Project No. 102-19 - BID

Set No.

Windsor Forest High School
ADA Upgrades

School Code 625-5070

BID# C20-10

Chatham County, Georgia

August 27, 2019

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P R O J E C T M A N U A L F O R
Windsor Forest HS ADA Upgrades
Chatham County, GA

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208 Bull Street
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(912) 395-5600

ARCHITECTS:
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Savannah, Georgia 31401
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333 Commercial Drive
Savannah, Georgia 31406
(912) 355-0235

Project No. 102-19

T A B L E O F C O N T E N T S

Savannah Chatham County Public School System
Windsor Forest HS ADA Upgrades
School Code 625-5070

THE CONTRACTOR IS REQUIRED TO COMPARE THIS PROJECT MANUAL WITH THE INDEX BELOW FOR COMPLETENESS. IF ANY PAGES ARE MISSING OR ILLEGIBLE IT IS HIS RESPONSIBILITY TO REQUEST REPLACEMENTS FROM THE ARCHITECT.

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Windsor Forest HS ADA Upgrades

SECTION 01 1000

SUMMARY

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. Project information.
2. Work covered by Contract Documents.
3. Work under separate contracts.
4. Access to site.
5. Coordination with occupants.
6. Work restrictions.
7. Specification and drawing conventions.
8. Miscellaneous provisions.

B. Related Requirements:

1. Section 015000 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.3 PROJECT INFORMATION

A. Project Identification: Windsor Forest High School

B. Owner: Savannah Chatham County Public School System

C. Architect: James W. Buckley & Associates, Inc. 7 East Congress Street suite # 800 Savannah Georgia 31401

D. Architect's Consultants: The Architect has retained the following design professionals who have prepared designated portions of the Contract Documents:

1. Electrical Engineer: Dulohery Weeks, 333, Commercial Drive Savannah Georgia 31406
2. Mechanical Engineer: Dulohery Weeks, 333, Commercial Drive Savannah Georgia 31406

1.4 WORK COVERED BY CONTRACT DOCUMENTS

A. Before submitting a bid, each bidder will be responsible to make or obtain such explorations, tests and data concerning physical conditions (surface, subsurface and underground facilities) at or contiguous to the site, or otherwise may affect cost, progress, performance or furnishing of the work and which bidder deems necessary to determine its bid for performing and furnishing the work in accordance with the time, price and other terms and conditions of the Contract Documents.

B. The Work of Project is defined by the Contract Documents and consists of the following:
   1. Renovations of existing interior spaces, Single and Group restrooms, nurse's clinic, janitor's closet, and common spaces.
      a. Masonry, Light gauge metal framing
      b. Ceramic tile, acoustic ceilings, toilet partitions and accessories, painting
      c. Plumbing, electrical, and mechanical renovation and new construction
   2. Select demolition

C. Type of Contract:

   1. Project will be constructed under a single prime contract.

1.5 WORK UNDER SEPARATE CONTRACTS

A. General: Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract or other contracts. Coordinate the Work of this Contract with work performed under separate contracts.

B. Concurrent Work: Owner may award separate contract(s) for the following construction operations at Project site. Those operations will be conducted simultaneously with work under this Contract.
   1. none

1.6 ACCESS TO SITE

A. General: Contractor shall have limited use of Project site for construction operations as indicated by requirements of this Section.

B. Use of Site: Limit use of Project site to areas within the Contract limits indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
   1. Limits: Confine construction operations to areas within site only as needed to perform this work.
   2. Coordinate with Owner and work around any conflicts with other operations happening concurrently with this work.
   3. Driveways, Walkways and Entrances: Keep driveways and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
      a. Schedule deliveries to minimize use of driveways and entrances by construction operations.

b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

1.7 COORDINATION WITH OCCUPANTS

A. Owner Limited Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed portions of the Work, prior to Substantial Completion of the Work, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and limited occupancy shall not constitute acceptance of the total Work.
   1. Architect will prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied prior to Owner acceptance of the completed Work.
   2. Obtain a Certificate of Occupancy from authorities having jurisdiction before limited Owner occupancy.
   3. Before limited Owner occupancy, mechanical and electrical systems shall be fully operational, and required tests and inspections shall be successfully completed.

1.8 WORK RESTRICTIONS

A. Work Restrictions, General: Comply with restrictions on construction operations.

   1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.

B. Confine operations to areas permitted under Contract.
   1. Do not disturb portions beyond areas on which work indicated
   2. Conform to site rules and regulations affecting work during construction period.
   3. Carefully place, watch work tools, ladders, hot tar kettles, other similar equipment to prevent injury to students and teachers.

C. Keep existing driveways, entrances serving premises clear, available to Owner, employees; do not use for parking, storage of materials.

D. Do not encumber site with materials or equipment.

E. Lock automotive vehicles (passenger cars, trucks, other mechanized, motorized construction equipment) when parked, unattended, to prevent unauthorized use; do not leave vehicles, equipment unattended with motor running, ignition key in place.

F. Clean Up: Work within project area and any off-site temporary facilities associated with the project shall be cleaned sufficiently on a daily basis to produce a neat appearance. Site Contractor to coordinate clean-up of debris outside of battery limits as shown on the Site Layout Plan with the general Building Contractor of the New Elementary School Building. The General Contractor of the New Elementary School Building is responsible for cleaning up debris as result of his construction activities.

G. Controlled Substances: Use of tobacco products and other controlled substances within the proposed new building is not permitted.

H.

On-Site Work Hours: Work shall be scheduled during working hours of 7 a.m. to 7 p.m., Monday through Saturday. Exceptions may be requested in writing. The Contractor shall observe the reasonable needs of nearby properties for quiet and minimized activity at certain times.

a. Weekend Hours: Except as required by the construction schedule, and as approved in advance by the Design Professional, do not work on Sundays. Any work done on Sundays must be non-disruptive to other facilities on the property and nearby properties, which includes consideration of noise levels.

b. Early Morning and Nighttime Hours: As indicated above, and as limited by regulations and by authorities having jurisdiction for restrictions of noise levels. Hours for Utility Shutdowns: As authorized in advance by the Design Professional, and as limited by regulations and by authorities having jurisdiction.

c. Coordination with Campus Police: Access to school facilities during non-school hours shall be coordinated with Campus Police. Contractor shall obtain prior clearance to occupy the site or buildings by calling Campus Police dispatcher @ 912-395-5536. Contact Campus Police at end of work and ensure facilities are secure and Alarm Systems are activated.

d. Tobacco Products are prohibited and not permitted on Board property.

e. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated. Notify Design Professional, and Owner, not less than 72 hours in advance of proposed utility interruptions. Proceed only with Design Professional's, and Owner’s, written permission and only with all written authorizations including permits that may be required by authorities having jurisdiction.

1.9 SPECIFICATION AND DRAWING CONVENTIONS

A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

B. Specification requirements are to be performed by Contractor unless specifically stated otherwise. All provisions in these Sections 01 21 00, 01 22 00, 01 26 00, 01 29 00, 01 31 00, 01 32 00, 01 32 33, 01 33 00, 01 40 00, 01 50 00, 01 60 00, 01 73 00, 01 73 29, 01 74 19, 01 77 00, 01 78 23, and 01 78 39 are in addition to the provisions in the CONSTRUCTION CONTRACT BETWEEN CONTRACTOR AND OWNER. No provisions in these Specifications shall be construed to negate or diminish any requirements in the Construction Contract, but shall be applicable in addition to those requirements.

C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:

1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.

2. Abbreviations: Materials and products are identified by abbreviations scheduled on Drawings.

1.10 EROSION AND SEDIMENT CONTROL BMPs

A. Not used

1.11 MISCELLANEOUS PROVISIONS

A. Cost of Testing – Responsibilities
   1. Contractor Responsibilities:
      a. The Contractor shall coordinate all testing activities.
   2. Owner's Responsibilities:
      a. **Owner** to pay for services of independent agency, selected by the owner and approved by Architect/Engineer, to perform inspections and all other testing where specifically required through-out the contract documents.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

SECTION 01 2300

ALTERNATES

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 administrative and procedural requirements for alternates.

1.3 DEFINITIONS

A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to or deducted from the base bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

1.4 PROCEDURES

A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
   1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.

B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated revisions to alternates.

C. Execute accepted alternates under the same conditions as other work of the Contract.

D. Schedule: A schedule of alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

PART 4 - SCHEDULE OF ALTERNATES:

A. ALTERNATE NO. 1(Add): RENOVATION OF COUNSELOR'S TOILET

1. Under Base Bid, no additional work is to be performed.

2. Under this Alternate, provide selective demolition and renovation for the Counselor's toilet as per details 1 through 5 on Sheet A2.2, corresponding MEP sheets, and as per specifications.

B. ALTERNATE NO. 2(Add): RENOVATION OF TEACHER'S LOUNGE TOILET

1. Under Base Bid, no additional work is to be performed.

2. Under this Alternate, provide selective demolition and renovation for the Teacher's Lounge toilet as per details 6 through 10 on Sheet A2.2, corresponding MEP sheets, and as per specifications.

C. ALTERNATE NO. 3(Add): RENOVATION OF EARLY CHILDHOOD TOILETS

1. Under Base Bid, no additional work is to be performed.

2. Under this Alternate, provide selective demolition and renovation for the Early Childhood toilets as per details 11 through 17 on Sheet A2.2, corresponding MEP sheets, and as per specifications.

D. ALTERNATE NO. 4(Add): RENOVATION OF ROTC TOILET

1. Under Base Bid, no additional work is to be performed.

2. Under this Alternate, provide selective demolition and renovation for the ROTC toilet as per details 18 through 22 on Sheet A2.2, corresponding MEP sheets, and as per specifications.

END OF SECTION 01 2300

SECTION 01 2500

SUBSTITUTION PROCEDURES

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 administrative and procedural requirements for substitutions.

B. Related Requirements:
   1. Division 01 "Alternates" for products selected under an alternate.
   2. Division 01 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

1.3 DEFINITIONS

A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

   1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
   2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

1.4 ACTION SUBMITTALS

A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

   1. Substitution Request Form: Use facsimile of form provided in Project Manual.
   2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

      a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.

b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
e. Samples, where applicable or requested.
f. Certificates and qualification data, where applicable or requested.
g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES.
j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
k. Cost information, including a proposal of change, if any, in the Contract Sum.
l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within Five days Prior to bid. Architect will notify Contractor of acceptance or rejection of proposed substitution by Addendum only. Accepted products will be listed with in addendum and rejected products will not be listed

1.5 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

1.6 PROCEDURES

A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 10 days prior to time required for preparation and review of related submittals.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
b. Requested substitution provides sustainable design characteristics that specified product provided.
c. Substitution request is fully documented and properly submitted.
d. Requested substitution will not adversely affect Contractor's construction schedule.
e. Requested substitution has received necessary approvals of authorities having jurisdiction.
f. Requested substitution is compatible with other portions of the Work.
g. Requested substitution has been coordinated with other portions of the Work.
h. Requested substitution provides specified warranty.
i. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

B. Substitutions for Convenience: After bid not allowed.

C. Substitutions for Convenience: Architect will consider requests for substitution if received within 10 days prior to bid Requests received after that time may be considered or rejected at discretion of Architect.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
b. Requested substitution does not require extensive revisions to the Contract Documents.
c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
d. Requested substitution provides sustainable design characteristics that specified product provided.

e. Substitution request is fully documented and properly submitted.
f. Requested substitution will not adversely affect Contractor's construction schedule.
g. Requested substitution has received necessary approvals of authorities having jurisdiction.
h. Requested substitution is compatible with other portions of the Work.
i. Requested substitution has been coordinated with other portions of the Work.
j. Requested substitution provides specified warranty.
k. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 2500

PRODUCT SUBSTITUTION CHECKLIST

Date: _____ Re: _____

A/E Number: _____ Manufacturer's Project No.: _____

Filing No.: _____ Contract For: _____

Product Equivalence:

☐ Is the submitted product equivalent to the specified item? _____

☐ Does it serve the same function? _____

☐ Does it have the same dimensions? _____

☐ Does it have the same appearance? _____

☐ Will it last as long? _____

☐ Does it comply with the same codes, and standards and performance requirements? _____

☐ Has the product been used locally, and where are the projects? _____

_____

☐ Has a problem occurred with the product, and what was the remedy? _____

_____

Effect on the Project:

☐ Will the substitution affect other aspects of the construction? _____

☐ Are any details affected and are changes required? _____

☐ What is the cost of the changes? _____

☐ Who pays for the required changes? _____

☐ Is construction time affected? _____

_____

Effect on the Warranty:

☐ How does the proposed warranty differ from the specified warranty? _____

_____

☐ Does the manufacturer have a track record of standing behind the warranty? _____

_____

SUBSTITUTION REQUEST

(During the Bidding/Negotiating Stage)

Project: _____ Substitution Request Number: _____

_____ From: _____

To: _____ Date: _____

_____ A/E Project Number: _____

Re: _____ Contract For: _____

Specification Title: _____ Description: _____

Section: _____ Page: _____ Article/Paragraph: _____

Proposed Substitution: _____

Manufacturer: _____ Address: _____ Phone: _____

Trade Name: _____ Model No.: _____

Attached data includes product description, specifications, drawings, photographs, and performance and test data adequate for evaluation of the request; applicable portions of the data are clearly identified.

Attached data also includes a description of changes to the Contract Documents that the proposed substitution will require for its proper installation.

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.

Submitted by: _____

Signed by: _____

Firm: _____

Address: _____

_____

Telephone: _____

A/E's REVIEW AND ACTION

☐ Substitution approved - Make submittals in accordance with Specification Section 01 25 00 Substitution Procedures.
☐ Substitution approved as noted - Make submittals in accordance with Specification Section 01 25 00 Substitution Procedures.
☐ Substitution rejected - Use specified materials.
☐ Substitution Request received too late - Use specified materials.

Signed by: Date:

Supporting Data Attached: ☐ Drawings ☐ Product Data ☐ Samples ☐ Tests ☐ Reports ☐ _____

SUBSTITUTION REQUEST

(After the Bidding/Negotiating Phase)

Project: _____ Substitution Request Number: _____

_____ From: _____

To: _____ Date: _____

_____ A/E Project Number: _____

Re: _____ Contract For: _____

Specification Title: _____ Description: _____

Section: _____ Page: _____ Article/Paragraph: _____

Proposed Substitution: _____

Manufacturer: _____ Address: _____ Phone: _____

Trade Name: _____ Model No.: _____

Installer: _____ Address: _____ Phone: _____

History: ☐ New product ☐ 1-4 years old ☐ 5-10 years old ☐ More than 10 years old

Differences between proposed substitution and specified product: _____

_____

_____

☐ Point-by-point comparative data attached — REQUIRED BY A/E

Reason for not providing specified item: _____

_____

Similar Installation:

Project: _____ Architect: _____

Address: _____ Owner: _____

_____ Date Installed: _____

Proposed substitution affects other parts of Work: ☐ No ☐ Yes; explain _____

_____

Savings to Owner for accepting substitution: _____ ($ _____).

Proposed substitution changes Contract Time: ☐ No ☐ Yes [Add] [Deduct] _____ days.

Supporting Data Attached: ☐ Drawings ☐ Product Data ☐ Samples ☐ Tests ☐ Reports ☐ _____

SUBSTITUTION

REQUEST

(After the Bidding/Negotiating Phase — Continued)

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Cost data as stated above is complete. Claims for additional costs related to accepted substitution which may subsequently become apparent are to be waived.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.
- Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.

Submitted by: _____

Signed by: _____

Firm: _____

Address: _____

_____

Telephone: _____

Attachments: ☐

A/E's REVIEW AND ACTION

☐ Substitution approved - Make submittals in accordance with Specification Section 01 25 00 Substitution Procedures.
☐ Substitution approved as noted - Make submittals in accordance with Specification Section 01 25 00 Substitution Procedures.
☐ Substitution rejected - Use specified materials.
☐ Substitution Request received too late - Use specified materials.

Signed by: _____ Date: _____

Additional Comments: ☐ Contractor ☐ Subcontractor ☐ Supplier ☐ Manufacturer ☐ A/E
☐ Other:

SECTION 01 2600

CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section specifies administrative and procedural requirements for processing Contract modifications.

1.2 Requests for Information or Clarification

A. Request for Information (RFI): The Design Professional will issue a written RFI Response to each written Contractor inquiry. Unless specifically addressed, RFIs and RFI Responses shall not involve any adjustment to the Contract Sum or the Contract Time. RFI Responses when issued, become a part of the Contract Documents, and as such must be adhered to. The effects of RFI Responses must be reflected in the Project Record Documents. Each RFI Response shall bear words addressed by the Design Professional to the Contractor: "The work shall be carried out according to the following instructions or clarifications issued in response to Request For Information #(enter RFI #), and in accordance with The Contract Documents without change in The Contract Sum or Contract Time. If you determine that this response does affect The Contract Sum or Contract Time, you shall notify The Design Professional immediately, and shall do so prior to proceeding with the work in accordance with this response. Proceeding with the work in accordance with this response without your prior notification otherwise indicates your acknowledgement that there will be no change in The Contract Sum or Contract Time."

1.3 CHANGES IN THE WORK AFFECTING COST AND/OR TIME

A. Proposed Change Order Requests: The Design Professional (or Owner) may issue a, which is detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time, the description will include supplemental or revised Drawings and Specifications. Each PCO will be numbered and dated, and subsequent communications regarding each PCO should give reference to the PCO number and date.

1. Proposal Requests are for information only. Do not consider them instructions either to stop work in progress or to execute the proposed change.
2. Within time specified in PCO after receipt of Proposal Request, the Contractor shall submit a Change Order Proposal (COP), which is a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change. Each COP must give reference to the number and date of the PCO to which it is in response.
    a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
    b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
    c. Pricing of Changes shall be in accordance with Articles 3.2.9 and 3.2.10 of the Construction Contract.
    d. If affected, the Contractor's Construction Schedule shall be updated to indicate the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. This updated schedule shall be submitted with the COP. Use available total float before requesting an extension

of the Contract Time. By omission of an updated Schedule as a part of a COP, the Contractor shall and does establish that the Schedule is not affected by the subject change. Any COP that proposes to affect Contract Time may be considered non-responsive if it does not include an updated Schedule

A. All change proposals shall include complete break-out and support documentation, including unit descriptions, unit quantities, unit costs (labor, material, other), burdens and mark-ups. Portions of work that are to be deleted as a part of an overall change description shall be clearly reflected in the break-out; abbreviated descriptions which reflect only the net effects of reduced work scopes combined with increased work scopes will not be accepted. The Design Professional and Owner shall have full discretion in determining what measure of breakout and support is adequate and acceptable. No extension of Contract Time will be allowed for Construction delays attributable to the failure on the part of the Contractor to provide properly prepared and supported change proposals.

B. Proposal and change request forms: Use forms that are acceptable to the Design Professional and Owner. If the Design Professional or Owner deems it necessary, the Contractor shall be required and shall agree to submit change proposals on forms provided by the Design Professional or Owner.

B. Do not reflect any Change Order in the Schedule of Values or Application for Payment Continuation without an approved Change Order. The Design Professional or Owner shall have full discretion in establishing the manner in which Change Orders are added to the Schedule of Values and Continuation Sheets.

1.4 ALLOWANCE

A. Allowance Adjustment: All charges against an Allowance shall be made in the form of a CO resulting from PCO or RFI, shall be managed as any CO, and shall be invoiced against the Allowance line item in the Application for Payment. At Project completion, any unused balance in each allowance will be returned to the Owner by deductive CO.

B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents Submit claims within 14 days of receipt of the Change Order authorizing work to proceed. Owner will reject claims submitted later than 14 days after such authorization per Article 5.2.2 of the Contract.

1. Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of work has changed from what could have been foreseen from information in the Contract Documents.
2. No change to Contractor's indirect expense is permitted for selection of higher- or lower-priced materials or systems of the same scope and nature as originally indicated.

1.5 CHANGE ORDER PROCEDURES

A. The Design Professional shall immediately upon receipt review each Proposed Change Order (PCO) for its technical and monetary merits. The Design Professional will not forward to the Owner any advice or recommendation for any PCO that does not meet all requirements per Article 3.2.4 of the Contract Documents, but shall instead return it to the Contractor with specific instructions as to what must be done in order to rectify the problems with PCO. The Design Professional will provide written advice to the Owner regarding his opinion of each PCO, which will include a recommendation.

B. Upon Owner's approval of a Proposed Change Order (PCO), Design Professional will issue a Change Order for approval by the Owner.

1.6 FORCE ACCOUNT CHANGE ORDER

A. Force Account: Force Account work shall be undertaken only after receipt of an Approved Change Order, stating a maximum dollar amount (Stipulated Maximum Sum) beyond which no change work may be undertaken subject to amendment, for funding all costs of the Change Order as prescribed in Article 3.2.7.3 of the Contract.

B. Documentation: The Contractor shall maintain detailed records on a time and material basis of work required by the Force Account Change Order.
   1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

1.7 TRACKING, COORDINATION and MANAGEMENT of CLARIFICATIONS and CHANGES

A. Some clarifications and changes will go thru a process whereby they are assigned tracking numbers as more than one of the type documents defined in the articles above and in other Sections of these Specifications (i.e. RFIs, etc.). All documents created which pertain to the same subject shall make clear reference to other previous or concurrent documents on the subject.
   1. The Contractor shall establish and maintain current a single Log which tracks all these type documents. The form and content of this log is subject to Design Professional and Owner approval, and may if sufficient be used to meet other stipulated tracking log requirements.

1.8 DELAYS AND EXTENSIONS OF TIME DUE TO WEATHER

A. Delays caused by weather are non-compensable, and will be processed in accordance with Article 3.3.7.2 of the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 2600

SECTION 01 2900

PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.

1.2 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule.
   1. The Design Professional and Owner shall have full discretion in establishing the measure and depth of breakout that is required to be reflected in the Schedule of Values. Additionally, the Design Professional and Owner shall have full discretion in establishing the manner in which Change Orders are added to the Schedule of Values.
   2. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including Application for Payment forms with Continuation Sheets Submittals Schedule and Contractor's Construction Schedule.
   3. Submit the Schedule of Values to Design Professional and Owner at earliest possible date but no later than 14 days after the issuance of the first Proceed Order. The Schedule of Values must precede and be approved by the Design Professional and Owner prior to the initial Application for Payment.
   4. Sub-schedules: Where the Work is separated into phases requiring separately phased payments, provide sub schedules showing values correlated with each phase of payment.

B. Format and Content: The Schedule of Values shall be in a format similar to AIA Document G703. Use the Project Manual table of contents as a guide to establish line items for the Schedule of Values. Provide at least one line item for each Specification Section.

   1. Submit draft of Application for Payment Continuation Sheets.
   2. The approved Schedule of Values shall be used in the Continuation Sheets of all Applications for Payment, and shall not be altered except by the addition of approved Change Orders. Alterations to the approved line items in an Application for Payment without prior agreement will result in the return of the Application for Payment to the Contractor, for correction.
   3. The total of the items in the Schedule of Values shall equal the Contract Sum.
   4. Allowances: Provide a separate line item in the Schedule of Values for each allowance. Use information indicated in the Contract Documents to determine quantities.
   .
   5. Schedule Updating: Resubmit the Schedule of Values at least 10 days before the next Applications for Payment when Change Orders result in a change in the Contract Sum.

1.3 APPLICATIONS FOR PAYMENT

A. Each Application for Payment shall be consistent with previous applications and payments as certified by Design Professional and paid by Owner.

B. Payment Application Times: Progress payments shall be submitted to Design Professional no later than the last day of the month. The period covered by each Application for Payment is one month (minimum), ending on the last date of the application.

D. Payment Application Forms: Use forms provided in the Construction Contract.

E. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Design Professional will return incomplete applications without action.

1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if approved revisions were made. No changes shall be made to the Schedule of Values and Continuation Sheets without the prior approval of the Design Professional and Owner.
2. Include amounts of Change Orders approved before last day of construction period covered by application. Add Change Orders to the Schedule of Values and Continuation Sheets in a manner that accurately reflects the manner in which they are authorized and issued.
3. On the Application form, include in the “work completed” columns (previous and current) only the value of work that has actually been completed. The value of the current inventory of stored materials shall be accurately reflected in the “stored materials” column. When stored materials which have been previously invoiced remain stored at the time of subsequent Applications, their value shall remain in the “stored materials” column; only when previously-stored materials are incorporated into the work shall their value be shifted into the “current work completed” column. The inaccurate inclusion of the value of Stored Materials within the value of Work Completed will result in the return of the Application for payment with no action. There will be no exceptions.
4. All Stored Materials for which payment is requested must be supported by sufficient documentation including invoices. If there remains stored a value of materials for which an invoice was presented with a previous Application for Payment, a copy of the same invoice shall be presented. When applicable, these material support invoices should bear notations to reflect the diminishing volume and hence value of the stored materials.
5. Applications for Payment which reflect an incorrect or unapproved retainage rate or amount will be returned without action.
6. The Design Professional will not mark, edit, or correct Applications for Payment in order to recommend them for payment. Applications which require corrections will be returned to the Contractor for the needed corrections.
7. The Contractor may if he wishes submit a draft of each Application for Payment in advance of the actual Application, for the advance cursory review and informal approval of the Design Professional. Any such review and informal approval by the Design Professional shall not guarantee the formal review action by the Design Professional of the actual Application for Payment.

F. Transmittal: Submit 4 signed and notarized original copies of each Application for Payment to Design Professional by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.

G. Waivers of Mechanic's Lien: If required by the Owner or Design Professional, with each

Application for Payment, submit waivers of mechanic's lien from every entity who is lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.

1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
2. When an application shows completion of an item, submit final or full waivers.
3. Owner and Design Professional reserve the right to designate which entities involved in the Work must submit waivers.
4. Waiver Forms: Submit waivers of lien on forms, executed in a manner acceptable to Owner and in conformance with Georgia Law.

H. All Applications for Payment involve additional required actions and submittals. Any Application for Payment submitted without compliance with these additional requirements will be returned without action.

1. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
   a. List of subcontractors and suppliers.
   b. Schedule of Values.
   c. Contractor's Construction Schedule (preliminary if not final).
   d. Submittals Schedule and Log (preliminary if not final).
   e. All submittals and approvals of all items that require approval prior to commencement of work for which payment is sought.
   f. List of Contractor's staff assignments.
   g. List of Contractor's principal consultants.
   h. Copies of building permits.
   i. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
   j. Initial progress report.
   k. Report of preconstruction conference.
   l. Certificates of insurance and insurance policies.
   m. Performance and Payment Bonds.

2. Periodic Applications for Payment: Administrative actions and submittals that must precede or coincide with submittal of each Periodic Application for Payment include the following:
   a. Contractor's updated construction schedule, or a written statement that the most recent previous updated schedule remains accurate within 5%, which statement shall be subject to the concurrence of the Design Professional.
   b. Updated current Submittals Schedule and Log.
   c. Updated current RFI, PCO and CO Logs.
   d. All actual submittals and approvals of all items that require approval prior to commencement of work for which payment is sought.
   e. Daily Construction Reports for the period covered by the Application.
   f. Minutes of all Meetings held during the period covered by the Application.
   g. Local and/or MFBE Monthly Report Forms provided in the Bidding Documents

3. Application for Payment at Material Completion and Final Payment:

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01290

SECTION 01 3100

PROJECT MANAGEMENT AND COORDINATION

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 administrative provisions for coordinating construction operations on Project including, but not limited to, the following:

1. General coordination procedures.
2. Coordination drawings.
3. Requests for Information (RFIs).
4. Project meetings.

B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.

C. Related Requirements:
1. Division 01 "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
2. Division 01 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
3. Division 01 "Closeout Procedures" for coordinating closeout of the Contract.

1.3 DEFINITIONS

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

1.4 INFORMATIONAL SUBMITTALS

A. Key Personnel Names: Within 10 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home, office, and cellular telephone numbers and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.

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

1.5 GENERAL COORDINATION PROCEDURES

A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.
4. Where availability of space is limited , coordinate installation of different components to ensure maximum performance and accessibility for required maintenance service, and repair of all components , including mechanical and electrical

B. Environmental conditions: Coordinate construction schedule with all environmental conditions to allow the concrete to cure to meet the moisture requirements of each floor finish.

1. Temporary dry in, accelerated drying equipment and reclaiming work is part of this project and shall not be considered a change order.
2. Removal of excess moisture: It is the responsibility of the contractor to place the concrete slab at the specified water/cement ration, properly sure concrete slabs, limit exposure to moisture, dry-in the building in a timely fashion and render the building HVAC system operational in sufficient time to allow for the concrete slabs to dry sufficiently to allow for the application of the flooring.
   a. Should the concrete slab fail to meet the established maximum limits for moisture, the contractor shall be responsible for the implementation of necessary procedures to dry out the slab.
   b. Contractor responsible to cost for material, labor, and/or equipment required to dry out building sufficiently for installation of finished flooring systems.
   c. Contractor responsible for remedial application (ARDEX) to provide an acceptable substrate for finish flooring. Remedial work is part of base bid and not considered a change order.
3. Exterior Wall Systems:
   a. Prepare coordination drawings for integration of structural system with window wall system, solar screen, electrical work and HVAC work making up principal wall system.

C. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

D. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's construction schedule.
2. Preparation of the schedule of values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Preinstallation conferences.
7. Project closeout activities.
8. Startup and adjustment of systems.

1.6 COORDINATION DRAWINGS

A. Coordination Drawings, General: Prepare coordination drawings where installation is not completely shown on Shop Drawings, where limited space availability necessitates maximum utilization of space for efficient installation of different components or if coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.

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

a. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
b. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
c. Indicate required installation sequences.
d. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
e. As shown or required in individual specification sections
f. Sheet size no smaller than 81/2’ x 11” and no larger than 30” x 42”

1.7 REQUESTS FOR INFORMATION (RFIs)

A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.

1. RFI’s shall originate with the contractor RFIs submitted by other entities other than the Contractor will be returned with no response.
2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:

1. Project name.(As shown in title block)
2. Date.
3. Name of Contractor. And sub contractor as necessary
4. Name of Architect.
5. RFI number, numbered sequentially.
6. RFI subject.
7. Specification Section number and title and related paragraphs, as appropriate.
8. Drawing number and detail references, as appropriate.
9. Field dimensions and conditions, as appropriate.
10. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
11. Contractor's signature.
12. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.

    a. Supplementary Drawings prepared by contractor shall include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.

C. RFI Forms: Software-generated form with substantially the same content as indicated above, acceptable to Architect.

1. Attachments shall be electronic files in Adobe Acrobat PDF format.

D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.

1. The following Contractor-generated RFIs will be returned without action:

    a. Requests for approval of submittals.
    b. Requests for approval of substitutions.
    c. Requests for approval of Contractor's means and methods.
    d. Requests for coordination information already indicated in the Contract Documents.
    e. Requests for adjustments in the Contract Time or the Contract Sum.
    f. Requests for interpretation of Architect's actions on submittals.
    g. Incomplete RFIs or inaccurately prepared RFIs.

2. Architect's action may include a request for additional information, in which case Architect's time for response will start again
3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal

    a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 10 days of receipt of the RFI response.

E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log. Software log with not less than the following:

1. Project name.
2. Name and address of Contractor.
3. Name and address of Architect.
4. RFI number including RFIs that were returned without action or withdrawn.
5. RFI description.
6. Date the RFI was submitted.
7. Date Architect's response was received.

F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.

1. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
2. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

1.8 PROJECT MEETINGS

A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.

B. Preconstruction Conference: Schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 10 days after execution of the Agreement.

1. Conduct the conference to review responsibilities and personnel assignments.
2. Attendees: Authorized representatives of Owner Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Discuss items of significance that could affect progress, including the following:

a. Tentative construction schedule.
b. Phasing.
c. Critical work sequencing and long-lead items.
d. Designation of key personnel and their duties.
e. Lines of communications.
f. Procedures for processing field decisions and Change Orders.

g. Procedures for RFIs.
h. Procedures for testing and inspecting.
i. Procedures for processing Applications for Payment.
j. Distribution of the Contract Documents.
k. Submittal procedures.
l. Preparation of record documents.
m. Use of the premises.
n. Work restrictions.
o. Working hours.
p. Owner's occupancy requirements.
q. Responsibility for temporary facilities and controls.
r. Procedures for moisture and mold control.
s. Procedures for disruptions and shutdowns.
t. Construction waste management and recycling.
u. Parking availability.
v. Office, work, and storage areas.
w. Equipment deliveries and priorities.
x. First aid.
y. Security.
z. Progress cleaning.

4. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.

C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect of scheduled meeting dates.
2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:

a. Contract Documents.
b. Options.
c. Related RFIs.
d. Related Change Orders.
e. Purchases.
f. Deliveries.
g. Submittals.
h. Review of mockups.
i. Possible conflicts.
j. Compatibility requirements.
k. Time schedules. And sequence of operations
l. Weather limitations.
m. Manufacturer's written instructions.
n. Warranty requirements.
o. Compatibility of materials.
p. Acceptability of substrates.
q. Temporary facilities and controls.

r. Space and access limitations. And site access
s. Regulations of authorities having jurisdiction.
t. Testing and inspecting requirements.
u. Installation procedures.
v. Coordination with other work.
w. Required performance results.
x. Protection of adjacent work.
y. Protection of construction and personnel.

3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

D. Project Closeout Conference: Schedule and conduct a project closeout conference, at a time convenient to Owner and Architect, but no later than 10 days prior to the scheduled date of Substantial Completion.

1. Conduct the conference to review requirements and responsibilities related to Project closeout.
2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:

a. Preparation of record documents.
b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
c. Submittal of written warranties.
d. Requirements for completing documentation.
e. Requirements for preparing operations and maintenance data.
f. Requirements for delivery of material samples, attic stock, and spare parts.
g. Requirements for demonstration and training.
h. Preparation of Contractor's punch list.
i. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
j. Submittal procedures.
k. Coordination of separate contracts.
l. Owner's partial occupancy requirements.
m. Installation of Owner's furniture, fixtures, and equipment.
n. Responsibility for removing temporary facilities and controls.

4. Minutes: Entity conducting meeting will record and distribute meeting minutes.

E. Progress Meetings: progress meetings at biweekly intervals.

1. Coordinate dates of meetings with preparation of payment requests.
2. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

    a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

        1) Review schedule for next period.

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

        1) Interface requirements.
        2) Sequence of operations.
        3) Resolution of BIM component conflicts.
        4) Status of submittals.
        5) Deliveries.
        6) Off-site fabrication.
        7) Access.
        8) Site utilization.
        9) Temporary facilities and controls.
        10) Progress cleaning.
        11) Quality and work standards.
        12) Status of correction of deficient items.
        13) Field observations.
        14) Status of RFIs.
        15) Status of proposal requests.
        16) Pending changes.
        17) Status of Change Orders.
        18) Attic stock
        19) Pending claims and disputes.
        20) Documentation of information for payment requests.

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

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 3100

SECTION 01 3200

CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
   1. Contractor's Construction Schedule.
   2. Submittals Schedule.
   3. Daily construction reports.
   4. Field condition reports.

B. See Division 01 Section "Payment Procedures" for submitting the Schedule of Values.

C. See Division 01 Section "Photographic Documentation" for submitting construction photographs.

1.2 DEFINITIONS

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
   1. Critical activities are activities on the critical path. They must start and finish on the planned early start and finish times.
   2. Predecessor Activity: An activity that precedes another activity in the network.
   3. Successor Activity: An activity that follows another activity in the network.

B. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.

C. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.

D. Float: The measure of leeway in starting and completing an activity.
   1. Float time belongs to Owner.

E. Fragment: A partial or fragmentary network that breaks down activities into smaller activities for greater detail.

F. Major Area: A story of construction, a separate building, or a similar significant construction element. See Section 01100, "Summary."

1.3 SUBMITTALS

A. Submittals Schedule {Article 2.2.3; Submittals}: Submit three copies of schedule within 60 days of the effective date of the contract. Arrange the following information in a tabular format:

1. Scheduled date for first submittal.
2. Specification Section number and title.
3. Submittal category (action or informational).
4. Name of subcontractor.
5. Description of the Work covered.
6. Scheduled date for Design Professional's final release or approval.

A. Contractor's Construction Schedule :{ Article 2.1.5; Construction Progress Schedule} Submit two copies of initial schedule, large enough to show entire schedule for entire construction period.

B. CPM Reports: Concurrent with CPM schedule, submit two copies of each of the following computer-generated reports. Format for each activity in reports shall contain activity number, activity description, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.
   1. Activity Report: List of all activities sorted by activity number and then early start date, or actual start date if known.
   2. Logic Report: List of preceding and succeeding activities for all activities, sorted in ascending order by activity number and then early start date, or actual start date if known.
   3. Total Float Report: List of all activities sorted in ascending order of total float.

C. Daily Construction Reports: Submit one copy of daily construction reports, accompanied by corresponding photographs, at weekly intervals.

D. Field Condition Reports: Submit immediately at time of discovery of differing or noteworthy conditions.

1.4 COORDINATION

A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.

B. Coordinate Contractor's Construction Schedule with the Schedule of Values, list of subcontracts, Submittals Schedule, progress reports, payment requests, and other required schedules and reports.
   1. Secure time commitments for performing critical elements of the Work from parties involved.
   2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 SUBMITTALS SCHEDULE

A. Comply with all requirements, including those of Section 013300, “Submittal Procedures,” and coordinate submittal requirements with the project schedule requirements.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Time Frame: Extend schedule from date established for the Proceed Order to date of Final

Completion.

1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

B. Activities: Treat each story or separate area as a separate numbered activity for each principal element of the Work. Comply with the following:

1. Activity Duration: Define activities so no activity is longer than 21 days, unless specifically allowed by Design Professional.
2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
3. Submittal Review Time: Include review and resubmittal times indicated in Division 01 Section "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with Submittals Schedule.
4. Startup and Testing Time: Include not less than 21 days for startup and testing.
5. Material Completion: Indicate completion in advance of date established for Material Completion, and allow time for Design Professional's administrative procedures necessary for certification of Material Completion.

C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.

1. Phasing: Arrange list of activities on schedule by phase.
2. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
3. Work Restrictions: Show the effect of the following items on the schedule:
   a. Use of premises restrictions.
   b. Seasonal variations.
   c. Environmental control.
4. Work Stages: Indicate important stages of construction for each major portion of the Work.

D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Proceed Order, Material Completion, and Final Completion, and the following interim milestones, including for applicable parts as established in Section 01100, "Summary":

1. All scheduled pre-installation conferences
2. Dry-in, roof
3. Dry-in, walls
4. Permanent power
5. Start-up dates for primary systems and equipment
6. Interim commissioning dates for systems and equipment which are relied upon by other systems or equipment
7 Permanent lighting
8. Moderation and control of interior climate
9. Milestone dates relating to Furniture, Fixtures, and Equipment
10. Certificate of Occupancy (delivered to Design Professional)

E. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using fragments to demonstrate the effect of the proposed change on the overall project schedule.

F. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:
   1. Identification of activities that have changed.
   2. Changes in early and late start dates.
   3. Changes in early and late finish dates.
   4. Changes in activity durations in workdays.
   5. Changes in the critical path.
   6. Changes in total float or slack time.
   7. Changes in the Contract Time.

2.4 REPORTS

A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site, to include:
   1. List of subcontractors at Project site, including the approximate man-power presence for each subcontractor.
   2. Equipment at Project site.
   3. Material deliveries.
   4. High and low temperatures and general weather conditions.
   5. Accidents and unusual events.
   6. Stoppages, delays, shortages, and losses.
   7. Meter readings and similar recordings.
   8. Orders and requests of authorities having jurisdiction.
   9. Services connected and disconnected.
   10. Equipment or system tests and startups.

B. Field Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare and submit a detailed report. Submit with an RFI. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.
   1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
   2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
   3. As the Work progresses, indicate Actual Completion percentage for each activity.

B. Distribution: Distribute copies of approved schedule to Design Professional, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.

1. Post copies in Project meeting rooms and temporary field offices.
2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION 01 3200

SECTION 01 3233
PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for the following:

1. Preconstruction photographs.
2. Periodic construction photographs.

B. See Division 01 Section "Closeout Procedures" for submitting digital media as Project Record Documents at Project closeout.

C. See Division 01 Section "Demonstration and Training" for submitting videotapes of demonstration of equipment and training of Owner's personnel.

1.2 SUBMITTALS

A. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph. Indicate elevation or story of construction. Include same label information as corresponding set of photographs.

B. Construction Photographs: Submit a digital image of all photographs weekly, along with daily construction reports.

1. Format: as approved by Design Professional.

2. Identification: Each digital image shall have a unique identifier, and shall be accurately date stamped, or the accurate date shall be ascertainable by electronic file date. Tag and/or transmit the photographs in a manner so as to clearly identify them as photographs of this project. Also, for digital images for which it is necessary or for which requested by the Design Professional, provide a description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.

2. Digital Images: Submit a complete set of digital image electronic files as a Project Record Document on CD-ROM. Identify electronic media with date photographs were taken. Submit images that have same aspect ratio as the sensor, un-cropped.

1.3 QUALITY ASSURANCE

A. Photographer Qualifications: An individual who is familiar with the project and the progress of the work.

1.4 COORDINATION

A. Auxiliary Services: Cooperate with photographer and provide auxiliary services requested, including access to Project site and use of temporary facilities, including temporary lighting

required to produce clear, well-lit photographs without obscuring shadows.

1.5 USAGE RIGHTS

A. Obtain and transfer copyright usage rights from photographer to Design Professional and Owner for unlimited reproduction of photographic documentation.

PART 2 - PRODUCTS

2.1 PHOTOGRAPHIC MEDIA

A. Digital Images: In format as approved by Design Professional.

PART 3 - EXECUTION

3.1 CONSTRUCTION PHOTOGRAPHS

A. General: Take photographs using the maximum range of depth of field, and that are in focus, to clearly show the Work. Photographs with blurry or out-of-focus areas will not be accepted.

1. Maintain key plan with each set of construction photographs that identifies each photographic location.

B. Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.

1. Date and Time: Include date and time in filename for each image.
2. Field Office Images: Maintain one set of images on CD-ROM in the field office at Project site, available at all times for reference. Identify images same as for those submitted to Design Professional.

C. Preconstruction Photographs: Before commencement of demolition, take , digital photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Design Professional.

1. Flag construction limits before taking construction photographs.
2. Take 36 photographs to show existing conditions adjacent to property before starting the Work.
3. Take 36 photographs of existing buildings either on or adjoining property to accurately record physical conditions at start of construction.

D. Periodic Construction Photographs: Take no fewer than 50 digital photographs weekly. Select vantage points to show status of construction and progress since last photographs were taken.

E. Additional Photographs: Design Professional may issue requests for 500 additional digital photographs, in addition to periodic photographs specified. These additional photographs are included in the Contract Sum.
1. Three days' notice will be given, where feasible.
2. In emergency situations, safely take additional photographs immediately upon request.
3. Circumstances that could require additional photographs include, but are not limited to, the following:

a. Special events planned at Project site.
b. Immediate follow-up when on-site events result in construction damage or losses.
c. Photographs to be taken at fabrication locations away from Project site. These photographs are not subject to unit prices or unit-cost allowances.
d. Material Completion of a major phase or component of the Work.
e. Extra record photographs at time of final acceptance.

END OF SECTION 01323

SECTION 01 3300

SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for submitting all project submittals, including product data, product certificates, manufacturer certificates, test reports, shop drawings, color and finish selection information, samples, and other submittals.

B. See also all other Divisions and Sections for additional submittal information as required by the Design Professional.

1.2 SUBMITTAL TYPES / DEFINITIONS

A. Each submittal must be identified according to the following submittal types:

1. Informational Submittal: Submittal item that is made for the purpose of supplying required information or information which demonstrate compliance with project requirements. While an Informational Submittal does not require the Design Professional's or Consultant’s responsive action, it may be rejected for not complying with requirements, in which case the item would be required to be re-submitted. Also, in certain instances, corrective work may be required as the result of a rejected Informational Submittal.
2. Action Submittal: Submittal item that is made for the purpose of supplying required information or information which demonstrate compliance with project requirements, and which does require the Design Professional's or Consultant’s responsive action. Except as directed or indicated otherwise, an Action Submittal shall be submitted and approved prior to the commencement of the work to which it pertains.
3. Administrative Submittal: Submittal item that is required as a part of general project management and administration. Most or all Administrative Submittals will be Informational Submittals.
4. Technical Submittal: Submittal item that pertains to a particular aspect of the actual work. Most Technical Submittals will be Action Submittals, although some will instead be informational submittals.
5. Periodic Submittal: Submittal item that is required during the course of construction (such as manufacturing or installation reports). Most or all Periodic Submittals will be Informational Submittals.
6. Job-End Submittal: Submittal item that is required as a part of project close-out, operation and maintenance information, warranties, record documents, demonstration and training, or special requirements associated with Material and Final Completion. Do not submit Job-End Submittals with Technical Submittals. Most or all Job-End Submittals will be Informational Submittals.
7. Component Submittal: Submittal (more accurately, transmittal) of actual components, such as extra materials, tools, parts that are specified to be required. While a Component Submittal does not require the Design Professional's or Consultant’s responsive action, it may be rejected for not complying with requirements, in which case the item would be required to be re-submitted. Also, corrective work may be required as the result of a rejected Informational Submittal.

B. Do not transmit or bind different type submittals together when such would encumber proper

handling or action by the Design Professional; for instance, do not bind Informational Submittals together with Action Submittals.

1.3 SUBMITTAL PROCEDURES

A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
   1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
   2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
      a. Design Professional may withhold action on a submittal requiring coordination with other submittals until related submittals are received. Failure on the part of the Design Professional to notify the Contractor that action on a submittal is pending related submittals shall not be cause for an extension in the Contract Time.

B. Submittals Schedule/Log: Maintain and periodically submit a Schedule/Log of Submittals. Coordinate submittal and action dates with the Project Schedule, allowing adequate time {14 calendar days minimum} for review and action by the Design Professional, re-submittal, re-review and action, field measuring, ordering, manufacturing, fabrication, and delivery.
   1. Include for each line entry in the Submittal Schedule/Log columns to indicate no less than the following information:
      a. Number
      b. Section Article Number
      c. Subject or Description
      d. Content
      e. Type Product
      f. Type
      g. Date, scheduled
      h. Date, actual
      i. Review Action Date, scheduled (for Action Submittals)
      j. Review Action Date, actual (for Action Submittals)
      k. Review Action
   2. Coordinate Submittals Schedule with list of subcontracts, the Schedule of Values, and Contractor's Construction Schedule.
   3. Submit current updated Submittal Schedule / Logs no less frequently than monthly and more frequently when required by the Design Professional.

C. Identification / Transmittal of Submittals: Use the Project “Submittal Cover / Transmittal Sheet” form, which follows this Section, to transmit ALL submittal items, without exception. Complete all information on the form, entering “NA” in blanks that are not applicable. For Action Submittals, attach a fully completed copy of the “Project Submittal Cover / Transmittal Sheet” to the front of each and every copy of each and every submittal. A partially editable electronic copy of the “Project Submittal Cover / Transmittal Sheet” will be made available to the Contractor upon request. Submittals that are not properly and correctly identified will be returned with no action, a re-submittal will be required, and attributable delays will not be considered as cause for an extension in Contract Time.

D. Processing Time: Allow enough time {14 calendar days minimum} for submittal review, in-

cluding time for re-submittals, as follows. Time for review shall commence on Design Professional's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including re-submittals.

1. Initial Review: Allow 14 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Design Professional will advise Contractor when a submittal being processed must be delayed for coordination.
2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Re-submittal Review: Allow 14 days for review of each re-submittal.

E. Deviations: Highlight, encircle, or otherwise specifically identify deviations from the Contract Documents on submittals.

F. Additional Copies: Unless additional copies are required for final submittal, and unless Design Professional observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
1. All copies including additional copies submitted for maintenance manuals less three will not be marked with action taken and will be returned.

G. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
1. Note date and content of previous submittal.
2. Note date and content of revision in label or title block and clearly indicate extent of revision.
3. Resubmit submittals until they are returned with a review stamp and note by either the Design Professional or his Consultant that does not indicate the requirement that they be resubmitted.
4. The Design Professional shall be responsible for an initial and one subsequent review of the submittal. The Contractor shall be liable for additional cost of subsequent reviews due to non-compliance.

H. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, and installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

I. Use for Construction: Use only final submittals with mark indicating a review stamp and note by either the Design Professional or his Consultant that does not indicate the requirement that they be resubmitted.

J. All submittals shall be made in a manner that will accommodate the progress of construction. No extension of Contract Time will be issued for construction delays caused by untimely submittals. All Action Submittals and all other submittals that are deemed relevant to the progress of the Work shall be provided according to the approved Submittals Schedule, and all such submittals shall be provided no later than within 60 days of commencement of work or other notice to provide submittals, or within 15% of the project schedule, whichever time period is shortest.

K. If at the time of an Application for Payment, the provision of submittals is behind schedule, based on the current approved Submittal Schedule, the Contractor may not be allowed to re-

quest funds for General Conditions, which, if requested, will cause the Application to be returned without action.

L. If the Agreement allows for the reduction of retainage, this reduction shall not be approved or allowed until all Action Submittals and all other submittals that are deemed relevant to the progress of the Work have been approved.

1.4 CONTRACTOR'S USE OF DESIGN PROFESSIONAL'S CAD FILES

A. General: At Contractor's written request, copies of Design Professional's electronic drawing files may be provided on a limited basis to Contractor for Contractor's use in connection with Project, subject to the following conditions:

1. The Design Professional assumes no liability for reliance upon these documents instead of actual physical measurements or examination of actual field conditions. The Design Professional's drawings are copyrighted and may not be used for any purposes other than for the construction of this building at this time and place.
2. Each request must include specific information about the intended use of the electronic drawings, and the type electronic drawing file sought, and a list of the specific drawing sheets sought. These will be provided in response to each request at the sole discretion of the Design Professional.

PART 2 - PRODUCTS

2.1 ACTION SUBMITTALS

A. General: Prepare and submit Action Submittals required by individual Specification Sections.
1. Except as approved by the Design Professional, submit all Action Submittals required by each Section at one time. Bind and consolidate these to the greatest extent possible, taking care however that each individual submittal requirement is included.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
1. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:
   a. Manufacturer's written recommendations.
   b. Manufacturer's product specifications.
   c. Manufacturer's installation instructions.
   d. Manufacturer's catalog cuts.
   e. Wiring diagrams showing factory-installed wiring.
   f. Printed performance curves.
   g. Operational range diagrams.
   h. Compliance with specified referenced standards.
   i. Testing by recognized testing agency.
4. Number of Copies: Submit copies of Product Data in a quantity to meet Contractor's requirements, considering that the Design Professional will retain three copies. Mark up and retain one returned copy as a Project Record Document.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data, unless submittal of Design Professional's electronic Drawings is otherwise permitted.
   1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
      a. Dimensions.
      b. Identification of products.
      c. Fabrication and installation drawings.
      d. Roughing-in and setting diagrams.
      e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
      f. Shopwork manufacturing instructions.
      g. Templates and patterns.
      h. Schedules.
      i. Notation of coordination requirements.
      j. Notation of dimensions established by field measurement.
      k. Relationship to adjoining construction clearly indicated.
      l. Seal and signature of professional engineer if specified.
      m. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.
   2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 30 by 40 inches.

   3. Number of Copies: Submit copies in a quantity to meet Contractor's requirements, considering that the Design Professional will retain three copies.

D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
   1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
   2. Identification: Attach label on unexposed side of Samples that includes the following:
      a. Generic description of Sample.
      b. Product name and name of manufacturer.
      c. Sample source.
      d. Number and title of appropriate Specification Section.
   3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
   4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
      a. Number of Samples: Submit no fewer than five full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Design Professional will retain three and will return the remaining submittal(s) with options selected.
   5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, tex-

ture, and pattern; color range sets; and components used for independent testing and inspection.

a. Number of Samples: Submit no fewer than four sets of Samples. Design Professional will retain three Sample sets; remainder will be returned. Mark up and retain one returned Sample set as a Project Record Sample.

E. Product Schedule or List: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location.

1. Number of Copies: Submit copies of product schedule or list in a quantity to meet Contractor's requirements, considering that the Design Professional will retain three copies.

F. Applications for Payment: Comply with requirements specified in Division 01 Section "Payment Procedures."

G. Schedule of Values: Comply with requirements specified in Division 01 Section "Payment Procedures."

I. List of Subcontractors and Suppliers, including Local and/or MWBE participants: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include company names, addresses, contacts, phone numbers, fax numbers, and email addresses.

1. Number of Copies: Submit no fewer than four copies of list, unless otherwise indicated.
2. Local and/or MWBE Monthly Report: Submit with Monthly Payment Application on Forms specified in the original solicitation documents.

2.2 INFORMATIONAL SUBMITTALS

A. General: Prepare and submit Informational Submittals required by other Specification Sections.

1. Number of Copies: Submit three copies of each submittal, unless otherwise indicated. Design Professional will not return copies.
2. Certificates and Certifications: Provide a notarized statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
3. Test and Inspection Reports: Comply with requirements specified in Division 01 Section "Quality Requirements." Instruct all testing and reporting agents to forward copies of all documents directly to the Design Professional.

B. Coordination Drawings: Comply with requirements specified in Division 01 Section "Project Management and Coordination."

C. Contractor's Construction Schedule: Comply with requirements specified in Division 01 Section "Construction Progress Documentation."

D. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of Design Professionals and owners, and other information specified.

E. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of

firms and personnel certified.

F. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.

G. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

H. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

I. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

J. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.

K. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

L. Research/Evaluation Reports: Prepare written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project.

M. Preconstruction Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.

N. Compatibility Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

O. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

P. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements specified in Division 01 Section "Operation and Maintenance Data."

Q. Design Data: Prepare written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. In-

clude page numbers.

R. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer.

S. Manufacturer's Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:
   1. Statement on condition of substrates and their acceptability for installation of product.
   2. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
   3. Results of operational and other tests and a statement of whether observed performance complies with requirements.

T. Insurance Certificates and Bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.

U. Construction Photographs: Comply with requirements specified in Division 01 Section "Photographic Documentation."

V. Material Safety Data Sheets (MSDSs): Submit information directly to Owner; do not submit to Design Professional.
   1. Design Professional will not review submittals that include MSDSs and will return them for re-submittal.

2.3 DELEGATED DESIGN

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
   1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Design Professional.

B. Delegated-Design Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit copies of a statement, in a count no fewer than that of the shop drawing or other type submittal to which it is in relation, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
   1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

All submittals shall be reviewed and approved by the Contractor prior to submittal to the Design professional. Submittals that are not fully and properly reviewed by the Contractor will be returned with no action, and a re-submittal will be required, and attributable delays will not be considered as

cause for an extension in Contract Time. Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions.

3.2 DESIGN PROFESSIONAL'S ACTION

A. General: Design Professional will not review submittals that do not bear Contractor's approval stamp and will return them without action.

B. Action Submittals: Design Professional will review each submittal, make marks to indicate corrections or modifications required, and return it. Design Professional will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken.

C. Informational Submittals: Design Professional will review each submittal and will not return it, or will return it if it does not comply with requirements.

D. Partial submittals are not acceptable, will be considered non-compliant, and will be returned without review.
   1. Should the Contractor proceed with the Work without the required full review of complete submittals, he does so at his sole risk. In any event and at any time it is determined that a missing portion of a submittal is needed in order to ensure compliance with the Contract Documents; the Contractor shall immediately submit the missing portion. No increase in the Contact Amount or the Contract Time will be allowed, nor will any variations from the requirements of the Contract Documents be allowed as a result of the failure on the part of the Contractor to provide complete submittals, or as a result of the failure of the Design Professional to garner complete submittals from the Contractor.

E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

F. In no case shall any review action or comments on the part of the Design Professional or his Consultants be construed to authorize compensable extra Work or an increase in Contract Amount or Contract Time.

END OF SECTION 01 3300

TRANSMITTAL

Project: _____ Date: _____

_____ A/E Project Number: _____

TRANSMITTAL A

To (Contractor): _____ Date: _____ Submittal No. _____

From (Subcontractor): _____ By: _____ ☐ Resubmission

Qty.	Reference / Number	Title / Description / Manufacturer	Spec. Section Title and Paragraph / Drawing Detail Reference

☐ Submitted for review and approval
☐ Resubmitted for review and approval
☐ Complies with contract requirements
☐ Will be available to meet construction schedule
☐ A/E review time included in construction schedule

☐ Substitution involved - Substitution request attached
☐ If substitution involved, submission includes point-by-point comparative data or preliminary details
☐ Items included in submission will be ordered immediately upon receipt of approval

Other remarks on above submission: ☐ One copy retained by sender

TRANSMITTAL B

To (A/E): _____ Attn: _____ Date Rec'd by Contractor: _____

From (Contractor): _____ By: _____ Date Trnsmt'd by Contractor: _____

☐ Approved
☐ Approved as noted
☐ Revise / Resubmit
☐ Rejected / Resubmit

Other remarks on above submission: ☐ One copy retained by sender

TRANSMITTAL C

To (Contractor): _____ Attn: _____ Date Rec'd by A/E: _____

From (A/E): _____ ☐ Other By: _____ Date Trnsmt'd by A/E: _____

☐ Approved
☐ Approved as noted
☐ Not subject to review
☐ No action required
☐ Revise / Resubmit
☐ Rejected / Resubmit
☐ Approved as noted / Resubmit

☐ Provide file copy with corrections identified
☐ Sepia copies only returned
☐ Point-by-point comparative data required to complete approval process
☐ Submission Incomplete / Resubmit

Other remarks on above submission: ☐ One copy retained by sender

TRANSMITTAL D

To (Subcontractor): _____ Attn: _____ Date Rec'd by Contractor: _____

From (Contractor): _____ By: _____ Date Trnsmt'd by Contractor: _____

Copies: ☐ Owner ☐ Consultants ☐ _____ ☐ _____ ☐ _____ ☐ One copy retained by sender

SECTION 01 4000

QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for quality assurance and quality control.
   1. Except for the expense of inspections and testing required by Chapter 17 of the IBC, the expense of all required on-site quality-control inspections and testing shall be borne by the Contractor.
   2. The Contractor's responsibility for Quality of Materials and Installation is specified in Article 2.1.4 of the Contract. The Contractor shall submit a written Quality Control program.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
   1. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and quality-control procedures that facilitate compliance with the Contract Document requirements.
   2. Requirements for Contractor to provide quality-assurance and quality-control services required by Design Professional, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

C. See Divisions 02 through 33 Sections for specific test and inspection requirements.

1.2 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Design Professional.

C. Mockups: Full-size, physical assemblies that are constructed on-site. Mockups are used to verify selections made under sample submittals, to demonstrate aesthetic effects and, where indicated, qualities of materials and execution, and to review construction, coordination, testing, or operation; they are not Samples. Approved mockups establish the standard by which the Work will be judged.

D. Laboratory Mockups: Full-size, physical assemblies that are constructed at testing facility to verify performance characteristics.

E. Preconstruction Testing: Tests and inspections that are performed specifically for the Project before products and materials are incorporated into the Work to verify performance or compli-

ance with specified criteria.

F. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with industry standards.

G. Source Quality-Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.

H. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

I. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

J. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
   1. Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to trades people of the corresponding generic name.

K. Experienced: When used with an entity, "experienced" means having successfully completed a minimum of five previous projects similar in size and scope to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.3 CONFLICTING REQUIREMENTS

A. General: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Design Professional for a decision before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Design Professional for a decision before proceeding.

1.4 SUBMITTALS

A. Qualification Data: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

B. Reports: Prepare and submit certified written reports that include the following:
   1. Date of issue.
   2. Project title and number.
   3. Name, address, and telephone number of testing agency.

4. Dates and locations of samples and tests or inspections.
5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.
7. Identification of product and Specification Section.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and re-inspecting.

C. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.5 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this Article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

C. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or products that are similar to those indicated for this Project in material, design, and extent.

F. Specialists: Certain sections of the Specifications require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
   1. Requirement for specialists shall not supersede building codes and regulations governing the Work.

G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 548; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.
   1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.

2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

H. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
1. Build mockups in location and of size indicated or, if not indicated, as directed by Design Professional.
2. Notify Design Professional seven days in advance of dates and times when mockups will be constructed.
3. Demonstrate the proposed range of aesthetic effects and workmanship.
4. Obtain Design Professional's approval of mockups before starting work, fabrication, or construction.
5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
6. Demolish and remove mockups when directed, unless otherwise indicated.

J. Laboratory Mockups: Comply with requirements of preconstruction testing and those specified in individual Sections in Divisions 02 through 16.

1.6 QUALITY CONTROL

B. Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified here or not.
1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
   a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
2. Notify testing agencies at least 24 hours (or as required by testing agencies) in advance of time when Work that requires testing or inspecting will be performed.
3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Division 01 Section "Submittal Procedures."

D. Retesting/Re-inspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and re-inspecting, for construction that replaced Work that failed to comply with the Contract Documents.

E. Testing Agency Responsibilities: Cooperate with Design Professional and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
   1. Notify Design Professional and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
   2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
   3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
   4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
   5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
   6. Do not perform any duties of Contractor.

F. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
   1. Access to the Work.
   2. Incidental labor and facilities necessary to facilitate tests and inspections.
   3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
   4. Facilities for storage and field curing of test samples.
   5. Delivery of samples to testing agencies.
   6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
   7. Security and protection for samples and for testing and inspecting equipment at Project site.

G. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
   1. Schedule times for tests, inspections, obtaining samples, and similar activities.

1.7 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Owner will engage a qualified testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, and as follows:
   1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.

   2. Notifying Design Professional and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
   3. Submitting a certified written report of each test, inspection, and similar quality-control service to Design Professional with copy to Contractor and to authorities having jurisdiction.
   4. Submitting a final report of special tests and inspections at Material Completion which includes a list of unresolved deficiencies.
   5. Interpreting tests and inspections and stating in each report whether tested and inspected

work complies with or deviates from the Contract Documents.

6. Retesting and re-inspecting corrected work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 COORDINATION

A. General: It is the sole responsibility of the Contractor to coordinate with the testing agency(s) and inspection authorities to ensure that all required tests and inspections are performed.

3.2 ACCESS TO WORK

A. General: It is the responsibility of the Contractor to provide safe and unencumbered access for the Design Professional and other testing and inspection personnel to all locations requiring testing or inspection. This in some cases may require and include the lifting of personnel using power equipment on the project site.

3.3 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.
2. Comply with the Contract Document requirements for Division 01 Section "Cutting and Patching."

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 01 4000

SECTION 01 4100

REGULATORY REQUIREMENTS

PART 1 - GENERAL

1.01. REGULATORY AGENCIES

A. Contractor responsible for notifying following agencies as to date that construction activities scheduled to commence:
   1. Clerk of Superior Court in County in which project is to be constructed; "Notice of Commencement".
   2. City or County Building Inspectors
   3. EPA/EPD
   4. Department of Natural Resources
   5. Utility Companies
   6. E-Verify

B. Contractor responsible for notifying following agencies as to date building is ready for preliminary and/or final inspection(s).
   1. State Fire Marshal
   2. Local Fire Marshal
   3. City or County Building Inspectors

C. Contractor responsible for following and completing requirements of the IBC building code Chapter 17 Special inspections
   1. Copy of Special inspections enclosed end of this section

D. Inspection Reports:
   1. Contractor shall send two copies of required notifications transmitted to Architect.
   2. Contractor shall have all inspection reports sent directly to him with copies to Owner and Architect.
   3. In event of inspection by one of above listed agencies not required, Contractor notify Owner and Architect in writing which agency and why not required to inspect building.

E. Forms:
   1. Form of "Notice of Commencement" included at end of this Section.
   2. Application for 80% preliminary and 100% final inspections by State Fire Marshal (if applicable) included at end of this Section.
   3. Contractor obtain necessary forms from agencies required by respective agency.
   4. Contractor Affidavit under O.C.G.A. 13-10-91, E-Verify (b) (1) Contractor
   5. Contractor Affidavit under O.C.G.A. 13-10-91, E-Verify (b) (3) Sub-Contractor
   6. Contractor Affidavit under O.C.G.A. 13-10-91, E-Verify (b) (4) Sub-Subcontractor

F. Fees and Costs:
   1. Contractor pay all inspection fees required and performed by agencies having jurisdiction.
      a. Contractor responsible for fee payments until all contract related deficiencies corrected to satisfaction of inspecting agency.
      b. If non-contract related deficiencies exist, Contractor's responsibility not negated until all contract related deficiencies corrected.
   2. Contractor responsible for costs associated with initial inspection and follow-up inspections (reinspections), when required, until all documented deficient work corrected and Occupancy Permit issued by all authorities having jurisdiction.

PART 2 - PRODUCTS (Not applicable).

PART 3 - EXECUTION

3.01 GENERAL

A. Within 7 Calendar Days of Commencement of Construction activities; contractor shall transmit to Clerk of the Superior Court in county in which project is located, form of "Notice of Commencement".

B. In appropriate and timely manner and using applicable forms, notify authorities having jurisdiction that Project ready for required inspections.
   1. Written notification required, indicating:
      a. Type inspection required.
      b. Stage of Project construction.
      c. Proposed date of inspection.
      d. Other requirements of specific agency or authority.
   2. Transmit copy to Architect.

C. Contractor assists inspecting authority in performance of inspection.
   1. Contractor's project Manager and site Forman Accompany inspector until inspection complete.
   2. Provide equipment required for inspections, including but not limited to:
      a. Flashlights.
      b. Mirrors.
      c. Ladders.
      d. Measuring devices.
      e. Other items required by specific inspection agency.

3.02 SUBCONTRACTS

A. The contractor or subcontractor shall insert in any subcontracts the clauses for providing Contractor Affidavit for E-Verify form and also a clause requiring the subcontractor to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in above and O.C.G.A. 13-10-91 Each company has to go on line, register and take knowledge test. Once this is done, you will receive company ID # https://e-verify.uscis.gov/emp

3.03 INSPECTION –IBC Chapter 17 SPECIAL INSPECTIONS (If applicable)

A. Contractor shall make himself familiar with the requirements of Special inspections.
   1. Carry out the requirement . document the process as required for each portion of the work .
   2. Review that each part of inspections has been completed
   3. Repair remove items not in compliance

3.04 INSPECTION - STATE FIRE MARSHALL OR LOCAL (IF APPLICABLE)

A. Eighty (80%) Inspection:
   1. Notify State Fire Marshall and request inspection upon completion of 80% of Project, providing minimum of 21 days notice.
   2. 80% completion defined as having structural components in place and open for review of fire safety components such as:
      a. Fire walls.
      b. Vertical shafts.
      c. Stairways.
      d. Smoke stops.
      e. Hazardous area separation.
      f. Roof and ceiling assemblies.

g. Corridor and door width.
h. HVAC system.

3. Do not install ceilings or other obstructing elements until 80% inspection complete and acceptable.

4. Upon receipt of Fire Marshall's report, Contractor take following actions:
   a. Type Fire Marshall's hand written report.
   b. Review and respond in writing to each item in report indicating status of item, proposed method of resolution, and time resolution to finished.
   c. Transmit copies of report and response to Architect.
   d. Correct deficiencies indicated on report.

B. One Hundred (100%) Inspection:
1. Notify Fire Marshall and request inspection upon completion of 100% of Project, providing minimum 21 days notice.
2. 100% completion defined building ready to occupy and qualify for Certificate of Occupancy.
3. Perform 100% inspection prior to occupancy of Project.
4. Upon receipt of Fire Marshall's report, Contractor take following actions:
   a. Type Fire Marshall's hand written report.
   b. Review and respond in writing to each item in report indicating status of item, proposed method of resolution, and time resolution to finished.
   c. Transmit copies of report and response to Architect.
   d. Correct deficiencies indicated on report.

C. Reinspection(s):
1. When documented deficiencies corrected, notify Fire Marshall Project ready for reinspection.
2. Upon receipt of Fire Marshall's report, Contractor take following actions:
   a. Type Fire Marshall's hand written report.
   b. Review and respond in writing to each item in report indicating status of item, proposed method of resolution, and time resolution to finished.
   c. Transmit copies of report and response to Architect.
   d. Correct deficiencies indicated on report.
3. Repeat procedure until all deficiencies corrected and Occupancy Permit obtained.

END OF SECTION 01 4100

NOTICE OF COMMENCEMENT

TO THE CLERK OF THE SUPERIOR COURT OF _____ COUNTY, GEORGIA

Pursuant to O.C.G.A 44-14-361.5(b), the undersigned hereby gives Notice of Commencement of improvements to property including the following information:

1. Name, Address, and Telephone number of Contractor:

_____

_____

_____

2. Name and Location of Project:

_____

_____

A legal description of the property upon which the improvements are being made is attached hereto as
Exhibit "A", which is incorporated herein by this reference.

3. Name and address of true owner of property:

_____

_____

1. Name and address of person, other than true owner, at whose instance the improvements to the property are being made:

_____

_____

2. Name and address of Surety for the Performance and Payment Bonds, if any:

_____

_____

6. Name and address of Construction lender, if any:

_____

_____

_____

The Clerk of the County is requested to file, record and index, this Notice of Commencement, in the records and indices maintained for such notices.

_____
(Owner, Agent of Owner, Or Contractor)

Date _____

Contractor Affidavit under O.C.G.A. § 13-10-91(b)(1)

By executing this affidavit, the undersigned contractor verifies its compliance with O.C.G.A. § 13-10-91, stating affirmatively that the individual, firm or corporation which is engaged in the physical performance of services on behalf of (name of public employer) has registered with, is authorized to use and uses the federal work authorization program commonly known as E-Verify, or any subsequent replacement program, in accordance with the applicable provisions and deadlines established in O.C.G.A. § 13-10-91. Furthermore, the undersigned contractor will continue to use the federal work authorization program throughout the contract period and the undersigned contractor will contract for the physical performance of services in satisfaction of such contract only with subcontractors who present an affidavit to the contractor with the information required by O.C.G.A. § 13-10-91(b). Contractor hereby attests that its federal work authorization user identification number and date of authorization are as follows:

_____
Federal Work Authorization User Identification Number

_____
Date of Authorization

_____
Name of Contractor

_____
Name of Project

_____
Name of Public Employer

I hereby declare under penalty of perjury that the foregoing is true and correct.

Executed on _____, ___, 201__ in _____(city), _____(state).

_____
Signature of Authorized Officer or Agent

_____
Printed Name and Title of Authorized Officer or Agent

SUBSCRIBED AND SWORN BEFORE ME
ON THIS THE _____ DAY OF _____,201__.

_____
NOTARY PUBLIC

My Commission Expires:
_____

Subcontractor Affidavit under O.C.G.A. § 13-10-91(b)(3)

By executing this affidavit, the undersigned subcontractor verifies its compliance with O.C.G.A. § 13-10-91, stating affirmatively that the individual, firm or corporation which is engaged in the physical performance of services under a contract with (name of contractor) on behalf of (name of public employer) has registered with, is authorized to use and uses the federal work authorization program commonly known as E-Verify, or any subsequent replacement program, in accordance with the applicable provisions and deadlines established in O.C.G.A. § 13-10-91. Furthermore, the undersigned subcontractor will continue to use the federal work authorization program throughout the contract period and the undersigned subcontractor will contract for the physical performance of services in satisfaction of such contract only with sub-subcontractors who present an affidavit to the subcontractor with the information required by O.C.G.A. § 13-10-91(b). Additionally, the undersigned subcontractor will forward notice of the receipt of an affidavit from a sub-subcontractor to the contractor within five business days of receipt. If the undersigned subcontractor receives notice of receipt of an affidavit from any sub-subcontractor that has contracted with a sub-subcontractor to forward, within five business days of receipt, a copy of such notice to the contractor. Subcontractor hereby attests that its federal work authorization user identification number and date of authorization are as follows:

_____
Federal Work Authorization User Identification Number

_____
Date of Authorization

_____
Name of Subcontractor

_____
Name of Project

_____
Name of Public Employer

I hereby declare under penalty of perjury that the foregoing is true and correct.

Executed on _____, ___, 201__ in _____(city), _____(state).

_____
Signature of Authorized Officer or Agent

_____
Printed Name and Title of Authorized Officer or Agent

SUBSCRIBED AND SWORN BEFORE ME
ON THIS THE _____ DAY OF _____,201__.

_____
NOTARY PUBLIC

My Commission Expires:

_____

Sub-subcontractor Affidavit under O.C.G.A. § 13-10-91(b)(4)

By executing this affidavit, the undersigned sub-subcontractor verifies its compliance with O.C.G.A. § 13-10-91, stating affirmatively that the individual, firm or corporation which is engaged in the physical performance of services under a contract for (name of subcontractor or sub-subcontractor with whom such sub-subcontractor has privity of contract) and (name of contractor) on behalf of (name of public employer) has registered with, is authorized to use and uses the federal work authorization program commonly known as E-Verify, or any subsequent replacement program, in accordance with the applicable provisions and deadlines established in O.C.G.A. § 13-10-91. Furthermore, the undersigned sub-subcontractor will continue to use the federal work authorization program throughout the contract period and the undersigned sub-subcontractor will contract for the physical performance of services in satisfaction of such contract only with sub-subcontractors who present an affidavit to the sub-subcontractor with the information required by O.C.G.A. § 13-10-91(b). The undersigned sub-subcontractor shall submit, at the time of such contract, this affidavit to (name of subcontractor or sub-subcontractor with whom such sub-subcontractor has privity of contract). Additionally, the undersigned sub-subcontractor will forward notice of the receipt of any affidavit from a sub-subcontractor to (name of subcontractor or sub-subcontractor with whom such sub-subcontractor has privity of contract). Sub-subcontractor hereby attests that its federal work authorization user identification number and date of authorization are as follows:

_____
Federal Work Authorization User Identification Number

_____
Date of Authorization

_____
Name of Sub-subcontractor

_____
Name of Project

_____
Name of Public Employer

I hereby declare under penalty of perjury that the foregoing is true and correct.
Executed on _____, ___, 201__ in _____(city), _____(state).

_____
Signature of Authorized Officer or Agent

_____
Printed Name and Title of Authorized Officer or Agent

SUBSCRIBED AND SWORN BEFORE ME
ON THIS THE _____ DAY OF _____,201__.

_____
NOTARY PUBLIC
My Commission Expires:

_____

SECTION 01 5000

TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

A. See Division 01 Section "Execution" for progress cleaning requirements.

B. See Divisions 02 through 33 Sections for temporary heat, ventilation, and humidity requirements for products in those Sections.

C. Failure on the part of the Contractor to establish and maintain all required on-site communication and clerical provisions may be cited as cause to return Applications for Payment without action.

1.2 DEFINITIONS

A. Permanent Enclosure: As determined by Design Professional, permanent or temporary roofing is complete, insulated, and weather-tight; exterior walls are insulated and weather-tight; and all openings are closed with permanent construction or substantial temporary closures.

1.3 USE CHARGES

A. General: Cost or use charges for temporary facilities shall be included in the Contract Sum. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Design Professional, testing agencies, and authorities having jurisdiction.

1.4 SUBMITTALS

A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.

1.5 QUALITY ASSURANCE

A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.6 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Installer of each permanent service shall assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned respon-

sibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Pavement: Comply with Division 02 pavement Sections.

B. Chain-Link Fencing: Minimum 2-inch, 0.148-inch thick, galvanized steel, chain-link fabric fencing; minimum 6 feet high with galvanized steel pipe posts; minimum 2-3/8-inch OD line posts and 2-7/8-inch OD corner and pull posts, with 1-5/8-inch OD top rails and galvanized barbed-wire top strand.

C. Portable Chain-Link Fencing: Minimum 2-inch, 9-gage, galvanized steel, chain-link fabric fencing; minimum 6 feet high with galvanized steel pipe posts; minimum 2-3/8-inch OD line posts and 2-7/8-inch OD corner and pull posts, with 1-5/8-inch OD top and bottom rails. Provide concrete or galvanized steel bases for supporting posts.

D. Lumber and Plywood: Comply with requirements in Division 06 Section "Rough Carpentry."

E. Gypsum Board: Minimum 1/2 inch thick by 48 inches wide by maximum available lengths; regular-type panels with tapered edges. Comply with ASTM C 36/C 36M.

F. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.

G. Provide and maintain during the Construction period one (1) project sign as specified by the Owner. The maintenance and upkeep of the sign shall be the responsibility of the Contractor.

2.2 TEMPORARY FACILITIES

A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading. Provide unit(s) of adequate size to serve needs of project, including jobsite progress meetings.

B. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

2.3 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system; provide climate control units with individual space thermostatic control.
   1. Heating Units: Listed and labeled for type of fuel being consumed, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
   2. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return air grille in system and remove at end of construction.

PART 3 – EXECUTION

3.1 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work, and to limit site disturbance as required to attain LEED-NC Credit SS 5.1, and as specified in Division 01 Section "Summary." Relocate and modify facilities as required by progress of the Work.

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.
   1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
   1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.

C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.

D. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

E. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

F. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

G. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
   1. Install electric power service overhead, or underground, as conditions required.

H. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
   1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

I. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install one telephone line(s) for each field office.
   1. At each telephone, post a list of important telephone numbers including police and fire

departments, Contractor's home office, Design Professional's office, principal subcontractors' field and home offices.

3. Provide superintendent with cellular telephone for use when away from field office.

J. Electronic Equipment: In field office, provide and maintain a computer with on-line capability and electronic mail. Provide and maintain also a printer which can be used to print communications and bulletin drawings.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Provide noncombustible construction for offices, shops, and sheds located within construction area or within 30 feet of building lines. Comply with NFPA 241.
2. Maintain support facilities until near Material Completion. Remove before Material Completion. Personnel remaining after Material Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas within construction limits indicated on Drawings.

1. Provide dust-control treatment that is nonpolluting and non-tracking. Reapply treatment as required to minimize dust.

C. Traffic Controls: Comply with requirements of authorities having jurisdiction.

1. Protect existing site improvements to remain including curbs, pavement, and utilities.
2. Maintain access for fire-fighting equipment and access to fire hydrants.

D. Parking: Provide temporary parking areas for construction personnel.

E. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.

1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties nor endanger permanent Work or temporary facilities.
2. Remove snow and ice as required to minimize accumulations.

F. Project Identification and Temporary Signs: Provide Project identification and other signs as a part of Allowance No. Four. Install signs where indicated to inform public and individuals seeking entrance to Project. Unauthorized signs are not permitted.

1. Provide temporary, directional signs for construction personnel and visitors.
2. Maintain and touchup signs so they are legible at all times.

G. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with Division 01 Section "Execution" for progress cleaning requirements.

H. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.

1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

I. Temporary Elevator Use: Refer to Division 14 Sections for temporary use of new elevators.

J. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.

K. Temporary Use of Permanent Stairs: Cover finished permanent stairs with protective covering of plywood or similar material so finishes will be undamaged at time of acceptance.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

B. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction.

C. Storm water Control: Comply with authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of storm water from heavy rains.

D. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.

E. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Material Completion. Obtain extended warranty for Owner. Perform control operations lawfully, using environmentally safe materials.

F. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.
   1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
   2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Provide Owner and Design Professional with one set of keys.

G. Security Enclosure and Lockup: Install substantial temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.

H. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

I. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weather tight enclosure for building exterior.
   1. Where heating or cooling is needed and permanent enclosure is not complete, insulate temporary enclosures.

K. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types

needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.

1. Prohibit smoking and use of all tobacco products on SCCPSS property
2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.5 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Material Completion.

D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Material Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves the right to take possession of Project identification signs.
2. At Material Completion, clean and renovate permanent facilities used during construction period. Comply with final cleaning requirements specified in Division 01 Section "Closeout Procedures."

END OF SECTION 01 5000

SECTION 01 6000

PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; product substitutions; and comparable products.

B. See Division 01 Section "Closeout Procedures" for submitting warranties for Contract closeout.

C. See Divisions 02 through 33 Sections for specific requirements for warranties on products and installations specified to be warranted.

1.2 DEFINITIONS

A. Products: Items purchased for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
2. New Products: Items that have not previously been incorporated into another project or facility, except that products consisting of recycled-content materials are allowed, unless explicitly stated otherwise. Products salvaged or recycled from other projects are not considered new products.
3. Comparable Product: Product that is demonstrated and approved through submittal process, or where indicated as a product substitution, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor. It may be in certain instances, but is not necessarily the intent of product Specifications to limit the use of product manufacturers and model numbers to those listed by name. As a minimum, all requirements of the Specifications must be met, including but not limited to in regard to appearance, function, quality, durability, and source reliability. Actions and approvals regarding products and product substitutions will occur in a manner that suits and is in the best interest of the Owner.

C. Basis-of-Design Product Specification: Where a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other named manufacturers.

1.3 SUBMITTALS

A. Substitution Requests: Submit three copies of each request for consideration. Identify product

or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Substitution Request Form: Use CSI Form 13.1A.
2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
   a. Statement indicating why specified material or product cannot be provided, or an explanation why Contractor wishes to provide an alternate material or product.
   b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
   c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
   d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
   e. Samples, where applicable or requested.
   f. List of similar installations for completed projects with project names and addresses and names and addresses of Design Professionals and owners.
   g. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
   h. Research/evaluation reports evidencing compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.
   i. Detailed comparison of Contractor's Construction Schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating lack of availability or delays in delivery.
   j. Cost information, including a proposal of change, if any, in the Contract Sum.
   k. Contractor's certification that proposed substitution complies with requirements in the Contract Documents and is appropriate for applications indicated.
   l. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results, or because of adverse unforeseen conditions or expenses resulting from the substitution.

3. Design Professional's Action: If necessary, Design Professional will request additional information or documentation for evaluation within 7 days of receipt of a request for substitution. Design Professional will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or 7 days of receipt of additional information or documentation, whichever is later.
   a. Form of Acceptance: Change Order.
   b. Use product specified if Design Professional cannot make a decision on use of a proposed substitution within time allocated.

B. Comparable Product Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Design Professional's Action: If necessary, Design Professional will request additional information or documentation for evaluation within one week of receipt of a comparable

product request. Design Professional will notify Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or 7 days of receipt of additional information or documentation, whichever is later.

a. Form of Approval: As specified in Division 01 Section "Submittal Procedures."
b. Use product specified if Design Professional cannot make a decision on use of a comparable product request within time allocated.

C. Basis-of-Design Product Specification Submittal: Comply with requirements in Division 01 Section "Submittal Procedures." Show compliance with requirements.

1.4 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project; product selected shall be compatible with products previously selected, even if previously selected products were also options.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.

B. Delivery and Handling:
1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.

C. Storage:
1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weather tight enclosure above ground, with ventilation adequate to prevent condensation.
4. Store cementations products and materials on elevated platforms.
5. Store foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
6. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
7. Protect stored products from damage and liquids from freezing.

1.6 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
2. Special Warranty: Written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide more rights for Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution. Submit a draft for approval before final execution.
1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included with the Specifications, prepare a written document using appropriate form properly executed.
3. Refer to Divisions 2 through 16 Sections for specific content requirements and particular requirements for submitting special warranties.

C. All warranties that are normally available from manufacturers, vendors, Subcontractors, etc. shall be provided to the Owner, even if these warranties are not specifically called for in the Contract Documents.

D. Submittal Time: Comply with requirements in Division 01 Section "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, that are new at time of installation.
1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Design Professional will make selection.
5. Where products are accompanied by the term "match sample," sample to be matched is Design Professional's.
6. Descriptive, performance, and reference standard requirements in the Specifications establish "salient characteristics" of products.

B. Product Selection Procedures:
1. Product: Where Specifications name a single product and manufacturer, provide the named product that complies with requirements.
2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements.
3. Available Products: Where Specifications include a list of names of both products and manufacturers, provide one of the products listed, or an unnamed product, that complies with requirements, as determined by the Design Professional. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product.
4. Available Manufacturers: Where Specifications include a list of manufacturers, provide

a product by one of the manufacturers listed, or an unnamed manufacturer, that complies with requirements, as determined by the Design Professional. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product.

5. Product Options: Where Specifications indicate that sizes, profiles, and dimensional requirements on Drawings are based on a specific product or system, provide the specified product or system. Comply with provisions in Part 2 "Product Substitutions" Article for consideration of an unnamed product or system.
6. Basis-of-Design Product: Where Specifications name a product and include a list of manufacturers, provide the specified product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product by the other named manufacturers.
7. Visual Matching Specification: Where Specifications require matching an established Sample, select a product that complies with requirements and matches Design Professional's sample. Design Professional's decision will be final on whether a proposed product matches.
    a. If no product available within specified category matches and complies with other specified requirements, comply with provisions in Part 2 "Product Substitutions" Article for proposal of product.

8. Visual Selection Specification: Where Specifications include the phrase "as selected from manufacturer's colors, patterns, and textures" or a similar phrase, select a product that complies with other specified requirements.
    a. Standard Range: Where Specifications include the phrase "standard range of colors, patterns, textures" or similar phrase, Design Professional will select color, pattern, density, or texture from manufacturer's product line that does not include premium items.
    b. Full Range: Where Specifications include the phrase "full range of colors, patterns, textures" or similar phrase, Design Professional will select color, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 PRODUCT SUBSTITUTIONS

A. Timing: Design Professional will consider requests for substitution if received within 5 days after the Proceed Order. Requests received after that time may be considered or rejected at the discretion of the Design Professional.

B. Conditions: Design Professional will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Design Professional will return requests without action, except to record noncompliance with these requirements:
    1. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Design Professional for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
    2. Requested substitution does not require extensive revisions to the Contract Documents.
    3. Requested substitution is consistent with the Contract Documents and will produce indicated results.

4. Substitution request is fully documented and properly submitted.
5. Requested substitution will not adversely affect Contractor's Construction Schedule.
6. Requested substitution has received necessary approvals of authorities having jurisdiction.
7. Requested substitution is compatible with other portions of the Work.
8. Requested substitution has been coordinated with other portions of the Work.
9. Requested substitution provides specified warranty.

C. Should, subsequent to the approval or implementation of a substitution, there occur a discovery of an unforeseen circumstance or condition that is attributable to the substitution, the Contractor shall be responsible to bear any additional costs or to return to the Owner any cost savings resulting from the discovery.

2.3 COMPARABLE PRODUCTS

A. Conditions: Design Professional will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Design Professional will return requests without action, except to record noncompliance with these requirements:
1. Evidence that the proposed product does not require extensive revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
3. Evidence that proposed product provides specified warranty.
4. List of similar installations for completed projects with project names and addresses and names and addresses of Design Professionals and owners, if requested.
5. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 6000

CERTIFICATE OF MANUFACTURER

INSTRUCTIONS FOR PREPARATIONS OF CERTIFICATE: To be acceptable, the certificate must be prepared in the form indicated by this specimen on the official letterhead of the manufacturer. No portions of the certificate may be omitted. The owner needs only two originals of the certificate. One in operational manual and one in warranty account (closeout). If the equipment of a manufacturer is not installed in strict compliance with the recommendations of the manufacturer, or if in the design of the work the equipment is not applied in strict compliance with the recommendations of the manufacturer, a letter from the manufacturer should be forwarded to the Contractor (with copies to the Design Professional and the Owner) setting forth a list of the deviations from the recommendations of the manufacturer and stating what remains to be done in order to bring the work into strict compliance with the recommendations of the manufacturer. Prior to calling upon the representative of the manufacturer for performance of the services necessary to enable him to execute a certificate in accordance with this specimen, it is the obligation of the Contractor to have installed the work in strict compliance with the recommendation of the manufacturer and it is likewise the obligation of the Contractor to have put the equipment good operating condition in absolute and final readiness for the "start-up," "testing," and "placing into operation" as defined herein below by the representative of the manufacturer.

Date: _____

Insert name and address of Owner

Re: Certificate of (JOHN DOE CORPORATION) that equipment of components furnished by it has (or have, as the case may be) installed in strict compliance with its recommendations and is (or are, as the case may be) operating properly at PROJECT NO. _____

Gentlemen:

1. We certify through our duty authorized and acting agent that the item (or items, as the case may be) furnished by us to the Project named in the caption was (or were as the case may be) started up, tested, and placed in operation by authorized field representative on (enter the date on which the field representative performed the start-up, test, and placing into operation) and is (or are, as the case may be) operating properly:

   (List the item or items furnished to the job. Show catalogue number or numbers.)

2. We certify further that the aforesaid equipment was installed in strict compliance with our recommendations as published by us in the following document (of documents, as the case may be):

   (Insert the date, name, or other positive means of identifying the exact document or documents in which the recommendations for installation and use of the item of items are published.) (*)

3. A copy of the aforesaid document(s) is (are) attached hereto.

   This_____ day of _____,20_____

   JOHN DOE CORPORATION

   By: _____

   Authorized Representative

(*) The date must be shown

DEFINITIONS:

1. "Start-up" is defined as putting the equipment into action.
2. "Testing" is defined as performing such testing as is stipulated in the Contract Documents to be performed.
3. "Placing into operation" is defined as operating the equipment for a sufficient period of time for the determination to be made that it is performing properly.

HAZARDOUS MATERIALS CERTIFICATE

CERTIFICATE OF GENERAL CONTRACTOR

OWNER: _____

PROJECT NUMBER: _____

ADDRESS: _____

COUNTY OF: _____ STATE OF: _____

DATE: _____

_____as General Contractor on the above project do hereby certify that all materials, products, and assemblies supplied and installed in this project and in the site are totally free of asbestos, PCB, or other hazardous materials.

This certificate covers all materials required by contract documents.

Nothing in the above shall be deemed to imply that this guarantee shall apply to any work which has been abused or neglected by the Owner.

Legal Name of Contractor:

_____

By: _____

Title: _____

_____

Notary Public

This _____ day of _____, 20 _____.

My commission expires _____

SECTION 01 7300

EXECUTION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes general procedural requirements governing execution of the Work including, but not limited to, the following:
   1. Construction layout.
   2. Field engineering and surveying.
   3. General installation of products.
   4. Progress cleaning.
   5. Starting and adjusting.
   6. Protection of installed construction.
   7. Correction of the Work.

B. See Division 01 Section "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.

1.2 SUBMITTALS

A. Certificates: Submit certificate signed by land surveyor certifying that location and elevation of improvements comply with requirements.

B. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal, if any.

1.3 QUALITY ASSURANCE

A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of site improvements, utilities, and other construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the Work.
   1. Before construction, verify the location and points of connection of utility services.

B. Existing Utilities: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify

the existence and location of underground utilities and other construction affecting the Work.

1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; and underground electrical services.
2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

C. Acceptance of Conditions: Examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
2. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
3. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
4. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Existing Utility Information: Furnish information to local utility that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Design Professional. Include a detailed description of problem encountered, together with recommendations for changing the Contract Documents.

3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Design Professional promptly.

B. General: Engage a land surveyor to lay out the Work using accepted surveying practices.

1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
2. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
3. Inform installers of lines and levels to which they must comply.
4. Check the location, level and plumb, of every major element as the Work progresses.

5. Notify Design Professional when deviations from required lines and levels exceed allowable tolerances.
6. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and invert elevations.

D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Design Professional.

3.4 FIELD ENGINEERING

A. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.

B. Benchmarks: Establish and maintain a minimum of four permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.
1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.

C. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.

D. Final Property Survey: Prepare a final property survey showing significant features (real property) for Project. Include on the survey a certification, signed by land surveyor, that principal metes, bounds, lines, and levels of Project are accurately positioned as shown on the survey.
1. Recording: At Material Completion, have the final property survey recorded by or with authorities having jurisdiction as the official "property survey."

3.5 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
1. Make vertical work plumb and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.

B. Comply with manufacturer's written instructions and recommendations for installing products in

applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Material Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Tools and Equipment: Do not use tools or equipment that produces harmful noise levels.

F. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

G. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.
   1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Design Professional.
   2. Allow for building movement, including thermal expansion and contraction.
   3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

H. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

I. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.6 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.
   1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
   2. Do not hold materials more than 7 days during normal weather or 3 days if the temperature is expected to rise above 80 deg F.
   3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
   1. Remove liquid spills promptly.
   2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written in-

structions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Material Completion.

G. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Material Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to assure that no part of the construction completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.7 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

B. Adjust operating components for proper operation without binding. Adjust equipment for proper operation.

C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Manufacturer's Field Service: If a factory-authorized service representative is required to inspect field-assembled components and equipment installation, comply with qualification requirements in Division 01 Section "Quality Requirements."

3.8 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Material Completion.

B. Comply with manufacturer's written instructions for temperature and relative humidity.

3.9 CORRECTION OF THE WORK

A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Division 01 Section "Cutting and Patching."
   1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up

with matching materials, and properly adjusting operating equipment.

B. Restore permanent facilities used during construction to their specified condition.

C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.

D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.

E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 01 7300

SECTION 01 7329
CUTTING AND PATCHING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes procedural requirements for cutting and patching.

B. See Divisions 2 through 33 Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.

C. See Division 07 Section "Penetration Fire stopping" for patching fire-rated construction.

1.2 SUBMITTALS

A. Cutting and Patching Proposal: Submit a proposal describing procedures at least 10 days before the time cutting and patching will be performed, requesting approval to proceed. Include the following information:
   1. Extent: Describe cutting and patching, show how they will be performed, and indicate why they cannot be avoided.
   2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building's appearance and other significant visual elements.
   3. Products: List products to be used and firms or entities that will perform the Work.
   4. Dates: Indicate when cutting and patching will be performed.
   5. Utility Services and Mechanical/Electrical Systems: List services/systems that cutting and patching procedures will disturb or affect. List services/systems that will be relocated and those that will be temporarily out of service. Indicate how long services/systems will be disrupted.
   6. Structural Elements: Where cutting and patching involve adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with original structure.
   7. Design Professional's Approval: Obtain approval of cutting and patching proposal before cutting and patching. Approval does not waive right to later require removal and replacement of unsatisfactory work.

1.3 QUALITY ASSURANCE

A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.

B. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.

C. Miscellaneous Elements: Do not cut and patch miscellaneous elements or related components in a manner that could change their load-carrying capacity that results in reducing their capacity to perform as intended, or that result in increased maintenance or decreased operational life or safety.

D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or

in occupied spaces in a manner that would, in Design Professional's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

1.4 WARRANTY

A. Existing and Projected Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties, or warranties that are set to commence with Material Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

B. In-Place Materials: Use materials identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
   1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.
   1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with in-place finishes or primers.
   2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Temporary Support: Provide temporary support of Work to be cut.

B. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

3.3 PERFORMANCE

A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
   1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or

adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Excavating and Backfilling: Comply with requirements in applicable Division 31 Sections where required by cutting and patching operations.
5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
6. Proceed with patching after construction operations requiring cutting are complete.

C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
4. Ceilings: Patch, repair, or re-hang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weather tight condition.

D. Cleaning: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

END OF SECTION 01 73 29

SECTION 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for the following:
   1. Recycling non-hazardous demolition and construction waste.
   2. Salvaging nonhazardous demolition and construction waste.
   3. Disposing of non-hazardous demolition construction waste.
   4. Removal and disposal of existing loose items inside the building.

B. See Division 02 Section "Structure Demolition" for disposition of waste resulting from demolition of buildings, structures, and site improvements, and for disposition of hazardous waste.

C. See Division 32 "Site work" and Civil Drawings for disposition of waste resulting from site clearing and removal of above- and below-grade improvements.

D. See Division 04 Section "Unit Masonry" for disposal requirements for masonry waste.

E. See Division 04 Section "Stone Masonry" for disposal requirements for excess stone and stone waste.

1.2 DEFINITIONS

A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

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

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

1.3 PERFORMANCE GOALS

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 Goals 01: Owner's goal is to salvage and recycle as much non-hazardous construction waste as possible. Owner has established minimum goals for the following materials:
   1. Recycle 75% of all metals.
   2. Reduce landfill waste disposal by 25%.

1.4 SUBMITTALS

A. Waste Management Plan: Submit for approval 3 copies of plan within 7 days of date established for the Proceed Order.

1.5 QUALITY ASSURANCE

A. Waste Management Conference: Conduct conference at Project site.

1.6 WASTE MANAGEMENT PLAN

A. General: Develop plan consisting of waste identification and waste reduction work plan. [Include separate sections in plan for demolition and construction waste.] Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.

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

C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, 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. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.
   2. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
   3. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
   4. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
   5. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
   6. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location on Project site where materials separation will be located.

D. Forms: Prepare waste management plan on forms satisfactory to the Design Professional.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

A. General: Implement waste management plan as approved by Design Professional. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.

B. Disposal of Loose Items Inside Existing Building: Except for items or materials to be salvaged, recycled, or otherwise reused, any of which would be at the Owner’s discretion, remove from the Project site all loose items inside the building and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.
   1. Distribute waste management plan to everyone concerned within three days of submittal.

2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.

D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, 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, and sold.
2. Comply with Division 01 Section "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

3.2 SALVAGING DEMOLITION WASTE

A. Salvaged Items for Reuse in the Work:
1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until installation.
4. Protect items from damage during transport and storage.
5. Install salvaged items to comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make items functional for use indicated.

B. Salvaged Items for Sale or Donation: Not permitted on Project site.

C. Salvaged Items for Owner's Use:
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 [on-site] [off-site] [designated by Owner].
5. Protect items from damage during transport and storage.

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: As much as possible, require deliveries 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. Gypsum Board: Stack large clean pieces on wood pallets and store in a dry location.
1. Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.
2. Ground and screened gypsum materials may be used as landscaping substrate, at Contractor’s option.

3.4 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.

B. Burning: Do not burn waste materials.

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

END OF SECTION 01 74 19

SECTION 01 7700

CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
   1. Inspection procedures.
   2. Warranties.
   3. Final cleaning.

B. See Division 01 Section "Payment Procedures" for requirements for Applications for Payment for Material and Final Completion.

C. See Division 01 Section "Photographic Documentation" for submitting Final Completion construction photographs and negatives.

D. See Division 01 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.

E. See Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.

F. See Division 01 Section "Demonstration and Training" for requirements for instructing Owner's personnel.

G. See Divisions 02 through 33 Sections, including but not limited to Section 23 0240, “Mechanical Work Closeout,” for specific closeout and special cleaning requirements for the Work in those Sections.

1.2 MATERIAL COMPLETION

A. Preliminary Procedures: Before requesting inspection for determining date of Material Completion, complete the following. List items below that are incomplete in request.
   1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
   2. Advise Owner of pending insurance changeover requirements.
   3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
   4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
   5. Prepare and submit Project Record Documents, operation and maintenance manuals, Final Completion construction photographs, damage or settlement surveys, property surveys, and similar final record information.
   6. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
   7. Make final changeover of permanent locks and deliver keys to Owner. Transmit keys

with a detailed accounting of the keys transmitted, and garner the receipt signature of an authorized representative of the Owner. Advise Owner's personnel of changeover in security provisions.

8. Complete startup testing of systems.
9. Submit test/adjust/balance records.
10. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
11. Advise Owner of changeover in heat and other utilities.
12. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
13. Complete final cleaning requirements, including touchup painting.
14. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

B. Inspection: Submit a written request for inspection for Material Completion. On receipt of this written request, Design Professional will either proceed with inspection or notify Contractor of unfulfilled requirements. Design Professional will prepare the Certificate of Material Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Design Professional, that must be completed or corrected before certificate will be issued.

1. Re-inspection: Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for Final Completion.

1.3 FINAL COMPLETION

A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:

1. Submit a final Application for Payment according to Division 01 Section "Payment Procedures."
2. Submit certified copy of Design Professional's Material Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Design Professional. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit pest-control final inspection report and warranty.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training DVDs.

B. Inspection: Submit a written request for final inspection for acceptance. On receipt of this written request, Design Professional will either proceed with inspection or notify Contractor of unfulfilled requirements. Design Professional will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.4 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Preparation: Submit three copies of list. Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction. Use CSI Form 14.1A.

1. Organize list of spaces in sequential order, starting with the site, then the building exterior then proceeding to the building interior, from lowest floor to highest floor.
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.

1.5 WARRANTIES

A. Submittal Time: Submit written warranties on request of Design Professional for designated portions of the Work where commencement of warranties other than date of Material Completion is indicated.

B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
1. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
4. Provide all warranties available from product and system manufacturers, regardless of whether each warranty is specifically called for in these Specifications.

B. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and mainte-

nance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Material Completion for entire Project or for a portion of Project:

    a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
    b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
    c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
    d. Remove tools, construction equipment, machinery, and surplus material from Project site.
    e. Remove snow and ice to provide safe access to building.
    f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
    g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
    h. Sweep concrete floors broom clean in unoccupied spaces.
    i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
    j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
    k. Remove labels that are not permanent.
    l. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
        1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.
    m. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
    n. Replace parts subject to unusual operating conditions.
    o. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
    p. Replace disposable air filters and clean permanent air filters and clean exposed surfaces of diffusers, registers, and grills.
    q. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
    r. Leave Project clean and ready for occupancy.

C. Pest Control: Engage an experienced, licensed exterminator to make a final inspection and rid Project of rodents, insects, and other pests. Prepare a report.

D. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or

excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

END OF SECTION 01 7700

SECTION 01 7823

OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following per Article 6.4.1; Final Documents, of the Contract.
   1. Emergency procedure manuals.
   2. Operation manuals for systems, subsystems, and equipment.
   3. Maintenance manuals for the care and maintenance of products, materials, and finishes systems and equipment.

B. See Divisions 02 through 33 Sections for specific operation and maintenance manual requirements for the Work in those Sections.

1.2 SUBMITTALS

A. Manual: Submit one copy of each manual in final form at least 15 days before final inspection. Design Professional will return copy with comments within 15 days after final inspection.
   1. Correct or modify each manual to comply with Design Professional's comments. Submit 3 copies of each corrected manual within 15 days of receipt of Design Professional's comments.

PART 2 - PRODUCTS

2.1 MANUALS, GENERAL

A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain a title page, table of contents, and manual contents.

B. Title Page: Enclose title page in transparent plastic sleeve. Include the following information:
   1. Subject matter included in manual.
   2. Name and address of Project.
   3. Name and address of Owner.
   4. Date of submittal.
   5. Name, address, and telephone number of Contractor.
   6. Name and address of Design Professional.
   7. Cross-reference to related systems in other operation and maintenance manuals.

C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

1. Binders: Heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
   a. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.
2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software diskettes for computerized electronic equipment.
4. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
   a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
   b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.2 EMERGENCY PROCEDURE MANUALS

A. Content: Organize manual into a separate section for type of emergency, emergency instructions, and emergency procedures.

B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component for fire, flood, gas leak, water leak, power failure, water outage, equipment failure, and chemical release or spill.

C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.

D. Emergency Procedures: Include instructions on stopping, shutdown instructions for each type of emergency, operating instructions for conditions outside normal operating limits, and required sequences for electric or electronic systems.

2.3 OPERATION MANUALS

A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and equipment descriptions, operating standards, operating procedures, operating logs, wiring and control diagrams, and license requirements.

B. Descriptions: Include the following:
   1. Product name and model number.
   2. Manufacturer's name.
   3. Equipment identification with serial number of each component.
   4. Equipment function.
   5. Operating characteristics.

6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include start-up, break-in, and control procedures; stopping and normal shutdown instructions; routine, normal, seasonal, and weekend operating instructions; and required sequences for electric or electronic systems.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.4 PRODUCT MAINTENANCE MANUAL

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Product Information: Include the following, as applicable:
1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and inspection procedures, types of cleaning agents, methods of cleaning, schedule for cleaning and maintenance, and repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

2.5 SYSTEMS AND EQUIPMENT MAINTENANCE MANUAL

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

B. Source Information: List each system, subsystem, and piece of equipment included in manual

identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including maintenance instructions, drawings and diagrams for maintenance, nomenclature of parts and components, and recommended spare parts for each component part or piece of equipment:

D. Maintenance Procedures: Include test and inspection instructions, troubleshooting guide, disassembly instructions, and adjusting instructions, and demonstration and training DVD if available, that detail essential maintenance procedures:

E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.

F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

A. Emergency Procedure Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.

B. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

C. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.

D. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

E. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in Record Drawings to

ensure correct illustration of completed installation.

1. Do not use original Project Record Documents as part of operation and maintenance manuals.

F. Comply with Division 01 Section "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 01 7823

SECTION 01 7839

PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for Project Record Documents, including the following:
   1. Record Drawings.
   2. Record Specifications.
   3. Record Product Data.
   4. Miscellaneous Submittals
   4. Record Documents

B. See Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.

C. See Divisions 02 through 32 Sections for specific requirements for Project Record Documents of the Work in those Sections.

1.2 SUBMITTALS

A. Record Drawings: Comply with the following:
   1. Submit one set of full size marked-up Record Prints
   2. Submit one set half size prints size marked-up Record Prints.

B. Record Specifications: Comply with the following:
   1. Submit one copy of Project's Specifications, including addenda and contract modifications.

C. Record Product Data: Comply with the following:
   1. Submit one copy of each Product Data submittal.

D. Electronic Copies: Using the Record Drawings and Specifications provided by the Construction Professional, the Design Professional shall provide the following
   1. Record Drawings: Submit two copies of electronic media (disk, memory card, etc.) in "PDF" format and "DWG/CAD" format. (Submitted from design professional to SCCPSS)
      a. PDF drawings to be created with layers that can be turned on and off. (no raster scan pdf will be accepted).
      b. Electronic File Naming to be as follows:
         i. School letters code-Sheet number.PDF
            1. Example for Beach High School – Sheet A1.0:"BHS-A1.0.PDF"
   2. Specifications: Submit two copies of electronic media (disk, memory card, etc.) in "PDF" format and "DOC" format. (submitted from design professional to SCCPSS)
      a. Electronic File Naming to be as follows:
         i. School letters code-Specification number-Section Title.PDF
         1. Example for Beach High School – Spec. Section 04 23 13 – Brick Masonry:"BHS-04 23 13-Brick Masonry.PDF"

E. Miscellaneous Submittals
   1. Submit one hard copy of any pertinent documents and one electronic copy in PDF Format

F. Municipality Close Out Documents
   1. Submit as a record of submittal one hard copy of any documents required by authority having jurisdiction and one electronic copy in PDF Format.
      a. Submit CAD file in DWG format if produced as part of this contract.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints: Maintain one set of blue- or black-line white prints of the Contract Drawings and Shop Drawings.
   1. Preparation: Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.
      a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
      b. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.

   2. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.
   3. Mark record sets with erasable, red-colored pencil/or PDF mark-up. Use other colors to distinguish between changes for different categories of the Work at same location.
   4. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

B. Record CAD Drawings: Immediately before inspection for Certificate of Material Completion, review marked-up Record Prints with Design Professional, to assist the Design Professional in preparing a full set of corrected CAD Drawings of the Contract Drawings, as follows:
   1. Format: “DWG” format Autocad version 2000 or greater.
   2. Incorporate changes and additional information previously marked on Record Prints. Delete, redraw, and add details and notations where applicable.
   3. Resolve any instances of uncertainty with Design Professional.

C. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
   1. Record Prints: Organize Record Prints and newly prepared Record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.

   2. Identification: As follows:
      a. Project name.
      b. Date.
      c. Designation "PROJECT RECORD DRAWINGS."
      d. Name of Design Professional.

e. Name of Contractor.

2.2 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
4. Note related Change Orders, Record Product Data, and Record Drawings where applicable.

2.3 RECORD PRODUCT DATA

A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders, Record Specifications, and Record Drawings where applicable.

2.4 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

1.5 MUNICIPALITY RECORD SUBMITTALS

A. Assemble all paper documents submitted to the authority having jurisdiction. Bind or file these records with and identifying each for continued use and reference.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and modifications to Project Record Documents as they occur; do not wait until the end of Project. Project Record Documents will be reviewed periodically during the course of the project, as a part of the payment authorization procedure.

B. Maintenance of Record Documents and Samples: Store Record Documents and Samples in the field office apart from the Contract Documents used for construction. Do not use Project Rec-

ord Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Design Professional's reference during normal working hours.

END OF SECTION 01 7839

SECTION 03 3000

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 WORK INCLUDED

A. Provide all cast-in-place concrete, complete, in place, as indicated on the Drawings, specified herein and required for the complete installation.

1.2 RELATED DOCUMENTS

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

1.3 SUMMARY

A. This Section specifies cast-in place concrete, including formwork, reinforcing, mix design, placement procedures, and finishes.

B. Cast-in-place concrete includes the following:
   1. Foundations and footings.
   2. Slabs-on-grade.
   3. Foundation walls.
   4. Equipment pads and bases.
   5. Grout fill for concrete masonry walls.

1.4 SUBMITTALS

A. General: Submit the following according to Conditions of the Contract and Division 1 Specification Sections.

B. Product data for proprietary materials and items, including reinforcement and forming accessories, admixtures, patching compounds, waterstops, joint systems, curing compounds, dry-shake finish materials, and others if requested by Architect.

C. Shop drawings for Concrete Reinforcement:
   1. Shop drawings shall be submitted by the Contractor to the Architect and review action received prior to fabrication. When corrections are required, copies will be returned noting such. Drawings shall then be corrected and resubmitted until final review action is received. Coordination of shop drawing shall be such that corrections noted on one sheet that affects another drawing will be transmitted and made on all sheets and also resubmitted.
   2. Shop drawings shall also include:
      a. Location of all proposed construction joints, keying and waterstops;
      b. Location of all openings, depressions, construction and control joints, trenches, sleeves, inserts and items affecting the reinforcement and placing of concrete.
   3. The Contractor shall be responsible for checking quantities and dimensions in accordance with contract drawings. Where discrepancies in dimensions are noted, the Contractor shall notify the Architect of such discrepancies and corrected dimensions will then be furnished by the Architect. Corrected dimensions shall be reflected on shop drawings.
   4. Contract drawings receive precedence over shop drawings unless otherwise authorized in writing.

5. Shop drawings furnished for reinforcing steel shall contain fabrication details as well as placement drawings which are to be used in conjunction with contract drawings.
6. Detailing and fabrication of reinforcing shall conform to ACI 315 ADetails and Detailing of Concrete Reinforcement@, and ACI 315R AManual of Engineering and Placing Drawings for Reinforced Concrete Structures@.

D. Samples of materials as requested by Architect, including names, sources, and descriptions, as follows:
1. Color finishes.
2. Normal weight aggregates.
3. Reglets.
4. Vapor barrier.
5. Form liners.

E. Submit 5 copies of laboratory test reports for concrete materials and mix design test. All concrete mix designs shall be prepared by a qualified testing laboratory.

F. Material certificates in lieu of material laboratory test reports when permitted by Architect. Material certificates shall be signed by manufacturer and Contractor, certifying that each material item complies with or exceeds specified requirements. Provide certification from admixture manufacturers that chloride content complies with specification requirements.

G. Review Action: Submittals are reviewed for general conformance with the design concept only and are subject to all requirements of the contract documents. Contractor is responsible for dimensions, quantities and coordination with other trades. Reviews do not authorize any changes involving additional cost unless stated in separate letter or change order.

1.5 QUALITY ASSURANCE

A. Codes and Standards: Comply with provisions of the following codes, specifications, and standards, except where more stringent requirements are shown or specified:
1. American Concrete Institute (ACI) 301, "Specifications for Structural Concrete for Buildings."
2. ACI 311.4R, AManual of Concrete Inspection.@
3. ACI 318, "Building Code Requirements for Reinforced Concrete."
4. ACI 304R, AGuide for Measuring, Mixing, Transporting and Placing Concrete.@
5. Concrete Reinforcing Steel Institute (CRSI) "Manual of Standard Practice."

B. Concrete Testing Service:
1. All testing services specified in this section of these specifications shall be performed by a recognized, independent laboratory approved by the Architect.
2. All expenses of the testing agency shall be borne by the Contractor.
3. The Contractor shall furnish to the testing agency samples of all proposed material to be used which requires testing.
4. Testing agency shall check and review proposed materials to be used for compliance with these specifications, perform all testing in accordance with referenced standards and provide all reports.
5. Contractor shall furnish all project specifications, testing material, mill reports, design mixes and cylinders, and shall notify laboratory of concrete pouring schedules so as not to delay progress of the work.
6. No material or mixes shall be used on project unless approved by the Architect.
7. Materials and installed work may require testing and retesting, as directed by the Architect, at anytime during the progress of the work. Allow free access to material stockpiles and facilities at all times. Retesting of rejected material and installed work, shall be provided at the Contractor=s expense.

C. Tests for Concrete Materials:
   1. Portland cement shall be sampled and tested to determine the properties in accordance with ASTM C 150.
   2. Aggregates shall be sampled and tested in accordance with ASTM C 33 (normal weight).

D. Supervision: All reinforced concrete construction shall be performed under the personal supervision of the contractor=s superintendent. This superintendent shall keep a record of all concrete poured on the job. The record shall show in detail the area poured, the time and date of the pour and weather conditions which existed at the time of the pour. Upon completion of the work, this record shall be turned over to the Architect.

PART 2 PRODUCTS

2.1 FORM MATERIALS

A. Forms for Exposed Finish Concrete: Plywood, metal, metal-framed plywood faced, or other acceptable panel-type materials to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on drawings.

B. Forms for Unexposed Finish Concrete: Plywood, lumber, metal, or another acceptable material. Provide lumber dressed on at least two edges and one side for tight fit.

C. Forms for Textured Finish Concrete: Units of face design, size, arrangement, and configuration to match Architect's control sample. Provide solid backing and form supports to ensure stability of textured form liners.

D. Form Release Agent: Provide commercial formulation form release agent with a maximum of 350 mg/l volatile organic compounds (VOCs) that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

E. Form Ties:
   1. Factory-fabricated, adjustable-length, removable or snap-off metal form ties designed to prevent form deflection and to prevent spalling of concrete upon removal. Provide units that will leave no metal closer than 1-1/2 inches to the plane of the exposed concrete surface.
   2. Provide ties that, when removed, will leave holes not larger than 1 inch in diameter in the concrete surface.

2.2 REINFORCING MATERIALS

A. Reinforcing Bars: ASTM A 615, Grade 60, deformed.

B. Steel Wire: ASTM A 1064, plain, cold-drawn steel.

C. Welded Wire Fabric: ASTM A 1064, welded steel wire fabric.

D. Deformed-Steel Welded Wire Fabric: ASTM A 497.

E. Supports for Reinforcement: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place. Use wire bar-type supports complying with CRSI specifications.
   1. For slabs-on-grade, including thickened slab areas, use supports with sand plates or horizontal runners where base material will not support chair legs.

2. For exposed-to-view concrete surfaces where legs of supports are in contact with forms, provide supports with legs that are protected by plastic (CRSI, Class 1) or stainless steel (CRSI, Class 2).
3. For foundations, support reinforcing in bottom at footings with whole concrete bricks at 4'-0" on center.

2.3 CONCRETE MATERIALS

A. Portland Cement:
1. Comply with ASTM C 150, Type I.
2. Use one brand of cement throughout Project unless otherwise acceptable to Architect.

B. Fly Ash: ASTM C 618, Type F.

C. Normal-Weight Aggregates:
1. Comply with ASTM C 33 Class 4M and as specified. Provide aggregates from a single source for exposed concrete.
2. For exposed exterior surfaces, do not use fine or coarse aggregates that contain substances that cause spalling.
3. Local aggregates not complying with ASTM C 33 that have been shown to produce concrete of adequate strength and durability by special tests or actual service may be used when acceptable to Architect.
4. Do not use aggregates containing soluble salts, iron sulphide, pyrite, marcasite or ochre which can cause strains on exposed concrete surfaces.
5. Dune sand, bank run sand and manufactured sand are not acceptable.
6. Coarse Aggregate: Clean, uncoated, processed aggregate containing no clay, mud, loam or foreign matter, as follows:
   a. Crushed stone, processed from natural rock or stone.
   b. Washed gravel, either natural or crushed. Use of pit or bank run gravel is not permitted.
   c. Maximum Aggregate Size: Not larger than one-fifth of the narrowest dimension between sides of forms, one-third of the depths of slabs nor three-fourths of the minimum clear spacing between individual reinforcing bars or bundles of bars nor over 1" in max. size except for block fill where max. size shall not exceed 2".

      These limitations may be waived if, in the judgement of the Architect, workability and methods of consolidation are such that concrete can be placed without honeycomb or voids.

D. Water: Potable.

E. Admixtures, General: Provide concrete admixtures that contain not more than 0.1 percent chloride ions.

F. Air-Entraining Admixture:
1. Comply with ASTM C 260, certified by manufacturer to be compatible with other required admixtures.

G. Water-Reducing Admixture:
1. Comply with ASTM C 494, Type A.

H. High-Range Water-Reducing Admixture:
1. Comply with ASTM C 494, Type F or Type G.

I. Water-Reducing, Accelerating Admixture:
1. Comply with ASTM C 494, Type E.

J. Water-Reducing, Retarding Admixture:
   1. Comply with ASTM C 494, Type D.

K. Calcium Chloride: Calcium chloride will not be permitted in concrete.

2.4 RELATED MATERIALS

A. Preformed Expansion Joint Fillers: Premolded fillers shall meet ASpecifications for Premolded Expansion Joint Fillers for Concrete Paving and Structural Construction@, ASTM D 1751.

B. Reglets: Where sheet flashing or bituminous membranes are terminated in reglets, provide reglets of not less than 0.0217-inch-thick (26-gage) galvanized sheet steel. Fill reglet or cover face opening to prevent intrusion of concrete or debris.

C. Slab on Grade Floor Joint Forms:
   1. Interior spaces: 24 ga., pre-shaped keyed type galvanized steel joint forms and stakes. Galvanizing shall be hot-dipped conforming to ASTM A 653 Grade 80 Steel G90 coating class.
   2. Exterior spaces: Wood or metal removable tongue and groove joint forms.

D. Chemical Hardener: Colorless aqueous solution containing a blend of magnesium fluosilicate and zinc fluosilicate combined with a wetting agent, containing not less than 2 pounds of fluosilicates per gallon.

E. Sand Fill: Clean, manufactured or natural sand.

F. Membrane-Forming Curing Compound: ASTM C 1315, 30% solids content minimum, Type 1, Class A.

G. Nonslip Aggregate Finish: Provide fused aluminum oxide granules or crushed emery as the abrasive aggregate for a nonslip finish, with emery aggregate containing not less than 50 percent aluminum oxide and not less than 25 percent ferric oxide. Use material that is factory-graded, packaged, rustproof, nonglazing, and unaffected by freezing, moisture, and cleaning materials.

H. Colored Wear-Resistant Finish:
   1. Use packaged dry combination of materials consisting of portland cement, graded quartz aggregate, coloring pigments, and plasticizing admixture. Use coloring pigments that are finely ground nonfading mineral oxides interground with cement. Color as selected by Architect from manufacturers' standards, unless otherwise indicated.

I. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 oz. per sq. yd., complying with AASHTO M 182, Class 2.

J. Moisture-Retaining Cover: One of the following, complying with ASTM C 171.
   1. Waterproof paper.
   2. Polyethylene film.
   3. Polyethylene-coated burlap.

K. Liquid Membrane-Forming Curing Compound: Liquid-type membrane-forming curing compound complying with ASTM C 309, Type I, Class A.

L. Epoxy Adhesive:
   1. ASTM C 881, two-component material suitable for use on dry or damp surfaces. Provide material type, grade, and class to suit Project requirements.

2.5 PROPORTIONING AND DESIGNING MIXES

A. Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 301. For the trial batch method, use an independent testing agency acceptable to Architect for preparing and reporting proposed mix designs.
   1. Limit use of fly ash to not exceed 25 percent of cement content by weight.

B. Submit written reports to Architect of each proposed mix for each class of concrete at least 15 days prior to start of Work. Do not begin concrete production until proposed mix designs have been reviewed by Architect.

C. Design mixes to provide normal weight concrete with the following properties as indicated on drawings and schedules:
   1. Exterior Concrete, Exposure Category F:
      a. Formed Concrete (Class F1): 4500 psi, 28-day compressive strength; 0.45 water/cement; air-entrained.
      b. Slab on Grade (Class F2): 4500 psi, 28-day compressive strength; 0.45 water/cement; air-entrained.
      c. Foundations (Class F0): 3000 psi, 28-day compressive strength; non-air-entrained.
   2. Interior Concrete:
      a. Formed Concrete: 4000 psi, 28-day compressive strength; 564 lbs. Cement per cubic yard minimum; non-air-entrained.
      b. Slabs on Grade: 3000 psi, 28-day compressive strength; non-air-entrained.
      c. Foundations: 3000 psi, 28-day compressive strength; non-air-entrained.
   3. Concrete Masonry Grout: 2500 psi, 28-day compressive strength.

D. Slump Limits: Proportion and design mixes to result in concrete slump at point of placement as follows:
   1. Ramps, slabs, and sloping surfaces: Not more than 4 inches.
   2. Reinforced foundation systems: Not less than 1 inch and not more than 4 inches.
   3. Concrete containing high-range water-reducing admixture (superplasticizer): Not more than 8 inches after adding admixture to site-verified 2-to-3-inch slump concrete.
   4. Concrete masonry grout: not less than 8 inches and not more than 11 inches.
   5. Other concrete: Not more than 4 inches.

E. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant, as accepted by Architect. Laboratory test data for revised mix design and strength results must be submitted to and accepted by Architect before using in Work. <u>No water shall be added to concrete mix at job site unless approved by Architect</u>, except where indicated on delivery ticket that water has been withheld at batch plant and total amount of water does not exceed the total amount of mix water on the approved mix design.

2.6 ADMIXTURES

A. Use water-reducing admixture or high-range water-reducing admixture (superplasticizer) in concrete, as required, for placement and workability.

B. Use accelerating admixture in concrete slabs placed at ambient temperatures below 50 deg F (10 deg C).

C. Use high-range water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs, architectural concrete, parking structure slabs, concrete required to be watertight, and concrete with water-cement ratios below 0.50.

D. Use air-entraining admixture in exterior exposed concrete unless otherwise indicated. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having total air content with a tolerance of plus or minus 1-1/2 percent within the following limits:
   1. Concrete structures and slabs exposed to freezing and thawing, deicer chemicals, or hydraulic pressure:
      a. 4.5 percent (Exposure Class F1); 5.5 percent (Exposure Class F2) for 1-1/2-inch maximum aggregate.
      b. 4.5 percent (Exposure Class F1); 6.0 percent (Exposure Class F2) for 1-inch maximum aggregate.
      c. 5.0 percent (Exposure Class F1); 6.0 percent (Exposure Class F2) for 3/4-inch maximum aggregate.
      d. 5.5 percent (Exposure Class F1); 7.0 percent (Exposure Class F2) for 1/2-inch maximum aggregate.
   2. Other concrete not exposed to freezing and thawing (Exposure Class F0), or hydraulic pressure, or to receive a surface hardener. No air-entrainment. Maximum total air content shall not exceed 3 percent.

