Lauderdale County Board of Supervisors

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Lauderdale County Health Department WIC Renovation

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CONTRACT DOCUMENTS AND SPECIFICATIONS

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SECTION 01100 - SUMMARY OF WORK

PART 1 – GENERAL

1.1 WORK COVERED BY CONTRACT DOCUMENTS

A. Work Covered: Work covered by the Contract Documents is as shown in drawings and described in words in the Contract Documents. The Project Title and location is indicated on the first page of this Contract Documents.

B. Start of Work: Work shall be started immediately upon issuance of a *Notice to Proceed.* Prior to this, all Contracts and beginning documents will have been executed and insurance in force.

C. Time of Completion: The completion of this Work is to be on, or before, the time indicated in the Agreement.

D. Contractor's Duties:

1. Final Curing Except as specifically noted, provide and pay for:
   a. Labor, materials and equipment.
   b. Tools, construction equipment and machinery.
   c. Water, heat and utilities required for construction.
   d. Other facilities and services necessary for proper execution and completion of the Work.
2. Pay legally required sales, consumer, use, payroll, privilege and other taxes.
3. Secure and pay for, as necessary for proper execution and completion of work, and as applicable at the time of the receipt of the bids:
   a. Permits.
   b. Government fees.
   c. Licenses.
4. Give required notices.
5. Comply with codes, ordinances, rules, regulations, orders and other legal requirements of public authorities which bear on performance of work.
6. Promptly submit written notice to Engineer of observed variance of Contract Documents from legal requirements. It is not the Contractor's responsibility to make certain that drawings and specifications comply with codes and regulations. Appropriate modifications to Contract Documents will adjust necessary changes. Assume responsibility for work known to be contrary to such requirements, without notice.
7. Enforce strict discipline and good order among employees. Do not employ or work unfit persons, or persons, not skilled in assigned task.
8. Provide a written safety plan.
9. Submit five (5) copies of shop drawings to Engineer for review.

E. Hazardous Materials: The Prime General Contractor is responsible for the removal and disposal of any hazardous materials encountered in the performance of the Contract requirements. Hazardous Containing Materials [HCM] include, but are not limited to, Asbestos and Lead Paint and should be identified and removed as a part of the Contract. The absence of details does not relieve the Prime General Contractor from the responsibility of removal and disposal; but, a Change Order could be executed in the absence of identified HCM in the documents.

F. Subcontractor's List: The Prime General Contractor will submit to the Owner a list of all

Subcontractors to be used on the Project within seven (7) days after written notice of contract award by the Owner. Any Subcontractor listed must be acceptable to the Owner.

G. Coordination: The Prime General Contractor is responsible for the coordination of the total project. All other Prime Contractors and all Subcontractors will cooperate with the Prime General Contractor so as to facilitate the general progress of the Work. Each trade shall afford all other trades every reasonable opportunity for the installation of their work. Refer to Section 01310 entitled Project Coordination.

1.2 CONTRACTS

A. Contracts: Construct work under a single Prime General Contract. Refer to Agreement.

1.3 WORK BY OTHERS

A. Work by Others shall be described in each appropriate Contract Documents section and noted on the Drawings.

1.4 OWNER-FURNISHED PRODUCTS

A. Products Furnished By Owner: Products furnished by Owner shall be described in each appropriate Contract Documents section and noted on the Drawings.

B. Products: Delivered and unloaded at site.

C. Owner's Duties:

1. Schedule delivery date with Supplier in accordance with construction schedule.
2. Obtain installation drawings and instructions.
3. Submit claims for transportation damages.
4. Arrange Guarantees, Warranties, etc.

D. Contractor's Duties:

1. Designate required delivery date for each product in construction schedule.
2. Promptly inspect delivered products, report missing, damaged, or defective items.
3. Handle at site, including uncrating and storage.
4. Protect from exposure to elements and from damage.
5. Repair or replace damaged items resulting from Contractor's operations.
6. Install and make final connections.

1.5 CONTRACTOR'S USE OF PREMISES

A. Confine operations at site to areas permitted by:

1. Law.
2. Ordinances.
3. Permits.
4. Contract Documents.

5. Owner.

B. Do not unreasonably encumber site with materials or equipment.

C. Assume full responsibility for protection and safekeeping of products stored on premises.

D. Move any stored products which interfere with operations of Owner or other Contractors.

E. Obtain and pay for use of additional storage or work areas needed for operations.

F. Limit use of site for work and storage to the area indicated in the drawings.

END OF SECTION 01100

SECTION 01200 - COST REPORTING AND PAYMENTS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS: The general provisions of the Contract, including General and Supplementary Conditions and other General Requirements sections, apply to the work specified in this section.

1.2 DESCRIPTION OF REQUIREMENTS

A. General: Certain administrative procedures are specified in this section for the Schedule of Values, Applications for Payment, payments at Substantial Completion and Final Completion. Refer to the General and Supplementary Conditions for the prime commitments of responsibility on these activities.

B. Refer to Section 01700 for procedures related to "Substantial Completion" and "Final Acceptance", including inspections and certifications associated therewith.

1.3 SCHEDULE OF VALUES: Prepare the Schedule of Values, as required by General Conditions, in coordination with the preparation of the Progress Schedule. Refer to Section 01310. Correlate the line items of the Schedule of Values with the Progress Schedule. Provide breakdown of Contract Sum in sufficient detail to facilitate continued evaluation of payment requests and Progress Reports. A breakdown of principal subcontract amounts will be required (several line items). See Section 01370, Schedule of Values. A Schedule of Values submittal is not required on unit priced items.

1.4 PAYMENT REQUESTS

A. General: Except as otherwise indicated in the Contract Documents, comply with the procedures and requirements of the General Conditions and Supplementary Conditions, including the submittal of supporting documentation. Refer to Supplementary Conditions for requirements concerning "retainage" by Owner on payments. Except as otherwise indicated, sequence of progress payments is to be regular, and each must be consistent with previous applications and payments. It is recognized that certain applications involve extra requirements, including the initial application, application at the time of Substantial Completion, and final payment application.

B. Payment Application Times: The "date" for each progress payment shall be no later than the last day of each month. The period of construction work covered by each payment request is the period ending on the 25th day of each month, and starting the day following the end of the preceding period. Refer to General Conditions and other Contract Documents for other dates related to payment application times.

C. Payment Application Forms: The payment application form shall be approved by the Engineer.

D. Application Preparation: Except as otherwise indicated, complete every entry provided for on the form, including the notary and execution by authorized persons. Incomplete applications will be returned by the Engineer without action. Entries must match current data of both the schedule of values and progress schedule and report. Listing must include amounts of change orders issued prior to the first day of the "period of construction" of the application.

E. Initial Payment Application: The principal administrative actions and submittals which must precede the submittal of the first payment application (required submittal times are specified elsewhere in the contract documents), can be summarized as follows, but not necessarily by way of limitation:
1. Listing of subcontractors.

2. Schedule of Values.
3. Progress Schedule (preliminary if not final).
4. Schedule of submittals (preliminary if not final).
5. Copies of acquired building permits and similar authorizations and licenses from governing authorities for the current performance of the work.

F. Application at Time of Substantial Completion: Following the issuance of the Engineer's final "Certificate of Substantial Completion," and also in part as applicable to prior certificates on portions of completed work as designated, a special payment) application may be prepared and submitted by the Contractor. The principal administrative actions and submittals which must proceed or coincide with such special applications are specified in the General Conditions and elsewhere in the Contract Documents.

G. Final Payment Application: The administrative actions and submittals which must precede or coincide with submittal of the final payment application (as specified elsewhere in the Contract Documents), can be summarized as follows, but not necessarily by way of limitation:

1. Completion of project closeout requirements. Refer to Section 01700.
2. Completion of times specified for payment application at time of substantial completion (regardless of whether such application was made).

H. Application Transmittal: Submit 3 executed copies of each payment application, complete with materials stored on site invoices when required, and similar attachments. Transmit with a transmittal form listing those attachments, and recording appropriate information related to the application in a manner acceptable to the Engineer. Transmit to Engineer to insure receipt within 24 hours.

1.5 METHOD OF MEASUREMENT

Individual items of work shall be measured separately for payment only as provided in the BID PROPOSAL FORM.

1.6 BASIS OF PAYMENT

Payment for the work shall be made to the Contractor in accordance with the Lump Sum and or Unit Price costs set forth in the Contractor’s bid. All payments shall be made at the Contract Prices set forth in the bid forms. All payments shall be in accordance with the General Conditions set forth herein before and such payment shall constitute full compensation to the Contractor for furnishing all materials, labor, tools and equipment, paying all fees, obtaining all permits, and performing all operations necessary for the work in accordance with these specifications and the Contract Drawings. Any items of work which are not listed in the Proposal, but are necessary for the completion of the work in accordance with the Contract Drawings and Specifications, shall be included in the cost of the items listed and bid in the Proposal.

All work required to provide a complete and functioning project for which there is no Lump Sum or Unit Price Bid Item is considered as incidental to the project and is to be included in the Lump Sum or Unit Prices for the Bid Items in the Proposal Form.

Partial payments will be made to the Contractor on a monthly basis in accordance with the percentage of construction completed and approved by the Engineer. The Engineer’s approval of the Contractor’s partial pay request shall not constitute final acceptance of that work. Retainage shall be withheld from all payments in accordance with Mississippi state law until completion and acceptance of all work.

END OF SECTION 01200

SECTION 01310 - PROJECT COORDINATION

PART 1 – GENERAL

1.1 DESCRIPTION

A. General: This section covers procedures, conditions and responsibility for coordination of the total project.

B. Project Coordinator: The General Contractor will designate one individual as Project Coordinator or Superintendent, as referred to in the General Conditions. Prior to beginning work his name and qualifications will be submitted, in writing, to the Engineer. Upon the approval of the Engineer and the Owner, he will remain until the project is completed and cannot be removed during construction without the written consent of the Owner and the Engineer.

1.2 DUTIES OF PROJECT COORDINATOR

A. General:

1. Coordination: Coordinate the work of all subcontractors and material suppliers.
2. Supervision: Supervise the activities of every phase of work taking place on the project.
3. Communication: Establish lines of authority and communication at the job site.
4. Location: The project coordinator must be present on the job all of the time.
5. Permits: Obtain building and special permits required for construction.

B. Interpretations of Contract Documents:

1. Consultation: Consult with Engineer to obtain interpretations.
2. Assistance: Assist in resolution of any questions.
3. Transmission: Transmit written interpretations to concerned parties.

C. Cessation of Work: Stop all work not in accordance with the requirements of the Contract Documents.

D. Division One: Coordinate and assist in the preparation of all requirements of Division One and specifically as follows:

1. Cutting and Patching: Supervise and control all cutting and patching of work.
2. Project Meetings: Schedule and preside at all project meetings.
3. Construction Schedules: Prepare and submit all construction schedules. Supervise work to monitor compliance with schedules.
4. Shop Drawings, Product Data and Samples: Administer the processing of all submittals required by the project manual.

5. Schedule of Values: Assist in preparation and be knowledgeable of each entry in the Schedule of Values.
6. Testing: Coordinate all required testing.
7. Temporary Facilities and Controls: Allocate, maintain and monitor all temporary facilities.
8. Substitutions and Product Option: Administer the processing of all substitutions.
9. Project Closeout: Conduct final inspections and assist in collection and preparation of closeout documents.
10. Cleaning: Direct and execute a continuing cleaning program throughout construction and dispose of debris.
11. Project Record Documents: Maintain up-to-date project record documents.
12. Enforce all safety requirements.

E. Changes: Recommend and assist in the preparation of requests to the Engineer for any changes in the Contract.

F. Application for Payment: Assist in the preparation and be knowledgeable of each entry in Application and Certificate of Payment.

1.3 SUBCONTRACTOR'S DUTIES

A. Each subcontractor is responsible to coordinate and supervise his employees in the work accomplished under his part of the contract.

B. Schedules: Conduct work to assure compliance with construction schedules.

C. Suppliers: Transmit all instructions to his material suppliers.

D. Cooperation: Cooperate with the Project Coordinator and other subcontractors.

1.4 OWNER-PURCHASED PRODUCTS: Cooperate, accept delivery, arrange storage and protect owner-purchased products until installation or final acceptance.

END OF SECTION 01310

SECTION 01325 - PROGRESS SCHEDULES

PART 1 – GENERAL

1.1 GENERAL

A. Provide projected progress schedules for entire work, revise periodically.

B. Related Requirements Specified Elsewhere:

1. General Requirements: Section 01100
2. Cost Reporting and Payments: Section 01200
3. Schedule of Values: Section 01370

1.2 FORM OF SCHEDULES

A. Prepare in form of horizontal bar chart.

1. Provide separate horizontal bar column for each trade or operation.
2. Bar columns shall be arranged in chronological order of beginning of each item of work
3. Identify each column by major specification number and by distinct graphic delineation.
4. Horizontal time scale: Identify first work day of each week.
5. Scale and Spacing: To allow space for up-dating.

B. Minimum sheet size: 8-1/2" x 14"

1.3 CONTENT OF SCHEDULES

A. Provide complete sequence of construction by activity.

1. Shop drawings, Project Data and Samples:
   a. Submittal dates
   b. Dates reviewed copies will be required
2. Decision Dates for:
   a. Products specified by allowances
   b. Selection of finishes
3. Product procurement and delivery dates
4. Dates for beginning and completion of each element of construction, specifically:
   a. Repairs, installation of items, sandblasting, painting, and related work.
   b. Subcontractor work
   c. Equipment installations
   d. Flushing, cleaning, sampling, testing and related items

B. Identify work of separate phases or other logically grouped activities.

C. Show projected percentage of completion for each item of work as of first day of each month.

D. Provide separate schedules showing submittals, review times, procurement schedules, and delivery dates.

1.4 UPDATING

A. Show all changes occurring since previous submission of updated schedule.

B. Indicate progress of each activity and show completion dates.

C. Include:

1. Major changes in scope
2. Activities modified since previous schedule updating
3. Revised projection due to changes
4. Other identifiable changes

D. Provide narrative report, including:

1. Discussion of problem areas, including current and anticipated delay factors and their impact.
2. Corrective action taken, or proposed.
3. Description of revisions:
    a. Effect on schedules due to change of scope
    b. Revisions in duration of activities
    c. Other changes that may affect schedule

1.5 SUBMITTALS

A. Submit initial schedule within 15 days after date of Notice to Proceed.

1. Engineer will review schedules and return review copy within 10 days after receipt.
2. If required, re-submit within 7 days after return of review copy.

B. Submit periodically updated schedules accurately depicting progress to first day of each month.

C. Submit one paper and one digital copy.

1.6 DISTRIBUTION

A. Distribute copies of schedules to

1. Job site file
2. Subcontractors
3. Engineer (four copies)
4. Other concerned parties

B. Instruct recipient to report any inability to comply and provide detailed explanation with suggested remedies.

END OF SECTION 01325

SECTION 01330 - SUBMITTAL PROCEDURES

PART 1 – GENERAL

1.1 GENERAL

A. Submit to Engineer shop drawings, product data, and samples required by specification sections.

B. Related requirements specified elsewhere:

1. Contract Documents

1.2 SHOP DRAWINGS

A. Original drawings shall be prepared by Contractor, Subcontractor, Supplier, or Distributor which illustrates pertinent portion of the work, showing fabrication layout, setting or erection details. Reproduction of contract drawings will not be acceptable.

B. Drawings shall be prepared by a qualified detailer. Details shall be identified by reference to sheet and detail numbers shown on Contract Drawings.

1.3 PRODUCT DATA

A. Manufacturer's standard schematic drawings:

1. Modify drawings to delete information which is not applicable to project.
2. Supplement standard information to provide additional information applicable to project.

B. Manufacturers' catalog sheets, brochures, diagrams, schedules, performance charts, illustrations, and other standard descriptive data.

1. Clearly mark each copy to identify pertinent materials, products or models. Mark through or blank out inapplicable parts.
2. Show dimensions and clearances required.
3. Show performance characteristics and capacities.
4. Show wiring diagrams and controls.
5. Bind into binders in logical order with index.

1.4 SAMPLES: Physical examples to illustrate materials, equipment or workmanship, and to establish standards by which completed work is judged.

A. Office samples: Of sufficient size and quantity to clearly illustrate:

1. Functional characteristics of product or materials, with integrally related parts and attachment devices.
2. Full range of color samples if applicable.
3. After review, samples, where applicable, may be used in construction of project. Other samples will be retained by Engineer for comparison with finished product and record purposes.

B. Field samples and mockups if applicable.

1. Erect at project site at location acceptable to Engineer.
2. Construct each sample or mock-up complete, including work of all trades required in finished work.
3. Remove at completion of work unless incorporated in work.

1.5 CONTRACTOR RESPONSIBILITIES

A. Review Shop Drawings, Product Data and Samples prior to submission.

B. Verify field measurements, field construction criteria, catalog numbers and similar data.

C. Coordinate each submittal with requirements of the Work and Contract Documents.

D. Contractor's responsibility for errors and omissions in submittals is not relieved by Engineer's review of submittals.

E. Contractor's responsibility for deviations in submittals from requirements of Contract Documents is not relieved by Engineer's review of submittals unless the Engineer gives written acceptance of specific deviations.

F. Notify Engineer, in writing at time of submission, of deviations in submittals from requirements of Contract Documents.

G. Begin no work which requires submittals until return of submittals indicating acceptance of submittal.

H. After Engineer's review, distribute copies.

1.6 SUBMISSION REQUIREMENTS

A. Schedule submissions at 1east 30 days before dates reviewed submittals will be needed.

B. Submit four (4) copies of submittals for review.

C. Submit number of samples specified in specification section.

D. Accompany submittals with transmittal letter, in triplicate, containing:

1. Date
2. Project Title and Number
3. Contractor's name and address
4. The number of each Shop Drawing, Product Data and sample submitted
5. Notification of deviation from Contract Documents
6. Other pertinent data.

E. Submittals shall include:

1. Data and revision dates
2. Project title and number
3. Names of:
    a. Engineer

b. Contractor
c. Subcontractor
d. Supplier
e. Manufacturer
f. Separate details when pertinent

4. Identification of product or material
5. Field dimension, clearly identified as such
6. Specification section number
7. Applicable standards, such as ASTM number or Federal Specification
8. Identification of deviations from Contract Documents
9. Contractor's stamp, initialed or signed, certifying to review of submittal, verification of field measurements and compliance with Contract Documents.

1.7 RESUBMISSION REQUIREMENTS

A. Shop Drawings:

1. Revise initial drawings as required and resubmit as specified for initial submittal.
2. Indicate on drawings any changes which have been made other than those required by the Engineer.

B. Product Data and Samples: Submit new datum and samples as required for initial submittal.

1.8 DISTRIBUTION OF SUBMITTALS AFTER REVIEW

A. Provide and distribute copies of Shop Drawings and Product Datum which carry Engineer's stamp to:

1. Contractor's file
2. Job site file
3. Subcontractors
4. Supplier
5. Fabricator

B. Distribute Samples

1.9 ENGINEER'S DUTIES

A. Review submittals with reasonable promptness.

B. Review for design concept of project only.

C. Review of separate item does not constitute review of an assembly in which item functions.

D. Affix stamp and initials or signature certifying to review of submittal.

E. Return submittals to Contractor for distribution.

END OF SECTION 01300

SECTION 01700 - PROJECT CLOSEOUT

PART 1 - GENERAL

1.1 GENERAL

A. Closeout is hereby defined to include general requirements near the end of Contact Time, in preparation for final acceptance, final payment, normal termination of contract, occupancy by Owner and similar actions evidencing completion of the work.

B. Specific requirements for individual units of work are specified in sections of Divisions 2 through 16.

1.2 PREREQUISITES TO SUBSTANTIAL COMPLETION: Prior to requesting Engineer's inspection for certification of Substantial Completion as required by Contract Documents for the entire Work, complete the following items and list known expectations in request:

A. Complete start-up testing of systems and instructions of Owner's operating maintenance personnel. Discontinue (or change over) and remove from project site temporary facilities and services, along with construction tools and facilities, mock-ups, and similar elements.

B. Deliver tools, spare parts, extra stocks of materials and similar physical items to Owner.

C. Complete final clean-up of entire project site in accordance with Contract Documents.

D. Prepare and submit to the Engineer a comprehensive list of items to be completed or corrected.

E. Submit written request for inspection to the Engineer at least ten (10) days prior to date requested for inspection.

1.3 INSPECTION PROCEDURES FOR SUBSTANTIAL COMPLETION

A. Upon receipt of the Contractor's list of items to be completed or corrected and request for inspection, the Engineer will either proceed with the inspection or advise Contractor of prerequisites not fulfilled.

B. If the Engineer's inspection discloses any item, whether or not included on the Contractor's list, which is not in accordance with the requirements of the Contract Documents, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item(s) upon notification by the Engineer. The Contractor shall then submit a request for another inspection by the Engineer to determine Substantial Completion.

C. When the Work or designated portion thereof is substantially complete, the Engineer will prepare a Certificate of Substantial Completion, which shall establish the date of Substantial Completion, shall establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance, and which shall be accompanied by a list indicating any items requiring completion

or correction. The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in such Certificate.

D. The Contractor shall have ten (10) days following date of Substantial Completion to finish all work included on the list indicated in Subparagraph C. above and to submit any closeout documents not previously submitted.

1.4 PREREQUISITES TO FINAL INSPECTION: Prior to requesting Engineer's final inspection for certification of final acceptance and final payment, as required by the Contract Documents, complete the following and list known exceptions (if any) in request:

A. Make final change-over of locks and transmit keys to Owner, and advise Owner's personnel as to change-over in security provisions.

B. Submit three (3) copies of final payment request with final releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.

C. Submit certified copy of Engineer's final punch-list of itemized work to be completed or corrected, stating tat each item has been completed or otherwise resolved for acceptance, endorsed and dated by Engineer.

D. Submit record drawings, maintenance manuals, specific warranties, workmanship/maintenance bonds, maintenance agreements, final certifications and similar final record information.

E. Complete final cleaning up requirements, including touch-up of marred surfaces.

F. Submit consent of surety to final payment.

G. If applicable, submit final delay penalty settlement statement, acceptable to Owner.

H. Submit release of liens and certification that all bills have been paid in the form of a sworn statement and affidavit from the Contractor to the Owner stating that all bills for this project have been paid and that the Owner is released from any and all claims and/or damages.

I. Submit sworn statement that all work is guaranteed against defects in materials and workmanship for one year from date of Owner's acceptance, except where specified for longer periods.

1. Word the Guaranty as follows: 'We hereby guarantee all work performed by us on the above captioned project to be free from defective materials and workmanship for a period of one yet or such longer period of time as may be called for in the Contract Documents for such portions of the work. All guarantees and warranties shall be obtained in the Owner's name.

2. Within the guaranty period, if repairs or changes are requested in connection with guaranteed work which, in the opinion of the Owner, are rendered necessary as a result of the use of materials, equipment or workmanship which are inferior, defective or not in accordance with the terms of the Contract, the Contractor shall promptly, upon receipt of notice from and without expense to the Owner, place in satisfactory condition in every particular, all such guaranteed work, correct all defects

therein and make good all damages to the building, site, equipment or contents thereof, and make good any work or materials or the equipment and contents of said building or site disturbed in fulfilling any such guaranty.

3. If, after notice, the Contractor fails to proceed promptly to comply with the terms of the guaranty, the Owner may have the defects corrected and the Contractor and his sureties shall be liable for all expense incurred.

4. All special guarantees applicable to definite pans of the Work stipulated in the Contract Documents or other papers forming part of the Contract shall be subject to the terms of this paragraph during the first year of the life of such special guaranty.

1.5 PROCEDURES FOR FINAL ACCEPTANCE

A. Upon receipt of written notice from the Contractor that the Work is ready for Final Inspection and upon receipt of all data specified in Paragraph 1.04, the Engineer will promptly schedule such inspection with the Owner.

B. When the Engineer and the Owner find the Work acceptable under the Contract Documents and the Contract fully performed, the Engineer will promptly issue a final Certificate for Payment.

C. Neither final payment nor any remaining retainage shall become due until all requirements of this Section and the Contract Documents have been complied with.

END OF SECTION 01700

SECTION 01720 - PROJECT RECORD DOCUMENTS

PART 1 – GENERAL

1.1 GENERAL

A. This section establishes the procedures and requirements for keeping project record documents.

B. Related Requirements Specified Elsewhere:

1. See Contract Documents

1.2 MAINTENANCE OF DOCUMENTS

A. Maintain at job site one record copy of:

1. Contract Drawings
2. Specifications
3. Addenda
4. Reviewed Shop Drawings
5. Change Orders
6. Other Modifications to Contracts
7. Field Test Records
8. Material Safety Data Sheets on materials

B. Store documents in field office apart from documents used for construction.

C. Provide files and racks for documents used for construction. Do not use record documents for construction.

D. Make documents available at all times for inspection by Engineer and Owner.

E. Maintain documents in clean, dry, legible condition.

1.3 RECORDING

A. Label each Document "Project Record".

B. Keep record documents current.

C. Do not permanently cover any work until required information has been recorded.

D. Project Manual and Addenda: Legibly mark up each section to record:

1. Manufacturer, trade name, catalog number and materials of each product and item of equipment actually installed.
2. Changes made by Change Order or Field Order.
3. Other matters not originally specified.

E. Shop Drawings: Maintain as record documents. Legibly annotate drawings to record changes made after review.

1.4 SUBMITTAL

A. At completion of project, deliver record documents to Engineer.

B. Accompany submittal with transmittal letter, in duplicate, containing:

1. Date
2. Project title and number
3. Contractor's name and address
4. Title a number of each record document.
5. Certification that each document as submitted is complete and accurate.
6. Signature of Contractor or his authorized representative.

END OF SECTION 01720

SECTION 01732 – CLEANING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Maintain premises and public properties free from accumulation of waste, debris and rubbish caused by construction operations.

B. Related Requirements Specified Elsewhere:

1. See Contract Documents

C. At completion of work, remove waste materials, rubbish, tools, equipment, machinery and surplus materials and clean all sight exposed surfaces. Leave project clean and ready for occupancy.

1.2 SAFETY REQUIREMENTS

A. Hazards Control

1. Store volatile wastes in covered metal containers and remove from premises daily or store in accordance with manufacturer's recommendations.

2. Prevent accumulations of waste which create hazardous conditions.

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

B. Disposable Materials

1. Disposal of cleaning materials shall comply with local ordinances and antipollution laws.

2. Do not burn or bury rubbish and waste material on project site.

3. Do not dispose of volatile wastes such as mineral spirits, oil or paint thinner in storm or sanitary sewer drains.

4. Do not dispose of wastes into streams, ditches, or waterways.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Use only cleaning materials recommended by manufacturer of surfaces to be cleaned.

B. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

PART 3 - EXECUTION

3.1 DURING CONSTRUCTION

A. Execute cleaning to insure that tanks, grounds, and public properties are maintained free from accumulations of waste materials and rubbish. The Contractor shall wet down all dry materials and rubbish to control dust and to prevent blowing dust.

B. At weekly intervals during progress of work, clean site and public properties and dispose of waste materials, debris and rubbish at public or private dumping areas off Owner's property.

C. Clean work site areas at end of each day's work and as needed.

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

E. Schedule cleaning operations so that dust or other contaminants resulting from cleaning processes will not fall on wet or newly painted surfaces.

3.2 FINAL CLEANING

A. In preparation for substantial completion, conduct final inspection on sight-exposed interior and exterior surfaces and concealed spaces.

B. Remove grease, dirt, stains, and other foreign materials from sight-exposed exterior finished surfaces

C. Repair, patch and touch-up marred surfaces to specified finish to match adjacent surfaces.

D. Broom clean paved surfaces. Rake clean other surfaces of grounds.

E. Owner will assume responsibility for cleaning as of time designated on Certificate of Substantial Completion for Owner's acceptance of project or portion thereof.

END OF SECTION 01732

BID BOND

Any singular reference to Bidder, Surety, Owner, or other party shall be considered plural where applicable.

BIDDER (Name and Address):

SURETY (Name and Address of Principal Place of Business):

OWNER (Name and Address):

Lauderdale County Board of Supervisors
410 Constitution Ave #11
Meridian, Mississippi 39301

BID
Bid Due Date: **10:00 AM Thursday July XX, 2021.**

BOND
Bond Number:
Date (Not later than Bid due date):
Penal sum _____ _____
(Words) (Figures)

Surety and Bidder, intending to be legally bound hereby, subject to the terms printed on the reverse side hereof, do each cause this Bid Bond to be duly executed on its behalf by its authorized officer, agent, or representative.

BIDDER	SURETY
_____ (Seal)	_____ (Seal)
Bidder's Name and Corporate Seal	Surety's Name and Corporate Seal
By: _____	By: _____
Signature and Title	Signature and Title
(Attach Power of Attorney)	
Attest: _____	Attest: _____
Signature and Title	Signature and Title

Note: Above addresses are to be used for giving required notice.

Penal Sum Form

1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to pay to Owner upon default of Bidder the penal sum set forth on the face of this Bond. Payment of the penal sum is the extent of Surety's liability.

2. Default of Bidder shall occur upon the failure of Bidder to deliver within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents.

3. This obligation shall be null and void if:
   3.1. Owner accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents, or
   3.2. All Bids are rejected by Owner, or
   3.3. Owner fails to issue a Notice of Award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and, if applicable, consented to by Surety when required by Paragraph 5 hereof).

4. Payment under this Bond will be due and payable upon default by Bidder and within 30 calendar days after receipt by Bidder and Surety of written notice of default from Owner, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.

5. Surety waives notice of any and all defenses based on or arising out of any time extension to issue Notice of Award agreed to in writing by Owner and Bidder, provided that the total time for issuing Notice of Award including extensions shall not in the aggregate exceed 90 Days days from Bid due date without Surety's written consent.

6. No suit or action shall be commenced under this Bond prior to 30 calendar days after the notice of default required in Paragraph 4 above is received by Bidder and Surety and in no case later than one year after Bid due date.

7. Any suit or action under this Bond shall be commenced only in a court of competent jurisdiction located in the state in which the Project is located.

8. Notices required hereunder shall be in writing and sent to Bidder and Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier, or by United States Registered or Certified Mail, return receipt requested, postage pre-paid, and shall be deemed to be effective upon receipt by the party concerned.

9. Surety shall cause to be attached to this Bond a current and effective Power of Attorney evidencing the authority of the officer, agent, or representative who executed this Bond on behalf of Surety to execute, seal, and deliver such Bond and bind the Surety thereby.

10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond shall be deemed to be included herein as if set forth at length. If any provision of this Bond conflicts with any applicable statute, then the provision of said statute shall govern and the remainder of this Bond that is not in conflict therewith shall continue in full force and effect.

11. The term "Bid" as used herein includes a Bid, offer, or proposal as applicable.

INSTRUCTIONS TO BIDDERS

INSTRUCTIONS TO BIDDERS

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INSTRUCTIONS TO BIDDERS

ARTICLE 1 - DEFINED TERMS

1.01 Terms used in these Instructions to Bidders have the meanings indicated in the General Conditions and Supplementary Conditions. Additional terms used in these Instructions to Bidders have the meanings indicated below:

ARTICLE 2 - COPIES OF BIDDING DOCUMENTS

Bid documents are being made available digital pdf. Plan holders are required to register and order bid documents at www.centralbidding.com. Bid documents are non-refundable and must be purchased through the website. All plan holders are required to have a valid email address for registration. Questions regarding website registration and online orders please contact Central Bidding at (225) 810-4814. All questions regarding bid documents and/or bid requirements must be submitted to Marques Hall, Hall Engineering, LLC, at marques@hallengineering.org.

ARTICLE 3 - QUALIFICATIONS OF BIDDERS

3.01 To demonstrate Bidder's qualifications to perform the Work, within five days of Owner's request, Bidder shall submit written evidence such as financial data, previous experience, present commitments, and such other data as may be called for below.

A. **Certificate of Responsibility**: The Mississippi State Board of Contractors is responsible for issuing Certificates of Responsibility (COR) to Contractors. To be awarded a Contract for public work, Sections 31-3-15 and 31-3-21 of the Mississippi Code 1972, Annotated requires a Contractor to have a current COR at the time of the bid and during the entire length of the project.

1. **Bid Under $50,000.00**: If a Bidder submits a bid which does not exceed $50,000.00, no COR number is required; however, a notation noting that the bid does not exceed $50,000.00 must appear on the face of the envelope, or a COR.

2. **Bid Over $50,000.00**: Each Bidder submitting a bid in excess of $50,000.00 must show it's COR number on the bid and on the face of the envelope containing the bid.

B. **Joint Venture Bid**: When multiple Contractors submit a joint venture bid in excess of $50,000.00, a joint venture COR number must be shown on the bid and on the face of the envelope containing the bid. If Multiple-Contractor joint venture has no joint venture COR number, each of the Contractors participating in the bid must indicate their individual COR numbers on the bid and the face of the envelope.

C. The Bidder is referred to the Bid Form for additional information, in particular Articles 3 and 4.

D. Nothing in these Contract Documents shall prejudice the Owner's right to seek additional information as provided for in these Contract Documents.

ARTICLE 4 - EXAMINATION OF BIDDING DOCUMENTS, OTHER RELATED DATA, AND SITE

4.01 *Subsurface and Physical Conditions*

A. The appendices to the technical specifications include:

1. Those reports of explorations and tests of subsurface conditions at or contiguous to the Site that Engineer has used in preparing the Bidding Documents.

2. Those drawings of physical conditions in or relating to existing surface and subsurface structures at or contiguous to the Site (except Underground Facilities) that Engineer has used in preparing the Bidding Documents.

B. Copies of reports and drawings referenced in Paragraph 4.01.A will be made available by Engineer to any Bidder on request. Those reports and drawings are not part of the Contract Documents, but the "technical data" contained therein upon which Bidder is entitled to rely has been identified and established in the appendices to the technical specifications. Bidder is responsible for any interpretation or conclusion Bidder draws from any "technical data" or any other data, interpretations, opinions or information contained in such reports or shown or indicated in such drawings.

4.02 *Underground Facilities*

A. Information and data shown or indicated in the Bidding Documents with respect to existing Underground Facilities at or contiguous to the Site is based upon information and data furnished to Owner and Engineer by owners of such Underground Facilities, including Owner, or others.

4.03 *Hazardous Environmental Condition*

A. The reports and drawings relating to a Hazardous Environmental Condition identified at the Site, if any, that Engineer has used in preparing the Bidding Documents are included in the Appendix to the Technical Specifications.

B. Copies of reports and drawings referenced in Paragraph 4.03.A will be made available by Owner to any Bidder on request. Those reports and drawings are not part of the Contract Documents, but the "technical data" contained therein upon which Bidder is entitled to rely has been identified and established in the Appendix. Bidder is responsible for any interpretation or conclusion Bidder draws from any "technical data" or any other data, interpretations, opinions, or information contained in such reports or shown or indicated in such drawings.

4.04 Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to a Hazardous Environmental Condition at the Site, if any, and possible changes in the Contract Documents due to

any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work appear in Specification 01100 Section 1.1 E.

4.05 On request, Owner will provide Bidder access to the Site to conduct such examinations, investigations, explorations, tests, and studies as Bidder deems necessary for submission of a Bid. Greyhound will need to be informed of any access to their active driveway. Bidder shall fill all holes and clean up and restore the Site to its former condition upon completion of such explorations, investigations, tests, and studies. Bidder shall comply with all applicable Laws and Regulations relative to excavation and utility locates. The site is available for inspection during normal working hours from 8:00 am until 5:00 pm Monday through Friday, except for holidays and during inclement weather.

4.06 It is the responsibility of each Bidder before submitting a Bid to:

A. examine and carefully study the Bidding Documents, the other related data identified in the Bidding Documents, and any Addenda;

B. visit the Site and become familiar with and satisfy Bidder as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work;

C. become familiar with and satisfy Bidder as to all federal, state, and local Laws and Regulations that may affect cost, progress, and performance of the Work;

D. carefully study all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) which have been identified, and (2) reports and drawings of Hazardous Environmental Conditions at the Site which have been identified;

E. obtain and carefully study (or accept consequences of not doing so) all examinations, investigations, explorations, tests, studies, and data concerning conditions (surface, subsurface, and Underground Facilities) at or contiguous to the Site which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including applying any specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents, and safety precautions and programs incident thereto;

F. agree at the time of submitting its Bid that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of its Bid for performance of the Work at the price(s) bid and within the times and in accordance with the other terms and conditions of the Bidding Documents;

G. become aware of the general nature of the work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents;

H. correlate the information known to Bidder, information and observations obtained from visits to the Site, reports and drawings identified in the Bidding Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Bidding Documents;

I. promptly give Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder discovers in the Bidding Documents and confirm that the written resolution thereof by Engineer is acceptable to Bidder; and

J. determine that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work.

4.08 The submission of a Bid will constitute an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article 4, that without exception the Bid is premised upon performing and furnishing the

Work required by the Bidding Documents and applying any specific means, methods, techniques, sequences, and procedures of construction that may be shown or indicated or expressly required by the Bidding Documents, that Bidder has given Engineer written notice of all conflicts, errors, ambiguities, and discrepancies that Bidder has

discovered in the Bidding Documents and the written resolutions thereof by Engineer are acceptable to Bidder, and that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work.

ARTICLE 5 - PRE-BID CONFERENCE

5.01 A non-mandatory pre-Bid conference will be held at 10:00 AM, on August 04, 2021, at Lauderdale County Health Department 5224 Vally Street Meridian, Mississippi 39307l.

Representatives of Owner and Engineer will be present to discuss the Project. Bidders are encouraged to attend and participate in the conference. Engineer will transmit to all prospective Bidders of record such Addenda as Engineer considers necessary in response to questions arising at the conference. Oral statements may not be relied upon and will not be binding or legally effective.

ARTICLE 6 - SITE AND OTHER AREAS

6.01 The Site is identified in the Bidding Documents. Easements for permanent structures or permanent changes in existing facilities are to be obtained and paid for by Owner unless otherwise provided in the Bidding Documents. All additional lands and access thereto required for temporary construction facilities, construction equipment, or storage of materials and equipment to be incorporated in the Work are to be obtained and paid for by Contractor.

ARTICLE 7 - INTERPRETATIONS AND ADDENDA

7.01 All questions about the meaning or intent of the Bidding Documents are to be submitted to Engineer in writing. Interpretations or clarifications considered necessary by Engineer in response to such questions will be issued by Addenda which will be transmitted to all parties recorded by Engineer as having received the Bidding Documents. Questions received less than ten calendar days prior to the date for submittal of Bids may not be answered. Only questions answered by Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.

7.02 Addenda may be issued to clarify, correct, or change the Bidding Documents as deemed advisable by Owner or Engineer.

ARTICLE 8 - BID SECURITY

8.01 A Bid must be accompanied by Bid Security (by a Surety licensed in Mississippi) made payable to Owner in an amount of five (5) percent of Bidder's maximum Bid price and in the form of a certified check or a Bid bond (on the form attached) issued by a surety meeting the requirements of the General Conditions.

8.02 The Bid security of the Successful Bidder will be retained until such Bidder has executed the Contract Documents, furnished the required contract security and met the other conditions of the Notice of Award, whereupon the Bid security will be returned. If the Successful Bidder fails to execute and deliver the Contract Documents and furnish the required contract security within 15 days after the Notice of Award, Owner may annul the Notice of Award and the Bid security of that Bidder will be forfeited. The Bid security of other Bidders whom Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of seven days after the Effective Date of the Agreement or 60 days after the Bid submission, whereupon Bid security furnished by such Bidders will be returned.

8.03 Bid security of other Bidders whom Owner believes do not have a reasonable chance of receiving the award will be returned within seven days after the Bid opening.

ARTICLE 9 - CONTRACT TIMES

9.01 The number of days within which the Work is to be substantially completed and ready for final payment are set forth in the "Agreement."

ARTICLE 10 - LIQUIDATED DAMAGES

10.01 Provisions for liquidated damages, if any, are set forth in the "Agreement."

ARTICLE 11 - SUBSTITUTE AND "OR-EQUAL" ITEMS

11.01 The Contract, if awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents, or those substitutes or "or-equal" materials and equipment approved by Engineer and identified by Addendum. The materials and equipment described in the Bidding Documents establish a standard of required type, function and quality to be met by any proposed substitute or "or-equal" item. No item of material or equipment will be considered by Engineer as a substitute or "or-equal" unless written request for approval has been submitted by Bidder and has been received by Engineer at least 15 days prior to the date for receipt of Bids. Each such request shall conform to the requirements of Section 8 of the General Conditions. The burden of proof of the merit of the proposed item is upon Bidder. Engineer's decision of approval or disapproval of a proposed item will be final. If Engineer approves any proposed item, such approval will be set forth in an Addendum issued to all prospective Bidders. Bidders shall not rely upon approvals made in any other manner.

ARTICLE 12 - SUBCONTRACTORS, SUPPLIERS, AND OTHERS

12.01 If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, individuals, or entities to be submitted to Owner in advance of a specified date prior to the Effective Date of the Agreement, the apparent Successful Bidder, and any other Bidder so requested, shall within five days after Bid opening, submit to Owner a list of all such Subcontractors, Suppliers, individuals, or entities proposed for those portions of the Work for which such identification is required. Such list shall be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification for each such Subcontractor, Supplier, individual, or entity if requested by Owner. If Owner or Engineer, after due investigation, has reasonable objection to any proposed Subcontractor, Supplier, individual, or entity, Owner may, before the Notice of Award is given, request apparent Successful Bidder to submit a substitute, in which case apparent Successful Bidder shall submit an acceptable substitute, Bidder's Bid price will be increased (or decreased) by the difference in cost occasioned by such substitution, and Owner may consider such price adjustment in evaluating Bids and making the Contract award.

12.02 If apparent Successful Bidder declines to make any such substitution, Owner may award the Contract to the next lowest Bidder that proposes to use acceptable Subcontractors, Suppliers, individuals, or entities. Declining to make requested substitutions will not constitute grounds for forfeiture of the Bid security of any Bidder. Any Subcontractor, Supplier, individual, or entity so listed and against which Owner or Engineer makes no written objection prior to the giving of the Notice of Award will be deemed acceptable to Owner and Engineer subject to revocation of such acceptance after the Effective Date of the Agreement.

12.03 Contractor shall not be required to employ any Subcontractor, Supplier, individual, or entity against whom Contractor has reasonable objection.

12.04 The Contractor is referred to the Contract Documents for additional information.

12.05. The Contractor shall comply with all applicable Laws and Regulations with respect to Subcontractors, Suppliers, individuals or entities.

12.06. Subcontractors, Suppliers individuals, or entities required to be identified by apparent Successful Bidder prior to award of the Contract are listed in the Supplementary Conditions.

ARTICLE 13 - PREPARATION OF BID

13.01 The Bid Form is included with the Bidding Documents. Additional copies may be obtained from Issuing Office.

13.02 All blanks on the Bid Form shall be completed by printing in ink or by typewriter and the Bid signed in ink. Erasures or alterations shall be initialed in ink by the person signing the Bid Form. A Bid price shall be

indicated for each Bid Item listed therein.

13.03 A Bid by a corporation shall be executed in the corporate name by the president or a vice-president or other corporate officer accompanied by evidence of authority to sign. The corporate seal shall be affixed and attested by the secretary or an assistant secretary. The corporate address and state of incorporation shall be shown below the signature.

13.04 A Bid by a partnership shall be executed in the partnership name and signed by a partner (whose title must appear under the signature), accompanied by evidence of authority to sign. The official address of the partnership shall be shown below the signature.

13.05 A Bid by a limited liability company shall be executed in the name of the firm by a member and accompanied by evidence of authority to sign. The state of formation of the firm and the official address of the firm shall be shown below the signature.

13.06 A Bid by an individual shall show the Bidder's name and official address.

13.07 A Bid by a joint venture shall be executed by each joint venture in the manner indicated on the Bid Form. The official address of the joint venture shall be shown below the signature.

13.08 All names shall be typed or printed in ink below the signatures.

13.09 The Bid shall contain an acknowledgment of receipt of all Addenda, the numbers of which shall be filled in on the Bid Form.

13.10 The address and telephone number for communications regarding the Bid shall be shown.

13.11 The Bid shall contain evidence of Bidder's authority and qualification to do business in the state where the Project is located or covenant to obtain such qualification prior to award of the Contract. Bidder's state contractor license number, if any, shall also be shown on the Bid Form.

ARTICLE 14 - BASIS OF BID; COMPARISON OF BIDS

14.01 *Lump Sum*

A. Bidders shall submit a Bid on a lump sum basis as set forth in the Bid Form.

14.02 Not Used.

14.03 Not Used.

ARTICLE 15 - SUBMITTAL OF BID

15.01 With each copy of the Bidding Documents, a Bidder is furnished one separate unbound copy of the Bid Form, and, if required, the Bid Bond Form. The unbound copy of the Bid Form is to be completed and submitted with the Bid security and the following data:

Required Bid security in the form of a certified check or a Bid bond (on the form attached) issued by a surety meeting the requirements of the Contract Documents.

Executed Security Clearance Forms for all Contractor/Subcontractor crew members to be on site at any time

Affidavit of Non-Collusion

Power of Attorney

15.02 A Bid shall be submitted no later than the date and time prescribed and at the place indicated in the Advertisement or Invitation to Bid and shall be enclosed in an opaque sealed envelope plainly marked with the Project title (and, if applicable, the designated portion of the Project for which the Bid is submitted), the name and address of Bidder, and shall be accompanied by the Bid security and other required documents. If a Bid is sent by mail or other delivery system, the sealed envelope containing the Bid shall be enclosed in a separate envelope plainly marked on the outside with the notation "BID ENCLOSED." A mailed Bid shall be addressed to the following:

Lauderdale County Board of Supervisors
Attn. County Administrator
410 Constitution Ave #11
Meridian, Mississippi 39301

ARTICLE 16 - MODIFICATION AND WITHDRAWAL OF BID

16.01 A Bid may be modified or withdrawn by an appropriate document duly executed in the manner that a Bid must be executed and delivered to the place where Bids are to be submitted prior to the date and time for the opening of Bids.

16.02 If within 24 hours after Bids are opened, any Bidder files a duly signed written notice with Owner and promptly thereafter demonstrates to the reasonable satisfaction of Owner that there was a material and substantial mistake in the preparation of its Bid, that Bidder may withdraw its Bid, and the Bid security will be returned. Thereafter, if the Work is rebid, that Bidder will be disqualified from further bidding on the Work.

ARTICLE 17 - OPENING OF BIDS

17.01 An abstract of the amounts of the base Bids and major alternates, if any, will be made available to Bidders after the opening of Bids.

ARTICLE 18 - BIDS TO REMAIN SUBJECT TO ACCEPTANCE

18.01 All Bids will remain subject to acceptance for the period of time stated in the Bid Form or up to 60 calendar days, but Owner may, in its sole discretion, release any Bid and return the Bid security prior to the end of this period.

ARTICLE 19 – EVALUATION OF BIDS AND AWARD OF CONTRACT

19.01 Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids. Owner further reserves the right to reject the Bid of any Bidder whom it finds, after reasonable inquiry and evaluation, to not be responsible. Owner may also reject the Bid of any Bidder if Owner believes that it would not be in the best interest of the Project to make an award to that Bidder. Owner also reserves the right to waive all informalities not involving price, time, or changes in the Work and to negotiate contract terms with the Successful Bidder.

19.02 More than one Bid for the same Work from an individual or entity under the same or different names will not be considered. Reasonable grounds for believing that any Bidder has an interest in more than one Bid for the Work may be cause for disqualification of that Bidder and the rejection of all Bids in which that Bidder has an interest.

19.03 In evaluating Bids, Owner will consider whether or not the Bids comply with the prescribed requirements, and such alternates, unit prices and other data, as may be requested in the Bid Form or prior to the Notice of Award.

19.04 In evaluating Bidders, Owner will consider the qualifications of Bidders and may consider the qualifications and experience of Subcontractors, Suppliers, and other individuals or entities proposed for those portions of the Work for which the identity of Subcontractors, Suppliers, and other individuals or entities must be submitted.

19.05 Owner may conduct such investigations as Owner deems necessary to establish the responsibility, qualifications, and financial ability of Bidders, proposed Subcontractors, Suppliers, individuals, or entities to perform the Work in accordance with the Contract Documents.

19.06 If the Contract is to be awarded, Owner will award the Contract to the Bidder whose Bid is in the best interests of the Project.

ARTICLE 20 - CONTRACT SECURITY AND INSURANCE

20.01 Article 22 of the General Conditions, sets forth Owner's requirements as to performance and payment bonds and insurance. When the Successful Bidder delivers the executed Agreement to Owner, it shall be accompanied by such bonds.

ARTICLE 21 - SIGNING OF AGREEMENT

21.01 When Owner gives a Notice of Award to the Successful Bidder, it shall be accompanied by the required number of unsigned counterparts of the Agreement with the other Contract Documents which are identified in the Agreement as attached thereto. Within seven days thereafter, Successful Bidder shall sign and deliver the required number of counterparts of the Agreement and attached documents to Owner. Within ten days thereafter, Owner shall deliver one fully signed counterpart to Successful Bidder with a complete set of the Drawings with appropriate identification.

ARTICLE 22 - SALES AND USE TAXES

22.01 The Contractor shall pay all applicable taxes, including sales and use taxes.

BID

Proposal of _____(hereinafter called "BIDDER"), organized and existing under the laws of the State of Mississippi doing business as _____.

To: **The Lauderdale County Board of Supervisors** (hereinafter called "OWNER").

In compliance with your Advertisement for Bids, BIDDER hereby proposes to perform all WORK for the construction of _____ in strict accordance with the CONTRACT DOCUMENTS, within the time set forth therein, and at the prices stated below.

By submission of this BID, each BIDDER certifies, and in the case of a joint BID each party thereto certifies as to its own organization, that this BID has been arrived at independently, without consultation, communication, or agreement as to any matter relating to this BID with any other BIDDER or with any competitor.

BIDDER hereby agrees to commence WORK under this contract on or before a date to be specified in the NOTICE TO PROCEED and to fully complete the PROJECT within 90 consecutive calendar days thereafter. BIDDER further agrees to pay as liquidated damages, the sum of **$150.00** for each consecutive calendar day thereafter as provided in Section 15 of the General Conditions.

BIDDER acknowledges receipt of the following ADDENDUM:

_____

_____

_____

* Insert "a corporation", "a partnership", or "an individual" as applicable.

BIDDER agrees to perform all the work described in the CONTRACT DOCUMENTS for the following unit prices or lump sum:

BID PROPOSAL FORM

(submit in triplicate)

Lauderdale County Health Department WIC Renovation

5224 Vally Street Meridian, MS 39307

LAUDERDALE COUNTY BOARD OF

SUPERVISORS

BASE BID:

_____

WRITTEN (LUMP SUM)

$_____

ADD ALTERNATE #1(If applicable):

_____

WRITTEN (LUMP SUM)

$_____

Respectfully submitted:

_____ _____

Signature Address

_____ _____

Title Date

_____

License number

SEAL - (if BID is by a corporation)

AGREEMENT

THIS AGREEMENT, made this _____day of _____ 2021, by and between **the Lauderdale County Board of Supervisors**, hereinafter called "OWNER", and _____ doing business as (_____) hereinafter called "CONTRACTOR".

WITNESSETH: That for and in consideration of the payments and agreements herein after mentioned:

1. The CONTRACTOR will commence and complete the construction of: LAUDERDALE COUNTY HEALTH DEPARTMENT WIC RENOVATION

2. The CONTRACTOR will furnish all of the materials, supplies, tools, equipment, labor, and other services necessary for the construction and completion of the PROJECT described herein as LAUDERDALE COUNTY HEALTH DEPARTMENT WIC RENOVATION

3. The CONTRACTOR will commence the work required by the CONTRACT DOCUMENTS within 10 calendar days after the date of the NOTICE TO PROCEED and will complete the same within 90_ calendar days unless the period for completion is extended otherwise by the CONTRACT DOCUMENTS.

4. The CONTRACTOR agrees to perform all of the WORK described in the CONTRACT DOCUMENTS and comply with the terms therein for the sum of $_____ or as shown in the BID schedule.

5. The term "CONTRACT DOCUMENTS" and includes the following:
   (A) Invitation For BIDS
   (B) Information To BIDDERS
   (C) BID
   (D) BID BOND
   (E) Agreement
   (F) General Conditions
   (G) SUPPLEMENTAL GENERAL CONDITIONS (N/A)
   (H) Payment BOND
   (I) Performance BOND
   (J) NOTICE OF AWARD
   (K) NOTICE TO PROCEED
   (L) CHANGE ORDERS
   (M) DRAWINGS prepared by Hall Engineering and KLF Designs numbered Sheets A1 to E5 dated July 2021.

(N) TECHNICAL SPECIFICATIONS prepared or issued by Hall Engineering LLC.

(O) ADDENDA:

No. dated _____, 20___
No. dated _____, 20___
No. dated _____, 20___

6. The OWNER will pay to the CONTRACTOR in the manner and at such times as set forth in the General Conditions such amounts as required by the CONTRACT DOCUMENTS.

7. This Agreement shall be binding upon all parties hereto and their respective heirs, executors, administrators, successors, and assigns.

IN WITNESS WHEREOF, the parties hereto have executed or caused to be executed by their duly authorized official, this Agreement in three (3) Copies, each of which shall be deemed an original on the date first above written.

OWNER:

_____
(Please Type)

By:_____
(Signature)

Name: _____
(Please Type)

Title: _____
(Officer if corporation)

SEAL (If Corporation)

ATTEST:

_____

Name: _____

Title: _____
(Please type) (Officer if Corporation)

CONTRACTOR: _____

By: _____

Name: _____
(Please Type or Print)

Address: _____

_____

_____
(Employer Identification Number)

(SEAL)

ATTEST:

_____

Name_____
(Please Type)

_____

PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS: that

_____
(Name of Contractor)

_____
(Address of Contractor)

a _____, hereinafter called Principal, and
(Corporation, Partnership or Individual)

_____
(Name of Surety)

_____
(Address of Surety)

hereinafter called Surety, are held and firmly bound unto:

_____
(Name of Owner)

_____
(Address of Owner)

hereinafter called OWNER, in the penal sum of _____Dollars, (_$_____) in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain contract with the OWNER, dated the _____ day of _____, 2021, a copy of which is hereto attached and made a part hereof for the construction of:

LAUDERDALE COUNTY HEALTH DEPARTMENT WIC RENOVATION

NOW, THEREFORE, if the Principal shall promptly make payment to all persons, firms, SUBCONTRACTORS, and corporations furnishing materials for or performing labor in the prosecution of the WORK provided for in such contract, and any authorized extension or modification thereof, including all amounts due to materials, lubricants, oil, gasoline, coal and repairs on machinery, equipment and tools, consumed or used in connection with the construction of such WORK, and all insurance premiums on said WORK, and for all labor, performed in such WORK whether by SUBCONTRACTOR or otherwise, then this obligation shall be void; otherwise to remain in full force and effort.

PROVIDED, FURTHER, that the said Surety for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to the WORK to be performed thereunder or the SPECIFICATIONS accompanying the same shall in any wise affect its obligation on this BOND, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the WORK or to the SPECIFICATIONS.

PROVIDED FURTHER, that no final settlement between the OWNER and the CONTRACTOR shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF this instrument is executed in three (Number) counterparts, each one of which shall be deemed an original, this the _____ day of _____, 2021.

ATTEST:

_____
Principal

_____
(Principal) Secretary

(SEAL) BY_____

_____
(Address)

_____
Witness as to Principal

_____
(Address)

_____ _____
Surety

ATTEST: BY _____
Attorney-in-Fact

_____ _____
Witness as to Surety (Address)

_____ _____

NOTE: Date of BOND must not be prior to date of Contract. If CONTRACTOR is partnership, all partners should execute BOND.

IMPORTANT: Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the State where the PROJECT is located.

PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS: that

_____
(Name of Contractor)

_____
(Address of Contractor)

a _____, hereinafter called Principal, and
(Corporation, Partnership or Individual)

_____
(Name of Surety)

_____
(Address of Surety)

hereinafter called Surety, are held and firmly bound unto:

_____
(Name of Owner)

_____
(Address of Owner)

hereinafter called OWNER, in the penal sum of _____Dollars, (_$_____) in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain contract with the OWNER, dated the _____ day of _____, 2021, a copy of which is hereto attached and made a part hereof for the construction of:

Lauderdale County Health Department
WIC Renovation

NOW, THEREFORE, if the Principal shall promptly make payment to all persons, firms, SUBCONTRACTORS, and corporations furnishing materials for or performing labor in the prosecution of the WORK provided for in such contract, and any authorized extension or modification thereof, including all amounts due to materials, lubricants, oil, gasoline, coal and repairs on machinery, equipment and tools, consumed or used in connection with the construction of such WORK, and all insurance premiums on said WORK, and for all labor, performed in such WORK whether by SUBCONTRACTOR or otherwise, then this obligation shall be void; otherwise to remain in full force and effort.

PROVIDED, FURTHER, that the said Surety for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to the WORK to be performed thereunder or the SPECIFICATIONS accompanying the same shall in any wise affect its obligation on this BOND, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the WORK or to the SPECIFICATIONS.

PROVIDED FURTHER, that no final settlement between the OWNER and the CONTRACTOR shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF this instrument is executed in three (Number) counterparts, each one of which shall be deemed an original, this the _____ day of _____, 2021.

ATTEST:

_____
Principal

_____
(Principal) Secretary

(SEAL) BY_____

_____
(Address)

_____
Witness as to Principal

_____
(Address)

_____ _____
Surety

ATTEST: BY _____
Attorney-in-Fact

_____ _____
Witness as to Surety (Address)

_____ _____

NOTE: Date of BOND must not be prior to date of Contract. If CONTRACTOR is partnership, all partners should execute BOND.

IMPORTANT: Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the State where the PROJECT is located.

NOTICE TO PROCEED

TO:_____
_____
_____
_____

DATE: _____
Project: _____
_____
_____

You are hereby notified to commence WORK in accordance with the Agreement dated _____, 2021, on or before _____, 2021, and you are to complete the WORK within _____ consecutive calendar days thereafter. The date of completion of all WORK is therefore _____, 2021.

_____
(Owner)

By: _____

Title: _____

ACCEPTANCE OF NOTICE

Receipt of the above NOTICE TO PROCEED is hereby acknowledged by:

_____,

this the_____day of _____, 2021.

By_____

Title _____

Employer Identification Number _____

GENERAL CONDITIONS

1. DEFINITIONS

1.1 Wherever used in the CONTRACT DOCUMENTS, the following terms shall have the meanings indicated and shall be applicable to both the singular and plural thereof:

1.2 ADDENDA - Written or graphic instruments issued prior to the execution of the Agreement which modify or interpret the CONTRACT DOCUMENTS, DRAWINGS and SPECIFICATIONS, by additions, deletions, clarifications, or corrections.

1.3 BID - The offer or proposal of the BIDDER submitted on the prescribed form setting forth the prices for the WORK to be performed.

1.4 BIDDER - Any person, firm, or corporation submitting a BID for the WORK.

1.5 BONDS - Bid, Performance, and Payment Bonds and other instruments of surety, furnished by the CONTRACTOR and the CONTRACTOR'S surety in accordance with the CONTRACT DOCUMENTS.

1.6 CHANGE ORDER - A written order to the CONTRACTOR authorizing an addition, deletion, or revision in the WORK within the general scope of the CONTRACT DOCUMENTS, or authorizing an adjustment in the CONTRACT PRICE or CONTRACT TIME.

1.7 CONTRACT DOCUMENTS - The contract, including Advertisement For BIDS, Information For BIDDERS, BID, BID BOND, Agreement, Payment BOND, Performance BOND, NOTICE OF AWARD, NOTICE TO PROCEED, CHANGE ORDER, DRAWINGS, SPECIFICATIONS, and ADDENDA.

1.8 CONTRACT PRICE - The total monies payable to the CONTRACTOR under the terms and conditions of the CONTRACT DOCUMENTS.

1.9 CONTRACT TIME - The number of calendar days stated in the CONTRACT DOCUMENTS for the completion of the WORK.

1.10 CONTRACTOR - The person, firm, or corporation with whom the OWNER has executed the Agreement.

1.11 DRAWINGS - The parts of the CONTRACT DOCUMENTS which show the characteristics and scope of the WORK to be performed and which have been prepared or approved by the ENGINEER.

1.12 ENGINEER - The person, firm, or corporation named as such in the CONTRACT DOCUMENTS.

1.13 FIELD ORDER - A written order effecting a change in the WORK not involving an adjustment in the CONTRACT PRICE or an extension of the CONTRACT TIME, issued by the ENGINEER to the CONTRACTOR during construction.

1.14 NOTICE OF AWARD - The written notice of the acceptance of the BID from the OWNER to the successful BIDDER.

1.15 NOTICE TO PROCEED - Written communication issued by the OWNER to the CONTRACTOR authorizing him/her to proceed with the WORK and establishing the date for commencement of the WORK.

1.16 OWNER - A public or quasi-public body or authority, corporation, association, partnership, or an individual for whom the WORK is to be performed.

1.17 PROJECT - The undertaking to be performed as provided in the CONTRACT DOCUMENTS.

1.18 RESIDENT PROJECT REPRESENTATIVE - The authorized representative of the OWNER who is assigned to the PROJECT site or any part thereof.

1.19 SHOP DRAWINGS - All drawings, diagrams, illustrations, brochures, schedules and other data which are prepared by the CONTRACTOR, a SUBCONTRACTOR, manufacturer, SUPPLIER or distributor, which illustrate how specific portions of the WORK shall be fabricated or installed.