E. Use admixtures for water reduction and set accelerating or retarding in strict compliance with manufacturer's directions.

2.7 CONCRETE MIXING

A. Job-Site Mixing:
   1. Mix concrete materials in appropriate drum-type batch machine mixer. For mixers of 1 cu. yd. or smaller capacity, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released. For mixers of capacity larger than 1 cu. yd., increase minimum 1-1/2 minutes of mixing time by 15 seconds for each additional cu. yd.
   2. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mix type, mix time, quantity, and amount of water introduced.

B. Ready-Mixed Concrete:
   1. Comply with requirements of ASTM C 94, and as specified.
   2. When air temperature is between 85 deg F (30 deg C) and 90 deg F (32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes, and when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

PART 3 EXECUTION

3.1 GENERAL

A. Coordinate the installation of joint materials, vapor barrier, and other related materials with placement of forms and reinforcing steel.

3.2 FORMS

A. General:
   1. Design, erect, support, brace, and maintain formwork to support vertical, lateral, static, and dynamic loads that might be applied until concrete structure can support such loads. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation,

and position. Maintain formwork construction tolerances and surface irregularities complying with the following ACI 347 limits:

2. Provide Class A tolerances for concrete surfaces exposed to view.
3. Provide Class C tolerances for other concrete surfaces.

B. Construct forms to sizes, shapes, lines, and dimensions shown and to obtain accurate alignment, location, grades, level, and plumb work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required in the Work. Use selected materials to obtain required finishes. Solidly butt joints and provide backup at joints to prevent cement paste from leaking.

C. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses, and the like for easy removal.

D. Provide temporary openings for clean-outs and inspections where interior area of formwork is inaccessible before and during concrete placement. Securely brace temporary openings and set tightly to forms to prevent losing concrete mortar. Locate temporary openings in forms at inconspicuous locations.

E. Chamfer exposed corners and edges as indicated, using wood, metal, PVC, or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.

F. Provisions for Other Trades: Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses, and chases from trades providing such items. Accurately place and securely support items built into forms.

G. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris just before placing concrete. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

3.3 PLACING REINFORCEMENT

A. General:

1. Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars," for details and methods of reinforcement placement and supports and as specified.
2. Avoiding cutting or puncturing vapor barrier during reinforcement placement and concreting operations. Repair damages before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials that reduce or destroy bond with concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as approved by Architect.

D. Place reinforcement to maintain minimum coverages as indicated for concrete protection. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

E. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

F. Isolation Joints in Slabs-on-Grade: Construct isolation joints in slabs-on-grade at all points of contact between slabs-on-grade and vertical surfaces column pedestals, foundation walls, grade beams and elsewhere as indicated on the drawings.

3.4 JOINTS

A. Construction Joints: Locate and install construction joints so they do not impair strength or appearance of the structure, as acceptable to Architect.

B. Provide keyways at least 1-1/2 inches deep in construction joints in walls and slabs and between walls and footings. Bulkheads designed and accepted for this purpose may be used for slabs.

C. Place construction joints perpendicular to main reinforcement. Continue reinforcement across construction joints except as indicated otherwise. Do not continue reinforcement through sides of strip placements.

D. Use bonding agent on existing concrete surfaces that will be joined with fresh concrete.

E. Construction Joints in Slabs-on-Grade:
1. Construction joints for slab-on-grade (floor joints) shall be tongue and groove key type wood or steel joint form. Prefabricated metal floor joint forms shall be installed as per manufacturer=s instructions.
2. All floor joints to be removed shall be painted on one side with grease or mastic to prevent bond.
3. Galvanized steel interior floor joint forms may be set to permit simultaneous pouring of concrete on both sides. Metal form to be left in place.

F. Isolation Joints in Slabs-on-Grade: Construct isolation joints in slabs-on-grade at points of contact between slabs-on-grade and vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
1. Joint fillers and sealants are specified in Division 7 Section "Joint Sealants."

3.5 INSTALLING EMBEDDED ITEMS AND ANCHORS

A. General: Set and build into formwork anchorage devices and other embedded items required for other work that is attached to or supported by cast-in-place concrete. Use setting drawings, diagrams, instructions, and directions provided by suppliers of items to be attached.

B. Install reglets to receive top edge of foundation sheet waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, relieving angles, and other conditions.

C. Install dovetail anchor slots in concrete structures as indicated on drawings.

D. Edge Forms and Screed Strips for Slabs: Set edge forms, or bulkheads and intermediate screed strips for slabs to obtain the elevations and contours in the finished slab surface. Provide and secure units to support the type of screed strips by the use of strike-off templates or accepted compacting type screeds. Screed strips are to be constructed, supported and set to avoid displacement of reinforcing steel positions.

E. All post-installed mechanical anchors shall be tested in accordance with ACI 355.2 and shall be installed as directed by the inspected manufactured written instructions and in accordance with the ICC-ES report.

F. All post-installed adhesive anchors shall be tested in accordance with ACI 355.4 and shall be installed as directed by the inspected manufactured written instructions and in accordance with the ICC-ES report.

3.6 PREPARING FORM SURFACES

A. General: Coat contact surfaces of forms with an approved, nonresidual, low-VOC, form-coating compound before placing reinforcement.

B. Do not allow excess form-coating material to accumulate in forms or come into contact with in-place concrete surfaces against which fresh concrete will be placed. Apply according to manufacturer's instructions.
   1. Coat steel forms with a nonstaining, rust-preventative material. Rust-stained steel formwork is not acceptable.

3.7 CONCRETE PLACEMENT

A. Inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast in. Notify other trades to permit installation of their work.

B. General: Comply with ACI 304R, "Guide for Measuring, Mixing, Transporting, and Placing Concrete," and as specified.

C. Deposit concrete continuously or in layers of such thickness that no new concrete will be placed on concrete that has hardened sufficiently to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as specified. Deposit concrete to avoid segregation at its final location.

D. Placing Concrete in Forms:
   1. Deposit concrete in forms in horizontal layers no deeper than 24 inches and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.
   2. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures for consolidation of concrete complying with ACI 309R.
   3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations no farther than the visible effectiveness of the machine. Place vibrators to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mix to segregate.

E. Placing Concrete Slabs:
   1. Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until completing placement of a panel or section.
   2. Consolidate concrete during placement operations so that concrete is thoroughly worked around reinforcement, other embedded items and into corners.
   3. Bring slab surfaces to correct level with a straightedge and strike off. Use bull floats or darbies to smooth surface free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations.
   4. Maintain reinforcing in proper position on chairs during concrete placement.

F. Cold-Weather Placement: Comply with provisions of ACI 306R and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

G. When air temperature has fallen to or is expected to fall below 40 deg F (4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C) and not more than 80 deg F (27 deg C) at point of placement.
   1. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
   2. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise accepted in mix designs.

H. Hot-Weather Placement: When hot weather conditions exist that would impair quality and strength of concrete, place concrete complying with ACI 305R and as specified.
   1. Cool ingredients before mixing to maintain concrete temperature at time of placement to below 90 deg F (32 deg C). Mixing water may be chilled or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
   2. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedding in concrete.
   3. Fog spray forms, reinforcing steel, and subgrade just before placing concrete. Keep subgrade moisture uniform without puddles or dry areas.
   4. Use water-reducing retarding admixture when required by high temperatures, low humidity, or other adverse placing conditions, as acceptable to Architect.

3.8 FINISHING FORMED SURFACES

A. Rough-Formed Finish: Provide a rough-formed finish on formed concrete surfaces not exposed to view in the finished Work or concealed by other construction. This is the concrete surface having texture imparted by form-facing material used, with tie holes and defective areas repaired and patched, and fins and other projections exceeding 1/4 inch in height rubbed down or chipped off.

B. Smooth-Formed Finish: Provide a smooth-formed finish on formed concrete surfaces exposed to view or to be covered with a coating material applied directly to concrete, or a covering material applied directly to concrete, such as waterproofing, dampproofing, veneer plaster, painting, or another similar system. This is an as-cast concrete surface obtained with selected form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch defective areas with fins and other projections completely removed and smoothed.

C. Smooth-Rubbed Finish: Provide smooth-rubbed finish on scheduled concrete surfaces that have received smooth-formed finish treatment not later than 1 day after form removal.
   1. Moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.

D. Grout-Cleaned Finish:
   1. Provide grout-cleaned finish on scheduled concrete surfaces that have received smooth-formed finish treatment.
   2. Combine one part portland cement to one and one-half parts fine sand by volume, and a 50:50 mixture of acrylic or styrene butadiene-based bonding admixture and water to form the consistency of thick paint. Blend standard portland cement and white portland cement in amounts determined by trial patches so that final color of dry grout will match adjacent surfaces.

3. Thoroughly wet concrete surfaces, apply grout to coat surfaces, and fill small holes. Remove excess grout by scraping and rubbing with clean burlap. Keep damp by fog spray for at least 36 hours after rubbing.

E. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike-off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.9 MONOLITHIC SLAB FINISHES

A. Scratch Finish: Apply scratch finish to monolithic slab surfaces to receive concrete floor topping or mortar setting beds for tile, portland cement terrazzo, and other bonded applied cementitious finish flooring material, and where indicated.
1. After placing slabs, finish surface to tolerances of F(F) 15 (floor flatness) and F(L) 13 (floor levelness) measured according to ASTM E 1155. Slope surfaces uniformly to drains where required. After leveling, roughen surface before final set with stiff brushes, brooms, or rakes.

B. Float Finish:
1. Apply float finish to monolithic slab surfaces to receive trowel finish and other finishes as specified; slab surfaces to be covered with membrane or elastic waterproofing, membrane or elastic roofing, or sand-bed terrazzo; and where indicated.
2. After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating, using float blades or float shoes only, when surface water has disappeared, or when concrete has stiffened sufficiently to permit operation of power-driven floats, or both. Consolidate surface with power-driven floats or by hand-floating if area is small or inaccessible to power units. Finish surfaces to tolerances of F(F) 20 (floor flatness) and F(L) 15 (floor levelness) measured according to ASTM E 1155. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to a uniform, smooth, granular texture.

C. Trowel Finish:
1. Apply a trowel finish to monolithic slab surfaces exposed to view and slab surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile, paint, or another thin film-finish coating system.
2. After floating, begin first trowel-finish operation using a power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-troweling operation, free of trowel marks, uniform in texture and appearance, and finish surfaces to tolerances of F(F) 38 (floor flatness) and F(L) 30 (floor levelness) and minimum local tolerances of F(F) 25 and F(L) 20 measured according to ASTM E 1155. Grind smooth any surface defects that would telegraph through applied floor covering system.

D. Trowel and Fine Broom Finish: Where ceramic or quarry tile is to be installed with thin-set mortar, apply a trowel finish as specified, then immediately follow by slightly scarifying the surface with a fine broom.

E. Nonslip Broom Finish:
1. Apply a nonslip broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.
2. Immediately after float finishing, slightly roughen concrete surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

F. Nonslip Aggregate Finish:

1. Apply nonslip aggregate finish to concrete stair treads, platforms, ramps, sloped walks, and where indicated.
2. After completing float finishing and before starting trowel finish, uniformly spread 25 lb of dampened nonslip aggregate per 100 sq. ft. of surface. Tamp aggregate flush with surface using a steel trowel, but do not force below surface. After broadcasting and tamping, apply trowel finishing as specified.
3. After curing, lightly work surface with a steel wire brush or an abrasive stone, and water to expose nonslip aggregate.

G. Chemical Hardener Finish:
1. Apply chemical hardener finish to all exposed dry interior concrete floors exposed to view.
2. Apply liquid chemical hardener after complete curing and drying of the concrete surface.
3. Dilute the liquid hardener with water and apply three coats:
   First Coat: 1/3 strength
   Second Coat: 1/2 strength
   Third Coat: 2/3 strength
4. Evenly apply all coats and allow 24 hours drying time between coats.
5. Apply proprietary chemical hardeners, in accordance with manufacturer=s printed instruction.
6. After final coat of chemical-hardener solution is applied and dried, remove surplus hardener by scrubbing and mopping with water.

H. F(L) and F(F) Exceptions:
1. F(L) tolerances and testing specified herein shall not be applicable to formed elevated concrete slab surfaces.
2. F(L) and F(F) tolerances and testing specified shall not be applicable to surfaces within two feet of any floor joints, pre-positioned embedments, or any types of full-depth penetrations in accordance with ASTM E-1155.

3.10 MISCELLANEOUS CONCRETE ITEMS

A. Filling In: Fill in holes and openings left in concrete structures for passage of work by other trades, unless otherwise shown or directed, after work of other trades is in place. Mix, place, and cure concrete as specified to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete Work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on drawings. Set anchor bolts for machines and equipment to template at correct elevations, complying with diagrams or templates of manufacturer furnishing machines and equipment.

D. Reinforced Masonry: Provide concrete grout for reinforced masonry lintels, bond beams and vertically reinforced cells where indicated on the drawings or as scheduled. Maintain accurate location of reinforcing steel during concrete placement. All masonry voids to be kept clean of mortar fins or obstructions to ensure complete filling of designated cells.

3.11 CONCRETE CURING AND PROTECTION

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. In hot, dry, and windy weather protect concrete from rapid moisture loss before and during finishing operations with an evaporation-control material. Apply according to manufacturer's instructions after screeding and bull floating, but before power floating and troweling.

B. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting, keep continuously moist for not less than 7 days.

C. Curing Methods: Cure concrete by curing compound, by moist curing, by moisture-retaining cover curing, or by combining these methods, as specified.

D. Provide moisture curing by the following methods:
   1. Keep concrete surface continuously wet by covering with water.
   2. Use continuous water-fog spray.
   3. Cover concrete surface with specified absorptive cover, thoroughly saturate cover with water, and keep continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with a 4-inch lap over adjacent absorptive covers.

E. Provide moisture-retaining cover curing as follows:
   1. Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least 3 inches and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

F. Apply curing compound on exposed interior slabs and on exterior slabs, walks, and curbs as follows:
   1. Apply curing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours and after surface water sheen has disappeared). Apply uniformly in continuous operation by power spray or roller according to manufacturer's directions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.
   2. Use membrane curing compounds that will not affect surfaces to be covered with finish materials applied directly to concrete.

G. Curing Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces, by moist curing with forms in place for the full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.

H. Curing Unformed Surfaces: Cure unformed surfaces, including slabs, floor topping, and other flat surfaces, by applying the appropriate curing method.
   1. Final cure concrete surfaces to receive finish flooring with a moisture-retaining cover, unless otherwise directed.

3.12 CONCRETE SURFACE REPAIRS

A. Patching Defective Areas: Repair and patch defective areas with cement mortar immediately after removing forms, when acceptable to Architect.

B. Mix dry-pack mortar, consisting of one part portland cement to 2-1/2 parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for handling and placing.
   1. Cut out honeycombs, rock pockets, voids over 1/4 inch in any dimension, and holes left by tie rods and bolts down to solid concrete but in no case to a depth less than 1 inch. Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water, and brush-coat the area to be patched with bonding agent. Place patching mortar before bonding agent has dried.
   2. For surfaces exposed to view, blend white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Provide test areas at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.

C. Repairing Formed Surfaces:
   1. Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of Architect. Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning. Flush out form tie holes and fill with dry-pack mortar or precast cement cone plugs secured in place with bonding agent.
   2. Repair concealed formed surfaces, where possible, containing defects that affect the concrete's durability. If defects cannot be repaired, remove and replace the concrete.

D. Repairing Unformed Surfaces:
   1. Test unformed surfaces, such as monolithic slabs, for smoothness and verify surface tolerances specified for each surface and finish. Correct low and high areas as specified. Test unformed surfaces sloped to drain for trueness of slope and smoothness by using a template having the required slope.
   2. Repair finished unformed surfaces containing defects that affect the concrete's durability. Surface defects include crazing and cracks in excess of 0.01 inch wide or that penetrate to the reinforcement or completely through nonreinforced sections regardless of width, spalling, popouts, honeycombs, rock pockets, and other objectionable conditions.
   3. Correct high areas in unformed surfaces by grinding after concrete has cured at least 14 days.
   4. Correct low areas in unformed surfaces during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete. Proprietary underlayment compounds may be used when acceptable to Architect.
   5. Repair defective areas, except random cracks and single holes not exceeding 1 inch in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose reinforcing steel with at least 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials to provide concrete of same type or class as original concrete.

Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

E. Repair isolated random cracks and single holes 1 inch or less in diameter by dry-pack method. Groove top of cracks and cut out holes to sound concrete and clean of dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding compound. Place dry-pack before bonding agent has dried. Compact dry-pack mixture in place and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

F. Perform structural repairs with prior approval of Architect for method and procedure, using specified epoxy adhesive and mortar.

G. Repair methods not specified above may be used, subject to acceptance of Architect.

3.13 QUALITY CONTROL TESTING DURING CONSTRUCTION

A. General: The Contractor will employ a testing agency to perform tests and to submit test reports.

B. Sampling and testing for quality control during concrete placement may include the following, as directed by Architect.

1. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.
   a. Slump: ASTM C 143; one test at point of discharge for each day's pour of each type of concrete; additional tests when concrete consistency seems to have changed.
   b. Air Content: ASTM C 173, volumetric method for lightweight or normal weight concrete; ASTM C 231, pressure method for normal weight concrete; one for each day's pour of each type of air-entrained concrete.
   c. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F (4 deg C) and below, when 80 deg F (27 deg C) and above, and one test for each set of compressive-strength specimens.
   d. Compression Test Specimen: ASTM C 31; one set of four standard cylinders for each compressive-strength test, unless otherwise directed. Mold and store cylinders for laboratory-cured test specimens except when field-cured test specimens are required.
   e. Compressive-Strength Tests: ASTM C 39; one set for each day's pour exceeding 5 cu. yd. plus additional sets for each 50 cu. yd. more than the first 25 cu. yd. of each concrete class placed in any one day; one specimen tested at 7 days, two specimens tested at 28 days, and one specimen retained in reserve for later testing if required.
2. When frequency of testing will provide fewer than five strength tests for a given class of concrete, conduct testing from at least five randomly selected batches or from each batch if fewer than five are used.
3. When total quantity of a given class of concrete is less than 50 cu. yd., Architect may waive strength testing if adequate evidence of satisfactory strength is provided.
4. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete.
5. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive strength test results equal or exceed specified compressive strength and no individual strength test result falls below specified compressive strength by more than 500 psi.

C. Test results will be reported in writing to the Architect within 24 hours after tests. Reports of compressive strength tests shall contain the Project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-day tests and 28-day tests.

D. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted but shall not be used as the sole basis for acceptance or rejection.

E. Floor Tolerance Testing: Test slab in accordance with ASTM E1155 within 24 hours of the final troweling. Provide tolerance report including key plan showing location and results of testing to the Architect.

F. Additional Tests: The testing agency will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by Architect. Testing agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed.

END OF SECTION 03 3000

SECTION 04 2000

UNIT MASONRY

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. Concrete masonry units.
2. Decorative concrete masonry units.
3. Mortar and grout.
4. Steel reinforcing bars.
5. Masonry-joint reinforcement.
6. Ties and anchors.
7. Miscellaneous masonry accessories.

1.3 DEFINITIONS

A. CMU(s): Concrete masonry unit(s).

B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For the following:
1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
2. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.

1.6 INFORMATIONAL SUBMITTALS

A. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers,

source of supply, and other information as required to identify materials used. Include mix proportions for mortar and grout and source of aggregates.

1. Submittal is for information only. Receipt of list does not constitute approval of deviations from the Contract Documents unless such deviations are specifically brought to the attention of Architect and approved in writing.

B. Qualification Data: For testing agency.

C. Material Certificates: For each type and size of the following:
   1. Masonry units.
      a. Include data on material properties material test reports substantiating compliance with requirements.
      b. For brick, include size-variation data verifying that actual range of sizes falls within specified tolerances.
      c. For exposed brick, include test report for efflorescence according to ASTM C67.
   2. Grout mixes. Include description of type and proportions of ingredients.
   3. Reinforcing bars.
   4. Joint reinforcement.
   5. Anchors, ties, and metal accessories.

D. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
   1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C109/C109M for compressive strength, ASTM C1506 for water retention, and ASTM C91/C91M for air content.
   2. Include test reports, according to ASTM C1019, for grout mixes required to comply with compressive strength requirement.

E. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to TMS 602/ACI 530.1/ASCE 6.

F. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.7 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM C1093 for testing indicated.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

D. Deliver preblended, dry mortar mix in moisture-resistant containers. Store preblended, dry mortar mix in delivery containers on elevated platforms in a dry location or in covered weatherproof dispensing silos.

E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.9 FIELD CONDITIONS

A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
   1. Extend cover a minimum of 24 inches down both sides of walls, and hold cover securely in place.
   2. Where one wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to unconstructed wythe, and hold cover in place.

B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.

C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
   1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
   2. Protect sills, ledges, and projections from mortar droppings.
   3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
   4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.
   1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.

E. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.

B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

2.2 PERFORMANCE REQUIREMENTS

A. Provide structural unit masonry that develops indicated net-area compressive strengths at 28 days.
   1. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to TMS 602/ACI 530.1/ASCE 6.
   2. Determine net-area compressive strength of masonry by testing masonry prisms according to ASTM C1314.

2.3 UNIT MASONRY, GENERAL

A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6, except as modified by requirements in the Contract Documents.

B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed Work.

C. Fire-Resistance Ratings: Comply with requirements for fire-resistance-rated assembly designs indicated.
   1. Where fire-resistance-rated construction is indicated, units shall be listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction.

2.4 CONCRETE MASONRY UNITS

A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.
   1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
   2. Provide [**square-edged**] [**bullnose**] units for outside corners unless otherwise indicated.

B. CMUs: ASTM C90.
   1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2150 psi.
   2. Density Classification: Lightweight.

3. Size (Width): Manufactured to dimensions 3/8 inch less than nominal dimensions.
4. Exposed Faces: Provide color and texture matching the range represented by Architect's sample.
5. Faces to Receive Plaster: Where units are indicated to receive a direct application of plaster, provide textured-face units made with gap-graded aggregates.

C. Concrete Building Brick: ASTM C55.
1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2800 psi.
2. Density Classification: Lightweight.

D. Decorative CMUs: ASTM C90.
1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2800 psi (19.3 MPa).
2. Density Classification: Normal weight.
3. Size (Width): Manufactured to dimensions specified in "CMUs" Paragraph.
4. Pattern and Texture:
   a. Standard pattern, split-face finish. Match Architect's samples.
   b. Custom shapes for external corners

5. Colors: Gray Ready for field finish ,Paint
6.

2.5 MASONRY LINTELS

A. General: Provide one of the following:

B. Masonry Lintels: Prefabricated or built-in-place masonry lintels made from bond beam CMUs matching adjacent CMUs in color, texture, and density classification, with reinforcing bars placed as indicated and filled with coarse grout. Cure precast lintels before handling and installing. Temporarily support built-in-place lintels until cured.

2.6 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C150/C150M, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

1. Alkali content shall not be more than 0.1 percent when tested according to ASTM C114.

B. Hydrated Lime: ASTM C207, Type S.

C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.

D. Masonry Cement: ASTM C91/C91M.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Cemex S.A.B. de C.V.
b. Essroc.
c. Holcim (US) Inc.
d. Lafarge North America Inc.
e. Lehigh Hanson; HeidelbergCement Group.

E. Aggregate for Mortar: ASTM C144.
1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
2. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
3. White-Mortar Aggregates: Natural white sand or crushed white stone.
4. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.

F. Aggregate for Grout: ASTM C404.

G. Water: Potable.

2.7 REINFORCEMENT

A. Uncoated-Steel Reinforcing Bars: ASTM A615/A615M or ASTM A996/A996M, Grade 60.

B. Masonry-Joint Reinforcement, General: ASTM A951/A951M.
1. Interior Walls: Hot-dip galvanized carbon steel.
2. Exterior Walls: Hot-dip galvanized carbon steel.
3. Wire Size for Side Rods: 0.148-inch diameter.
4. Wire Size for Cross Rods: 0.148-inch diameter.
5. Wire Size for Veneer Ties: 0.148-inch diameter.
6. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches o.c.
7. Provide in lengths of not less than 10 feet, with prefabricated corner and tee units.

C. Masonry-Joint Reinforcement for Single-Wythe Masonry: truss type with single pair of side rods.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
a. Wire-Bond.
b. Duro-O-Wall
c. H&B

2.8 TIES AND ANCHORS

A. General: Ties and anchors shall extend at least 1-1/2 inches into veneer but with at least a 5/8-inch cover on outside face.

B. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:
1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A82/A82M, with ASTM A153/A153M, Class B-2 coating.

2. Galvanized-Steel Sheet: ASTM A653/A653M, Commercial Steel, G60 zinc coating.
3. Steel Sheet, Galvanized after Fabrication: ASTM A1008/A1008M, Commercial Steel, with ASTM A153/A153M, Class B coating.
4. Steel Plates, Shapes, and Bars: ASTM A36/A36M.

C. Corrugated-Metal Ties: Metal strips not less than 7/8 inch wide with corrugations having a wavelength of 0.3 to 0.5 inch and an amplitude of 0.06 to 0.10 inch made from 0.030-inch-thick steel sheet, galvanized after fabrication 0.060-inch-thick steel sheet, galvanized after fabrication.

D. Individual Wire Ties: Rectangular units with closed ends and not less than 4 inches wide.

1. Z-shaped ties with ends bent 90 degrees to provide hooks not less than 2 inches long may be used for masonry constructed from solid units.
2. Wire: Fabricate from 3/16-inch-diameter, hot-dip galvanized steel wire.

E. Adjustable Anchors for Connecting to Structural Steel Framing: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
1. Anchor Section for Welding to Steel Frame: Crimped 1/4-inch-diameter, hot-dip galvanized steel wire.
2. Tie Section: Triangular-shaped wire tie made from 0.25-inch-diameter, hot-dip galvanized steel wire.

F. Partition Top Anchors: 0.105-inch-thick metal plate with a 3/8-inch-diameter metal rod 6 inches long welded to plate and with closed-end plastic tube fitted over rod that allows rod to move in and out of tube. Fabricate from [**steel, hot-dip galvanized after fabrication**] [**stainless steel**].

G. Rigid Anchors: Fabricate from steel bars 1-1/2 inches wide by 1/4 inch thick by 24 inches long, with ends turned up 2 inches or with cross pins unless otherwise indicated.
1. Corrosion Protection: Hot-dip galvanized to comply with ASTM A153/A153M.

2.9 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene urethane or PVC.

B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D2000, Designation M2AA-805 or PVC, complying with ASTM D2287, Type PVC-65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

C. Bond-Breaker Strips: Asphalt-saturated felt complying with ASTM D226/D226M, Type I (No. 15 asphalt felt).

2.10 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.
   1. Do not use calcium chloride in mortar or grout.
   2. Use portland cement-lime masonry cement or mortar cement mortar unless otherwise indicated.

B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

C. Mortar for Unit Masonry: Comply with ASTM C270, Property Specification. Provide the following types of mortar for applications stated unless another type is indicated or needed to provide required compressive strength of masonry.
   1. For masonry below grade or in contact with earth, use Type M.
   2. For reinforced masonry, use Type S.
   3. For exterior, above-grade, load-bearing and nonload-bearing walls and parapet walls; for interior load-bearing walls; for interior nonload-bearing partitions; and for other applications where another type is not indicated, use Type S.
   4. For interior nonload-bearing partitions, Type O may be used instead of Type N.

D. Grout for Unit Masonry: Comply with ASTM C476.
   1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with TMS 602/ACI 530.1/ASCE 6 for dimensions of grout spaces and pour height.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
   1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
   2. Verify that foundations are within tolerances specified.
   3. Verify that reinforcing dowels are properly placed.
   4. Verify that substrates are free of substances that impair mortar bond.

B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.

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

3.2 INSTALLATION, GENERAL

A. Thickness: Build cavity and composite walls and other masonry construction to full thickness shown. Build single-wythe walls to actual widths of masonry units, using units of widths indicated.

B. Build chases and recesses to accommodate items specified in this and other Sections.

C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match construction immediately adjacent to opening.

D. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

E. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures. Mix units from several pallets or cubes as they are placed.

F. Matching Existing Masonry: Match coursing, bonding, color, and texture of existing masonry.

3.3 TOLERANCES

A. Dimensions and Locations of Elements:
1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch or minus 1/4 inch.
2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch.
3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.

B. Lines and Levels:
1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 feet, or 1/2-inch maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2-inch maximum.
3. For vertical lines and surfaces, do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2-inch maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2-inch maximum.
5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2-inch maximum.
6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet or 1/2-inch maximum.
7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch except due to warpage of masonry units within tolerances specified for warpage of units.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch.
2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.
5. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16 inch from one masonry unit to the next.

3.4 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in stack bond; do not use units with less-than-nominal 4-inch horizontal face dimensions at corners or jambs.

C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 4 inches. Bond and interlock each course of each wythe at corners. Do not use units with less-than-nominal 4-inch horizontal face dimensions at corners or jambs.

D. Stopping and Resuming Work: Stop work by stepping back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.

E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

F. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

G. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below, and rod mortar or grout into core.

H. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

I. Build nonload-bearing interior partitions full height of story to underside of solid floor or roof structure above unless otherwise indicated.
   1. Install compressible filler in joint between top of partition and underside of structure above.
   2. Fasten partition top anchors to structure above and build into top of partition. Grout cells of CMUs solidly around plastic tubes of anchors and push tubes down into grout to

provide 1/2-inch clearance between end of anchor rod and end of tube. Space anchors 48 inches o.c. unless otherwise indicated.

3. Wedge nonload-bearing partitions against structure above with small pieces of tile, slate, or metal. Fill joint with mortar after dead-load deflection of structure above approaches final position.
4. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Section 078443 "Joint Firestopping."

3.5 MORTAR BEDDING AND JOINTING

A. Lay CMUs as follows:
1. Bed face shells in mortar and make head joints of depth equal to bed joints.
2. Bed webs in mortar in all courses of piers, columns, and pilasters.
3. Bed webs in mortar in grouted masonry, including starting course on footings.
4. Fully bed entire units, including areas under cells, at starting course on footings where cells are not grouted.
5. Fully bed units and fill cells with mortar at anchors and ties as needed to fully embed anchors and ties in mortar.

B. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

D. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

3.6 MASONRY-JOINT REINFORCEMENT

A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.
1. Space reinforcement not more than 16 inches o.c.
2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings.

B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.

C. Provide continuity at wall intersections by using prefabricated T-shaped units.

D. Provide continuity at corners by using prefabricated L-shaped units.

E. Cut and bend reinforcing units as directed by manufacturer for continuity at[**corners,**] returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.7 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

A. Anchor masonry to structural steel and concrete, where masonry abuts or faces structural steel or concrete, to comply with the following:
   1. Provide an open space not less than 1/2 inch wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
   2. Anchor masonry with anchors embedded in masonry joints and attached to structure.
   3. Space anchors as indicated, but not more than 24 inches o.c. vertically and 36 inches o.c. horizontally.

3.8 CONTROL AND EXPANSION JOINTS

A. General: Install control- and expansion-joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.

B. Form control joints in concrete masonry as follows:
   1. Install interlocking units designed for control joints. Install bond-breaker strips at joint. Keep head joints free and clear of mortar or rake out joint for application of sealant.

3.9 LINTELS

A. Install steel lintels where indicated.

B. Provide masonry lintels where shown and where openings of more than 12 inches for brick-size units and 24 inches for block-size units are shown without structural steel or other supporting lintels.

C. Provide minimum bearing of 8 inches at each jamb unless otherwise indicated.

3.10 REINFORCED UNIT MASONRY

A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
   1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
   2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and that of other loads that may be placed on them during construction.

B. Placing Reinforcement: Comply with requirements in TMS 602/ACI 530.1/ASCE 6.

C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.

1. Comply with requirements in TMS 602/ACI 530.1/ASCE 6 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
2. Limit height of vertical grout pours to not more than 60 inches.

3.11 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.

3.12 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

B. Excess Masonry Waste: Remove excess clean masonry waste and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 04 2000

SECTION 06 4110

ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 DESCRIPTION OF WORK

A. Extent of each type of architectural woodwork is indicated and scheduled.

B. Types of architectural woodwork include the following:
1. Architectural wood Cabinets
2. Cabinet Tops; Solid Surface, Plastic Laminate
3. Closet shelving
4. Miscellaneous Shelving

1.03 QUALITY ASSURANCE

A. AWI Quality Standard: Comply with applicable requirements of Architectural Woodwork Institute (AWI), "Architectural Woodwork Quality Standards", except as otherwise indicated.

B. Arrange for architectural woodwork with sequence matched wood veneers to be produced by single firm.
1. Include veneering of wood doors in single-firm production, where veneer matching extends across wood doors.

C. Coordination: Distribute copies of approved scheduled for cabinet hardware specified in Division-8 section "Door Hardware" to manufacturer of architectural woodwork; coordinate cabinet shop drawings and fabrication with hardware requirements.

D. Installer Qualifications: Arrange for installation of architectural woodwork by firm demonstrating successful experience in installation of architectural woodwork items similar in type and quality to those required for Project.

E. Installer Qualifications: Arrange for installation of architectural woodwork items by same firm which fabricated them.

1.04 SUBMITTALS

A. Product Data: Submit manufacturer's product data for each product and process specified as work of this section and incorporated into items of architectural woodwork during fabrication, finishing, and installation.

B. Wood Treatment Data: Submit chemical treatment manufacturer's instructions for handling, storing, installation, and finish of treated material.
1. Non-Pressure preservative Treatment: Include certification stating chemical solution and submersion period used and affirming compliance with indicated treatment standards.
2. Pressure Preservative Treatment: For each type of treatment and wood species indicated, include

certification of treating plant stating type of preservative solution, net amount of preservatives retained, depth of penetration and compliance with indicated standards.

3. Fire-Retardant Treatment: Include certification by treating plant that treated materials comply with requirements.

C. Quality Certification: Submit woodwork Manufacturer's (Fabricator's) certification, stating that fabricated woodwork complies with quality grades and other requirements indicated.

D. Shop Drawings: Submit shop drawings showing location of each item, dimensioned plans and elevations, large scale details, attachment devices and other components.

E. Samples: Submit the following samples:
1. Lumber with or for transparent finish; 6" x 3/4" x 18", for each species and cut, finished on one side and one edge.
2. Veneer leaves representative of and selected from, flitches to be used for transparent finished woodwork.
3. Wood veneer faced panel products, with or for transparent finish, finished, 8" x 10", for each species and cut.
4. Lumber or panel products with factory-applied opaque finish, 8" x 10", for each finish system and color.
5. Plastic laminate, 8" x 10" for each type, color, pattern and surface finish.
6. Flexible wood paneling, 8" x 10" for each type, pattern and surface finish.
7. Exposed cabinet hardware, one unit of each type and finish.

1.05 DELIVERY, STORAGE AND HANDLING

A. Protect woodwork during transit, delivery, storage and handling to prevent damage, soiling and deterioration.

B. Do not deliver woodwork, until painting, wet work, grinding and similar operations which could damage, soil or deteriorate woodwork have been completed in installation areas.
1. If, due to unforeseen circumstances, woodwork must be stored in other than installation areas, store only in areas meeting requirements specified for installation areas.

1.06 PROJECT CONDITIONS

A. Conditioning:
1. Woodwork Manufacturer and Installer advise Contractor of temperature and humidity requirements for woodwork installation and storage areas.
2. Do not install woodwork until required temperature and relative humidity stabilized and maintained in installation areas.

B. Maintain temperature and humidity in installation area as required to maintain moisture content of installed woodwork within a 1.0 percent tolerance of optimum moisture content, from date of installation through remainder of construction period.
1. Require Woodwork Manufacturer to establish optimum moisture content and required temperature and humidity condition.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Manufacturer: Subject to compliance with requirements, provide products of one of the following:

1. High Pressure Decorative Laminates:
    a. Consoweld Corp.
    b. Formica Corp.
    c. Lamin-Art.
    d. Micarta Div., Westinghouse Electric Corp.
    e. Nevamar Corp.
    f. Pioneer Plastics, Div. of LOF Plastics, Inc.
    g. Ralph Wilson Plastics Co.
2. Flexible Wood Paneling:
    a. National Products Co.
    b. Flexible Materials, Inc.
    c. Forms + Surfaces
3. Solid Surfacing
    a. Corian; Dupont
    b. Gibraltar; Ralph Wilson Plastics Co.
    c. Avonite
4. Epoxy Resin
    a. Theressa
    b. Durcon Inc.
    c. Rhea Resin.
    d. Thermo Fisher

2.02 FABRICATION, GENERAL

A. Wood Moisture Content: Comply with requirements of referenced quality standard for moisture content of lumber at time of fabrication and for relative humidity conditions in the installation areas.

B. Fabricate woodwork to dimensions, profiles, and details indicated with openings and mortises precut, where possible, to receive hardware and other items and work.
    1. Ease edges to 1/16" radius, for corners of cabinets and edges of solid wood (lumber) members less than 1" in nominal thickness, 1/8" radius for edges of rails and similar members over 1" in nominal thickness.

C. Complete fabrication, assembly, finishing, hardware application, and other work before shipment to project site to maximum extent possible.
    1. Disassemble components only as necessary for shipment and installation.
    2. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

D. Pre-Cut Openings:
    1. Fabricate architectural woodwork with pre-cut openings, where possible, to receive hardware, appliances, plumbing fixtures, electrical work and similar items.
    2. Locate openings accurately and use templates or roughing-in diagrams for proper size and shape.
    3. Smooth edges of cutoffs and, where located in countertops and similar exposures seal edges of cutouts with a water-resistant coating.

E. Measurements:
    1. Before proceeding with fabrication of woodwork required to be fitted to other construction, obtain field measurements and verify dimensions and shop drawing details as required for accurate fit.
    2. Where sequence of measuring substrates before fabrication would delay the project, proceed with fabrication (without field measurements) and provide ample borders and edges to allow for subsequent scribing and trimming of woodwork for accurate fit.

2.03 FIRE-RETARDANT MATERIALS

A. Where fire-retardant treated lumber is indicated, provide materials which are pressure impregnated with fire-retardant chemicals and comply with the following requirements:
   1. Fire-Retardant Chemicals: Use chemicals of type and for applications indicated which do not bleed-through or otherwise adversely affect finishes; do not use colorant in solution to distinguish treated lumber from untreated lumber.

B. Fire Performance Characteristics: Provide materials which are identical to those tested per ASTM methods and time periods indicated, are marked and listed for fire performance characteristics by Underwriters Laboratories, Inc. or other testing and inspecting agency acceptable to authorities having jurisdiction, and comply with the following requirements:

C. Mill lumber after treatment, within limits set for wood removal which does not affect listed fire performance characteristics, using a woodworking plant certified by testing and inspecting agency.

D. Mill lumber before treatment and institute special procedures during treatment and drying processes to prevent warping, discoloration from drying sticks or other causes, marring or other defects in appearance of treated woodwork.

E. At Contractor's option, mill treated lumber in either sequence indicated above.

F. Marking: Identify treated lumber with separable paper classification marking of inspecting and testing agency, unless otherwise indicated.

G. Surface Burning Characteristics: Not exceeding values indicated below, tested per ASTM E 84 for 30 minutes with no evidence of significant combustion.
   1. Flame Spread: 25.
   2. Smoke Developed: 50.

H. Kiln-dry woodwork after treatment to levels required for non-fire-retardant treated woodwork materials; maintain moisture content required by kiln drying, before and after treatment.

I. Discard treated lumber which does not comply with requirements of referenced woodworking standard; do not use twisted, warped, bowed, discolored, or otherwise damaged or defective lumber.

J. Where fire-retardant particleboard is indicated, provide panels with fire- retardant chemicals incorporated at time of manufacture to achieve surface- burning characteristics of 20 for flame spread and 25 for smoke developed when tested in accordance with ASTM E 84.
   1. Comply with ANSI A108.1 for Grade 1-M-1 panels with density of 45 lbs./cu. ft. for thicknesses of 3/4" and less and 44 lbs./cu. ft for thicknesses of 13/16" to 1-1/4"; except as follows:
      a. Modulus of rupture and modulus of elasticity: 1600 psi and 350,000 psi, respectively, for 48 lb. density, 1300 psi, respectively, and 275,000 psi for 44 lb. density.
      b. Linear expansion: 0.35% for 45 lb. density and 0.50% for 44 lb. density.
      c. Screw-holding capacity, face and edge: 300 lbs. and 250 lbs., respectively, for 45 lb. density, and of 250 and 175 lbs., respectively, for 44 lb. density.

2.04 ARCHITECTURAL CABINETS, WOOD

A. Quality Standard: Comply with AWI Section 400 and its Division 400A "Wood Cabinets".

B. Wood Cabinets for Transparent Finish: Comply with the following requirements:

1. Grade:
   a. Custom, no particleboard permitted. All plywood veneer core.
2. Type of Cabinet Construction:
   a. As indicated.
3. Wood Species for Exposed Surfaces:
   a. Provide White Birch rotary cut
   b. Grain Matching:
      (1) Run and match grain vertically for doors.
      (2) Run and match grain horizontally for drawer fronts.
      (3) As indicated.
   c. Matching of Veneer Leaves:
      (1) A-Face book match plain sliced Venner Core back #2.
   d. Comply with veneer and other matching requirements indicated for Blueprint matched paneling.
4. Wood Species for Semi-Exposed Surfaces: Match species and cut indicated for exposed surfaces.
5. Concealed Members:
   a. Solid Lumber or Plywood: Any species, with no defects affecting strength or utility.
   b. Particleboard: Not permitted.
   c. Hardboard: ANSI A135.4, Class 1, tempered.
6. Drawers:
   a. Construct drawers using Dovetail , French dovetail, lock shoulder. Or dowels spaced 3” apart
   b. Drawer bottoms shall be set into sides and front ¼” deep grove with min 3/8” standing shoulder, Drawer bottom ¼” ply wood veneer face

2.05 CABINET TOPS PLASTIC LAMINATE

A. Quality Standard: Comply with AWI Section 400 and its Division 400C.

B. Type of Top:
   1. High Pressure Decorative Laminate:
      a. Grade:
         (1) Premium.
         (2) Custom.
      b. Laminate Cladding for Horizontal Surface: High pressure decorative laminate complying with NEMA LD 3 and as follows:
         (1) Colors, Patterns, and Finishes: As indicated or, if not otherwise indicated, as selected from laminate manufacturer's standard products in the following categories:
            (a) Solid colors.
            (b) Patterns.
         (2) Colors, Patterns, and Finishes: Match Architect's sample.
         (3) Grade: GP-50 (0.050" nominal thickness).
            (a) Grain Direction: Parallel to longest dimension.
         (4) Edge Treatment:
            (a) Same as laminate cladding on horizontal surface.
            (b) Lumber edge for transparent finish matching wood species and cut on cabinet surfaces.
            (c) As indicated.

2.01 CABINET TOPS SOLID SURFACE

2. Solid Plastic/Solid Surface:
   a. Mineral -filled acrylic resin composition.
      (1) Thickness:
         (a) ½", sizes, shapes indicated.
      (2) Colors, Finishes:
         (a) From Price Groups: (C).
      (3) Edge Treatment:
         (a) Square where abutting other surfaces, with edged rounded to ⅛" radius where exposed.
         (b) Square where abutting other surfaces, fully rounded (bullnose) where exposed.
         (c) Square where abutting other surfaces, formed to profiles indicated where exposed.
      (4) Backsplash: ½" thick by height indicated, or if not indicated, 4", with ¾" radius at top.
      (5) Lavatories: Integral with top made of same material as top. Size: 13”x18”x5¼” deep. Color selected from manufacturers standard.
      (6) Drill holes in countertops for plumbing and accessories at shop.
   b. Manufacturers:
      (1) DuPont “Corian”
      (2) Avonite.
      (3) Wilson Art “Gibraltar”

2.02 WINDOW SILLS – Not used

2.06 FINISHING OF INTERIOR ARCHITECTURAL WOODWORK

A. Quality Standard: Comply with AWI Section 1500, unless otherwise indicated.

B. General: The entire finish of interior architectural woodwork is work of this section, regardless of whether factory-applied or applied after installation.

C. Factory Finishing: To the greatest extent possible, finish architectural woodwork at factory; defer only final touch-up, cleaning and polishing for time after delivery and installation.

D. Preparation for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing of concealed surfaces and similar preparations for finishing of architectural woodwork, as applicable to each unit of work.

E. Transparent Finish for Woods: Comply with requirements indicated below for grade, finish system, staining, effect and sheen.
   a. Grade: Custom.
   b. Finish: AWI System #1 standard lacquer.
   c. Staining: To match approved sample for color. Exterior of cabinet
   d. Staining Interior of cabinet and interior of drawers Clear No stain
   e. Effect:Closed grain (filled finish).
   f. Sheen:Satin-medium rubbed effect.

2.07 CABINET HARDWARE AND ACCESSORY MATERIALS

A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets, except for items which are specified in Division-8 section "Door Hardware".

B. Cabinet Hardware Schedule: Refer to schedule at end of this section for cabinet hardware required for architectural cabinets.

C. Hardware Standard: Comply with ANSI/BHMA A156.9 "American National Standard for Cabinet Hardware" for items indicated by reference to BHMA numbers or referenced to this standard.

D. Hardware Finishes: Comply with BHMA 1301 for finishes indicated by BHMA Code Numbers or if not otherwise indicated, provide finishes complying with requirements indicated below:
   1. For exposed hardware comply with requirements indicated for finish and base indicated by BHMA Code Number below:
      a. 626

   2. For concealed hardware provide manufacturer's standard finish which complies with product class requirements of ANSI/BHMA A156.9.

PART 3 - EXECUTION

3.01 PREPARATION

A. Condition woodwork to average prevailing humidity conditions in installation areas prior to installing.

B. Pre-Installation Meeting:
   1. Meet at project site prior to delivery of architectural woodwork and review coordination and environmental controls required for proper installation and ambient conditioning in areas to receive work.
   2. Include Contractor; Architect and other Owner Representatives (if any); Installers of architectural woodwork, wet work such as plastering, other finishes, painting, mechanical work and electrical work; and firms or persons responsible for continued operation (whether temporary or permanent) of HVAC system required to maintain temperature and humidity conditions.
   3. Proceed with woodwork installation only when all concerned agree that required ambient conditions can be maintained.

C. Deliver concrete inserts and similar anchoring devices to be built into substrates, well in advance of time substrates are to be built.

D. Prior to installation of architectural woodwork, examine shop fabricated work for completion, and complete work as required, including back priming and removal of packing.

3.02 INSTALLATION

A. Install woodwork plumb, level, true and straight with no distortions.
   1. Shim as required using concealed shims.
   2. Install to tolerance of 1/8" in 8'-0" for plumb and level (including tops); and with no variations in flushness of adjoining surfaces.
B. Scribe and cut work to fit adjoining work, and refinish cut surfaces or repair damaged finish at cuts.
   1. Seal cabinet, tops and backsplash to walls using sealant ready to receive wall paint

C. Pressure Treated Wood: Handle, store, and install pressure treated wood in compliance with recommendations of chemical treatment manufacturer including those for adhesives, where required for installation.
   1. For preservative treated lumber cut or drilled in field, treat cut ends with preservative solution used for original treatment by brushing, spraying, dipping or soaking; as required by AWPA M4.

D. Anchor woodwork to anchors or blocking built-in or directly attached.
   1. Secure to grounds, stripping and blocking with countersunk, concealed fasteners and blind nailing as required for complete installation.
   2. Except where prefinished matching fasteners heads required, countersink fine finishing nails for exposed nailing and fill flush with woodwork, matching final finish where transparent finish indicated.

E. Standing and Running Trim: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible.
   1. Stagger joints in adjacent and related members.
   2. Cope at returns, miter at corners and comply with referenced Quality Standards for joinery.

F. Cabinets:
   1. Install without distortion so that doors and drawers fit openings properly and are accurately aligned.
   2. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation.
   3. Complete the installation of hardware and accessory items as indicated.
   4. Maintain veneer sequence matching (if any) of cabinets with transparent finish.
   5. Unless otherwise indicated, anchor cabinets with ¼” fasteners of type appropriate for substrate, max. 12" o.c, min. 2 each unit.
      a. Wall-hung Units: One row top, one row bottom
      b. Base cabinets: One row top
      c. Floor set cabinets over 5'-0" high: One row top.
      d. At vent hood provide finished cover matching cabinets , from top of upper cabinet to underside of ceiling to cover the exhaust vent pipe.

G. Tops: Anchor securely to base units and other support systems as indicated.
   1. Install plastic grommets where indicated, 2" dia. unless otherwise indicated, in cleanly bored holes

H. Paneling:
   1. Anchor paneling to supporting substrate with concealed panel hanger clips, and by blind nailing on back-up strips, splined-connection strips, and similar associated trim and framing.
   2. Do not face-nail, unless otherwise indicated.

I. Shelving: Complete the assembly of units and install in the areas indicated, including hardware and accessories as indicated.

J. Finish Hardware Installation:
   1. Supplier to mark each item of hardware for location.
      a. Protect markings until each item installed.
      b. If any item of hardware delivered to job not marked, return to supplier for marking before attempting to install.
   2. Install and make adjustments for correct working order.
   3. Replace hardware damaged by improper adjustment or abuse, at no additional cost to Owner.
   4. Fit all surface applied hardware.
   5. Provide clean, sized and placed mortises and drilled holes for all mortise hardware such as lock sets,

flush bolts and pivots.

6. After hardware installation, protect exposed surfaces from wear and abuse with heavy paper and masking tape; maintain until job completion.
7. Center kickplates at bottom of doors and provide same margin at bottom as at sides.
8. Remove all hardware, except that which is primed for painting, before painter's finish applied and replace and readjust for function after painter's finish completed and dried hard.

3.03 ADJUSTMENT, CLEANING, FINISHING AND PROTECTION

A. Repair damaged and defective woodwork where possible to eliminate defects functionally and visually; where not possible to repair replace woodwork. Adjust joinery for uniform appearance.

B. Clean, lubricate and adjust hardware.

C. Clean woodwork on exposed and semi-exposed surfaces; touch-up shop-applied finishes to restore damaged or soiled areas.

D. Complete finishing work specified as work of this Section, to whatever extent not completed at shop or prior to installation of woodwork.

E. Refer to the Division 9 sections for final finishing of installed architectural woodwork.

F. Provide final protection and maintain conditions, in manner acceptable to Fabricator and Installer, which ensures architectural woodwork being without damage or deterioration at time of Final Acceptance.

3.04 CABINET HARDWARE SCHEDULE

A. For each 3/4" thick hinged door leaf:
   1. 1 pr. hinges (1-1/2 pair if door height over 3'-6"):
      a. Blum 71M2550 x 175L6600.22
      b. Grass 1006 x G/FFAL 2.6
      c. Lamp 430-C46/19 x 430P4A32
   2. 1 pull:
      a. Stanley 4484 x US26D
      b. Epco MC-402-4 x US26D
      c. Colonial 753
   3. 1 catch (inactive leaf of locked pair):
      a. Amerock BP3675-2G
      b. Epco Co. 1016
      c. Ives 2
   4. 1 cabinet lock (if shown) millwork manufacturer provide Olympus 100 Series

B. For each drawer:
   1. 1 drawer guide set:
      a. hafele – EC 437SC
      b. Grass - 3215
      c. Knape & Vogt 1284
   2. 1 pull (2 if drawer width more than 24"):
      a. Stanley 4484 x US26D

b. Epco MC-402-4 x US26D
c. Colonial 753

3. 1 lock (where shown) millwork manufacturer provide Olympus 200 series

C. For adjustable shelves in cabinetwork:
1. Standards:
a. Grant 120
b. Lamp SP-1820
c. Knape & Vogt 255
2. Brackets:
a. Grant 21
b. Lamp SPB-20
c. Knape & Vogt 256

D. For wall mounted shelves:
1. Standards:
a. Lamp SP-1820
b. Knape & Vogt 80 x length required x anochrome.
2. Brackets:
a. Lamp SPB-20
b. Knape & Vogt 180 x length required x anochrome.

3. Shelf Supports:
a. Hager 1796
b. Lamp BT-380
c. Stanley 796

END OF SECTION 06400

SECTION 08 1113

HOLLOW METAL DOORS AND FRAMES

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 hollow-metal work.

1.3 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings according to SDI A250.8.

1.4 COORDINATION

A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include construction details, material descriptions, core descriptions, fire-resistance ratings, temperature-rise ratings, and finishes.

B. Shop Drawings: Include the following:
   1. Elevations of each door type.
   2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
   3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
   4. Locations of reinforcement and preparations for hardware.
   5. Details of each different wall opening condition.
   6. Details of anchorages, joints, field splices, and connections.
   7. Details of accessories.
   8. Details of moldings, removable stops, and glazing.
   9. Details of conduit and preparations for power, signal, and control systems.

C. Schedule: Provide a schedule of hollow-metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final Door Hardware Schedule.
   1. Provide to section 08710 for inclusion with there submittal

1.6 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each type of hollow-metal door and frame assembly, for tests performed by a qualified testing agency.

B. Oversize Construction Certification: For assemblies required to be fire rated and exceeding limitations of labeled assemblies.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow-metal work palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.

   1. Provide additional protection to prevent damage to factory-finished units.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store hollow-metal work vertically under cover at Project site with head up. Place on minimum 4-inch- high wood blocking. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Ceco Door Products; an Assa Abloy Group company.
   2. Curries Company; an Assa Abloy Group company.
   3. Steelcraft; an Ingersoll-Rand company.

B. Source Limitations: Obtain hollow-metal work from single source from single manufacturer.

2.2 REGULATORY REQUIREMENTS

A. Fire-Rated Assemblies: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings and temperature-rise limits indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.
   1. Smoke- and Draft-Control Assemblies: Provide an assembly with gaskets listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities

having jurisdiction, based on testing according to UL 1784 and installed in compliance with NFPA 105.

B. Fire-Rated, Borrowed-Light Assemblies: Complying with NFPA 80 and listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9.

2.3 INTERIOR DOORS AND FRAMES

A. Construct interior doors and frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

B. Heavy-Duty Doors and Frames: SDI A250.8, Level 2..
   1. Physical Performance: Level B according to SDI A250.4.
   2. Doors:
      a. Type: As indicated in the Door and Frame Schedule.
      b. Thickness: 1-3/4 inches
      c. Top and bottom rail open chanel
      d. Face: Metallic-coated, cold-rolled steel sheet, minimum thickness of 0.042 inch 18 gauge.
      e. Edge Construction: Model 2, Seamless– continuous spot welded.
      f. Core: Manufacturer's standard , polystyrene,

   3. Frames:

      a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch 16 gauge. with A40 coating
      b. Construction: full profile welded.

   4. Exposed Finish: Prime Factory.

2.4 EXTERIOR HOLLOW-METAL DOORS AND FRAMES

1. Not used

2.5 FRAME ANCHORS

A. Jamb Anchors:
   1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
   2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.
   3. Compression Type for Drywall Slip-on Frames: Adjustable compression anchors.

4. Postinstalled Expansion Type for In-Place Concrete Minimum 3/8-inch- diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.

B. Floor Anchors: Formed from same material as frames, minimum thickness of 0.042 inch , and as follows:
   1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
   2. Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at finish floor surface.

2.6 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B.

D. Frame Anchors: ASTM A 879/A 879M, Commercial Steel (CS), 04Z coating designation; mill phosphatized.
   1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.

E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.

F. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.

G. Grout: ASTM C 476, except with a maximum slump of 4 inches , as measured according to ASTM C 143/C 143M.

H. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.

I. Glazing: Comply with requirements in Section 088000 "Glazing."

2.7 FABRICATION

A. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Hollow-Metal Doors:
   1. Steel-Stiffened Door Cores: Provide minimum thickness 0.026 inch , steel vertical stiffeners of same material as face sheets extending full-door height, with vertical webs spaced not more than 6 inches apart. Spot weld to face sheets no more than 5 inches o.c. Fill spaces between stiffeners with glass- or mineral-fiber insulation.
   2. Fire Door Cores: As required to provide fire-protection and temperature-rise ratings indicated.
   3. Vertical Edges for Single-Acting Doors: Bevel edges 1/8 inch in 2 inches .
   4. Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted or as required to comply with published listing of qualified testing agency.

C. Hollow-Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
   1. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
   2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
   3. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
   4. Floor Anchors: Weld anchors to bottoms of jambs with at least four spot welds per anchor; however, for slip-on drywall frames, provide anchor clips or countersunk holes at bottoms of jambs.
   5. Jamb Anchors: Provide number and spacing of anchors as follows:
      a. Masonry Type: Locate anchors not more than 16 inches from top and bottom of frame. Space anchors not more than 32 inches o.c., to match coursing, and as follows:
         1) Two anchors per jamb up to 60 inches high.
         2) Three anchors per jamb from 60 to 90 inches high.
         3) Four anchors per jamb from 90 to 120 inches high.
         4) Four anchors per jamb plus one additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.

      b. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
         1) Three anchors per jamb up to 60 inches high.
         2) Four anchors per jamb from 60 to 90 inches high.
         3) Five anchors per jamb from 90 to 96 inches high.
         4) Five anchors per jamb plus one additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.

      c. Compression Type: Not less than two anchors in each frame.
      d. Postinstalled Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.

   6. Head Anchors: Two anchors per head for frames more than 42 inches wide and mounted in metal-stud partitions.

7. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.
   a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
   b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.

D. Fabricate concealed stiffeners and edge channels from either cold- or hot-rolled steel sheet.

E. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.
   1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
   2. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.

F. Stops and Moldings: Provide stops and moldings around glazed lites and louvers where indicated. Form corners of stops and moldings with butted or mitered hairline joints.
   1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow-metal work.
   2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
   3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
   4. Provide loose stops and moldings on inside of hollow-metal work.
   5. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.

2.8 STEEL FINISHES

A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.
   1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

2.9 ACCESSORIES

A. Louvers: Provide louvers for interior doors, where indicated, which comply with SDI 111C, with blades or baffles formed of 0.020-inch- thick, cold-rolled steel sheet set into 0.032-inch-thick steel frame.
   1. Sightproof Louver: Stationary louvers constructed with inverted-V or inverted-Y blades.
   2. Fire-Rated Automatic Louvers: Louvers constructed with movable blades closed by actuating fusible link, and listed and labeled for use in fire-rated door assemblies of type and fire-resistance rating indicated by same qualified testing and inspecting agency that established fire-resistance rating of door assembly.

B. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.

C. Grout Guards: Formed from same material as frames, not less than 0.016 inch thick.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.

C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

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

3.2 PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

B. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

A. General: Install hollow-metal work plumb, rigid, properly aligned, and securely fastened in place. Comply with Drawings and manufacturer's written instructions.

B. Hollow-Metal Frames: Install hollow-metal frames of size and profile indicated. Comply with SDI A250.11 as required by standards specified.
   1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
      a. At fire-rated openings, install frames according to NFPA 80.
      b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
      c. Install frames with removable stops located on secure side of opening.
      d. Install door silencers in frames before grouting.
      e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
      f. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
      g. Field apply bituminous coating to backs of frames that will be filled with grout containing antifreezing agents.

2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.

    a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.

3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation inside frames.
4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
5. Concrete Walls: Solidly fill space between frames and concrete with mineral-fiber insulation.
6. In-Place Concrete : Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
7. In-Place Metal or Wood-Stud Partitions: Secure slip-on drywall frames in place according to manufacturer's written instructions.
8. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
    a. Squareness: Plus or minus 1/16 inch , measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
    b. Alignment: Plus or minus 1/16 inch , measured at jambs on a horizontal line parallel to plane of wall.
    c. Twist: Plus or minus 1/16 inch , measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
    d. Plumbness: Plus or minus 1/16 inch , measured at jambs at floor.

C. Hollow-Metal Doors: Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.
1. Non-Fire-Rated Steel Doors:
    a. Between Door and Frame Jambs and Head: 1/8 inch plus or minus 1/32 inch .
    b. Between Edges of Pairs of Doors: 1/8 inch to 1/4 inch plus or minus 1/32 inch .
    c. At Bottom of Door: 5/8 inch plus or minus 1/32 inch .
    d. Between Door Face and Stop: 1/16 inch to 1/8 inch plus or minus 1/32 inch .

2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
3. Smoke-Control Doors: Install doors and gaskets according to NFPA 105.

D. Glazing: Comply with installation requirements in Section 088000 "Glazing" and with hollow-metal manufacturer's written instructions.
1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.

3.4 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow-metal work that is warped, bowed, or otherwise unacceptable.

B. Remove grout and other bonding material from hollow-metal work immediately after installation.

C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

D. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

E. Factory-Finish Touchup: Clean abraded areas and repair with same material used for factory finish according to manufacturer's written instructions.

F. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION 081113

SECTION 08 1416

FLUSH WOOD DOORS

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. Solid-core doors with wood-veneer faces.
   2. Factory fitting flush wood doors to frames and factory machining for hardware.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of door. Include details of core and edge construction and trim for openings.

B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; and the following:
   1. Dimensions and locations of blocking.
   2. Dimensions and locations of mortises and holes for hardware.
   3. Dimensions and locations of cutouts.
   4. Undercuts.
   5. Requirements for veneer matching.
   6. Doors to be factory finished and finish requirements.
   7. Fire-protection ratings for fire-rated doors.