1.20 SPECIFICATIONS - A part of the CONTRACT DOCUMENTS consisting of written descriptions of a technical nature of materials, equipment, construction systems, standards and workmanship.

1.21 SUBCONTRACTOR - An individual, firm, or corporation having a direct contract with CONTRACTOR or with any other SUBCONTRACTOR for the performance of a part of the WORK at the site.

1.22 SUBSTANTIAL COMPLETION - That date certified by the ENGINEER when the construction of the PROJECT or a specified part thereof is sufficiently completed, in accordance with the CONTRACT DOCUMENTS, so that the PROJECT or specified part can be utilized for the purposes for which it is intended.

1.23 SUPPLEMENTAL GENERAL CONDITIONS - Modifications to General Conditions required by a Federal agency for participation in the PROJECT and approved by the agency in writing prior to inclusion in the CONTRACT DOCUMENTS, or such requirements that may be imposed by applicable state laws.

1.24 SUPPLIER - Any person or organization who supplies materials or equipment for the WORK, including that fabricated to a special design, but who does not perform labor at the site.

1.25 WORK - All labor necessary to produce the construction required by the CONTRACT DOCUMENTS, and all materials and equipment incorporated or to be incorporated in the PROJECT.

1.26 WRITTEN NOTICE - Any notice to any party of the Agreement relative to any part of this Agreement in writing and considered delivered and the service thereof completed, when posted by certified or registered mail to the said party at their last given address, or delivered in person to said party or their authorized representative on the WORK.

2. ADDITIONAL INSTRUCTIONS AND DETAIL DRAWINGS

2.1 The CONTRACTOR may be furnished additional instructions and detail drawings, by the ENGINEER, as necessary to carry out the WORK required by the CONTRACT DOCUMENTS.

2.2 The additional drawings and instructions thus supplied will become a part of the CONTRACT DOCUMENTS. The CONTRACTOR shall carry out the WORK in accordance with the additional detail drawings and instructions.

3. SCHEDULES, REPORTS AND RECORDS

3.1 The CONTRACTOR shall submit to the OWNER such schedule of quantities and costs, progress schedules, payrolls, reports, estimates, records and other data where applicable as are required by the CONTRACT DOCUMENTS for the WORK to be performed.

3.2 Prior to the first partial payment estimate the CONTRACTOR shall submit construction progress schedules showing the order in which the CONTRACTOR proposes to carry on the WORK, including dates at which the various parts of the WORK will be started, estimated date of completion of each part and, as applicable:

3.2.1 The dates at which special detail drawings will be required; and

3.2.2 Respective dates for submission of SHOP DRAWINGS, the beginning of manufacture, the testing and the installation of materials, supplies and equipment.

3.3 The CONTRACTOR shall also submit a schedule of payments that the CONTRACTOR anticipates will be earned during the course of the WORK.

4. DRAWINGS AND SPECIFICATIONS

4.1 The intent of the DRAWINGS and SPECIFICATIONS is that the CONTRACTOR shall furnish all labor, materials, tools, equipment, and transportation necessary for the proper execution of the WORK in accordance with the CONTRACT DOCUMENTS and all incidental work necessary to complete the PROJECT in an acceptable manner, ready for use, occupancy or operation by the OWNER.

4.2 In case of conflict between the DRAWINGS and SPECIFICATIONS, the SPECIFICATIONS shall govern. Figure dimensions on DRAWINGS shall govern over general DRAWINGS.

4.3 Any discrepancies found between the DRAWINGS and SPECIFICATIONS and site conditions or any inconsistencies or ambiguities in the DRAWINGS or SPECIFICATIONS shall be immediately reported to the ENGINEER, in writing, who shall promptly correct such inconsistencies or ambiguities in writing. WORK done by

the CONTRACTOR after discovery of such discrepancies, inconsistencies or ambiguities shall be done at the CONTRACTOR'S risk.

5. SHOP DRAWINGS

5.1 The CONTRACTOR shall provide SHOP DRAWINGS as may be necessary for the prosecution of the WORK as required by the CONTRACT DOCUMENTS. The ENGINEER shall promptly review all SHOP DRAWINGS. The ENGINEER'S approval of any SHOP DRAWING shall not release the CONTRACTOR from responsibility for deviations from the CONTRACT DOCUMENTS. The approval of any SHOP DRAWING which substantially deviates from the requirement of the CONTRACT DOCUMENTS shall be evidenced by a CHANGE ORDER.

5.2 When submitted for the ENGINEER's review, SHOP DRAWINGS shall bear the CONTRACTOR'S certification that he has reviewed, checked and approved the SHOP DRAWINGS and that they are in conformance with the requirements of the CONTRACT DOCUMENTS.

5.3 Portions of the WORK requiring a SHOP DRAWING or sample submission shall not begin until the SHOP DRAWING or submission has been approved by the ENGINEER. A copy of each approved SHOP DRAWING and each approved sample shall be kept in good order by the CONTRACTOR at the site and shall be available to the ENGINEER.

6. MATERIALS, SERVICES AND FACILITIES

6.1 It is understood that, except as otherwise specifically stated in the CONTRACT DOCUMENTS, the CONTRACTOR shall provide and pay for all materials, labor, tools, equipment, water, light, power, transportation, supervision, temporary construction of any nature, and all other services and facilities of any nature whatsoever necessary to execute, complete, and deliver the WORK within the specified time.

6.2 Materials and equipment shall be so stored as to insure the preservation of their quality and fitness for the WORK. Stored materials and equipment to be incorporated in the WORK shall be located so as to facilitate prompt inspection.

6.3 Manufactured articles, materials, and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned as directed by the manufacturer.

6.4 Materials, supplies, and equipment shall be in accordance with samples submitted by the CONTRACTOR and approved by the ENGINEER.

6.5 Materials, supplies, or equipment to be incorporated into the WORK shall not be purchased by the CONTRACTOR or the SUBCONTRACTOR subject to a chattel mortgage or under a conditional sale contract or other agreement by which an interest is retained by the seller.

7. INSPECTION AND TESTING

7.1 All materials and equipment used in the construction of the PROJECT shall be subject to adequate inspection and testing in accordance with generally accepted standards, as required and defined in the CONTRACT DOCUMENTS.

7.2 The OWNER shall provide all inspection and testing services not required by the CONTRACT DOCUMENTS.

7.3 The CONTRACTOR shall provide at the CONTRACTOR'S expense the testing and inspection services required by the CONTRACT DOCUMENTS.

7.4 If the CONTRACT DOCUMENTS, laws, ordinances, rules, regulations or orders of any public authority having jurisdiction require any WORK to specifically be inspected, tested, or approved by someone other than the CONTRACTOR, the CONTRACTOR will give the ENGINEER timely notice of readiness. The CONTRACTOR will then furnish the ENGINEER the required certificates of inspection, testing or approval.

7.5 Inspections, tests, or approvals by the engineer or others shall not relieve the CONTRACTOR from the obligations to perform the WORK in accordance with the requirements of the CONTRACT DOCUMENTS.

7.6 The ENGINEER and the ENGINEER'S representatives will at all times have access to the WORK. In addition, authorized representatives and agents of any participating Federal or State agency shall be permitted to inspect all work, materials, payrolls, records or personnel, invoices of materials, and other relevant data and records. The CONTRACTOR will provide proper facilities for such access and observation of the WORK and also for any inspection or testing thereof.

7.7 If any WORK is covered contrary to the written instructions of the ENGINEER it must, if requested by the ENGINEER, be uncovered for the ENGINEER'S observation and replaced at the CONTRACTOR'S expense.

7.8 If the ENGINEER considers it necessary or advisable that covered WORK be inspected or tested by others, the CONTRACTOR, at the ENGINEER'S request, will uncover, expose or otherwise make available for observation, inspection or testing as the ENGINEER may require, that portion of the WORK in question, furnishing all necessary labor, materials, tools, and equipment. If it is found that such WORK is defective, the CONTRACTOR will bear all the expenses of such uncovering, exposure, observation, inspection and testing and of satisfactory reconstruction, if, however, such WORK is not found to be defective, the CONTRACTOR will be allowed an increase in the CONTRACT PRICE or an extension of the CONTRACT TIME, or both, directly attributable to such uncovering, exposure, observation, inspection, testing and reconstruction and an appropriate CHANGE ORDER shall be issued.

8. SUBSTITUTIONS

8.1 Whenever a material, article, or piece of equipment is identified on the DRAWINGS or SPECIFICATIONS by reference to brand name or catalogue numbers, it shall be understood that this is referenced for the purpose of defining the performance or other salient requirements and that other products of equal capacities, quality and function shall be considered. The CONTRACTOR may recommend the substitution of a material, article, or piece of equipment of equal substance and function for those referred to in the CONTRACT DOCUMENTS by reference to brand name or catalogue number, and if, in the opinion of the ENGINEER, such material, article, or piece of equipment is of equal substance and function to that specified, the ENGINEER may approve its substitution and use by the CONTRACTOR. Any cost differential shall be deductible from the CONTRACT PRICE and the CONTRACT DOCUMENTS shall be appropriately modified by CHANGE ORDER. The CONTRACTOR warrants that if substitutes are approved, no major changes in the function or general design of the PROJECT will result. Incidental changes or extra component parts required to accommodate the substitute will be made by the CONTRACTOR without a change in the CONTRACT PRICE or CONTRACT TIME.

9. PATENTS

9.1 The CONTRACTOR shall pay all applicable royalties and license fees, and shall defend all suits or claims for infringement of any patent rights and save the OWNER harmless from loss on account thereof, except that the OWNER shall be responsible for any such loss when a particular process, design, or product of a particular manufacturer or manufacturers is specified, however, if the CONTRACTOR has reason to believe that the design, process or product specified is an infringement of a patent, the CONTRACTOR shall be responsible for such loss unless the CONTRACTOR promptly gives such information to the ENGINEER.

10. SURVEYS, PERMITS, REGULATIONS

10.1 The OWNER shall furnish all boundary surveys and establish all base lines for locating the principal component parts of the WORK together with a suitable number of benchmarks adjacent to the WORK as shown in the CONTRACT DOCUMENTS. From the information provided by the OWNER, unless otherwise specified in the CONTRACT DOCUMENTS, the CONTRACTOR shall develop and make all detail surveys needed for construction such as slope stakes, batter boards, stakes for pipe locations and other working points, lines, elevations and cut sheets.

10.2 The CONTRACTOR shall carefully preserve benchmarks, reference points and stakes and, in case of willful or careless destruction, shall be charged with the resulting expense and shall be responsible for any mistake that may be caused by their unnecessary loss or disturbance.

10.3 Permits and licenses of a temporary nature necessary for the prosecution of the WORK shall be secured and paid for by the CONTRACTOR unless otherwise stated in the SUPPLEMENTAL GENERAL CONDITIONS. Permits, licenses and easements for permanent structures or permanent changes in existing facilities shall be secured and paid for by the OWNER, unless otherwise specified. The CONTRACTOR shall give all notices and comply with all laws, ordinances, rules and regulations bearing on the conduct of the WORK as drawn and specified. If the CONTRACTOR observes that the CONTRACT DOCUMENTS are at variance therewith, the CONTRACTOR shall promptly notify the ENGINEER in writing, and any necessary changes shall be adjusted as provided in Section 13, CHANGES IN THE WORK.

11. PROTECTION OF WORK, PROPERTY, AND PERSONS

11.1 The CONTRACTOR will be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the WORK. The CONTRACTOR will take all necessary precautions for the safety of, will provide the necessary precautions for the safety of, and will provide the necessary protection to prevent damage, injury or loss to all employees on the WORK and other persons who may be affected thereby, all the WORK and all materials or equipment to be incorporated therein, whether in storage on or off the site, and other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

11.2 The CONTRACTOR will comply with all applicable laws, ordinances, rules, regulations and orders of any public body having jurisdiction. The CONTRACTOR will erect and maintain, as required by the conditions and progress of the WORK, all necessary safeguards for safety and protection. The CONTRACTOR will notify owners of adjacent utilities when prosecution of the WORK may affect them. The CONTRACTOR will remedy all damage, injury or loss to any property caused, directly or indirectly, in whole or part, by the CONTRACTOR, any SUBCONTRACTOR or anyone directly or indirectly employed by any of them, except damage or loss attributable to the fault of the CONTRACT DOCUMENTS or to the acts or omissions of the OWNER, of the ENGINEER or anyone employed by either of them or anyone for whose acts either of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of the CONTRACTOR.

11.3 In emergencies affecting the safety of persons or the WORK or property at the site or adjacent thereto, the CONTRACTOR, without special instructions or authorization from the ENGINEER or OWNER, shall act to prevent threatened damage, injury or loss. The CONTRACTOR will give the ENGINEER prompt WRITTEN NOTICE of any significant changes in the WORK or deviations from the CONTRACT DOCUMENTS caused thereby, and a CHANGE ORDER shall thereupon be issued covering the changes and deviations involved.

12. SUPERVISION BY CONTRACTOR

12.1 The CONTRACTOR will supervise and direct the WORK. He will be solely responsible for the means, methods, techniques, sequences and procedures of construction. The CONTRACTOR will employ and maintain on the WORK a qualified supervisor or superintendent who shall have been designated in writing by the CONTRACTOR as the CONTRACTOR'S representative at the site. The supervisor shall have full authority to act on behalf of the CONTRACTOR and all communications given to the supervisor shall be as binding as if given to the CONTRACTOR. The supervisor shall be present on the site at all times as required to perform adequate supervision and coordination of the WORK.

13. CHANGES IN THE WORK

13.1 The OWNER may at any time, as the need arises, order changes within the scope of the WORK without invalidating the Agreement. If such changes increase or decrease the amount due under the CONTRACT DOCUMENTS, or in the time required for performance of the WORK, an equitable adjustment shall be authorized by CHANGE ORDER.

13.2 The ENGINEER, also, may at any time, by issuing a FIELD ORDER, make changes in the details of the WORK. The CONTRACTOR shall proceed with the performance of any changes in the WORK so ordered by the ENGINEER unless the CONTRACTOR believes that such FIELD ORDER entitles the CONTRACTOR to a change in CONTRACT PRICE or TIME, or both, in which event the CONTRACTOR shall give the ENGINEER WRITTEN NOTICE thereof within seven (7) days after the receipt of the ordered change. Thereafter the CONTRACTOR shall document the basis for the change in CONTRACT PRICE or TIME within thirty (30) days. The CONTRACTOR shall not execute such changes pending the receipt of an executed CHANGE ORDER or further instruction from the OWNER.

14. CHANGES IN CONTRACT PRICE

14.1 The CONTRACT PRICE may be changed only by a CHANGE ORDER. The value of any WORK covered by a CHANGE ORDER or of any claim for increase or decrease in the CONTRACT PRICE shall be determined by one or more of the following methods in the order of precedence listed below:

a. Unit prices previously approved.

b. An agreed lump sum.

15. TIME FOR COMPLETION AND LIQUIDATED DAMAGES

15.1 The date of beginning and the time for completion of the WORK are essential conditions of the CONTRACT DOCUMENTS and the WORK embraced shall be commenced on a date specified in the NOTICE TO PROCEED.

15.2 The CONTRACTOR will proceed with the WORK at such rate of progress to insure full completion within the CONTRACT TIME. It is expressly understood and agreed, by and between the CONTRACTOR and the OWNER, that the CONTRACT TIME for the completion of the WORK described herein is a reasonable time, taking into consideration the average climatic and economic conditions and other factors prevailing in the locality of the WORK.

15.3 If the CONTRACTOR shall fail to complete the WORK within the CONTRACT TIME, or extension of time granted by the OWNER, then the CONTRACTOR will pay to the OWNER the amount for liquidated damages as specified in the BID for each calendar day that the CONTRACTOR shall be in default after the time stipulated in the CONTRACT DOCUMENTS.

15.4 The CONTRACTOR shall not be charged with liquidated damages or any excess cost when the delay in completion of the WORK is due to the following and the CONTRACTOR has promptly given WRITTEN NOTICE of such delay to the OWNER or ENGINEER.

15.4.1 To any preference, priority or allocation order duly issued by the OWNER.

15.4.2 To unforeseeable causes beyond the control and without the fault or negligence of the CONTRACTOR, including but not restricted to, acts of God, or of the public enemy, acts of the OWNER, acts of another CONTRACTOR in the performance of a contract with the OWNER, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, and abnormal and unforeseeable weather; and

15.4.3 To any delays of SUBCONTRACTORS occasioned by any of the causes specified in paragraphs 15.4.1 and 15.4.2 of this article.

16. CORRECTION OF WORK

16.1 The CONTRACTOR shall promptly remove from the premises all WORK rejected by the ENGINEER for failure to comply with the CONTRACT DOCUMENTS, whether incorporated in the construction or not, and the CONTRACTOR shall promptly replace and execute the WORK in accordance with the CONTRACT DOCUMENTS and without expense to the OWNER and shall bear the expense of making good all WORK of other CONTRACTORS destroyed or damaged by such removal or replacement.

16.2 All removal and replacement WORK shall be done at the CONTRACTOR'S expense. If the CONTRACTOR does not take action to remove such rejected WORK

within ten (10) days after receipt of WRITTEN NOTICE, the OWNER may remove such WORK and store the materials at the expense of the CONTRACTOR.

17. SUBSURFACE CONDITIONS

17.1 The CONTRACTOR shall promptly, and before such conditions are disturbed, except in the event of an emergency, notify the OWNER by WRITTEN NOTICE of:

17.1.1 Subsurface or latent physical conditions at the site differing materially from those indicated in the CONTRACT DOCUMENTS; or

17.1.2 Unknown physical conditions at the site, of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in WORK of the character provided for in the CONTRACT DOCUMENTS.

17.2 The OWNER shall promptly investigate the conditions, and if it is found that such conditions do so materially differ and cause an increase or decrease in the cost of, or in the time required for, performance of the WORK, an equitable adjustment shall be made and the CONTRACT DOCUMENTS shall be modified by a CHANGE ORDER. Any claim of the CONTRACTOR for adjustment hereunder shall not be allowed unless the required WRITTEN NOTICE has been given; provided that the OWNER may, if the OWNER determines the facts so justify, consider and adjust any such claims asserted before the date of final payment.

18. SUSPENSION OF WORK, TERMINATION, AND DELAY

18.1 The OWNER may suspend the WORK or any portion thereof for a period of not more than ninety days or such further time as agreed upon by the CONTRACTOR, by WRITTEN NOTICE to the CONTRACTOR and the ENGINEER which shall fix the date on which WORK shall be resumed. The CONTRACTOR will resume that WORK on the date so fixed. The CONTRACTOR will be allowed an increase in the CONTRACT PRICE or an extension of the CONTRACT TIME, or both, directly attributable to any suspension.

18.2 If the CONTRACTOR is adjudged a bankrupt or insolvent, or makes a general assignment for the benefit of its creditors, or if a trustee or receiver is appointed for the CONTRACTOR or for any of its property, or if CONTRACTOR files a petition to take advantage of any debtor's act, or to reorganize under the bankruptcy or applicable laws, or repeatedly fails to supply sufficient skilled workmen or suitable materials or equipment, or repeatedly fails to make prompt payments to SUBCONTRACTORS or for labor, materials or equipment or disregards laws, ordinances, rules, regulations or orders of any public body having jurisdiction of the WORK or disregards the authority of the ENGINEER, or otherwise violates any provision of the CONTRACT DOCUMENTS, then the OWNER may, without prejudice to any other right or remedy and after giving the CONTRACTOR and its surety a minimum of ten (10) days from delivery of a WRITTEN

NOTICE, terminate the services of the CONTRACTOR and take possession of the PROJECT and of all materials, equipment, tools, construction equipment and machinery thereon owned by the CONTRACTOR, and finish the WORK by whatever method the OWNER may deem expedient. In such case the CONTRACTOR shall not be entitled to receive any further payment until the WORK is finished. If such costs exceed such unpaid balance, the CONTRACTOR will pay the difference to the OWNER. Such costs incurred by the OWNER will be determined by the ENGINEER and incorporated in a CHANGE ORDER.

18.3 Where the CONTRACTOR'S services have been so terminated by the OWNER, said termination shall not affect any right of the OWNER for claims against the CONTRACTOR whether existing or which may thereafter accrue. Any retention or payment of monies by the OWNER due the CONTRACTOR will not release the CONTRACTOR from compliance with the CONTRACT DOCUMENTS.

18.4 After ten (10) days from delivery of a WRITTEN NOTICE to the CONTRACTOR and the ENGINEER, the OWNER may, without cause and without prejudice to any other right or remedy, elect to abandon the PROJECT and terminate the CONTRACT. In such case the CONTRACTOR shall be paid for all WORK executed and any expense sustained plus reasonable profit.

18.5 If, through no act or fault of the CONTRACTOR, the WORK is suspended for a period of more than ninety (90) days by the OWNER or under an order of court or other public authority, or the ENGINEER fails to act on any request for payment within thirty (30) days after it is submitted, or the OWNER fails to pay the CONTRACTOR substantially the sum approved by the ENGINEER or awarded by arbitrators within thirty (30) days of its approval and presentation, then the CONTRACTOR may, after ten (10) days from delivery of a WRITTEN NOTICE to the OWNER and the ENGINEER terminate the CONTRACT and recover from the OWNER payment for all WORK executed and all expenses sustained. In addition and in lieu of terminating the CONTRACT, if the ENGINEER has failed to act on a request for payment, or if the OWNER has failed to make any payment as aforesaid, the CONTRACTOR may upon ten (10) days written notice to the OWNER and the ENGINEER stop the WORK until paid all amounts then due, in which event and upon resumption of the WORK, CHANGE ORDERS shall be issued for adjusting the CONTRACT PRICE or extending the CONTRACT TIME or both to compensate for the costs and delays attributable to the stoppage of the WORK.

18.6 If the performance of all or any portion of the WORK is suspended, delayed, or interrupted as a result of a failure of the OWNER or ENGINEER to act within the time specified in the CONTRACT DOCUMENTS, or if no time is specified, within a reasonable time, an adjustment in the CONTRACT PRICE or an extension of the CONTRACT TIME, or both, shall be made by CHANGE ORDER to compensate the CONTRACTOR for the costs and delays necessarily caused by the failure of the OWNER or ENGINEER.

19. PAYMENT TO CONTRACTOR

19.1 At least ten (10) days before each progress payment falls due (but not more often than once a month), the CONTRACTOR will submit to the ENGINEER a partial payment estimate filled out and signed by the CONTRACTOR covering the WORK performed during the period covered by the partial payment estimate and supported by such data as the ENGINEER may reasonably require. If payment is requested on the basis of materials and equipment not incorporated in the WORK but delivered and suitably stored at or near the site, the partial payment estimate shall also be accompanied by such supporting data, satisfactory to the OWNER, as will establish the OWNER'S title to the material and equipment and protect the OWNER'S interest therein, including applicable insurance. The ENGINEER will, within ten (10) days after receipt of each partial payment estimate, either indicate in writing approval of payment, and present the partial payment estimate to the OWNER, or return the partial payment estimate to the CONTRACTOR indicating in writing the reasons for refusing to approve payment. In the latter case, the CONTRACTOR may make the necessary corrections and resubmit the partial payment estimate. The OWNER will, within ten (10) days of presentation of an approved partial payment estimate, pay the CONTRACTOR a progress payment on the basis of the approved partial payment estimate less the retainage. The retainage shall be an amount equal to 5% of said estimate. If at any time thereafter when the progress of the WORK is not satisfactory, additional amounts may be retained. Upon substantial completion of the work, any amount retained may be paid to the CONTRACTOR. When the WORK has been substantially completed except for WORK which cannot be completed because of weather conditions, lack of materials or other reasons which in the judgment of the OWNER are valid reasons for noncompletion, the OWNER may make additional payments, retaining at all times an amount sufficient to cover the estimated cost of the WORK still to be completed.

19.2 The request for payment may also include an allowance for the cost of such major materials and equipment which are suitably stored either at or near the site.

19.3 Prior to SUBSTANTIAL COMPLETION, the OWNER, with the approval of the ENGINEER and with the concurrence of the CONTRACTOR, may use any completed or substantially completed portions of the WORK. Such use shall not constitute an acceptance of such portions of the WORK.

19.4 The OWNER shall have the right to enter the premises for the purpose of doing work not covered by the CONTRACT DOCUMENTS. This provision shall not be construed as relieving the CONTRACTOR of the sole responsibility for the care and protection of the WORK, or the restoration of any damaged WORK except such as may be caused by agents or employees of the OWNER.

19.5 Upon completion and acceptance of the WORK, the ENGINEER shall issue a certificate attached to the final payment request that the WORK has been accepted under

the conditions of the CONTRACT DOCUMENTS. The entire balance found to be due the CONTRACTOR, including the retained percentages, but except such sums as may be lawfully retained by the OWNER, shall be paid to the CONTRACTOR within thirty (30) days of completion and acceptance of the WORK.

19.6 The CONTRACTOR will indemnify and save the OWNER or the OWNER'S agents harmless from all claims growing out of the lawful demand of SUBCONTRACTORS, laborers, workmen, mechanics, material men, and furnishers of machinery and parts thereof, equipment, tools, and all supplies, incurred in the furtherance of the performance of the WORK. The CONTRACTOR shall, at the OWNER'S request, furnish satisfactory evidence that all obligations of the nature designated above have been paid, discharged, or waived. If the CONTRACTOR fails to do so the OWNER may, after having notified the CONTRACTOR, either pay unpaid bills or withhold from the CONTRACTOR'S unpaid compensation a sum of money deemed reasonably sufficient to pay any and all such lawful claims until satisfactory evidence is furnished that all liabilities have been fully discharged whereupon payment to the CONTRACTOR shall be resumed in accordance with the terms of the CONTRACT DOCUMENTS, but in no event shall the provisions of this sentence be construed to impose any obligations upon the OWNER to either the CONTRACTOR, the CONTRACTOR'S Surety, or any third party. In paying any unpaid bills of the CONTRACTOR, any payment so made by the OWNER shall be considered as a payment made under the CONTRACT DOCUMENTS by the OWNER to the CONTRACTOR and the OWNER shall not be liable to the CONTRACTOR for any such payments made in good faith.

19.7 If the OWNER fails to make payment thirty (30) days after approval by the ENGINEER, in addition to other remedies available to the CONTRACTOR, there shall be added to each such payment interest at the maximum legal rate commencing on the first day after said payment is due and continuing until the payment is received by the CONTRACTOR.

20. ACCEPTANCE OF FINAL PAYMENT AS RELEASE

20.1 The acceptance by the CONTRACTOR of final payment shall be and shall operate as a release to the OWNER of all claims and all liability to the CONTRACTOR other than claims in stated amounts as may be specifically excepted by the CONTRACTOR for all things done or furnished in connection with this WORK and for every act and neglect of the OWNER and others relating to or arising out of this WORK. Any payment, however, final or otherwise, shall not release the CONTRACTOR or its sureties from any obligations under the CONTRACT DOCUMENTS or the Performance and Payment BONDS.

21. INSURANCE

21.1 The CONTRACTOR shall purchase and maintain such insurance as will protect it from claims set forth below which may arise out of, or result from, the CONTRACTOR'S execution of the WORK, whether such execution be by the CONTRACTOR, any SUBCONTRACTOR, or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

21.1.1 Claims under workmen's compensation, disability benefit and other similar employee benefit acts;

21.1.2 Claims for damages because of bodily injury, occupational sickness or disease, or death of employees;

21.1.3 Claims for damages because of bodily injury, sickness or disease, or death of any person other than employees;

21.1.4 Claims for damages insured by usual personal injury liability coverage which are sustained (1) by any person as a result of an offense directly or indirectly related to the employment of such person by the CONTRACTOR, or (2) by any other person; and

21.1.5 Claims for damages because of injury to or destruction of tangible property, including loss of use resulting therefrom.

21.2 Certificates of Insurance acceptable to the OWNER shall be filed with the OWNER prior to commencement of the WORK. These Certificates shall contain a provision that coverages afforded under the policies will not be canceled unless at least fifteen (15) days prior WRITTEN NOTICE has been given to the OWNER.

21.3 The CONTRACTOR shall procure and maintain, at the CONTRACTOR'S own expense, during the CONTRACT TIME, Liability insurance as hereinafter specified:

21.3.1 The successful Bidder shall be required to provide evidence of insurance acceptable to the Authority. These are the minimum insurance requirements. General Liability in the amount of $1,000,000, listing the Lauderdale County Board of Supervisors as additional insured; and with a Waiver Of Subrogation in favor of the Lauderdale County Board of Supervisors. Automobile Liability in the amount of $1,000,000, listing the Lauderdale County Board of Supervisors as additional insured; and with a Waiver Of Subrogation in favor of the Lauderdale County Board of Supervisors. Statutory Workers Compensation and Employers' Liability of $500,000/$500,000/$500,000 with a Waiver Of Subrogation in favor of the Lauderdale County Board of Supervisors. Listing the Lauderdale County Board of Supervisors as and additional insured: Lauderdale County Board of Supervisors P.O. Box 1235 Jackson, MS 39215. Provide proof of insurance within five (5) business days of bid proposal.

21.3.2 The CONTRACTOR shall acquire and maintain, if applicable, Fire and Extended Coverage insurance upon the PROJECT to the full insurable value thereof for the benefit of the OWNER, the CONTRACTOR, and SUBCONTRACTORS as their interest may appear. This provision shall in no way release the CONTRACTOR or CONTRACTOR'S surety from obligations under the CONTRACT DOCUMENTS to fully complete the PROJECT.

21.4 The CONTRACTOR shall procure and maintain, at the CONTRACTOR'S own expense, during the CONTRACT TIME, in accordance with the provisions of the laws of the state in which the WORK is performed, Workmen's Compensation Insurance, including occupational disease provisions, for all of the CONTRACTOR'S employees at the site of the PROJECT and in case any WORK is sublet, the CONTRACTOR shall require such SUBCONTRACTOR similarly to provide Workmen's Compensation Insurance, including occupational disease provisions for all of the latter's employees unless such employees are covered by the protection afforded by the CONTRACTOR. In case any class of employees engaged in hazardous work under this contract at the site of the PROJECT is not protected under Workmen's Compensation statue, the CONTRACTOR shall provide, and shall cause each SUBCONTRACTOR to provide, adequate and suitable insurance for the protection of its employees not otherwise protected.

21.5 The CONTRACTOR shall secure, if applicable, "All Risk" type Builder's Risk Insurance for WORK to be performed. Unless specifically authorized by the OWNER, the amount of such insurance shall not be less than the CONTRACT PRICE totaled in the BID. The policy shall cover not less than the losses due to fire, explosion, hail, lightning, vandalism, malicious mischief, wind, collapse, riot, aircraft, and smoke during the CONTRACT TIME, and until the WORK is accepted by the OWNER. The policy shall name as the insured the CONTRACTOR, and the OWNER.