C. Schedule: Provide a schedule of Wood doors work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final Door Hardware Schedule.
   1. Provide to section 08710 for inclusion with there submittal

D. Samples for Initial Selection: For factory-finished doors.

E. Samples for Verification:
   1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches for each material and finish.
   2. Louver blade and frame sections, 6 inches long, for each material and finish specified.
   3. Frames for light openings, 6 inches long, for each material, type, and finish required.

1.4 INFORMATIONAL SUBMITTALS

A. Sample Warranty: For special warranty.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of referenced standard and manufacturer's written instructions.

B. Package doors individually in plastic bags or cardboard cartons.

C. Mark each door on top and bottom rail with opening number used on Shop Drawings.

1.6 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during remainder of construction period.

B. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 25 and 55 percent during remainder of construction period.

1.7 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
   a. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.
   b. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.

2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
3. Warranty Period for Solid-Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Graham Wood Doors;
2. Lambton Doors.
3. Marshfield Door Systems, Inc.

4. Oshkosh Doors
5. Masonite

B. Source Limitations: Obtain flush wood doors from single manufacturer.

2.2 FLUSH WOOD DOORS, GENERAL

A. Quality Standard: In addition to requirements specified, comply with AWI's, AWMAC's, and WI's "Architectural Woodwork Standards."
1. Provide AWI Quality Certification and WI Certified Compliance Labels indicating that doors comply with requirements of grades specified.
2. Contract Documents contain selections chosen from options in quality standard and additional requirements beyond those of quality standard. Comply with those selections and requirements in addition to quality standard.

B. WDMA I.S.1-A Performance Grade: Heavy Duty.

C. WDMA I.S.1-A Performance Grade:
1. Heavy Duty unless otherwise indicated.

D. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.
1. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.
2. Temperature-Rise Limit: At vertical exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F above ambient after 30 minutes of standard fire-test exposure.
3. Cores: Provide core specified or mineral core as needed to provide fire-protection rating indicated.
4. Edge Construction: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed edges.
5. Pairs: Provide fire-retardant stiles that are listed and labeled for applications indicated without formed-steel edges and astragals. Provide stiles with concealed intumescent seals. Comply with specified requirements for exposed edges.
6. Pairs: Provide formed-steel edges and astragals with intumescent seals.
   a. Finish steel edges and astragals with baked enamel same color as doors.

E. Smoke- and Draft-Control Door Assemblies: Listed and labeled for smoke and draft control, based on testing according to UL 1784.

F. Mineral-Core Doors:

1. Core: Noncombustible mineral product complying with requirements of referenced quality standard and testing and inspecting agency for fire-protection rating indicated.

2. Edge Construction: At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.
   a. Screw-Holding Capability: 475 lbf per WDMA T.M.-10.

2.3 VENEER-FACED DOORS FOR TRANSPARENT FINISH

A. Interior Solid-Core Doors
   1. Grade: Premium, with Grade A faces.
   2. Species: White Birch.
   3. Cut: Rotary Cut
   4. Exposed Vertical Edges: Same species as faces - edge Type A.
   5. Core: Particleboard.
   6. Construction: Five or seven plies. Stiles and rails are bonded to core, then entire unit is abrasive planed before veneering.
   7. Adhesives: Type I per WDMA T.M.-6.
   8. WDMA I.S.1-A Performance Grade: Heavy Duty.

2.4 LIGHT FRAMES AND LOUVERS

A. Wood Beads for Light Openings in Wood Doors: Provide manufacturer's standard wood beads unless otherwise indicated.
   1. Wood Species: Same species as door faces.
   2. Profile: Manufacturer's standard shape.
   3. At wood-core doors with 20-minute fire-protection ratings, provide wood beads and metal glazing clips approved for such use.

B. Wood-Veneered Beads for Light Openings in Fire-Rated Doors: Manufacturer's standard wood-veneered noncombustible beads matching veneer species of door faces and approved for use in doors of fire-protection rating indicated. Include concealed metal glazing clips where required for opening size and fire-protection rating indicated.

C. Wood Louvers: Door manufacturer's standard solid-wood louvers unless otherwise indicated.
   1. Wood Species: Same species as door faces.

2.5 FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
   1. Comply with NFPA 80 requirements for fire-rated doors.

B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, BHMA-156.115-W, and hardware templates.
   1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.
   2. Metal Astragals: Factory machine astragals and formed-steel edges for hardware for pairs of fire-rated doors.

C. Openings: Factory cut and trim openings through doors.
   1. Light Openings: Trim openings with moldings of material and profile indicated.
   2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Section 088000 "Glazing."
   3. Louvers: Factory install louvers in prepared openings.

2.6 FINISHING

A. General: All doors are to be provided fully factory-prepared to receive a transparent field-applied finish by others.
   1. Finish faces, all four edges, edges of cutouts, and mortises. Fillers may be omitted on top and bottom edges, edges of cutouts, and mortises.

B. Factory prepare doors that are indicated to receive a field-applied transparent finish.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and installed door frames, with Installer present, before hanging doors.
   1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
   2. Reject doors with defects.

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

3.2 INSTALLATION

A. Hardware: For installation, see Section 087100 "Door Hardware."

B. Installation Instructions: Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.
   1. Install fire-rated doors according to NFPA 80.
   2. Install smoke- and draft-control doors according to NFPA 105.

C. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.
   1. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 1/8 inch from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide 1/4 inch from bottom of door to top of threshold unless otherwise indicated.
      a. Comply with NFPA 80 for fire-rated doors.

   2. Bevel non-fire-rated doors 1/8 inch in 2 inches at lock and hinge edges.
   3. Bevel fire-rated doors 1/8 inch in 2 inches at lock edge; trim stiles and rails only to extent permitted by labeling agency.

D. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

E. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.3 ADJUSTING

A. Operation: Rehang or replace doors that do not swing or operate freely.

B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 081416

SECTION 08 3050

ACCESS DOORS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-l Specification sections, apply to work of this Section.

1.02 SUMMARY

A. Extent, location, and size of each type of access door required indicated on drawings and herein.

B. Building in of anchors and grouting of frames set in masonry construction specified in Division 4.

C. Roof hatches specified in Division 7.

1.03 SUBMITTALS

A. Product Data: Submit manufacturer's technical data and installation instructions for each type of access door assembly, including setting drawings, templates, instructions and directions for installation of anchorage devices.
   1. Include complete schedule, including types, general locations, sizes, wall and ceiling construction details, finishes, latching or locking provisions, and other data pertinent to installation.
   2. Verification: Obtain specific locations and sizes for required access doors from trades requiring access to concealed equipment, and indicate on submittal schedule.
   3. Special Sizes Access Doors: Use where required or requested; indicate on schedule.

B. Shop Drawings: Submit shop drawings for fabrication and installation of customized access doors and frames, including details of each frame type, elevations of door design types, anchorage and accessory items.

C. Samples: 3" x 5" min. size, of each panel face material showing factory- finished color and texture.

1.04 QUALITY ASSURANCE

A. Fire-Resistance Ratings: Wherever fire-resistance classification indicated, provide access door assembly with panel door, frame, hinge, and latch from manufacturers listed in Underwriters Laboratories, Inc.; "Building Materials Directory" for rating shown.
   1. Provide UL label on each fire-rated access door.

B. Size Variations: Obtain Architect's acceptance of manufacturer's standard size units which may vary slightly from sizes indicated.

C. Coordination:
   1. Furnish inserts and anchoring devices built into other work for installation of access doors.
   2. Coordinate delivery with other work to avoid delay.

D. Certificate of Compliance: Submit, as part of Shop Drawings, certification from manufacturer of product or materials furnished herein, stating that product(s) and / or material (s) being furnished comply with technical provisions contained herein.
   1. Any and all deviations from technical provisions of specifications shall be specifically noted.

E. Producer's Statement of Applicability: Submit from manufacturer or other producer, a written-certified statement that producer reviewed proposed application of product on Project.
   1. Statement shall state that producer agrees with or does not object to Architect's specification and Contractor's selection of product for use in Work.
   2. Statement also state that proposed application of product on project is suitable and proper.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide access doors by one of following:
   1. Bar-Co., Inc.
   2. J.L. Industries
   3. Karp Associates, Inc.
   4. Milcor Div.; Inryco, Inc.
   5. Nystrom, Inc.

2.02 MATERIALS AND FABRICATION

A. General: Furnish each access door assembly manufactured as integral unit, complete with all parts and ready for installation.

B. Steel Access Doors and Frames:
   1. Fabricate units of continuous welded steel construction, unless otherwise indicated.
   2. Grind welds smooth and flush with adjacent surfaces.
   3. Furnish attachment devices and fasteners of type required to secure access panels to types of support shown.
   4. Steel Frames: Unless noted otherwise, fabricate from 16-gage steel.
   5. Stainless Steel Frames: Where indicated fabricate 16-gage, #4 satin finished stainless steel, as indicated.
   6. Fabricate frame with exposed flange nominal l" wide around perimeter of frame for units installed in following construction:
      a. Exposed masonry.
      b. Exposed concrete.
      c. Drywall finish.
      d. Ceramic tile finish.

7. For gypsum drywall or gypsum plaster, furnish perforated frames with drywall bead.
8. For installation in masonry construction, furnish frames with adjustable metal masonry anchors.
9. For full-bed plaster applications, furnish frames with galvanized expanded metal lath and exposed casing bead, welded to perimeter of frame.

C. "Steel" Flush Panel Doors:
1. Unless noted otherwise fabricate from min. 14-gage sheet steel, with concealed spring hinges or concealed continuous piano hinge set to open 175°.
2. Finish with manufacturer's factory-applied prime paint.

D. “Stainless Steel" Flush Panel Doors:
1. Where indicated fabricate from min. 14-gage stainless steel sheet, with concealed spring hinges or concealed piano hinge set to open 175°.
2. Buff exposed surfaces to #4 satin finish.

E. Fire-Rated Flush Panel Doors:
1. For fire-rated units, provide manufacturer's standard insulated flush panel/doors, with continuous piano hinge and self-closing mechanism.

F. Locking Devices:
1. Furnish flush, screwdriver-operated cam locks of number required to hold door in flush, smooth plane when closed.
2. Provide one mortised cylinder lock per access door.
   a. Furnish 2 keys per lock.
   b. Key all locks alike, unless otherwise scheduled.

G. Door Release:
1. Each door access door 24" and larger in size, shall be equipped with an interior latch release system so arranged to prevent entrapment of individual(s) behind door.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Comply with manufacturer's instructions for installation of access doors.

B. Coordinate installation with work of other trades.

C. Set frames accurately in position and securely attach to supports with face panels plumb or level in relation to adjacent finish surfaces.

D. Where access doors are scheduled to be installed in fire or smoke rated walls, ceilings or assemblies, access door shall be self-closing, self latching and have a rating equal to or greater than wall, ceiling, or assembly in which door is being placed.

3.02 ADJUST AND CLEAN

A. Adjust hardware and panels after installation for proper operation.

B. Remove and replace panels or frames which are warped, bowed or otherwise damaged.

3.03 SCHEDULE

A. Provide and install access doors for each condition and location indicated on drawings and as listed below:

Application	**Quantity**	**Size**	**Fire Rating**	**Material**
Wall (Chase) Applications				
Access to mechanical system gate valves	1 per valve	12"X12"	See Plan	Stainless
Access to controls-showers and tubs	1 per unit	12"X12"	See Plan	Stainless
Access to roof drain leader cleanouts	1 per cleanout	16"X16"	See Plan	Stainless
Access to Can Wash Hose Bibb	1 per hose bibb	12"X12"	See Plan	Stainless
Access through Smoke Partitions	1 per smoke part.	48"X48"	Yes	Primed Steel
Ceiling Applications:				
Access through fire rated assembly	1 per room	24"X36"	YES	Primed Steel
Access through plaster ceiling	1 per room	24"X36"	See Plan	Primed Steel
Access through gypsum board ceiling	1 per room	24"X36"	See Plan	Primed Steel
Miscellaneous Areas:				
Where shown or indicated on drawings	as indicated	as indicated	See Plan	Primed Steel; U.N.

B. In addition to units listed above, provide and install the following in locations to be designated by the Architect and as required for access to systems components:

Application	**Quantity**	**Size**	**Fire Rating**	**Material**
As required	2 each	12"X12"	Yes	Stainless
As required	2 each	12"X12"	No	Stainless
As required	2 each	24"X36"	Yes	Primed Steel
As required	2 each	24"X36"	No	Primed Steel

END OF SECTION 083050

SECTION 087100

DOOR HARDWARE

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 commercial door hardware for the following:
   1. Swinging doors.
   2. Other doors to the extent indicated.

B. Door hardware includes, but is not necessarily limited to, the following:
   1. Mechanical door hardware.
   2. Electromechanical door hardware, power supplies, back-ups and surge protection.
   3. Cylinders specified for doors in other sections.

C. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

   1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
   2. ICC/IBC - International Building Code.
   3. NFPA 80 - Fire Doors and Windows.
   4. NFPA 101 - Life Safety Code.
   5. NFPA 105 - Installation of Smoke Door Assemblies.
   6. State Building Codes, Local Amendments.
   7. ASCE 7-10.

D. Standards: All hardware specified herein shall comply with the following industry standards:

   1. ANSI/BHMA Certified Product Standards - A156 Series
   2. UL10C – Positive Pressure Fire Tests of Door Assemblies

1.3 SUBMITTALS

A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.

B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."

2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.

3. Content: Include the following information:
   a. Type, style, function, size, label, hand, and finish of each door hardware item.
   b. Manufacturer of each item.
   c. Fastenings and other pertinent information.
   d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
   e. Explanation of abbreviations, symbols, and codes contained in schedule.
   f. Mounting locations for door hardware.
   g. Door and frame sizes and materials.

4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.

C. Shop Drawings: Details of electrified access control hardware indicating the following:
1. Wiring Diagrams: Upon receipt of approved schedules, submit detailed system wiring diagrams for power, signaling, monitoring, communication, and control of the access control system electrified hardware. Differentiate between manufacturer-installed and field-installed wiring. Include the following:
   a. Elevation diagram of each unique access controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.
   b. Complete (risers, point-to-point) access control system block wiring diagrams.
   c. Molex connections with SCCPSS color code and pinning connections for the established ‘Plug n Play’ connection system.

2. Electrical Coordination: Coordinate with related Division 26 Electrical Sections the voltages and wiring details required at electrically controlled and operated hardware openings.

D. Keying Schedule: Prepared under the supervision of the Owner, separate schedule detailing final keying instructions for locksets and cylinders in writing. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner to approve submitted keying schedule prior to the ordering of permanent cylinders.

E. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Submittals. The manual to include the name, address, and contact information of the manufacturers providing the hardware and their nearest service representatives. The final copies delivered after completion of the installation test to include "as built" modifications made during installation, checkout, and acceptance.

F. Warranties and Maintenance: Special warranties and maintenance agreements specified in this Section.

G. Installer Qualifications: Provide installer qualifications.

H. Certification Report: Submit a sample certification outline report as required in section 3.4/B.

1.4 QUALITY ASSURANCE

A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.

B. Installer Qualifications: Provide installer qualifications. These qualifications shall demonstrate (10) years of successful installation of similar projects for the hardware types specified which include all of the access control hardware applications. As part of the qualifications, the installer shall submit their factory certifications for all of the electrified product applications which are specified within this scope of work.

C. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 15 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor in good standing by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier shall have on staff and in their full time employ a certified Architectural Hardware Consultant (AHC) who shall be the responsible project manager during the course of this project. Their duties shall include but not be limited to; consultation with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware, installation practices, wiring requirements, and keying.
   1. Scheduling Responsibility: Preparation of door hardware, electrical hardware connections, point to point wiring diagrams, and keying schedules.

D. Source Limitations: All products contained within this section shall be purchased and supplied by a single supplier. Obtain each type and variety of Door Hardware specified in this Section from a single source supplier. Splitting of materials between multiple suppliers/distributors for this scope of work is prohibited.
   1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.

   2. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.

E. Regulatory Requirements: Comply with NFPA 70, NFPA 80, NFPA 101 and ANSI A117.1 requirements and guidelines as directed in the model building code including, but not limited to, the following:
   1. NFPA 70 "National Electrical Code", including electrical components, devices, and accessories listed and labeled as defined in Article 100 by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

   2. Where indicated to comply with accessibility requirements, comply with Americans with Disabilities Act (ADA), "Accessibility Guidelines for Buildings and Facilities (ADAAG)," ANSI A117.1 as follows:
      a. Handles, Pulls, Latches, Locks, and other Operating Devices: Shape that is easy to grasp with one hand and does not require tight grasping, tight pinching, or twisting of the wrist.
      b. Door Closers: Comply with the following maximum opening-force requirements indicated:
         1) Interior Hinged Doors: 5 lbf applied perpendicular to door.
         2) Fire Doors: Minimum opening force allowable by authorities having jurisdiction.

c. Thresholds: Not more than 1/2 inch high. Bevel raised thresholds with a slope of not more than 1:2.

3. NFPA 101: Comply with the following for means of egress doors:

    a. Latches, Locks, and Exit Devices: Not more than 15 lbf to release the latch. Locks shall not require the use of a key, tool, or special knowledge for operation.

    b. Thresholds: Not more than 1/2 inch high.

4. Fire-Rated Door Assemblies: Provide door hardware for assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252 (neutral pressure at 40" above sill) or UL-10C.

    a. Test Pressure: Positive pressure labeling.

F. Each unit to bear third party permanent label demonstrating compliance with the referenced standards.

G. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:
1. Function of building, purpose of each area and degree of security required.
2. Plans for existing and future key system expansion.
3. Requirements for key control storage and software.
4. Installation of permanent keys, cylinder cores and software.
5. Address and requirements for delivery of keys.

H. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.
1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
3. Review sequence of operation narratives for each unique access-controlled opening.
4. Review and finalize construction schedule and verify availability of materials.
5. Review the required inspecting, testing, commissioning, and demonstration proceduresAt completion of installation, provide written documentation that components were applied to manufacturer's instructions and recommendations and according to approved schedule.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.

B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.

C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.6 COORDINATION

A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.

B. Door Hardware and Electrical Connections: Coordinate the layout and installation of scheduled electrified door hardware and related access control equipment with required connections to source power junction boxes, low voltage power supplies, detection and monitoring hardware, and fire and detection alarm systems.

C. Door and Frame Preparation: Related Division 08 Sections (Steel, Aluminum and Wood) doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.7 WARRANTY

A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:
1. Structural failures including excessive deflection, cracking, or breakage.
2. Faulty operation of the hardware.
3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
4. Electrical component defects and failures within the systems operation.

C. Standard Warranty Period: Two year from date of Substantial Completion, unless otherwise indicated.

D. Special Warranty Periods:
1. Ten years for mortise locks and latches.
2. Five years for exit hardware.
3. Twenty five years for manual surface door closers.
4. Two years for electromechanical door hardware.

1.8 MAINTENANCE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.
   1. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:
      a. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.

B. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01, Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

2.2 HANGING DEVICES

A. Hinges: ANSI/BHMA A156.1 certified butt hinges with number of hinge knuckles as specified in the Door Hardware Sets.
   1. Quantity: Provide the following hinge quantity, unless otherwise indicated:
      a. Two Hinges: For doors with heights up to 60 inches.
      b. Three Hinges: For doors with heights 61 to 90 inches.
      c. Four Hinges: For doors with heights 91 to 120 inches.
      d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.

   2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
      a. Widths up to 3’6”: 4-1/2” standard or heavy weight as specified.
      b. Sizes from 3’7” to 4’0”: 5” standard or heavy weight as specified.

   3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:
      a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
      b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.

   4. Hinge Options: Comply with the following where indicated in the Hardware Sets or on Drawings:
      a. Half surface hinges are required for all wood door applications except those that have electrified locks or exit devices.

      b. Non-removable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the following applications:
         1) Out-swinging exterior doors.
         2) Out-swinging access-controlled doors.
         3) Out-swinging lockable doors.

5. Acceptable Manufacturers:

    a. Stanley (ST)
    b. McKinney Products (MK).
    c. Bommer Industries (BO).

2.3 DOOR OPERATING TRIM

A. Flush Bolts and Surface Bolts: ANSI/BHMA A156.3 and A156.16, Grade 1, certified automatic, self-latching, and manual flush bolts and surface bolts. Manual flush bolts to be furnished with top rod of sufficient length to allow bolt location approximately six feet from the floor. Furnish dust proof strikes for bottom bolts. Surface bolts to be minimum 8” in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.
   1. Acceptable Manufacturers:
      a. Baldwin (BA).
      b. Rockwood Manufacturing (RO).
      c. Trimco (TC).

B. Door Push Plates and Pulls: ANS/BHMA A156.6 certified door pushes and pulls of type and design specified below or in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.
   1. Push/Pull Plates: Minimum .050-inch-thick, size as indicated in hardware sets, with beveled edges, secured with exposed screws unless otherwise indicated.
   2. Door Pull and Push Bar Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door unless otherwise indicated.
   3. Offset Pull Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door and offset of 90 degrees unless otherwise indicated.
   4. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets.
      a. Acceptable Manufacturers:
         1) Baldwin (BA).
         2) Rockwood Manufacturing (RO).
         3) Trimco (TC).

2.4 CYLINDERS AND KEYING

A. General: Cylinders shall be Sargent. Cylinders shall be keyed into the SCCPSS existing great grand master key system. Patented cylinders required as specified.
   1. Existing Key way Sargent Signature Key System -10-
   2. Key and Cylinders are not listed with in the hardware schedule Provide a Cylinder core and keys for device requiring a Key/lock, Cylinder and or core.

B. Cylinders: Original manufacturer Conventional cylinders complying with the following:
   1. Mortise Type: Threaded cylinders with rings and straight- or clover-type cam.
   2. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
   3. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
   4. Keyway: As directed by the Manufacturer for the campus system.

C. Security Cylinders: ANSI/BHMA A156.5, Grade 1, patented security cylinders and keys able to be used together under the same facility master or grandmaster key system. Cylinders are to be factory keyed.
   1. Acceptable Manufacturers:
      a. Sargent Manufacturing (SA) - Signature Series. (Owners Existing)

D. Keying System: Each type of lock and cylinders to be factory keyed. Conduct specified "Keying Conference" to define and document keying system instructions and requirements. Furnish factory cut, nickel-silver large

bow permanently inscribed with a visual key control number as directed by Owner. Incorporate decisions made in keying conference, and as follows:

1. Great-Grand Master Key System: Cylinders are operated by a change key, a master key, a grand master key, and a great-grand master key.
   Existing System: Master key or grand master key locks to Owner's existing system. Key Quantity: Provide the following minimum number of keys:
2. Top Master Key: One (5)
3. Change Keys per keyset: Three (3)
4. Construction Keys (where required): Ten (10)

E. Construction Keying: Provide construction keyed for all key items. Provide construction keys in quantity as noted above. Key Registration List: Provide keying transcript list to Owner's representative in the proper format.

1. Sargent Lost ball Construction Key -21-

2.5 MECHANICAL LOCKS AND LATCHING DEVICES

A. Mortise Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.13, Series 1000, Operational Grade 1 certified mortise locksets furnished in the functions as specified in the Hardware Sets. Locksets to be manufactured with a corrosion resistant, stamped 12 gauge minimum formed steel case and be field-reversible for handing without disassembly of the lock body. Lockset trim (including knobs, levers, escutcheons, roses) to be the product of a single manufacturer. Furnish with standard 2 3/4" backset, 3/4" throw anti-friction stainless steel latch bolt, and a full 1" throw stainless steel bolt for deadbolt functions.

1. Acceptable Manufacturers:
   a. Corbin Russwin Hardware (RU) – ML2000 Series.
   b. Sargent Manufacturing (SA) – 8200 Series.
   c. Schlage Hardware L9000 x
   d. Yale Locks and Hardware (YA) – 8800FL Series.

B. Lock Trim Design: As specified in Hardware Sets.

2.6 AUXILIARY LOCKS

A. Mortise Deadlocks, Small Case: ANSI/BHMA A156.5, Grade 1, certified small case mortise type deadlocks constructed of heavy gauge wrought corrosion resistant steel. Steel or stainless-steel bolts with a 1" throw and hardened steel roller pins. Deadlocks to be products of the same source manufacturer and keyway as other specified locksets.

1. Acceptable Manufacturers:
   a. Corbin Russwin Hardware (RU) - DL4100 Series.
   b. Schlage Hardware (SC)
   c. Sargent Manufacturing (SA) - 4870 Series.
   d. Best
   e. Yale Locks and Hardware (YA) - 350 Series.

2.7 LOCK AND LATCH STRIKES

A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:

1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.

2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.

B. Standards: Comply with the following:
1. Strikes for Mortise Locks and Latches: BHMA A156.13.
2. Strikes for Bored Locks and Latches: BHMA A156.2.
3. Strikes for Auxiliary Deadlocks: BHMA A156.5.
4. Dustproof Strikes: BHMA A156.16.

2.8 CONVENTIONAL EXIT DEVICES

A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:

1. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.

2. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer’s catalog and template book for specific requirements.
   a. Fire Exit Removable Mullions: Provide keyed removable mullions for use with fire exit devices complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire and panic protection, based on testing according to UL 305 and NFPA 252. Mullions to be used only with exit devices for which they have been tested.

3. Except on fire rated doors, provide exit devices with hex key dogging device to hold the push bar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.

4. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is not acceptable except in any case where the door light extends behind the device as in a full glass configuration.

5. Flush End Caps: Provide heavy weight impact resistant flush end caps made of architectural metal in the same finish as the devices as in the Hardware Sets. Plastic end caps will not be acceptable.

6. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty trim with cold forged escutcheons, beveled edges, and four threaded studs for thru-bolts.
   a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets. Provided free-wheeling type trim where indicated.
   b. Where function of exit device requires a cylinder, provide an interchangeable core type keyed cylinder (Rim or Mortise) as specified in Hardware Sets.

7. Vertical Rod Exit Devices: Provide and install interior surface and concealed vertical rod exit devices as Less Bottom Rod (LBR) unless otherwise indicated.

8. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2” wide stiles.

9. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.

10. Rail Sizing: Provide exit device rails factory sized for proper door width application.

11. Through Bolt Installation: For exit devices and trim on wood doors, thru bolts are required.

12. Hurricane and Tornado Resistance Compliance: Conventional exit devices and tube steel removable mullions to be U.L. listed for windstorm components where applicable. Provide the appropriate hurricane or tornado resistant products that have been independent third party tested, certified, and labeled to meet state and local windstorm building codes applicable to project.

B. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 certified panic and fire exit hardware devices furnished in the functions specified in the Hardware Sets. Mounting rails to be formed from smooth stainless steel, brass or bronze architectural materials no less than 0.072" thick, with push rails a minimum of 0.062" thickness. Painted or aluminum metal rails are not acceptable. Exit device latch to be investment cast stainless steel, pullman type, with deadlock feature.
   1. Acceptable Manufacturers:
      a. Corbin Russwin Hardware (RU) - ED4000 / ED5000 Series.
      b. Von Duprin
      c. Sargent Manufacturing (SA) - 80 Series.
      d. Yale Locks and Hardware (YA) - 7000 Series.

C. Tube Steel Removable Mullions: ANSI/BHMA A156.3 removable steel mullions with malleable-iron top and bottom retainers and a primed paint finish. Provide keyed removable feature, stabilizers, and mounting brackets as specified in the Hardware Sets. At openings designed for severe wind load conditions due to hurricanes or tornadoes, provide manufacturers approved mullion and accessories to meet applicable state and local windstorm codes. All removable mullions of this type shall be removable by use of a keyed cylinder.
   1. Acceptable Manufacturers:
      a. Corbin Russwin Hardware (RU) - 700/900 Series.
      b. Von Duprin
      c. Sargent Manufacturing (SA) - 980S Series.
      d. Yale Locks and Hardware (YA) - M200 Series.

2.9 ELECTROMECHANICAL CONVENTIONAL EXIT DEVICES

A. Electrified Conventional Push Rail Devices (Heavy Duty): Subject to same compliance standards and requirements as mechanical exit devices, electrified devices to be of type and design as specified below.
   1. Acceptable Manufacturers:
      a. Corbin Russwin Hardware (RU) - ED4000 / ED5000 Series.
      b. Von Duprin -QEL
      c. Sargent Manufacturing (SA) - 80 Series.
      d. Yale Locks and Hardware (YA) - 7000 Series.

B. Electrified Options: As indicated in hardware sets, provide electrified exit device options including: electric latch retraction, electric dogging, outside door trim control, exit alarm, delayed egress, latchbolt monitoring, lock/unlock status monitoring, touchbar monitoring and request-to-exit signaling. Unless otherwise indicated, provide electrified exit devices standard as fail secure.

2.10 DOOR CLOSERS

A. All door closers specified herein shall meet or exceed the following criteria:

1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers including installation and adjusting information on inside of cover.

2. Standards: Closers to comply with UL-10C and UBC 7-2 for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.

   Cycle Testing: Provide closers which have surpassed 15 million cycles in a test witnessed and verified by UL.

3. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the physically handicapped, provide units complying with ANSI ICC/A117.1.

4. Thru-Bolts: For all wood door applications, provide thru-bolt for all closer applications.

5. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
   a. Where closers are indicated to have mechanical dead-stop, provide heavy duty arms and brackets with an integral positive stop.
   b. Where closers are indicated to have mechanical hold open, provide heavy duty units with an additional built-in mechanical holder assembly designed to hold open against normal wind and traffic conditions. Holder to be manually selectable to on-off position.
   c. Where closers are indicated to have a cushion-type stop, provide heavy duty arms and brackets with spring stop mechanism to cushion door when opened to maximum degree.
   d. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics. Provide drop plates or other accessories as required for proper mounting.

6. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates, and through-bolt or security type fasteners as specified in the door Hardware Sets.

B. Door Closers, Surface Mounted (Heavy Duty): ANSI/BHMA A156.4, Grade 1 surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units standard.
   1. Acceptable Manufacturers:
      a. Corbin Russwin Hardware (RU) - DC8000 Series.
      b. Sargent Manufacturing (SA) - 351 Series.
      c. LCN 4040 / 4041 series
      d. Norton Door Controls (NO) - 7500 Series.
         Yale Locks and Hardware (YA) - 4400 Series.

2.11 ARCHITECTURAL TRIM

A. Door Protective Trim

1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.

2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1” LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.

3. Metal Protection Plates: ANSI/BHMA A156.6 certified metal protection plates (kick, armor, or mop), beveled on four edges (B4E), fabricated from the following:

   a. Stainless Steel: 300 series, 050-inch thick, with countersunk screw holes (CSK).

4. Fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets.

5. Metal Door Edging: Door protection edging fabricated from a minimum .050-inch thick metal sheet, formed into an angle or "U" cap shapes, surface or mortised mounted onto edge of door. Provide appropriate leg overlap to account for protection plates as required. Height to be as specified in the Hardware Sets.

6. Acceptable Manufacturers:

   a. Baldwin (BA).
   b. Trimco (TC).
   c. Rockwood Manufacturing (RO).

2.12 DOOR STOPS AND HOLDERS

A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.

B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 certified door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. The hardware supplier shall exchange a Floor for a wall stop and wall to floor stop at no cost. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.

1. Acceptable Manufacturers:
   a. Baldwin (BA)
   b. Trimco (TC)
   c. Rockwood Manufacturing (RO).

C. Overhead Door Stops and Holders: ANSI/BHMA A156.6, Grade 1 certified overhead stops and holders to be surface or concealed types as indicated in Hardware Sets. Track, slide, arm and jamb bracket to be constructed of extruded bronze and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function. For all wood door applications, provide thru-bolts for the overhead stops.

1. Acceptable Manufacturers:
   a. ABH (AB)
   b. Rixson Door Controls (RF).

c. Rockwood Manufacturing (RO).
d. Sargent Manufacturing (SA).

2.13 ARCHITECTURAL SEALS

A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.

B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.
   1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.

C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.
   1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and UBC 7-2, Fire Tests of Door Assemblies.

D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated, based on testing according to ASTM E 1408.

E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

F. Acceptable Manufacturers:
   1. Pemko Manufacturing (PE).
   2. National Guard (NG).
   Reese (RE).

2.14 FABRICATION

A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.15 FINISHES

A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.

B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware.

C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Contractor shall provide

B. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.

C. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.

Wood Doors: Comply with ANSI/DHI A115-W series.

3.3 INSTALLATION

A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.
   1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.
   2. Access control wiring; for devices to power supply, above ceiling shall be performed by a licensed low voltage installer who is contracted with the hardware supplier.

B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:
   1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
   2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
   3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
   4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.

C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

E. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.4 FIELD QUALITY CONTROL

A. Field Inspection: Supplier will perform a final inspection of installed door hardware and state in report whether work complies with or deviates from requirements, including whether door hardware is properly installed, operating and adjusted.

3.5 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.6 CLEANING AND PROTECTION

A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.

B. Clean adjacent surfaces soiled by door hardware installation.

C. Clean operating items as necessary to restore proper finish. and provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.7 DEMONSTRATION

A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.8 DOOR HARDWARE SCHEDULE

A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.

Manufacturer List

Code	Name
AB	ABH Manufacturing Inc.
BO	Bommer
BY	By Others
HW	Houston Wire
MK	McKinney
NA	National Guard
OT	Others
SA	Sargent
SE	Sentrol
SN	Securitron
ST	Stanley
TR	Trimco

Hardware Sets

SET #1

Doors: 1B, 2B

3	Hinges	TA2714 4-1/2"	US26D	MK
1	Pull Plate	1018-3B	630	TR
1	Deadlock	64 4878 GMK	26D	SA
1	Closer	DA 351 O	EN	SA
1	Kick Plate	KO050 8" x 2" Less Door Width, B4E, CSK	630	TR
1	Mop Plate	KM050 8" x 1" Less Door Width, B4E, CSK	630	TR
1	Push Plate	1001-11	630	TR
1	Wall Bumper	1270CX or 1214H As Req.	626	TR
3	Door Silencers	1229A	GREY	TR

SET #2

Doors: 3A

3	Hinges	TA2714 4-1/2"	US26D	MK
1	Privacy Set	49 LB 8265 LNJ	26D	SA
1	Kick Plate	KO050 8" x 2" Less Door Width, B4E, CSK	630	TR
1	Mop Plate	KM050 8" x 1" Less Door Width, B4E, CSK	630	TR
1	Wall Bumper	1270CX or 1214H As Req.	626	TR
3	Door Silencers	1229A	GREY	TR

SET #3

Doors: 1A, 2A,

3	Hinges	TA2714 4-1/2"	US26D	MK
1	Pull Plate	1018-3B	630	TR
1	Closer	DA 351 O	EN	SA
1	Kick Plate	KO050 8" x 2" Less Door Width, B4E, CSK	630	TR
1	Mop Plate	KM050 8" x 1" Less Door Width, B4E, CSK	630	TR
1	Push Plate	1001-11	630	TR
1	Wall Bumper	1270CX or 1214H As Req.	626	TR
3	Door Silencers	1229A	GREY	TR

END 08 7100

SECTION 09 2216

NON-STRUCTURAL METAL FRAMING

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. Non-load-bearing steel framing systems for interior gypsum board assemblies.
2. Suspension systems for interior gypsum ceilings, soffits, and grid systems.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For dimpled steel studs and runners firestop tracks, from ICC-ES.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 119 by an independent testing agency.
1. Fire Resistance Design Manual; sound control
2. UL rate assemblies

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.
1. Fire Resistance Design Manual; sound control

2.2 FRAMING SYSTEMS

A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.

1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal unless otherwise indicated.
2. Protective Coating: ASTM A 653/A 653M, G40 , hot-dip galvanized unless otherwise indicated.

B. Studs and Runners: ASTM C 645. Use either steel studs and runners or dimpled steel studs and runners.

1. Steel Studs and Runners:
   a. Depth: 3-5/8 inches .
   b. Minimum Base-Metal Thickness: 0.033 inch 20 gauge. walls up to 13’-6”
   c. Minimum Base-Metal Thickness: 0.043 inch .18 gauge walls up to 14’-9”
   d. Minimum Base-Metal Thickness: 0.053 inch .16 gauge walls up to 15’-9”

2. Steel Studs and Runners:
   a. Depth: 6 inches .
   b. Minimum Base-Metal Thickness: 0.033 inch 20 gauge. walls up to 20’-10”
   c. Minimum Base-Metal Thickness: 0.043 inch .18 gauge walls up to 22’-9”

C. Slip-Type Head Joints: Where indicated, provide the following:
1. Double-Runner System: ASTM C 645 top runners, inside runner with 2-inch- deep flanges in thickness not less than indicated for studs and fastened to studs, and outer runner sized to friction fit inside runner.

   a. Products: Subject to compliance with requirements, provide one of the following:

      1) Dietrich Metal Framing; SLP-TRK Slotted Deflection Track.
      2) MBA Building Supplies;.
      3) Steel Network Inc. (The);
      4) Superior Metal Trim; Superior Flex Track System (SFT).
      5) Telling Industries;.

D. Firestop Tracks: Top runner manufactured to allow partition heads to expand and contract with movement of the structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. Fire Trak Corp.; Fire Trak System attached to studs with Fire Trak Posi Klip.
   b. Grace Construction Products; FlameSafe FlowTrak System.
   c. Metal-Lite, Inc.; The System.

E. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.

1. Minimum Base-Metal Thickness: 0.033 inch .

F. Cold-Rolled Channel Bridging: Steel, 0.053-inch minimum base-metal thickness, with minimum 1/2-inch- wide flanges.

1. Depth: 1-1/2 inches .
2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches , 0.068-inch- thick, galvanized steel.

G. Hat-Shaped, Rigid Furring Channels: ASTM C 645.

1. Minimum Base-Metal Thickness: 0.033 inch .
2. Depth: 7/8 inch .

H. Resilient Furring Channels: 1/2-inch- deep, steel sheet members designed to reduce sound transmission.

1. Configuration: hat shaped.

I. Cold-Rolled Furring Channels: 0.053-inch uncoated-steel thickness, with minimum 1/2-inch-wide flanges.

1. Depth: 3/4 inch .
2. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with minimum uncoated-steel thickness of 0.033 inch .
3. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch-diameter wire, or double strand of 0.048-inch- diameter wire.

J. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches , wall attachment flange of 7/8 inch , minimum uncoated-metal thickness of 0.033 inch , and depth required to fit insulation thickness indicated.

2.3 SUSPENSION SYSTEMS

A. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch- diameter wire, or double strand of 0.048-inch- diameter wire.

B. Hanger Attachments to Concrete:

1. Anchors: Fabricated from corrosion-resistant materials with holes or loops for attaching wire hangers and capable of sustaining, without failure, a load equal to 5 times that imposed by construction as determined by testing according to ASTM E 488 by an independent testing agency.

2. Powder-Actuated Fasteners: Suitable for application indicated, fabricated from corrosion-resistant materials with clips or other devices for attaching hangers of type indicated, and capable of sustaining, without failure, a load equal to 10 times that imposed by construction as determined by testing according to ASTM E 1190 by an independent testing agency.

C. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.16 inch in diameter.

D. Flat Hangers: Steel sheet, 1 by 3/16 inch by length indicated.

E. Carrying Channels: Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.053 inch and minimum 1/2-inch- wide flanges.

1. Depth: 2-1/2 inches .

F. Furring Channels (Furring Members):

1. Cold-Rolled Channels: 0.053-inch uncoated-steel thickness, with minimum 1/2-inch-wide flanges, 3/4 inch deep.
2. Steel Studs and Runners: ASTM C 645.

a. Minimum Base-Metal Thickness: 0.033 inch .
b. Depth: 1-5/8 inches .

3. Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8 inch deep.

a. Minimum Base-Metal Thickness: 0.033 inch .

b. Configuration: hat shaped.

2.4 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards.

1. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

B. Isolation Strip at Exterior Walls: Provide the following:
1. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.

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

3.2 PREPARATION

A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building

structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.

1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

3.3 INSTALLATION, GENERAL

A. Installation Standard: ASTM C 754.
   1. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.

B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

C. Not all framing shown on drawing for clarity provide framing , bracing , as necessary to support applied finishes, wall soffit assemblies

D. Install bracing at terminations in assemblies.

E. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.4 INSTALLING FRAMED ASSEMBLIES

A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

   1. Single-Layer Application: 16 inches o.c. unless otherwise indicated.
   2. Multilayer Application: 16 inches o.c. unless otherwise indicated.
   3. Tile Backing Panels: 16 inches o.c. unless otherwise indicated.

B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.

C. At locations where walls do not extend to deck, extend framing a minimum of 12 “above the top of ceiling assembly

D. Contact architect after installing framing to locate control joints. modify framing to suit locations

E. Bridging: horizontal stiffeners provide cold rolled channel with clip
   1. Clip shall be 80% of stud depth two screws to stud and one to channel, one clips each stud
   2. Install bridging at 4’-0” o/c and

F. Install studs so flanges within framing system point in same direction.

G. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to

terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.

1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
2. Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.

    a. Install two studs at each jamb unless otherwise indicated.

    b. Provide box Lintel made of two base track and two studs
        1) Openings up to 4 feet two 3-5/8 inch studs and two base track
        2) Openings up to 6”-6” , two 6 inch studs and two base track
        3) Openings up to 11’-10” two 8 inch studs and two base track
    c. Provide built up sills
        1) Openings up to 4 feet one base track
        2) Openings up to 6”-6” one stud and two base track
        3) Openings up to 11’-10” two studs and two base track
    d. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.
    e. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.

3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.

    a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.

5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
6. Curved Partitions:

    a. Bend track to uniform curve and locate straight lengths so they are tangent to arcs.
    b. Begin and end each arc with a stud, and space intermediate studs equally along arcs. On straight lengths of no fewer than two studs at ends of arcs, place studs 6 inches o.c.

H. Direct Furring:

1. Screw to wood framing.
2. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.

I. Z-Furring Members:

1. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
2. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12 inches from corner and cut insulation to fit.

J. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

3.5 INSTALLING SUSPENSION SYSTEMS

A. Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

1. Hangers: 48 inches o.c.
2. Carrying Channels (Main Runners): 48 inches o c.
3. Furring Channels (Furring Members): 16 inches o.c.

B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.

C. Suspend hangers from building structure as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.

   a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.

2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.

   a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.

3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
4. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
5. Do not attach hangers to steel roof deck.
6. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
7. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.

8. Do not connect or suspend steel framing from ducts, pipes, or conduit.

D. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.

E. Seismic Bracing: Sway-brace suspension systems with hangers used for support.

F. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

G. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION 092216

SECTION 09 2900

GYPSUM BOARD

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. Interior gypsum board.
2. Tile backing panels.
3. Texture finishes.
4. Sound attenuation blankets

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For the following products:
1. Trim Accessories: Full-size Sample in 12-inch- long length for each trim accessory indicated.

1.4 DELIVERY, STORAGE AND HANDLING

A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.5 FIELD CONDITIONS

A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.

B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.

C. Contact architect prior to installing gypsum board. Review locations of control joint and type of edge trim used at each location.
1. Provide control joints where gypsum board meets dismantled material.
2. Provide control joints where gypsum board is 20 or more in any one direction
3. Provide control joints in ceilings where soffits change direction from inside corner.

4. Provide additional control joints as directed by Architect on side. Coordinate requirements with light gauge framing.

D. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.
   1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
   2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.
   1. Gypsum Association “Fire Resistance Design Manual; sound control”

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.
   1. Gypsum Association “Fire Resistance Design Manual; sound control”

2.2 GYPSUM BOARD, GENERAL

A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.3 INTERIOR GYPSUM BOARD

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. CertainTeed Corp.
   2. Georgia-Pacific Gypsum LLC.
   3. Lafarge North America Inc.
   4. National Gypsum Company.
   5. Temple-Inland.
   6. USG Corporation.

B. Gypsum Wallboard: ASTM C 1396/C 1396M.
   1. Thickness: 5/8 inch .
   2. Long Edges: Tapered and featured (rounded or beveled) for prefilling.

C. Gypsum Board, Type X: ASTM C 1396/C 1396M.
   1. Thickness: 5/8 inch.
   2. Long Edges: Tapered and featured (rounded or beveled) for prefilling.

D. Flexible Gypsum Board: ASTM C 1396/C 1396M. Manufactured to bend to fit radii and to be more flexible than standard regular-type gypsum board of same thickness.
   1. Thickness: 1/4 inch .
   2. Long Edges: Tapered.

E. Moisture- and Mold-Resistant Gypsum Board: ASTM C 1396/C 1396M. With moisture- and mold-resistant core and paper surfaces.
   1. Core: 5/8 inch , Type X.
   2. Long Edges: Tapered.
   3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

F. Impact-Resistant Gypsum Board: ASTM C 1396/C 1396M gypsum board, tested according to ASTM C 1629/C 1629M.
   1. Core: 5/8 inch , Type X. where required
   2. Surface Abrasion: ASTM C 1629/C 1629M, meets or exceeds Level 3 requirements.
   3. Indentation: ASTM C 1629/C 1629M, meets or exceeds Level 1 requirements.
   4. Soft-Body Impact: ASTM C 1629/C 1629M, meets or exceeds Level 2 requirements.
   5. Hard-Body Impact: ASTM C 1629/C 1629M, meets or exceeds Level 2 requirements according to test in Annex A1.
   6. Long Edges: Tapered.
   7. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.4 SPECIALTY GYPSUM BOARD

A. Gypsum Board, Type C: ASTM C 1396/C 1396M. Manufactured to have increased fire-resistive capability.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. CertainTeed Corp.; ProRoc Type C.
      b. Georgia-Pacific Gypsum LLC; Fireguard C.
      c. Lafarge North America Inc.; Firecheck Type C.
      d. National Gypsum Company; Gold Bond Fire-Shield C.
      e. Temple-Inland; Type TG-C.
      f. USG Corporation; Firecode C Core.
   2. Thickness: As required by fire-resistance-rated assembly indicated on Drawings.
   3. Long Edges: Tapered.

2.5 TILE BACKING PANELS

A. Cementitious Backer Units: ANSI A118.9 and ASTM C 1288 or 1325, with manufacturer's standard edges.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. C-Cure; C-Cure Board 990.
      b. CertainTeed Corp.; FiberCement
      c. Custom Building Products; [
      d. James Hardie Building Products, Inc.;
      e. National Gypsum Company, Permabase Cement Board.
      f. USG Corporation; DUROCK Cement Board.

2. Thickness: 5/8 inch .
3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.6 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.
1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc.
2. Shapes:
a. Cornerbead.
b. Bullnose bead.
c. LC-Bead: J-shaped; exposed long flange receives joint compound.
d. L-Bead: L-shaped; exposed long flange receives joint compound.
e. U-Bead: J-shaped; exposed short flange does not receive joint compound.
f. Expansion (control) joint.
g. Curved-Edge Cornerbead: With notched or flexible flanges.

B. General: Comply with ASTM C 475/C 475M.

C. Joint Tape:
1. Interior Gypsum Board: Paper.
2. Tile Backing Panels: As recommended by panel manufacturer.

D. Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
1. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.
2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.
a. Use setting-type compound for installing paper-faced metal trim accessories.

3. Fill Coat: For second coat, use drying-type, all-purpose compound.
4. Finish Coat: For third coat, use drying-type, all-purpose compound.
5. Skim Coat: For final coat of Level 5 finish, use drying-type, all-purpose compound.

E. Joint Compound for Tile Backing Panels:
1. Cementitious Backer Units: As recommended by backer unit manufacturer.

2.7 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.

B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

C. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
   1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
   2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

D. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.

   1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.

E. Acoustical Joint Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Accumetric LLC; BOSS 824 Acoustical Sound Sealant.
      b. Grabber Construction Products; Acoustical Sealant GSC.
      c. Pecora Corporation;
      d. Specified Technologies, Inc.; Smoke N Sound Acoustical Sealant.
      e. USG Corporation; SHEETROCK Acoustical Sealant.

F. Thermal Insulation: As specified in Section 072100 "Thermal Insulation."

G. Vapor Retarder: As specified in Section 072100 "Thermal Insulation."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates including welded hollow-metal frames and framing, with Installer present, for compliance with requirements and other conditions affecting performance.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

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

D. Gypsum board install prior to closing the exterior envelope (Windows not installed) and the climate control system operating and areas that require “Pre-Rock”, Moisture- and Mold-Resistant Gypsum Board shall be used.

3.2 APPLYING AND FINISHING PANELS, GENERAL

A. Comply with ASTM C 840.

B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panel's not less than one framing member.

C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch (1.5 mm) of open space between panels. Do not force into place.

D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

E. Form control and expansion joints with space between edges of adjoining gypsum panels.

F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
   1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
   2. Fit gypsum panels around ducts, pipes, and conduits.
   3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- wide joints to install sealant.

G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- (6.4- to 12.7-mm-) wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

I. Wood Framing: Install gypsum panels over wood framing, with floating internal corner construction. Do not attach gypsum panels across the flat grain of wide-dimension lumber, including floor joists and headers. Float gypsum panels over these members or provide control joints to counteract wood shrinkage.

J. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.

K. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 APPLYING INTERIOR GYPSUM BOARD

A. Install interior gypsum board in the following locations:
   1. Wallboard Type: As indicated on Drawings.
   2. Moisture resistant and Moisture resistant Type X and Impact Resistant MR board, at all locations where wall board is install prior to building being climatized.
   3. Type X: Where required for fire-resistance-rated assembly.
   4. Flexible Type: Apply in double layer at curved assemblies.
   5. Type C: Where required for specific fire-resistance-rated assembly indicated.
   6. Impact Resistant wall Board at all locations below 10 feet

B. Single-Layer Application:
   1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
   2. On partitions/walls, apply gypsum panels vertically (parallel to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
      a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
      b. At stairwells and other high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.
   3. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
   4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

C. Multilayer Application:
   1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints one framing member, 16 inches minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
   2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
   3. On Z-furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
   4. Fastening Methods: Fasten base layers and face layers separately to supports with screws.

D. Curved Surfaces:
   1. Install panels horizontally (perpendicular to supports) and unbroken, to extent possible, across curved surface plus 12-inch- long straight sections at ends of curves and tangent to them.
   2. For double-layer construction, fasten base layer to studs with screws 16 inches o.c. Center gypsum board face layer over joints in base layer, and fasten to studs with screws spaced 12 inches o.c.

3.4 APPLYING TILE BACKING PANELS

A. Cementitious Backer Units: ANSI A108.11, provide at ALL locations indicated to receive tile.

B. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

C. Install backer panel over CMU with a combination of a construction adhesive and mechanically fasten with masonry screws at 16” o.c. min. starting 2” max from the perimeter or as per backer board installation recommendations for installing over CMU.

3.5 INSTALLING TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

B. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect for visual effect.

C. Interior Trim: Install in the following locations:
   1. Cornerbead: Use at outside corners unless otherwise indicated.
   2. LC-Bead: Use at exposed panel edges.
   3. L-Bead: Use where indicated and wnere panel meets adjacent surfaces .
   4. U-Bead: Use at exposed panel edges.
   5. Curved-Edge Cornerbead: Use at curved openings.

3.6 FINISHING GYPSUM BOARD

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

B. Prefill open joints[, rounded or beveled edges,] and damaged surface areas.

C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.

D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
   1. Level 1: Ceiling plenum areas, concealed areas,
   2. Level 2: Panels that are substrate for tile.
   3. Level 3 Not used
   4. Level 4: At panel surfaces that will be exposed to view .at areas that are not occupied secondary spaces , closets, storage etc
      a. Level 4 finish is achieved by using the gypsum construction handbook and the following requirements:
         1) 1st coat embedded
         2) 2nd coat fill
         3) 3rd coat level coat
         4) 4th finish coat
      b. Sanding is required between 3rd and 4th coat and after 4th coat
      c. Each coat is a separate operations. Coats may not be combined.
      d. Minimum of three coats over fasteners.
   5. Level 5: all areas exposed to view Unless other wise noted
      a. Level 5 finish is achieved by using the gypsum construction handbook and the following requirements:
         1) 1st coat embedded
         2) 2nd coat fill
         3) 3rd coat level coat
         4) 4th finish coat
         5) 5th coat skim
         6) Sanding is required between 4th and 5th coat
         7) Each coat is a separate operation and may not be combined
         8) Minimum of 4 coats over fasteners
         9) Skim coat is the operation of applying joint treatment compound to cover the entire surface of gypsum wall board including joints so as not paper is visible. This operation is trowel applied. Roller or spray type products will not be accepted as “skim coat”. Finish and sand with 220 or wet sand. Tough-up as needed where holiday of gypsum board paper shows.

E. Glass-Mat Gypsum Sheathing Board: Finish according to manufacturer's written instructions for use as exposed soffit board.

F. Glass-Mat Faced Panels: Finish according to manufacturer's written instructions.

G. Cementitious Backer Units: Finish according to manufacturer's written instructions.

3.7 PROTECTION

A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.

B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

C. Remove and replace panels that are wet, moisture damaged, and mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 09 2900

SECTION 09 3000

TILING

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. Ceramic tile.
   2. Stone thresholds.
   3. Crack isolation membrane.
   4. Metal edge strips.

1.3 DEFINITIONS

A. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.

B. ANSI A108 Series: ANSI A108.01, ANSI A108.02, ANSI A108.1A, ANSI A108.1B, ANSI A108.1C, ANSI A108.4, ANSI A108.5, ANSI A108.6, ANSI A108.8, ANSI A108.9, ANSI A108.10, ANSI A108.11, ANSI A108.12, ANSI A108.13, ANSI A108.14, ANSI A108.15, ANSI A108.16, and ANSI A108.17, which are contained in "American National Standard Specifications for Installation of Ceramic Tile."

C. TCA : Tile Council of North America , Inc

D. Module Size: Actual tile size plus joint width indicated.

E. Face Size: Actual tile size, excluding spacer lugs.

1.4 ACTION SUBMITTALS

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

B. Shop Drawings: Show locations of each type of tile and tile pattern. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.

C. Samples for Initial Selection: For each type of tile and grout indicated. Include Samples of accessories involving color selection.

D. Samples for Verification:

1. Full-size units of each type and composition of tile and for each color and finish required.
2. Stone thresholds in 6-inch lengths.
3. Metal edge strips in 6-inch lengths.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Product Certificates: For each type of product, signed by product manufacturer.

C. Material Test Reports: For each tile-setting and -grouting product.

1.6 QUALITY ASSURANCE

A. Source Limitations for Tile: Obtain tile of each type from one source or producer.
1. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.

B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from one manufacturer and each aggregate from one source or producer.

C. Source Limitations for Other Products: Obtain each of the following products specified in this Section from a single manufacturer for each product:
1. Stone thresholds.
2. Waterproof membrane.
3. Crack isolation membrane.
4. Joint sealants.
5. Cementitious backer units.
6. Metal edge strips.

D. Preinstallation Conference: Conduct conference at Project site.
1. Review requirements in ANSI A108.01 for substrates and for preparation by other trades.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.

B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.

C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.

D. Store liquid materials in unopened containers and protected from freezing.

E. Handle tile that has temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units. If coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 PRODUCTS, GENERAL

A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.
   1. Provide tile complying with Standard grade requirements unless otherwise indicated.

B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCA installation methods specified in tile installation schedules, and other requirements specified.

C. FloorScore Compliance: Tile for floors shall comply with requirements of FloorScore Standard.

2.1 TILE PRODUCTS

2.2 TILE PRODUCTS

A. Tile Type CT-1: Unglazed floortile
   1. Basis-of-Design Product: Subject to compliance with requirements, provide Crossville Cross colors-Mingles Brown Tweed A750 ", or comparable product by one of the following:
      a. American Olean; Division of Dal-Tile International Inc.
      b. Crossville, Inc.
      c. Daltile; Division of Dal-Tile International Inc.
      d. GranitiFiandre; c/o Trans Ceramica, Ltd.
      e. United States Ceramic Tile Company.

   2. Composition: Porcelain through body.
   3. Face Size: 8 by inches .
   4. Pattern ; Off set
   5. Thickness: 3/8 inch .
   6. Color :Price Group III
   7. Face: Textured with square edges.
   8. Pattern: as indicated on drawings

9. Grout Color: Match existing tile
10. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:

B. Tile Type CT-2: Unglazed floor tile.
1. Basis-of-Design Product: Subject to compliance with requirements, provide Crossville Cross colors-Mingles Brown Tweed A750 ", or comparable product by one of the following:
   a. American Olean; Division of Dal-Tile International Inc.
   b. Crossville, Inc.
   c. Daltile; Division of Dal-Tile International Inc.
   d. GranitiFiandre; c/o Trans Ceramica, Ltd.
   e. United States Ceramic Tile Company.

2. Composition: Porcelain through body.
3. Face Size: 6 by 8 inches.
4. Thickness: 3/8 inch .
5. Color: Price Group III
6. Face: Plain with square edges.
7. Pattern: as indicated on drawings
8. Grout Color: As selected by Architect from manufacturer's full range.
9. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:
   a. Base Cove: Cove, module size same as adjoining flat tile. Size shall be module of adjacent tile.,Floor .(Grout joint must align)
   b. External cove base Corners for Thin-Set Mortar Installations: Surface bullnose, module size
   c. Internal Corners: Field-Mitered square corners. For coved base and cap, use angle pieces designed to fit with stretcher shapes.

C. Tile Type CT-3: Glazed wall tile;
1. Basis-of-Design Product: Subject to compliance with requirements, provide Daltile Semigloss / matt Group I Putty or comparable by Custom made Products from one of the following:
   a. American Olean; Division of Dal-Tile International Inc.
   b. Daltile; Division of Dal-Tile International Inc.
   c. United States Ceramic Tile Company.

2. Module Size: 6 x 6 inches
3. Thickness: 5/16 inch.
4. Face: Plain with cushion edges.
5. Finish: Gloss
6. Tile Color and Pattern: Pattern as indicated on drawings. 7 colors will be chosen
7. Grout Color: As selected by Architect from manufacturer's full range.
8. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:
   a. Wainscot Cap for Thin-Set Mortar Installations: Surface bullnose, module

b. Wainscot Cap for Flush Conditions: Regular flat tile for conditions where tile wainscot is shown flush with wall surface above it, same size as adjoining flat tile.
c. External Corners for Thin-Set Mortar Installations: Surface bullnose, same size as adjoining flat tile.
d. Internal Corners: Field-butted square corners. For coved base and cap use angle pieces designed to fit with stretcher shapes.

D. Tile Type CT-3: Glazed wall tile; Decorative tile.
1. Basis-of-Design Product: Subject to compliance with requirements, provide Daltile Keystones 12 x 24 sheet Mosaic D195 Oak Moss comparable by Custom made Products from one of the following:
a. American Olean; Division of Dal-Tile International Inc.
b. Daltile; Division of Dal-Tile International Inc.
c. United States Ceramic Tile Company.

2. Module Size: 1 x 1 inches
3. Thickness: 5/16 inch.
4. Face: Plain with cushion edges.
5. Finish: Gloss
6. Tile Color and Pattern: Pattern as indicated on drawings. 7 colors will be chosen
7. Grout Color: As selected by Architect from manufacturer's full range.
8. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:
a. Wainscot Cap for Thin-Set Mortar Installations: Surface bullnose, module
b. Wainscot Cap for Flush Conditions: Regular flat tile for conditions where tile wainscot is shown flush with wall surface above it, same size as adjoining flat tile.
c. External Corners for Thin-Set Mortar Installations: Surface bullnose, same size as adjoining flat tile.
d. Internal Corners: Field-butted square corners. For coved base and cap use angle pieces designed to fit with stretcher shapes.
e.

2.3 THRESHOLDS

A. General: Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes.
1. Bevel edges at 1:2 slope, with lower edge of bevel aligned with or up to 1/16 inch above adjacent floor surface. Finish bevel to match top surface of threshold. Limit height of threshold to 1/2 inch or less above adjacent floor surface.

B. Granite Thresholds: ASTM C 615, with polished finish.
1. Description: Uniform, -grained, gray stone without veining.
2. Description: Match Architect's sample.

2.4 CRACK ISOLATION MEMBRANE

A. General: Manufacturer's standard product that complies with ANSI A118.12 for standard performance and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.

B. Fabric-Reinforced, Fluid-Applied Membrane: System consisting of liquid-latex rubber or elastomeric polymer and fabric reinforcement.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Boiardi Products; a QEP company; Elastiment 344 Reinforced Waterproofing and Anti-Fracture/Crack Suppression Membrane.
      b. Bonsal American; an Oldcastle company; B 6000 Waterproof Membrane with Glass Fabric.
      c. Bostik, Inc.; Hydroment Blacktop 90210.
      d. Custom Building Products; 9240 Waterproofing and Anti-Fracture Membrane.
      e. Laticrete International, Inc.; Laticrete Blue 92 Anti-Fracture Membrane.
      f. MAPEI Corporation; Mapelastic HPG with MAPEI Fiberglass Mesh.
      g. Mer-Kote Products, Inc.; Hydro-Guard 2000.

2.5 SETTING MATERIALS

A. Portland cement Mortar (Thickset) Installation Materials: ANSI A108.02.

   1. Cleavage Membrane: Asphalt felt, ASTM D 226, Type I (No. 15); or polyethylene sheeting, ASTM D 4397, 4.0 mils thick.
   2. Reinforcing Wire Fabric: Galvanized, welded wire fabric, 2 by 2 inches by 0.062-inch diameter; comply with ASTM A 185 and ASTM A 82 except for minimum wire size.

   3. Latex Additive: Manufacturer's standard water emulsion, serving as replacement for part or all of gaging water, of type specifically recommended by latex-additive manufacturer for use with field-mixed portland cement and aggregate mortar bed.