22. CONTRACT SECURITY

22.1 The CONTRACTOR shall within ten (10) days after the receipt of the NOTICE OF AWARD furnish the OWNER with a Performance BOND and a Payment BOND in penal sums equal to the amount of the CONTRACT PRICE, conditioned upon the performance by the CONTRACTOR of all undertakings, covenants, terms, conditions and agreements of the CONTRACT DOCUMENTS, and upon the prompt payment by the CONTRACTOR to all persons supplying labor and materials in the prosecution of the WORK provided by the CONTRACT DOCUMENTS. Such BONDS shall be executed by the CONTRACTOR and a corporate bonding company licensed to transact such business in the state in which the WORK is to be performed and named on the current list of "Surety Companies Acceptable on Federal Bonds" as published in the Treasury Department Circular Number 570. The expense of these BONDS shall be borne by the

CONTRACTOR. If at any time a surety on any such BOND is declared a bankrupt or loses its right to do business in the state in which the WORK is to be performed or is removed from the list of Surety Companies accepted on Federal Bonds, CONTRACTOR shall within ten (10) days after notice from the OWNER to do so, substitute an acceptable BOND (or BONDS) in such form and sum and signed by such other surety or sureties as may be satisfactory to the OWNER. The premiums on such BOND shall be paid by the CONTRACTOR. No further payment shall be deemed due nor shall be made until the new surety or sureties shall have furnished an acceptable BOND to the OWNER.

23. ASSIGNMENTS

23.1 Neither the CONTRACTOR nor the OWNER shall sell, transfer, assign, or otherwise dispose of the Contract or any portion thereof, or of any right, title or interest therein, or any obligations thereunder, without written consent of the other party.

24. INDEMNIFICATION

24.1 The CONTRACTOR will indemnify and hold harmless the OWNER and the ENGINEER and their agents and employees from and against all claims, damages, losses and expenses including attorney's fees arising out of or resulting from the performance of the WORK, provided that any such claims, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property including the loss of use resulting therefrom; and is caused in whole or in part by any negligent or willful act or omission of the CONTRACTOR, and SUBCONTRACTOR, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable.

24.2 In any and all claims against the OWNER or the ENGINEER, or any of their agents or employees, by any employee of the CONTRACTOR, any SUBCONTRACTOR, anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable, the indemnification obligation shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for the CONTRACTOR or any SUBCONTRACTOR under workmen's compensation acts, disability benefit acts or other employee benefits acts.

24.3 The obligation of the CONTRACTOR under this paragraph shall not extend to the liability of the ENGINEER, its agents or employees arising out of the preparation or approval of maps, DRAWINGS, opinions, reports, surveys, CHANGE ORDERS, designs or SPECIFICATIONS.

25. SEPARATE CONTRACTS

25.1 The OWNER reserves the right to let other contracts in connection with this PROJECT. The CONTRACTOR shall afford other CONTRACTORS reasonable

opportunity for the introduction and storage of their materials and the execution of their WORK, and shall properly connect and coordinate the WORK with theirs. If the proper execution or results of any part of the CONTRACTOR'S WORK depends upon the WORK of any other CONTRACTOR, the CONTRACTOR shall inspect and promptly report to the ENGINEER any defects in such WORK that render it unsuitable for such proper execution and results.

25.2 The OWNER may perform additional WORK related to the PROJECT or the OWNER may let other contracts containing provisions similar to these. The CONTRACTOR will afford the other CONTRACTORS who are parties to such Contracts (or the OWNER, if the OWNER is performing the additional WORK) reasonable opportunity for the introduction and storage of materials and equipment and the execution of WORK, and shall properly connect and coordinate the WORK with theirs.

25.3 If the performance of additional WORK by other CONTRACTORS or the OWNER is not noted in the CONTRACT DOCUMENTS prior to the execution of the CONTRACT, written notice thereof shall be given to the CONTRACTOR prior to starting any such additional WORK. If the CONTRACTOR believes that the performance of such additional WORK by the OWNER or others involves it in additional expense or entitles it to an extension of the CONTRACT TIME, the CONTRACTOR may make a claim thereof as provided in Sections 14 and 15.

26. SUBCONTRACTING

26.1 The CONTRACTOR may utilize the services of specialty SUBCONTRACTS on those parts of the WORK which, under normal contracting practices, are performed by specialty SUBCONTRACTORS.

26.2 The CONTRACTOR shall not award WORK to SUBCONTRACTOR(s), in excess of sixty (60%) percent of the CONTRACT PRICE, without prior written approval of the OWNER.

26.3 The CONTRACTOR shall be fully responsible to the OWNER for the acts and omissions of its SUBCONTRACTORS, and of persons either directly or indirectly employed by them, as the CONTRACTOR is for the acts and omissions of persons directly employed by the CONTRACTOR.

26.4 The CONTRACTOR shall cause appropriate provisions to be inserted in all subcontracts relative to the WORK to bind SUBCONTRACTORS to the CONTRACTOR by the terms of the CONTRACT DOCUMENTS insofar as applicable to the WORK of SUBCONTRACTORS and to give the CONTRACTOR the same power as regards terminating any subcontract that the OWNER may exercise over the CONTRACTOR under any provision of the CONTRACT DOCUMENTS.

26.5 Nothing contained in this CONTRACT shall create any contractual relationship between any SUBCONTRACTOR and the OWNER.

27. ENGINEER'S AUTHORITY

27.1 The ENGINEER shall act as the OWNER'S representative during the construction period, shall decide questions which may arise as to quality and acceptability of materials furnished and WORK performed, and shall interpret the intent of the CONTRACT DOCUMENTS in a fair and unbiased manner. The ENGINEER will make visits to the site and determine if the WORK is proceeding in accordance with the CONTRACT DOCUMENTS.

27.2 The CONTRACTOR will be held strictly to the intent of the CONTRACT DOCUMENTS in regard to the quality of materials, workmanship, and execution of the WORK. Inspections may be made at the factory or fabrication plant of the source of material supply.

27.3 The ENGINEER will not be responsible for the construction means, controls, techniques, sequences, procedures, or construction safety.

27.4 The ENGINEER shall promptly make decisions relative to interpretation of the CONTRACT DOCUMENTS.

28. LAND AND RIGHTS-OF-WAY

28.1 Prior to issuance of NOTICE TO PROCEED, the OWNER shall obtain all land and rights-of-way necessary for carrying out and for the completion of the WORK to be performed pursuant to the CONTRACT DOCUMENTS, unless otherwise mutually agreed.

28.2 The OWNER shall provide to the CONTRACTOR information which delineates and describes the lands owned and rights-of-way acquired.

28.3 The CONTRACTOR shall provide at its own expense and without liability to the OWNER any additional land and access thereto that the CONTRACTOR may desire for temporary construction facilities, or for storage of materials.

29. GUARANTEE

29.1 The CONTRACTOR shall guarantee all materials and equipment furnished and WORK performed for a period of one (1) year from the date of SUBSTANTIAL COMPLETION. The CONTRACTOR warrants and guarantees for a period of one (1) year from the date of SUBSTANTIAL COMPLETION of any system that the completed system is free from all defects due to faulty materials or workmanship and the CONTRACTOR shall promptly make such corrections as may be necessary by reason of

such defects including the repairs of any damage to other parts of the system resulting from such defects. The OWNER will give notice of observed defects with reasonable promptness. In the event that the CONTRACTOR should fail to make such repairs, adjustments, or other WORK that may be made necessary by such defects, the OWNER may do so and charge the CONTRACTOR the cost thereby incurred. The Performance BOND shall remain in full force and effect through the guarantee period.

30. ARBITRATION BY MUTUAL AGREEMENT

30.1 All claims, disputes, and other matters in question arising out of, or relating to, the CONTRACT DOCUMENTS or the breach thereof, except for claims which have been waived by making an acceptance of final payment as provided by Section 20, may be decided by arbitration if the parties mutually agree. Any agreement to arbitrate shall be specifically enforceable under the prevailing arbitration law. The award rendered by the arbitrators shall be final, and judgment may be entered upon it in any court having jurisdiction thereof.

30.2 Notice of the request for arbitration shall be filed in writing with the other party to the CONTRACT DOCUMENTS and a copy shall be filed with the ENGINEER. Request for arbitration shall in no event be made on any claim, dispute, or other matter in question which would be barred by the applicable statute of limitations.

30.3 The CONTRACTOR will carry on the WORK and maintain the progress schedule during any arbitration proceedings, unless otherwise mutually agreed in writing.

31. TAXES

31.1 The CONTRACTOR will pay all sales, consumer, use, and other similar taxes required by the laws of the place where the WORK is performed.

32. ENVIRONMENTAL REQUIREMENTS

The CONTRACTOR, when constructing a project involving trenching and/or other related earth excavation, shall comply with the following environmental constraints:

32.1 WETLANDS - The CONTRACTOR, when disposing of excess, spoil, or other construction materials on public or private property, WILL NOT FILL IN or otherwise CONVERT WETLANDS.

32.2 FLOODPLAINS - The CONTRACTOR, when disposing of excess, spoil, or other construction materials on public or private property, WILL NOT FILL IN or otherwise CONVERT 100 YEAR FLOODPLAIN areas delineated on the latest FEMA Floodplain Maps.

32.3 HISTORIC PRESERVATION - Any excavation by the Contractor that uncovers an historical or archaeological artifact shall be immediately reported to the PROJECT ENGINEER. Construction shall be temporarily halted pending the notification process and further directions issued by ENGINEER after consultation with the State Historic

Preservation Officer (SHPO).

32.4 ENDANGERED SPECIES - The CONTRACTOR shall comply with the Endangered Species Act, which provides for the protection of endangered and/or threatened species and critical habitat. Should any evidence of the presence of endangered and/or threatened species or their critical habitat be brought to the attention of the CONTRACTOR, the CONTRACTOR will immediately report this evidence to the PROJECT ENGINEER. Construction shall be temporarily halted pending the notification process and further directions issued by the ENGINEER after consultation with the U.S. Fish and Wildlife Service.

Lauderdale County Board of Supervisors

NON COLLUSION AFFIDAVIT
CERTIFICATION
(Execute in triplicate)

State of Mississippi
County of _____

I,_____,
(Name of person signing certification)

individually, and in my capacity as _____ of
(Title)

_____ do hereby certify under
(Name of Firm, Partnership, or Corporation)

penalty of perjury under the laws of the United States and the State of Mississippi that
_____, Bidder
(Name of Firm, Partnership, or Corporation)

on Project Lauderdale County Health Department WIC Renovation, in Lauderdale
County, Mississippi, has not directly or indirectly entered into any agreement, participated in any collusion; or otherwise taken any action in restraint of free competitive bidding in connection with this contract; nor have any of its corporate officers or principal owners.

All of the foregoing is true and correct.

Executed on _____ _____
(date) Signatur

SCOPE OF WORK

GENERAL

The Contract Documents for this project contain a complete set of project plans and specifications**.**

It shall be the responsibility of the Contractor to protect all existing structures, from damage occurring as a result of the Contractor's operations. Damages to existing features caused by the Contractor's operations shall be repaired or replaced at no cost to the Owner.

The Work shall consist of the following:

Scope of Work

1. Renovate Public Restrooms:
   - Replace fixtures: Toliets/urinal, hand sinks, light fixtures
   - Replace tile flooring
   - Paint walls, doors, trim
2. Replace Public Water Fountain ourside Men's Restroom
3. Install new (lockable) full glassed entry door into the (new)WIC Waiting Area
4. Renovate (new) WIC Waiting Area:
   - Remove half walls
   - Install new vinyl flooring in waiting room and hall
   - Paint walls
   - Install/replace ceiling titles in the waiting area and hall
   - Install/replace new lighting in the WIC Clinic area
5. Close-up the pass through window in the waiting area
6. Renovate (new) Clerical Area:
   - Remove 2 doors to create open clerical/reception workstations
   - Remove small counter and close-up the reception window facing the elevator
   - Install ceiling lights in the clerical area
   - Replace counter tops at clerical work stations
   - Install sliding glass window over clerical workstations facing the WIC waiting area
7. Renovate 5 offices:
   - Counter tops
   - Sinks
   - Ceiling tiles
   - Light fixtures
8. Add walls as identified on the Proposed Renovated Floor Plan
9. Install additional doors as identified on the Proposed Renovated Floor Plan
10. Install new vinyl floor in the area from the public elevator/stairwell into the (new) WIC Waiting Area

SECTION 02225
DEMOLITION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Remove all work as indicated in drawings.

1.02 RELATED SECTIONS

A. Section 01010 – Summary of Work.

1.03 REGULATORY REQUIREMENTS

A. Conform to applicable code and ordinances for disposal of debris.

B. Coordinate demolition work with Owner.

C. Conform to applicable regulatory procedures when discovering hazardous or contaminated materials.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.01 PROTECTION

A. Locate, identify, and protect existing electrical and mechanical not in scope of work from damage.

B. Protect existing structures and other existing construction which are not to be demolished.

3.02 EXECUTION

A. Demolish indicated structures and appurtenances in orderly and careful manner.

B. Cease operations and notify Architect immediately if existing structure or utilities appear to be endangered. Notify Architect of any unknown utilities that are discovered.

C. Care shall be taken to protect all items that are to remain. Items removed or destroyed that were to remain shall be replaced at the expense of the Contractor.

D. Items to be relocated shall be carefully removed and stored until it is needed for new construction.

3.03 DISPOSAL

A. The Contractor shall make a reasonable effort to channel merchantable material into the commercial market to make beneficial use of materials resulting from demolition operations.

B. Except where noted otherwise, immediately remove demolished material from site to a site disposal area furnished by the Contractor. Such disposal shall comply with all applicable federal, state and local laws.

END OF SECTION

SECTION 022230
MINOR DEMOLITION FOR REMODELING

PART1 GENERAL

1.01 SECTION INCLUDES

A Removal of designated building equipment and fixtures.

B. Removal of designated construction.

C. Disposal of materials.

D. Identification of utilities.

1.02 REGULATORY REQUIREMENTS

A Conform to applicable code for demolition work, dust control, products requiring electrical disconnection and re-connection .

B. Obtain required permits from authorities.

C. Do not close or obstruct egress from any building exit or site exit.

D. Do not disable or disrupt building fire or life safety systems without 3 days' prior written notice to Owner.

E. Conform to applicable regulatory procedures when hazardous or contaminated materials are discovered.

1.03 SCHEDULING

A Schedule work to coincide with new construction.

B. Describe demolition removal procedures and schedule.

1.04 PROJECT CONDITIONS

A Conduct demolition to minimize interference with adjacent and occupied building areas.

B. Cease operations immediately if structure appears to be in danger and notify Architect. Do not resume operations until directed.

PART 2 PRODUCTS- NOT USED.

PART 3 EXECUTION

3.01 PREPARATION

A Provide, erect, and maintain temporary barriers at locations indicated.

B. Erect and maintain weatherproof closures for exterior openings.

C. Erect and maintain temporary partitions to prevent spread of dust, odors, and noise to permit continued building occupancy.

D. Protect existing materials and finishes that are not to be demolished.

E. Prevent movement of structure; provide bracing and shoring.

F. Notify affected utility companies before starting work and comply with their requirements.

G. Mark location and termination of utilities.

H. Provide appropriate temporary signage including signage for exit or building egress.

3.02 DEMOLITION

A Disconnect, remove, and identify designated utilities within demolition areas.

B. Demolish in an orderly and careful manner. Protect existing supporting structural members .

C. Remove demolished materials from site except where specifically noted otherwise. Do not burn or bury materials on site.

D. Remove materials as demolition progresses. Upon completion of demolition, leave areas in clean condition.

SECTION 06100

ROUGH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Preservative treated wood materials.

B. Fire retardant treated wood materials.

C. Communications and electrical room mounting boards.

D. Concealed wood blocking, nailers, and supports.

1.02 RELATED REQUIREMENTS

A. Section 09260 (092116) - Gypsum Board Assemblies: Gypsum-based sheathing.

1.03 REFERENCE STANDARDS

A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.

B. ASTM D2898 - Standard Test Methods for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing; 2010.

C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2010b.

D. AWPA C2 - Lumber, Timber, Bridge Ties and Mine Ties -- Preservative Treatment by Pressure Processes; American Wood Protection Association; 2003.

E. AWPA C20 - Structural Lumber -- Fire Retardant Treatment by Pressure Processes; American Wood-Protection Association; 2003.

F. AWPA C27 - Plywood -- Fire-Retardant Treatment by Pressure Processes; American Wood-Protection Association; 2002.

G. AWPA U1 - Use Category System: User Specification for Treated Wood; American Wood Protection Association; 2010.

H. PS 1 - Structural Plywood; 2007.

I. PS 20 - American Softwood Lumber Standard; National Institute of Standards and Technology (Department of Commerce); 2005.

J. SPIB (GR) - Grading Rules; Southern Pine Inspection Bureau, Inc.; 2002.

1.04 SUBMITTALS

A. See Section 01340 - Administrative Requirements, for submittal procedures.

B. Samples: For rough carpentry members that will be exposed to view, submit two samples, 6” x 6” inch in size illustrating wood grain, color, and general appearance.

C. Manufacturer's Certificate: Certify that wood products supplied for rough carpentry meet or exceed specified requirements.

1.05 DELIVERY, STORAGE, AND HANDLING

A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.

B. Fire Retardant Treated Wood: Prevent exposure to precipitation during shipping, storage, or installation.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
   1. Species: Southern Pine, unless otherwise indicated.
   2. If no species is specified, provide any species graded by the agency specified; if no grading agency is specified, provide lumber graded by any grading agency meeting the specified requirements.
   3. Grading Agency: Any grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee (www.alsc.org) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.
   4. Lumber of other species or grades is acceptable provided structural and appearance characteristics are equivalent to or better than products specified.

B. Lumber fabricated from old growth timber is not permitted.

2.02 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

A. Grading Agency: Southern Pine Inspection Bureau, Inc. (SPIB).

B. Sizes: Nominal sizes as indicated on drawings, S4S.

C. Moisture Content: Kiln-dry or MC15.

D. Stud Framing (2 by 2 through 2 by 6):
   1. Species: Southern Pine.
   2. Grade: No. 2.

E. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
   1. Lumber: S4S, No. 2 or Standard Grade.
   2. Boards: Standard or No. 3.

2.03 EXPOSED DIMENSION LUMBER

A. Grading Agency: Southern Pine Inspection Bureau, Inc. (SPIB).

B. Sizes: Nominal sizes as indicated on drawings, S4S.

C. Moisture Content: Kiln-dry or MC15.

D. Species: Southern Pine.

E. Joist, Rafter, and Small Beam Framing (2 by 6 through 4 by 16):
   1. Species: Southern Pine.
   2. Grade: Clear Structural.

2.04 CONSTRUCTION PANELS

A. Communications and Electrical Room Mounting Boards: PS 1 A-D plywood, or medium density fiberboard; 3/4 inch thick; flame spread index of 25 or less, smoke

developed index of 450 or less, when tested in accordance with ASTM E84.

B. Other Additional Requirements:
   1. Plywood Concealed From View But Located Within Exterior Enclosure: PS 1, C-C Plugged or better, Exterior grade.
   2. Plywood Exposed to View But Not Exposed to Weather: PS 1, A-D, or better.
   3. Other Locations: PS 1, C-D Plugged or better.

2.05 ACCESSORIES

A. Fasteners and Anchors:
   1. Metal and Finish: Hot-dipped galvanized steel per ASTM A 153/A 153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.
   2. Drywall Screws: Bugle head, hardened steel, power driven type, length three times thickness of sheathing.
   3. Anchors: Expansion shield and lag bolt type for anchorage to solid masonry or concrete.

2.06 FACTORY WOOD TREATMENT

A. Treated Lumber and Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.
   1. Fire-Retardant Treated Wood: Mark each piece of wood with producer's stamp indicating compliance with specified requirements.
   2. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWPA standards.

B. Fire Retardant Treatment:
   1. Interior Type A: AWPA U1, Use Category UCFA, Commodity Specification H, low temperature (low hygroscopic) type, chemically treated and pressure impregnated; capable of providing a maximum flame spread rating of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes.
      a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
      b. Treat rough carpentry items as indicated .
      c. Do not use treated wood in applications exposed to weather or where the wood may become wet.

C. Preservative Treatment:
   1. Preservative Pressure Treatment of Lumber Above Grade: AWPA U1, Use Category UC3B, Commodity Specification A using waterborne preservative to 0.25 lb/cu ft retention.
      a. Kiln dry lumber after treatment to maximum moisture content of 19 percent.
      b. Treat lumber exposed to weather.
      c. Treat lumber in contact with roofing, flashing, or waterproofing.

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

A. Select material sizes to minimize waste.

B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.

C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

3.02 BLOCKING, NAILERS, AND SUPPORTS

A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.

B. In metal stud walls, provide continuous blocking around door and window openings for anchorage of frames, securely attached to stud framing.

C. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.

D. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.

E. Specifically, provide the following non-structural framing and blocking:
   1. Cabinets and shelf supports.
   2. Wall brackets.
   3. Handrails.
   4. Grab bars and toilet accessories
   5. Acoustical wall panels
   6. Wall-mounted door stops.
   7. Chalkboards and marker boards.
   8. Wall paneling and trim.
   9. Joints of rigid wall coverings that occur between studs.

3.03 INSTALLATION OF CONSTRUCTION PANELS

A. Roof Sheathing: Secure panels with long dimension perpendicular to framing members, with ends staggered and over firm bearing.
   1. At long edges use sheathing clips where joints occur between roof framing members.
   2. Nail panels to framing; staples are not permitted.

B. Communications and Electrical Room Mounting Boards: Secure with screws to studs with edges over firm bearing; space fasteners at maximum 24 inches on center on all edges and into studs in field of board.
   1. At fire-rated walls, install board over wall board indicated as part of the fire-rated assembly.
   2. Where boards are indicated as full floor-to-ceiling height, install with long edge of board parallel to studs.
   3. Install adjacent boards without gaps.
   4. Size: 48 by 96 inches, installed horizontally at ceiling height.

3.04 TOLERANCES

A. Framing Members: 1/4 inch from true position, maximum.

B. Variation from Plane (Other than Floors): 1/4 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.

END OF SECTION

SECTION 06200

FINISH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Finish carpentry items.

1. Including, but not limited to, wood platform steps.

B. Hardware and attachment accessories.

1.02 RELATED REQUIREMENTS

A. Section 06100 (061000) - Rough Carpentry: Support framing, grounds, and concealed blocking.

B. Section 06410 (064100) - Custom Cabinets: Shop fabricated custom cabinet work.

C. Section 09900 (099000) - Paints and Coatings: Painting and finishing of finish carpentry items.

1.03 REFERENCE STANDARDS

A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; current edition.

B. ANSI A135.4 - American National Standard for Basic Hardboard; 2004.

C. ANSI A208.1 - American National Standard for Particleboard; 2009.

D. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings, Safety Performance Specifications and Methods of Test; 2010.

E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2010b.

F. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2009.

G. BHMA A156.9 - American National Standard for Cabinet Hardware; Builders Hardware Manufacturers Association; 2010 (ANSI/BHMA A156.9).

H. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood; Hardwood Plywood & Veneer Association; 2004.

I. NEMA LD 3 - High-Pressure Decorative Laminates; National Electrical Manufacturers Association; 2005.

J. NHLA G-101 - Rules for the Measurement & Inspection of Hardwood & Cypress; National Hardwood Lumber Association; 2007.

K. PS 1 - Structural Plywood; 2007.

L. PS 20 - American Softwood Lumber Standard; National Institute of Standards and Technology (Department of Commerce); 2005.

M. WDMA I.S.4 - Water-Repellent Preservative Non-Pressure Treatment for Millwork; Window and Door Manufacturers Association; 2009.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the work with plumbing rough-in, electrical rough-in, and installation of associated and adjacent components.

B. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

1.05 SUBMITTALS

A. See Section 01340 – Shop Drawings for submittal procedures.

B. Product Data:
   1. Provide data on fire retardant treatment materials and application instructions.
   2. Provide instructions for attachment hardware and finish hardware.

C. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
   1. Minimum Scale of Detail Drawings: 1-1/2 inch to 1 foot.
   2. Provide the information required by AWI/AWMAC/WI Architectural Woodwork Standards.

D. Samples: Submit two samples of finish plywood, 12 x 12 inch in size illustrating wood grain and specified finish.

E. Samples: Submit two samples of wood trim 12 inch long.

1.06 QUALITY ASSURANCE

A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum three years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Protect work from moisture damage.

PART 2 PRODUCTS

2.01 FINISH CARPENTRY ITEMS

A. Quality Grade: Unless otherwise indicated provide products of quality specified by AWI/AWMAC/WI Architectural Woodwork Standards for Premium Grade.

B. Surface Burning Characteristics: Provide materials having fire and smoke properties as required by applicable code.

C. Interior Woodwork Items:
   1. Moldings, Bases, Casings, and Miscellaneous Trim; prepare for paint finish. See Interior Finish Schedule and drawings for types and details.
   2. Wood platform steps; prepare for finish. See Interior Finish Schedule.

2.02 WOOD-BASED COMPONENTS

A. Wood fabricated from old growth timber is not permitted.

B. Provide sustainably harvested wood, certified or labeled as specified in Section 01600 (016000).

2.03 LUMBER MATERIALS

A. Hardwood Lumber: Poplar species, molded surface sawn lumber, maximum

moisture content of 6 percent, custom grade for painted finish.

B. Hardwood Lumber: Oak species, plain sawn lumber, maximum moisture content of 6 percent, custom grade for stained finish.
   1. Platform Steps: 1-1/4 inch oak lumber, rounded nosing.

2.04 FASTENINGS

A. Adhesive for Purposes Other Than Laminate Installation: Suitable for the purpose; not containing formaldehyde or other volatile organic compounds.

B. Fasteners: Of size and type to suit application.

2.05 ACCESSORIES

A. Wood Filler: Solvent base, tinted to match surface finish color.

2.06 FABRICATION

A. Shop assemble work for delivery to site, permitting passage through building openings.

B. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify adequacy of backing and support framing.

B. Verify mechanical, electrical, and building items affecting work of this section are placed and ready to receive this work.

3.02 INSTALLATION

A. Install work in accordance with AWI/AWMAC/WI Architectural Woodwork Standards requirements for grade indicated.

B. Set and secure materials and components in place, plumb and level.

C. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.

3.03 PREPARATION FOR SITE FINISHING

A. Set exposed fasteners. Apply wood filler in exposed fastener indentations. Sand work smooth.

B. Site Finishing: See Section 09900 (099000).

3.04 TOLERANCES

A. Maximum Variation from True Position: 1/16 inch.

B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch.

END OF SECTION

SECTION 07212

BATT INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Batt insulation in interior metal stud construction.

B. Batt insulation for interior ceilings

1.02 RELATED REQUIREMENTS

A. Section 09260 (092116) - Gypsum Board Assemblies: Acoustic insulation inside walls and partitions.

1.03 REFERENCE STANDARDS

A. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2006.

B. ASTM D2842 - Standard Test Method for Water Absorption of Rigid Cellular Plastics; 2006.

C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2010b.

D. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2010.

E. ASTM E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 Degrees C; 2011.

F. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials; National Fire Protection Association; 2006.

G. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01300 (013000) - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.

C. Manufacturer's Installation Instructions: Include information on special environmental conditions required for installation and installation techniques.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.05 FIELD CONDITIONS

A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

PART 2 PRODUCTS

2.01 APPLICATIONS

A. Insulation in Metal Framed Walls: Batt insulation with no vapor retarder.

2.02 BATT INSULATION MATERIALS

A. Glass Fiber Batt Insulation: Flexible preformed batt or blanket, complying with ASTM C665; friction fit.
   1. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
   2. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
   3. Combustibility: Non-combustible, when tested in accordance with ASTM E136.
   4. Facing: Unfaced.
   5. Manufacturers:
      a. Owens Corning Corp: www.owenscorning.com.
   6. Substitutions: See Section 01600 (016000) - Product Requirements.
   7. Locations:
      a. Ceilings: Batt Insulation.
         1) Product: Owens Corning Unfaced Building Insulation.
         2) Thermal Resistance: R of 11.
         3) Thickness: 3-1/2 inch.

B. Mineral Fiber Batt Insulation: Flexible preformed batt or blanket, complying with ASTM C665; friction fit; unfaced flame spread index of 0 (zero) when tested in accordance with ASTM E84.
   1. Locations: as indicated on drawings
   2. Smoke Developed Index: 0 (zero), when tested in accordance with ASTM E84.
   3. Thickness: 6 inch.
   4. Manufacturers:
      a. Thermafiber, Inc: www.thermafiber.com.
      b. Substitutions: See Section 01600 (016000) - Product Requirements.

2.03 ACCESSORIES

A. Insulation Fasteners: Impaling clip of unfinished steel with washer retainer and clips, to be adhered to surface to receive insulation, length to suit insulation thickness and substrate, capable of securely and rigidly fastening insulation in place.

B. Adhesive: Type recommended by insulation manufacturer for application.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation and adhesive.

B. Verify substrate surfaces are flat, free of irregularities or materials or substances that may impede adhesive bond.

3.02 BATT INSTALLATION

A. Install insulation in accordance with manufacturer's instructions.

B. Install in interior walls and ceiling spaces/clouds without gaps or voids as indicated on drawings. Do not compress insulation.

C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.

D. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.

E. Retain insulation batts in place with spindle fasteners at 12 inches on center.

3.03 PROTECTION

A. Do not permit installed insulation to be damaged prior to its concealment.

END OF SECTION

SECTION 08110

STEEL DOORS AND FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Non-fire-rated steel doors and frames.

B. Steel frames for wood doors.

C. Thermally insulated steel doors.

D. Steel glazing frames.

1.02 RELATED REQUIREMENTS

A. Section 08710 (08 7100) - Door Hardware.

B. Section 08800 (08 8000) - Glazing: Glass for doors and borrowed lites.

C. Section 09900 (09 9000) - Paints and Coatings: Field painting.

1.03 REFERENCE STANDARDS

A. ANSI/ICC A117.1 - American National Standard for Accessible and Usable Buildings and Facilities; International Code Council; 2009.

B. ANSI A250.8 - SDI-100 Recommended Specifications for Standard Steel Doors and Frames; 2003.

C. ANSI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 1998 (R2004).

D. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2010.

E. ASTM C1363 - Standard Test Method for Thermal Performance of Building Assemblies by Means of a Hot Box Apparatus; 2005.

F. BHMA A156.115 - Hardware Preparation in Steel Doors and Steel Frames; 2006.

G. DHI A115 Series - Specifications for Steel Doors and Frame Preparation for Hardware; Door and Hardware Institute; 2000 (ANSI/DHI A115 Series).

H. NAAMM HMMA 840- Guide Specifications for Installation and Storage of Hollow Metal Doors and Frames; The National Association of Architectural Metal Manufacturers; 2007.

1.04 SUBMIITALS

A. See Section 01300 (01 3000) - Administrative Requirements for submittal procedures.

B. Product Data: Materials and details of design and construction, hardware

locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced grade standard.

C. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and identifying location of different finishes, if any.

D. Installation Instructions: Manufacturer's published instructions, including any special installation instructions relating to this project.