B. Latex-Portland Cement Mortar (Thin Set): ANSI A118.4.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Bonsal American; an Oldcastle company.
      b. Custom Building Products.
      c. Laticrete International, Inc.
      d. MAPEI Corporation.
      e. TEC; a subsidiary of H. B. Fuller Company.

   2. Provide prepackaged, dry-mortar mix containing dry, redispersible, vinyl acetate or acrylic additive to which only water must be added at Project site.

   3. Exterior locations: ultra-flexible thin set compatible and tested with water proofing membrane (Custom Mega Flex Basis of design)
   4. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.4.

2.6 GROUT MATERIALS

A. Sand-Portland Cement Grout: ANSI A108.10, composed of white or gray cement and white or colored aggregate as required to produce color indicated.

B. Polymer-Modified Tile Grout: ANSI A118.7.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Bonsal American; an Oldcastle company.
      b. Bostik, Inc.
      c. Custom Building Products.
      d. Laticrete International, Inc.
      e. MAPEI Corporation.
      f. TEC; a subsidiary of H. B. Fuller Company.

   2. Polymer Type: Ethylene vinyl acetate or acrylic additive, in dry, redispersible form, prepackaged with other dry ingredients.

2.7 ELASTOMERIC SEALANTS

A. General: Provide sealants, primers, backer rods, and other sealant accessories that comply with the following requirements and with the applicable requirements in Section 079200 "Joint Sealants."

B. Colors: Provide colors of exposed sealants to match colors of grout in tile adjoining sealed joints unless otherwise indicated.

C. One-Part, Mildew-Resistant Silicone Sealant: ASTM C 920; Type S; Grade NS; Class 25; Uses NT, G, A, and, as applicable to nonporous joint substrates indicated, O; formulated with fungicide, intended for sealing interior ceramic tile joints and other nonporous substrates that are subject to in-service exposures of high humidity and extreme temperatures.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Dow Corning Corporation; Dow Corning 786.
      b. GE Silicones; a division of GE Specialty Materials; Sanitary 1700.
      c. Laticrete International, Inc.; Latasil Tile & Stone Sealant.
      d. Pecora Corporation; Pecora 898 Sanitary Silicone Sealant.
      e. Tremco Incorporated; Tremsil 600 White.

2.8 MISCELLANEOUS MATERIALS

A. Trowelable Underlayments and Patching Compounds: Latex-modified, Portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.

B. Metal Edge Strips: Angle or L-shape, height to match tile and setting-bed thickness, metallic or combination of metal and PVC or neoprene base, designed specifically for flooring applications; stainless-steel, ASTM A 666, 300 Series exposed-edge material.
   1. Edge Protection and Transition Profiles:

2. Provide at all base to floor locations, top of wainscot, External corners, internal corners at walls
3. Depth and style required for tile setting and thickness.
4. Angle or "T"-type for adhesive bonding to substrate.
5. Provide as follows Design based on Scluter System:
   a. Floor to wall : DILEX-HK
   b. Wall external corner: RONDEC
   c. Walls Internal corner DILEX-HKW
   d. Edge of tile RONDEC-DB
   e. Control joints DILEX-AKWS
   f. Stair Nosing TREP-SE

C. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

D. Grout Sealer: Manufacturer's standard silicone product for sealing grout joints and that does not change color or appearance of grout.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Bonsal American; an Oldcastle company; Grout Sealer.
      b. Bostik, Inc.; .
      c. Custom Building Products; Surfaceguard Sealer.
      d. TEC; a subsidiary of H. B. Fuller Company; TA-256 Penetrating Silicone Grout Sealer.

2.9 MIXING MORTARS AND GROUT

A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.

B. Add materials, water, and additives in accurate proportions.

C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.

   1. Verify that substrates for setting tile are firm, dry, clean, free of coatings that are incompatible with tile-setting materials including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.

2. Verify that concrete substrates for tile floors installed with bonded mortar bed or thin-set mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.

   a. Verify that surfaces that received a steel trowel finish have been mechanically scarified.
   b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.

3. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.

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

3.2 PREPARATION

A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with thin-set mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.

B. Where indicated, prepare substrates to receive waterproofing by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot toward drains.

C. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

D. Field-Applied Temporary Protective Coating: If indicated under tile type or needed to prevent grout from staining or adhering to exposed tile surfaces, precoat them with continuous film of temporary protective coating, taking care not to coat unexposed tile surfaces.

3.3 TILE INSTALLATION

A. Comply with TCA's "Handbook for Ceramic Tile Installation" for TCA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 Series "Specifications for Installation of Ceramic Tile" that are referenced in TCA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.

B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for

straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

D. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.

E. Jointing Pattern: Lay tile in pattern indicated on drawings. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.

1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.
2. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
3. At radius steps treads cut each tile to a trapezoidal shape to maintain joint width , cut riser tiles same with as cut tread tile
4. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.

F. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:
1. Ceramic Mosaic Tile: 3/16 inch .
2. Quarry Tile: 1/4 inch .
3. Paver Tile: 3/16 inch .
4. Decorative Thin Wall Tile: 3/16 inch .

G. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.

H. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.
1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.

I. Stone Thresholds: Install stone thresholds in same type of setting bed as adjacent floor unless otherwise indicated.
1. At locations where mortar bed (thickset) would otherwise be exposed above adjacent floor finishes, set thresholds in latex-Portland cement mortar (thin set).
2. Do not extend crack isolation membrane under thresholds set in latex-Portland cement mortar. Fill joints between such thresholds and adjoining tile set on crack isolation membrane with elastomeric sealant.

J. Metal Edge Strips: Install where exposed edge of tile flooring meets carpet, VCT, wood, or other flooring that finishes flush with top of tile where exposed edge of tile flooring meets carpet, VCT, wood, or other flooring that finishes flush with or below top of tile and no threshold is indicated.

K. Metal Edge Strips: Install noising where exposed edge of tile flooring is installed on steps , provide custom components to be accurate to the radius

L. Grout Sealer: Apply grout sealer to grout joints in tile floors according to grout-sealer manufacturer's written instructions. As soon as grout sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.

3.4 CRACK ISOLATION MEMBRANE INSTALLATION

A. Install crack isolation membrane to comply with ANSI A108.17 and manufacturer's written instructions to produce membrane of uniform thickness and bonded securely to substrate.

B. Do not install tile or setting materials over crack isolation membrane until membrane has cured.

3.5 CLEANING AND PROTECTING

A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
   1. Remove latex-Portland cement grout residue from tile as soon as possible.
   2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.
   3. Remove temporary protective coating by method recommended by coating manufacturer and that is acceptable to tile and grout manufacturer. Trap and remove coating to prevent drain clogging.

B. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors. Repair cover tough construction process, remove one day prior to architect performing deficiency list.

C. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.

D. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

3.6 INTERIOR TILE INSTALLATION SCHEDULE

A. Interior Floor Installations, Concrete Subfloor:

   1. Tile Installation F112:

      a. Tile Type: CT , PT with membrane
      b. Thin-Set Mortar for Cured-Bed Method: Latex- Portland cement mortar.
      c. Grout: Polymer-modified sanded grout.

   2. Tile Installation F125A: Thin-set mortar on crack isolation membrane; TCA F125A.

a. Tile Type: CT-1
b. Thin-Set Mortar: Latex- Portland cement mortar.
c. Grout: Polymer-modified sanded grout.

3. Tile Installation : Thin-set mortar on crack isolation membrane; TCA F121-14.

a. Tile Type: QT-
b. Mud Set: Latex- Portland cement mortar.
c. Cleavage membrane
d. Grout: Polymer-modified sanded grout.(Black)

B. Interior Wall Installations, Masonry or Concrete:

1. Tile Installation W201with no membrane

a. Tile Type: CT
b. Thin-Set Mortar: Latex- Medium-bed, latex- Portland cement mortar.
c. Grout: Polymer-modified sanded grout.

2.

3.7 EXTERIOR TILE INSTALLATION SCHEDULE

A. Interior Floor Installations, Concrete Subfloor:

1. Tile Installation F104-14:

a. Tile Type: PT with membrane
b. Thin-Set Mortar over fluid applied waterproofing Latex- Portland cement mortar.
c. Grout: Polymer-modified sanded grout.

END OF SECTION 093000

SECTION 09 5100

ACOUSTICAL CEILINGS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Extent of each type of acoustical ceiling shown and scheduled on drawings.

B. Types of acoustical ceilings specified in this section include following:
   1. Acoustical panel ceilings, exposed suspension.

1.03 SUBMITTALS

A. Product Data: Submit manufacturer's technical data for each type acoustical ceiling unit and suspension system required.

B. Coordination Drawings:
   1. Submit reflected ceiling plans, prepared by Installer for installation purposes, drawn accurately to scale and coordinated with related mechanical, electrical and other work above, penetrating, or connected to acoustical ceiling.
   2. Show ceiling suspension members, method of anchorage to building structure of hangers, size and location of initial access modules for acoustical tile ceilings (if any), and ceiling-mounted work including light fixtures, diffusers, grilles, and special moldings.
   3. Scale: ¼" = 1'-0".

C. Samples for Initial Selection Purposes:
   1. Submit manufacturers' standard size samples of acoustical units, but min. 6" square, and of exposed ceiling suspension members including wall and special moldings.
   2. Provide samples showing full range of colors, textures and patterns available for each type component required.

D. Samples for Verification Purposes: Submit following:
   1. 6" square samples of each acoustical panel type, pattern and color.
   2. Set of 12" long samples of exposed runners and moldings for each color and system type required.

E. Certificates: Submit certificates from manufacturers of acoustical ceiling units and suspension systems attesting that their products comply with specification requirements.

1.04 QUALITY ASSURANCE

A. Fire Performance Characteristics:
   1. Provide acoustical ceiling components identical to those tested for following fire performance characteristics, according to ASTM test method indicated, by UL or other testing and inspecting agency acceptable to authorities having jurisdiction.

2. Identify acoustical ceiling components with appropriate marking of applicable testing and inspecting agency.
3. Surface Burning Characteristics: As follows, tested per ASTM E 84.
   a. Flame Spread: 25 or less.
   b. Smoke Developed: 50 or less.

B. Coordination of Work: Coordinate layout and installation of acoustical ceiling units and suspension system components with other work supported by, or penetrating through, ceilings, including light fixtures, HVAC equipment, fire-suppression system components (if any), and partition system (if any).

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical ceiling units to project site in original, unopened packages and store in fully enclosed space where protected against damage from moisture, direct sunlight, surface contamination or other causes.

B. Before installing acoustical ceiling units, permit them to reach room temperature and stabilized moisture content.

C. Handle acoustical ceiling units carefully to avoid chipping edges or damaging units in any way.

1.06 PROJECT CONDITIONS

A. Space Enclosure: Do not install interior acoustical ceilings until space enclosed and weatherproof, wet-work in space completed and nominally dry, work above ceilings complete, and ambient conditions of temperature and humidity continuously maintained at values near those indicated for final occupancy.

1.07 SPECIAL WARRANTY:

A. Ceiling Panel Types AT and CAT only - Manufacturer's Written Warranty:
   1. 10 years against sagging and warping of ceiling panels in temperatures up to 104° F and in unlimited relative humidity conditions except exterior application and direct exposure to moisture or standing water.
   2. Applies to conditions before and after installation of ceiling panels.

B. Suspension System Only- Manufacturer's Written Warranty:
   1. 10 years against Rust in temperatures up to 120 degrees F and unlimited relative humidity conditions except exterior applications and direct exposure to moisture or standing water. Applies to conditions before and after installation of Suspension System.

1.08 EXTRA MATERIALS

A. Deliver extra materials to Owner.

B. Furnish extra materials described below matching products installed, packaged with protective covering for storage and identified with appropriate labels.

C. Acoustical Ceiling Units: Furnish quantity of full size units equal to 2.0% of amount installed.

D. Exposed Suspension System Components: Furnish quantity of each exposed component equal to 2.0% of amount installed.

PART 2 - PRODUCTS

2.01 ACOUSTICAL CEILING UNITS, GENERAL

A. Standard for Acoustical Ceiling Units: Provide manufacturer's standard units of configuration indicated, prepared for mounting method designated and complying with FS SS-S-118 requirements, including those indicated by reference to type, form, pattern, grade (NRC or NIC' as applicable), light reflectance coefficient (LR), edge detail, and joint detail (if any).
   1. Mounting Method for Measuring NRC: No. 7 (mechanically mounted on special metal support), FS SS-S-118; or Type E-400 mounting as per ASTM E 795.

B. Sound Attenuation Performance: Provide acoustical ceiling units with ratings for ceiling sound transmission class (STC) of range indicated as determined according to AMA 1-II "Ceiling Sound Transmission Test by Two-Room Method" with ceilings continuous at partitions and supported by a metal suspension system of type appropriate for ceiling unit of configuration indicated (concealed for tile, exposed for panels).

C. Colors, Textures, and Patterns: Provide products to match appearance characteristics indicated or, if not otherwise indicated, selected by Architect from manufacturer's standard colors, surface textures, and patterns available for acoustical ceiling units and exposed metal suspension system members of quality designated.

2.02 ACOUSTICAL PANELS

A. Type CAT: Mineral Composition - Water Felted Panels with Scrubbable Vinyl Plastic or Acrylic Coated Finish, Non- Fire Resistance Rated:
   1. Physical Characteristics:
      a. Color/Light Reflectance: White, LR .84 Minimum
      b. NRC: .55 Minimum, UL Certified Performance Marked on Each Carton
      c. CAC: 33 Minimum, UL Certified Performance Marked on Each Carton
      d. Edge Detail: Square Edge Lay-in
      e. Size: 24” x 24” x 5/8” except as otherwise indicated
   2. Products: Subject to full compliance with requirements provide one of the following:
      a. “Fine Fissured” – Ceramaguard with Humiguard Plus Performance, Armstrong World Industries, Inc. - #607
      b. “Chicago Metallic”, Euro Stone.
      c. “Radar Ceramic ClimaPlus” USG Interiors-56644

2.03 METAL SUSPENSION SYSTEMS, GENERAL

A. Standard for Metal Suspension Systems: Provide metal suspension systems of type, structural classification and finish indicated which comply with applicable ASTM C 635 requirements.

B. Finishes and Colors:
   1. Provide manufacturer's standard factory-applied finish for type of system indicated.
   2. For exposed suspension members and accessories with painted finish, provide color indicated or, if not otherwise indicated, as selected by Architect from manufacturer's full range of standard colors.

C. High Humidity Finish: Hot-Dipped Galvanized Steel grid members with Aluminum Capping rated severe environmental, ASTM C 635, required at:
   1. Type CAT (coated acoustical panels).

D. Attachment Devices: Size for 5 times design load indicated in ASTM C 635, Table 1, Direct Hung.

E. Hanger Wire: Galvanized carbon steel wire, ASTM A 641, soft temper, prestretched, Class 1 coating, sized so that stress at 3-times hanger design loan (ASTM C 635, Table 1, Direct Hung), will be less than yield stress of wire, but provide min. 12 gage.

F. Edge Moldings and Trim:
1. Metal of types and profiles indicated or, if not indicated, provide manufacturer's standard molding for edges and penetrations of ceiling which fits with type of edge detail and suspension system indicated.
2. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.

2.04 EXPOSED METAL DIRECT-HUNG SUSPENSION SYSTEMS

A. Non-Fire-Resistance-Rated Double Web Steel Suspension System: Manufacturer's standard system roll-formed from prefinished cold-rolled steel sheet with 15/16" wide exposed faces on structural members; other characteristics as follows:
1. Structural Classification: Intermediate-Duty System.
2. Finish: Painted, white.;

B. Manufacturers: Subject to compliance with requirements, provide products of one of following:
1. Manufacturers of Non-Fire-Resistance-Rated Double Web Steel Suspension Systems:
a. Chicago Metallic Corporation.
b. Donn Corporation.
c. Eastern Products Div., Armstrong World Industries, Inc.
d. National Rolling Mills, Inc.

2.05 MISCELLANEOUS MATERIALS

A. Acoustical Sealant: Resilient, non-staining, non-shrinking, non-hardening, non-skinning, non-drying, non-sag sealant intended for interior sealing of concealed construction joints.
1. Products: Subject to compliance with requirements, provide one of following:
a. BA-98; Pecora Corp.
b. Tremco Acoustical Sealant; Tremco.
c. Norseal V-730; Norton

PART 3 - EXECUTION

3.01 PREPARATION

A. Coordination:
1. Furnish layouts for inserts, clips, or other supports required to be installed by other trades for support of acoustical ceilings.
2. Furnish concrete inserts and similar devices to other trades for installation well in advance of time needed for coordination of other work.

B. Testing Substrates: Before installing adhesively applied tile on wet-placed substrates such as cast-in-place concrete or plaster, test and verify that moisture level below tile manufacturer's recommended limits.

C. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling.
1. Avoid use of less-than-half width units at borders.

2. Comply with reflected ceiling plans wherever possible.

3.02 INSTALLATION

A. General: Install materials in accordance with manufacturer's printed instructions, and to comply with governing regulations, fire resistance rating requirements as indicated, and CISCA standards applicable to work.

B. Arrange acoustical units and orient directionally-patterned units (if any) in manner shown by reflected ceiling plans.
   1. Install tile with pattern running in one direction.

C. Install suspension systems to comply with ASTM C 636, with hangers supported only from building structural members.
   1. Locate hangers min. 6" from each end and 4'-0" along each carrying channel or direct-hung runner, unless otherwise indicated, leveling to tolerance of 1/8" in 12'-0".
   2. Provide additional hanger at each corner of grid supporting light fixtures or similar items where weight of item exceeds max. recommended by grid manufacturer.

D. Secure wire hangers by looping and wire-tying, either directly to structures or to inserts, eye-screws, or other devices secure and appropriate for substrate, and not deteriorate or fail with age or elevated temperatures.
   1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum not part of supporting structural or ceiling suspension system.
   2. Splay hangers only where required to miss obstructions and offset resulting horizontal force by bracing, countersplaying or other equally effective means.

E. Install edge moldings of type indicated at perimeter of acoustical ceiling area and at locations where necessary to conceal edges of acoustical units.

F. Sealant Bed: Apply continuous ribbon of acoustical sealant, concealed on back of vertical leg before installing moldings.

G. Screw-attach moldings to substrate at max. intervals of 16" o.c. and max. 3" from ends, leveling with ceiling suspension system to tolerance of ⅛” in 12'-0".
   1. Miter corners accurately and connect securely.
   2. Provide ¼” x 1¼” hex-head Tapcon screws at concrete and masonry walls.

H. Install acoustical panels in coordination with suspension system, with edges concealed by support of suspension members.
   1. Scribe and cut panels to fit accurately at borders and at penetrations.
   2. Install hold-down clips in areas indicated, and in areas where required by governing regulations or for fire-resistance ratings; space as recommended by panel manufacturer, unless otherwise indicated or required.

3.03 CLEANING

A. Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension members; comply with manufacturer's instructions for cleaning and touch-up of minor finish damage.
   1. Remove and replace work not successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 09 5100

SECTION 09 6513

RESILIENT BASE AND ACCESSORIES

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. Resilient base.
   2. Resilient molding accessories.

1.3 ACTION SUBMITTALS

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

B. Samples for Initial Selection: For each type of product indicated.

C. Samples for Verification: For each type of product indicated, in manufacturer's standard-size Samples but not less than 12 inches long, of each resilient product color, texture, and pattern required.

D. Product Schedule: For resilient products.

1.4 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
   1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

B. Mockups: Provide resilient products with mockups specified in other Sections.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 55 deg F or more than 85 deg F .

1.6 PROJECT CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 85 deg F , in spaces to receive resilient products during the following time periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 85 deg F .

C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 RESILIENT BASE

A. Resilient Base:

1. Manufacturers: Subject to compliance with requirements,:

a. Allstate Rubber Corp.; Stoler Industries.
b. Burke Mercer Flooring Products; Division of Burke Industries, Inc.
c. Endura Rubber Flooring; Division of Burke Industries, Inc.
d. Flexco, Inc.
e. Mondo Rubber International, Inc.
f. Musson, R. C. Rubber Co.
g. Nora Rubber Flooring; Freudenberg Building Systems, Inc.
h. Roppe Corporation, USA.

B. Resilient Base Standard: ASTM F 1861.

1. Material Requirement: Type TS (rubber, vulcanized thermoset).
2. Manufacturing Method: Group I (solid, homogeneous).
3. Style: Cove (base with toe).

C. Minimum Thickness: 0.125 inch .

D. Height: 4 inches .

E. Lengths: Rolls ,no Cut lengths,

F. Outside Corners: Preformed.

G. Inside Corners: Job formed or preformed.

H. Finish: Low luster.

I. Colors and Patterns: Johnsonite 4” Toast 283

2.2 RESILIENT MOLDING ACCESSORY

A. Resilient Molding Accessory:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Burke Mercer Flooring Products; Division of Burke Industries, Inc.
   b. Flexco, Inc.
   c. Johnsonite.
   d. R.C.A. Rubber Company (The).
   e. Roppe Corporation, USA.

B. Description: Cap for cove carpet Cap for cove resilient floor covering Carpet bar for tackless installations Carpet edge for glue-down applications Nosing for carpet Nosing for resilient floor covering Reducer strip for resilient floor covering Joiner for tile and carpet Transition strips.

C. Material: Rubber.

D. Profile and Dimensions: As indicated.

E. Colors and Patterns: As selected by Architect from full range of industry colors.

2.3 RUBBER STAIR ACCESSORIES

A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.
   a. Allstate Rubber Co.
   b. Felxco
   c. Armstrong
   d. Nora Systems
   e. Roppe Corp
   f. Johnsonite

B. Stair Treads: ASTM F 2169.

1. Type: TS (rubber, vulcanized thermoset) or TP (rubber, thermoplastic).
2. Class: 2 (pattern; embossed, grooved, or ribbed).
3. Group: 2 (with contrasting color for the visually impaired).
4. Nosing Style: Square, adjustable to cover angles between 60 and 90 degrees.
5. Nosing Height: 1-1/2 inches.
6. Thickness: 1/4 inch and tapered to back edge.
7. Size: Lengths and depths to fit each stair tread in one piece.

C. Landing Tile: Matching treads; produced by same manufacturer as treads and recommended by manufacturer for installation with treads.

D. Locations: Provide rubber stair accessories in areas indicated.

E. Colors and Patterns: As selected by Architect from full range of industry colors.

2.4 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, Portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

C. Metal Edge Strips: Extruded aluminum with mill finish of width shown, of height required to protect exposed edges of tiles, and in maximum available lengths to minimize running joints.

D. Floor Polish: Provide protective liquid floor polish products as recommended by resilient stair tread manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.

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

3.2 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

B. Concrete Substrates for Resilient Stair Treads and Accessories: Prepare according to ASTM F 710.
   1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
   2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
   3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer.
   4. Moisture Testing: Perform tests recommended by manufacturer and as follows. Proceed with installation only after substrates pass testing.

a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
b. Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have maximum 75 percent relative humidity level measurement.

C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.

D. Do not install resilient products until they are same temperature as the space where they are to be installed.
1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

E. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.3 RESILIENT BASE INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient base.

B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

C. Install resilient base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.

D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

E. Do not stretch resilient base during installation.

F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.

G. Preformed Corners: Install preformed corners before installing straight pieces.

H. Job-Formed Corners:
1. Inside Corners: Use straight pieces of maximum lengths possible.

3.4 RESILIENT ACCESSORY INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient accessories.

B. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of carpet resilient floor covering that would otherwise be exposed.

3.5 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protection of resilient products.

B. Perform the following operations immediately after completing resilient product installation:
   1. Remove adhesive and other blemishes from exposed surfaces.
   2. Sweep and vacuum surfaces thoroughly.
   3. Damp-mop surfaces to remove marks and soil.

C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Cover resilient products until Substantial Completion.

END OF SECTION 09 6513

SECTION 09 6519

RESILIENT TILE FLOORING

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. Vinyl composition floor tile.

1.3 ACTION SUBMITTALS

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

B. Shop Drawings: For each type of floor tile. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.

   1. Show details of special patterns.

C. Samples for Initial Selection: For each type of floor tile indicated.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of floor tile to include in maintenance manuals.

1.6 MATERIALS MAINTENANCE SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Floor Tile: Furnish 1 box for every each color

1.7 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for floor tile installation indicated.
   1. Engage an installer who employs workers for this Project who are trained or certified by manufacturer for installation techniques required.

B. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
   1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store floor tile and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 55 deg F or more than 85 deg F . Store floor tiles on flat surfaces.

1.9 PROJECT CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 85 deg F , in spaces to receive floor tile during the following time periods:
   1. 48 hours before installation.
   2. During installation.
   3. 48 hours after installation.

B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 85 deg F .

C. Close spaces to traffic during floor tile installation.

D. Close spaces to traffic for 48 hours after floor tile installation.

E. Install floor tile after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 VINYL COMPOSITION FLOOR TILE

A. Products: Subject to compliance with requirements, provide one of the following:
   1. Armstrong World Industries, Inc.
   2. Congoleum Corporation.
   3. Mannington Mills, Inc.
   4. Tarkett, Inc.
B. Tile Standard: ASTM F 1066, Class 2, through-pattern tile.
C. Wearing Surface: Smooth.
D. Thickness: 0.125 inch.
E. Size: 12 by 12 inches.

F. Colors and Patterns: 12 x 12 Armstrong Cirque White 52513

G. Slip-Retardent Vinyl Composition Tile: Provide at locations shown and on ramps whether shown or not.
   1. Meet requirements and size 1/8" ASTM F-1066.
   2. Fire test ASTM E-648 and E-622 at 450 or less.
      a. Armstrong – Safety Zone
      b. Azrock – Thru-Quartz
      c. Mannington – Assurance
      d. Alto – Safety Flooring

2.2 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, Portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by manufacturer to suit floor tile and substrate conditions indicated.

C. Floor Polish: Provide protective liquid floor polish products as recommended by manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor tile.

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

3.2 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

B. Concrete Substrates: Prepare according to ASTM F 710.
   1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
   2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
   3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.

4. Moisture Testing: Perform tests recommended by manufacturer and as follows. Proceed with installation only after substrates pass testing.

    a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 5 lb of water/1000 sq. ft. in 24 hours.
    b. Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75% Insert acceptable percentage relative humidity level measurement.

C. Flooring Panels: Remove protective film of oil or other coating using method recommended by access flooring manufacturer.

D. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.

E. Do not install floor tiles until they are same temperature as space where they are to be installed.
    1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

F. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.3 FLOOR TILE INSTALLATION

A. Comply with manufacturer's written instructions for installing floor tile.

B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
    1. Lay tiles square with room axis in pattern indicated

C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.
    1. Lay tiles with grain direction alternating in adjacent tiles (basket-weave pattern).

D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.

E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent, nonstaining marking device.

G. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in finished floor areas. Maintain overall continuity of color and pattern

between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.

H. Adhere floor tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.4 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protection of floor tile.

B. Perform the following operations immediately after completing floor tile installation:
   1. Remove adhesive and other blemishes from exposed surfaces.
   2. Sweep and vacuum surfaces thoroughly.
   3. Damp-mop surfaces to remove marks and soil.

C. Protect floor tile products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Floor Polish For Punch List: Remove soil, visible adhesive and surface blemishes from floor tile surfaces before applying liquid floor polish. Ready for owner architect deficiently list.
   1. Apply two coat(s).

E. Finial cleaning; After owner move in this shall be performed after the items on the deficiency have been completed. After owner move and prior to students starting class.
   1. Move owner’s furniture as needed and place back in original position.
   2. Scrub VCT prior to Appling sealer
   3. Apply three coats of floor sealer.
   4. Apply two coats of high gloss wax 21-25%

F. Joint Sealant: Apply sealant to resilient terrazzo floor tile perimeter and around columns, at door frames, and at other joints and penetrations.

G. Cover floor tile until Substantial Completion.

END OF SECTION 09 6519

SECTION 09 9000

PAINTS AND COATINGS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 DESCRIPTION OF WORK

A. Extent of painting work indicated on drawings and schedules, and herein specified.

B. Work includes painting and finishing of interior and exterior exposed items and surfaces throughout Project, except as otherwise indicated.
   1. Surface preparation, priming and coats of paint specified are in addition to shop-priming and surface treatment specified under other sections of work.

C. "Paint" used herein means all coating systems materials, including primers, emulsions, enamels, stains, sealers and fillers, and other applied materials whether used as prime, intermediate or finish coats.

D. Surfaces to be Painted:
   1. Except where natural finish of material specifically noted as surface not painted, paint exposed surfaces whether or not colors designated in "schedules".
   2. Where items or surfaces not specifically mentioned, paint same as similar adjacent materials or areas.
   3. If color or finish not designated, Architect will select from standard colors or finishes available.
   4. Following categories of work not included as part of field-applied finish work.
      a. Pre-Finished Items: Unless otherwise indicated, do not include painting when factory-finishing or installer-finishing specified for such items as (but not limited to) follows:
         (1) Acoustic materials
         (2) Architectural woodwork and casework.
         (3) Finished mechanical and electrical equipment.
         (4) Light fixtures.
         (5) Switchgear and distribution cabinets.
      b. Concealed Surfaces: Unless otherwise indicated, painting not required on surfaces such as follows:
         (1) Walls or ceilings in concealed areas.
         (2) Generally inaccessible areas.
         (3) Foundation spaces.
         (4) Furred areas.

c. Finished Metal Surfaces: Unless otherwise indicated, similar finished metal surfaces listed below do not require painting:
   (1) Anodized aluminum.
   (2) Stainless steel.
   (3) Chromium plate.

d. Operating Parts: Unless otherwise indicated, moving parts of operating units, mechanical and electrical parts, such as follows, do not require painting:
   (1) Valve and damper operators.
   (2) Linkages.
   (3) Sensing devices.
   (4) Motor and fan shafts.

5. Following categories of work included under other Sections.
   a. Shop Primers: Unless otherwise specified, shop priming ferrous metal items included under various Sections for structural steel, metal fabrications, hollow metal work and similar items.
   b. Unless otherwise specified, shop priming of fabricated components such as architectural woodwork, wood casework and shopfabricated or factory-built mechanical and electrical equipment or accessories included under other Sections.
6. Mechanical and Electrical Work: Painting of mechanical and electrical work specified in Divisions 15 and 16, respectively.

E. Do not paint over any code-required labels, such as Underwriters' Laboratories and Factory Mutual, or any equipment identification, performance rating, name, or nomenclature plates.

1.03 QUALITY ASSURANCE

A. Single Source Responsibility: Provide primers and other undercoat paint produced by same manufacturer as finish coats; use only thinners approved by paint manufacturer, and use only within recommended limits.

B. Coordination of Work:
   1. Review other Sections in which prime paints provided to ensure compatibility of total coatings system for various substrates.
   2. Upon request from other trades, furnish information/characteristics of finish materials provided for use, to ensure use of compatible prime coats.

1.04 SUBMITTALS

A. Product Data: Submit manufacturer's technical information including Paint label analysis and application instructions for each material used.

B. Samples:
   1. Prior to beginning work, Architect will furnish color chips for surfaces to be painted.
   2. Use representative colors when preparing samples for review.
   3. Submit samples for Architect's review of color and texture only.
   4. Provide listing of material and application for each coat of each finish sample.

a. On 12" x 12" hardboard, provide two samples of each color and material, with texture to simulate actual conditions; resubmit samples requested by Architect until acceptable sheen, color, and texture achieved.
b. On actual wood surfaces, provide two 4" x 8" samples of natural and stained wood finish; label and identify each location and application.
c. On concrete masonry, provide two 4" square samples of masonry for each type of finish and color, defining filler, prime and finish coat.
d. On actual wall surfaces and other exterior and interior building components, duplicate painted finishes of prepared samples.
(1) Provide full-coat finish samples on min. 100 sq. ft. of surface, as directed, until required sheen, color and texture obtained.
(2) Simulate finished lighting conditions for review of in-place work.

5. Final acceptance of colors from samples applied on job.

1.05 DELIVERY AND STORAGE

A. Deliver materials to site in original, new and unopened packages and containers bearing manufacturer's label and following information:
1. Name or title of material.
2. Fed. Spec. number, if applicable.
3. Manufacturer's stock number and date of manufacture.
4. Manufacturer's name.
5. Contents by volume, for major pigment and vehicle constituents.
6. Thinning instructions.
7. Application instructions.
8. Color name and number.

B. Store materials not in actual use in tightly covered containers.
1. Maintain containers used for storage of paint in clean condition, free of foreign materials and residue.
2. Protect from freezing where necessary.
3. Keep storage area neat and orderly.
4. Remove oily rags and waste daily.
5. Take all precautions to ensure that workmen and work areas adequately protected from fire hazards and health hazards resulting from handling, mixing and application of paints.

1.06 COLOR SELECTION

A. Architect will select colors from manufacturer's standard or custom formulations for shades and tints required.

B. Individual elements (columns, furring, frames, changes in surface level or plane) may require change of hue or color at the discretion of Architect.

C. Graphics:
1. Not used

D. A total of twenty (20) colors may be chosen in addition to wall pattern designs.

1. Office accent walls
2. Trim accent colors

1.07 EXTRA MATERIALS

A. Deliver extra materials to Owner.

B. Furnish Owner list of all colors utilized on project along with manufacturer's name, product name and, if custom color, formulation.

C. Furnish extra materials consisting of one full gallon of each paint product listed in paint schedule and utilized in Project, with lids sealed tightly for storage and identified with appropriate labels matching list of colors required above and including application instructions.

1.08 JOB CONDITIONS

A. Apply water-base paints only when temperature of surfaces to be painted and surrounding air temperatures are between 50ºF (10ºC) and 90ºF (32ºC), unless otherwise permitted by paint manufacturer's printed instructions.

B. Apply solvent-thinned paints only when temperature of surfaces painted and surrounding air temperatures are between 45ºF (7ºC) and 95ºF (35ºC), unless otherwise permitted by paint manufacturer's printed instructions.

C. Do not paint in snow, rain, fog or mist, or when relative humidity exceeds 85%, or to damp or wet surfaces, unless otherwise permitted by paint manufacturer's printed instructions.
   1. Painting may be continued during inclement weather if areas and surfaces to be painted enclosed and heated within temperature limits specified by paint manufacturer during application and drying periods.

1.09 FIRE CODE REQUIREMENTS

A. Corridor partitions, smoke partitions, fire walls, area separation partitions, horizontal exit partitions, exit enclosures, and other fire partitions and ceiling fire rated assemblies and other areas as required by Fire Marshal (state and local) having jurisdiction, shall be effectively and permanently identified with signs or stenciling in manner acceptable to such authority.
   Paint such identification above decorative ceiling in concealed spaces and in mechanical rooms.
   Frequency of signage shall be as required by the Fire Marshal, but shall be no greater than 10’-0” on center for full length of wall. Min. height 4 inch
   Identification shall occur on both sides of partitions.
   Identification shall occur on exposed side of fire rated assemblies.

   Suggested Wording:
   Smoke Partition: “Smoke Barrier – Protect All Openings.”
   0.5 Hour Partition: “Smoke and 0.5 Hour Fire Barrier – Protect All Openings.”
   1.0 Hour Partition: “Smoke and 1.0 Hour Fire Barrier – Protect All Openings.”
   1.5 Hour Partition: “Smoke and 1.5 Hour Fire Barrier – Protect All Openings.”
   2.0 Hour Partition: “Smoke and 2.0 Hour Fire Barrier – Protect All Openings.”
   4.0 Hour Partition: “Smoke and 4.0 Hour Fire Barrier – Protect All Openings.”

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Manufacturer: Subject to compliance with requirements, provide products of one of following:

1. Devoe and Raynolds Co. (Devoe).
2. PPG Industries, Pittsburgh Paints (PPG).
3. Sherwin Williams.

2.02 MATERIALS

A. Material Quality:
1. Provide best quality grade of various types of coatings regularly manufactured by acceptable paint materials manufacturers.
2. Materials not displaying manufacturer's identification as standard, best-grade product not acceptable.

B. Proprietary names used to designate color or materials not intended to imply that products of named manufacturers required to exclusion of equivalent products of other manufacturers.

C. Color Pigments: Pure, non-fading, applicable types to suit substrates and service indicated.

D. Lead content in pigment limited to contain not more than 0.06% lead, as lead metal based on total non-volatile (dry-film) of paint by weight.

PART 3 - EXECUTION

3.01 INSPECTION

A. Applicator examine areas and conditions under which painting work applied and notify Contractor in writing of conditions detrimental to proper and timely completion of work.
1. Do not proceed with work until unsatisfactory conditions corrected in manner acceptable to Applicator.
2. Starting of painting work construed as Applicator's acceptance of surfaces and conditions within any particular area.

B. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions otherwise detrimental to formation of durable paint film.

3.02 SURFACE PREPARATION

A. General: Perform preparation and cleaning procedures in accordance with paint manufacturer's instructions and herein specified, for each particular substrate condition.
1. Provide barrier coats over incompatible primers or remove and reprime as required; notify Architect in writing of any anticipated problems in using specified coating systems with substrates primed by others.
2. Remove hardware, hardware accessories, machined surfaces, plates, lighting fixtures, and similar items in place and not to be finish-painted, or provide surface-applied protection prior to surface preparation and painting operations.
   a. Remove, if necessary, for complete painting of items and adjacent surfaces.
   b. Following completion of painting of each space or area, reinstall removed items.

3. Clean surfaces to be painted before applying paint or surface treatments.
   a. Remove oil and grease prior to mechanical cleaning.
   b. Program cleaning and painting so contaminants from cleaning process will not fall on wet, newly-painted surfaces.

B. Cementitious Materials:
1. Prepare cementitious surfaces of concrete, concrete block, cement plaster and mineral-fiber-reinforced cement panels for paint by removing efflorescence, chalk, dust, dirt, grease, oils, and by roughening as required to remove glaze.
2. Determine alkalinity and moisture content of surfaces by performing appropriate tests.
3. If surfaces found sufficiently alkaline to cause blistering and burning of finish paint, correct condition before application of paint.
4. Do not paint over surfaces where moisture content exceeds that permitted in manufacturer's printed directions.
5. Clean concrete floor surfaces scheduled with commercial solution or muriatic acid, or other etching cleaner before painting.
6. Flush floor with clean water to neutralize acid, and allow to dry before painting.

C. Wood:
1. Clean wood surfaces of dirt, oil, or other foreign substances with scrapers, mineral spirits, and sandpaper, as required.
   a. Sand smooth those finished surfaces exposed to view, and dust off.
   b. Scrape and clean small, dry, seasoned knots and apply thin coat of white shellac or other recommended knot sealer, before application of priming coat.
   c. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood-filler.
   d. Sand smooth when dried.
2. Prime, stain, or seal wood required to be job-painted immediately upon delivery to job.
   a. Prime edges, ends, faces, undersides, and backsides of such wood, including cabinets, counters, cases, paneling.
   b. When transparent finish required, use spar varnish for back-priming.
   c. Backprime paneling on interior partitions only where masonry, plaster, or other wet wall construction occurs on backside.
   d. Seal tops, bottoms, and cut-outs of unprimed wood doors with heavy coat of varnish or equivalent sealer immediately upon delivery to job.

D. Ferrous Metals:
1. Clean ferrous surfaces not galvanized or shop-coated, of oil, grease, dirt, loose mill scale and other foreign substances by solvent or mechanical cleaning.
2. Touch-up shop-applied prime coats wherever damaged or bare, where required by other Sections; clean and touch-up with same type shop primer.

E. Galvanized Surfaces:
1. Clean free of oil and surface contaminants with non-petroleum based solvent.

3.03 MATERIALS PREPARATION

A. Mix and prepare painting materials in accordance with manufacturer's directions.

B. Maintain containers used in mixing and application of paint in clean condition, free of foreign materials and residue.

C. Stir materials before application to produce mixture of uniform density, and stir as required during application.
   1. Do not stir surface film into material.
   2. Remove film and, if necessary, strain material before using.

3.04 APPLICATION

A. General:
   1. Apply paint in accordance with manufacturer's directions; use applicators and techniques best suited for substrate and type of material being applied.
      a. Paint colors, surface treatments, and finishes, indicated in "schedules" of Contract Documents.
      b. Block filler shall be applied to cover all CMU voids. Do not add any thinners/cutting agents. Apply product to hide gray of CMU more than 1 coat may be required.
      c. Provide finish coats compatible with prime paints used.

   2. Apply first finish coat with light tint of second finish coat color.
      a. First finish coat must contrast with prime coat and second finish coat to identify it as such.
   3. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces.
      a. Paint surfaces behind permanently-fixed equipment or furniture with prime coat only before final installation of equipment.
   4. Paint interior surfaces of ducts, where visible through registers or grilles, with flat, non-specular black paint.
   5. Paint back sides of access panels, and removable or hinged covers to match exposed surfaces.
   6. Finish exterior doors on tops, bottoms and side edges same as exterior faces, unless otherwise indicated.
   7. Sand lightly between each succeeding enamel or varnish coat.
   8. Omit first coat (primer) on shop primed metal surfaces and touch-up painted, unless otherwise indicated.
   9. Apply additional coats when undercoats, stains or other conditions show through final coat of paint, until paint film of uniform finish, color and appearance.
      a. Give special attention to insure that surfaces, including edges, corners, crevices, welds, and exposed fasteners receive dry film thickness equivalent to that of flat surfaces.

B. Scheduling Painting:
   1. Apply first-coat material to surfaces cleaned, pretreated or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
   2. Allow sufficient time between successive coatings to permit proper drying.
   3. Do not recoat until paint dried so it feels firm, and does not deform or feel sticky under moderate thumb pressure, and application of another coat of paint does not cause lifting or loss of adhesion of undercoat.

C. Minimum Coating Thickness:
   1. Apply materials at not less than manufacturer's recommended spreading rate, to establish total dry film thickness indicated or, if not indicated, recommended by coating manufacturer.

D. Prime Coats:
   1. Apply prime coat to material required to be painted or finished, and not prime coated by others.
   2. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat, to assure finish coat with no burn-through or other defects due to insufficient sealing.

E. Pigmented (Opaque) Finishes:
   1. Completely cover to provide opaque, smooth surface of uniform finish, color, appearance and coverage.
   2. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness or other surface imperfections not acceptable.

F. Transparent (Clear) Finish:
   1. Use multiple coats to produce glass-smooth surface film of even luster.
   2. Provide finish free of laps, cloudiness, color irregularity, runs, brush marks, orange peel, nail holes, or other surface imperfections.
   3. Provide satin finish for final coats, unless otherwise indicated.

G. Completed Work:
   1. Match approved samples for color, texture and coverage.
   2. Remove, refinish or repaint work not in compliance with specified requirements.

H. Metal Light Kits: Finish same as hollow metal frame. Finish unit prior to installation.

3.05 FIELD QUALITY CONTROL

A. Owner reserves right to invoke following material testing procedure at any time, and any number of times during field painting:
   1. Engage services of an independent testing laboratory to sample paint being used.
   2. Samples of materials delivered to project site taken, identified and sealed, and certified in presence of Contractor.
   3. Testing laboratory perform appropriate tests for any or all of following characteristics:
      a. Abrasion resistance.
      b. Apparent reflectivity.
      c. Flexibility.
      d. Washability.
      e. Absorption.
      f. Accelerated weathering.
      g. Dry opacity.
      h. Accelerated yellowness.
      i. Recoating.
      j. Skinning.
      k. Color retention.
      l. Alkali resistance.
      m. Quantitative materials analysis.

B. If test results show material being used does not comply with specified requirements, Contractor directed to stop painting work, and:
   1. Remove non-complying paint.
   2. Pay for testing.
   3. Repaint surfaces coated with rejected paint.
   4. Remove rejected paint from previously painted surfaces if, upon repainting with specified paint, two coatings are non-compatible.

3.06 CLEAN-UP AND PROTECTION

A. Clean-Up:
1. As work Progresses, remove discarded paint materials, rubbish, cans and rags from site at end of each work day.
2. Upon completion of painting work, clean window glass and other paint spattered surfaces.
3. Remove spattered paint by proper methods of washing and scraping, using care not to scratch or otherwise damage finished surfaces.

B. Protection:
1. Protect work of other trades, whether to be painted or not, against damage by painting and finishing work.
2. Correct any damage by cleaning, repairing or replacing, and repainting, as acceptable to Architect.
3. Provide "Wet Paint" signs as required to protect newly-painted finishes.
4. Remove temporary protective wrappings provided by others for protection of their work, after completion of painting operations.
5. At completion of work of other trades, touch-up and restore all damaged or defaced painted surfaces.

3.07 EXTERIOR PAINT SCHEDULE – Not Used

3.08 INTERIOR PAINT SCHEDULE

A. General: Provide the following paint systems for the various substrates, as indicated.

B. Concrete Masonry Units:
1. Eggshell Enamel Finish: 2 coats over filled surface with min. total dry film thickness of 3.5 mils, excluding filler coat.
   a. Location : (PCB) Painted concrete Block,
   b. Block Filler: High-Performance Latex Block Filler. Apply filler coat at a rate to ensure complete coverage with pores filled.
      (1) S&W: B-42W46 Block Filler (200 microns).
      (2) Glidden: Bloxfil-4000
      (3) PPG
   c. First and Second Finish Coat: Interior, Eggshell, Odorless, Pre- Catalyzed Water Bourne Epoxy.
      (1) S&W: K-45W-151
      (2) PPG : Pitt-Glaze WB1
      (3) Glidden : Lanning LW- 176, LW-190

2. Semi-Gloss Enamel Finish 2 coats over filled surface with min. total dry film thickness of 3.5 mils, excluding filler coat.
   a. Location: (PCB) Painted Concrete Block.
   b. Block Filler: High-Performance Latex Block Filler. Apply filler coat at a rate to ensure complete coverage with pores filled.
      (1) S&W: B-42W46 Block Filler (200 microns).
      (2) Glidden: Bloxfil-4000
      (3) PPG 6-15 Blockfiller
      (4)
   c. First and Second Finish Coat: Interior, Eggshell, Odorless, Pre- Catalyzed Water Bourne Epoxy..
      (1) S&W: K-46W-151
      (2) PPG Pitt -Glaze WB1

(3) Glidden : Lanning LW- 176, LW-190

C. Gypsum Drywall Systems:
1. Location all areas noted (PGB) Painted Gypsum Board
2. Odorless Eggshell Enamel Finish: 3 coats with min. total dry film thickness of 2.5 mils.
a. Primer: White, Interior, Latex-Based Primer.
(1) S&W: B-28 Prep-Rite Classic Latex Primer and Sealer.
(2) Glidden 1000-1200 High Hide Primer
(3) PPG 6-2 Speedhide

b. First and Second Coats: Interior, Eggshell, Odorless, Water Bourne.
(1) S&W: K-45W-151
(2) PPG : Pitt-Glaze WB1
(3) Glidden : Lanning LW- 176, LW-190

D. Stained Woodwork:
1. Stained - Varnish Rubbed Finish: 3 finish coats over stain plus filler on open grain wood. Wipe filler before applying first varnish coat.
a. Location ALL WOOD DOORS and all wood work not listed as paint or shipped Pre-Finished.
b. Stain Coat: Oil-Type Interior Wood Stain.
(1) S&W: 96XX Wonder Woodstain Alkyd Stain.
(2) Glidden 1700 Wood Pride
(3) PPG 77-560 Rez Stain
c. First Coat: Cut Shellac.
d. Filler Coat: Paste Wood Filler.
e. Second and Third Coats: Urethane Varnish.
(1) S&W: A-67 Wood Classics Polyurethane Finish.
(2) Glidden 1902 Wood Pride Polyurethane
(3) PPG 77-9 Rez Polyurethane

E. Ferrous Metal: Primer not required on shop-primed items.
1. All interior metal doors and frames and other metal items requiring paint.
2. Full Gloss Alkyd Enamel: 2 finish coats over primer.
a. Primer: Synthetic Rust-Inhibitive Primer.
(1) S&W: B-50 Kem-Kromik – HA Metal Primer.
(2) Glidden 4160 Degaurd Industrial Enamel
(3) PPG 6-208 Speedhide Primer

b. First and Second Coats: Gloss Alkyd Enamel.
(1) S&W: B-54 Industrial Enamel.
(2) Glidden 4308 Devgaurd Industrial Enamel
(3) PPG 70282 Industrial Enamel

F. Zinc-Coated Metal: Primer not required on shop-primed items.
1. High Gloss Alkyd Enamel: 2 finish coats over primer.

a. Primer: Galvanized Metal Primer.
   (1) S&W: B-50 Galvite HS Metal Primer.
   (2) Glidden 4160 Degaurd Industrial Enamel
   (3) PPG 6-209 Speedhide Primer

b. First and Second Coats: High Gloss Alkyd Enamel.
   (1) S&W: B-54 Gloss Enamel.
   (2) Glidden 4308 Devgaurd Industrial Enamel
   (3) PPG 70282 Industrial Enamel

G. Concrete Flooring:(All areas Marked as concrete in finish schedule) Two (2) coats
1. Location all floors listed as (CONC) Concrete, (CONC-ST) Concrete Stained.
2. Penetrating Stain Finish:
   a. Finish Coats: Multi-Purpose Floor coating
      (1) S&W: H&C Shield Plus
      (2) Glidden : GP-3610
      (3) PPG

END OF SECTION 09 9000

SECTION 10 1500

COMPARTMENTS AND CUBICLES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Extent of compartments and cubicles is indicated on drawings.

B. Provide one of the following types of toilet compartments:
   1. Plastic laminate Face. -Solid phenolic core

C. Styles of toilet compartments include:
   1. Floor-anchored, overhead braced.

D. Toilet accessories, such as toilet paper holders, grab bars, purse shelves, specified elsewhere in Division 10.

1.03 SUBMITTALS

A. Product Data: Submit manufacturer's detailed technical data for materials, fabrication, and installation, including catalog cuts of anchors, hardware, fastenings, and accessories.

B. Shop Drawings: Submit shop drawings for fabrication and erection of toilet partition assemblies not fully described by product drawings, templates, and instructions for installation of anchorage devices built into other work.

C. Samples:
   1. Submit full range of color samples for each type of unit required.
   2. Submit 6" square samples of each color and finish on same substrate used in work, for color verification after selections made.
   3. Upon request from Architect submit one (1) sample each of following:
      (a) Hardware (Complete)
      (b) Pilaster (12" x 12")
      (c) Divider panel (12" x 12")
      (d) Continuous mounting bracket

1.04 QUALITY ASSURANCE

A. Field Measurements:
   1. Take field measurements prior to preparation of shop drawings and fabrication where possible, to ensure proper fitting of work.
   2. Allow for adjustments within specified tolerances wherever taking of field measurements before fabrication might delay work.

B. Coordination: Furnish inserts and anchorages to be built into other work for installation of toilet partitions and related work; coordinate delivery with other work to avoid delay.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturer: Subject to compliance with requirements, provide products of one of the following:
   1. AmproProducts, Inc.
   2. Columbia Partitions, Inc.
   3. Comtec Inc.
   4. Flush Metal Partishions.
   5. Rockville Partitions, Inc.
   6. Sanymetal Products Co.
   7. American Sanitary Partition Corp.
   8. Global Steel Products Corp.

2.02 MATERIALS

A. General: Provide materials, which have been selected for surface flatness and smoothness. Exposed surfaces, which exhibit pitting, seam marks, roller marks, stains, discolorations, telegraphing of core material, or other imperfections on finished units are not acceptable.

B. Plastic Laminate: NEMA Std. LD-3, min. 0.050" thick, color and pattern as indicated or, if not indicated, selected by Architect from manufacturer's standards.

C. Core Material for Plastic Laminate:
   1. Solid phenolic core with face laminate fused in fabrication to substrate with no glue line or seam visible.
      a. Doors and pilasters min. 3/4" finished thickness; divider panels min. 1/2" finished thickness.

D. Pilaster Shoes: ASTM A 167, Type 302/304 stainless steel, min. 3" high, 20 gage, finished to match hardware.

E. Continuous Brackets:
   1. Full height extruded aluminum 6063-T5, mill finish, min. 1.685 lbs./l.f. or stainless steel or manufactures standard plastic.
   2. Use for pilaster to wall connections, pilaster to partitions and partitions to walls.
   3. Pre-drill wall brackets with holes 6" o.c. along full length of bracket, no hole less than 3" from end of bracket.

F. Hinges:
   1. Stainless Steel though bolt.

G. Hardware and Accessories:
   1. Manufacturer's standard design, heavy-duty operating hardware and accessories of stainless steel.

H. Overhead Bracing: Continuous extruded aluminum, anti-grip profile, with clear anodized finish.

I. Anchorages and Fasteners:
   1. Manufacturer's standard exposed fasteners of stainless steel, to match hardware, with theft-resistant type heads and nuts.
   2. For concealed anchors, use hot-dip galvanized, cadmium-plated, or other rust-resistant protective-coated steel.

2.03 FABRICATION

A. General:

1. Furnish standard doors, panels, screens, and pilasters fabricated for partition system, unless otherwise indicated.
2. Furnish units with cutouts, drilled holes, and internal reinforcement to receive partition-mounted hardware, accessories, and grab bars, as indicated.

B. Door Dimensions: Unless otherwise indicated, furnish 24" wide inswinging doors for ordinary toilet stalls and 32" wide (clear opening) outswinging doors at stalls equipped for use by handicapped.

C. Solid phenolic Partitions and Screens:
1. Pressure-laminate one-piece face sheets to core material with no splices or joints, and with edges straight and sealed.

D. Overhead-Braced Partitions:
1. Furnish galvanized steel supports and leveling bolts at pilasters, as recommended by manufacturer to suit floor conditions.
2. Make provisions for setting and securing continuous extruded aluminum anti-grip overhead-bracing at top of each pilaster.
3. Furnish shoe at each pilaster to conceal supports and leveling mechanism.

E. Hardware: Furnish hardware for each compartment in partition system, as follows:
1. Hinges:
(a) Cutout inset type, adjustable to hold door open at any angle up to 90º.
(b) Provide gravity type, spring-action cam type, or concealed torsion rod type, to suit manufacturer's standards.
2. Latch and Keeper: Manufacturer's standard stainless steel surface-mounted latch unit, designed for emergency access, with combination rubber-faced door strike and keeper.
3. Door Pull: Manufacturer's standard stainless steel unit for out-swing doors.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General:
1. Comply with manufacturer's recommended procedures and installation sequence.
2. Install partitions rigid, straight, plumb, and level.
3. Thru-bolt brackets to pilasters with one-way sex bolts.
4. Attachment of brackets to adjacent wall construction:
(a) Toggle bolts directly behind vertical edge of pilaster, spaced 12" o.c. along full length of bracket.
(b) No. 5 plastic anchors and No. 14 x 1-1/4" cadmium plated phillips head screws at each 12" interval alternately spaced between toggle bolt connections.
5. Face attachment of pilasters to masonry partitions: Toggle bolt to masonry with sex bolts and grommets 12" o.c.

B. General:
1. Comply with manufacturer's recommended procedures and installation sequence.
2. Install partitions rigid, straight, plumb, and level.
3. Provide max. clearances of 1/2" between pilasters and panels, and 1" between panels and walls.
4. Secure panels to walls with min. of two stirrup brackets attached near top and bottom of panel.
5. Locate wall brackets so that holes for wall anchorages occur in masonry or tile joints.
6. Secure panels to pilasters with min. of two stirrup brackets located to align with stirrup brackets at wall.
7. Secure panels in position with manufacturer's recommended anchoring devices.

C. Overhead-Braced Partitions:
1. Secure pilasters to floor, and level, plumb, and tighten installation with devices furnished.
2. Secure overhead-brace to each pilaster with min. of two fasteners.
3. Hang doors and adjust so tops of doors parallel with overhead-brace when doors in closed position.

D. Floor-Supported Partitions:

1. Set pilaster units with anchorages having min. of 2" penetration into structural floor, unless otherwise recommended by partition manufacturer.
2. Level, plumb, and tighten installation with devices furnished.
3. Hang doors and adjust so tops of doors level with tops of pilasters when doors in closed position.

3.02 ADJUST AND CLEAN

A. Hardware Adjustment:
   1. Adjust and lubricate hardware for proper operation.
   2. Set hinges on inswinging doors to hold open approx. 30º from closed position when unlatched.
   3. Set hinges on outswinging doors (and entrance swing doors) to return to fully closed position.

B. Clean exposed surfaces of partition systems using materials and methods recommended by manufacturer, and provide protection necessary to prevent damage during remainder of construction period.

END OF SECTION 10 1500

SECTION 10 4150

SIGNAGE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 DESCRIPTION OF WORK

A. Extent of Room signs .

1.03 QUALITY ASSURANCE

A. Uniformity of Manufacturer: For each sign form and graphic image process indicated, furnish products of single manufacturer.

1.04 SUBMITTALS

A. Shop Drawings:
   1. Submit shop drawings for fabrication and erection of specialty signs.
   2. Include plans, elevations, and large scale details of sign wording and lettering layout.
   3. Show anchorages and accessory items.
   4. Submit min. four (4) copies of complete list itemizing all rooms showing room name and number, including disabled accessibility signs.
      (a) Indicate door number where sign located or other identifying designation.
      (b) Indicated number of lines and size of sign required for text required.
      (c) Utilize room names and numbers shown on drawings for initial submittal.
      (d) After review of initial submittal by Architect and Owner, submit final list for review and approval.

B. Product Data: Submit manufacturer's technical data and installation instructions for each type of sign required.

C. Samples:
   1. Submit samples of each sign form and material showing finishes, colors, surface textures and qualities of manufacturer and design of each sign component including graphics.
   2. Submit full-size sample units.
   3. Acceptable units may be installed as part of Work.

1.05 REFERENCE STANDARDS

A. Disability Compliance: Meet requirements of Georgia Code Chapter 120-3-20 "Accessibility Code for Buildings and Facilities”.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Manufacturer: Subject to compliance with requirements, provide products of one of following:
   1. Manufacturers of Panel Signs:
      (a) Allenite, A Division of Allen Marking Products, Inc.
      (b) Andco Industries Corp.
      (c) American Graphics, Inc.
      (d) Amerson Engraving Co.
      (e) Architectural Graphics, Inc.
      (f) Architectural Sign Systems, Inc.
      (g) ASI Sign Systems, Inc.
      (h) Best Manufacturing Co.
      (i) Bayuk Graphic
      (j) Mohawk Sign Systems.
      (k) Multi-Graphics, Inc.
      (l) N-Tect, Inc.
      (m) Sign Productions, Inc.
      (n) Spanjer Brothers, Inc.
      (o) The Supersine Company.
      (p) Vomar Products, Inc.

2.02 MATERIALS

A. Plastic Laminate: High pressure engraving stock with face and core plies in contrasting colors, in finishes and color combinations indicated or, if not indicated, selected by Architect from manufacturer's standards.

B. Fasteners: Unless otherwise indicated, concealed fasteners fabricated from metals non-corrosive to either sign material or mounting surface.

C. Anchors and Inserts:
   1. Non-ferrous metal or hot-dipped galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance.
   2. Toothed steel or lead expansion bolt devices for drilled-in-place anchors.
   3. Inserts, as required, set into concrete or masonry work.

2.03 PANEL SIGNS, ROOM SIGNS

A. Fabricate panel signs to comply with requirements indicated for materials, thicknesses, finishes, colors, designs, shapes, sizes and details of construction.

B. Produce smooth, even, level sign panel surfaces, constructed to remain flat under installed condition within tolerance of $\pm$1/16" measured diagonally.

C. Interior Wall-Mounted Room Identity Signs: (Basis of Design: ASI Horizon Series)
   Fabricate unframed panel signs with edges mechanically and smoothly finished to conform with following requirements:
   1. Arched face anodized aluminum frame size: min. 8.75" height x 7.87” width.
   2. Panel insert area size 8.24" height x[7.76” width.
   3. Accent Bar – clear anodized aluminum.
   4. Clear Anodized Aluminum End Caps.
   5. Material: Provide tactile copy and Grade 2 Braille raised 1/32 inch minimum from plaque first surface by manufacturer’s aluminum backed photopolymer process. Sign face of single material (.040 aluminum backed photopolymer), tactile characters and Braille integral to photopolymer. Adhesive-fixed characters are not acceptable.
   6. Wall Mounting: Mechanically fasten with bracket mounting.

D. Graphic Image Process:

1. Graphic Content and Style: Provide sign copy to comply with requirements indicated for sizes, styles, spacing, content, positions, materials, finishes and colors of letters, numbers, symbols and other graphic devices.
2. Pictograms:
   (a) All pictograms based on international symbols and those developed by U. S. Department of Transportation.
   (b) Accompany by verbal and braille description below pictogram.
   (c) Required Pictograms:
      (1) Accessibility Symbol.
   (d) Pictogram plaques same as interior door plaques.
   (e) Refer to drawing at end of this Section.
3. Characters: Meet ADA requirements for proportion of height and width and height and stroke width.
   (a) Characters: "Helvetica" Medium C, all same height, minimum 1".
   (b) Braille: Provide below characters.
4. Sign Size: Min. 6" x 6" but as required to maintain min. 1" between lettering and edge.
5. Sand-cut or Machine-cut Engraved Copy - Raised Characters:
   (a) Sand-cut or machine-cut background to produce raised letters, numbers, symbols and other graphic devices on sign panel on face indicated to provide precisely formed copy, with background incised to uniform depth.
   (b) If machine cut, use high speed cutters mechanically linked to master templates in pantographic system or equivalent process capable of producing characters of style indicated with sharply formed edges.
   (c) Plastic Laminate: Cut through exposed face ply of plastic laminate sheet to expose contrasting core ply.
   (d) Produce copy to provide min. indentation depth of 1/32" and min, stroke width of ¼".