E. Manufacturer's Certificate: Certification that products meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

B. Maintain at the project site a copy of all reference standards dealing with installation.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Store in accordance with NAAMM HMMA 840.

B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Steel Doors and Frames:
   1. Assa Abloy Ceco, Curries, or Fleming: www.assaabloydss.com.
   2. Steelcraft; Product L-Series: www.steelcraft.com.
   3. Substitutions: See Section 01600 (01 6000)- Product Requirements.

2.02 DOORS AND FRAMES

A. Requirements for All Doors and Frames:
   1. Accessibility: Comply with ANSI/ICC A117.1.
   2. Door Top Closures: Flush with top of faces and edges.
   3. Door Edge Profile: Beveled on both edges.
   4. Door Texture: Smooth faces.
   5. Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings.
   6. Hardware Preparation: In accordance with BHMA A156.115, with reinforcement welded in place, in addition to other requirements specified in door grade standard.
   7. Galvanizing for Units in Wet Areas: All components hot-dipped zinc-iron alloy-coated (galvannealed), manufacturer's standard coating thickness.
   8. Finish: Factory primed, for field finishing.

B. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with all the specified requirements for each type; for instance, an exterior door that is also indicated as

being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.03 STEEL FRAMES

A. General:
   1. Comply with the requirements of grade specified for corresponding door, except:
      a. ANSI A250.8 Level 3 Doors: 14 gage frames.
      b. Frames for Wood Doors: Comply with frame requirements specified in ANSI A250.8 for Level 2
   2. Finish: Same as for door.
   3. Provide mortar guard boxes for hardware cut-outs in frames to be installed in masonry or to be grouted.
   4. Frames in Masonry Walls: Size to suit masonry coursing with head member 4 inches high to fill opening without cutting masonry units.
   5. Frames Wider than 48 Inches: Reinforce with steel channel fitted tightly into frame head, flush with top.

B. Exterior Door Frames: Face welded, seamless with joints filled.
   1. Galvanizing: All components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness.
   2. Weatherstripping: Separate, see Section 08710 (08 7100).

C. Interior Door Frames, Non-Fire-Rated: Face welded type.

D. Frames for Interior Glazing or Borrowed Lights: Construction and face dimensions to match door frames, and as indicated on drawings.

2.04 ACCESSORY MATERIALS

A. Glazing: As specified in Section 08800 (08 8000).

B. Astragals for Double Doors: Specified in Section 08710 (08 7100).

C. Grout for Frames: Portland cement grout of maximum 4-inch slump for hand troweling; thinner pumpable grout is prohibited.

D. Silencers: Resilient rubber, fitted into drilled hole; 3 on strike side of single door, 3 on center mullion of pairs, and 2 on head of pairs without center mullions.
   1. Coordinate with Section 08710 (08 7100) regarding who is providing silencers. If Section 08710 (08 7100) list silencers then that section is providing the silencers for that door(s).

E. Temporary Frame Spreaders: Provide for all factory- or shop-assembled frames.

2.05 FINISH MATERIALS

A. Primer: Rust-inhibiting, complying with ANSI A250.10, door manufacturer's standard.

B. Bituminous Coating: Asphalt emulsion or other high-build, water-resistant,

resilient coating.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

3.02 PREPARATION

A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

3.03 INSTALLATION

A. Install in accordance with the requirements of the specified door grade standard and NAAMM HMMA 840.

B. Coordinate frame anchor placement with wall construction.

C. Grout frames in masonry construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames.

D. Coordinate installation of hardware.

E. Coordinate installation of glazing.

3.04 TOLERANCES

A. Clearances Between Door and Frame: As specified in ANSI A250.8.

B. Maximum Diagonal Distortion: 1/16 in measured with straight edge, corner to corner.

3.05 ADJUSTING

A. Adjust for smooth and balanced door movement.

3.06 SCHEDULE - See Drawings

A. Refer to Hollow Metal (HM) designations on the drawings.

END OF SECTION

SECTION 08211

FLUSH WOOD DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Flush wood doors; flush configuration.

1.02 RELATED REQUIREMENTS

B. Section 08710 (087100) - Door Hardware.

C. Section 08800 (088000) - Glazing.

D. Section 09900 (099000)- Paints and Coatings: Site finishing of door frames.

1.03 REFERENCE STANDARDS

A. AWI/AWMAC/WI (AWS)- Architectural Woodwork Standards; 2009.

B. ICC (IBC)- International Building Code; 2009.

C. ITS (DIR) - Directory of Listed Products; Intertek Testing Services NA, Inc.; current edition.

D. NFPA 80- Standard for Fire Doors and Other Opening Protectives; 2010.

E. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; National Fire Protection Association; 2012.

F. UL (BMD) - Building Materials Directory; Underwriters Laboratories Inc.; current edition.

G. UL 10B - Standard for Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

H. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

I. WDMA I.S.1-A - Architectural Wood Flush Doors; Window and Door Manufacturers Association; 2004.

1.04 SUBMITTALS

A. See Section 01300 - Administrative Requirements for submittal procedures.

B. Product Data: Indicate door core materials and construction; veneer species, type and characteristics.

C. Shop Drawings: Show doors and frames, elevations, sizes, types, swings, undercuts, beveling, blocking for hardware, factory machining, factory finishing, cutouts for glazing and other details.

D. Specimen warranty.

E. Samples: Submit two samples of door construction, 12 by 12 inch in size cut

from top corner of door.

F. Samples: Submit two samples of door veneer, 12 by 12 inch in size illustrating wood grain, stain color, and sheen.

G. Manufacturer's Installation Instructions: Indicate special installation instructions.

H. Warranty, executed in Owner's name.

1.05 QUALITY ASSURANCE

A. Maintain one copy of the specified door quality standard on site for review during installation and finishing.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Package, deliver and store doors in accordance with specified quality standard.

B. Accept doors on site in manufacturer's packaging. Inspect for damage.

C. Protect doors with resilient packaging sealed with heat shrunk plastic. Do not store in damp or wet areas; or in areas where sunlight might bleach veneer. Seal top and bottom edges with tinted sealer if stored more than one week. Break seal on site to permit ventilation.

1.07 WARRANTY

A. See Section 01780 (017800) - Closeout Submittals for additional warranty requirements.

B. Interior Doors: Provide manufacturer's warranty for the life of the installation.

C. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Wood Veneer Faced Doors:
   1. Graham Wood Doors: www.grahamdoors.com.
   2. Substitutions: See Section 01600 (016000) - Product Requirements.

2.02 DOORS

A. All Doors: See drawings for locations and additional requirements.
   1. Quality Level: Custom Grade, in accordance with AWI/AWMAC/WI Architectural Woodwork Standards.
   2. Wood Veneer Faced Doors: 5-ply unless otherwise indicated.

B. Interior Doors: 1-3/4 inches thick unless otherwise indicated; flush construction.
   1. Provide solid core doors at all locations.
   2. Wood veneer facing with factory transparent finish.

2.03 DOOR AND PANEL CORES

A. Solid Core: Type particleboard core (PC), plies and faces as indicated above.

2.04 DOOR FACINGS AND FINISHES

A. Wood Veneer Facing for Transparent Finish: Plain Sliced White Maple, veneer grade as specified above, plain sliced, book veneer match, center balance assembly match; unless otherwise indicated.
   1. Vertical Edges: Same species as face veneer.
   2. Pairs: Pair match each pair; set match pairs within 10 feet of each other when doors are closed.
   3. Finish: Graham Wood Doors, Natural Solutions (stain color to be custom stain to match architect's sample).

B. Facing Adhesive: Type II – water resistant.

B. Factory finish doors in accordance with specified quality standard:
   1. Semi-transparent finish shall have a pigmented modified stain.
   2. Water-clear topcoat shall be 100% solids modified acrylic urethane with low level V.O.C.'s.

2.05 ACCESSORIES

A. Glazing Stops: Wood, of same species as door facing, mitered corners; prepared for countersink style tamper proof screws.

2.06 DOOR CONSTRUCTION

A. Fabricate doors in accordance with door quality standard specified.

B. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.

C. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.
   1. Exception: Doors to be field finished.

D. Provide edge clearances in accordance with the quality standard specified.

E. Door View Lites: 2010 ADA Standards for Accessibility Design, **Section 404.2.11 Vision Lights.** *Doors, gates, and side lights adjacent to doors or gates, containing one or more glazing panels that permit viewing through the panels shall have the bottom of at least one glazed pane/located 43 inches (1090 mm) maximum above the finish floor.* ***EXCEPTION:*** *Vision lights with the lowest part more than 66 inches (1675 mm) from the finish floor or ground shall not be required to comply with 404.2.11.*

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

C. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

3.02 INSTALLATION

A. Install doors in accordance with manufacturer's instructions and specified quality standard.

B. Factory-Finished Doors: Do not field cut or trim; if fit or clearance is not correct, replace door.

C. Use machine tools to cut or drill for hardware.

D. Coordinate installation of doors with installation of frames and hardware.

E. Coordinate installation of glazing.

3.03 TOLERANCES

A. Conform to specified quality standard for fit and clearance tolerances.

B. Conform to specified quality standard for telegraphing, warp, and squareness.

3.04 ADJUSTING

A. Adjust doors for smooth and balanced door movement.

B. Adjust closers for full closure.

3.05 SCHEDULE – See Drawings

END OF SECTION

SECTION 08710
DOOR HARDWARE

PART 1 GENERAL

1.01 SUMMARY

A. The extent of hardware is shown on the drawings and in schedules. Finish hardware is hereby defined to include all items known commercially as builders hardware, as required for swing doors, except special types of unique and non-matching hardware specified in the same section as the door and door frame. The required types of hardware include (but are not necessarily limited to) the following:

1. Butts and hinges
2. Lock cylinders and keys
3. Lock and latch sets
4. Bolts
5. Panic exit devices
6. Push/pull units
7. Closers
8. Door trim units
9. Stripping and seals

B. Items of hardware not definitively specified, but required for the completion and proper operation of the doors, shall be suitable in type, comparable to the type specified for similar openings. Labeled doors shall be fitted with labeled hardware.

1.02 COORDINATION

A. All modifications of hardware required by reason of construction characteristics shall be such as to provide the proper operation or functional features. Contractor shall be fully responsible for checking all details, such as wall trim clearance, bevels, backsets, proper type strike plates, length of spindles, hands of locks, etc., in order that all items of hardware shall fit properly. Hardware for application to metal shall be made to standard templates. Template information shall be furnished to door and frame fabricators and all other trades requiring same, in order that they may cut, reinforce or otherwise prepare in the shop, materials for reception of hardware.

B. Coordinate layout and installation of recessed pivots and closers with floor construction.

C. Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing door hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

D. Coordinate layout and installation of electrified door hardware with connection to power supplies, fire alarm system and detection devices, access control system, and security system. Verify that the appropriate power supply for each type of powered device is provided.

1.03 QUALITY ASSURANCE

A. Hardware shall be free from defects affecting appearance and serviceability. Working parts shall be well fitted and smooth working without unnecessary play.

B. Installer shall have a record of completed work with successful in-service performance and shall have a minimum of five years experience in the installation of door hardware similar in material, design, and extent to that indicated for this Project

C. Obtain all door hardware from a single source supplier. Door hardware supplier shall have warehousing facilities in Project's vicinity and shall employ a certified Architectural Hardware Consultant, available during the course of the Work to consult with Contractor, Architect, and Owner about door hardware and keying.

D. Architectural Hardware Consultant shall be certified by the Door and Hardware Institute as a Architectural Hardware Consultant and shall have a minimum of five years experience in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project.

E. Obtain each type and variety of door hardware from a single manufacturer, unless otherwise indicated.

1.04 SUBMITTALS

A. Submit product data, installation details, material descriptions, profiles and finishes on all hardware and accessories.

B. Submit such samples as required by the Architect for approval. Do not deliver hardware until approval is obtained.

C. Submit five copies of a complete schedule of all finish hardware required after all samples have been approved but prior to delivery of hardware. Schedule shall follow requirements of specifications and shall indicate type, manufacturer's name and number, location and finish of each item required. Approval of schedule will not relieve Contractor of responsibility for furnishing all necessary hardware.

D. Submit keying schedule prepared by or under the supervision of supplier, detailing Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations.

E. Submit product certificates signed by manufacturer of electrified door hardware certifying that products furnished comply with requirements. Certify that door

hardware approved for use on types and sizes of labeled fire doors complies with listed fire door assemblies.

1.05 PACKING, MARKING AND DELIVERY

A. Package each item of hardware and lockset separately in individual containers, complete with screws, keys, instructions and installation template for spotting mortising tools. Mark each container with item number corresponding to number shown on Contractor's hardware schedule.

B. All items of hardware shall be delivered to the building site in sufficient time in advance of its requirement for use for inspection prior to installation.

C. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.

D. 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.

1.06 KEYS AND KEYING

A. A keying conference shall be conducted with the Owner and Architect and shall be scheduled at such time to allow Owner input without delay to hardware delivery.

B. All locks shall be set to a master key system and keyed in sets as directed by Architect and Owner.

1.07 WARRANTY

A. Warranties specified in this Article shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Special Warranty: Written warranty, executed by manufacturer agreeing to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period. Failures include, but are not limited to, the following:

1. Structural failures including excessive deflection, cracking, or breakage.

2. Faulty operation of operators and door hardware.

3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

C. Warranty shall be for three years from date of Substantial Completion, unless otherwise indicated.

D. Warranty period for delayed egress locks shall be 5 years from date of

Substantial Completion.

E. Warranty period for manual closers shall be ten years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 LOCKSETS

A. Mortise locksets equal to Corbin/Russwin ML2000, NSA design, 626 finish

2.02 PLATES

A. Shall be type as shown on the schedule. Plates shall be .050 gauge. Push plates shall have 1/2 inch radius corners and eased edges similar to Rockwood 70-RC series.

2.03 SCREWS, BOLTS, ANCHOR AND OTHER FASTENING DEVICES

A. Provide as required to secure each item of hardware. No attempt has been made to enumerate fastening devices in the accompanying hardware schedule. Exposed fasteners shall be finished to match the metal which they fasten.

2.04 SCHEDULE OF HARDWARE

A. Hardware of the following manufacturers equal in quality and comparable in operation to that specified will be acceptable, or equal and comparable hardware of other manufacturers as approved by the Architect.

1.	Butts:	Stanley, Bommer, McKinney
2.	Keyed Locks:	See Owner
3.	Exit Devices	See Owner
4.	Closers	Stanley, Sargent, LCN
5.	Weatherstripping	National Guard, Pemko, Zero
6.	Flat Goods	Trimco, Rockwood, Ives

PART 3 EXECUTION

3.01 INSTALLATION

A. Mount hardware units at heights recommended in "Recommended Locations for Builders' Hardware" NBHA, except as otherwise specifically indicated or required to comply with governing regulations, and except as may be otherwise directed

by the Architect.

B. Install each hardware item in compliance with the manufacturer's

instructions and recommendations. Wherever cutting and fitting is required to install hardware onto or into surfaces which are later to be painted or finished in
another way, install each item completely and then remove and store in a secure place during the finish application. After completion of the finishes, re- install each item. Do not install surface-mounted items until finishes have been completed on the substrate.

C. Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation. Drill and countersink units which are not factory-prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.

D. Cut and fit threshold and floor covers to profile of door frames, with mitered corners and hair-line joints. Join units with concealed welds or concealed mechanical joints. Cut smooth openings for spindles, bolts and similar.

E. Screw thresholds to substrate with No. 10 or larger screws, of the proper type for permanent anchorage and of bronze or stainless steel which will not corrode in contact with the threshold metal.

F. At exterior doors, and elsewhere as indicated, set thresholds in a bed of either butyl rubber sealant or polyisobutylene mastic sealant to completely fill concealed voids and exclude moisture from every source. Do not plug drainage holes or block weeps. Remove excess sealant.

3.02 ADJUST AND CLEAN

A. Adjust and check each operating item of hardware and each door, to ensure proper operation or function of every unit. Lubricate moving parts with type lubrication recommended by manufacturer (graphite-type if no other recommended). Replace units which cannot be adjusted and lubricated to operate freely and smoothly as intended for the application made.

3.03 DOOR HARDWARE SCHEDULE

MANUFACTURER LIST

Code	Name
AB	ABH Manufacturing Inc.
BB	Black Board
BE	Best
NA	National Guard
PR	Precision
SD	Stanley Door Closers
SEC	Securitron
ST	Stanley
TR	Trimco

OPTION LIST

Code	Description
C	Quick Connect Wiring System
SN	Sex Nuts (Pkg. of 4)
B4E	BEVELED 4 EDGES - KICK PLATES
CSK	COUNTER SINKING OF KICK and MOP PLATES
IDH	Integrated Dr. Hardware (45HW, 47HW)
VIN	Visual Indicator
VIT	Visual Indictor Thumb-Turn
EPT Prep	EPT Prep (full mortise)

FINISH LIST

Code	Description
AL	Aluminum
626	Satin Chromium Plated
630	Satin Stainless Steel
689	Aluminum Painted
BLACK	Black
US26D	Chromium Plated, Dull
US32D	Stainless Steel, Dull

END OF SECTION

SECTION 09260

GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Performance criteria for gypsum board assemblies.

B. Metal stud wall framing.

C. Acoustic insulation.

D. Gypsum sheathing.

E. Gypsum wallboard.

F. Joint treatment and accessories.

G. Water-resistive barrier over exterior wall sheathing.

1.02 RELATED REQUIREMENTS

A. Section 05400 (054000) Cold Formed Metal Framing: Exterior wind-load-bearing metal stud framing.

B. Section 06100 (061000) - Rough Carpentry: Wood blocking product and execution requirements.

C. Section 07212 (072100) - Board and Batt Insulation: Acoustic insulation.

D. Section 07900 (079005) - Joint Sealers: Acoustic sealant.

E. Section 09300 (093000)- Tiling: Tile backing board.

1.03 REFERENCE STANDARDS

A. AISI SG02-1 - North American Specification for the Design of Cold-Formed Steel Structural Members; American Iron and Steel Institute; 2001 with 2004 supplement. (replaced SG-971)

B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2010.

C. ASTM C475/C475M- Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2002 (Reapproved 2007).

D. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; 2009a.

E. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2006.

F. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2009a.

G. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2008.

H. ASTM C954- Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness; 2010.

I. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Pane! Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2007.

J. ASTM C1047 - Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base; 201Oa.

K. ASTM C1177/C1177M- Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2008.

L. ASTM C1280 - Standard Specification for Application of Gypsum Sheathing; 2009.

M. ASTM C1396/C1396M- Standard Specification for Gypsum Board; 2009a.

N. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2000 (Reapproved 2005).

O. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009.

P. ASTM E413- Classification for Rating Sound Insulation; 2010.

Q. GA-216 -Application and Finishing of Gypsum Board; Gypsum Association; 2010.

1.04 SUBMITTALS

A. See Section 01300 (013000) - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate special details associated with acoustic seals.

C. Product Data: Provide data on metal framing, gypsum board, accessories, and joint finishing system.

D. Product Data: Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.

E. Test Reports: For all stud framing products that do not comply with ASTM C645 or C 754, provide independent laboratory reports showing maximum stud heights at required spacings and deflections.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing gypsum board application and finishing, with minimum 5 years of documented experience.

B. Copies of Documents at Site: Maintain at the project site a copy of each referenced document that prescribes execution requirements.

PART 2 PRODUCTS

2.01 GYPSUM BOARD ASSEMBLIES

A. Provide completed assemblies complying with ASTM C840 and GA-216.
   1. See PART 3 for finishing requirements.

B. Interior Partitions: Provide completed assemblies with the following characteristics:
   1. Acoustic Attenuation: STC of 45-49 calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.

C. Fire Rated Assemblies: Provide completed assemblies as indicated in drawings
   1. ICC IBC Item Numbers: Comply with applicable requirements of ICC IBC for the particular assembly.
   2. Gypsum Association File Numbers: Comply with requirements of GA-600 for the particular assembly.
   3. UL Assembly Numbers: Provide construction equivalent to that listed for the particular assembly in the current UL Fire Resistance Directory.

2.02 METAL FRAMING MATERIALS

A. Manufacturers - Metal Framing, Connectors, and Accessories:
   1. Clarkwestern Dietrich Building Systems LLC: www.clarkdietrich.com.
   2. Marino\Ware; Product _____: www.marinoware.com.
   3. Substitutions: See Section 01600 (016000)- Product Requirements.

B. Non-Loadbearing Drywall Framing System Components: ASTM C 645; galvanized sheet steel, of size and properties necessary to comply with ASTM C 754 for the spacing indicated, with maximum deflection of wall framing of L/240 at 5 psf.
   1. Studs: "C" shaped with flat or formed webs.
      a. At no time can the gauge be less than 20 regardless of the listing in the manufacturer's tables.
   2. Runners: U shaped, sized to match studs.
   3. U-Channels: (CRC Cold Rolled Channel).
      a. Size: As required by length.
   4. Furring: Hat-shaped sections.
   5. Resilient Furring Channels: 1/2 inch depth, for attachment to substrate through one or two legs.
      a. Size: One Leg 1/2 inch x 2-1/4 inch.
      b. Size: Two Leg 1/2 inch x 1-1/4 inch.
   6. Ceiling Framing: L/240 Load Deflection with sizes for fully braced mid-span support.

C. Loadbearing Studs for Application of Gypsum Board: As specified in Section 05400 (054000).

D. Partition Head to Structure Connections: Provide mechanical anchorage devices that accommodate deflection using slotted holes, screws and anti-friction bushings, preventing rotation of studs while maintaining structural performance of

partition.

1. Structural Performance: Maintain lateral load resistance and vertical movement capacity required by applicable code, when evaluated in accordance with AISI North American Specification for the Design of Cold-Formed Steel Structural Members.
2. Material: ASTM A653/A653M steel sheet, SS Grade 50/340, with G60/Z180 hot dipped galvanized coating.
3. Provide components UL-listed for use in UL-listed fire-rated head of partition joint systems of fire rating and movement required.
4. Deflection and Firestop Track:
   a. Provide mechanical anchorage devices as described above that accommodate deflection while maintaining the fire-rating of the wall assembly.

2.03 BOARD MATERIALS

A. Manufacturers- Gypsum-Based Board:

1. CertainTeed Corporation: www.certainteed.com.
2. Georgia-Pacific Gypsum LLC: www.gp.com/gypsum.
3. National Gypsum Company: www.nationalgypsum.com.
4. USG Corporation: www.usg.com.
5. Substitutions: See Section 01600 (016000)- Product Requirements.

B. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.

1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
2. Mold Resistance (Glass-Mat-Faced-Products): Score of 10, when tested in accordance with ASTM D3273.
   a. Mold-resistant glass-matt-faced board is required whenever board is being installed before the building is enclosed and conditioned.
3. Thickness:
   a. Vertical Surfaces: 5/8 inch. b. Ceilings: 5/8 inch.
4. Mold-Resistant Paper-Faced Products:
   a. CertainTeed Corporation; ProRoc Brand Moisture & Mold Resistant Gypsum Board.
   b. National Gypsum Company; Gold Bond Brand XP Gypsum Board. c. USG Corporation; Sheetrock Brand Mold Tough Gypsum Panels.

C. Ceiling Board: Special sag-resistant gypsum ceiling board as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.

1. Application: Ceilings, unless otherwise indicated.
2. Thickness: 1/2 inch.

3. Edges: Tapered.

D. Glass-Mat-Faced Board: Coated glass mat water-resistant gypsum backing panel as defined in ASTM C1178.
   1. Standard Type: Thickness 1/2 inch.
   2. Fire-Resistant Type: Type X core, thickness 5/8 inch.
   3. Products:
      a. Georgia-Pacific Gypsum LLC; DensShield Tile Backer.

E. Exterior Sheathing Board (Sheathing Type 1): Sizes to minimize joints in place;
ends square cut.
   1. Application: Exterior sheathing, unless otherwise indicated.
   2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
   3. Glass-Mat-Faced Sheathing: Glass mat faced gypsum substrate as defined
      in ASTM C1177/C1177M.
   4. Core Type: Regular and Type X, as indicated.
   5. Type X Thickness: 5/8 inch.
   6. Edges: Square, for vertical application.
   7. Weight: 1.9 lb/sq. ft.
   8. Surfacing: Fiberglass mat on face, back, and long edges.
   9. Racking Strength (Ultimate, not design value) (ASTM E72): Not less than 540 pounds per square foot, dry.
   10. Flexural Strength, Parallel (ASTM C473): 80 lbf, parallel.
   11. Humidified Deflection (ASTM C1177): Not more than 2/8 inch.
   12. Permeance (ASTM E96): 23 perms.
   13. R-Value (ASTM C518): 0.56.
   14. Mold Resistance (ASTM D3273): 10, in a test as manufactured.
   15. Microbial Resistance (ASTM D6329, GREENGUARD 3-week protocol): Will not support microbial growth.
   16. Glass-Mat-Faced Products:
      a. Georgia-Pacific Gypsum LLC; DensGiass Gold Sheathing.

2.04 ACCESSORIES

A. Acoustic Insulation: ASTM C665; preformed glass fiber, friction fit type, unfaced. Thickness: 3-1/2 inches.
   1. Manufacturer: Owens Corning Noise Barrier Insulation.
   2. Thermal Resistance: R of 11

B. Acoustic Sealant: Non-hardening, non-skinning, for use in conjunction with gypsum board.

C. Water-Resistive Barrier: No. 15 asphalt felt.

D. Finishing Accessories: ASTM C1047, galvanized steel or rolled zinc, unless otherwise indicated.

1. Types: As detailed or required for finished appearance.
2. Special Shapes: In addition to conventional cornerbead and control joints, provide the following trim at exposed panel edges.
   a. Fry "J" Molding #JDM-625, 5/8 inch.
   b. Fry "L" Molding #DRML-625, 5/8 inch.
   c. Fry Reveal picture Hanger, DRMH-50, 3/4 inch.
   d. Fry "F" Reveal Molding. #DRMF-625-75.
   e. Fry "F" Reveal, #FDM-625-75.
   f. Reveal Molding, #DRM-625-75.
3. Provide factory fabricated inside and outside corners, "T's", connection clips @ butt joints and end caps.

E. Suspended Gypsum Board Ceiling Panel (Clouds) Trim:
1. Armstrong AXIOM, #AX8STR 2".
2. Armstrong AXIOM bottom drywall trim #AXBTSTR, 27/32" x 1-1/8".
3. Suspension: Aircraft cable.

F. Joint Materials: ASTM C475 and as recommended by gypsum board manufacturer for project conditions.
1. Tape: 2 inch wide, creased paper tape for joints and corners, except as otherwise indicated.
2. Ready-mixed vinyl-based joint compound.
3. Control Joints: #093 as manufactured by USG, for use in gypsum board walls and ceilings or Fry #DRMV-25.

G. Screws for Attachment to Steel Members Less Than 0.03 inch In Thickness, to Wood Members, and to Gypsum Board: ASTM C1002; self-piercing tapping type; cadmium-plated for exterior locations.

H. Screws for Attachment to Steel Members From 0.033 to 0.112 Inch in Thickness: ASTM C954; steel drill screws for application of gypsum board to loadbearing steel studs.

I. Anchorage to Substrate: Tie wire, nails, screws, and other metal supports, of type and size to suit application; to rigidly secure materials in place.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that project conditions are appropriate for work of this section to commence.

3.02 FRAMING INSTALLATION

A. Metal Framing: Install in accordance with ASTM C754 and manufacturer's instructions.

B. Suspended Ceilings and Soffits: Space framing and furring members at 24 inches on center.
1. Level ceiling system to a tolerance of 1/1200.
2. Laterally brace entire suspension system.
3. Install bracing as required at exterior locations to resist wind uplift.

C. Studs: Space studs as indicated.
   1. Extend partition framing to structure in all locations.
   2. Partitions Terminating at Structure: Attach top runner to structure, maintain clearance between top of studs and structure, and connect studs to track using specified mechanical devices in accordance with manufacturer's instructions; verify free movement of top of stud connections; do not leave studs unattached to track.

D. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs.

E. Blocking: Install wood blocking for support of:
   1. Framed openings.
   2. Wall mounted cabinets.
   3. Plumbing fixtures.
   4. Toilet partitions.
   5. Toilet accessories.
   6. Wall mounted door hardware.

3.03 ACOUSTIC ACCESSORIES INSTALLATION

A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.

B. Acoustic Sealant: Install in accordance with manufacturer's instructions.
   1. Place continuous bead at perimeter of each layer of gypsum board.
   2. In non-fire-rated construction, seal around all penetrations by conduit, pipe, ducts, and rough-in boxes.

3.04 BOARD AND GLASS MAT FACED BOARD INSTALLATION

A. Comply with ASTM C 840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.
   1. When gypsum board is to be applied to both the ceiling and walls, the gypsum board is to be applied to the ceiling and then the walls.
   2. Deflection at design load of horizontal (ceiling) framing members supporting gypsum board shall be not more than L/240 of the span.

B. Single-Layer Non-Rated: Install gypsum board perpendicular to framing, with ends and edges occurring over firm bearing.

C. Double-Layer Non-Rated: Use gypsum board for first layer, placed parallel to framing or furring members, with ends and edges occurring over firm bearing. Use glass mat faced gypsum board at exterior walls and at other locations as indicated. Place second layer perpendicular to framing or furring members. Offset joints of second layer from joints of first layer.

D. Exterior Sheathing: Comply with ASTM C1280. Install sheathing vertically, with edges butted tight and ends occurring over firm bearing.
   1. DensGLass Sheathing:
      a. Fasteners should be driven flush with the panel surface (not countersunk) and into the framing system. Locate fasteners at least 3/8

inch from the ends and edges of the sheathing.

b. Nails or screws shall be in accordance with the manufacturer's application specifications.

c. For horizontal applications install with end joints staggered.

E. Installation on Metal Framing: Use screws for attachment of all gypsum board except face layer of non-rated double-layer assemblies, which may be installed by means of adhesive lamination.

F. Moisture Protection: Treat cut edges and holes in moisture resistant gypsum board and exterior gypsum soffit board with sealant.

3.05 INSTALLATION OF TRIM AND ACCESSORIES

A. Control Joints: Place control joints consistent with lines of building spaces and as follows:

1. Control joints shall be manufactured devices for this purpose.
2. Control joints shall be installed where indicated on the plans. Full height door frames shall be considered equivalent to a control joint.
3. A control joint shall be installed where a partition, wall or ceiling traverses a construction joint (expansion, seismic, or building control element) in the base building structure.
4. Control joints shall be installed where a partition, wall, or ceiling runs in a uninterrupted straight plane exceeding 30 linear ft.
5. Control joints in interior ceilings with perimeter relief shall be installed so the linear dimensions between control joints do not exceed 50 ft and total area between control joints does not exceed 2500 sq. ft.
6. Control joints in exterior ceilings and soffits shall be installed so that linear dimensions between control joints do not exceed 30 ft. and total area between control joints does not exceed 900 sq. ft.
7. A control joint or intermediate blocking shall be installed where ceiling framing members change direction.
8. Where a control joint occurs in an acoustical or fire-rated system, blocking shall be provided behind the control joint by using a backing material such as 5/8-inch Type X gypsum board, mineral fiber or other tested equivalent.
9. At exterior soffits, not more than 30 feet apart in both directions.