E. Copy Content:
1. Refer to Part 3 of this Section for locations.
2. Room Identification Signs:
   (a) Room name, characters and braille
   (b) Room number, characters and braille
3. Disabled Accessible Toilet Signs:
   (a) Accessibility symbol
   (b) Text "MEN", "WOMEN", "BOYS", "GIRLS" or "TOILET" as applicable, characters and braille
   (c) See drawing at end of this Section.

2.04 FINISHES

A. Colors and Surface Textures: For exposed sign material that requires selection of materials with integral or applied colors, surface textures or other characteristics related to appearance, provide color matches indicated, or if not indicated, as selected by Architect from manufacturer's standards.

PART 3 - EXECUTION

3.01 LOCATIONS

A. Room Identification:
1. Provide one sign for every interior door location where renovation work is being performed as part of this project.

2. Install signs on wall at latch side of doors outside of space identified, centered 60" above finished floor.

B. Disabled Accessible Toilets:
1. Provide one sign for every battery or individual toilet room containing provisions for disabled.
2. Install signs on wall at push/pull or latch side of door outside of toilet, centered 60" above finished floor.

3.02 INSTALLATION

A. General: Use mounting methods of type described and in compliance with manufacturer's instructions, unless otherwise indicated.

B. Install sign units level, plumb and at height indicated, with sign surfaces free from distortion or other defects of appearance.

C. Wall-Mounted Panel Signs:
1. Attach panel signs to wall surfaces using methods indicated below:
(a) Mechanical Fasteners:
(1) Where above methods not practical, provide screws and plastic shields or similar devices, size and type recommended by manufacturer.
(2) Color of exposed portion of fastener match sign surface it penetrates.
(b) If exposed fasteners used, color of exposed portion of fastener to match plaque and provide neat and uniform appearance.

3.03 CLEANING AND PROTECTION

A. At completion of installation, clean soiled sign surfaces in accordance with manufacturer's instructions.
1. Protect units from damage until acceptance by Owner.

END OF SECTION 10 4150

SECTION 10 8000

TOILET, BATH AND MISCELLANEOUS ACCESSORIES

PART 1 - GENERAL

1.01 SUMMARY

A. Related Work Specified Elsewhere:
   1. Drawings, General and Supplementary Conditions, Division-1 Specification sections, apply this Section.

B. Work Included in this Section:
   1. Toilet Accessories:
      a. Mirrors (M).
      b. Paper Towel Dispenser (PTD).
      c. Toilet Tissue Dispenser (TTD).
      d. Paper Towel Receptacle (PTR).
      e. Soap Dispenser (SD).
      f. Grab Bar (GB).
   2. Miscellaneous Accessories:
      a. Mop and Broom Holder (MBH).
   3. Bath and Shower Accessories:
      a. Soap Tray (ST)
      b. Towel Pin (TP)
      c. Robe Hook (RH)
      d. Shower Curtain Rod (SCR)
      e. Shower Curtain and Hooks (SCH)
      f. Folding Shower Seat (FS)

1.02 QUALITY ASSURANCE

A. Inserts, Anchorages: Furnish devices to be set in concrete or masonry; coordinate delivery with other work.

B. Accessory Locations: Coordinate with other work to avoid interference, assure proper operation, servicing of accessories.

1.03 SUBMITTALS

A. Product Data: Manufacturer's technical data, installation instructions for each unit.

B. Samples: Full-size samples of units to Architect for review of design, operation; acceptable samples returned to Contractor for use in Project.

C. Shop Drawings: Setting drawings, templates, instructions, directions for installation of anchorage devices, cut-out requirements in other work.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Manufacturer: Subject to compliance with requirements, provide toilet accessories by one of following:
   1. General Accessories:

      a. American Specialties, Inc.
      b. Bobrick Washroom Equipment, Inc.
      c. Bradley Corp.

2.02 MATERIALS, GENERAL

A. Stainless Steel: AISI Type 302/304, No. 4 finish, 22 gage (.034") min. unless otherwise indicated.

B. Brass: Leaded and unleaded, flat products, FS QQ-B-613; Rods, shapes, forgings, flat products with finished edges, FS QQ-B-626.

C. Sheet Steel: Cold rolled, commercial quality ASTM A 366, 20-gage (.040") min., unless otherwise indicated; surface preparation, metal pretreatment for applied finish.

D. Galvanized Steel Sheet: ASTM A 527, G60.

E. Galvanized Steel Mounting Devices: ASTM A 153, hot-dip galvanized after fabrication.

F. Fasteners: Screws, bolts, other devices, of same material as unit or galvanized steel where concealed.

2.03 FABRICATION

A. General:
   1. No names labels permitted on exposed faces.
   2. On interior surface not exposed to view or on back surface, identify item by printed, waterproof label or stamped nameplate with manufacturer's name, product model number.

B. Surface-Mounted Units, General:
   1. Except where otherwise indicated, fabricate units with tight seams, joints, roll exposed edges.
   2. Hang doors, access panels with full length stainless steel piano hinge.
   3. Conceal anchorage where possible.

C. Recessed Toilet Accessories, General:
   1. Except where otherwise indicated, fabricate all welded units, without mitered corners.
   2. Hang doors, access panels with full-length stainless steel piano hinges.
   3. Fully conceal anchorage when unit closed.

D. Accessories scheduled at end of section form basis of quality required..

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install units using manufacturers' instructions, with fasteners appropriate to substrate, recommended by unit manufacturer.

B. Install units plumb, level, firmly anchor in locations at heights indicated.

C. Toilet Accessories:
1. Mirrors (M):
   a. Location: Over each lavatory, elsewhere indicated; not required over cabinet sinks unless specifically indicated.
   b. Mounting: Heights indicated, except bottom of handicap mirrors max. 40" above finish floor.34 inches to bottom for Childs restroom

2. Paper Towel Dispensers (PTD):
   a. Location: Over each lavatory, wash fountain, elsewhere indicated; not required at cabinet sinks unless specifically indicated.
   b. Mounting: Max. 40" from finish floor to towel dispensing slot.
3. Toilet Tissue Dispensers (TTD):
   a. Location: One each water closet.
   b. Mounting: 3'-0" from rear wall, 2'-0" from centerline to finish floor.17-19 inches for Child restroom
4. Paper Towel Receptacles (PTR):
   a. Location: Where indicated; if not indicated, directed by Architect.
      (1) Free Standing Receptor: One each toilet, elsewhere indicated.
   b. Mounting (Wall Mounted Receptor): Top 28" above finish floor unless otherwise indicated.
5. Soap Dispensers (SD):
   a. Location: One each lavatory, elsewhere indicated; not required above wash fountains and counter sinks unless specifically indicated.
   b. Mounting:
      (1) Wall Mounted: Center above lavatory unless otherwise indicated; max. 3'-4" above finish floor to level of soap discharge or plunger.32inches for child's restroom
      (2) Deck Mounted: Left rear of lavatory, extend spout over edge of bowl.
      (3) Lavatory Mounting: In opening in lavatory.
6. Grab Bars (GB):
   a. Location:
      (1) Handicapped water closets.
   b. Mounting:
      (1) At handicapped water closets:
         (a) Side wall nearest water closet, edge of 48" unit 6" from rear wall.
         (b) Behind water closet, edge of 36" unit 6" from nearest side wall.
      (2) 33" above finish floor to centerline horizontal bars.
      (3) 25-27 Inches for Childs restroom
      (4) 1½" clearance between grab bar and wall; mount to withstand min. 250 lb. vertical load after installation.

D. Miscellaneous Accessories:
1. Mop and Broom Holder (MBH):
   a. Location: Each janitor's space containing floor or janitor's sink.

b. Mounting: 4'-0" above finish floor.

3.02 ADJUSTING AND CLEANING

A. Adjust toilet accessories for proper operation, verify mechanisms function smoothly.
1. Replace damaged or defective items.

B. Removing temporary labels and protective coatings, clean, polish exposed surfaces.

3.03 TOILET ACCESSORY SCHEDULE

SYMBOL	CATALOG NUMBERS	DESCRIPTION
TOILET ACCESSORIES		
M	A&J - U700P ASI - Model #0600E Bobrick - B-2907 Series Bradley - 700-6 McKinney/Parker - 150AP	Mirror: Stainless steel frame, ¼" thick acrylic, mirrorized, clear acrylic sheet with silvering applied to back surface (vacuum deposition process), abrasion-resistant surface coating on exposed face; 18" wide x 30" high unless otherwise indicated on drawings.
PTD	A&J – ASI – 0210 Bobrick – B-2620 Series Bradley – McKinney/Parker –	Surface-Mounted Towel Dispensers: Stainless steel unit, hinged front, tumbler lockset; pierced refill indicator slots at sides; cap. min. either 400 C-fold or 700 multi-fold towels.
TTD	VONDREHEHLE 3253	Twin Jumbo Roll Dispenser
PTR	A&J – U466 ASI - 0829 Bobrick - B-268 Bradley - 360 McKinney/Parker - 636	Stainless steel, seamless exposed walls, continuously welded bottom pan; removable heavy-duty vinyl liner, secured min. 3 points by stainless steel grommets and hooks; min. 13 gal. cap.
SD	SPATAN 975600	Lit and Foamy – White
GB	At H.C. water closets: A&J - UG30BX-48; UG30AX-36 ASI - 3202P-48; 3201P-36 Bobrick - B-62061.99 x 48"; B-6206.99 x	Grab Bars: Stainless steel, Min. 18 (.050") gage wall thickness; concealed mounting, manufacturer's standard flanges and anchorages,1½" clearance between wall and inside face of bar; Manufacturer's standard non-slip texture; heavy-duty 1½"OD. At H.C. showers modify to meet dimensional requirements indicated.

SYMBOL	CATALOG NUMBERS	DESCRIPTION
	36" Bradley - 8122-00248; 8122-00136 McKinney/Parker - 9605F-48CP; 9605F- 36	
EHD	Excel Columbia Vortex Dyson Air Blade	Electric Hand Dryers: Mounting: Surface Finish: Porcelain Enamel Nozzle: Fixed Controls: Solid state infrared sensor touchless. Air speed 75-100 m/s @ 60cfm Dry Cycle Time: less than 12 seconds. Electric: 208-230Y. 2300 watts.
GB	At H.C. water closets: A&J - UG30BX-48; UG30AX-36 ASI - 3202P-48; 3201P-36 Bobrick - B-62061.99 x 48"; B-6206.99 x 36" Bradley - 8122-00248; 8122-00136 McKinney/Parker - 9605F-48CP; 9605F- 36	Grab Bars: Stainless steel, Min. 18 (.050") gage wall thickness; concealed mounting, manufacturer's standard flanges and anchorages,1½" clearance between wall and inside face of bar; Manufacturer's standard non-slip texture; heavy-duty 1½"OD. At H.C. showers modify to meet dimensional requirements indicated.
MISCELLANEOUS ACCESSORIES		
MBH	A&J - UJ13B ASI - 8215B Bobrick - B-223 x 36" Bradley - 995-4 McKinney/Parker - 233 x 36"	Mop and Broom Holder: 18-gage (.050") Type 304 stainless steel "hat" channel with spring loaded rubber cam type mop/broom holders; min. 36" long, 4 holders.

END OF SECTION 108000

SECTION 22 0110

PLUMBING GENERAL PROVISIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

B. It is recognized that separate sub-contracts may be instituted by THIS CONTRACT'S GENERAL CONTRACTOR with others. It is the responsibility of THIS CONTRACT'S GENERAL CONTRACTOR to completely inform, coordinate and advise those sub-contractors as to all of the requirements, conditions and information associated with providing and installing their portion of the total job.

1.2 IMPOSED REGULATIONS:

A. Applicable provisions of the State and Local Codes and of the following codes and standards in addition to those listed elsewhere in the specifications are hereby imposed on a general basis for plumbing work. In each case, the prevailing edition shall be the current adopted edition of the state where the project is located.

1. International Plumbing Code.
2. International Gas Code.
3. International Energy Conservation Code.
4. International Fire Code.

1.3 SCOPE OF WORK:

A. Provide all labor, materials, equipment and supervision to construct complete and operable plumbing systems as indicated on the drawings and specified herein. All materials and equipment used shall be new, undamaged and free from any defects.

1.4 EXISTING SERVICES AND FACILITIES:

A. Damage to Existing Services: Existing services and facilities damaged by the Contractor through negligence or through use of faulty materials or workmanship shall be promptly repaired, replaced, or otherwise restored to previous conditions by the Contractor without additional cost to the Owner.

B. Interruption of Services: Interruptions of services necessary for connection to or modification of existing systems or facilities shall occur only at prearranged times approved by the Owner. Interruptions shall only occur after the provision of all temporary work and the availability of adequate labor and materials will assure that the duration of the interruption will not exceed the time agreed upon.

C. Removed Materials: Existing materials made unnecessary by the new installation shall be removed, shall remain the property of the Owner and shall be stored at a location and in a

manner as directed, or, if classified by the Owner's authorized representative as unsuitable for further use, shall become the property of the Contractor and shall be removed from the site.

1.5 PRODUCT WARRANTIES:

A. Provide manufacturer's standard printed commitment in reference to a specific product and normal application, stating that certain acts of restitution will be performed for the Purchaser or Owner by the manufacturer, when and if the product fails within certain operational conditions and time limits. Where the warranty requirements of a specific specification section exceed the manufacturer's standard warranty, the more stringent requirements will apply and modified manufacturer's warranty shall be provided. In no case shall the manufacturer's warranty be less than one (1) year.

1.6 PRODUCT SUBSTITUTIONS:

A. General: Materials specified by manufacturer's name shall be used unless prior approval of an alternate is given by addenda. Requests for substitutions must be received in the office of the Architect at least 10 days prior to opening of bids.

PART 2 - PRODUCTS

2.1 GENERAL PRODUCT REQUIREMENTS:

A. Standard Products: Provide not less (quality) than manufacturer's standard products, as specified by their published product data. In addition to the indication that a particular product/model number is acceptable, comply with the specified requirements. Do not assume that the available off-the-shelf condition of a product complies with the requirements; as an example, a specific finish or color may be required.

B. Uniformity: Where multiple units of a general product are required for the work, provide identical products by the same manufacturer, without variations except for sizes and similar variations as indicated.

C. Product Compatibility, Options: Where more than one product selection is specified, either generically or proprietarily, selection is Purchaser's or Installer's option. Provide adaptations as needed for interfacing of selected products in the work.

D. Equipment Nameplates: Provide a permanent operational data nameplate on each item of power operated equipment, indicating the manufacturer, product name, model number, serial number, speed, capacity, power characteristics, labels of tested compliance, and similar essential operating data.

E. Locate nameplates in easy-to-read locations. When product is visually exposed in an occupied area of the building, locate nameplate in a concealed position (where possible) which is accessible for reading by service personnel.

PART 3 - EXECUTION

3.1 PRODUCT INSTALLATION, GENERAL:

A. Except where more stringent requirements are indicated, comply with the product manufacturer's installation instructions and recommendations, including handling, anchorage, assembly, connections, cleaning and testing, charging, lubrication, startup, test operation and shut-down of operating equipment. Consult with manufacturer's technical experts, for specific instructions on unique product conditions and unforeseen problems.

B. Protection and Identification: Deliver products to project properly identified with names, models numbers, types, grades, compliance labels and similar information needed for distinct identifications; adequately packaged or protected to prevent deterioration during shipment, storage and handling. Store in a dry, well ventilated, indoor space, except where prepared and protected by the manufacturer specifically for exterior storage.

C. Permits and Tests: Provide labor, material and equipment to perform all tests required by the governing agencies and submit a record of all tests to the Owner or his representative. Notify the Architect five days in advance of any testing.

END OF SECTION 22 0110

SECTION 22 0120

PLUMBING STANDARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 QUALITY ASSURANCE:

A. Industry Standards: It is a general requirement that plumbing work comply with applicable requirements and recommendations of standards published by listed agencies and trade associations, except to the extent more detailed and stringent requirements are indicated or required by governing regulations. Listing of Associations, Standards, and Abbreviations:

1.	AGA	*American Gas Association* *1515 Wilson Blvd.* *Arlington, VA 22209*
2.	ASHRAE	*American Society of Heating, Refrigerating &* *Air Conditioning Engineers, Inc.* *1791 Tullie Circle, NE, Atlanta, GA. 30329* *404/636-8400*
3.	AWS	*American Welding Society, Inc.* *2501 NW 7th St., Miami, FL 33125* *305/642-7090*
4.	CISPI	*Cast Iron Soil Pipe Institute* *2020 K. St., NW, Washington, DC* *202/233-4536*
5.	NEC	*National Electrical Code by NFPA*
6.	NEMA	*National Electrical Manufacturers Association* *1300 N 17th Street, Suite 1847* *Rosslyn, VA 22209* *703/841-3200*
7.	NFPA	*National Fire Protection Association* *407 Atlantic Ave.,* *Boston, MA 02210* *617/482-8755*
8.	UL	*Underwriters' Laboratories, Inc.* *207 East Ohio St.,*

Chicago, IL 60611
312/642-6969

PARTS 2 AND 3 - PRODUCTS AND EXECUTION (Not applicable)

END OF SECTION 22 0120

SECTION 22 0210

PLUMBING COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 QUALITY ASSURANCE:

A. Coordinate the actual location of all plumbing work visible in finished spaces with the Architect/Engineer.

PART 2 - PRODUCTS

2.1 PRODUCT COORDINATION:

A. Power Characteristics: Refer to the electrical sections of the specifications and the electrical drawings for the power characteristics available for the operation of each power driven item of equipment. The electrical design was based on the typical power requirements of the equipment manufacturers scheduled or specified. Any modifications to the electrical system which are required due to the use of an approved equivalent manufacturer shall be made at no additional cost to the owner. All changes must be clearly documented and submitted for review by the Architect/Engineer prior to purchasing equipment. Coordinate purchases to ensure uniform interface with electrical work. The plumbing contractor shall furnish a detailed list of equipment electrical characteristics to the electrical contractor for the purpose of preparing the coordination affidavit required by Division 26.

B. Coordination of Options and Substitutions: Where the contract documents permit the selection from several product options, and where it becomes necessary to authorize a substitution, do not proceed with purchasing until coordination of interface of equipment has been checked and satisfactorily established.

C. Firestopping: Refer to architectural drawings for the locations of all fire rated ceilings, floors and walls. The contractor shall furnish detailed shop drawings of all firestopping details to be used for both piping and ductwork. All firestopping details shall be U.L. listed and subject to approval by the Authority having jurisdiction.

PART 3 - EXECUTION

3.1 INSPECTION AND PREPARATION:

A. Substrate Examination: The Installer of each element of the work must examine the condition of the substrate to receive the work, and the conditions under which the work will be performed, and must notify the Contractor in writing of conditions detrimental to the proper completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.

B. Do not proceed with the installation of sleeves, anchors, hangers, roof penetrations and similar work until coordination drawings have been processed and released for construction. Where work must be installed prior to that time in order to avoid a project delay, review proposed installation in a project coordination meeting including all parties involved with the interfacing of the work.

3.2 CUTTING AND PATCHING:

A. Structural Limitations: Do not cut structural framing, walls, floors, decks and other members intended to withstand stress, except with the Architect's or Engineer's written authorization. Authorization will be granted only where there is not other reasonable method for completing the work, and where the proposed cutting clearly does not materially weaken the structure.

B. Where authorized, cut opening through concrete (for pipe penetrations and similar services) by core drilling or sawing. Do not cut by hammer-driven chisel or drill.

C. Other work: Do not endanger or damage other work through the procedures and processes of cutting to accommodate mechanical work. Review the proposed cutting with the Installer of the work to be cut, and comply with his recommendations to minimize damage. Where necessary, engage the original Installer or other specialists to execute the cutting in the recommended manner.

D. Where patching is required to restore other work, because of either cutting or other damage inflicted during the installation of plumbing work, execute the patching in the manner recommended by the original Installer. Restore the other work in every respect, including the elimination of visual defects in exposed finishes, as judged by the Architect. Engage the original Installer to complete patching of the following categories of work:

1. Exposed concrete finishes.
2. Exposed masonry.
3. Waterproofing and vapor barriers.
4. Roofing, flashing and accessories.
5. Interior exposed finishes and casework, where judged by the Architect to be difficult to achieve an acceptable match by other means.

3.3 COORDINATION OF PLUMBING INSTALLATION:

A. General: Sequence, coordinate and integrate the various elements of plumbing work so that

building systems will perform as indicated and be in harmony with other work of the building. The Architect/Engineer will not supervise the coordination, which is the exclusive responsibility of the Contractor. Comply with the following requirements:

1. Install piping and similar services straight and true, aligned with other work and with overhead structures and allowing for insulation where applicable. Conceal where possible.
2. Arrange work to facilitate maintenance and repair or replacement of equipment. Locate services requiring maintenance on valves and similar units in front of services requiring less maintenance. Connect equipment for ease of disconnecting, with minimum of interference with other work.
3. Give the right-of way to piping systems required to slope for drainage (over other service lines). Piping shall be located to avoid interference with ductwork and light fixtures.
4. Store materials off the ground and protected from standing water and weather.

B. Drawings: Conform with the arrangement indicated by the contract documents to the greatest extent possible, recognizing that portions of the work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, comply with the Architect's decision on resolution of the conflict.

C. Electrical Work: Coordinate the plumbing work with electrical work, and properly interface with the electrical service. In general, and except as otherwise indicated, install plumbing equipment ready for electrical connection. Refer to electrical sections of the specifications for electrical connection of plumbing equipment.

D. Utility Connections: Coordinate the connection of plumbing systems with exterior underground utilities and services. Comply with the requirements of governing regulations, franchised service companies and controlling agencies. Provide a single connection for each service except where multiple connections are indicated.

END OF SECTION 22 0210

SECTION 22 0220

PLUMBING SUBMITTALS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 SUBMITTAL FORMS AND PROCEDURES:

A. The purpose of submittals is to demonstrate to the Architect/Engineer that the Contractor understands the design concept. The Architect/Engineer's review of such drawings, schedules, or cuts shall not relieve the Contractor from responsibility for deviation from drawings or specifications unless he has, in writing, called the Architect/Engineer's attention to such deviations at the time of submission, and has received from the Architect/Engineer, in writing, permission for such deviations. All submittals must be completely checked by the Contractor prior to submission for review.

B. Hard Copy Submittals: Submittal data shall be placed in one or more hard-back 3-ring binders, arranged and labeled according to specification section. Each binder shall contain a title page and table of contents. Provide separator tabs, and label by specification section. Make note in the table of contents, any drawings that accompany the submittal. Title page shall contain Project Name, Contractor’s Name, Division 22 Superintendent’s name, Suppliers and point of contact for each, and date. Except as otherwise indicated in other sections, submit 5 complete copies. Quantity indicated does not include copies required for regulatory agencies.

C. Electronic Submittals: If the Architect agrees to allow electronic submittals via an on-line information management product such as “Submittal Exchange, etc., all electronic submittal files shall be organized to match the bid documents for specification section and name. Each submittal file shall be complete for each specification section. Multiple partial submittals per specification section will be rejected. Make note in the table of contents, any drawings that accompany the submittal. Title page shall contain Project Name, Contractor’s Name, Division 22 Superintendent’s name, Suppliers and point of contact for each, and date.

D. Submittals shall be made for all items contained in the following specification sections:

1. Plumbing Coordination
2. Plumbing Identification
3. Plumbing Pipe, Tube, and Fittings
4. Plumbing Hangers and Supports
5. Plumbing Piping Systems Insulation
6. Domestic Water Piping System
7. Soil, Waste and Vent Piping System
8. Plumbing Fixtures
9. Electric Water Coolers

E. Response to Submittals: A Submittal Review Report shall be issued by the Architect/Engineer with the following classifications for each item:

1. "No Exceptions Taken": No corrections, no marks. Contractor shall submit copies for

distribution.

2. "Make Corrections Noted": A few minor corrections. Items may be ordered as marked up without further resubmission. Submit copies for distribution.
3. "Revise and Resubmit": Minor corrections. Item may be ordered at the Contractor's option. Contractor shall resubmit drawings with corrections noted.
4. "Rejected": Major corrections or not in accordance with the contract documents. No items shall be ordered. Contractor shall correct and resubmit drawings.

PART 2 - PRODUCTS

2.1 SUBMITTAL REQUIREMENTS:

A. General: Each specification section shall list the required submittal items. All submittal items shall conform to the requirements listed below. For each major section of submittal data, include a summary page which lists items and model numbers for each piece of equipment.

B. Shop Drawings: Prepare shop drawings to accurate scale except where diagrammatic representations are specifically indicated. Show clearance dimensions of critical locations, and show dimensions of spaces required for operation and maintenance of equipment. Show piping connections and other service connections, and show interface with other work including structural support. Indicate by note, the portions of plumbing work shown on the shop drawings which deviated from the indication of work in the contract documents, and explain the reasons for the deviations. Show how such deviations coordinate with interfacing deviations on shop drawings for other portions of the work, currently or previously submitted.

C. Manufacturer's Data: Where pre-printed data is submitted for more than one distinct product, size, type, material, trim, accessory group or other variation, mark submitted copy with black pen to indicate which of the variations is to be provided. Delete or mark-out significant portions of preprinted data which are not applicable. Where operating ranges are shown, mark data to show portion of range required for project application. Expansion or elaboration of standard data to describe a non-standard product must be processed as a shop drawing submittal. For each product include the manufacturer's production specifications, installation or fabrication instructions, nearest source of supply (including telephone number), sizes, weights, speeds, operating capacities, piping and service line connection sizes and locations, statements of compliance with required standards and governing regulation (include manufacturer's signed statements if not covered in printed data), performance data (where applicable) and similar information needed to confirm compliance with the requirements.

D. Certifications: Where specifically indicated, submit with notarized execution.

E. Test Reports: Submit test reports which have been signed and dated by the firm performing the test and prepared in the manner specified in the standard or regulation governing the test procedures as indicated.

F. Manufacturer's Product Warranties: Where pre-printed and published warranty includes substantial deviation from required warranty (as judged by the Architect or Engineer), product is automatically disqualified from use on the project, except where manufacturer prepares and issues a specific product warranty on the product, stating that it is in lieu of the published warranty, and is executed by an authorized officer, and complies with the requirements. Warranties shall comply with the requirements of individual specification section where those requirements exceed the manufacturer's standard warranty.

PART 3 - EXECUTION

3.1 CLOSEOUT REQUIREMENTS:

A. Operating Instructions: Submit manufacturer's operating instructions for each item of plumbing equipment and supplement with additional project application instructions where necessary. Prepare and submit specific operating instructions for charging, start-up, control or sequencing of operation, phase or seasonal variations, shut-down, safety and similar operational instructions. Prepare in typewritten form in completely explained and easily understood English language.

B. Maintenance Manuals: Organize each copy of the required system maintenance manuals to include an index followed by thumb-tab marked sections for each of the following:

1. System operating instructions.
2. Emergency instructions including addresses and telephone numbers of service sources.
3. Regular system maintenance procedures including lubrication.
4. Spare parts listing and stocking recommendations.
5. Inspection, adjusting, rebalancing, cleaning, parts replacement, and similar maintenance instructions and recommendations, including the proper use of tools and accessories.
6. Valve schedule and control diagram for each system.
7. Manufacturer's data for each operating item in each system.
8. Manufacturer's product warranties and guarantees relating to the system and equipment items in the system.
9. Corrected or approved issues of submittal items relating to the system.
10. Bind each maintenance manual in one or more vinyl-covered, 2", 3-ring binder, plus pocket-folder type binders for folded drawings, and mark the back spine of each binder with system identification and volume number.

C. Maintenance Materials: Deliver to Owner’s representative at the location as directed, in containers or packages suitable for storage and fully identified.

D. Guarantees: Where indicated as "Certified", provide guarantee which, in addition to execution by an authorized officer of each guarantor, is attested to by the Secretary of each guarantor and bears the corporate seal.

END OF SECTION 22 0220

SECTION 22 0230

PLUMBING IDENTIFICATION

PART 1 – GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 QUALITY ASSURANCE:

A. Manufacturers: Firms regularly engaged in the manufacture of identification systems required for this product.

B. Submittals: Submit manufacturer's data on materials and submit a sample of each type required.

PART 2 - PRODUCTS

2.1 PLUMBING IDENTIFICATION MATERIALS:

A. Plastic Pipe Markers:

1. General: Product manufacturer's standard pre-printed, flexible or semi-rigid, permanent, color-coded, plastic-sheet pipe markers, complying with ANSI A13.1.
2. Small Pipe: For external diameters less than 6 inches (including insulation, if any), provide full band pipe markers, extending 360 degrees around pipe at each location, fastened by one of the following methods:
   a. Snap-on application of pre-tensioned semi-rigid plastic pipe marker.
   b. Adhesive lap joint in pipe marker overlap.
   c. Laminated or bonded application of pipe marker to pipe (or insulation).
   d. Taped to pipe (or insulation) with color-coded plastic adhesive tape, not less than 3/4 inch wide; full circle at both ends of pipe marker, tape lapped 1-1/2 inch.
3. Large Pipes: For external diameters of 6 inches and larger (including insulation, if any), provide either full-band or strip-type pipe markers, but not narrower than 3 x letter height (and of required length), fastened by one of the following methods:
   a. Laminated or bonded application of pipe marker to pipe (insulation).
   b. Taped to pipe (or insulation) with color-coded plastic adhesive tape, not less than 1-1/2 inches wide: full circle at both ends of pipe marker, tape lapped 3 inches.
4. Lettering: Comply with piping system names as specified, scheduled or shown, and abbreviate only as necessary for each application length.
5. Arrows: Print each pipe marker with arrow indicating direction of flow, either integrally with piping system service lettering or as separate unit of plastic (to accommodate both directions).
6. Install pipe markers on piping of the following piping systems:

   Domestic Cold Water
   Domestic Hot Water

B. Plastic Tape: Manufacturer's standard color-coded pressure-sensitive (self-adhesive) vinyl

tape, not less than 3 mils thick:

1. Width: Provide 1-1/2 inches wide tape markers on pipes with outside diameters including insulation of less than 6 inches, 2-1/2 inches wide tape on larger pipes.
2. Color: Comply with ANSI A13.1.

C. Engraved Plastic-Laminate Signs:

1. General: Provide engraving stock melamine plastic laminated, complying with FS L-P-387, in the sizes and thicknesses indicated, engraved with engraver's standard letter style of the sizes and wording indicated, black with white core, letter color, except as otherwise indicated, punched for mechanical fastening except where adhesive mounting is necessary because of substrate.
2. Thickness: 1/16 inch, except as otherwise indicated.
3. Fasteners: Self-tapping stainless steel screws, except contact type permanent adhesive where screws cannot or should not penetrate the substrate.

D. Valve Tags:

1. Valve tags shall be 18 gauge (minimum) brass with 1-1/4" (minimum) height and width. Identification letters and numbers shall be stamped in tag and shall be filled with black paint
2. Valve tags shall be attached to valve using cable ties. Cable ties shall be self-locking nylon ties.
3. Valve tags shall be installed at all shut-off, balancing, metering, and drain valves. Valve tag shape and designations shall be as follows:

Identification System	Shape	Numbers
Domestic Cold Water	Hexagonal	CW-1, 2, 3, ...
Domestic Hot Water	Hexagonal	HW-1, 2, 3, ...

E. Valve Charts:

1. Valve charts shall be provided for plumbing systems. Charts shall be located in the main mechanical room.
2. Valve charts shall be typed listing all valve tags. List shall include identification number, valve location in system (e.g., Corridor 123, Water Heater WH-1, etc.) and its function (e.g., shut-off, balancing, drain, etc.). Charts shall be mounted in a wooden frame with glass cover.

2.2 LETTERING AND GRAPHICS:

A. General: Coordinate names, abbreviations and other designations used in the identification work, with the corresponding designations shown, specified or scheduled. Provide numbers, lettering recommended by manufacturers or as required for proper identifications and operation/maintenance of the systems and equipment.

B. Multiple Systems: Where multiple systems of the same generic name are shown and specified, provide identification which indicates the individual system number as well as the service.

PART 3 - EXECUTION

3.1 APPLICATION AND INSTALLATION:

A. Coordination: Where identification is to be applied to surfaces which require insulation, painting and other covering or finish, including valve tags in finished spaces, install identification after completion of covering or painting.

B. All equipment, valves, etc. located above ceiling grids shall be located with an engraved marker permanently attached to the ceiling grid. The marker shall describe the item located above the ceiling.

C. Piping System Identification:

1. General: Install pipe markers on each system indicated to receive identification, and include arrows to show normal direction of flow.

D. Locate pipe markers as follows wherever piping is exposed to view in mechanical rooms, accessible maintenance spaces (including accessible areas above ceilings) and exterior non-concealed locations:

1. Near each valve and control device.
2. Near each branch, excluding short take-offs for fixtures. Mark each pipe at branch, where there could be a question of flow pattern.
3. Near locations where pipes pass through walls or ceilings, or enter non-accessible enclosures.
4. Near major equipment items and other points of origination and termination.
5. Spaced intermediately at maximum spacing of 50 feet along each piping run, except reduce spacing to 25 feet in congested areas of piping and equipment.

E. Do not mark piping exposed in finished occupied spaces.

F. Plumbing Equipment Identification: Install an engraved plastic laminate sign on or near each major item of plumbing equipment and each operational device, as specified herein if not otherwise specified for each item or device. Provide signs for all major items of plumbing equipment.

G. Valve tags shall be attached to the valve handwheel with cable ties.

END OF SECTION 22 0230

SECTION 22 0240

PLUMBING WORK CLOSEOUT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 DOCUMENTATION PROCEDURES:

A. Signed Commitments: Do not proceed with transfer of plumbing systems to the Owner for operation until warranties, performance certifications and similar commitments to be signed by Contractor and other entities have been executed and transmitted to Architect (for Owner's records).

1.3 RECORD DRAWINGS:

A. Explanation: Except where otherwise indicated, plumbing drawings (contract drawings) prepared by Architect/Engineer, contract/drawings, are diagrammatic in nature and may not show locations accurately for various components of plumbing systems. Shop drawings, including coordination drawings, prepared by Contractor shall show certain portions of work more accurately to scale and location, and in greater detail.

B. General Recording Procedure: Maintain a white-print set, blue-line or black-line, of plumbing contract drawings and shop drawings in clean, undamaged condition, for mark-up of actual installations which vary substantially from the work as shown. Mark-up whatever drawings are most capable of showing the installed conditions accurately; however, where shop drawings are marked, record a reference note on appropriate contract drawing. Mark with erasable pencil and use multiple colors to aid in the distinction between work of separate systems. In general, record every substantive installation of plumbing work which previously is either not shown or shown inaccurately, but in any case record the following:

1. Underground and aboveground piping, both exterior and interior, drawn to scale and fully dimensioned.
2. Plumbing "Project Record" shall be maintained as part of the "Project Record" specified in Division 1.

PART 2 - PRODUCTS

2.1 NOT APPLICABLE:

PART 3 - EXECUTION

3.1 CLOSEOUT PROCEDURES:

A. General Coordination: Sequence closeout procedures properly, so that work will not be endangered or damaged, and so that every required performance will be fully tested and demonstrated.

B. System Performance Test Run: At the time of plumbing work closeout, check each item in each system to determine that it is set for proper operation. With Owner's representative and Architect/Engineer present, operate each system in a test run of appropriate duration to demonstrate compliance with performance requirements. During or following test runs, make final corrections or adjustments of system to refine and improve performances wherever possible, including noise and vibration reductions, elimination of hazards, better response of controls, signals and alarms, and similar system performance improvements. Provide testing or inspection devices as may be requested for Architect's/Engineer's observation of actual system performances. Demonstrate that controls and items requiring service or maintenance are accessible. Test run shall be scheduled to coincide with Engineer's final inspection of the plumbing work.

C. Cleaning and Lubrication: After final performance test run of each plumbing system, clean system both externally and internally. Flush piping system by operating drains and similar means, and clean strainers and traps. Lubricate both power and hand operated equipment and remove excess lubrication. Touch-up minor damage to factory painted finishes and other painting specified as plumbing work; refinish work where damage is extensive.

D. General Operating Instructions: In addition to specified training of Owner's operating personnel specified in individual plumbing sections, and in addition to preparation of written operating instructions and compiled maintenance manuals specified, provide general operating instructions for the plumbing systems. Conduct a walk-through explanation and demonstration for orientation and education of Owner's personnel to be involved in continued operation of building.

1. Describe each basic system and how its control system functions, including flow adjustments, temperature control and similar operations.
2. Explain and point out identification system, displayed diagrams, signals, alarms and similar provisions of the work.
3. Describe basic sequencing requirements and interlock provisions for system start-up, phasing and shut-down.
4. Emphasize emergency procedures and safety provisions for protection of equipment and safety of occupants during equipment malfunction, disasters, power failures and similar unusual circumstances.
5. Outline basic maintenance procedures.

E. Demonstrate what adjustments have been made and can continue to be made to reduce noise and vibration, improve system output, decrease energy consumption and similar performance improvements.

F. Point out operational security provisions, safety, unavoidable hazards and similar operator limitations. Display and conduct a "thumb-through" explanation of maintenance manuals, record drawings, meter readings and similar service items.

G. Construction Equipment: After completion of performance testing and Owner's operating instructions and demonstrations, remove installers tools, test facilities, construction equipment and similar devices and materials used in execution of the work but not incorporated in the work.

3.2 CONTINUED SYSTEM OPERATIONS:

A. Final Acceptance: At time of substantial completion of plumbing work, Owner's operating personnel will take over operation of plumbing systems. However, until time of final acceptance, respond promptly with consultation and services on whatever operation or maintenance problems may remain or arise.

END OF SECTION 22 0240

SECTION 22 0310

PLUMBING PIPE, TUBE AND FITTINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 QUALITY ASSURANCE:

A. Industry Standards:

1. Qualify welding procedures, welders and operators in accordance with ASME B31.1 for shop and project site welding of piping work.
2. Certify welding of piping work using the Standard Procedure Specifications by, and welders tested under supervision of, the National Certified Pipe Welding Bureau.
3. Where plastic piping is indicated to transport potable water, provide pipe and fittings bearing approval label by the National Sanitation Foundation (NSF).

B. SUBMITTALS:

1. Submit manufacturer's data, welding certifications, test reports, and product warranties as applicable for all piping materials.
2. Grooved joint couplings and fittings shall be shown on drawings and product submittals, and be specifically identified with the applicable style number.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS:

A. General: Provide pipe and tube of the type, joint type, grade, size and weight (wall thickness or Class) indicated for each service. Where type, grade or class is not indicated, provide proper selection as determined by Installer for installation requirements and comply with governing regulations and industry standards.

B. Copper Tube: ASTM B88-89 Type (wall thickness) as indicated for each service; hard-drawn temper, except as otherwise indicated. Solder for use on domestic water piping shall be lead free type.

C. Plastic Pipe:

1. PVC-WATER: ASTM D2466-88
2. PVC-DWV: ASTM D2665-88
3. ABS-DWV: ASTM D2661-87

2.2 PIPE/TUBE FITTINGS:

A. General: Provide factory-fabricated fittings of the type, materials, grade, class and pressure rating indicated for each service and pipe size. Provide sizes and types matching pipe, tube valve or equipment connections in each case. Where not otherwise indicated, comply with governing regulations and industry standards for selections, and with pipe manufacturer's recommendations where applicable.

B. Soldering Materials: Except as otherwise indicated, provide soldering materials as determined by the Installer to comply with installation requirements.

1. Tin-Antimony Solder: ASTM B 32, Grade 95TA.

C. Mechanical Couplings for Hard Copper Tube: Coupling housings shall be ductile iron (ASTM A536), coated with copper colored alkyd enamel and cast with angle-pattern bolt pads for system rigidity. Bolts and nuts shall be carbon steel track-type (ASTM A183), minimum tensile 110,000 psi. Gaskets shall be Grade “E” EPDM FlushSeal® type, for water services from -30 to +230EF. Mechanical couplings shall be by Victaulic, Anvil or Grinnell.

D. Mechanical Couplings for Copper Pipe: Fittings 2"-4" size shall be wrought copper (ASTM B75 C12200 or ASTM B152 C11000 and ANSI B 16.22). Fittings 5" - 8" size shall be bronze sand casting (ASTM B584-87) or copper alloy CDA844 (81-3-7-9) (ANSI B 16.18). Fittings shall have pre-grooved ends for use with mechanical couplings of the same manufacturer. Fittings shall be manufactured to copper tubing sizes. (Flaring of tube and fitting ends to IPS dimensions is not allowed.)

E. Copper Press-Connect Fittings: Fittings 2” and smaller size shall be cast-bronze or wrought-copper fitting with EPDM-rubber, O-ring seal in each end. Fittings 2½”-4" size shall be wrought-copper fitting with EPDM-rubber, O-ring seal in each end.

F. Solvent Cement for PVC Joints: D2564-88.

G. Solvent Cement for ABS Joints: D2235-88.

H. Pipe Sleeves:

1. Iron Pipe Sleeves: Fabricate from Schedule 40 galvanized steel pipe; remove burrs.
2. Sheet Metal Pipe Sleeves: Fabricate from galvanized sheet metal closed with lock-seam joints. For following pipe sizes provide gauge indicated: 3 inch pipe and smaller, 20 gauge; 4 to 6 inch pipe, 16 gauge; over 6 inch pipe, 14 gauge.
3. Pipe Sleeve Caulking: 3M Fire Barrier Caulk, CP25N/S, except where another caulking system or material is specified or approved by Jaco or Flamestopper.

PART 3 - EXECUTION

3.1 INSTALLATION:

A. General: Install pipe, tube and fittings in accordance with recognized industry practices which will achieve permanently-leakproof piping systems, capable of performing each indicated service without piping failure. Install each run with a minimum of joints and couplings, but with adequate and accessible unions for disassembly and maintenance/ replacement of valves and equipment. Reduce sizes (where indicated) by use of reducing fittings. Align piping accurately at connections, within 1/16" misalignment tolerance.

1. Comply with ASME B31.1 Code for Pressure Piping.

B. Locate piping runs as indicated on the drawings. Route vertically and horizontally (pitched to drain) and avoid diagonal runs wherever possible. Orient horizontal runs parallel with walls and column lines. Locate runs as shown, or described by diagrams, details and notations or, if not otherwise indicated, run piping in the shortest route which does not obstruct usable space or block access for servicing the building and its equipment. Where possible, locate insulated piping for 1.0" clearance outside insulation. Changes in direction shall be made with fittings.

C. Piping System Joints: Provide joints of the type indicated in each piping system.

D. Mechanical Coupling Joints: Square cut pipe ends and deburr. Roll-groove pipe ends to manufacturer's specifications. Lubricate gaskets completely on interior and exterior using a non-petroleum based lubricant. Slide gasket over pipe ends between grooves. Engage coupling housing into grooves and tighten until housing bolt pads are in full contact on each side of joint. For pipes 2 inches and smaller, no groove is required. Mark pipe ends for proper insertion into couplings and fittings. Engage piping into fitting to full depth, indicated by marked pipe ends. Align pipe ends, position compression tool and press trigger until assembly cycle is complete. All grooved couplings, fittings, valves and specialties shall be the products of a single manufacturer. Grooving tools shall be of the same manufacturer as the grooved components. The gasket style and elastomeric material (grade) shall be verified as suitable for the intended service as specified. Gaskets shall be molded and produced by the grooved coupling manufacturer. Grooved ends shall be clean and free from indentations, projections, and roll marks in the area from pipe end to groove. Grooved coupling manufacturer's factory trained field representative shall provide on-site training for contractor's field personnel in the proper use of grooving tools, application of groove and installation of grooved piping products. Factory trained representative shall periodically inspect the product installation. Contractor shall remove and replace any improperly installed products.

E. Soldered Joints: Solder copper tube and fitting joints where required, in accordance with recognized industry practice. Cut tube ends squarely, ream to full inside diameter, and clean outside of tube ends and inside of fittings with steel wool. Apply solder flux to joint areas of both tubes and fittings. Insert tube full depth into fitting and solder in manner which will draw solder full depth and circumference of joint. Wipe excess solder from joint before it hardens. Use a non-corrosive paste flux and wire solder composed of 95 percent tin and 5 percent antimony.

F. Plastic Pipe/Tube Joints: Comply with manufacturer's instructions and recommendations and with applicable industry standards. Install all storm, soil, waste and vent plastic pipe underground in compliance with ASTM D 2321.

G. Pipe Sleeves: Install pipe sleeves of the types specified wherever piping passes through the walls, floors or structural members of the work. Provide sleeves of adequate size, accurately centered in pipe runs. Size sleeves so that piping and insulation will have free movement in the sleeve, including allowance for thermal expansion. Where insulation includes a vapor barrier covering provide sleeve with sufficient clearance for installation of vapor barrier. Install length of sleeve equal to thickness of construction penetrated, except extend floor sleeves 0.25 inches above floor finish. Provide temporary support of sleeves during placement of concrete and other work around sleeves and provide temporary closure to prevent concrete and other materials from entering pipe sleeves.

1. Sleeve Type: At interior partitions and ceilings, install sheet metal sleeves.
2. Sleeve Type: At exterior penetrations both above and below grade, install iron pipe sleeves.

3. Sleeve Type: Except as otherwise specified, install steel pipe sleeves.
4. Caulk pipe sleeves at exterior penetrations and at other locations where indicated. Provide sufficient quantities of oakum and lead to make permanent weather-tight closure between sleeve and piping, slightly recessed at exposed surface.

H. PVC piping exposed to sunlight shall be coated with water-based latex white paint to prevent UV light degradation.

3.2 CLEANING, FLUSHING AND INSPECTING:

A. General: Clean exterior surfaces of installed piping systems of superfluous materials and prepare for application of specified coatings.

B. Flush out piping system with clean water before proceeding with required tests. Inspect each run of each system for completion of joints, supports and accessory items.

3.3 PIPING TESTS:

A. General: Provide temporary equipment for testing, including pump and gages. Test piping systems before insulation is installed wherever feasible, and remove control devices before testing. Test each natural section of each piping system independently, but do not use piping system valves to isolate sections where test pressure exceeds valve pressure rating.

1. Required test period is 2 hours.

B. Unless otherwise specified for specific systems, hydraulically test each pressurized piping system at 150% of operating pressure indicated, but not less than 100 psig test pressure.

C. Observe each test section for leakage at end of test period. Test fails if leakage is observed or if pressure drop exceeds 5% of test pressure.

D. Repair piping systems sections which fail the required piping test, by disassembly and re-installation, using new materials to the extent required to overcome leakage. Do not use chemicals, stop-leak compound, mastics, or other temporary repair methods. Drain test water from piping systems after repair work and retesting has been completed.

END OF SECTION 22 0310

SECTION 22 0320

PLUMBING HANGERS AND SUPPORTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 SUBMITTALS:

A. Provide manufacturer's data, test reports, and product warranties on all items.

PART 2 - PRODUCTS

2.1 HANGERS AND SUPPORTS:

A. General: Except as otherwise indicated, provide factory-fabricated piping hangers and supports of the type specified complete with bolts and washers. Comply with the manufacturer's published product information. Size hangers and supports properly for piping and weight of the medium being transported. Provide insulation shields for all insulated piping.

B. Hangers for domestic hot and cold water piping shall be copper plated band type with adjusting nut; Grinnell, Fig. CT-69, B-Line Fig. B 3172CT, or equivalent by Michigan Hanger, PHD Manufacturing or Hubbard Enterprises/Holdrite.

C. Hangers for plastic drain and vent piping, shall be Clevis type, B-Line Fig. B 3100, or equivalent by Grinnell, Michigan Hanger, PHD Manufacturing or Hubbard Enterprises/Holdrite.

PART 3 - EXECUTION

3.1 HORIZONTAL PIPING SUPPORT:

A. Maximum spacing of hangers and supports for above-ground horizontal pipe and tubing shall be as follows:

1. Cast-iron pipe (all sizes) shall be supported at not more than five foot intervals and near each hub or hubless pipe joint and at multiple fittings as required.

B. Copper Tubing:

Tubing Size (inches)	Support Spacing (feet)

3/4 & smaller	5
1 to 2-1/2	6
3	10
4 and larger	12

C. Plastic Pipe:

Nominal Pipe Size (inches)	Support Spacing (feet)
3/4	3.0
3/4 to 1	3.5
1-1/4 to 1-1/2	4.0
2 to 2-1/2	4.5
3 and larger	5.5

D. Prevent electrolysis in the support of copper tubing by the use of hangers and supports which are copper plated, or by other recognized industry methods.

E. Branch piping located in walls, partitions or pipe chases shall be rigidly supported inside the wall or chase.

F. Piping installed above a roof shall be supported on pre-fabricated, non-penetrating supports by *Pipe Pier* or approved equal. Provide matching adjustable elevation kits.

3.2 VERTICAL PIPING SUPPORT:

A. Cast Iron Pipe: Support at each floor and support at each base and roof level with pipe clamps.

B. Plastic Piping: Support at 8 feet maximum intervals and near each joint.

C. Copper Tubing: Support at riser tops and 5 feet maximum on center for pipe 1-1/2” and larger and 4 feet on center for pipe 1-1/4” and smaller. Use copper plated pipe clamps.

D. Fixture Supports: See Fixture Schedule. Provide concealed supports and carriers recommended by the manufacturer of the fixtures and equipment to suit the structural and finish conditions.

3.3 ADJUSTMENT OF HANGERS AND SUPPORTS:

A. Adjust hangers and supports to bring piping to proper level, elevations and slopes.

END OF SECTION 22 0320

SECTION 22 0330

PLUMBING EXCAVATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 QUALITY ASSURANCE:

A. Coordination: Where excavation and backfill for plumbing work passes through or occurs in the same areas as work specified in the Division 2 sections, comply with both the requirements of the Division 2 sections and the requirements of this section, whichever is the more stringent (as determined by the Architect/Engineer in cases of conflicting requirements).

1.3 JOB CONDITIONS:

A. Existing Utilities: Locate and protect existing utilities and other underground work in a manner which will ensure that no damage or service interruption will result from excavating and backfilling.

PART 2 - PRODUCTS

2.1 BACKFILL MATERIALS:

A. Subbase Material: A graded mixture of gravel, sand, crushed stone or crushed slag.

PART 3 - EXECUTION

3.1 EXCAVATING:

A. Inspection: The excavator must examine the areas to be excavated, and the conditions under which the work is to be performed, and notify the Contractor in writing of conditions detrimental to the proper completion of the work. Do not proceed with excavating until unsatisfactory conditions have been corrected in a manner acceptable to the excavator.

B. General:

1. Do not excavate until the work is ready to proceed without delay, so that the total time lapse from excavation to completion of backfilling will be minimum.
2. Provide signs, illuminations and barricades as necessary to prevent accidents at excavations.
3. Excavate with vertical sided excavations to the greatest extent possible, except where otherwise indicated. Where necessary, provide sheeting and cross-bracing to sustain

sides of excavations. Remove sheeting and cross-bracing during backfilling wherever such removal would not endanger the work or other property. Where not removed, cut sheeting off at a sufficient distance below finished grade to not interfere with other work.

4. Excavate for piping with 6" to 9" clearance both sides of pipe, except where otherwise shown or required for proper installation of pipe joints, fittings, valves and other work. Provide a minimum of 12" clearance around underground tanks.
5. For work to be supported directly on undisturbed soil, do not excavate beyond required depths, and hand excavate the bottom cut to accurate elevations. Except as otherwise indicated, support the following work on undisturbed soil at the bottom of the excavations:
   a. Piping of 5" and less pipe/tube size.
   b. Cast-in-place concrete.
6. Where directed, excavate additional depth to reach satisfactory soil-bearing conditions. Backfill with subbase material, compacted as directed, to indicated excavation depth.
7. Except as otherwise indicated, excavate for exterior water-bearing piping so that the top of piping will not be less than 2'- 0" vertical distance below finished grade.
8. Store excavated material (temporarily) near the excavation, in a manner which will not interfere with or damage the excavation or other work.
   a. Retain excavated material which complies with the requirements for backfill material.
   b. Dispose of excavated material which is either in excess of quantity needed for backfilling or does not comply with requirement for backfill material.

3.2 DEWATERING:

A. Maintain dry excavations by removing water. Pump minor inflow of ground water from excavations; protect excavations from major inflow of ground water by installing temporary sheeting and waterproofing. Provide adequate barriers which will protect other excavations from being damaged by water, sediment or erosion from or through excavations.

3.3 BASE PREPARATION:

A. Install subbase material to receive plumbing work, and compact by tamping to form a firm base for the work. For piping, shape the subbase to fit the shape of the bottom 90 degrees of the cylinder, for uniform continuous support.

B. Shape subbases and bottoms of excavations with recesses to receive pipe bells, flanges connections, valves and similar enlargements in the piping systems.

3.4 BACKFILLING:

A. Do not backfill until installed work has been tested and accepted, wherever testing is indicated.

B. Condition backfill material by either drying or adding water uniformly, to whatever extent may be necessary to facilitate compaction to the required densities. Do not backfill with frozen soil materials.

C. Backfill simultaneously on opposite sides of work, and compact simultaneously; do not dislocate the work from installed positions.

D. Backfill excavations in 8" high courses of backfill material, uniformly compacted to the

following densities (percent of maximum density, ASTM Standard Proctor), using power-driven hand-operated compaction equipment.

1. Lawn/Landscaped Areas: 90%
2. Roadways: 95%
3. Paved Area, Other than Roadways: 95%

E. Backfill to elevations matching adjacent grades, at the time of backfilling excavations for mechanical work.

F. Where compaction tests indicate lower densities of backfill than specified, continue compaction (and re-excavation and backfilling where necessary) and provide additional testing as directed by the Architect/Engineer.

3.5 PERFORMANCE AND MAINTENANCE:

A. Where subsidence is measurable or observable at plumbing work excavations during the guarantee period, remove the surface (pavement, lawn or other finish), add backfill material, compact and replace the surface treatment. Restore the appearance, quality and condition of the surface or finish to match adjacent work, and eliminate evidence of the restoration to the greatest extent possible.

END OF SECTION 22 0330

SECTION 22 1110

DOMESTIC WATER PIPING SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 QUALITY ASSURANCE:

A. Code Compliance: Comply with governing regulations which require the products used for domestic water piping work to be selected from lists in certain published standards or codes as indicated therein.

1.3 SUBMITTALS:

A. Provide manufacturer's data, test reports, and product warranties as applicable for all items.

B. Provide certified copy of contractor’s sterilization test.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS:

A. General: Comply with section 22 0310 for product requirements of piping materials. For each service, provide the piping materials indicated including, pipe, fitting, hangers supports, anchors, valves and accessories. Where more than one type is indicated, selection is Installer's option. Where type is not otherwise indicated, provide materials complying with governing regulations.

B. Service Water Piping:

1. Pipe Sizes 4" and Smaller:	Copper tube of the size indicated.
2. Wall Thickness:	Type K
3. Fittings:	Wrought copper-solder joint (with lead free solder).

C. Water Distribution Piping:

1. Pipe Sizes 4" and Smaller:	Copper tube of the size indicated.
2. Wall Thickness:	Type K (belowground) Type L (above ground).
3. Fittings:	Wrought copper-solder joint (with lead free solder).

2.2 ACCESSORIES:

A. General: Provide factory-fabricated piping products of the size, type, rating and capacity indicated. Where not indicated, provide proper selection as determined by the Installer to comply with installation requirements. Provide sizes and types matching piping and equipment connections.

B. Watts is an approved manufacturer for water supply products.

C. Water Hammer Arrestors: Bellows type; precharged compressor chamber; stainless steel casing and bellows. Provide sizes complying with PDI Standard WH-201. Josam 75000 Series, Jay R. Smith Fig 5000, Watts SS series or Zurn 1700 Series

D. Interior Wall Hydrant HB/B: All brass with polished brass finish, flush mounting wall box, adjustable packing nut, teflon impregnated packing, vacuum breaker with hose thread and loose key operated. Woodford Manufacturing Co. Model B79, Josam #71020 Watts HY-330 or Zurn Z-1320.

E. Ball Valves: Ball valves may be substituted for gate valves at the contractor's option. Ball valves shall have two-piece bronze or brass body, meeting MSS-SP110, full or standard port, blowout-proof stem and adjustable packing nut independent of handle. Valves shall be rated for 150 SWP, 600 WOG or 300 CWP. Valves shall be by Apollo, Milwaukee, Nibco, Victaulic, Watts Smith-Cooper or Red-White.

F. Escutcheon Plates: Metal split-ring type units, with nickel or chrome plated finish. Provide units sized to fit closely outside of pipe insulation or bare pipe where no covering is required.

G. Sheet-Metal Pipe Sleeves: Fabricate from galvanized sheet metal closed with lock-seam joints. For following pipe sizes provide gauge indicated: 3 inch pipe and smaller, 20 gauge; 4 inch to 6 inch pipe, 16 gauge; over 6 inch pipe, 14 gauge.

H. Pipe Sleeve Caulking: 3M Fire Barrier Caulk, CP25N/S, except where another caulking system or material is specified, or equivalent by Hilti or Tremco.

PART 3 - EXECUTION

3.1 INSTALLATION OF PIPING:

A. General: Comply with the requirements of section 22 0310 for installation of basic piping materials.

B. Expansion Compensation: Except as otherwise indicated, install piping, including mains, branches and runouts with offsets to allow for free expansion and contraction sufficient to prevent leaks and over-stressing of the piping system.

C. Sterilization: The entire water distribution system shall be thoroughly sterilized with a solution containing not less than 50 parts per million of available chlorine. The chlorinating material shall be liquid chlorine conforming to Federal Specification BB-C-120. The sterilization solution shall be allowed to remain in the system for a period of 24 hours, during which time all valves and faucets shall be opened and closed several times. After sterilization, the solution shall be flushed from the system with clean water until the residual chlorine content is not greater than 0.2 parts per million. After completion of sterilization water samples shall be sent to the Local Health Department (LDH) for testing. Approval must be received from LDH before the system is put into service.

3.2 INSTALLATION OF ACCESSORIES:

A. Install premanufactured accessories in accordance with the manufacturer's instructions and recommendations.

B. Access Panel: Install access panels as shown on drawings. Paint access panels to match walls or ceilings.

C. Escutcheon Plates: Install escutcheon plates at pipe sleeves where piping is exposed to view in occupied spaces of the building, on the exterior and elsewhere as indicated.

D. Water Hammer Arrestors: Install units at the top of each riser or as otherwise indicated to comply with PDI Standard WH-201.

END OF SECTION 22 1110

SECTION 22 1210

SOIL, WASTE, VENT AND STORM PIPING SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 SUBMITTALS:

A. Provide manufacturer's data, test reports, and product warranties as applicable for all items.

1.3 QUALITY ASSURANCE:

A. Industry Standards: Comply with local regulations, the International Plumbing Code and standards established by the Plumbing and Drainage Institute (PDI) pertaining to floor drains.

B. General: Provide factory-fabricated drainage piping products of the size and type indicated. Where not indicated, provide proper selection as determined by the Installer to comply with the installation requirements and governing regulations. Contractor shall coordinate drainage products selected with finish conditions encountered.

C. Cast Iron Pipe: All cast iron soil pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute (CISPI) and be listed by NSF International.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS:

A. General: Comply with section 22 0310 for product requirements of piping materials. For each service, provide the piping materials indicated, including pipe, fittings, joints, hangers, supports, anchors and accessories. Where type is not otherwise indicated, provide materials complying with governing regulations.

B. Watts, Mifab and Wade are approved manufacturers for drainage products.

C. Soil, Waste and Vent Piping (Belowground):

1. Schedule 40 ABS-DWV or PVC-DWV pipe and fittings. Joints shall be solvent cement socket type.

D. Soil, Waste Drain and Vent Piping (Above Ground):

1. Schedule 40 plastic ABS-DWV or PVC-DWV pipe and fittings. Joints shall be solvent cement socket type above ground. If ABS or DWV pipe and fittings are used aboveground all penetrations of rated walls, floors, and assemblies shall be protected in

an approved manner, including penetrations of one side of an assembly.

E. Storm Drain Piping (Above Ground):

1. Schedule 40 plastic ABS-DWV or PVC-DWV pipe and fittings. Joints shall be solvent cement socket type above ground. If ABS or DWV pipe and fittings are used aboveground all penetrations of rated walls, floors, and assemblies shall be protected in an approved manner, including penetrations of one side of an assembly.
2. Hub less cast iron pipe and fittings, CISPI 301 or ASTM A888. Joints in above ground cast iron shall be made using stainless steel no-hub standard couplings, CISPI 310, ASTM C 1277 and ASTM C564 or stainless steel no-hub heavy duty couplings, ASTM C 1540 and ASTM C 564.

2.2 FLOOR DRAINS:

A. Drains installed in waterproofed floors shall be provided with flashing clamps.

B. Floor Drain FD-A: shall have a coated cast iron body with integral pipe stops, flashing collar, seepage flange, vandal-proof screws, 6” diameter round Nikaloy strainer. Drains shall be by *J. R. Smith, Josam, Zurn,* or *Watts.*

2.3 CLEANOUTS:

A. Cleanout plugs shall be cast bronze or brass countersunk type with taper threads complying with ANSI B2.

B. Cleanouts on underground drainage shall have piping extended to the floor and finished with cleanout plug and removable floor plate.

C. Cleanouts shall be the same size as the pipe on which installed, except cleanouts on underground piping shall be a maximum of 4".

D. Cleanouts in waterproofed floors shall have flashing clamp.

E. Cleanouts in carpeted floors shall be provided with a carpet marker.

F. Concrete Floors: Cleanouts shall have cast iron body with integral pipe stop, adjustable round scoriated nickel bronze cover and rim, vandalproof securing screw, and countersunk bronze plug. Cleanouts shall be by *J. R. Smith, Josam, Zurn,* or *Watts.*

G. Quarry Tile or Ceramic Tile Floors: Cleanouts shall have cast iron body with integral pipe stop, adjustable square scoriated nickel bronze cover and rim, vandalproof securing screw, and countersunk bronze plug. Cleanouts shall be by *J. R. Smith, Josam, Zurn,* or *Watts.*

H. Resilient Tile Floors: Cleanouts shall have cast iron body with integral pipe stop, adjustable square nickel bronze cover recessed for tile, vandalproof securing screw, and countersunk bronze plug. Cleanouts shall be by *J. R. Smith, Josam, Zurn,* or *Watts.*

I. Terrazzo Floors: Cleanouts shall have cast iron body with integral pipe stop, adjustable round nickel bronze cover recessed for terrazzo, vandalproof securing screw, and countersunk bronze plug. Cleanouts shall be by *J. R. Smith, Josam, Zurn,* or *Watts.*

J. Carpeted Floors: Cleanouts shall have cast iron body with integral pipe stop, adjustable round

scoriated nickel bronze cover and rim, bronze carpet marker, and countersunk bronze plug. Cleanouts shall be by *J. R. Smith, Josam, Zurn*, or *Watts.*

K. Exterior Areas: Cleanouts to grade shall have cast iron body with integral pipe stop, heavy duty round cast iron tractor cover with vandalproof screw, and countersunk bronze plug. Cleanouts shall be by *J. R. Smith, Josam, Zurn*, or *Watts.*

L. Wall Cleanouts: shall consist of a threaded recessed tapped cleanout tee with tapered thread bronze plug, vandalproof securing screw, and round stainless steel wall plate. Cleanouts shall be by *J. R. Smith, Josam, Zurn*, or *Watts.*

2.4 DRAINAGE ACCESSORIES:

A. Escutcheon Plates: Metal split-ring type units, with nickel or chrome plated finish. Provide units sized to fit closely outside of pipe insulation or bare pipe where no covering is required.

B. Inline Floor Drain Trap Sealer: Provide trap sealer with ASB plastic body, keeper pin neoprene rubber diaphragm and sealing gasket. Trap sealer unit shall comply with the requirements of ASSE 1072. Basis of design is Sure Seal model SS.

PART 3 - EXECUTION

3.1 INSTALLATION OF PIPING:

A. General: Comply with the requirements of section 22 0310 for installation of basic materials.

B. Testing: The piping of the soil, waste and vent system shall be tested with water before installing fixtures. Water test shall be applied to the soil, waste and venting system either in its entirety or in sections. If the test is applied to the entire system, all openings in the piping shall be closed except the highest opening, and the system shall be filled with water to the point of overflow. If the system is tested in sections, each opening of the section under test shall be plugged and each section shall be filled with water and tested with at least a 10 foot head of water. In testing successive sections, at least the upper 10 feet of the next preceding section shall be tested so that each joint or pipe in the building except the upper most 10 feet of the system has been submitted to a test of at least 10 foot head of water. The water shall be kept in the system, or in the portion under test, for at least 30 minutes before the inspection starts; the system shall be tight at all joints. Joints that fail the test shall be remade and retested.

C. Protection: The installer of drains shall advise the Contractor of required protection for the drains during the remainder of the construction periods, to avoid clogging with construction materials and debris to prevent damage from traffic and construction work.

D. During construction all pipe openings shall be capped or plugged, when not being worked on, to prevent foreign objects and construction debris from entering system.

E. Horizontal drainage piping 2-1/2" and smaller shall be graded at a minimum of 1/4 inch per foot, unless noted otherwise. Horizontal drainage piping 3" and larger shall be graded at a minimum of 1/8 inch per foot, unless noted otherwise.

F. All underground plastic soil, waste and vent and storm drainage piping shall be installed in compliance with ASTM D2321.

3.2 INSTALLATION OF ACCESSORIES:

A. Install escutcheon plates at pipe sleeves where piping is exposed to view in occupied spaces of the building, on the exterior and elsewhere as indicated.

B. Cleanouts in vertical piping shall be roughed-in with the centerline 18" above the finished floor.

C. Install drains in accordance with manufacturer’s written instructions and in locations indicated.

D. Coordinate with soil and waste piping as necessary to interface drains with drainage piping system.

E. Install drain flashing collar or flange so that no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes, where penetrated.

F. Install drains at low points of the surface areas to be drained. Set tops of drains flush with finished floor or deck.

G. The installer shall advise the General Contractor of required protection for drains and cleanouts during the remainder of the construction period, to prevent damage from traffic and construction work.

H. After installation, cover the tops of drains with duct tape or some other strong material during the remainder of the construction process, to avoid clogging with construction materials and debris.

END OF SECTION 22 1210

SECTION 22 1610

PLUMBING PIPING SYSTEM INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 SCOPE:

A. Plumbing piping systems to be insulated include:

1. Domestic Hot and Cold Water Piping, Above Ground

1.3 QUALITY ASSURANCE:

A. Manufacturers: Provide insulation products produced by one of the following for each type and temperature range of insulation.

1. Certainteed
2. Knauf
3. Manville
4. Owens-Corning
5. Pittsburgh Corning

B. Flame/Smoke Ratings: Provide composite piping insulation (insulation, jackets, covering, sealers, mastics and adhesives) with flame-spread rating not exceeding 25 and smoke developed rating not exceeding 50, as tested by ASTM E 84 (NFPA 255) method and UL 723.

1.4 SUBMITTALS:

A. Provide manufacturer's data, test reports, and product warranties for all items.

PART 2 - PRODUCTS

2.1 PIPE INSULATION:

A. Fiberglass Insulation: Insulation shall be preformed, two-piece, heavy density fiberglass with self sealing ASJ jacket conforming to FS HH-I-558 Form D, Type III, and Class 12. Valves and fittings shall be insulated with fiberglass insulation of the same material thickness as insulation on adjacent pipe and having a molded PVC jacket. Jackets shall be Certainteed Snap-Form, Knauf Proto PVC or Zeston PVC. Insulation thickness shall be as follows:

1. Domestic Hot & Cold Water Piping: 1 inch thick for all sizes.

PART 3 - EXECUTION

3.1 APPLICATION REQUIREMENTS:

A. General: Insulate all above ground domestic hot and cold water piping except do not insulate supplies to fixtures unless specifically required. Insulate horizontal waste lines receiving the discharge from HVAC drains. Insulate the underside of all roof drains and all roof drain piping installed above conditioned spaces.

B. In high abuse areas such as janitor closets and traffic areas in equipment rooms, kitchens and mechanical rooms aluminum jackets shall be provided. Pipe insulation to the 6 foot level shall be protected.

3.2 INSTALLATION OF PIPING INSULATION:

A. General: Install insulation products in accordance with the manufacturer's written instructions, and in accordance with recognized industry practices to ensure that the insulation serves its intended purpose. Do not use cut pieces or scraps abutting each other.

B. Insulation shall be applied on clean dry surfaces. All insulation shall be continuous through wall and ceiling openings and sleeves. Insulation on all cold surfaces, where vapor barrier jackets are used, will be applied with continuous unbroken vapor seal. Seal off ends of insulation on cold piping systems with white vapor barrier coating at valves, flanges, supports and exposed ends. Supports that are secured to cold surfaces shall be insulated and vapor sealed to prevent condensation.

C. Pipe covering protection shields shall be provided around exterior of pipe insulation at pipe hangers which fit around pipe insulation. Shields shall be 12 inches long by 180 degrees and shall be 18 gauges galvanized steel sheet. High density isolation inserts shall be provided at pipe saddles.

D. Unions shall not be insulated.

E. Cover valves, flanges, fittings and similar items in each piping system.

F. Extreme care shall be taken to insure a neat, uniform exterior surface on insulation applied to exposed pipes. Insulation in finished areas shall be painted in accordance with the paint specifications.

3.3 PROTECTION AND REPLACEMENT:

A. Replace damaged insulation which cannot be repaired satisfactorily, including units with vapor barrier damage and moisture saturated units.

B. Protection: The Installer of the insulation shall advise the Contractor of required protection for the insulation work during the remainder of the construction period, to avoid damage and deterioration.

END OF SECTION 22 1610

SECTION 22 3110

PLUMBING FIXTURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 QUALITY ASSURANCE:

A. Industry Standards: Comply with ANSI Standards pertaining to plumbing fixtures and systems.

B. Comply with ANSI A117.1 standard pertaining to plumbing fixtures for handicapped.

C. Comply with standards established by Plumbing and Drainage institute (PDI) pertaining to plumbing fixture supports.

D. Comply with applicable Federal Standard FS WW-P-541/Series sections pertaining to plumbing fixtures.

PART 2 - PRODUCTS

2.1 PLUMBING FIXTURES:

A. General: Provide factory-fabricated fixtures of the type, style and material indicated. For each type of fixture, unless otherwise specified, provide fixture manufacturer's standard trim, carrier seats and valves as indicated by their published product information, either as designed and constructed, or as recommended by the manufacturer, and as required for a complete installation. Where more than one type or manufacturer is indicated, selection is Installer's option.

2.2 MATERIALS:

A. General: Unless otherwise specified, comply with applicable Federal Specification WW-P-541/series sections pertaining to plumbing fixtures, fittings, trim, metals and finishes. Comply with requirements of WW-P-541/specification relative to quality of ware, glazing, enamel, composition and finish of metals, air gaps and vacuum breakers, even though some plumbing fixtures specified in this section are not described in WW-P-541.

B. Unless otherwise specified, faucets shall comply with National Sanitation Foundation International NSF Standard 61, and where applicable NSF Standard 61, Section 9. Faucets shall be NSF certified, and bear the NSF mark.

C. Provide materials which have been selected for their surface flatness and smoothness. Exposed surface which exhibit pitting, seam marks, roller marks, foundry sand holes, stains, discoloration or other surface imperfections on finished units are not acceptable.

D. Where fittings, trim and accessories are exposed or semi-exposed, provide bright chrome-plated or polished stainless steel units.

E. Vitreous China: High quality, free from fire cracks, spots, blisters, pinholes and speck; glaze exposed surfaces and test for crazing resistance in accordance with ASTM C 554.

F. Vitreous China and Enamel Iron Fixtures shall be white unless specified otherwise.

G. Comply with additional fixture requirements contained in the fixture schedule.

H. In addition to the manufacturers list below, the following manufacturers are approved for all lavatory, service sink, can wash and sink faucets: Kohler, American Standard, Eljer, Chicago, Zurn, T & S Brass, Symmons, Speakman, Elkay and Just.

I. In addition to the manufacturers list below, the following manufacturers are approved for all vitreous china and cast iron plumbing fixtures Zurn One, Eljer and Sloan.

J. Dearborn is an approved manufacturer for insulation kits.

A. Flush valves shall be the size, roughing height, and flow rate specified hereinafter for each fixture. Flush valve shall be a diaphragm actuated type with chrome plated exterior, angle stop with cover, vacuum breaker, adjustable tailpiece, and cast escutcheon with setscrew. Where shown on the drawings provide a trap primer connection in the valve tailpiece. All flush valves specified to be 24" roughing shall be provided with wall brace. *In addition to the manufacturers list below, Sloan is the preferred flush valve manufacturer.*

K. All low voltage wiring, sensors, and transformers shall be provided under this section with the hardwired flush valves and/or faucets.

L. Toilet seats shall be same color as fixture. Seats shall be open front without cover, and solid molded plastic with self-sustaining check hinge. Seats shall be for elongated bowl unless specified otherwise.

M. Carriers shall be commercial grade and selected to match the fixtures for which they are used. Carriers shall be floor mounted and designed to transfer any fixture loading to the floor and not the wall unless specified otherwise. Carriers provided for wall hung urinals shall be two plate type. Carriers for wall hung water closets and urinals shall be provided with chrome plated mounting hardware.

N. Fixture stops shall be provided for all fixtures and shall be chrome plated with cast escutcheons with set screws. Stops for flush valves shall be by the flush valve manufacturer. Stops for shower valves shall be either angle or straight type and shall be concealed behind the shower cover plate. Stops for lavatories and sinks shall be loose key or wheel handle type by manufacturers shown as specified for each fixture.

O. Fixture drains shall be by the same manufacturer as the lavatory and sink faucets, with a matching finish. Lavatory and sink drains shall be pop-up, grid, or crumb cup type as specified for each fixture. Drains shall be chrome plated brass or stainless steel unless noted otherwise. Drain tailpieces shall be minimum 17 gauge chrome plated cast brass.

P. All p-traps, continuous wastes and fixture drain piping shall be 17 gauge chrome plated cast brass and of the size indicated in the fixture schedule on the plumbing drawings.

Q. Insulation kits shall be provided for all handicap lavatories and sinks with exposed supply and

waste piping. Insulation kits shall include covers for fixture drains, p-traps and supplies.

2.3 PLUMBING FIXTURE SCHEDULE:

A. Water Closet P-1A: shall be a floor mounted, floor outlet, vitreous china, siphon jet water closet with elongated bowl (designed for 1.28 gallon flush), 1-1/2" top spud, floor bolts, bolt caps, and outlet gasket. The water closet shall be fitted with a white seat and 1-1/2" (11-1/2" roughing) flush valve. Flush valve shall be a battery powered infrared operated diaphragm actuated type with manual override button and chrome plated exterior. Water closet and trim shall be:

	AMERICAN STD.	KOHLER	ZURN
	Madera	Wellcomme	
Water Closet:	3451.001	K-96053	Z5655
Flush Valve:	SLOAN	DELANY	Included
Seat:	PLUMBTECH	BEMIS	Included

B. Water Closet P-1B: shall be an ADA compliant floor mounted, floor outlet, vitreous china, siphon jet water closet with elongated bowl (designed for 1.28 gallon flush), 1-1/2" top spud, floor bolts, bolt caps, and outlet gasket. The water closet shall be fitted with a white seat and 1-1/2" (11-1/2" roughing) flush valve. Water closet and trim shall be:

	AMERICAN STD.	KOHLER	ZURN
	Madera ADA	Highline	
Water Closet:	3461.001	K-4405	Z5665
Flush Valve:	SLOAN	DELANY	Included
Seat:	PLUMBTECH	BEMIS	Included

C. Water Closet P-1C: shall be a floor mounted, floor outlet, vitreous china, siphon jet water closet with 10” bowl height (designed for 1.6 gallon flush), 1-1/2" top spud, floor bolts, bolt caps, and outlet gasket. The water closet shall be fitted with a white seat and 1-1/2" (11-1/2" roughing) flush valve. Water closet and trim shall be:

	AMERICAN STD.	KOHLER	CRANE
Water Closet:	Baby Devor	Primary	Baby Bowl
	2282.010	K-4321-B	3380
Flush Valve:	SLOAN	DELANY	ZURN
	111 Series	402 Series	Z-6000 Series
Seat:	PLUMBTECH	BEMIS	CENTOCO

D. Urinal P-2: shall be a compact wall hung, vitreous china, siphon jet urinal (designed for 1.0 gallon flush), 2” outlet, 3/4” top spud, and wall hanger. The urinal shall be fitted with a 3/4" (11-1/2” roughing) flush valve and back plate. Urinal shall be:

	AMERICAN STD.	KOHLER	ZURN
	Allbrook	Deexter	
Urinal:	6541511	K-5016-ET	Z5730
Flush Valve:	SLOAN	DELANY	ZURN

E. Lavatory P-3A: shall be a wall hung, 20" x 18" vitreous china lavatory with back splash and punched for 4" centers. The lavatory shall be fitted with a chrome plated ADA compliant center-set faucet with single lever handle and low flow aerator (0.5 gpm), thermostatic mixing valve off-set perforated grid drain, 1-1/4" p-trap, loose key angle supplies, chair carrier with concealed arm supports and insulation kit. Lavatory and trim shall be:

	AMERICAN STD.	KOHLER	ZURN
Lavatory:	Lucerne	Greenwich	
	0355.012	K-2032	5360
Faucet:	CHICAGO	ZURN	MOEN COMM
	Equivalent	Z86500-XL	Equivalent
Mixing Valve:	CHICAGO	ZURN	MOEN COMM
Drain:	McGUIRE	ZURN	WATTS
P-trap:	McGUIRE	ZURN	WATTS
Supplies:	McGUIRE	ZURN	WATTS
Insulation Kit:	McGUIRE	TRUEBRO	SKAL-GUARD
Carrier:	J.R. SMITH	JOSAM	ZURN

F. Clinic Lavatory P-3B: shall be a wall hung, 20" x 18" vitreous china lavatory with back splash and punched for 8" centers. The sink shall be fitted with a chrome plated deck mounted faucet with gooseneck spout with 4” wrist action handles with low flow aerator (1.5 gpm) and third water connection, polished chrome plated floor mounted, slow closing, double pedal mixing valve, 1-1/4" p-trap, loose key angle supplies, chair carrier with concealed arm supports and insulation kit. Lavatory and trim shall be:

	AMERICAN STD.	KOHLER	ZURN
Lavatory:	Lucerne	Greenwich	
	0356.015	K-2030	5360
Faucet:	T&S	CHICAGO	SPEAKMAN
	B-0866-PV	Equivalent	Equivalent
Foot Pedal:	B-0502-SL	Equivalent	Equivalent
Drain:	McGUIRE	ZURN	WATTS
P-trap:	McGUIRE	ZURN	WATTS
Supplies:	McGUIRE	ZURN	WATTS
Insulation Kit:	McGUIRE	TRUEBRO	SKAL-GUARD
Carrier:	J.R. SMITH	JOSAM	ZURN

G. Lavatory P-3C: shall be a drop-in, 16” x 11” bowl vitreous china lavatory and punched for 4” centers. The lavatory shall be fitted with a chrome plated ADA compliant center-set faucet with single lever handle, perforated offset grid drain, 1-1/4" p-trap, loose key angle supplies, and insulation kit. Lavatory and trim shall be:

Faucet:	CHICAGO	ZURN	MOEN COMM
	Equivalent	Z86500-XL	Equivalent
Mixing Valve:	CHICAGO	ZURN	MOEN COMM
Drain:	McGUIRE	ZURN	WATTS
P-trap:	McGUIRE	ZURN	WATTS
Supplies:	McGUIRE	ZURN	WATTS
Insulation Kit:	McGUIRE	TRUEBRO	SKAL-GUARD

H. Lavatory P-3D: shall be a drop-in, 16” x 11” bowl vitreous china lavatory and punched for 4” centers. The lavatory shall be fitted with a chrome plated ADA compliant pushbutton metering faucet (cold water only), perforated offset grid drain, 1-1/4" p-trap, loose key angle supplies, and insulation kit. Lavatory and trim shall be:

Faucet:	CHICAGO	ZURN	MOEN COMM
	Equivalent	Z86300-XL-CP4	Equivalent
Drain:	McGUIRE	ZURN	WATTS
P-trap:	McGUIRE	ZURN	WATTS
Supplies:	McGUIRE	ZURN	WATTS
Insulation Kit:	McGUIRE	TRUEBRO	SKAL-GUARD

I. Mop Sink P-4: shall be a 24" x 24" molded stone mop basin with 10" high sides and integral 3" chrome plated dome drain. The mop sink shall be fitted with vinyl bumper guards, a chrome plated faucet with vacuum breaker, a hose with hose bracket, and stainless steel wall guards. Mop sink shall be white and the faucet shall be mounted on the wall 36 inches above the floor. Mop basin shall be:

	FIAT	SWAN	ZURN
Basin:	MSB 2424	MS 2424-3	Z-1996-24
Bumperguards:	E-77-AA	MS-2408	BV
Faucet:	830-AA	MS-5811	Z843M1-XL
Hose/Bracket:	832-AA	MS-2405	HH
Wall Guards:	MSG2424		WG

PART 3 - EXECUTION

3.1 INSTALLATION:

A. Install plumbing fixtures of types indicated where shown and at indicated heights or where not shown in accordance with manufacturer's written instruction, roughing-in drawings and with recognized industry practices.

B. Install all low voltage wiring, sensors, and transformers furnished with the hardwired flush valves and/or faucets. 120V power connections for the low voltage transformers shall be connected by the Division 26 contractor in accordance with specification section 261010. All low voltage wiring and needed pathways shall be provided under this section. Provide needed pathway/chase to form an accessible pathway from each sensor location to a point within 6" of low voltage transformer, and terminate with insulated throat bushing. Wiring installed in an open plumbing chase can be installed without conduit.

C. Fasten plumbing fixtures securely to indicated supports or building structure, and ensure that fixtures are level and plumb and tight against mounting surface.

D. Seal the outer perimeter of wall mounted lavatories and urinals and water closets to the wall and floor mounted water closets to the floor with a smooth bead of white silicone compound.

E. All fixtures provided under another division of the specifications shall be roughed-in and connected under this section. Provide individual shut-off valves or supply stops to all fixtures with a water or gas supply. Provide p-traps and extensions to waste stack in wall or to drain, as shown on the drawings, if not provided by the fixture supplier. Supply stops and p-traps shall be McGUIRE, EBC, or BRASS-CRAFT.

F. Provide and install undercounter mixing valves for all sinks and lavatories except those in commercial kitchens.

3.2 FIELD QUALITY CONTROL:

A. Upon completion of installation of plumbing fixtures and after units are water pressurized, test and adjust fixtures for proper operation.

END OF SECTION 22 3110

SECTION 22 3210

ELECTRIC WATER COOLERS & DRINKING FOUNTAINS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 QUALITY ASSURANCE:

A. Industry Standards:

1. Provide drinking-water coolers which have been listed and labeled by Underwriters' Laboratories (UL399)
2. Provide drinking-water coolers which are rated and certified in accordance with Air Conditioning and Refrigeration Institute (ARI) Standard 1010.
3. Provide wheelchair water coolers which comply with ANSI A117.1-2003 and ADA guidelines.
4. Provide drinking-water coolers which are manufactured using lead-free components and solder in all waterways.

1.3 SUBMITTALS:

A. Provide manufacturer's data, test reports, and product warranties as applicable.

PART 2 - PRODUCTS

2.1 ELECTRIC WATER COOLER “EWC-1":

A. Provide wall mounted wheelchair type water coolers with integral water chiller capable of delivering 7.5 gph of 50 degrees water at 90 degrees F ambient temperature and 80 degrees F entering water temperature. Units shall have hermetically sealed refrigerant system complete with 120V/1PM/60HZ compressor and air cooled condenser. Cabinet, receptor, and back shall be stainless steel. Bubbler operator shall be a soft touch vandal proof bar full across the front of the unit. The water cooler shall be fitted with cast brass p-traps, a valved 1/2" cold water supply, a NEMA5-20P rated plug with 3 feet (min.) chord, and chair carrier. Units shall be OASIS P8AM, HALSEY-TAYLOR HAC-8FS, SUNROC NWCA-8 or ELKAY EZS8. Chair carrier shall be J.R. Smith, Josam or Zurn.

2.2 ELECTRIC WATER COOLER “EWC-2":

A. Unit shall be the same as EWC-1 except for that it shall include a bottle filler.

2.3 ELECTRIC WATER COOLER “EWC-1":

A. Provide bi-level wall mounted water coolers with single refrigeration system, capable of delivering 8 GPH of 50 degrees F water at 90 degrees F ambient and 80 degrees F entering water temperature. The unit shall be ADA compliant and have heavy gauge stainless steel cabinets, and receptor basins. The refrigeration system shall utilize an HFC refrigerant and be hermetically sealed with 115 Volt, 1 phase, 60 hertz compressor and air cooled condenser. Each basin shall have a chrome plated brass drain with removable strainer, and self-closing push button/bar which meets the ADA operating requirements. The water cooler shall be fitted with cast brass p-traps, a valved 1/2" cold water supply, a NEMA5-20P rated plug with 3 feet (min.) chord, and chair carrier. Unit shall be an OASIS PLF8WMQSL, HALSEY-TAYLOR HAC-8BL, SUNROC NWCA-8BL, or ELKAY EZSTL8C. Chair carrier shall be J.R. Smith, Josam or Zurn.

2.4 ELECTRIC WATER COOLER “EWC-2":

A. Unit shall be the same as EWC-1 except for that it shall include a bottle filler at ADA height side.

PART 3 - EXECUTION

3.1 INSTALLATION:

A. General: Install water coolers in accordance with manufacturer's written instructions and in accordance with the National Electrical code and recognized industry practices.

B. After water coolers are mounted on wall, bolt a 1-1/2 inch steel angle bracket to bottom of unit and attach to wall. Paint to match wall.

3.2 FIELD QUALITY CONTROL:

A. Test operates installed water coolers to demonstrate compliance with the requirements.

END OF SECTION 22 3210

SECTION 23 0110

MECHANICAL GENERAL PROVISIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

B. It is recognized that separate sub-contracts may be instituted by THIS CONTRACT'S GENERAL CONTRACTOR with others. It is the responsibility of THIS CONTRACT'S GENERAL CONTRACTOR to completely inform, coordinate and advise those sub-contractors as to all of the requirements, conditions and information associated with providing and installing their portion of the total job.

1.2 IMPOSED REGULATIONS:

A. Applicable provisions of the State and Local Codes and of the following codes and standards in addition to those listed elsewhere in the specifications are hereby imposed on a general basis for mechanical work. In each case, the prevailing edition shall be the current adopted edition of the state where the project is located.

1. *International Mechanical Code.*
2. *International Gas Code.*
3. *International Energy Conservation Code.*
4. *International Fire Code.*

1.3 SCOPE OF WORK:

A. Provide all labor, materials, equipment and supervision to construct complete and operable mechanical systems as indicated on the drawings and specified herein. All materials and equipment used shall be new, undamaged and free from any defects.

1.4 EXISTING SERVICES AND FACILITIES:

A. Damage to Existing Services: Existing services and facilities damaged by the Contractor through negligence or through use of faulty materials or workmanship shall be promptly repaired, replaced, or otherwise restored to previous conditions by the Contractor without additional cost to the Owner.

B. Interruption of Services: Interruptions of services necessary for connection to or modification of existing systems or facilities shall occur only at prearranged times approved by the Owner. Interruptions shall only occur after the provision of all temporary work and the availability of adequate labor and materials will assure that the duration of the interruption will not exceed the time agreed upon.

C. Removed Materials: Existing materials made unnecessary by the new installation shall be removed, shall remain the property of the Owner and shall be stored at a location and in a

manner as directed, or, if classified by the Owner's authorized representative as unsuitable for further use, shall become the property of the Contractor and shall be removed from the site.

1.5 WARRANTIES:

A. Provide manufacturer's standard printed commitment in reference to a specific product and normal application, stating that certain acts of restitution will be performed for the Purchaser or Owner by the manufacturer, when and if the product fails within certain operational conditions and time limits. Where the warranty requirements of a specific specification section exceed the manufacturer's standard warranty, the more stringent requirements will apply and modified manufacturer's warranty shall be provided. The Contractor shall provide a (2) year warranty on all parts and labor. The warranty shall begin at the Material Completion date.

1.6 PRODUCT SUBSTITUTIONS:

A. General: Materials specified by manufacturer's name shall be used unless prior approval of an alternate is given by addenda. Requests for substitutions must be received in the office of the Architect at least 10 days prior to opening of bids.

PART 2 - PRODUCTS

2.1 GENERAL MECHANICAL PRODUCT REQUIREMENTS:

A. Standard Products: Provide not less (quality) than manufacturer's standard products, as specified by their published product data. In addition to the indication that a particular product/model number is acceptable, comply with the specified requirements. Do not assume that the available off-the-shelf condition of a product complies with the requirements; as an example, a specific finish or color may be required.

B. Uniformity: Where multiple units of a general product are required for the mechanical work, provide identical products by the same manufacturer, without variations except for sizes and similar variations as indicated.

C. Product Compatibility, Options: Where more than one product selection is specified, either generically or proprietarily, selection is Purchaser's or Installer's option. Provide mechanical adaptations as needed for interfacing of selected products in the work.

D. Equipment Nameplates: Provide a permanent operational data nameplate on each item of power operated mechanical equipment, indicating the manufacturer, product name, model number, serial number, speed, capacity, power characteristics, labels of tested compliance, and similar essential operating data.

E. Locate nameplates in easy-to-read locations. When product is visually exposed in an occupied area of the building, locate nameplate in a concealed position (where possible) which is accessible for reading by service personnel.

PART 3 - EXECUTION

3.1 PRODUCT INSTALLATION, GENERAL:

A. Except where more stringent requirements are indicated, comply with the product manufacturer's installation instructions and recommendations, including handling, anchorage, assembly, connections, cleaning and testing, charging, lubrication, startup, test operation and shut-down of operating equipment. Consult with manufacturer's technical experts, for specific instructions on unique product conditions and unforeseen problems.

B. Protection and Identification: Deliver products to project properly identified with names, model numbers, types, grades, compliance labels and similar information needed for distinct identifications; adequately packaged or protected to prevent deterioration during shipment, storage and handling. Store in a dry, well ventilated, indoor space, except where prepared and protected by the manufacturer specifically for exterior storage.

C. Permits and Tests: Provide labor, material and equipment to perform all tests required by the governing agencies and submit a record of all tests to the Owner or his representative. Notify the Architect five days in advance of any testing.

END OF SECTION 23 0110

SECTION 23 0120

MECHANICAL STANDARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 QUALITY ASSURANCE:

A. Industry Standards: It is a general requirement that mechanical work comply with applicable requirements and recommendations of standards published by listed agencies and trade associations, except to the extent more detailed and stringent requirements are indicated or required by governing regulations.

B. Listing of Associations, Standards, and Abbreviations:

1.	AGA	*American Gas Association* 1515 Wilson Blvd. Arlington, VA 22209
2.	AMCA	*Air Movement & Control Association* 30 W. University Dr., Arlington Heights, IL 60004 302/394-0150
3.	ARI	*Air-Conditioning and Refrigeration Institute* 4301 North Fairfax Drive, Suite 425, Arlington, VA 22203 703/524-8800
4.	ASHRAE	*American Society of Heating, Refrigerating &* *Air Conditioning Engineers, Inc.* 1791 Tullie Circle, NE, Atlanta, GA. 30329 404/636-8400
5.	AWS	*American Welding Society, Inc.* 2501 NW 7th St., Miami, FL 33125 305/642-7090
6.	CISPI	*Cast Iron Soil Pipe Institute* 2020 K. St., NW, Washington, DC 202/233-4536
7.	NEBB	*National Environmental Balancing Bureau* 1611 North Kent St., Arlington, VA 22209
8.	NEC	*National Electrical Code* by NFPA
9.	NEMA	*National Electrical Manufacturers Association* 1300 N 17th Street, Suite 1847 Rosslyn, VA 22209 703/841-3200
10.	NFPA	*National Fire Protection Association* 407 Atlantic Ave., Boston, MA 02210

617/482-8755

11. SMACNA *Sheet Metal & Air Conditioning Contractors National Association, Inc.*
8224 Old Courthouse Rd., Tysons Corner
Vienna, VA 22180
703/790-9890

12. TIMA *Thermal Insulation Manufacturers Association*
7 Kirby Plaza
Mt. Kisco, NY 10549
912/241-2284

13. UL *Underwriters' Laboratories, Inc.*
207 East Ohio St.,
Chicago, IL 60611
312/642-6969

PARTS 2 AND 3 - PRODUCTS AND EXECUTION

A. Not applicable,

END OF SECTION 23 0120

SECTION 23 0210

MECHANICAL COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 QUALITY ASSURANCE:

A. Coordinate the actual location of all mechanical work visible in finished spaces with the Architect/Engineer. This includes air distribution devices, exposed ductwork, thermostats, humidistats, switches, sensors, etc.

PART 2 - PRODUCTS

2.1 MECHANICAL PRODUCT COORDINATION:

A. Power Characteristics: Refer to the electrical sections of the specifications and the electrical drawings for the power characteristics available for the operation of each power driven item of equipment. The electrical design was based on the typical power requirements of the equipment manufacturers scheduled or specified. Any modifications to the electrical system which are required due to the use of an approved equivalent manufacturer shall be made at no additional cost to the owner. All changes must be clearly documented and submitted for review by the Architect/Engineer prior to purchasing equipment. Coordinate purchases to ensure uniform interface with electrical work. The mechanical contractor shall furnish a detailed list of equipment electrical characteristics to the electrical contractor for the purpose of preparing the coordination affidavit required by Division 26.

B. Coordination of Options and Substitutions: Where the contract documents permit the selection from several product options, and where it becomes necessary to authorize a substitution, do not proceed with purchasing until coordination of interface of equipment has been checked and satisfactorily established.

C. Firestopping: Refer to architectural drawings for the locations of all fire rated ceilings, floors and walls. The contractor shall furnish detailed shop drawings of all firestopping details to be used for both piping and ductwork. All firestopping details shall be U.L. listed and subject to approval by the State Fire Marshal.

PART 3 - EXECUTION

3.1 INSPECTION AND PREPARATION:

A. Substrate Examination: The Installer of each element of the mechanical work must examine the

condition of the substrate to receive the work, and the conditions under which the work will be performed, and must notify the Contractor in writing of conditions detrimental to the proper completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.

B. Do not proceed with the installation of sleeves, anchors, hangers, roof penetrations and similar work until mechanical coordination drawings have been processed and released for construction. Where work must be installed prior to that time in order to avoid a project delay, review proposed installation in a project coordination meeting including all parties involved with the interfacing of the work.

3.2 CUTTING AND PATCHING:

A. Structural Limitations: Do not cut structural framing, walls, floors, decks and other members intended to withstand stress, except with the Architect's or Engineer's written authorization.

B. Where authorized, cut opening through concrete (for pipe penetrations and similar services) by core drilling or sawing. Do not cut by hammer-driven chisel or drill.

C. Other work: Do not endanger or damage other work through the procedures and processes of cutting to accommodate mechanical work. Review the proposed cutting with the Installer of the work to be cut, and comply with his recommendations to minimize damage. Where necessary, engage the original Installer or other specialists to execute the cutting in the recommended manner.

D. Where patching is required to restore other work, because of either cutting or other damage inflicted during the installation of mechanical work, execute the patching in the manner recommended by the original Installer. Restore the other work in every respect, including the elimination of visual defects in exposed finishes, as judged by the Architect. Engage the original Installer to complete patching of the following categories of work:

1. Exposed concrete finishes and exposed masonry.
2. Waterproofing and vapor barriers.
3. Roofing, flashing and accessories.
4. Interior exposed finishes and casework, where judged by the Architect to be difficult to achieve an acceptable match by other means.

3.3 COORDINATION OF MECHANICAL INSTALLATION:

A. General: Sequence, coordinate and integrate the various elements of mechanical work so that the mechanical plant will perform as indicated and be in harmony with the other work of the building. The Architect/Engineer will not supervise the coordination, which is the exclusive responsibility of the Contractor. Comply with the following requirements:

1. Install piping, ductwork and similar services straight and true, aligned with other work and with overhead structures and allowing for insulation. Conceal where possible.
2. Arrange work to facilitate ease of maintenance and repair or replacement of equipment and filters. Locate items requiring more maintenance such as valves, etc. in front of items requiring less maintenance. Connect equipment for ease of disconnecting, with minimum of interference with other work.
3. Equipment located above ceilings shall be installed in a position and elevation which allows complete and adequate maintenance access through the ceiling grid or access panel while standing safely on a ladder. If this is not possible, a suitable maintenance

platform must be provided per IMC.

4. Give the right-of way to piping systems required to slope for drainage (over other service lines). Piping shall be located to avoid interference with ductwork and light fixtures.
5. Store materials off the ground and protected from standing water and weather.

B. Drawings: Conform with the arrangement indicated by the contract documents to the greatest extent possible, recognizing that portions of the work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, comply with the Architect's decision on resolution of the conflict.

C. Electrical Work: Coordinate the mechanical work with electrical work, and properly interface with the electrical service. In general, and except as otherwise indicated, install mechanical equipment ready for electrical connection. Refer to electrical sections of the specifications for electrical connection of mechanical equipment.

D. Duct Smoke Detectors: In buildings equipped with a fire alarm system, all HVAC duct smoke detectors, including smoke detectors for smoke dampers, shall be furnished by Division 26 and installed by Division 23. All duct smoke detectors must be compatible with the fire alarm system and must be connected to the fire alarm system for notification. All fire alarm wiring and associated devices shall be furnished and installed by the fire alarm system installer. In buildings not equipped with a fire alarm system, all HVAC duct smoke detectors and accessories shall be furnished and installed by Division 23. Each duct smoke detector must have a remote device where actuation of the duct smoke detector shall activate a visible and an audible signal in an approved location. Duct smoke detector trouble conditions shall activate a visible or audible signal in an approved location and shall be identified as “Air Duct Detector Trouble.” Each smoke detector shall be wired into the respective fan control circuit to automatically shut down the fan upon sensing products of combustion.

E. Utility Connections: Coordinate the connection of mechanical systems with exterior underground utilities and services. Comply with the requirements of governing regulations, franchised service companies and controlling agencies. Provide a single connection for each service except where multiple connections are indicated.

3.4 COORDINATION OF MECHANICAL START-UP:

A. Seasonal Requirements: Adjust and coordinate the timing of mechanical system start-ups with seasonal variations, so that demonstration and testing of specified performance can be observed and recorded. Exercise proper care in off-season start-ups to ensure that systems and equipment will not be damaged by the operation.

B. Painting and Air Distribution: Coordinate the initial cleaning and start-up of the air distribution system, to occur prior to preparatory cleaning and general interior painting and decorating on the project. The HVAC system should not be operated until drywall work is completed. Drywall dust must not be allowed to contaminate the interior of air handing units and ductwork. Use high efficiency temporary filters until project closeout.

END OF SECTION 23 0210

SECTION 23 0220

MECHANICAL SUBMITTALS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 SUBMITTAL FORMS AND PROCEDURES:

A. The purpose of submittals is to demonstrate to the Architect/Engineer that the Contractor understands the design concept. The Architect/Engineer's review of such drawings, schedules, or cuts shall not relieve the Contractor from responsibility for deviation from drawings or specifications unless he has, in writing, called the Architect/Engineer's attention to such deviations at the time of submission, and has received from the Architect/Engineer, in writing, permission for such deviations. All submittals must be completely checked by the Contractor prior to submission for review.

B. Hard Copy Submittals: Submittal data shall be placed in one or more hard-back 3-ring binders, arranged and labeled according to specification section. Each binder shall contain a title page and table of contents. Provide separator tabs, and label by specification section. Make note in the table of contents, any drawings that accompany the submittal. Title page shall contain Project Name, Contractor’s Name, Division 23 Superintendent’s name, Suppliers and point of contact for each, and date. Except as otherwise indicated in other sections, submit 5 complete copies. Quantity indicated does not include copies required for regulatory agencies.

C. Electronic Submittals: If the Architect agrees to allow electronic submittals via an on-line information management product such as “Submittal Exchange,” etc., all electronic submittal files shall be organized to match the bid documents for specification section and name. Each submittal file shall be complete for each specification section. Multiple partial submittals per specification section will be rejected. Make note in the table of contents, any drawings that accompany the submittal. Title page shall contain Project Name, Contractor’s Name, Division 23 Superintendent’s name, Suppliers and point of contact for each, and date.

D. Submittals shall be made for all items contained in the Mechanical Submittal List in PART 3 - EXECUTION.

E. Response to Submittals: A Mechanical Submittal Review Report shall be issued by the Engineer with the following classifications for each item:

1. "No Exceptions Taken": No corrections, no marks. Contractor shall submit copies for distribution.
2. "Make Corrections Noted": A few minor corrections. Items may be ordered as marked up without further resubmission. Submit copies for distribution.
3. "Revise and Resubmit": Minor corrections. Item may be ordered at the Contractor's option. Contractor shall resubmit drawings with corrections noted.
4. "Rejected": Major corrections or not in accordance with the contract documents. No items shall be ordered. Contractor shall correct and resubmit drawings.

PART 2 - PRODUCTS

2.1 SUBMITTAL REQUIREMENTS:

A. General: Each specification section shall list the required submittal items. All submittal items shall conform to the requirements listed below. For each major section of submittal data, include a summary page which lists items and model numbers for each piece of equipment.

B. Shop Drawings: Prepare mechanical shop drawings to accurate scale except where diagrammatic representations are specifically indicated. Show clearance dimensions of critical locations, and show dimensions of spaces required for operation and maintenance of equipment. Show piping connections and other service connections, and show interface with other work including structural support. Indicate by note, the portions of mechanical work shown on the shop drawings which deviated from the indication of work in the contract documents, and explain the reasons for the deviations. Show how such deviations coordinate with interfacing deviations on shop drawings for other portions of the work, currently or previously submitted.

C. Manufacturer's Data: Where pre-printed data is submitted for more than one distinct product, size, type, material, trim, accessory group or other variation, mark submitted copy with black pen to indicate which of the variations is to be provided. Delete or mark-out significant portions of preprinted data which are not applicable. Where operating ranges are shown, mark data to show portion of range required for project application. Expansion or elaboration of standard data to describe a non-standard product must be processed as a shop drawing submittal. For each product include the manufacturer's production specifications, installation or fabrication instructions, nearest source of supply (including telephone number), sizes, weights, speeds, operating capacities, piping and service line connection sizes and locations, statements of compliance with required standards and governing regulation (include manufacturer's signed statements if not covered in printed data), performance data (where applicable) and similar information needed to confirm compliance with the requirements.

PART 3 - EXECUTION

3.1 MECHANICAL SUBMITTAL LIST:

23 0230 – Mechanical Identification:

Engraved Nameplates.

23 0240 – Mechanical Work Closeout:

Record Plans.
Maintenance Manuals.
Mechanical TAB Report.

23 2110 – Ductwork:

Duct Construction Standards.
Galvanized Steel Ducts.

Flexible Ducts.
Flexible Connectors.
Balancing Dampers.
Round Takeoff Fittings.
Rectangular Takeoff Fittings.
Duct Wrap Type ‘A’ .
Duct Insulation Accessories.
Duct Insulation Compounds.
Duct Sealant.
Duct Leakage Test Results.

23 2210 – Air Distribution:

All devices in AIR DISTRIBUTION SCHEDULE and/or plans and/or specifications.

23 2310 – Fans:

All equipment in FAN SCHEDULE and/or plans and/or specifications.

23 3110 – Electric Heaters:

All equipment in ELECTRIC HEATER SCHEDULE and/or plans and/or specifications.

23 9210 – Mechanical TAB (Test, Adjust, Balance):

Qualifications package.
Testing procedures.
Instrument list.
Sample test forms.

END OF SECTION 23 0220

SECTION 23 0230

MECHANICAL IDENTIFICATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 QUALITY ASSURANCE:

A. Manufacturers: Firms regularly engaged in the manufacture of identification systems required for this product.

B. Submittals: Submit manufacturer's data on materials and submit a sample of each type required.

PART 2 - PRODUCTS

2.1 MECHANICAL IDENTIFICATION MATERIALS:

A. Engraved Plastic-Laminate Labels:

1. General: Provide engraving stock melamine plastic laminated, complying with FS L-P-387, in the sizes and thicknesses indicated, engraved with engraver's standard letter style of the sizes and wording indicated, black with white core, letter color, except as otherwise indicated, punched for mechanical fastening except where adhesive mounting is necessary because of substrate.
2. Thickness: 1/16 inch, except as otherwise indicated.
3. Fasteners: Self-tapping stainless steel screws, except contact type permanent adhesive where screws cannot or should not penetrate the substrate.
4. Install engraved equipment labels on all mechanical equipment. Match equipment names as scheduled.
5. Install “Permanent Label of Equivalent Length” in each laundry area near the clothes dryer. Label shall match the example shown in 2012 IMC, Section 504. The contractor shall fill in the actual equivalent length for each dryer exhaust duct.

2.2 LETTERING AND GRAPHICS:

A. General: Coordinate names, abbreviations and other designations used in the mechanical identification work, with the corresponding designations shown, specified or scheduled. Provide numbers, lettering recommended by manufacturers or as required for proper identifications and operation/maintenance of the mechanical systems and equipment.

PART 3 - EXECUTION

3.1 APPLICATION AND INSTALLATION:

A. Coordination: Where identification is to be applied to surfaces which require insulation, painting and other covering or finish, including valve tags in finished mechanical spaces, install identification after completion of covering or painting.

B. All equipment, dampers, filters, valves, etc. located above ceiling grids shall be located with an engraved marker permanently attached to the ceiling grid. The marker shall describe the item located above the ceiling.

C. Mechanical Equipment Identification: Install an engraved plastic laminate label on or near each major item of mechanical equipment and each operational device, as specified herein if not otherwise specified for each item or device. Each label shall include the equipment name, room number and electrical panel name. Confirm installed final room numbers and electrical panel names prior to ordering labels.

END OF SECTION 23 0230

SECTION 23 0240

MECHANICAL WORK CLOSEOUT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 DOCUMENTATION PROCEDURES:

A. Signed Commitments: Do not proceed with transfer of mechanical plant to the Owner for operation until warranties, performance certifications and similar commitments to be signed by Contractor and other entities have been executed and transmitted to Architect (for Owner's records).

PART 2 – PRODUCTS

2.1 RECORD PLANS:

A. Explanation: Except where otherwise indicated, mechanical plans (contract plans) prepared by Engineer are diagrammatic in nature and may not show locations accurately for various components of mechanical systems. Shop drawings, including coordination plans, prepared by Contractor shall show certain portions of work more accurately to scale and location, and in greater detail.

B. General Recording Procedure: Maintain a white-print set, blue-line or black-line, of mechanical contract plans and shop drawings in clean, undamaged condition, for mark-up of actual installations which vary substantially from the work as shown. Mark-up whatever plans are most capable of showing the installed conditions accurately; however, where shop drawings are marked, record a reference note on appropriate contract drawing. Mark with erasable pencil and use multiple colors to aid in the distinction between work of separate mechanical systems. In general, record every substantive installation of mechanical work which previously is either not shown or shown inaccurately, but in any case record the following:

1. Underground and aboveground piping, both exterior and interior, drawn to scale and fully dimensioned.
2. *"Mechanical Project Record"* shall be maintained as part of the *"Project Record"* specified in Division 1.

2.2 MAINTENANCE MANUALS:

A. Organize each copy of the required system maintenance manuals to include an index followed by thumb-tab marked sections for each of the following:

1. Operating Instructions: Submit manufacturer's operating instructions for each item of mechanical equipment and supplement with additional project application instructions where necessary. Prepare and submit specific operating instructions for charging, start-up, control or sequencing of operation, phase or seasonal variations, shut-down, safety and similar operational instructions. Prepare in typewritten form in completely explained and easily understood English language
2. Emergency instructions including addresses and telephone numbers of service sources.
3. Regular system maintenance procedures including lubrication.
4. List of all filters required for each unit.
5. Spare parts listing and stocking recommendations.
6. Inspection, adjusting, rebalancing, cleaning, parts replacement, and similar maintenance instructions and recommendations, including the proper use of tools and accessories.
7. Valve schedule and control diagram for each system.
8. Manufacturer's data and test reports for each operating item in each system.
9. Manufacturer's product warranties and guarantees relating to the system and equipment items in the system.
10. Corrected or approved issues of submittal items relating to the system.

B. Bind each maintenance manual in one or more vinyl-covered, 2", 3-ring binder, plus pocket-folder type binders for folded drawings, and mark the back spine of each binder with system identification and volume number.

C. Certifications: Where specifically indicated, submit with notarized execution.

D. Test Reports: Submit test reports which have been signed and dated by the firm performing the test and prepared in the manner specified in the standard or regulation governing the test procedures as indicated.

E. Manufacturer's Product Warranties: Where pre-printed and published warranty includes substantial deviation from required warranty (as judged by the Architect or Engineer), product is automatically disqualified from use on the project, except where manufacturer prepares and issues a specific product warranty on the product, stating that it is in lieu of the published warranty, and is executed by an authorized officer, and complies with the requirements. Warranties shall comply with the requirements of individual specification section where those requirements exceed the manufacturer's standard warranty.

F. Guarantees: Where indicated as "Certified", provide guarantee which, in addition to execution by an authorized officer of each guarantor, is attested to by the Secretary of each guarantor and bears the corporate seal

2.3 MECHANICAL TEST, ADJUST, BALANCE REPORT

A. See Section 23 9210.

PART 3 - EXECUTION

3.1 CLOSEOUT PROCEDURES:

A. General Coordination: Sequence closeout procedures properly, so that work will not be endangered or damaged, and so that every required performance will be fully tested and demonstrated.

B. System Performance Test Run: At the time of mechanical work closeout, check each item in each system to determine that it is set for proper operation. With Owner's representative and Architect/Engineer present, operate each system in a test run of appropriate duration to demonstrate compliance with performance requirements. During or following test runs, make final corrections or adjustments of system to refine and improve performances wherever possible, including noise and vibration reductions, elimination of hazards, better response of controls, signals and alarms, and similar system performance improvements. Provide testing or inspection devices as may be requested for Architect's/Engineer's observation of actual system performances. Demonstrate that controls and items requiring service or maintenance are accessible. Test run shall be scheduled to coincide with Engineer's final inspection of the mechanical work.

C. Cleaning and Lubrication: After final performance test run of each mechanical system, clean system both externally and internally. Clean dirt and debris from air handling systems and install new filters. Flush piping system by operating drains and similar means, and clean strainers and traps. Lubricate both power and hand operated equipment and remove excess lubrication. Touch-up minor damage to factory painted finishes and other painting specified as mechanical work; refinish work where damage is extensive.

D. General Operating Instructions: In addition to specified training of Owner's operating personnel specified in individual mechanical sections, and in addition to preparation of written operating instructions and compiled maintenance manuals specified, provide general operating instructions for the total mechanical plant. Conduct a walk-through explanation and demonstration for orientation and education of Owner's personnel to be involved in continued operation of building and its mechanical plant.

1. Describe each basic mechanical system and how its control system functions, including flow adjustments, temperature control and similar operations.
2. Explain and point out identification system, displayed diagrams, signals, alarms and similar provisions of the work.
3. Describe basic sequencing requirements and interlock provisions for system start-up, phasing, coast-down, shut-down and seasonal operations.
4. Emphasize emergency procedures and safety provisions for protection of equipment and safety of occupants during equipment malfunction, disasters, power failures and similar unusual circumstances, and describe system limitations and precautions including weather adjustments.
5. Outline basic maintenance procedures.

E. Demonstrate what adjustments have been made and can continue to be made to reduce noise and vibration, improve system output, decrease energy consumption and similar performance improvements.

F. Point out operational security provisions, safety, unavoidable hazards and similar operator limitations. Display and conduct a "thumb-through" explanation of maintenance manuals, record drawings, meter readings and similar service items.

G. All training sessions shall be digitally recorded (audio/video) and submitted to the Owner.

H. Construction Equipment: After completion of performance testing and Owner's operating instructions and demonstrations, remove installers tools, test facilities, construction equipment and similar devices and materials used in execution of the work but not incorporated in the work.

3.2 CONTINUED SYSTEM OPERATIONS:

A. Final Acceptance: At time of substantial completion of mechanical work, Owner's operating personnel will take over operation of mechanical systems. However, until time of final acceptance, respond promptly with consultation and services on whatever operation or maintenance problems may remain or arise in continued operation of mechanical plant.

END OF SECTION 23 0240

SECTION 23 2110

DUCTWORK AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 QUALITY ASSURANCE:

A. Industry Standards:

1. Comply with SMACNA *(Sheet Metal and Air Conditioning Contractor's National Association)* recommendations for fabrication, construction and details and installation procedures, except as otherwise indicated.
2. Comply with ASHRAE *(American Society of Heating, Refrigerating and Air Conditioning Engineers)* recommendations, except as otherwise indicated.
3. Provide composite ductwork insulation (insulation, coverings, sealers, mastics and adhesives) with flame-spread rating of 25 or less and a smoke-developed rating of 50 or less, as tested by ASTM E84 (NFPA 255) method.
4. Provide duct connectors which comply with applicable portion of UL 181 and bear label of *Underwriter's Laboratories*.

1.3 SUBMITTALS:

A. Provide manufacturer's data, test reports, and product warranties as applicable for all items.

PART 2 - PRODUCTS

2.1 ABOVE GROUND DUCTWORK:

A. General: Galvanized steel ductwork shall be used for all supply, return, exhaust, and ventilation ducts except as indicated otherwise by the contract documents. Preinsulated flexible duct shall be used to make final concealed connections to diffusers, registers, and grilles. Length of flexible duct shall not exceed five feet.

B. Galvanized Steel Ductwork: Ducts shall be fabricated from G90 galvanized sheet steel complying with ASTM A653, lock-forming quality. Concealed round ducts from Air Handling Units to Terminal Units shall be the spiral seam type with matching fittings. Concealed round ducts shall be the spiral seam type or snap-lock type with matching fittings.

C. Flexible Ducts: Flexible ducts shall be U.L. Listed as Class 1 Flexible Air Duct Material and shall comply with NFPA Standards 90A and 90B. Duct shall be a factory fabricated assembly composed of a polymeric liner duct bonded permanently to a coated spring steel wire helix and supporting a fiberglass insulating blanket with a minimum R-value of 4.2. Low permeability outer vapor barrier of fiberglass reinforced film laminate shall complete the assembly. Duct

shall be suitable for low and medium pressure systems and shall carry a full 5-year warranty. For all flexible duct connections to diffusers, registers and grilles, provide rigid elbow brace accessory with one duct diameter centerline radius. Flexible duct shall be by *Atco*, *Flexmaster*, *Genflex* or *Thermaflex*.

2.2 DUCTWORK ACCESSORIES:

A. General: Except as otherwise indicated for each ductwork accessory, provide metal type, gauge, weight, construction and reinforcing as required by size limitations, and applicable SMACNA standards, including fittings, supports and appurtenances.

B. Flexible Connectors: Provide flexible connectors between supply and return duct connections to equipment and as otherwise indicated on the drawings. Flexible connector shall be constructed of neoprene permanently attached to 3" wide metal bands. Connector shall be UL listed and shall be by *Durodyne*, *Ventfabrics* or *Young Regulator*.

C. Manual Balancing Dampers: Provide single blade dampers for round ducts and rectangular ducts less than 12" as indicated on the drawings. Dampers shall be constructed of galvanized steel. Damper shall be installed complete with locking quadrants. For rectangular ducts 12" and wider, provide opposed-blade type dampers constructed of galvanized steel mounted in a galvanized steel channel frame. Blade spacing shall not exceed 6" and the top and bottom edges of the blades shall be crimped to stiffen the blades. Damper blades shall be interconnected by rods and linkages to provide simultaneous operation of all blades. Damper shall be provided with an extended rod to permit installation of a damper regulator. Dampers shall be by *Air Balance*, *Arrow*, *Dowco*, *Jer-Air*, *Nailor*, *National Controlled Air*, *Ruskin*, *Phillips-Aire*, *Safe-Air* or *United*.

D. Round Take-Offs: Round take-offs shall be made using collars constructed of galvanized steel equipped gasket flange and manual balancing damper with 2" handle standoff. Do not furnish extractors or air scoops. Takeoffs from medium pressure ducts to air terminal units shall have a conical entry. Take-offs from low pressure rectangular trunk ducts shall have 45° entry. Takeoffs shall be by *Celcon*, *Crown*, *Flexmaster*, *Jer-Air*, *Metalcraft*, *Sheet Metal Connectors*, *Thermaflex* or *United*.

E. Rectangular Take-Offs: Rectangular take-offs shall be made using collars constructed of galvanized steel equipped with gasket flange and manual balancing damper with 2" handle standoff. Do not furnish extractors or air scoops. All takeoffs shall have 45° entry. Takeoffs shall be by *Celcon*, *Crown*, *Flexmaster*, *Jer-Air*, *Metalcraft*, *Sheet Metal Connectors*, *Thermaflex* or *United*.

2.3 DUCTWORK INSULATION:

A. General: Refer to the mechanical plans for duct insulation types and locations. Insulation shall be by *Certainteed*, *Knauf*, *Manville* or *Owens Corning*.

B. Duct Wrap: Type "A" Duct wrap shall be 2" thick, 0.75 pcf density, blanket type fiberglass insulation with vapor barrier and minimum R-Value of 6.7.

C. Ductwork Insulation Accessories: Provide mechanical fasteners as recommended by the insulation manufacturer.

D. Ductwork Insulation Compounds: Provide cement, adhesives, coatings, sealers, protective

finishes, and similar compounds as recommended by the insulation manufacturer for the applications indicated.

2.4 MISCELLANEOUS MATERIALS:

A. General: Provide miscellaneous materials and products of the types and sizes indicated and where not otherwise indicated, provide type and size required to comply with ductwork system requirements including proper connection of ductwork and equipment.

B. Duct Sealant: Duct Sealant for above ground ductwork shall be a mastic suitable for the pressure classification in accordance with SMACNA *HVAC Duct Construction Standard*". All joints and seams shall be sealed.

C. Ductwork Support Materials: Provide hot-dipped galvanized steel rods, fasteners, anchors, straps, angles and trim for support of ductwork. Wires shall not be acceptable. Ductwork installed above a roof shall be supported on pre-fabricated, non-penetrating supports by *Pipe Pier* or approved equal. Provide matching adjustable elevation kits.

2.5 DUCT FABRICATION:

A. Shop fabricate ductwork in 4’, 8’, 10’ or 12’ lengths, unless otherwise indicated or required to complete runs. Pre-assemble in the shop to the greatest extent possible, so as to minimize field assembly of systems. Disassemble systems only to the extent necessary for shipping and handling. Match-mark sections for re-assembly and coordinated installation.

B. Fabricate ductwork with joints, seams and reinforcements as required in the latest edition of SMACNA *HVAC Duct Construction Standards*, 2” static pressure rating.

C. Fabricate duct fittings to match adjoining ducts and to comply with duct requirements as applicable to fittings. Elbows shall be either the curved radius type or the square type with turning vanes. Curved radius elbows shall have a centerline radius equal to 1.5 times the duct width. Curved radius elbows with square throats shall not be acceptable.

D. Fabricate ductwork with accessories installed during fabrication to the greatest extent possible. Where ducts are specified to lined, make allowances for the thickness of the liner. Duct sizes shown on the drawings are clear, inside dimensions.

PART 3 - EXECUTION

3.1 INSTALLATION OF DUCTWORK:

A. General: Assemble and install ductwork in accordance with the latest edition of SMACNA *HVAC Duct Construction Standards* and with recognized industry practices which will achieve air tight noiseless systems, capable of performing each indicated service. Install each run with a minimum of joints. Align ductwork accurately at connections, and with internal and external surface smooth. Support ducts rigidly with suitable ties, braces, hangers and anchors of the type which will hold ducts true-to-shape and prevent buckling. Hanger locations shall be coordinated with the building structure and finish conditions.

B. Complete fabrication of work at the project as necessary to match shop fabricated work and accommodate installation requirements.

C. Locate ductwork runs, except as otherwise indicated, vertically and horizontally and avoid diagonal runs wherever possible. Locate runs as indicated by plans, diagrams, details and notations or, if not otherwise indicated, run ductwork in the shortest route which does not obstruct usable space or block access for servicing the building and its equipment. Coordinate the layout with piping, lighting layouts and similar finished work and plumbing risers. Duct layouts shown are diagrammatic and actual location of duct shall be field verified and coordinated by the duct fabricator prior to beginning fabrication of duct systems.

D. Duct collars shall be provided where ducts pass through walls and partitions which extend full height to the underside of the roof structure. Collars shall be fabricated from 22 gauge galvanized steel sheet. Duct collars shall be provided on both sides of walls and partitions, except collar shall be omitted on that side of the wall where registers and grilles are installed. Flanges shall be installed tight against the wall. The space between the duct and the wall shall be packed with mineral wool.

E. Coordinate duct installations with installation of accessories, dampers, equipment, controls and other associated work of the ductwork system.

3.2 INSTALLATION OF INSULATION:

A. Duct Wrap: Wrap shall be wrapped around duct work with all circumferential joints butted and longitudinal joints overlapped a minimum of 2”. Adhere insulation to duct with 4” strips of fire resistant adhesive at 8” on centers. On circumferential joints, the 2” flange on the facing shall be taped with minimum of 3” wide foil reinforced *Kraft* tape. On longitudinal joints the overlap shall be taped with a minimum 3” wide foil reinforced Kraft tape. On ends of insulation use 3” wide foil reinforced *Kraft* tape to fasten insulation ends to duct. For duct widths 24” and greater, provide additional mechanical fasteners on 18” centers on the bottom of the duct to prevent sagging. Insulate that part of the supply diffusers above the ceiling so that there is no uncovered metal surface subject to condensation. Provide taped-on 12”x12” squares of insulation over damper regulators located above ceilings. All duct wrap shall also be wrapped with wire. All duct insulation installed on duct exterior shall have joints and seams taped and covered with mastic, including connections to equipment.

3.3 CLEANING AND PROTECTION:

A. Clean ductwork internally, unit-by-unit as it is installed, of dust and debris. Clean external surfaces of foreign substances which might cause corrosive deterioration of the metal or, where ductwork is to be painted, might interfere with painting or cause paint deterioration.