B. Corner Beads: Install at external corners, using longest practical lengths.

C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials and as indicated.

3.06 JOINT TREATMENT

A. Paper Faced Gypsum Board: Use paper joint tape, bedded with ready-mixed vinyl-based joint compound and finished with ready-mixed vinyl-based joint compound.

B. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:

1. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
2. Level 1: All wall surfaces in the interstitial areas above finished ceilings,

whether or not accessible in the completed construction.

C. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
   1. Feather coats of joint compound so that camber is maximum 1/32 inch.
   2. Taping, filling, and sanding is not required at surfaces behind adhesive applied ceramic tile and fixed cabinetry.
   3. Taping, filling and sanding is not required at base layer of double layer applications.

3.07 TOLERANCES

A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

END OF SECTION

SECTION 09300

TILE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Tile for floor applications.

B. Tile for wall applications.

C. Coated glass mat backer board as tile substrate.

D. Non-ceramic trim.

1.02 RELATED REQUIREMENTS

A. Section 07900 - Joint Sealers.

1.03 REFERENCE STANDARDS

A. ANSI A108 Series/A118 Series/A136.1 - American National Standard Specifications for the Installation of Ceramic Tile (Compendium); 2011.

1. ANSI A108.1a - American National Standard Specifications for Installation of Ceramic Tile in the Wet-Set Method, with Portland Cement Mortar; 2011.
2. ANSI A108.1b - American National Standard Specifications for installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex Portland Cement Mortar; 2011.
3. ANSI A108.1c - Specifications for Contractors Option: Installation of Ceramic Tile in the Wet-Set Method with Portland Cement Mortar or Installation of Ceramic Tile on a Cured Portland Cement Mortar Bed with Dry-Set or Latex Portland Cement Mortar; 2011.
4. ANSI A108.4 - American National Standard Specifications for Installation of Ceramic Tile with Organic Adhesives or Water Cleanable Tile-Setting Epoxy Adhesive; 2011.
5. ANSI A108.5 - American National Standard Specifications for Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar; 2011.
6. ANSI A108.6 -American National Standard Specifications for installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy; 2011.
7. ANSI A108.8 -American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant Furan Resin Mortar and Grout; 2011.
8. ANSI A108.9 - American National Standard Specifications for Installation of Ceramic Tile with Modified Epoxy Emulsion Mortar/Grout; 2011.
9. ANSI A108.10 - American National Standard Specifications for Installation of Grout in Tilework; 2011.
10. ANSI A118.1 - American National Standard Specifications for Dry-Set Portland Cement Mortar; 2011.

11. ANSI A118.4 - American National Standard Specifications for Latex-Portland Cement Mortar; 2011.
12. ANSI A118.5 - American National Standard Specifications for Chemical Resistant Furan Mortars and Grouts for Tile Installation; 2011.
13. ANSI A118.6 - American National Standard Specifications for Standard Cement Grouts for Tile Installation; 2011.

B. ASTM C1178/C1178M - Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel; 2011.

C. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation; 2011.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by all affected installers.

1.05 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturers' data sheets on tile, mortar, grout, and accessories. Include instructions for using grouts and adhesives.

C. Samples: Mount tile and apply grout on two plywood panels, minimum 6x6 inches in size illustrating pattern, color variations, and grout joint size variations.

D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
1. See Section 01600 - Product Requirements, for additional provisions.
2. At the end of each phase, provide the Owner a minimum of two (2) complete boxes of each type, pattern and color of wall and floor tile, for each building where it is used.

1.06 QUALITY ASSURANCE

A. Maintain one copy of The Tile Council of North America Handbook and ANSI A108 Series/A118 Series on site.

B. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, with minimum 5 years of documented experience.

C. Installer Qualifications: Company specializing in performing tile installation, with minimum of 5 years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

1.08 FIELD CONDITIONS

A. Do not install solvent-based products in an unventilated environment.

B. Maintain ambient and substrate temperature of 50 degrees F during installation

of mortar materials.

PART 2 PRODUCTS

2.01 TILE

A. Manufacturers: Basis of Design; Manufacturers and products as indicated on the Interior Finish Schedules in the drawings and shown herein.
   1. Atlas Concorde USA: www.americanolean.com
   2. Dal-Tile Corporation: www.daltile.com
   3. Substitutions: Not Permitted

B. Glazed Wall Tile (CT1): ANSI A137.1, and as follows:
   1. Glazed Wall Tile manufactured by American Olean Tile.
   2. Size and Shape: 8" x 24".
   3. Edges: Cushioned.
   4. Surface Finish: High gloss.
   5. Colors: As scheduled.

C. Glazed Wall Tile (CT2): ANSI A137.1, and as follows:
   1. Glass Wall Tile manufactured by American Olean Tile.
   2. Size and Shape: 1" x 1" mosaic.
   3. Edges: Cushioned.
   4. Surface Finish: High gloss.
5. Colors: As scheduled

2.02 TRIM AND ACCESSORIES

A. Non-Ceramic Trim: Brushed stainless steel, style and dimensions to suit application, for setting using tile mortar or adhesive.
   1. Manufacturer: Basis of Design.
      a. Schluter-Systems: www.schluter.com.
      b. Other manufacturers and products of equal quality.
   2. Transition between Porcelain tile and Vinyl Composition Tile.
      a. Product: RENO-U, EBU 125.

2.03 SETTING MATERIALS

A. Provide setting materials made by the same manufacturer as grout.

B. Organic Adhesive: ANSI A136.1, thinset mastic type.
   1. Use Type I in areas subject to prolonged moisture exposure.
   2. Products: Basis of Design.
      a. Bostik Inc: www.bostik-us.com.
      b. Other manufacturers and products of equal quality.

C. Dry-Set Portland Cement Mortar Bond Coat: ANSI A118.1.
   1. Products: Basis of Design.
      a. Bostik Inc: www.bostik-us.com.
      b. Other manufacturers and products of equal quality.

2.04 GROUTS

A. Manufacturers: Basis of Design.
   1. LATICRETE International, Inc; LATICRETE SpectraLOCK PRO Premium

Grout: www.laticrete.com.
2. Other manufacturers and products of equal quality.

B. Standard Grout: ANSI A118.6 standard cement grout.
1. Applications: Use this type of grout where indicated and where no other type of grout is indicated.
2. Use sanded grout for joints 1/8 inch wide and larger; use unsanded grout for joints less than 1/8 inch wide.
3. Color(s): As selected by Architect from manufacturer's full line.
4. Products: Basis of Design.
a. LATICRETE International, Inc; 1600 Unsanded Grout: www.laticrete.com.
b. Other manufacturers and products of equal quality.

C. Epoxy Grout: ANSI A118.3 chemical resistant and water-cleanable epoxy grout.
1. Applications: Where indicated
2. Color(s): As selected by Architect from manufacturer's full line
3. Products: Basis of Design
a. LATICRETE International, Inc; LATICRETE SpectraLOCK PRO Premium Grout: www.laticrete.com.
b. Other manufacturers and products of equal quality

2.05 THICK-BED MATERIALS

A. Mortar Bed Materials: Portland cement, sand, latex additive, and water.
1. Products: Basis of Design.
a. LATICRETE International, Inc; LATICRETE 3701 Fortified Mortar Bed: www.laticrete.com.
b. Other manufacturers and products of equal quality.

2.06 THIN-SET - ACCESSORY MATERIALS

A. Coated Glass Mat Backer Board: ASTM C1178/C1178M, with coated inorganic fiberglass mat on both surfaces and integral acrylic coating vapor retarder.
1. Product: Basis of Design; DensShield Tile Backer manufactured by Georgia-Pacific.
2. Standard Type: Thickness 1/2 inch.
3. Fire-Resistant Type: Type X core, thickness 5/8 inch.
4. Products:
a. Other manufacturers and products of equal quality.

B. Mesh Tape: 2-inch wide self-adhesive fiberglass mesh tape.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that sub-floor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive tile.

B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive tile.

C. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of setting materials to sub-floor surfaces.

D. Verify that concrete sub-floor surfaces are ready for tile installation by testing for moisture emission rate and alkalinity; obtain instructions if test results are not within limits recommended by tile manufacturer and setting materials manufacturer.

E. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

A. Protect surrounding work from damage.

B. Vacuum clean surfaces and damp clean.

C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.

D. Install backer board in accordance with ANSI A108.11 and board manufacturer's instructions. Tape joints and corners, cover with skim coat of setting material to a feather edge.

1. Install tile backer board using galvanized roofing nails or corrosion-resistant bugle head drywall screws. Bed fiberglass self-adhesive tape at all joints and corners with material used to set tiles.

3.03 INSTALLATION - GENERAL

A. Install tile and thresholds and grout in accordance with applicable requirements of ANSI A108.1 .through A108:13, manufacturer's instructions, and The Tile Council of North America Handbook recommendations.

B. Lay tile to pattern indicated. Do not interrupt tile pattern through openings.

1. Lay out tile on floors and lengthwise on wall so that no tile less than half size occurs. For height stated in feet and inches, maintain full courses to reproduce nearest attainable heights without cutting tile.
2. For offset patterns; use offset of no greater than 33% for tiles exceeding 18 inches in width or length.

C. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners neatly. Align floor joints.

D. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make grout joints without voids, cracks, excess mortar or excess grout, or too little grout.

1. Use credit card width joints for floor tile unless indicated or specified otherwise.

E. Form internal angles square and external angles square.

F. Install ceramic accessories rigidly in prepared openings.

G. Install non-ceramic trim in accordance with manufacturer's instructions.

H. Install thresholds where indicated.

I. Sound tile after setting. Replace hollow sounding units.

J. Keep control joints free of adhesive or grout. Apply sealant to joints.

K. Prior to grouting, allow installation to completely cure; minimum of 48 hours.

L. Grout tile joints. Use standard grout unless otherwise indicate.

M. Apply sealant to junction of tile and dissimilar materials and junction of dissimilar planes.

N. Floor tile shall be installed beneath all new millwork.

3.04 INSTALLATION – WALL TILE

A. Over coated glass mat backer board on studs, install in accordance with The Tile Council of North America Handbook Method W245.

B. Over interior concrete and masonry install in accordance with The Tile Council of North America Handbook Method W202, thin-set with dry-set or latex-Portland cement bond coat.

3.05 CLEANING

A. Clean tile and grout surfaces.

3.06 PROTECTION

A. Do not permit traffic over finished floor surface for 4 days after installation.

END OF SECTION

SECTION 9511

PART 1 GENERAL

1.01 SECTION INCLUDES

SUSPENDED ACOUSTICAL CEILINGS

A. Suspended Metal Grid Ceiling System. B. Lay-In Acoustical Ceiling Tile Units.

1.02 RELATED REQUIREMENTS

A. Section 07212- Board and Batt Insulation: Acoustical insulation. B. Section 07900 :. Joint Sealers: Acoustical sealant.

C. Section/Division 16 - Fire Alarm System: Fire alarm components in ceiling system.

D. Section/Division 15 - Fire Suppression Sprinklers: Sprinkler heads in ceiling system.

E. Section/Division 15 - Air Outlets and Inlets: Air diffusion devices in ceiling.

F. Section/Division 16 - Interior Luminaires: Light fixtures in ceiling system.

G. Section/Division 16 - Public Address and Music Equipment: Speakers in ceiling system.

1.03 REFERENCE STANDARDS

A. ASTM C635 - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 2007.

B. ASTM C636/C636M - 'Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels; 2008.

C. ASTM E1264- Standard Classification for Acoustical Ceiling Products; 2008e1.

D. ITS (DIR) - Directory of Listed Products; Intertek Testing Services NA, Inc.; current edition.

E. UL (FRO) - Fire Resistance Directory; Underwriters Laboratories

1.04 ADMINISTRATIVE REQUIREMENTS

A. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.

B. Do not install acoustical units until after interior wet work is dry.

1.05 SUBMITTAL

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on suspension system components and acoustical units.

C. Samples: Submit two samples 12 x 12 inch in size illustrating material and finish of acoustical units.

D. Samples: Submit two samples each, 12 inches long, of suspension system main runner, cross runner, and perimeter molding.

E. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01600 - Product Requirements, for additional provisions. ,
   2. Extra Acoustical Units: At the end of each phase, provide a minimum of three (3) complete boxes of each type, style and pattern of acoustical units of each building where it is used.
   3. Extra Suspension System Components: Quantity of each concealed grid and exposed component equal to 2 percent of quantity installed.

1.06 QUALITY ASSURANCE

A. Suspension System Manufacturer Qualifications: Company specializing in manufacturing the products specified in his section with minimum five years· documented experience.

B. Acoustical Unit Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years documented experience.

1.07 FIELD CONDITIONS

A. Maintain ·uniform temperature of minimum 60 degrees F, and maximum humidity of 20 to 40 percent prior to, during, and after acoustical unit installation.

B. Building shall be clean and HVAC shall be operating with a constant air temperature ,maintained within the building at all times prior to installation of acoustical ceiling tile.

PART 2 PRODUCTS

2.01 ACOUSTICAL UNITS

A. Manufacturers:
   1. Armstrong World Industries, Inc. - Basis of Design: www.armstrong.com.
   2. Other manufacturers and products of equal quality.

B. Acoustical Units- General: ASTM E1264, Class A.

C. Acoustical Panels Type LAT-1: Painted mineral fiber, ASTM E1264 Type Ill, with the following characteristics:
   1. Size: 24 x 24 inches.
   2. Thickness: 5/8 inches.
   3 Composition: Wet felted.
   4. Light Reflectance: 0.85 percent, determined as specified in ASTM E1264.

5. NRC Range: 0.50 to 0.55, determined as specified in ASTM E1264.
6. Articulation Class (AC): N/A, determined as specified in ASTM E1264.
7. Ceiling Attenuation Class (CAC): 33, determined as specified in ASTM E1264.
8. Edge: Square.
9. Surface Color: White.
10. Surface Pattern: Perforated, regularly spaced large holes.
11. Product: Item #1728 Fine Fissured Square Lay-In by Armstrong World Industries, Inc.
12. Suspension System: Exposed grid Type 15/16" PRELUDE ML.

2.03 SUSPENSION SYSTEM(S)

A. Manufacturers:
   1. Armstrong World Industries, Inc.: www.armstrong.com.
   2. Substitutions: See Section 01600 - Product Requirements.

B. Suspension Systems - General: ASTM C635; die cut and interlocking components, with stabilizer bars, clips, splices, perimeter moldings, hold down clips, and intermediate suspension system as required.

C. Exposed Steel Suspension System: Formed steel, commercial quality cold rolled; intermediate-duty.
   1. Profile: Tee; 15/16 inch wide face.
   2. Construction: Double web.
   3. Finish: White.

2.04 ACCESSORIES

A. Support Channels and Hangers: Galvanized steel; size and type to suit application and ceiling system flatness requirement specified.

B. Perimeter Moldings: Same material and finish as grid.
   1. At Exposed Grid: Provide L-shaped molding for mounting at same elevation as face of grid.

C. Acoustical Insulation: Specified in Section 07212.

D. Acoustical Sealant For Perimeter Moldings: Specified in Section 07900.

E. Touch-up Paint: Type and color to match acoustical and grid units.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that layout of hangers will not interfere with other work.

3.02 INSTALLATION- SUSPENSION SYSTEM

A. Install suspension system in accordance with ASTM C636/C636M and manufacturer's instructions and as supplemented in this section.

B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.

C. Locate system on room axis according to reflected plan with respect to borders, ceiling openings, light fixtures and similar construction. Measure each ceiling area and establish layout of acoustical tiles to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width tiles at borders.

D. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.

E. Provide hanger clips during steel deck erection. Provide additional hangers and inserts as required.

F. Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.

G. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.

H. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.

I. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.

J. Do not eccentrically load system or induce rotation of runners.

K. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
   1. Use longest practical lengths.
   2. Miter corners.
      a. Pre-made corners @ 90 degree locations.

3.03 INSTALLATION - ACOUSTICAL UNITS

A. Install acoustical units in accordance with manufacturer's instructions.

B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.

C. Lay directional patterned units with pattern parallel to longest room axis.

D. Fit border trim neatly against abutting surfaces.

E. Install units after above-ceiling work is complete.

F. Install. acoustical units level, in uniform plane, and free from twist, warp, and dents.

G. Cutting Acoustical Units:
   1. Cut to fit irregular grid and perimeter edge trim.
   2. Make field cut edges of same profile as factory edges.

H. Where round obstructions occur, provide preformed closures to match perimeter molding.

I. Lay acoustical insulation for a distance of 48 inches either side of acoustical partitions as indicated.

J. Install hold-down clips on panels within 20 ft of an exterior door.

3.04 TOLERANCES

A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.

B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

END OF SECTION

SECTION 09650

RESILIENT FLOORING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Resilient tile flooring.

B. Resilient base.

C. Resilient stair accessories

D. Installation accessories.

1.02 REFERENCE STANDARDS

A. ASTM F1066 - Standard Specification for Vinyl Composition Floor Tile; 2004 (Reapproved 2010) e1.

B. ASTM F1861 - Standard Specification for Resilient Wall Base; 2008.

C. RFCI – Recommended Work Practices for Removal of Resilient Floor Coverings; Resilient Floor Covering Institute; 1998.

1.03 SUBMITTALS

A. See Section 01300- Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.

C. Selection Samples: Submit manufacturer's complete set of color samples for Architect's initial selection.

D. Verification Samples: Submit three samples, 12x12 inch in size illustrating color and pattern for each resilient flooring product specified.

E. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.

F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01600 - Product Requirements, for additional provisions.
   2. Extra Flooring Material:
      a. At the end of each phase, provide 2 boxes of each type, style, pattern and color for each building where it is used.
   3. Extra Resilient Wall Base and Accessories: Furnish not less than 100 lineal feet of each type, pattern, size and color.

1.04 FIELD CONDITIONS

A. Maintain temperature in storage area between 55 degrees and 90 degrees F.

B. Store materials for not less than 48 hours prior to installation in area of installation at a temperature of 70 degrees F to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F.

PART 2 PRODUCTS

2.01 TILE (VCT) FLOORING

A. Luxury Vinyl Tile (LVT): Homogeneous, with color extending throughout thickness, and:
   1. Minimum Requirements: Comply with ASTM F1066, of Class corresponding to type specified.
   2. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E 648 or NFPA 253.
   3. Size: 4 x 36 inch.
   4. Thickness: 0.125 inch.
   5. Pattern: see schedule.
   6. Manufacturers:
      a. Mannington Mills, Inc; Product : www.mannington.com.
      b. Tandus Centiva A Tarkett Company (Basis of Design) Product as scheduled:www.tandus-centiva.com
      c. Armstrong World Industries, Inc ; Product as scheduled: www.armstrong.com.
      d. d. Other manufacturers and products of equal quality.

2.03 RESILIENT BASE

A. Resilient Base (RB-1): ASTM F1861, Type TS rubber, vulcanized thermoset; top set Style B, Cove, and as follows:
   1. Critical Radiant Flux (CRF):. Minimum > 1.0 watt per square centimeter,, when tested in accordar:Jce with ASTM E 648 or NFPA 253.
   2. Height: 4 inch.
   3. Thickness: 0.125 inch thick.
   4. Finish: Satin.
   5. Length: Roll (120ft. coils).
   6. Color: See schedule.
   7. Accessories: Premolded external corners.
      a. Premolded external corners are not required at concrete masonry walls with bullnose corners.
   8. Manufacturers:
      a. Flexco Corporation(Basis of Design); Product Wallflowers® Premium rubber wall base: www.flexco.com

b. Rappe Corp: www.roppe.com.
c. Johnsonite, Inc : www.johnsonite.com.
d. Substitutions: See Section 01600 - Product Requirements.
e. Other manufacturers and products of equal quality.

2.04 ACCESSORIES

A. Subfloor Filler: White premix latex; type recommended by adhesive material manufacturer.

B. Primers, Adhesives, and Seaming Materials: Waterproof; types recommended by flooring manufacturer.

C. High Performance Adhesives and/or Sealers: To be used when the concrete slab exceeds the manufacturers recommended moisture content for installation (7-8 lbs/1,000 sf/24 hours).
1. VCT: MoistureBioc Emulsion One Step Sealer as manufactured by Vexcon Chemicals and Mannington M-Guard V-11 adhesive (10 lbs/1,000 sf/24 hours).

D. Moldings, Transition and Edge Strips: As scheduled.
1. Basis of Design: Product: RENO-U manufactured by Schluter-Systems, brushed stainless, or equal.
a. Transition between Vinyl Composition Tile to Porcelain Tile.
2. Product: VT0 manufactured by Armstrong, or equal.
a. Transition between Vinyl Composition Tile to Carpet.
3. Product: VT5 manufactured by Armstrong, or equal.
a. Transition between Vinyl Composition Tile to Sealed/Stained Concrete.

E. Filler for Coved Base: Plastic.

F. Sealer and Wax: Types recommended by flooring manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

A Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.

B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive resilient base.

C. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

A Remove existing resilient flooring and flooring adhesives; follow the recommendations of RFCI Recommended Work Practices for Removal of Resilient Floor Coverings.

B. Remove sub-floor ridges and bumps. Fill minor low spots, cracks, joints, holes, and other defects with sub-floor filler to achieve smooth, flat, hard surface.

C. Prohibit traffic until filler is cured

D. Clean substrate.

E. Apply primer as required to prevent "bleed-through" or interference with adhesion by substances that cannot be removed.

3.03 INSTALLATION

A. Starting installation constitutes acceptance of sub-floor conditions.

B. Install in accordance with manufacturer's instructions.

C. Spread only enough adhesive to permit installation of materials before initial set.

D. Fit joints tightly.

E. Set flooring in place, press with heavy roller to attain full adhesion.

F. Where type of floor finish, pattern, or color are different on opposite sides of door, terminate flooring under centerline of door.

G. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated.
   1. Metal Strips: Attach to substrate before installation of flooring using stainless steel screws.

H. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.

I. Install flooring in recessed floor access covers, maintaining floor pattern.

J. Resilient flooring shall be installed beneath all new millwork.

3.04 TILE FLOORING

A. Mix tile from container to ensure shade variations are consistent when tile is placed, unless manufacturer's instructions say otherwise.

B. Lay flooring with joints and seams parallel to building lines to produce symmetrical tile pattern.

C. Install tile to basket weave pattern. Allow minimum 1/2 full size tile width at room or area perimeter.

3.05 RESILIENT BASE

A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints.

B. Miter internal corners. At external corners, use premolded units. At exposed ends, use premolded units.

C. Scribe and fit to door frames and other interruptions.

3.06 CLEANING

A. Remove excess adhesive from floor, base, and wall surfaces without damage.

B. Clean, seal, and wax in accordance with manufacturer's instructions.

3.07 PROTECTION

A. Prohibit traffic on resilient flooring for 48 hours after installation.

END OF SECTION

Division 11

SECTION 15010

GENERAL MECHANICAL PROVISIONS

PART I - GENERAL

1.1 1.1 SCOPE

A. Provide all material, equipment and labor, etc., required to complete installation specified herein and/or shown or scheduled on Plans. General description of work includes all material and labor required to provide a complete and operating HVAC and Plumbing system in compliance with all applicable codes and the intent of the design shown on the construction documents for the building.

1.2 1.2 RELATED WORK SPECIFIED ELSEWHERE

A. See Mechanical Division Index on previous sheet.

1.3 1.3 SUBMITTALS: In accordance with Paragraph, Submittals and Shop Drawings, in Section 15020, furnish the following:

A. Manufacturer's Literature and Data for:

1. Materials and equipment called for and itemized in all Sections of Division 15.

2. Other materials, equipment, tools, or information as required by Engineer.

1.4 1.4 APPLICABLE STANDARDS

A. See Paragraph, Applicable Standards, Section 15020, Basic Mechanical Requirements.

1.5 1.5 GENERAL CONDITIONS

A. The General Conditions, Information to Bidders, Special Conditions, and other pertinent documents issued by the Architect are a part of these Specifications and shall be complied with in every respect.

B. This Contractor shall examine the General Construction Plans, the Structural Plans and the Electrical Plans and lay out his work accordingly to avoid conflict.

C. This Contractor shall visit the site in order to familiarize himself with existing working conditions. Failure to do so shall not relieve Contractor of responsibility of making changes required by conditions encountered on site.

D. This Contractor shall conform to standards prescribed by City, County, and State regulations or ordinances having jurisdiction. Any changes that may be necessary to conform to such regulations or ordinances shall be made by this Contractor without extra costs to the Owner.

E. This Contractor shall provide all items, articles, materials, operations or methods listed, mentioned, or scheduled on the Drawings and/or herein including all labor, materials, equipment and incidentals necessary, required or implied, for the completion of the various systems.

F. Permits required for the installation of the work, as well as all authorized code inspections, including all fees, meters, and assessments, shall be borne by and arranged for by the Contractor.

1.6 1.6 EXPLANATION AND PRECEDENCE OF DRAWINGS:

A. For purposes of clearness and legibility, Drawings are essentially diagrammatic and, although size and location of equipment are to be drawn to scale whenever possible, the Contractor shall make use of all data in all of the contract documents and shall verify this information at building site.

B. The Drawings indicate required size and points of termination of pipes and ducts, and suggest proper routes of pipe to conform to structure, avoid obstructions and preserve clearances. However, it is not intended that Drawings indicate all necessary offsets, and it shall be the work of this Section to install piping in such a manner as to conform to structure, avoid obstructions, preserve headroom and keep openings and passageways clear without further instruction or cost to the Owner.

C. It is intended that all apparatus be located symmetrically with Architectural elements, and shall be installed at exact height and locations as shown on the Architectural drawings.

D. The Contractor shall fully inform himself regarding any and all peculiarities and limitations of space available for the installation of all work and materials furnished and installed under the contract. He shall exercise due and particular caution to determine that all parts of his work are made quickly and easily accessible. The Contractor shall be guided by the Architectural details and conditions existing at the job, correlating this work with that of the other trades, and report to the Owner any discrepancies or interferences that are discovered. Failure to report such discrepancies and interferences shall result in the correcting of these errors or omissions by the Contractor at his own expense. All work installed under this Division which deviates from the Drawings and Specifications without prior approval of the Owner, shall be altered by the Contractor at his own expense to comply with the Drawings and Specifications as directed.

E. The Contractor shall be solely responsible for taking his own measurements and installing his work to suit conditions encountered.

1.7 1.7 SPECIAL CONDITIONS, MECHANICAL:

A. By the act of submitting a bid, this Contractor agrees that all of the contract documents and each of the divisions of the complete Specifications have been reviewed and studied, and all requirements and coordination resulting therefrom are included.

B. In this Section, the word "Contractor" means the Mechanical Contractor. The word "provide" means furnish, install, connect. The word “install” means furnish, provide, connect unless clearly shown to be provided by others.

C. Do not scale drawings having ¼" or smaller scale. Because of small scale, it is not possible to indicate all offsets, fittings, and accessories; provide such as are required for complete installation.

D. The right is reserved to move any element as much as ten (10) feet at no increase in cost provided Contractor is notified before work in question is started.

PART 2 - PART 2 - PRODUCTS - NOT APPLICABLE

PART 3 - PART 3 - EXECUTION

3.1 EXISTING SERVICES:

A. No service shall be interrupted without permission of the Owner.

B. When encountered in work, protect existing active sewer, water, gas, electric, other utility services, structures; where required for proper execution of work, relocate them as directed. If existing active services are not indicated, contact Engineer for instructions.

C. When encountered in work area, whether or not indicated, cap or plug or otherwise discontinue existing inactive sewer, water, gas, electric, other utility services, structures, of which action should be taken. If removal is required, request instructions from Engineer.

3.1 3.2 INSPECTION OF SITE:

A. Prior to submitting his bid, the Contractor shall visit the site of the proposed construction and shall thoroughly acquaint himself with existing utilities, working conditions to be encountered, etc. No additional compensation shall be allowed for conditions increasing the Contractor's cost which were not known or appreciated by him when submitting his proposal if the condition was obvious and could have been discovered by him if he had visited the project and thoroughly informed himself of all existing conditions which would affect his work.

3.2 3.3 WORKMANSHIP, MATERIALS AND EQUIPMENT

A. All work shall be performed in a workmanlike manner and shall present a neat and mechanical appearance when completed. All materials shall be of type, quality and minimum rating prescribed herein or indicated on the Plans.

3.3 3.4 CUTTING AND PATCHING:

A. This Contractor shall perform all cutting and patching required for the introduction and placement of his work. He shall employ men to perform all patching work who are skilled in the particular trade involved. Cutting and patching required as a result of the omission of an opening in construction shall be done by the Contractor at his own expense.

3.4 3.5 PROTECTION OF WORK

A. This Contractor shall protect his work at all times from danger by freezing, breakage, dirt, foreign materials, etc., and shall replace all work so damaged. The Contractor shall use every precaution to protect the work of others, and he will be held responsible for all damage to other work caused by his work or through the neglect of his workmen.

END OF SECTION 15010

SECTION 15020

BASIC MECHANICAL REQUIREMENTS

PART 1 - GENERAL

1.01 SCOPE

A. Provide all material, equipment and labor, etc., required to complete installation specified herein and/or shown or scheduled on Plans.

B. The general conditions, supplementary general conditions, information to bidders, general requirements, special conditions, addenda, and other pertinent documents issued by the Architect/Engineer are a part of these Specifications and shall be complied with in every respect.

C. Furnish all labor, materials, services, and equipment required to complete the installation of complete and acceptable mechanical systems in accordance with these specifications and the contract drawings.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Division 1 - General Requirements
B. Division 2 - Sitework
C. Division 9 - Finishes
D. Division 16 - Electrical

1.03 SUBMITTALS AND SHOP DRAWINGS:

A. In accordance with Section 01340, Shop Drawings, Product Data and Samples, submit list of materials, fixtures, and equipment as called for in each Section of Division 15.

B. Contractor shall submit to the Architect a list of materials, fixtures and equipment:

1. Submit a complete list of materials, fixtures and equipment for approval. There shall be minimum six (6) copies of data on each item and they shall be complete with names and addresses of manufacturers, catalog and model numbers, trade names, capacities and all other information required. Do not submit partial lists from time to time. Approval shall be based on manufacturer's published ratings only. Submit information requested from each Section of Division 15. Submittals are due within forty (40) days of contract.

2. Contractor shall not delegate the authority to material supply houses to present data for approval. This shall be done by the Contractor.

3. Contractor shall submit copy of welder's certification as outlined in Section 15050

.

C. Substitutions of Materials:

1. Where a definite material or brand name is specified, it is not the intent to discriminate against any product of another manufacturer. For the purposes of setting standards of quality, design, dimensions and appearance, certain manufacturer's and/or trade names are designated herein. Reference to a specific manufacturer's product by name, make or catalog number is intended to establish a Standard of Quality and shall not exclude other similar acceptable products. Substitution shall be only with written approval of the Engineer.

2. Open competition is expected, but in all cases, complete data must be submitted on all proposed substitutions and samples shall be submitted for comparison and test when requested by the Engineer.

3. The words "or as accepted", etc. signify that the written approval of the Engineer must be obtained before any substitutions may be made for the items specified well in advance of the time when such items are needed. The Engineer's approval will not relieve the Contractor of responsibility for material, equipment or work later found to be defective or otherwise unsuitable for the work.

4. It shall be the responsibility of this Contractor to ascertain if the substitute items will fit into the space allotted as conveniently as the items specified. Any changes to the building or system design necessary changes shall be borne by the Contractor. If such changes are deemed inadvisable by the Engineer, the Contractor shall install items specified even though substitute item had been previously approved. Engineer's approval of a substitute is for performance and/or design only.

5. The availability of service is of prime importance to the Owner and was a major consideration in selecting items as a basis for this specification. The Contractor is advised, therefore, to exercise caution in accepting prices in the "or as accepted" clause in this specification. Competent service must not only be available, but must, in the case of refrigeration equipment, boilers and control systems, be a direct arm of the manufacturer. Further, the service agency, as a representative of this manufacturer, must have been in continuous operation in this area sufficient time to indicate a degree of permanence as required by the Engineer.

6. In submitting substitution, bidders should note the following minimum considerations: (1) capacities shown are absolute minimum and must be equaled, (2) physical size limitation for space allotted, (3) static and dynamic weight limitation, (4) structural properties, (5) noise level, (6) vibration generation, (7) interchangeability, (8) accessibility for maintenance and replacement, (9) compatibility with other materials, assemblies, and (10) similar items shall be same manufacture and style whenever possible.

7. All material and equipment, for which a U.L. Standard, and AGA approval, or an ASME requirement is established, shall be so approved and labeled or stamped.

8. Contractor shall pay any costs added to total contract as a result of an approved substitution.

9. The Contractor will submit all paperwork including material of construction, capacities, coatings, performance, energy consumption, and etc to the engineer to show that the submitted substitution is equal or superior to the item specified in all regards. The engineer will not study and research to determine performance characteristics of substitute items. Any substitute equipment or material that is submitted without complete documentation will be rejected and returned without delay – no questions asked.

D. Shop Drawings: Shop drawings and required field drawings shall be prepared by the Contractor in sextuplicate. Provide shop drawings (scale ½" = 1' -0") for the following equipment, when other than what is specified, is substituted for approval.

1. Air Handling equipment rooms

2. Water heater rooms

3. HVAC ductwork plans including all utilities. The ductwork drawings shall show and coordinate the ductwork, HVAC piping, lighting layouts, structural elements, conduit and sprinkler piping with sprinkler heads. (Scale ¼"-1'-0").

Shop drawings shall include all dimensions, grades, materials, etc. pertinent to installation. Equipment rooms shall be drawn for maintenance, etc. The shop drawings will be coordinated with the work of related trades.

E. Composite Wiring Diagram: Coordinate with Electrical:

1. Submit a "terminal-to-terminal" wiring diagram showing all electrical wiring and interlock circuits for all mechanical systems. After approval, this diagram will be used by all trades for installation and connection purposes.

2. This diagram shall be based on "certified" wiring diagrams of equipment which has been approved.

F. Reference to Drawings: Reference shall be made to drawing schedules and details for: manufacturer, model, catalog number, size, capacity, performance installation, etc., of equipment and material.

1.4 APPLICABLE STANDARDS

A. The intent is that the complete installation shall comply with applicable laws and ordinances, utility company regulations, and applicable requirements of the following:

NFPA	National Fire Protection Association
IPC	International Plumbing Code
IMC	International Mechanical Code
IBC	International Building Code
ASME	American Society of Mechanical Engineers
PDI	Plumbing Drainage Institute
UL	Underwriters Laboratories
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
OSHA	Occupational Safety and Health Act of 1970
PFMA	Power Fan Manufacturers Association
MSS	Manufacturers Association
ANSI	American National Standard Institute
ASHRAE	ASHRAE guide, Latest Edition
ASTM	American Society of Testing Materials

Local Authorities Having Jurisdiction, and City Requirements

B. The A.S.A., the A.S.T.M., The National Engineering Society of Manufacturer's Association having jurisdiction over the equipment, at the decision of the Engineer.

C. Other applicable building, safety or fire codes having jurisdiction over equipment, materials or methods. The decision of the Engineer will be final in event of dispute over Code to use or its interpretation.

1.5 WORK INCLUDED

A. Plumbing fixtures and accessories.

B. Sanitary and Vent System.

C. Storm Water Piping.

D. Domestic Hot Water Generation.

E. Hot and Cold Water Distribution Systems.

F. HVAC Piping Systems.

G. Air Distribution System, Return and Exhaust Systems.

H. Air Conditioning Controls and Monitoring.

I. Thermal Insulation and Acoustical Treatment.

J. Fire Protection Systems.

K. Rough-in and connect equipment furnished by others and under other contract divisions.

L. Miscellaneous other work as shown, specified or required for complete and operative system, in accordance with the intent of these documents.

M. Concrete housekeeping pads (4" thick unless shown as 6" thick) for all floor/ground-mounted equipment. Reinforce with No. 4 rebars, 12" O.C. each way, and welded wire mesh.

1.6 SEQUENCING AND SCHEDULING

A. The Contractor under this division of the Specifications shall furnish all labor, material, tools, equipment, supplies and supervision to completely install and place in operation satisfactory to the Owner the system as described herein and shown or reasonably implied on the Drawings. This Contractor shall cooperate with other Contractors as required to prevent such interference and shall make such adjustments as required to prevent such interference. All work shall be accomplished by or under direct supervision of qualified craftsmen in trades indicated.

B. This Contractor shall carefully coordinate his work with other Contractors and Sub Contractors, and shall schedule his work as required to prevent delay. Shop Drawings shall be carefully checked against all phases of the work to prevent interferences and discrepancies.

C. Lines which pitch shall have right-of-way over lines whose elevations can be changed. Offsets, transitions and changes in direction in pipes, and ducts shall be made as required to maintain proper headroom, pitch, etc.

D. The Contractor shall coordinate his work with that of the Owner, in order that there will be no delay in the proper installation and completion of the work. If, in the opinion of the Owner, any piping, equipment, etc., has been improperly placed or installed due to lack of coordination with the other trades, such piping and equipment shall be relocated as directed by the Owner at the Contractor's expense.

1.7 TESTS

A. This Contractor shall conduct such tests as required to determine that systems and equipment which he installs conform to Specifications. Contractor shall supply all labor, materials, instruments, operations, etc., required to facilitate testing.

1.8 OPERATING INSTRUCTIONS AND AS-BUILT DRAWINGS

A. Operating Instructions:

1. All equipment and systems shall be tested as hereinafter specified.

2. Furnish a competent mechanic to supervise the starting, adjusting and testing of all equipment and to train the Owner's operator in the operation of the system. Where specified, certain major items of equipment shall be installed under the supervision of and tested by a specialist furnished by the manufacturer of the equipment. Such specialist shall train the Owner's operator in the use of his equipment.

3. Contractor shall furnish three 3-complete sets of information including copies of operating and maintenance instructions for each and every piece of equipment supplied by him together with three (3) copies of spare parts lists, and three (3) copies of approved submittal manufacturer's data. The submittal data shall include all information pertinent to each item or piece of equipment as outlined in the Section, Testing, Adjusting and Balancing. Include all manufacturer's pump and fan curves, air pressure drop charts, capacity charts, control drawings, etc., as required for future reference. Information to be neatly bound in spring post 8½" x 11" binders, indexed, and labeled for each piece of equipment. Contractor will spend sufficient time with the operator to acquaint him with the complete operations of the systems. Provide framed, glass enclosed, typewritten instructions, easily read, explaining exactly the procedure to be followed in starting up, and in shutting down the systems for each of the various control cycles. Operators, such as switches, pushbuttons, changeovers, etc., shall be numbered and referred to by number and function in the operating instructions. This applies to the general, mechanical, and electrical Contractors. The manuals shall be previously approved by the Engineer and transmitted to the Owner at least one month prior to the completion of the work. Also, the names and addresses of all Sub Contractor shall be listed in the front of the manual.

B. Project Record Documents and As-Built Drawings:

1. Maintain at job site a set of contract record documents kept current by indicating thereon all changes, substitutions, etc., between work as specified and as installed.

2. Furnish Owner one complete set of reproducible Mylar sepia drawings, one set of bluelines and one complete, clean set of specifications showing installed location, size, etc., of all work and material as taken from record documents.

3. Show on record documents actual air quantities, water flow rates, valve or damper positions after balancing, etc.; also show, by actual dimension, location of all underground work.

1.9 SYSTEM CLEAN-UP

A. All piping systems shall be thoroughly flushed and cleaned as detailed herein.

B. All air filtration equipment shall be monitored and replaced as detailed herein.

1.10 GUARANTEE AND WARRANTY

A. Related Work Specified in Other Sections:

1. Condition of the Contract.

2. General Requirements.

B. Test Period:

1. Each piece of equipment shall meet performance specifications after three months' actual operation to Owner's satisfaction.

C. INDUSTRY'S STANDARD GUARANTEE:

1. See AIA General Conditions.

D. Contractor shall replace, or make good, any defect due to faulty workmanship or material which shall develop within one year from date of final acceptance. This guaranty shall cover both material and labor. Leaking pipework is considered faulty workmanship.

E. For first year after final acceptance, Contractor shall provide, at no cost to the Owner, any required maintenance and service necessary to assure the proper operation of the system. This shall include:

1. Any adjustments or service required.

2. Any necessary adjustments in system control setpoints when required, excluding filter maintenance.

F. Date of acceptance shall be the date of the Owner's final certificate. If a whole or partial system, or equipment, is put into use for benefit of any party, other than Contractor, and with prior written permission of Owner, this agreed date shall become the "date of acceptance" of the accepted portion of the work.

G. Certification:

1. Prior to completion and final acceptance of the facility, furnish to the Owner certification that all mechanical systems have been tested and that the installation and performance of these systems conform to the requirements of the Plans and Specifications.

PART 2 - PRODUCTS - NOT APPLICABLE

PART 3 - EXECUTION

3.1 WORK BY OTHERS

A. The General Contractor will provide foundations for equipment, chases, furring, curbs with roof flashing, framed openings in walk, partitions, etc., installation of grilles in doors, finish painting, except as noted, and all other similar work of a general construction nature. The General Contractor will also provide all temporary water, electric power, heating, and toilet facilities required for general construction purposes. Painting and/or identification of piping or ductwork by Mechanical Contractor.

B. The Electrical Contractor shall bring adequate power to and make final connections to all

equipment furnished under this Contract. All control wiring shall be by Mechanical Contractor. All conduit and materials for housing control wiring shall be by the Mechanical Contractor, unless otherwise stipulated on Drawings.

C. The General Contractor shall furnish openings in roof for vents, and install outdoor air louvers as indicated.

D. All items of labor, materials and equipment not specifically stated herein or on Plans to be by others are required to make the systems complete and operative, shall be by this Contractor.

3.2 INSTALLATION DIRECTIONS

A. Obtain manufacturer's printed installation directions to aid in properly executing work on equipment requiring such directions in opinion of Engineer. Submit such directions to Engineer for approval prior to time of installation for use in supervising work.

3.3 STARTING AND INSTRUCTIONS

A. All equipment and systems shall be tested as hereinafter specified.

B. Furnish a competent mechanic to supervise the starting, adjusting and testing of all equipment and to train the operator in the operation of the system. Where specified, certain major items of equipment shall be installed under the supervision of and tested by a specialist furnished by the manufacturer of the equipment. Such specialist shall train the operator in the use of his equipment.

C. Furnish manufacturer's printed operating and maintenance instructions for equipment and systems. Mount operating instructions in approved frame with glass cover and locate where directed.

3.4 PROTECTION OF EQUIPMENT AND MATERIALS

A. Responsibility for care and protection of equipment and materials under this Contract rests with this Contractor until equipment or materials have been tested and accepted.

B. All pipe ends, valves, ductwork and parts of equipment left unconnected, permanently or temporary, shall be capped, plugged or properly protected to prevent entry of foreign matter.

3.5 SUBMITTALS AND SHOP DRAWINGS

A. Minimum six (6) copies of equipment drawings and/or manufacturer's descriptive data of a nature to completely identify the quality of the material or equipment intended for installation shall be submitted for approval before beginning any construction. Failure to submit data for approval within specified time limit will be construed as meaning the Contractor will furnish equipment as called for by name. Data shall be submitted all in one brochure, indexed by flysheet on front page, and be bound in spring post 8 1/2 x 11 binders, all sets identical. No exception will be made to this procedure and time schedule. All sets shall be indexed and tabbed by section, i.e. Section 15020, etc.

B. Include with applicable equipment, capacity curves and tables, including pump and fan curves, efficiencies, etc. as pertinent to equipment selection and evaluation. Identify equipment and accessories to be provided on data sheets with multiple equipment/accessory information.

C. Whether or not the Contractor is utilizing the equipment as called for by name or not, does not relieve the Contractor of providing submittals. Submittals shall be required of all equipment as directed herein and as directed by the Engineer.

D. Any partial submittals will be returned to the Contractor for re-submittal. Only complete mechanical submittals will be acceptable. There are no exceptions. If the contractor delays submittals until his delay effects the progress or schedule of the project, that will NOT cause the engineer to review partial incomplete submittals.

3.6 TESTS

A. Tests shall be as follows:

1. Water Piping: (Domestic and circulating systems) 150 psi hydrostatic, with no discernable pressure loss for a period of eight (8) hours.

2. Sanitary Waste: Minimum 10 feet hydrostatic test and as required by ASA-A40.8 or local code.

3. Relief Valves: Fire equipment until safety valves relieve. Record temperature and/or pressure at time of opening.

4. Safety Controls: Test boiler and other equipment safety controls such as high temperature limit, high pressure limit, pilot safety, flame failure, and other such safety controls for proper operation prior to acceptance. Furnish certificate of such tests prior to request for final payment.

5. Fire Protection System Test: Test fire lines hydrostatically for two (2) hours at 200 psi and all other tests as required by NFPA 13. Obtain certificate of approval from local fire marshall.

6. Ductwork - See Section 15890 for test requirements.

B. Instrument Replacement:

1. Thermometers, Gauges, Etc.: Contractor shall remove, recalibrate and/or replace any instrument installed in the system, as directed by the Engineer, when accuracy is questionable, mercury columns are separated, or other such conditions exist.

C. Testing and Adjusting of Equipment:

1. Upon completion of the various systems, this Contractor shall set and adjust all valves, dampers, controllers, thermostats, etc.

2. Each and every phase of the heating and ventilating system shall be operated for a sufficient period of time to demonstrate to the entire satisfaction of the Engineer, the ability of the system to meet the capacity and performance requirements.

D. Cooperation:

1. The Engineer shall be notified no less than forty-eight (48) hours prior to any pipe test. The Engineer shall also be notified in adequate time for an inspection of the test before the test is completed.

3.7 SYSTEM CLEANING AND TREATMENT

A. All closed hot and chilled water piping systems shall be cleaned as follows:

1. All piping shall be cleaned of iron cutting and other debris as installed into the system. Piping received with heavy mill scale shall not be installed in the system. Particular attention shall be given to coils, valve seats and glands, pump mechanical seals and packing glands, strainers, etc., such that surfaces are clean and free of all foreign material.

2. At completion of the piping hook-up, after pressure tests and prior to operation of any equipment, the Contractor shall thoroughly flush the piping system with clean water to remove any debris remaining in piping.

   a. Initial Flushing: Remove loose dirt, and scale, metal chips, weld beads, rust, and like deleterious substances without damage to any system component. Bypass factory cleaned equipment unless acceptable means of protection are provided and subsequent inspection of hide-out areas takes place. Isolate or protect clean system components, including pumps and pressure vessels, and remove any components which may be damaged. Open all valves, drains, vents, and strainers at all system levels. debris accumulation cannot occur. Sectionalize system if possible, to circulate at velocities not less than six (6) feet per second. Circulate each section for not less than 24 hours. Blowdown all strainers, or remove and clean as frequently as necessary. Drain and prepare for final flushing.

B. Potable Water System: All potable water lines shall be thoroughly flushed and sterilized with a solution containing not less than 50 ppm available chlorine for eight (8) hours. During sterilization, operate all valves, faucets, etc., so that all portions of the system are reached. Flush system with clear water until concentration drops to 0.5 ppm. Contractor shall furnish system sample to State Health Department attesting to satisfactory condition of water.

C. Filter Cleaning:

1. No air handling equipment shall be operated during any stage of construction, clean up or testing without filters.

2. All filters on air handling equipment shall be new and unused and shall be installed by time mechanical construction is accepted and taken over for operation by the Owner.

3. Provide two (2) sets of filters at start-up.

3.8 INSTRUCTIONS FOR OPERATING AND MAINTENANCE MANUALS

A. Furnish written submittal data, manufacturers operating and maintenance procedures and recommendations, spare parts lists and suppliers, test and balance report and any interlocking control or wiring diagrams for all equipment. Include with equipment data, size and binder specified herein, in the following order, the following information:

1. First sheet to list Architect, Engineer, Contractor and Sub Contractor with addresses for each.

2. Second sheet to list type of equipment with sequential number, as applicable from Drawings, (as Pump No. 1), Duty (As Heating Water Loop, Heating Water Zone, etc.), the manufacturer, make, model and serial number off the actual equipment nameplate data rated horsepower, full load rated amps., voltage and phase. List installed location (as Mechanical Room, 201, etc.).

3. Next, actual copy of approved submittal data including all manufacturers published information on capacities, capacity curves or tables, accessory and control item lists, and other pertinent information as requested by Engineer. Cross reference all equipment to contract documents.

4. Next, include the manufacturer's published operating and maintenance procedures. Include instructions to stop and start each piece of equipment and an itemized maintenance schedule detailing procedure and interval of periodic maintenance items. Start this log of the maintenance list(s) by accomplishing the initial required maintenance procedure(s) for each and every maintenance item.

5. Submit three (3) complete sets of the above mentioned bound in 8 1/2 x 11 spring post binders brochures, indexed and tabled by equipment type (as Pumps, Air Handling Units, etc.), to the Engineer. This brochure will require the Engineer's signed approval before this contract is complete. No exceptions will be granted.

B. When systems are completely adjusted, furnish personnel to instruct Owner's operators. There shall be at least two (2) class periods of not more than four (4) hours each. Classes shall be at least two (2) days apart. Coordinate with Owner's representative at least one week before instruction.

3.09 GUARANTEE AND WARRANTY

A. All certificates shall first be presented to the Engineer for approval. After approval, copies of the certification(s) shall be forwarded to the Owner by the Contractor.

END OF SECTION 15020

SECTION 15050 - BASIC MECHANICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Piping materials and installation instructions common to most piping systems.
2. Dielectric fittings.
3. Mechanical sleeve seals.
4. Sleeves.
5. Escutcheons.
6. Grout.
7. Mechanical demolition.
8. Equipment installation requirements common to equipment sections.
9. Concrete bases.
10. Supports and anchorages.

1.2 DEFINITIONS

A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.

E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

1.3 SUBMITTALS

A. Welding certificates.

1.4 QUALITY ASSURANCE

A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."

B. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

C. Electrical Characteristics for Mechanical Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

PART 2 - PRODUCTS

2.1 PIPE, TUBE, AND FITTINGS

A. Refer to individual Division 15 piping Sections for pipe, tube, and fitting materials and joining methods.

B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.2 JOINING MATERIALS

A. Refer to individual Division 15 piping Sections for special joining materials not listed below.

B. Pipe-Flange Gasket Materials: ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness unless thickness or specific material is indicated.

C. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

D. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

E. Brazing Filler Metals: AWS A5.8, BCuP Series or BAg1, unless otherwise indicated.

F. Welding Filler Metals: Comply with AWS D10.12.

G. Solvent Cements for Joining Plastic Piping:

1. ABS Piping: ASTM D 2235.
2. CPVC Piping: ASTM F 493.
3. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.

4. PVC to ABS Piping Transition: ASTM D 3138.

2.3 DIELECTRIC FITTINGS

A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.

B. Insulating Material: Suitable for system fluid, pressure, and temperature.

C. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig minimum working pressure at 180 deg F .

D. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150 - 300-psig minimum working pressure as required to suit system pressures.

E. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225 deg F .

F. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig minimum working pressure at 225 deg F .

2.4 MECHANICAL SLEEVE SEALS

A. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.

B. Sealing Elements: EPDM interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.

C. Pressure Plates: Plastic Include two for each sealing element.

D. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.5 SLEEVES

A. Galvanized-Steel Sheet: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.

B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.

C. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

D. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.

1. Underdeck Clamp: Clamping ring with set screws.

E. Molded PVC: Permanent, with nailing flange for attaching to wooden forms.

F. PVC Pipe: ASTM D 1785, Schedule 40.

G. Molded PE: Reusable, PE, tapered-cup shaped, and smooth-outer surface with nailing flange for attaching to wooden forms.

2.6 ESCUTCHEONS

A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.

B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.

C. One-Piece, Cast-Brass Type: With set screw.

1. Finish: Polished chrome-plated.

D. Split-Casting, Cast-Brass Type: With concealed hinge and set screw.

1. Finish: Polished chrome-plated.

2.7 GROUT

A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.

1. Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
2. Design Mix: 5000-psi , 28-day compressive strength.
3. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 MECHANICAL DEMOLITION

A. Refer to Division 1 Sections "Cutting and Patching" and "Selective Demolition" for general demolition requirements and procedures.

B. Disconnect, demolish, and remove mechanical systems, equipment, and components indicated to be removed.

1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
2. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material. Mark all abandoned pipe as "abandoned" for easy visual identification.
3. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
4. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material. Mark all duct as "abandoned" for easy visual identification.
5. Equipment to Be Removed: Disconnect and cap services and remove equipment.
6. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
7. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.

C. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

3.2 PIPING SYSTEMS - COMMON REQUIREMENTS

A. Install piping according to the following requirements and Division 15 Sections specifying piping systems.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

F. Install piping to permit valve servicing.

G. Install piping at indicated slopes.

H. Install piping free of sags and bends.

I. Install fittings for changes in direction and branch connections.

J. Install piping to allow application of insulation.

K. Select system components with pressure rating equal to or greater than system operating pressure.

L. Install escutcheons for penetrations of walls, ceilings, and floors.

M. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.

N. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

1. Install steel pipe for sleeves smaller than 6 inches in diameter.
2. Install cast-iron "wall pipes" for sleeves 6 inches and larger in diameter.
3. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

O. Underground, Exterior-Wall Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

1. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

P. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Refer to Division 7 Section "Through-Penetration Firestop Systems" for materials.

Q. Verify final equipment locations for roughing-in.

R. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

3.3 PIPING JOINT CONSTRUCTION

A. Join pipe and fittings according to the following requirements and Division 15 Sections specifying piping systems.

B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.

E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.

F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

G. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.

H. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

I. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402, for safe-handling practice of cleaners, primers, and solvent cements.
2. ABS Piping: Join according to ASTM D 2235 and ASTM D 2661 Appendixes.
3. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.
4. PVC Pressure Piping: Join schedule number ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
5. PVC Nonpressure Piping: Join according to ASTM D 2855.
6. PVC to ABS Nonpressure Transition Fittings: Join according to ASTM D 3138 Appendix.

J. Plastic Pressure Piping Gasketed Joints: Join according to ASTM D 3139.

K. Plastic Nonpressure Piping Gasketed Joints: Join according to ASTM D 3212.

L. PE Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.

1. Plain-End Pipe and Fittings: Use butt fusion.
2. Plain-End Pipe and Socket Fittings: Use socket fusion.

M. Fiberglass Bonded Joints: Prepare pipe ends and fittings, apply adhesive, and join according to pipe manufacturer's written instructions.

3.4 PIPING CONNECTIONS

A. Make connections according to the following, unless otherwise indicated:

1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.
3. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.
4. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.5 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.

B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.

C. Install mechanical equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.

D. Install equipment to allow right of way for piping installed at required slope.

3.6 CONCRETE BASES

A. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.

1. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit.
2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of the base.
3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
5. Install anchor bolts to elevations required for proper attachment to supported equipment.
6. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
7. Use **3000-psi** , 28-day compressive-strength concrete and reinforcement as specified in Division 3 Section "Cast-in-Place Concrete."

3.7 ERECTION OF METAL SUPPORTS AND ANCHORAGES

A. Refer to Division 5 Section "Metal Fabrications" for structural steel.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor mechanical materials and equipment.

C. Field Welding: Comply with AWS D1.1.

3.8 ERECTION OF WOOD SUPPORTS AND ANCHORAGES

A. Cut, fit, and place wood grounds, nailers, blocking, and anchorages to support, and anchor mechanical materials and equipment.

B. Select fastener sizes that will not penetrate members if opposite side will be exposed to view or will receive finish materials. Tighten connections between members. Install fasteners without splitting wood members.

C. Attach to substrates as required to support applied loads.

3.9 GROUTING

A. Mix and install grout for mechanical equipment base bearing surfaces, pump and other equipment base plates, and anchors.

B. Clean surfaces that will come into contact with grout.

C. Provide forms as required for placement of grout.

D. Avoid air entrapment during placement of grout.

E. Place grout, completely filling equipment bases.

F. Place grout on concrete bases and provide smooth bearing surface for equipment.

G. Place grout around anchors.

H. Cure placed grout.

END OF SECTION 15050

SECTION 15110

VALVES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following general-duty valves:

1. Copper-alloy ball valves.
2. Bronze check valves.
3. Bronze gate valves.

B. See Division 2 piping Sections for general-duty and specialty valves for site construction piping.

C. See Division 13 fire-suppression piping and fire pump Sections for fire-protection valves.

D. See Division 15 piping Sections for specialty valves applicable to those Sections only.

1.2 SUBMITTALS

A. Product Data: For each type of valve indicated. Include body, seating, and trim materials; valve design; pressure and temperature classifications; end connections; arrangement; dimensions; and required clearances. Include list indicating valve and its application. Include rated capacities; furnished specialties; and accessories.

1.3 QUALITY ASSURANCE

A. ASME Compliance: ASME B31.9 for building services piping valves.

1. Exceptions: Domestic hot- and cold-water piping valves unless referenced.

B. ASME Compliance for Ferrous Valves: ASME B16.10 and ASME B16.34 for dimension and design criteria.

C. NSF Compliance: NSF 61 for valve materials for potable-water service.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.
2. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 VALVES, GENERAL

A. Refer to Part 3 "Valve Applications" Article for applications of valves.

B. Bronze Valves: NPS 2 and Smaller: Threaded ends, unless otherwise indicated.

C. Ferrous Valves NPS 2-1/2 and Larger: Flanged ends, unless otherwise indicated.

D. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

E. Valve Sizes: Same as upstream pipe, unless otherwise indicated.

F. Valve Actuators:

1. Handwheel: For valves other than quarter-turn types.
2. Lever Handle: For quarter-turn valves NPS 6 and smaller, except plug valves.

G. Extended Valve Stems: On insulated valves.

H. Valve Flanges: ASME B16.1 for cast-iron valves, ASME B16.5 for steel valves, and ASME B16.24 for bronze valves.

I. Valve Grooved Ends: AWWA C606.

1. Solder Joint: With sockets according to ASME B16.18.

a. Caution: Use solder with melting point below 840 deg F for angle, check, gate, and globe valves; below 421 deg F for ball valves.

2. Threaded: With threads according to ASME B1.20.1.

J. Valve Bypass and Drain Connections: MSS SP-45.

2.3 COPPER-ALLOY BALL VALVES

A. Manufacturers:

1. One-Piece, Copper-Alloy Ball Valves:

a. American Valve, Inc.
b. Conbraco Industries, Inc.; Apollo Div.
c. Crane Co.; Crane Valve Group; Jenkins Valves.
d. Crane Co.; Crane Valve Group; Stockham Div. e. DynaQuip Controls.
f. Grinnell Corporation.
g. Jamesbury, Inc.
h. Kitz Corporation of America.
i. Legend Valve & Fitting, Inc.
j. NIBCO INC.
k. Watts Industries, Inc.; Water Products Div.

2.4 BRONZE CHECK VALVES

A. Manufacturers:

1. Type 1, Bronze, Horizontal Lift Check Valves with Metal Disc:

a. Cincinnati Valve Co.
b. Crane Co.; Crane Valve Group; Crane Valves.
c. Crane Co.; Crane Valve Group; Stockham Div.
d. Red-White Valve Corp.
e. Walworth Co.

2. Type 2, Bronze, Horizontal Lift Check Valves with Nonmetallic Disc:

a. Cincinnati Valve Co.
b. Crane Co.; Crane Valve Group; Crane Valves.
c. Crane Co.; Crane Valve Group; Jenkins Valves.
d. Crane Co.; Crane Valve Group; Stockham Div. e. Walworth Co.

3. Type 1, Bronze, Vertical Lift Check Valves with Metal Disc:

a. Cincinnati Valve Co.
b. Crane Co.; Crane Valve Group; Crane Valves.
c. Crane Co.; Crane Valve Group; Jenkins Valves.
d. Red-White Valve Corp.

4. Type 2, Bronze, Vertical Lift Check Valves with Nonmetallic Disc:

a. Grinnell Corporation.
b. Kitz Corporation of America.
c. Milwaukee Valve Company.

PART 3 - EXECUTION

3.1 VALVE APPLICATIONS

A. Refer to piping Sections for specific valve applications. If valve applications are not indicated, use the following:

1. Shutoff Service: Ball, or gate valves.
2. Throttling Service: Angle, ball.
3. Pump Discharge: Spring-loaded, lift-disc check valves.

B. If valves with specified SWP classes or CWP ratings are not available, the same types of valves with higher SWP class or CWP ratings may be substituted.

C. Domestic Water Piping: Use the following types of valves:

1. Ball Valves, NPS 2 and Smaller: One-piece, 400-psig CWP rating, copper alloy.
2. Ball Valves, NPS 2-1/2 and Larger: Class 150 ferrous alloy.
3. Lift Check Valves, NPS 2 and Smaller: Type 2, Class 125, horizontal or vertical, bronze.
4. Gate Valves, NPS 2 and Smaller: Type 1, Class 125, bronze.
5. Gate Valves, NPS 2-1/2 and Larger: Type I, Class 125, bronze-mounted cast iron.

D. Select valves, except wafer and flangeless types, with the following end connections:

1. For Copper Tubing, NPS 2 and Smaller: Solder-joint or threaded ends.
2. For Copper Tubing, NPS 2-1/2 to NPS 4 : Flanged or threaded ends.
3. For Steel Piping, NPS 2 and Smaller: Threaded ends.
4. For Steel Piping, NPS 2-1/2 to NPS 4 : Flanged or threaded ends.