B. Temporary Closure: At ends of ducts which are not connected to equipment or air distribution devices at the time of ductwork installation, provide temporary closure of polyethylene film or other covering which will prevent the entrance of dust and debris.

END OF SECTION 23 2110

SECTION 23 2210 - AIR DISTRIBUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 QUALITY ASSURANCE:

A. *Titus* is the Basis of Design manufacturer for grilles, registers and diffusers. Equivalent equipment by *Carnes, Krueger, Metalaire, Nailor, Price* and *Tuttle & Bailey* that meets performance, capacity, space and other requirements of the design documents shall be acceptable.

B. *Greenheck* is the Basis of Design manufacturer for louvers. Equivalent equipment by *Arrow, Penn, Louvers And Dampers, Ruskin* and *United Enertech* that meets performance, capacity, space and other requirements of the design documents shall be acceptable.

C. Industry Standards: Comply with *National Fire Protection Association* Standard No. 90A, as applicable to construction and installation of required devices.

1.3 SUBMITTALS:

A. Provide manufacturer's data, test reports, and product warranties for all items as applicable.

B. Provide standard color selection charts for all air distribution devices. All colors shall be selected by the Architect during Submittal Review.

PART 2 - PRODUCTS

2.1 GRILLES, REGISTERS, AND DIFFUSERS:

A. Ceiling Diffusers: Square ceiling diffusers shall be the full 2x2 face type with round neck, three or four cones, and one-way, two-way, three-way, or four-way throw as indicated. Diffusers shall be of stamped aluminum construction. Provide T-bar lay-in frame for grid ceilings. Provide manufacturer’s molded backpan R-6 insulation.

B. Ceiling Return/Exhaust Grilles: Eggcrate grilles shall be all aluminum construction with ½” square eggcrate louvers, 1” deep. All 1'x2', 2'x2', and 2'x4' grilles in lay-in ceilings shall be the lay-in type. All other sizes shall have a flanged frame.

PART 3 - EXECUTION

3.1 INSTALLATION:

A. General: Install devices as detailed on the drawings and in accordance with manufacturer's written instructions and in accordance with recognized industry practices.

B. Coordinate with other work, including ductwork and ductwork accessories and ceiling system as necessary to interface installation of grilles and diffusers properly with other work.

C. Ceiling mounted devices to be installed in lay-in tile ceilings shall be compatible with 24"x24" or 24"x48" T-bar grid as applicable. Refer to Architectural Reflected Ceiling Plans for exact locations of grilles, registers and diffusers. For flush mounted devices in T-bar ceilings, special care shall be taken to install devices in the center of ceiling tiles. Sagging will not be permitted. Provide rear sheet metal angle bracing.

END OF SECTION 23 2210

SECTION 23 2310

FANS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 QUALITY ASSURANCE:

A. *Greenheck* is the Basis of Design manufacturer unless noted otherwise. Equivalent name brand equipment manufactured by *Acme, Carnes, Cook, Penn, Stanley and Twin City* that meets performance, capacity, space and other requirements of the design documents shall be acceptable.

B. Industry Standards:

1. Provide fans which bear *Air Movement and Control Association* (AMCA) certified performance rating seals.
2. Provide fan components which have been listed and labeled by *Underwriters' Laboratories*.
3. Comply with applicable portion of *National Electrical Manufacturer's Association* standards for motors.

1.3 SUBMITTALS:

A. Provide manufacturer's data, test reports, and product warranties on all items.

PART 2 - PRODUCTS

2.1 CEILING EXHAUST FANS:

A. Provide ceiling exhaust fans, in types and sizes indicated; locate where shown. Provide direct-driven fans with permanently lubricated, continuous duty, thermally protected, ball bearing motor. Construct fan housing of sheet steel with enamel finish, lined with sound absorbing acoustical insulation securely fastened to walls of housing. Provide a true centrifugal wheel with air outlet perpendicular to inlet and with statically and dynamically balanced wheel. Provide a white ceiling grille.

B. Equip motor with integral thermal overload protection and with terminal box mounted on housing with cord, plug and receptacle inside housing. Provide matching square hooded wall cap with trim and finish color selected by Architect.

PART 3 - EXECUTION

3.1 INSTALLATION OF FANS:

A. General: Except as otherwise shown or specified, install fans in accordance with manufacturer's written instructions and in accordance with National Electrical Code (NEC) and recognized industry practices.

B. The mounting height of each wall mounted thermostat or temperature sensor shall comply with ADA for maximum side reach. The thermostat or sensor shall be at 48” maximum above the floor.

3.2 TESTING:

A. After installation of fans has been completed, test each unit to demonstrate proper operation at performance requirements specified, including, but not limited to, proper rotation of impeller. When possible, field correct malfunctioning units, then retest to demonstrate compliance. Replace units which cannot be satisfactorily corrected.

END OF SECTION 23 2310

SECTION 23 3110

ELECTRIC HEATERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 QUALITY ASSURANCE:

A. *QMark* is the Basis of Design manufacturer. Equivalent name brand equipment by *Berko, Chromalox, Markel, Neptronic, Reddi, Raywall* and *Warren* that meets performance, capacity, space and other requirements of the design documents shall be acceptable.

B. Industry Standards: Each unit shall be U.L. listed.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT:

A. Cabinet Heaters: Cabinet heaters shall be blow-thru type with front discharge and front inlet. Cabinet shall be heavy gauge steel with baked enamel finish, configured for fully recessed ceiling mounting. Provide mounting flange. Motor and fans shall be direct drive connected and mounted as a single assembly on a rigid frame. Motors shall be 2-speed, resiliently mounted with automatic reset motor overload protection. Heating elements shall be fin-tube type with steel sheath. Provide fan-delay switch, built-in circuit breakers, and built-in low voltage transformer. Provide integral thermostat.

PART 3 - EXECUTION

3.1 INSTALLATION:

A. Install heaters in accordance with the manufacturer's instructions.

B. The mounting height of each wall mounted thermostat or temperature sensor shall comply with ADA for maximum side reach. The thermostat or sensor shall be at 48” maximum above the floor.

END OF SECTION 23 3110

SECTION 23 9210

MECHANICAL TESTING, ADJUSTING, BALANCING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 QUALITY ASSURANCE:

A. General: An independent test agency shall perform the TAB work as described herein. The agency shall have a minimum of 3 years of successful TAB experience on projects of similar size and scope. The name of the test agency and proof of satisfactory performance on 5 previous projects in the form of projects referenced shall be submitted to the Architect for approval within 30 days after receipt of the construction contract.

B. Test Agency: A firm with membership in the *Associated Air Balance Council* (AABC) or certified by the *National Environmental Balancing Bureau* (NEBB) in those testing and balancing disciplines similar to those required for this project, who is not the Installer of the system to be tested, and is otherwise independent of the project.

C. Compliance: Comply with AABC standards or NEBB *Procedural Standards for Testing-Adjusting-Balancing of Environmental Systems* as applicable to mechanical air systems and associated equipment apparatus.

D. Industry Standards: Comply with ASHRAE (*American Society for Heating, Refrigeration and Air Conditioning Engineers, Inc.*) recommendations pertaining to measurements, instruments, and testing, adjusting, and balancing except as otherwise indicated.

E. Pre-Qualified TAB Agencies: Testing and Balancing shall be performed by one of the following firms:

1. *Air Analysis of Atlanta*
2. *TAB Services*
3. *Thomas Balancing*
4. *Georgia Balance Company*
5. *Augusta Air Balance*

1.3 SUBMITTALS:

A. Submit 5 copies of a certified test report signed by the TAB supervisor who performed the TAB work. Test reports shall be submitted prior to the final inspection of mechanical work.

B. Include identification and types of instruments used and their most recent calibration date with submission of final test report.

C. In addition to Air Balance and operational data required to be submitted, the report shall include any observation of unusual noise or vibration observed and any malfunction of

adjustable devices encountered during the TAB work.

1.4 JOB CONDITIONS:

A. Do not proceed with testing, adjusting and balancing work until mechanical systems are complete and operable. Do not proceed until systems are clean and free from debris, dirt, and discarded building materials.

PART 2 - PRODUCTS

2.1 PATCHING MATERIALS:

A. Except as otherwise indicated, use the same products as used by original Installer for patching holes in insulation, ductwork and housing which may have been cut or drilled for test purposes, including access for test instruments, attaching jigs and similar purposes.

2.2 TEST INSTRUMENTS:

A. Utilize test instruments and equipment for the TAB work required, of the type, precision and capacity as recommended in AABC standards or NEBB Procedural Standards for Testing-Adjusting-Balancing of Environmental Systems.

PART 3 - EXECUTION

3.2 TESTING:

A. Tester must examine the installed work and conditions under which testing is to be done to ensure that work has been completed, cleaned and is operable. Notify the Contractor in writing of conditions detrimental to the proper completion of the test-adjusting-balancing work. Do not proceed with the TAB work until unsatisfactory conditions have been corrected in a manner acceptable to Tester.

B. Test, adjust, and balance mechanical air systems. At a minimum, the report shall document the following:

1. CFM for all diffusers, grilles and registers.
2. CFM for all fans including static pressure setpoints.

C. Airflows shown on drawings are provided as a guide to achieve uniform room temperature throughout the building. Field correct as required to suite room condition. Any substantial alteration shall be called to the engineer's attention.

D. Prepare a report of test results, including instrumentation calibration reports, in the form recommended by the applicable standards.

E. Patch holes in insulation, ductwork and housing, which have been cut or drilled for test purposes, in a manner recommended by the original Installer.

F. Mark equipment settings, including manual damper control positions, and similar controls and

devices, to show final settings at completion of TAB work. Provide marking with paint or other suitable permanent identification materials.

END OF SECTION 23 9210

SECTION 26 0100

GENERAL PROVISIONS - ELECTRICAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 IMPOSED REGULATIONS:

A. Applicable provisions of the State and Local Codes and of the following codes and standards are hereby imposed on a general basis for electrical work:

1. NEC, National Electrical Code (NFPA No. 70), with Georgia Amendments.
2. The Life Safety Code (NFPA No. 101), with Georgia Amendments.
3. State of Georgia ADA Accessibility Guidelines for Building and Facilities.
4. The Standard Building Code, with Georgia Amendments.
5. The National Electrical Safety Code (ANSI C2.)
6. U.L. Fire Resistance Directory.
7. U.L. Electrical Construction Materials Directory.
8. U.L. Electrical Appliance and Utilization Equipment Directory.

1.3 SCOPE OF WORK:

A. Provide all labor, materials, equipment and supervision to construct complete and operable electrical systems as indicated on the drawings and specified herein. All materials and equipment used shall be new, undamaged and free from any defects.

1.4 COORDINATION:

A. Coordinate work provided under this division of the specifications with work provided under other divisions of the specifications and work provided by owner, where applicable.

1.5 PROJECT STAFFING:

A. Superintendent:

1. Provide a superintendent to plan, layout, supervise and coordinate the work provided by all organizations providing work under Division 26. The superintendent shall be at the job site at any time work is being performed.
2. The superintendent shall have a minimum of 5 years of experience in educational projects of similar size and scope. The superintendent shall have a State of Georgia unrestricted electrical contractor’s license.

B. Organizations Furnishing and Installing Electrical Systems:

1. Traditional electrical systems work shall be furnished and installed by organizations who have successfully completed work of similar size and scope, and who have been in business for at least 3 years.
2. Electricians, 600V and below:
   a. Electricians assigned to the project shall have proof of having completed a formal training program which certifies that they are qualified to perform electrical work of the type encountered on this project and are familiar with the building codes which apply to this project. For the purposes of this project, workers not possessing these qualifications shall be considered helpers and shall not be allowed to perform electrical work.

C. Submit resumes for review and approval by the Architect prior to proceeding with any work on the project. Fill out Attachment 2, Section 260120 for each firm providing work under Division 26.

1.6 PERMITS AND TEST; ELECTRICAL WORK:

A. Submit a record copy (for Owner's records) of electrical work notices, permits, licenses, inspection or test reports, and similar items obtained in response to governing and imposed codes, regulations and standards.

1.7 ELECTRICAL DRAWINGS:

A. Do not scale the electrical drawings. Obtain all dimensions from the Architect's dimensioned drawings, field measurements and shop drawings.

B. Electrical contract drawings are diagrammatic and indicate the general arrangement and connection of equipment and devices. Review product data sheets, wiring diagrams, manufacturer’s installation instructions, etc. and provide the connections required to place equipment into service. Do not rely solely on the conductor counts shown on the drawings.

C. Discrepancies shown on different drawings, between drawings and specifications or between documents and field conditions shall be brought to the attention of the Architect. The specifications do not override the drawings or vice-versa.

1.8 EQUIPMENT REQUIRING ELECTRICAL SERVICE:

A. Provide connections for all electrically driven equipment, in accordance with the electrical drawings and the Division of the specifications in which the equipment is specified.

1. Connection shall include circuit breaker, wiring, control and disconnecting means (where applicable) and final connection.
2. Prior to ordering materials, review approved shop drawings of equipment that will be ordered and verify the connections shown. Fill out and submit the Coordination Affidavit required by Section 260120.
3. Where connection is required by other Divisions, but no connection is shown on the electrical drawings, provide connection to nearest panel of same voltage and phase based on the characteristics shown on other drawings. All added connections shall be brought to the attention of the Architect.
4. Provide 120 volt, 1 phase, 20 ampere power connection for all Division 23 control panels, whether indicated on the project drawings or not. Circuit from nearest 120/208

volt, 3 phase, 4 wire panelboard from available 20 amp, single-pole spares. Revise panelboard schedules accordingly. Document and coordinate control panel requirements and locations during preparation of the Coordination Affidavit, Attachment No. 1.

1.9 SYSTEMS REQUIRING ROUGH-IN:

A. Rough-in shall consist of all outlet boxes and covers/raceway systems/supports and sleeves required for the installation of cables/devices specified by other Divisions and by the Using Agency.

B. Review shop drawings to determine rough-in requirements; do not rely solely on the information shown on the drawings. Keep a copy of these shop drawings at the project site throughout the course of construction.

C. Systems requiring rough-in shall include, but not be limited to the following:

1. Mechanical equipment as shown in Divisions 22 and 23
2. Building equipment as shown
3. Equipment furnished by the Using Agency as shown on plans

D. Rough-in requirements are further defined in Section 261010. Prior to performing any rough-in, meet with the designated representative of the trade involved to confirm device locations, mounting heights, trim ring type and orientation.

1.10 PERFORMANCE TESTING:

A. Testing specified in other sections shall be performed by authorized representatives of the system manufacturer, scheduled and paid for by the Contractor.

1. The contractor shall provide personnel, tools and equipment necessary to conduct the tests.
2. Provide three copies of all test results. For each system, include a cover page with the Testing Agency letterhead, name of persons conducting the test, date(s) of tests, and an executive summary of the testing performed. Include the detailed results after this summary.

B. Notify the Architect, in writing, 48 hours in advance of any testing to be performed. Include the system, or systems to be tested. The purpose of this requirement is to allow the Architect and Using Agency time to schedule representatives to be present.

C. Schedule the work so that all tests can be conducted at one time.

D. Provide personnel and equipment necessary to make all work accessible to the testing agency.

E. A copy of the test reports will be made available to the contractor. The contractor shall remove and replace all work that does not meet specified performance parameters. The contractor shall bear the expense of retesting systems.

1.11 RECORD DOCUMENTS:

A. The electrical superintendent shall maintain a white set (blue-line or black-line) of contract documents in clean, undamaged condition, for mark-up of actual installations which vary

substantially from the work as shown. Mark-up whatever drawings are most capable of showing installed conditions accurately. These documents shall be used for no other purpose. As a minimum, record the following:

1. Post all addenda prior to beginning work.
2. Post all changes in the work.
3. Document actual feeder conduit routes, both interior and exterior. For lines run below grade or slab, dimension lines off of fixed surfaces.
4. Scope of each change order (C.O.), noting C.O. number.
5. Mark up all branch circuit connections.

1.12 RECORD MANUALS: (CLOSEOUT REQUIREMENTS)

Record manuals shall include the following:

A. Shop drawings, revised to reflect all review comments, *supplemented with the installation instructions shipped with equipment.*

B. One copy of all panelboard directories plus CD/RW with electronic spreadsheets containing directories.

C. All test results listed by specification section.

D. All required keys, tools, and spare parts.

Submit record manuals in quantities and in the format prescribed in the Division specifications, plus one copy for the Engineer.

1.13 TRAINING OF OWNERS FORCES:

A. Train Owner’s personnel on the operation and maintenance of the following systems :

1. Tour of Facility - 1 hour

B. The “tour of facility” shall consist of the walk-thru of at least one space of each type. The Division 26 Superintendent shall demonstrate operation of all lighting controls, emergency shut off controls, use of receptacles, etc. The tour shall be conducted jointly with Division 27.

C. Training shall not be conducted until system has been tested by the Contractor and is 100% operational. Training shall be conducted at the project site.

D. As a minimum, the following materials shall be reviewed during the training session:

1. Owner’s operation and maintenance manual.
2. Corrected shop drawings and as-built system drawings.
3. Hands-on demonstration of system features and operation.

E. Schedule the training at least two weeks in advance. At that time, provide a detailed outline of the training session.

F. Training shall be conducted by authorized representatives of the system manufacturer and the Division 27 superintendent.

1.14 REVIEW OF THE WORK BY THE ARCHITECT:

A. During the course of the project, the work will be reviewed by a representative of the Architect. Upon each visit, the Contractor shall also demonstrate that the record documents and shop drawing files are being kept current. The Division 26 Superintendent shall accompany the Architect on all reviews and shall provide all personnel, tools, ladders, etc. necessary to conduct the review.

B. Prior to reviewing of work in progress, or at the final inspection, the Contractor shall submit a letter describing the specific work to be reviewed, along with a punch-list of items that are incomplete or which require correction, based on observations made by the supervisor of the given trade. Reviews will not be scheduled until this information is submitted. The Contractor shall bear the burden of any resulting delays.

C. Construction review reports will be issued by the Architect for every review trip. Within five working days from the date of review, the Contractor shall submit a letter which addresses when corrections will be made for each deficiency in the report. Prior to subsequent review of the work, the Contractor shall submit a letter confirming that the work required by all comments on the report has been completed.

PART 2 - PRODUCTS

2.1 GENERAL:

A. Refer to the drawings and individual specification sections for requirements.

B. All equipment shall be suitable for the environment in which it is installed. Such considerations shall include, but not be limited to characteristics of this specific project such as wet/damp/dry locations, ambient temperature / humidity, spaces used as air plenums and hazardous locations. It shall be the responsibility of the contractor to review the contract documents and order equipment based on intended use.

2.2 MATERIALS:

A. All materials and equipment used shall be new, undamaged and free from any defects.

B. Provide materials and equipment that are U.L. listed, unless listing is unavailable.

C. All equipment of the same type or of the same product category shall be the product of a single manufacturer.

D. It is the responsibility of the Contractor to determine the shipping splits for large equipment.

E. Where product is specified by catalog number, such specification is intended only to convey general characteristics. Actual product selection shall be based on catalog number, other references on the drawings / specifications and intended use. Products not listed in these specifications or shown on drawings shall not be used.

2.3 ACCEPTABLE MANUFACTURERS:

A. Provide equipment and materials which are products of the manufacturers listed on the drawings and in the specifications. Requests for substitution of other manufacturers shall comply with Division 1 and the paragraph “B” below.

B. Requests for prior approval (i.e. before the bid opening) must contain all information listed for the specific item in Section 260120, including any applicable dimensioned layout drawings. Requests must be sent by mail or express delivery such that they are received in the Architect’s office no later than ten working days prior to the opening of bids. Requests that are incomplete or are sent by facsimile will not be reviewed.

PART 3 - EXECUTION

3.1 ROLE OF THE SUPERINTENDENT:

A. The Division 26 Superintendent’s duties shall include, but not be limited to the following:

1. Preparation of submittals.
2. Planning and layout of the work.
3. Coordination with other trades and the local utility company.
4. Posting addenda and changes in the work to maintain the Record Documents and to ensure that Division 26 personnel are working from up-to-date drawings and specifications.
5. Supervision of all Division 26 personnel.
6. Ongoing review of work in place to ensure compliance with the Contract Documents.
7. Administrative duties as required to fulfill the requirements of the General Conditions, Special Conditions and Division 1 specifications.
8. Training of the Owner’s personnel.

3.2 PROTECTION OF THE WORK:

A. Protect the work during the course of construction. Do not install any equipment or materials until the proper environmental conditions have been established.

B. Store materials in the manner recommended by the manufacturer until materials are installed. Materials rated for indoor use shall not be stored outdoors regardless of the packaging in which the materials are shipped.

C. Prior to the building being "dried-in", protect incomplete conduit runs, outlet boxes, equipment enclosures, etc. from the entry of water or construction debris, by installing and maintaining temporary protective covers.

D. Do not install wiring devices, equipment or panel interiors until the building is dried-in. For the purposes of this specification “dried in” shall mean the roof has been installed, all exterior openings are covered and the interior of the building is dry.

E. Maintain temporary protective covers over equipment enclosures, outlet boxes and similar items after interiors, conductors, devices, etc. are installed, to prevent the entry of construction debris and to protect the installation during finish work performed by others. Do not install device plates, equipment covers or trims until finish work is complete.

F. Install temporary protective covers over equipment mounted on the building exterior to prevent corrosion damage during cleaning of the building exterior, by others.

G. Clean all equipment, inside and out, upon completion of the work. Scratched or marred surfaces shall be touched-up with touch-up paint furnished by the equipment manufacturer.

H. Equipment or materials that are improperly stored or are installed before the proper environmental conditions are achieved will be removed and replaced with new, at no cost to the Owner. The Contractor shall bear all consequences from any resulting delays.

I. All equipment and materials that become damaged will be removed and replaced with new, at no additional cost to the Owner.

3.3 INTERFACE OF ELECTRICAL WORK WITH OTHER TRADES:

A. Where electrical work must connect to or be incorporated into work installed by other trades, engage the services of the other trade to interface the work. Under no circumstances shall the installer performing work under this Division of the specifications modify or alter work installed by others. Such work includes, but is not limited to:

1. Roof Penetrations.
2. Any attachments to roofing system.
3. Penetrations in Vapor Barriers.
4. Exterior Insulation and Finish Systems (EIFS).

END OF SECTION 26 0100

SECTION 26 0110

DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 SCOPE:

A. Building:

1. Demolition shall include the removal of the associated outlet box, supports, conduits, fittings and conductors. Existing devices that are embedded in concrete may be abandoned in place and provided with blank cover plate, of the same type specified in Section 261010.

B. Services that pass through the areas being renovated, but serve areas outside of the scope of work, shall be maintained.

1.3 SITE INVESTIGATION:

A. Prior to submitting bids on the project, visit the site to become familiar with conditions which may affect the cost of the work.

PART 2 - PRODUCTS

2.1 Not applicable:

PART 3 - EXECUTION

3.1 EXISTING UTILITIES DAMAGED BY THE CONTRACTOR:

A. Notify the Using Agency immediately if any existing utilities are damaged. Utilities will repaired by the Using Agency, at the Contractor’s expense.

3.2 INTERRUPTIONS TO ELECTRICAL POWER SERVICES:

A. All outages shall be scheduled with the Using Agency. Refer to the Special Conditions for permitted outages.

3.3 INCIDENTAL WORK:

A. It is anticipated that existing conduits to remain may impede the installation of new ductwork or piping systems. The contractor shall include in his bid, sufficient costs to identify and relocate these conduits as may be required.

B. It is anticipated that demolition of existing branch circuits may interrupt power to devices in areas outside of the area of work. Prior to removing existing circuits trace all circuits that extend beyond the project limits and will be affected by the new work. The contractor shall include in his bid, sufficient costs to identify and reconnect these areas to spare circuits in existing panels, in a manner acceptable to the Using Agency.

3.4 MATERIALS REMOVED:

A. Prior to beginning the demolition, meet with the Using Agency's designated representative to identify any items the Using Agency may want to keep. The Contractor shall submit to the Architect, in letter form, a record of the meeting, with a list of the disposition of items to be removed.

B. All other items shall become the property of the Contractor and shall be removed from the project site.

3.5 REUSE OF EXISTING MATERIALS:

A. The reuse of existing materials is not permitted.

3.6 CUTTING AND PATCHING:

A. Structural Limitations: Do not cut structural framing, walls, floors, decks, and other members intended to withstand stress, except with the Architect's written authorization. Authorization will be granted only when there is no other reasonable method for completing the electrical work, and where the proposed cutting clearly does not materially weaken the structure.

B. Cutting Concrete: Where authorized, cut openings through concrete (for conduit penetrations and similar services) by core drilling or sawing. Do not cut by hammer-driven chisel or drill.

C. Other Work: Do not endanger or damage other work through the procedures and process of cutting to accommodate electrical work. Review the proposed cutting with the Installer of the work to be cut, and comply with his recommendations to minimize damage. Where necessary, engage the original Installer or other specialists to execute the cutting in the recommended manner.

D. Patching: Where patching is required to restore other work, because of cutting or other damage inflicted during the installation of electrical work, execute the patching in the manner recommended by the original Installer. Restore the other work in every respect, including the elimination of visual defects in exposed finished, as judged by the Architect. Engage the original Installer to complete patching of various categories of work including: concrete and masonry finishing, waterproofing and roofing, exposed wall finishes, etc.

END OF SECTION 26 0110

SECTION 26 0120

ELECTRICAL SUBMITTALS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 GENERAL:

A. Submit for review by the Architect a schedule with engineering data of materials and equipment to be incorporated in the work.

1. Submittals shall be supported by descriptive materials, i.e., catalog sheets, product data sheets, diagrams, performance curves and charts published by the manufacturer, to show conformance to Specifications and Plan requirements; model numbers alone shall not be acceptable.
2. Data submitted for review shall contain all information to indicate compliance with Contract Documents. Complete electrical characteristics shall be provided for all equipment.
3. Submittals for lighting fixtures shall include Photometric Data.
4. The Architect reserves the rights to require samples of any equipment to be submitted for review.

B. Prepare submittals, including the necessary inter-division planning and coordination in accordance with the approved project schedule. Note that certain Division 26 submittals cannot be prepared until approved submittals are available from other Divisions of the work.

C. Submittal material shall be assembled and checked by the Division 26 superintendent.

D. Hard Copy Submittals: Submittal data shall be placed in one or more hard-back 3-ring binders arranged and labeled according to specification section. Each binder shall contain a title page and table of contents. Provide separator tabs, and label by specification section. Make note in the table of contents, any drawings that accompany the submittal. Title page shall contain Project Name, Contractor's Name, Division 26 Superintendent's name, Suppliers and point of contact for each, and date. Except as otherwise indicated in other sections, submit 5 complete copies. Quantity indicated does not include copies required for regulatory agencies.

E. Electronic Submittals: If the Architect agrees to allow electronic submittals via an on-line information management product such as "Submittal Exchange, etc., all electronic submittal files shall be organized to match the bid documents for specification section and name. Each submittal file shall be complete for each specification section. Multiple partial submittals per specification section will be rejected. Make note in the table of contents, any drawings that accompany the submittal. Title page shall contain Project Name, Contractor's Name, Division 26 Superintendent's name, Suppliers and point of contact for each, and date.

1.3 RESPONSE TO SUBMITTALS:

A. The contractor shall review all submittals prior to submitting to ensure compliance with the

contract documents. Comments made by the Design Professional do not relieve the contractor from complying with the contract documents (drawings, specifications, and addenda). The Design Professional does not approve any submittals. The Design Professional only reviews and makes observations regarding the submittals.

B. The purpose of the submittals is to demonstrate to the Design Professional that the contractor understands the design concept and that he demonstrates his understanding by indicating which equipment and materials he intends to furnish and install. Any deviation from the contract documents shall be clearly stated on the submittal data. If not clearly stated, the submittal shall be marked “Revise and Resubmit”. Failure of the contractor to provide submittals during the submittal process shall make the contractor totally responsible for any and all changes to achieve compliance with the contract documents.

C. Shop drawings shall be evaluated by the Architect in accordance with the following classifications:

1. "No Exceptions Taken": No corrections, no marks. Items may be ordered.
2. "Make Corrections Noted": A few minor corrections. Items may be ordered as marked up without further resubmission.
3. "Revise and Resubmit": Minor correction. Item may be ordered at the Contractor's option. Contractor shall resubmit drawings with corrections noted.
4. "Rejected": Major corrections or not in accordance with the contract documents. No items shall be ordered. Contractor shall correct and resubmit drawings.

D. Whether resubmittals are required or not, all shop drawings shall be corrected for the record manuals specified in Section 26 0100.

1.4 SUBMITTAL GROUPING:

A. Submittals shall be made in no more than 1 group.

B. All submittals for a given system shall be submitted at the same time. For example, wiring diagrams and other detailed layout information must be submitted with equipment data sheets.

C. Submittals that do not comply with these requirements or that are deemed by the Architect to be incorrect shall be returned without review. The Contractor shall bear the burden of any resulting delays.

1.5 EQUIPMENT AND MATERIALS REQUIRING SUBMITTALS:

A. Section 26 0100 - General Provisions

1. Superintendent’s resume
2. Electricians’ qualifications

B. Section 26 0110 - Demolition

1. List of Materials to remain property of the Using Agency.

C. Section 26 1010 - Raceway Systems

1. Raceways and Fittings
2. Expansion Fittings

3. Wall Boxes and Covers
4. Ceiling Boxes and Covers
5. Surface Mounted Raceway System components
6. Firestopping Materials and Installation Drawings
7. Letter advising Architect when firestop site demonstration will be conducted.
8. Corrosion Protection

D. Section 26 2010 - Wires and Cables

1. Conductors
2. Connectors
3. Splices

E. Section 26 2020 - Wiring Devices

1. Receptacles
2. GFCI Receptacles
3. Switches
4. Occupancy Sensors & switches
5. Device Plates
6. Temporary Protective Covers

F. Section 26 2080 - Electrical Grounding, 600V and Below

1. Conductors
2. Connectors

PART 2 - PRODUCTS

2.1 NOT APPLICABLE:

PART 3 - EXECUTION

3.1 MANUFACTURER'S DATA:

A. Include the manufacturer's comprehensive product data sheet and installation instructions.

B. Where operating ranges are shown, mark data to show portion of range required for project application.

C. Where pre-printed data sheet covers more than one distinct product-size, type, material, trim, accessory group or other variations, delete or mark-out portions of the pre-printed data which are not applicable.

3.2 EQUIPMENT LIST:

A. Where more than one type of a product is being used (i.e. starters, disconnects, breakers, etc.) provide a list with each submittal correlating the type and size of product to the load served.

3.3 TEST REPORTS:

A. Submit test reports which have been signed and dated by the firm performing the tests, and prepare in the manner specified in the standard or regulation governing the tests procedure as indicated.

END OF SECTION 26 0120

SECTION 26 1010

RACEWAY SYSTEMS AND SUPPORTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 SCOPE OF WORK:

A. The requirements of this section apply to all electrical raceway systems and supporting devices, installed under this contract, except for concrete encased duct banks. Electrical raceway system is defined to include, but not be limited to, all electrical raceways, boxes, fittings and similar components necessary for a continuous pathway for the installation of cables or conductors. Supports are any devices or components used to support raceways or electrical equipment.

1.3 QUALITY ASSURANCE:

A. Submittals: Refer to Section 260120 for requirements.

PART 2 - PRODUCTS

2.1 ELECTRICAL METALLIC TUBING (EMT):

A. Uses permitted:

1. Indoors concealed in walls or ceiling.
2. Concealed in slabs above grade.
3. Exposed horizontal runs installed at least 7' above finished floor.

2.2 INTERMEDIATE METAL CONDUIT (IMC) OR RIGID GALVANIZED STEEL CONDUIT (RGS):

A. Uses permitted:

1. Indoors concealed or exposed.
2. Transition from below grade nonmetallic raceway system to above grade metallic raceway system.
3. Refrigerated spaces.
4. Vertical drops serving equipment.

2.3 RIGID NON-METALLIC CONDUIT (SCHEDULE 40 PVC):

A. Uses permitted:

1. Below grade installations.
2. Grounding electrode conductor raceway.
3. Lightning protection system down conductor raceway.

2.4 FLEXIBLE METAL CONDUIT:

A. Uses permitted:

1. Final connection to lighting fixtures.
2. Final connection to other than Division 23 equipment located in indoor, dry locations.

2.5 LIQUID-TIGHT FLEXIBLE METAL CONDUIT:

A. Uses permitted:

1. Final connection to equipment in indoor or outdoor locations.

2.6 CABLE RUNWAY:

A. Installed where shown to support cables specified under Division 27, limited to use at backboards and above equipment cabinets. This product is not the same as the Cable Trays specified in Section 261020.

B. Material: ASTM A36 steel bar:

1. Stringers:	3/8" x 2"
2. Rungs:	½" x 1" steel channel welded, @ 9" on centers
3. Runway width:	12"

C. Finish: Baked polyester powder coat, telephone gray.

D. Provide hanger kits, corner kits and other accessory fittings needed to install in the configurations specified.

E. Cable runways and accessories shall be the product of B-Line, Kindorf or Cope.

2.7 INNERDUCTS:

A. Innerducts shall be used where specifically indicated.

B. Innerducts shall be solid wall (ribbed) suitable for the use intended.

C. Provide metered tape and pull cord in all innerducts.

D. When installed within conduits, terminate conduit runs with non-metallic, corrosion-proof, water/air/gas tight triplex or quadruplex duct plugs, for the number of innerducts installed. Additionally, provide duct plugs of the same type in all runs in which conductors are not installed.

2.8 SURFACE MOUNTED NON-METALLIC RACEWAY SYSTEMS:

A. Use only on existing walls where new wiring cannot be concealed in walls, and for extension to existing flush mounted device.

B. Individual Devices:

1. Raceway shall be Panduit PD6 series or equivalent by Wiremold or Hubbell.
2. System shall consist of concealed, screw-type base, snap-on cover, wire retainers, couplings, outlet boxes, fittings and other accessories required for complete raceway system installation.
3. All fittings shall be of the type specifically intended for use with raceway system.
4. Color shall be selected by the Architect.

2.9 SLEEVES:

A. Conduit sleeves shall be RGS unless otherwise required by the through penetration firestop system selected.

B. Sleeves shall be minimum 1" and maximum 4" diameter, provided in quantities necessary to install cable systems specified in Divisions 23 and 27.

C. The contractor shall take special note that sleeve fill will be limited by the specific through penetration firestop system used. *In no case shall the fill exceed 40%*.

2.10 CONNECTORS/COUPLINGS:

A. Connectors/couplings for use with EMT conduit shall be steel compression type, except that steel, set screw type will be acceptable for EMT conduits sizes 2-1/2" and larger.

B. Connectors/couplings for use with IMC and RGS conduit shall be threaded type.

C. All connectors shall be insulated throat type.

D. Locknuts shall be of the same material as connectors.

E. All fittings shall be raintight. Fittings encased in concrete shall be concrete-tight.

2.11 CONDUIT BODIES:

A. Provide galvanized steel or cast metal conduit bodies constructed with threaded conduit ends, removable cover, and corrosion resistant screws.

2.12 CEILING OUTLET BOXES:

A. Provide 4" octagon, galvanized steel interior outlet boxes constructed with stamped knockouts in back and sides and with threaded holes with screws for securing box covers or wiring devices.

B. Boxes used to support ceiling paddle fans shall be listed for the purpose.

2.13 WALL OUTLET BOXES:

A. Recessed:

1. Boxes shall be galvanized steel constructed with stamped knockouts in back and sides and with threaded holes with screws for securing box covers or wiring devices.
2. Minimum box size shall be 4" square by 1-1/2" deep.
3. Boxes for GFCI outlets, Division 22, Division 23, and Division 27 devices and other locations deemed necessary, shall be 4-11/16" square by 2 1/8" deep.
4. Boxes shall have square edge tile type covers.
5. Where devices are ganged, use gang-type boxes with gang box covers.
6. The use of gangable type outlet or switchboxes is not acceptable unless required by specific device manufacturer.
7. Use masonry type boxes of equal or greater volume to those specified above, in masonry walls.

B. Surface:

1. Use cast aluminum box with threaded hubs in conjunction with metallic conduit systems.

C. Special Conditions:

1. Where box type specified herein conflicts with requirements of equipment to be installed, equipment manufacturer’s requirements shall govern.

2.14 SUPPORTS:

A. Supporting devices shall be the products of manufacturers’ specifically intended for supporting electrical raceways, devices and equipment. Makeshift supports are not acceptable. Where channel type supports are used, select complete assemblies based on the weight of the raceway(s) or equipment being supported.

B. The use of tie wire or tie wraps as a means of support for electrical raceways, devices and equipment is not permitted.

C. Plywood backboards shown in Communications Rooms or otherwise for the support of low-voltage cabling systems and/or mounting of equipment shall be fire resistant, Type AC rated. The plywood shall be painted with gray, fire resistant coating. Ensure that the plywood rating seal is left exposed after painting.

2.15 FIRESTOPPING:

A. A through-penetration firestop system shall be used to seal penetrations of electrical conduits and cables through fire-rated partitions per NEC 300-21 and NEC 800-3. The firestop system shall be qualified by formal performance testing in accordance with ASTM E-814, or UL 1479.

B. The firestop system shall consist of a fire-rated caulk type substance and a high temperature fiber insulation. It shall be permanently flexible, water-proof, non-toxic, smoke and gas tight and have a high adhesion to all solids so damming is not required. Only metal conduit shall be used in conjunction with this system to penetrate fire rated partitions. Install in strict compliance with manufacturer's recommendations. 3M, Metacaulk or Nelson.

C. Submit installation drawings for conduit penetration, cable in metal sleeve penetration and blank metal sleeve penetration for each type of wall/floor construction encountered.

D. Schedule a representative of the manufacturer to conduct a product demonstration / training session for each through-penetration firestop system to be used on this project. The session shall be held at the project site. Submit a letter to the Architect stating when the demonstration will be conducted.

PART 3 - EXECUTION

3.1 RACEWAY INSTALLATION - GENERAL:

A. Wherever possible, install horizontal raceway runs above water and drain piping. Give the right-of-way in confined spaces to piping which must slope for drainage and to larger HVAC duct work and similar services which are less conformable than electrical services. *However, ensure that all junction boxes and other points of access in raceway systems are located such that they are not rendered inaccessible.*

B. Complete the installation of electrical raceways before starting installation of cables within raceways.

C. All above grade conduits shall be routed parallel or perpendicular to the building structure.

D. Raceways shall not be installed exposed in finished spaces or on the exterior of the building. Install concealed in walls, ceilings, below slab-on-grade or embedded in slabs above grade. *Where raceway system serves surface mounted* equipment (i.e. safety switch), mount equipment over recessed outlet box.

E. All exposed raceway systems shall be painted to match the surface to which it is attached. All components of the raceway system shall be painted, i.e. conduits, boxes, supports, etc. Painting is specified under other divisions of the work.

F. Provide 200 lb. nylon pull cord in all conduits installed for cable systems specified under Division 23 and Division 27; and where conduits will be left empty for future use. Cap open ends and mark location of opposite end with black indelible marker pen.

G. Seal the inside of all conduits entering the building from outside, whether they connect to enclosures or not.

H. Do not run raceways atop the roof deck, through stairwells or elevator shafts.

3.2 SURFACE MOUNTED NON-METALLIC RACEWAY SYSTEMS:

A. Use Access 5000 series system to serve receptacle and communication devices located in classrooms, offices, meeting rooms, library, and break rooms. Access 5000 series raceway shall be installed as follows:

1. Raceway shall wrap entire room. There shall be no uncovered wall.

2. Raceway shall be installed at floor level. This raceway shall be installed in such a manner that it will act as the baseboard molding for the space.

3. There shall be only one vertical raceway per space. This vertical raceway shall be installed at the hinge side of the door in each space.

B. PD6 series raceway shall be used to serve all devices not covered in note G above.

C. Engage the services of a carpenter to cut raceways / covers, and to install raceways on the walls. Raceways shall be installed level and all joints shall be true.

A. All supports shall be concealed type. Attachment screws shall have countersunk heads and shall not protrude into the raceway system.

B. Provide covers or couplings over all joints.

D. Provide end caps on all dead-end runs.

E. Provide trim plate at ceiling penetration.

F. Miter-cut surface raceway to create flat 90 degree fittings if they are not available from manufacturer.

G. Prior to ordering materials, review raceway layouts with the Architect and the Using Agency in one of each type space.

3.3 CORROSION PROTECTION:

A. Corrosion protection for conduits passing through concrete slabs shall be by one of the following means:

1. Field-wrap conduits with tape, using with a 50 percent overlay. Tape shall be premium 7-mil, flame retardant, weather resistant tape. Resists temperature and moisture for splicing. Meets requirements of UL 510, HHI-595, and CSA 22.2.
2. Conduits shall have a factory-applied polyvinyl chloride, plastic resin, or epoxy coating.

B. All supporting materials installed exposed on the building exterior shall be hot-dipped galvanized after fabrication or provide an equivalent level of corrosion protection. Protect exterior raceway systems from damage while the building exterior is cleaned. Replace any portions of the system showing signs of rust at the time of final inspection.

3.4 GROUNDING:

A. Metallic raceway systems shall be made electrically continuous to provide a low impedance path to ground for faults, as required by the NEC.

3.5 RACEWAY BENDS:

A. Bend radius shall comply with the NEC and the requirements of the specific cabling system installed. For television and telephone service entrance conduits, consult with the local utility.

B. All field bends shall be made with a tool specifically intended for the purpose.

C. Tools using open flames are not acceptable for bending PVC conduit. Any section of conduit discolored or deformed in any way shall be cut out and replaced.

3.6 FLEXIBLE CONNECTIONS:

A. Final connections to light fixtures may be made using 3/8" diameter flexible metal conduit not exceeding 6 feet in length.

B. ½" diameter flexible metallic conduit may be used to fish existing walls, within the limits of NFPA 70.

C. Final connections to motors and to other electrical equipment subject to movement and vibration shall be made using Liquid-tight flexible metal conduit not more than 24" long.

3.7 SLEEVES:

A. Provide sleeves of the size and quantity required to install cabling systems specified under Division 23 and Division 27. Where multiple sleeves are required, install in a rectangular array.

B. Make and seal all penetrations to maintain fire rating of member penetrated. Pay particular attention to the annular space required around the inside and outside of the penetrating item. Sealing compounds shall be re-enterable type.

C. Coordinate the exact placement of sleeves with other trades to ensure they are readily accessible and are not obstructed by pipes, ductwork, etc.

D. Sleeves shall be flush with both sides of the member penetrated unless otherwise required by the through penetration firestop system selected.

3.8 RACEWAY LAYOUT:

A. Unless noted otherwise, the layout of all raceway systems is the responsibility of the Contractor.

B. Provide pull points as required by the NEC and ensure that all such points are readily accessible and not blocked by ducts, pipes, etc.

3.9 WALL OUTLET LAYOUT:

A. The location of devices shown on the drawings is schematic. Prior to roughing-in, review the Architectural interior elevations and millwork shop drawings, to ensure that outlets will not be installed behind cabinets or otherwise inaccessible. Ensure that there is sufficient space from door jamb, cabinets, etc. to install without trimming device cover.

B. Outlets installed below countertops shall be centered in the kneespace.

C. All outlets shall be installed vertically except where space above counter back splash and other features does not permit, and when installed in baseboards. In such cases, outlets shall be installed horizontally.

D. Maintain uniform spacing of outlets shown to be side-by-side on the plans. Spacing shall not exceed 2" in framed walls. For masonry walls, install outlets in adjacent cells.

E. Gang mount switches shown in the same location, unless noted otherwise. Provide metal barrier in boxes between switches, when switches are connected to opposite phases of systems exceeding 150V to ground.

F. Mark the branch circuit identification on the cover of all outlet boxes.

G. Provide separate outlet boxes and flexible final connections for fixtures provided with both normal and emergency power connections.

3.10 SUPPORTS:

A. Raceways:

1. Support all components of the electrical raceway system using wood screws to wood; by toggle bolts on hollow masonry units; by concrete inserts or expansion bolts on concrete or brick; by machine screws, welded threaded studs, or spring-tension clamps on steel work.
2. Support individual raceways with conduit straps or clips. Support multiple runs using trapeze-type hangers. Trapeze hangers shall consist of 1-1/2" x 1-1/2" gage steel channels, 1/2" diameter threaded steel rods and conduit clamps. Attach rods to the building structure or to 1-1/2" x 1-1/2" gage steel channels span between adjacent structural members.
3. Support conduits at distances required by the National Electrical Code. *Additional supports shall be provided at the points of tangency of all bends.*
4. Joints in conduit systems shall coincide with point of support.
5. Provide expansion joints in all raceway systems in either of the following conditions:
   a. In accordance with manufacturer's literature, based on length of run and temperature differential that will be encountered.
   b. When raceways cross expansion joints.

B. Outlet Boxes:

1. Ceiling outlet boxes shall be supported by lightweight channel attached to structure with (2)-1/4" threaded rods and braced to prevent lateral movement. Boxes used to support ceiling paddle fans shall be listed for the purpose.
2. Masonry walls:
   a. Install outlet boxes in sawcut openings.
   b. Outlet boxes shall be grouted in place, back and sides. There shall no reveals around the perimeter of the box.
3. Framed walls:
   a. Non-rated walls - Outlet boxes shall be attached to intermediate horizontal supports between vertical framing members. *Do not attach boxes to vertical members*.
   b. Framed walls rated 1-hr or 2-hr, boxes 16 square inches or less - Compartmentalize each outlet box (top, bottom and sides) using same material as wall framing. All penetrations in framing members shall be sealed. Where penetrations exceed 100 square inches per 100 square feet of wall space, install in accordance with subparagraph "c" below.
   c. Framed walls rated 1-hr or 2-hr, boxes exceeding 16 square inches - Compartmentalize boxes as specified above. Additionally, Boxes shall be covered back, top, bottom and all sides with drywall such that the rating is carried around the box. All penetrations in this envelope shall be sealed.
4. Boxes shall not be installed in walls rated more than 2-hr.
5. Do not install outlets back-to-back. Maintain 24" offset in rated walls and with no overlap in non-rated walls. Where groups of outlets are shown back-to-back, each group of outlets shall be shifted to accommodate the installation. *Exceptions: (1- Outlet boxes in non-rated masonry walls, may be installed back-to-back. Do not break webbing or connect boxes back-to-back. The use of thru-wall outlet boxes is not permitted. 2- The*

24" offset may be eliminated in 1-hr and 2-hr walls when U.L. listed moldable putty is installed around box, in accordance with the U.L. Fire Resistance Directory.)

6. Outlet boxes mounted in STC rated walls shall be sealed in accordance with Gypsum Association Document GA-600 “Fire Resistance Design Manual, Sound Control”.
7. Cover of outlets installed flush mounted in walls shall be set back no more than 1/8" from face of wall.

3.11 ROUGH-IN FOR DIVISION 27 SYSTEMS AND USING AGENCY PROVIDED TELECOMMUNICATIONS SYSTEMS:

A. Provide all outlet and junction boxes, sleeves and raceways to form an accessible pathway from each wall or floor mounted device, and ceiling mounted devices to the IDF or MDF or headend equipment location in which the cable terminates, as specified herein and as indicated on the drawings. Cable trays are specified in Section 261020.

B. Conduit sizes shall conform to the following:

1. Voice / Data / Video outlet:	1"
2. Voice / Data outlet:	1"
3. Video outlet:	1"
4. Fire alarm outlet:	3/4"
5. Other:	3/4"

C. Raceways shall be labeled to the extent necessary to allow easy identification by the cable system installers.

D. Outlet box mounting height, cover type, and alignment shall be governed by Division 27.

3.12 ROUGH-IN FOR DIVISION 23 CONTROL WIRING:

A. Provide outlet box and ¾” conduit stubbed up to above accessible ceiling from each wall mounted device. Rough-in details shall be similar to that shown for Division 27 devices. Cabling support system above accessible ceilings for division 23 control wiring shall be supplied and installed by Division 23 contractor. In areas with exposed ceilings, such as mechanical rooms, provide complete conduit pathway to the associated control equipment.

3.13 FIRESTOPPING:

A. Do not proceed with firestopping until the field demonstration has been conducted.

B. Seal all penetrations based on rating / element being penetrated. Penetrations in non-rated walls shall be rated 1–hour.

END OF SECTION 26 1010

SECTION 26 2010

WIRES AND CABLES, 600V AND BELOW

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 SCOPE OF WORK:

A. The requirements of this section apply to the wire and cable work installed under this contract.

1.3 QUALITY ASSURANCE:

A. Acceptable Manufacturers: Provide wires and cables from manufacturers who have been in business for a minimum of five years.

B. Submittals: Refer to Section 260120 for requirements.

PART 2 - PRODUCTS

2.1 GENERAL:

A. Wires and cables manufactured more than 12 months prior to date of delivery to the site shall not be used.

B. Color Coding

1. Color shall be green for grounding conductors and green with yellow stripe for isolated grounding conductors.

2. The color of the circuit conductors shall be as follows:

120/208 volt, 3-phase	Phase A - Black Phase B -Red Phase C - Blue Neutrals – White (with stripes as specified below)
277/480 volt, 3-phase:	Phase A - Brown Phase B - Orange Phase C - Yellow Neutrals – Gray (with stripes as specified below)

C. All conductors shall be 600V copper, with 75 degrees C, THWN/THHN insulation. Minimum

size shall be No. 12 AWG. Conductors within three inches of fixture ballasts shall be rated 90 degrees C. Sizes up to No. 10 AWG may be stranded; sizes No. 8 AWG and larger shall be concentric-lay-stranded. All control conductors shall be concentric-lay-stranded.

D. Conductors used in flexible metal conduit and liquid-tight flexible metal conduit used for final connection to equipment shall be stranded.

PART 3 - EXECUTION

3.1 INSTALLATION GENERAL:

A. No more than three phase conductors, each of opposite phases for a three phase WYE system, shall be combined in a single raceway without written permission from the Architect.

B. For each ungrounded conductor, provide a dedicated neutral conductor, with stripe color to match ungrounded conductor insulation color.

C. For each electrical connection/termination, provide a complete assembly of materials, including but not necessarily limited to, pressure connectors, terminals (lugs), electrical insulating tape, heat-shrinkable insulating tubing, cable ties, solderless wire nuts, and other materials necessary to complete splices and terminations. Torque all connections according to installation instructions.

D. Motor connections shall be made with compression connectors forming a bolted in-line or stub-type connection. Connections shall be insulated with Raychem MCK motor connection kit.

E. Splicing of feeder conductors shall not be acceptable, unless specifically indicated on the drawing. Where splicing of feeder conductors is indicated, splices shall be made using Raychem RVS splice kit and compression type butt splice

F. Numbers 10 and 12 AWG stranded conductors shall not be directly terminated to screw-type terminals. The use of Stacon type compression connectors is required.

G. All conductors shall be installed in raceways.

H. Make connections to wiring devices using "pigtails" within outlet boxes. *Direct connection (loop) to devices is not acceptable.*

3.2 DISTANCE LIMITATIONS FOR 20A BRANCH CIRCUITS:

A. All 120 volt, 20 amp branch circuits exceeding 90 feet in length shall consist of No. 10 AWG circuit conductors. Increase conduit size accordingly.

B. All 277 volt, 20 amp branch circuits exceeding 150 feet in length shall consist of No. 10 AWG circuit conductors. Increase conduit size accordingly.

END OF SECTION 26 2010

SECTION 26 2020

WIRING DEVICES

PART 1 -GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 SCOPE OF WORK:

A. The requirements of this section apply to all wiring devices installed under this contract.

1.3 QUALITY ASSURANCE:

A. Acceptable Manufacturers:

1. Provide devices by manufacturers listed for each item.

B. Occupancy/Vacancy sensor catalog numbers and locations shown on plans and specifications are for representation purposes only. Exact models and mounting locations shall be provided by sensor manufacturer. System drawings including device layout, device type, and wiring details shall be submitted for review in shop drawing phase prior to ordering. All sensors shall be dual technology.

C. Submittals: Refer to Section 260120 for requirements.

PART 2 - PRODUCTS

2.1 GENERAL:

A. Provide factory-fabricated wiring devices, in type, color and electrical rating for the service indicated. Where type and grade are not indicated, provide proper selection as determined by Installer to fulfill the wiring requirements, and complying with NEC and NEMA standards for wiring devices.

B. Device colors shall be selected by the Architect on an area-by-area basis.

2.2 GENERAL USE RECEPTACLES:

A. Standard (Heavy Duty Specification Grade): Hubbell 5362, Arrow Hart 5362, or Pass & Seymour 5362.

B. Ground-Fault Receptacles (Heavy Duty Auto Grounding): Hubbell GF20LA, Arrow Hart SGF20, or Pass & Seymour 2095S.

C. Receptacles shall be 2-pole, 3-wire, grounding type, rated 20A/125V.

D. Provide weather resistant receptacles in all outdoor locations.

2.3 SPECIAL PURPOSE RECEPTACLES:

A. Provide heavy-duty type of the NEMA configuration indicated on the drawings, as manufactured by Hubbell, Arrow Hart, or Pass & Seymour.

2.4 SWITCHES:

A. Toggle (Industrial Extra Heavy Duty Specification Grade): Hubbell HBL1221, Arrow Hart AH1221, or Pass & Seymour PS20AC1. Provide single-pole, three-way and four-way switches as indicated. Catalog numbers listed herein are for single pole units. Other configurations shall be from the same product family.

B. Keyed: Key switches shall be rated same as toggle switches but shall have cylindrical locking mechanism. *Fork-type keys are not acceptable*. Provide 6 keys to the Owner at the time of final inspection.

C. Switches installed adjacent to dimmers shall be of the same type and style as dimmer.

D. Narrow-body switches for installation in door-jambs shall not be used.

E. Switches shall have ground screw.

2.5 OCCUPANCY SENSORS:

A. Corner Mounted: Dual technology (Ultrasonic & Infrared), ceiling or wall bracket mounted. Select based on size of space. Provide power pack and mounting hardware; suitable for switching 120 and/or 277 volt loads. Watt-Stopper DT-200 series, Hubbell LODT series, or equivalent by Cooper or Sensor Switch.

B. Ceiling Mounted: Dual technology (Ultrasonic & Infrared), ceiling mounted. Select based on size of space. Provide power pack and mounting hardware; suitable for switching 120 and/or 277 volt loads. Watt-Stopper DT-300 series, Hubbell OMNIDT series, or equivalent by Cooper or Sensor Switch.

C. Wall Mounted: Dual technology (Ultrasonic & Infrared), wall bracket mounted. Select based on size of space. Suitable for switching 120 and/or 277 volt loads. Watt-Stopper DW-100 series, Hubbell LHMTS1 series, or equivalent by Cooper or Sensor Switch.

D. The triggering of only one technology shall keep the fixtures on.

E. Power packs for sensors shall be rated for control of fractional horsepower motor loads in conjunction with the respective lighting load. Low-voltage multi-conductor cable between sensors and power packs shall be plenum rated, 22 AWG.

F. Provide auxiliary contacts in sensors where shown on the project drawings, or as otherwise required for the functionality specified in the particular building space.

2.6 WIRING DEVICE ACCESSORIES:

A. Wall Plates: Provide one piece wall plates for wiring devices, with ganging and cutouts as indicated. Provide blank plates for all unused outlet boxes. Provide with metal screws for securing plates to devices, screw heads colored to match finish of plate, and wall plates possessing the following additional construction features:

1. Material and Finish: Type 302 stainless steel in finished spaces and stamped steel in unfinished spaces.
2. Wall plates for surface raceway boxes shall be of the same width as the surface raceway boxes.
3. All plates shall be jumbo size.

PART 3 - EXECUTION

3.1 INSTALLATION OF WIRING DEVICES:

A. General:

1. Devices of the same type shown side-by-side shall be gang-mounted and installed under a common plate unless specifically noted.
2. Do not install receptacles within 6" of the edge of sinks.
3. Provide weatherproof covers for all devices installed outdoors.
4. All receptacles installed outdoors, all kitchen receptacles, and receptacles within six feet of sinks and other interior receptacles specifically indicated shall be GFCI type.
5. Coordinate location of electric water cooler receptacles with cooler manufacturer's recommendations.
6. All receptacles installed in the following locations shall be tamper-resistant type:
   a. Dwelling units, dormitories, guest rooms and guest suites of hotels and motels.
   b. Child care facilities.
   c. Preschools and elementary education facilities.
   d. Business offices, corridors, waiting rooms and the like in clinics, medical and dental offices and outpatient facilities.
   e. Subsets of assembly occupancies described in NEC 518.2 to include places of waiting transportation, gymnasiums, skating rinks, and auditoriums.

B. Connections:

1. Make connections to side terminals only. Wrap side of device with two complete turns of 600V electrical tape, to cover the exposed terminals.
2. See Section 262010 for conductor requirements.

C. Labeling:

1. Provide engraved device plates where indicated. Use 1/8" high black letters.
2. Device plates for receptacles in patient care areas shall have circuit designation engraved in 1/8" high black letters.
3. Mark the branch circuit to which the device is connected on the back of each device plate, using an indelible marker pen.

3.2 OCCUPANCY/VACANCY SENSORS:

A. Corner mounted sensors shall be ceiling bracket mounted where ceiling is present and no higher than 12’ AFF. Where space has no ceiling or ceiling is higher than 12’ AFF, the corner mounted sensor shall be mounted 10’ AFF on a manufacturer-supplied wall bracket.

B. Sensors shall be installed in locations shown on manufacturer submitted shop drawings.

C. Wall mounted sensors shall also be configured to operate manual-on/automatic-off, in configuration shown on plans.

D. Low-voltage sensor cable shall be supported by j-hooks attached to structural members, and shall be run at right angles with respect to building structure.

E. Adjust time-off delay to a minimum of fifteen minutes

F. Test all sensors to ensure that they are operating properly.

3.3 TESTING:

A. Test all devices to ensure proper polarity and grounding.

3.4 PROTECTION:

A. If painting and other finish work occurs after device installation, protect device and conductors by installing and maintaining temporary cover:

END OF SECTION 26 2020

SECTION 26 2080

ELECTRICAL GROUNDING, 600V AND BELOW

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 DESCRIPTION OF WORK:

A. Provide grounding and bonding of systems and equipment as shown on the drawings, specified herein and as required by Article 250 of the NEC.

B. The grounding electrode system shall consist of:

1. Ground rods.
2. Underground metal water supply pipe, outside the building.
3. Concrete encased electrode

C. The following items shall be bonded to the grounding system:

1. Structural steel frame of the building.
2. Interior metal piping systems.
3. Equipment enclosures.
4. Device terminals.
5. Equipment grounding conductors.
6. Lightning protection system (if specified).

1.3 RELATED WORK:

A. Grounding and bonding for Lightning Protection Systems is specified in Section 265000.

1.4 QUALITY ASSURANCE:

A. Acceptable Manufacturers: Use products of manufacturer's regularly engaged in the production of grounding systems products.

B. Standards: IEEE Green Book - Grounding.

C. Compliance / Labels: All materials shall be U.L. listed for grounding and bonding systems.

D. Submittals: Refer to Section 260120 for requirements.

PART 2 - PRODUCTS

2.1 GENERAL:

A. Where more than one type meets indicated requirements, selection is Installer's option. Where material or component is not otherwise indicated, provide products complying with U.L., NEC, and established industry standards.

2.2 CONDUCTORS:

A. Equipment Grounding conductors: Insulated, stranded copper electrical grounding conductors complying with Section 262010, sized as shown. When no size is shown, select from Table 250-122 of the NEC.

2.3 CONNECTORS:

A. Connectors to rod or reinforcing steel bar electrodes shall be exothermic weld type. The use of wire ties to make rebar continuous is not acceptable.

B. Connections to pipe electrodes shall be pressure or clamp type.

C. Connections to items specified to be bonded to the grounding system may be by any U.L. listed product suitable for the application.

PART 3 - EXECUTION

3.1 GENERAL:

A. Ensure that metal-to-metal contact is made between grounding connectors and painted or coated surfaces of equipment enclosures, piping systems, etc.

B. Where concrete penetration is necessary, non-metallic conduit shall be cast flush with the points of concrete entrance and exit so as to provide an opening for the ground wire and the opening shall be sealed with a suitable compound after installation of the ground wire.

C. Metallic raceway systems shall be made electrically continuous to provide a low impedance path to ground for faults, as required by the NEC.

3.2 EQUIPMENT GROUNDING CONDUCTORS:

A. Install an equipment grounding conductor in all branch circuit and feeder raceways, sized in accordance with Article 250 of NFPA 70.

B. Branch circuits serving isolated ground receptacles shall be provided with an isolated equipment grounding conductor in addition to the equipment grounding conductor.

3.3 BONDING:

A. Bond metallic equipment enclosures to a lug installed within the enclosure, which is connected to an equipment grounding conductor.

B. Bond standard device grounding terminals to metallic outlet box and to equipment grounding conductor.

C. Bond equipment grounding conductor to metallic boxes where splices are made.

3.4 TESTING:

A. Upon completion of installation of electrical grounding system, test resistance of each ground rod installation using the "Fall of Potential" method. Ground resistance shall be measured in normally dry conditions not less than 48 hours after rainfall. Where tests show resistance to ground is over 25 ohms, take appropriate action to reduce resistance to 25 ohms or less by driving additional sections of ground rods and/or by chemically treating soil encircling ground rod; then retest to demonstrate compliance. Provide forms to record the data as the tests are conducted. Forms shall be signed by the person conducting the test.

END OF SECTION 26 2080