3.2 VALVE INSTALLATION

A. Piping installation requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

C. Locate valves for easy access and provide separate support where necessary.

D. Install valves in horizontal piping with stem at or above center of pipe.

E. Install valves in position to allow full stem movement.

F. Install check valves for proper direction of flow and as follows:

1. Swing Check Valves: In horizontal position with hinge pin level.

2. Dual-Plate Check Valves: In horizontal or vertical position, between flanges.
3. Lift Check Valves: With stem upright and plumb.

3.3 JOINT CONSTRUCTION

A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping joint construction.

B. Grooved Joints: Assemble joints with keyed coupling housing, gasket, lubricant, and bolts according to coupling and fitting manufacturer's written instructions.

C. Soldered Joints: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder; and ASTM B 828 procedure, unless otherwise indicated.

3.4 ADJUSTING

A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

END OF SECTION 15110

SECTION 15140

DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes domestic water piping from locations indicated to fixtures and equipment inside the building.

1.2 SUBMITTALS

A. Water Samples: Specified in "Cleaning" Article in Part 3.

B. Field quality-control test reports.

1.3 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

B. Comply with NFPA 24, "Installation of Private Fire Service Mains and Their Appurtenances," and NSF 61, "Drinking Water System Components-Health Effects; Sections 1 through 9," for combined fire-protection and domestic water service piping to building. This building should have a separate water supply for each service as shown on the drawings.

C. Comply with NSF 14, "Plastics Piping Components and Related Materials," for plastic, potable domestic water piping and components.

D. Comply with NSF 61, "Drinking Water System Components-Health Effects; Sections 1 through 9," for potable domestic water piping and components.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Transition Couplings: Coupling or other manufactured fitting the same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.

B. Steel Pipe: ASTM A 53, Type E or S, Grade A or B, Schedule 40, galvanized. Include ends matching joining method.

1. Steel Pipe Nipples: ASTM A 733, made of ASTM A 53 or ASTM A 106, Schedule 40, galvanized, seamless steel pipe. Include ends matching joining method.
2. Malleable-Iron Unions: ASME B16.39, Class 150, hexagonal-stock body with ball-and-socket, metal-to-metal, bronze seating surface, and female threaded ends.
3. Gray-Iron, Threaded Fittings: ASME B16.4, Class 125, galvanized, standard pattern.
4. Cast-Iron Flanges: ASME B16.1, Class 125.
5. Cast-Iron, Flanged Fittings: ASME B16.1, Class 125, galvanized.
6. Steel-Piping, Expansion Joints: Compound, galvanized, steel fitting with telescoping body and slip-pipe section. Include packing rings, packing, limit rods, chrome-plated finish on slip-pipe sections, and flanged ends.
7. Steel-Piping, Double Expansion Joints: Compound, galvanized, steel fitting with telescoping body and two slip-pipe sections. Include packing rings, packing, limit rods, chrome-plated finish on slip-pipe sections, and flanged ends.

C. Soft Copper Tube: ASTM B 88, Types K and L, water tube, annealed temper.

1. Copper Pressure Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint fittings. Furnish wrought-copper fittings if indicated.
2. Bronze Flanges: ASME B16.24, Class 150, with solder-joint end. Furnish Class 300 flanges if required to match piping.
3. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces and solder-joint or threaded ends.

D. Hard Copper Tube: ASTM B 88, Types L and M, water tube, drawn temper.

1. Copper Pressure Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint fittings. Furnish wrought-copper fittings if indicated.
2. Bronze Flanges: ASME B16.24, Class 150, with solder-joint end. Furnish Class 300 flanges if required to match piping.
3. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces and solder-joint or threaded ends.

E. CPVC Schedule 40 Pipe: ASTM F 441/F 441M.

1. CPVC Schedule 40 Fittings: ASTM F 438, socket type.

F. CPVC Schedule 80 Pipe: ASTM F 441/F 441M.

1. CPVC Schedule 80 Fittings: ASTM F 439, socket type.

G. CPVC Piping System: ASTM D 2846/D 2846M, SDR 11, pipe and socket fittings.

H. CPVC Tubing System: ASTM D 2846/D 2846M, SDR 11, tube and socket fittings.

I. PVC Schedule 40 Pipe: ASTM D 1785.

1. PVC Schedule 40 Fittings: ASTM D 2466, socket type.

J. PVC Schedule 80 Pipe: ASTM D 1785.

1. PVC Schedule 80 Fittings: ASTM D 2467, socket type.

K. PVC AWWA Pipe: AWWA C900, Class 150 and Class 200, with bell end with gasket and spigot end.

1. Provide piping listed for fire-protection service where indicated.
2. PVC Fabricated Fittings: AWWA C900, Class 150 and Class 200, with bell-and-spigot or double-bell ends. Include elastomeric gasket in each bell.
3. PVC Molded Fittings: AWWA C907, Class 150, with bell-and-spigot or double-bell ends. Include elastomeric gasket in each bell.

2.2 VALVES

A. Refer to Division 15 Section "Valves" for bronze and cast-iron, general-duty valves.

B. CPVC Union Ball Valves: MSS SP-122, with full-port ball, socket detachable end connectors, and pressure rating not less than **125 psig** at **73 deg F** .

1. Material Option: MSS SP-122, of plastic other than CPVC and suitable for potable water. Include threaded ends and pressure rating not less than 150 psig at 73 deg F, unless otherwise indicated.

C. CPVC Non-Union Ball Valves: MSS SP-122, with full- or reduced-port ball, socket or threaded ends, and pressure rating not less than **125 psig** at **73 deg F** .

1. Material Option: MSS SP-122, of plastic other than CPVC and suitable for potable water. Include threaded ends and pressure rating not less than 150 psig (1035 kPa) at 73 deg F (23 deg C), unless otherwise indicated.

D. PVC Union Ball Valves: MSS SP-122, with full-port ball, socket detachable end connectors, and pressure rating not less than **125 psig** .

1. Material Option: MSS SP-122, of plastic other than PVC and suitable for potable water. Include threaded ends and pressure rating not less than 150 psig (1035 kPa), unless otherwise indicated.

E. PVC Non-Union Ball Valves: MSS SP-122, with full- or reduced-port ball, socket or threaded ends, and pressure rating not less than **125 psig** .

1. Material Option: MSS SP-122, of plastic other than PVC and suitable for potable water. Include threaded ends and pressure rating not less than 150 psig (1035 kPa), unless otherwise indicated.

F. PVC Check Valves: Swing or ball-check design and pressure rating not less than **150 psig** .

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below, unless otherwise indicated.

B. Flanges may be used on aboveground piping, unless otherwise indicated.

C. Domestic Water Piping: Use the following piping materials for each size range:

1. NPS 1-1/2 and Smaller: Hard copper tube, **Type L**; copper pressure fittings; and soldered joints.
2. NPS 2: Hard copper tube, **Type L**; copper pressure fittings; and soldered joints.
3. NPS 2-1/2 to NPS 3-1/2: Hard copper tube, **Type L**; copper pressure fittings; and soldered joints.
4. NPS 4 to NPS 6: Hard copper tube, **Type L**; copper pressure fittings; and soldered joints.

D. Nonpotable-Water Piping: **Use any of** the following piping materials for each size range:

1. NPS 3-1/2 and Smaller: Hard copper tube, [**Type L (Type B)**] [**Type M (Type C)**]; copper pressure fittings; and soldered joints.
2. NPS 3-1/2 and Smaller: PVC, Schedule 40 pipe; PVC, Schedule 40 socket fittings; and solvent-cemented joints.
3. NPS 4 to NPS 6: PVC, Schedule 40 pipe; PVC, Schedule 40 socket fittings; and solvent-cemented joints.

3.2 VALVE APPLICATIONS

A. Where specific valve types are not indicated, the following requirements apply:

1. Shutoff Duty: Use bronze ball or gate valves for piping NPS 2 and smaller. Use cast-iron or gate valves with flanged ends for piping NPS 2-1/2 and larger.
2. Throttling Duty: Use bronze ball valves for piping NPS 2 and smaller.
3. Hot-Water-Piping, Balancing Duty: Memory-stop balancing valves.
4. Drain Duty: Hose-end drain valves.

B. PVC ball, butterfly, and check valves may be used with PVC piping.

3.3 PIPING INSTALLATION

A. Refer to Division 2 Section "Water Distribution" for site water distribution and service piping.

B. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping installation.

C. Extend domestic water service piping to exterior water distribution piping in sizes and locations indicated.

D. Install cast-iron sleeve with water stop and mechanical sleeve seal at each service pipe penetration through foundation wall. Select number of interlocking rubber links required to make installation watertight. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for sleeves and mechanical sleeve seals.

E. Install wall penetration system at each service pipe penetration through foundation wall. Make installation watertight. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for wall penetration systems.

F. Install shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve, inside building at each domestic water service.

G. Install water-pressure regulators downstream from shutoff valves. Install domestic water piping level without pitch and plumb.

H. Fill water piping. Check components to determine that they are not air bound and that piping is full of water.

I. Perform the following steps before operation:

1. Close drain valves, hydrants, and hose bibbs.
2. Open shutoff valves to fully open position.
3. Open throttling valves to proper setting.
4. Remove plugs used during testing of piping and plugs used for temporary sealing of piping during installation.
5. Remove and clean strainer screens. Close drain valves and replace drain plugs.
6. Remove filter cartridges from housings, and verify that cartridges are as specified for application where used and that cartridges are clean and ready for use.

J. Check plumbing equipment and verify proper settings, adjustments, and operation. Do not operate water heaters before filling with water.

K. Check plumbing specialties and verify proper settings, adjustments, and operation.

1. Water-Pressure Regulators: Set outlet pressure at 80 psig maximum, unless otherwise indicated.

L. Energize pumps and verify proper operation.

3.4 JOINT CONSTRUCTION

A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping joint construction.

B. Soldered Joints: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder; and ASTM B 828 procedure, unless otherwise indicated.

3.5 ROUGHING-IN FOR WATER METERS

A. Rough-in domestic water piping for water meter installation. If the local utility requires, this contractor shall purchase and install the meter. Water meters will be furnished by utility.

3.6 VALVE INSTALLATION

A. Install sectional valve close to water main on each branch and riser serving plumbing fixtures or equipment. Use ball or gate valves for piping NPS 2 and smaller. Use or gate valves for piping NPS 2-1/2 and larger.

B. Install shutoff valve on each water supply to equipment and on each water supply to plumbing fixtures without supply stops. Use ball or gate valves for piping NPS 2 and smaller. Use gate valves for piping NPS 2-1/2 and larger.

C. Install drain valves for equipment, at base of each water riser, at low points in horizontal piping, and where required to drain water piping.

1. Install hose-end drain valves at low points in water mains, risers, and branches.
2. Install stop-and-waste drain valves where indicated.

D. Install balancing valve in each hot-water circulation return branch and discharge side of each pump and circulator. Set balancing valves partly open to restrict but not stop flow. Use ball valves for piping NPS 2 and smaller.

3.7 HANGER AND SUPPORT INSTALLATION

A. Refer to Division 15 Section "Mechanical Vibration and Seismic Controls" for vibration-restraint devices.

B. Refer to Division 15 Section "Hangers and Supports" for pipe hanger and support devices. Install the following:

1. Vertical Piping: MSS Type 8 or Type 42, clamps.
2. Individual, Straight, Horizontal Piping Runs: According to the following:

a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
b. Longer Than 100 Feet : MSS Type 43, adjustable roller hangers.

C. Install supports according to Division 15 Section "Hangers and Supports."

D. Support vertical piping and tubing at base and at each floor.

E. Rod diameter may be reduced 1 size for double-rod hangers, to a minimum of 3/8 inch .

F. Install hangers for steel piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/4 and Smaller: 84 inches with 3/8-inch rod.
2. NPS 1-1/2: 108 inches with 3/8-inch rod.
3. NPS 2: 10 feet with 3/8-inch rod.
4. NPS 2-1/2 : 11 feet with 1/2-inch rod.
5. NPS 3 and NPS 3-1/2: 12 feet with 1/2-inch rod.
6. NPS 4 and NPS 5: 12 feet with 5/8-inch rod.

G. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 3/4 and Smaller: 60 inches with 3/8-inch rod.
2. NPS 1 and NPS 1-1/4: 72 inches with 3/8-inch rod.
3. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
4. NPS 2-1/2: 108 inches with 1/2-inch rod.
5. NPS 3 to NPS 5: 10 feet with 1/2-inch rod.

H. Install supports for vertical copper tubing every 10 feet.

I. Install hangers for PVC piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 2 and Smaller: 48 inches with 3/8-inch rod.
2. NPS 2-1/2 to NPS 3-1/2: 48 inches with 1/2-inch rod.

J. Install supports for vertical PVC piping every 48 inches.

K. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.8 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to equipment and machines to allow service and maintenance.

C. Connect domestic water piping to exterior water service piping. Use transition fitting to join dissimilar piping materials.

D. Connect domestic water piping to service piping with shutoff valve, and extend and connect to the following:

1. Booster Systems: Cold-water suction and discharge piping.
2. Water Heaters: Cold-water supply and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.
3. Plumbing Fixtures: Cold- and hot-water supply piping in sizes indicated, but not smaller than required by plumbing code. Refer to Division 15 Section "Plumbing Fixtures"
4. Equipment: Cold- and hot-water supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection. Use flanges instead of unions for NPS 2-1/2 and larger.

3.9 FIELD QUALITY CONTROL

A. Inspect domestic water piping as follows:

1. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.
2. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:

    a. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
    b. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

3. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.
4. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

B. Test domestic water piping as follows:

1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
2. Leave uncovered and unconcealed new, altered, extended, or replaced domestic water piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
3. Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
4. Repair leaks and defects with new materials and retest piping or portion thereof until satisfactory results are obtained.

5. Prepare reports for tests and required corrective action.

3.10 CLEANING

A. Clean and disinfect potable domestic water piping as follows:

1. Purge new piping and parts of existing domestic water piping that have been altered, extended, or repaired before using.
2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction or, if methods are not prescribed, procedures described in either AWWA C651 or AWWA C652 or as described below:

    a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
    b. Fill and isolate system according to either of the following:

        1) Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours.
        2) Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for three hours.

    c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
    d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.

B. Prepare and submit reports of purging and disinfecting activities.

C. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

END OF SECTION 15140

SECTION 15150 - SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes soil and waste, sanitary drainage and vent piping inside the building.

1.2 SUBMITTALS

A. Field quality-control test reports.

1.3 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

B. Comply with NSF 14, "Plastics Piping Systems Components and Related Materials," for plastic piping components. Include marking with "NSF-dwv" for plastic drain, waste, and vent piping; "NSF-drain" for plastic drain piping; "NSF-tubular" for plastic continuous waste piping; and "NSF-sewer" for plastic sewer piping.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Flexible Transition Couplings for Underground Nonpressure Piping: ASTM C 1173 with elastomeric sleeve. Include ends of same sizes as piping to be joined and include corrosion-resistant metal band on each end.

B. Transition Couplings for Underground Pressure Piping: AWWA C219 metal, sleeve-type coupling or other manufactured fitting same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.

C. Hubless Cast-Iron Pipe and Fittings: ASTM A 888 or CISPI 301.

1. Couplings: ASTM C 1277 assembly of metal housing, corrosion-resistant fasteners, and ASTM C 564 rubber sleeve with integral, center pipe stop.

a. Heavy-Duty, Type 304, Stainless-Steel Couplings: ASTM A 666, Type 304, stainless-steel shield; stainless-steel bands; and sleeve.

1) NPS 1-1/2 to NPS 4: 3-inch- wide shield with 4 bands.
2) NPS 5 to NPS 10 : 4-inch- wide shield with 6 bands.

D. ABS Pipe: ASTM D 2661, Schedule 40, solid wall.

1. ABS Socket Fittings: ASTM D 2661, made to ASTM D 3311, drain, waste, and vent patterns.

E. PVC Pipe: ASTM D 2665, solid-wall drain, waste, and vent.

1. PVC Socket Fittings: ASTM D 2665, socket type, made to ASTM D 3311, drain, waste, and vent patterns.

F. PVC Special Fittings: ASTM F 409, drainage-pattern tube and tubular fittings with ends as required for application.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

A. Transition and special fittings with pressure ratings at least equal to piping pressure ratings may be used in applications below, unless otherwise indicated.

B. Flanges may be used on aboveground pressure piping, unless otherwise indicated.

C. Aboveground, Soil, Waste, and Vent Piping: Use one of the following piping materials for each size range:

1. NPS 1-1/4 and NPS 1-1/2: Use NPS 1-1/2 hubless, cast-iron soil piping and one of the following:

   a. Couplings: Heavy-duty, Type 301, stainless steel.
   b. Couplings: Compact, stainless steel.

2. NPS 1-1/4 and NPS 1-1/2: ABS pipe, ABS socket fittings, and solvent-cemented joints.
3. NPS 1-1/4 and NPS 1-1/2: PVC pipe, PVC socket fittings, and solvent-cemented joints.
4. NPS 2 to NPS 4: Service class, cast-iron soil piping; gaskets; and gasketed joints.
5. NPS 2 to NPS 4: Hubless, cast-iron soil piping and one of the following:

   a. Couplings: Heavy-duty, Type 301, stainless steel.

6. NPS 2 to NPS 4: ABS pipe, ABS socket fittings, and solvent-cemented joints.
7. NPS 2 to NPS 4: PVC pipe, PVC socket fittings, and solvent-cemented joints.
8. NPS 5 and NPS 6: Service class, cast-iron soil piping; gaskets; and gasketed joints.
9. NPS 5 and NPS 6: Hubless, cast-iron soil piping and one of the following:

   a. Couplings: Heavy-duty, Type 301, stainless steel.

10. NPS 5 and NPS 6: Use NPS 6 PVC pipe, PVC socket fittings, and solvent-cemented joints.

D. Underground, Soil, Waste, and Vent Piping: Use one of the following piping materials for each size range:

1. NPS 1-1/2: Hubless, cast-iron soil piping and one of the following:

   a. Couplings: Heavy-duty, Type **301**, stainless steel.
2. NPS 1-1/2: PVC pipe, PVC socket fittings, and solvent-cemented joints.
3. NPS 2 to NPS 4: Service class, cast-iron soil piping; gaskets; and gasketed joints.
4. NPS 2 to NPS 4: PVC pipe, PVC socket fittings, and solvent-cemented joints.
5. NPS 5 and NPS 6: Service class, cast-iron soil piping; gaskets; and gasketed joints.
6. NPS 5 and NPS 6: Hubless, cast-iron soil piping and one of the following:

   a. Couplings: Heavy-duty, Type 301, stainless steel.
7. NPS 5 and NPS 6: PVC pipe, PVC socket fittings, and solvent-cemented joints.

3.2 PIPING INSTALLATION

A. Refer to Division 2 Section "Sanitary Sewerage" for Project-site sanitary sewer piping.

B. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping installation.

C. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers.

D. Install cast-iron sleeve with water stop and mechanical sleeve seal at each service pipe penetration through foundation wall. Select number of interlocking rubber links required to make installation watertight. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for sleeves and mechanical sleeve seals.

E. Install wall penetration system at each service pipe penetration through foundation wall. Make installation watertight. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for wall penetration systems.

F. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."

1. Encase underground piping with PE film according to ASTM A 674 or AWWA C105.

G. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if 2 fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 deg rees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.

H. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.

I. Install soil and waste drainage and vent piping at the following minimum slopes, unless otherwise indicated:

1. Building Sanitary Drain: 2 percent downward in direction of flow for piping NPS 3 and smaller; 1 percent downward in direction of flow for piping NPS 4 and larger.
2. Horizontal Sanitary Drainage Piping: 2 percent downward in direction of flow.
3. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.

J. Sleeves are not required for cast-iron soil piping passing through concrete slabs-on-grade if slab is without membrane waterproofing.

K. Install PVC soil and waste drainage and vent piping according to ASTM D 2665.

L. Install underground PVC soil and waste drainage piping according to ASTM D 2321.

M. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

3.3 JOINT CONSTRUCTION

A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping joint construction.

B. Cast-Iron, Soil-Piping Joints: Make joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."

1. Gasketed Joints: Make with rubber gasket matching class of pipe and fittings.
2. Hubless Joints: Make with rubber gasket and sleeve or clamp.

C. Soldered Joints: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder; and ASTM B 828 procedure, unless otherwise indicated.

D. PVC Nonpressure Piping Joints: Join piping according to ASTM D 2665.

3.4 VALVE INSTALLATION

A. Backwater Valves: Install backwater valves in piping subject to sewage backflow.

1. Horizontal Piping: Horizontal backwater valves. Use normally closed type, unless otherwise indicated.
2. Floor Drains: Drain outlet backwater valves, unless drain has integral backwater valve.
3. Install backwater valves in accessible locations.

4. Refer to Division 15 Section "Plumbing Specialties" for backwater valves.

3.5 HANGER AND SUPPORT INSTALLATION

A. Refer to Division 15 Section "Hangers and Supports" for pipe hanger and support devices. Install the following:

1. Vertical Piping: MSS Type 8 or Type 42, clamps.
2. Individual, Straight, Horizontal Piping Runs: According to the following:

    a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
    b. Longer Than 100 Feet : MSS Type 43, adjustable roller hangers.
    c. Longer Than 100 Feet, if Indicated: MSS Type 49, spring cushion rolls.

3. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
4. Base of Vertical Piping: MSS Type 52, spring hangers.

B. Install supports according to Division 15 Section "Hangers and Supports."

C. Support vertical piping and tubing at base and at each floor.

D. Rod diameter may be reduced 1 size for double-rod hangers, with 3/8-inch minimum rods.

E. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/2 and NPS 2 : 60 inches with 3/8-inch rod.
2. NPS 3 : 60 inches with 1/2-inch rod.
3. NPS 4 and NPS 5 : 60 inches with 5/8-inch rod.

F. Install supports for vertical cast-iron soil piping every 15 feet (4.5 m).

G. Install hangers for ABS and PVC piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/2 and NPS 2 : 48 inches with 3/8-inch rod.
2. NPS 3: 48 inches with 1/2-inch rod.
3. NPS 4 and NPS 5: 48 inches with 5/8-inch rod.

H. Install supports for vertical ABS and PVC piping every 48 inches.

I. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.6 CONNECTIONS

A. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.

B. Connect drainage and vent piping to the following:

1. Plumbing Fixtures: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code. Refer to Division 15 Section "Plumbing Fixtures."
2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.
3. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code. Refer to Division 15 Section "Plumbing Specialties."
4. Equipment: Connect drainage piping as indicated. Provide shutoff valve, if indicated, and union for each connection. Use flanges instead of unions for connections NPS 2-1/2 and larger.

3.7 FIELD QUALITY CONTROL

A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.

1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.

C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction. D.

Test sanitary drainage and vent piping according to procedures of authorities having jurisdiction.

1. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
2. Prepare reports for tests and required corrective action.

3.8 CLEANING

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

C. Place plugs in ends of uncompleted piping at end of day and when work stops.

3.9 PROTECTION

A. Exposed ABS and PVC Piping: Protect plumbing vents exposed to sunlight with two coats of water-based latex paint.

END OF SECTION 15150

SECTION 15400 - PLUMBING SYSTEMS AND EQUIPMENT

PART 1 - GENERAL

1.1 REFERENCE TO OVERALL PROJECT

A. The General Conditions, Supplementary Conditions, and all applicable requirements of the overall project, except as otherwise amended shall apply to all work herein.

B. Related Documents: Drawings and general provisions of the contract including General Supplemental, and Special Conditions, Instruction to Bidders, and Division 1 specification sections, apply to work of the section.

C. Building materials which are scheduled to be incorporated into the Work under the agreement shall first either be certified by the Manufacturer to be asbestos free or be inspected and tested by accredited parties and certified to be free of asbestos content in accordance with by EPA and AHERA.

D. The Owner reserves the right to inspect all material and equipment at random at the job site. Materials containing asbestos or equipment substituted or provided without approval of the architect shall be declared in nonconformance with the document requirements and shall be removed immediately at the Contractor's expense.

1.2 SCOPE

A. The work under this Section shall be to provide a complete plumbing system. All items of work, of cost and expense of any nature whatsoever belonging with or necessary to the completion of work called for in this Specification or in the Contract Documents are hereby specified to be included in this Contract.

B. Work covered by this Section of the specifications and accompanying drawings consists of furnishing all labor, equipment, appliances and materials and in performing all operations in connection with installation of a complete plumbing system for the proposed building as indicated and specified. This Section shall also include all incidental items not ordinarily specified, but necessary for the complete installation.

C. All equipment and materials mentioned in these specifications and/or shown on the Drawings shall be furnished, except where otherwise specifically noted, completely installed, adjusted, and left in a safe and satisfactory operating condition. All accessories, appliances and connections necessary for the operation of the equipment shall be furnished and installed.

D. The plumbing systems consist of the following principal items:
   1. Underground sanitary sewer system to points indicated on the drawings.

2. Above ground sanitary waste, and vent systems.
3. Above ground domestic hot water, and cold water systems, natural gas systems.
4. Plumbing fixtures and equipment.
5. Insulation of plumbing systems.
6. Aboveground rainwater systems.
7. Underground rainwater system to points indicated on the drawings.

1.3 DRAWINGS AND SPECIFICATIONS

A. The commencement of work under this Section indicates that the Contractor has examined and has knowledge of the architectural, structural, electrical, existing plumbing, mechanical, site work Drawings and Specifications. The failure of the Contractor to acquaint himself with all available information shall not relieve him of any responsibility for performing his work properly.

1.4 ORDINANCES, PERMITS AND CODES

A. It shall be the Contractor's duty to perform the work and provide the materials covered by these specifications in conformance with all ordinances and regulations of all authorities having jurisdiction.

B. The Contractor shall obtain and pay for all permits, connection, and inspection fees as required for the complete installation of the plumbing systems.

C. All work herein shall conform to all applicable laws, ordinances and regulations of the local utility companies.

D. The work shall be in accordance with, but not limited to, the requirements of:
1. National Fire Protection Association
2. National Safety Code
3. Applicable Energy Code for Buildings
4. Local Plumbing Code
5. International Plumbing Code

E. Codes and regulations referred to are minimum standards. Where the requirements of these specifications or drawings exceed those of the codes and regulations, the drawings and specifications govern.

1.5 COORDINATION AND CONFLICTS

A. The Contractor shall coordinate his work so that it does not interfere with the work of other trades. It shall be the Contractor's duty to see that his work is installed in a timely manner.

B. Drawings indicate approximate locations of fixtures, apparatus and piping. It is required that piping generally be concealed above ceilings and in walls.

C. Where minor deviations from plans are required in order to conform to space limitations and building conditions, such changes shall be made by the Contractor at

no additional cost to the Owner and shall be subject to the approval of the Architect.

1.6 WARRANTY

A. All equipment shall be started, tested, adjusted, and placed in satisfactory operating condition by the Contractor. All equipment shall be covered for the duration of the manufacturer's guarantee or warranty and the Subcontractor shall furnish the Owner with all manufacturer's guarantees or warranties.

B. Equipment furnished shall be guaranteed for a period of one (1) year from date of acceptance.

1.7 RECORD DOCUMENTS

A. Contractor shall furnish at the time of request for final payment, copies of a brochure containing the following information as called for in these specifications.
   1. Letter of guarantees.
   2. Operating instructions.
   3. Manufacturer's parts data and service instructions on all items of equipment.
   4. Manufacturer's guarantees and warranties.

1.8 MOTORS

A. Motors shall be wound for the currents specified under the Electrical Plans and Specifications. Motor running currents shall not exceed the manufacturer's name plate full load amperes. Motors other than hermetic type shall be manufactured in accordance with NEMA Standards. All motors installed outdoors shall be enclosed, weatherproof type, unless installed within weatherproof type equipment housing.

1.9 ELECTRICAL WORK

A. Motors, controls, relays, contactors and switches required for proper operation of equipment covered under this Section, except items specified to be furnished under the Electrical Section, shall be furnished by the Subcontractor under this Section of the Specifications. Devices which are a part of the power wiring circuit and which are not an integral part of the equipment shall be installed under the Electrical Section.

B. All control wiring shall be furnished and installed under this Section.

C. Power wiring, unless otherwise indicated hereinbefore, shall be furnished and installed under the Electrical Section of the Specifications.

D. Devices, materials and installation shall conform to requirements of the Electrical section, except as specified herein.

E. All motors, and motor switches shall be for the voltage and phase shown on the Electrical Plans and Specifications.

1.10 PRODUCTS AND EXECUTION

A. All materials, equipment, fixtures and apparatus shall be new and shall bear the label of the Underwriters' Laboratories, Inc., where UL standards have been established for such material.

1.11 SUBMITTALS

A. All materials and equipment which the Contractor proposes to furnish shall be submitted to the engineer for review and approval. Data shall be complete in all respects and shall reference, where applicable, to the unit symbol utilized on the Drawings and Specifications.

B. Submittal review and approval is considered as general acceptance of the basic applicability of the equipment. Contractor is responsible for the installation of the equipment and/or alternate arrangement of the equipment within a given space. When the Contractor desires to use substituted equipment, he shall be responsible for providing submittal documents which provide pertinent information including capacities to the engineer. No equipment may be substituted for an approved piece of equipment without the approval of the engineer/architect. Where the substituted equipment creates the need for alterations in any portion of the work depicted in the contract documents, it shall be the Contractor's responsibility to notify all of the affected parties and coordinate these items with all other trades. Further, it shall be the Contractor's responsibility to assume any additional cost to the contract created by the substituted equipment.

C. Substituted equipment is considered to be any equipment other than the first named item in the Specifications or on the Drawings, or any item not approved as a submittal.

D. Contractor further agrees that if deviations, discrepancies or conflicts between Shop Drawings and Specifications are discovered either prior to or after Shop Drawing Submittals are processed by the Engineer, the design drawings and Specifications shall control and shall be followed. Review of submittal data shall in no way relieve the Contractor of his duty to perform all work and provide all equipment in strict compliance with the requirements set forth in the contract documents.

E. Each individual submittal item for materials and equipment shall be marked to show specification section and paragraph number which pertains to the item. Failure to mark submittals in accordance with the above format shall be considered due cause for rejection of shop drawings.

F. Submittals shall be made on all plumbing fixtures and equipment.

G. Submit for review complete data and Drawings on the following items:
   1. Backflow preventers
   2. Cleanouts

3. Drains
4. Fixtures, faucets, traps, drains, tailpieces, etc.
5. Insulation
6. Pipe hangers, supports and attachments
7. Piping
8. Pressure gages
9. Pressure reducing valves
10. T&P relief valves
11. Thermometers
12. Vacuum breakers
13. Valves
14. Water heaters

1.12 RECORD DRAWINGS

A. Upon completion of the Project, the Contractor shall submit a set of prints indicating as-built conditions of all piping and equipment, and incorporating changes made during construction. Prints may be made from corrected tracings or sepias of shop drawings.

B. A record of as-built conditions shall be kept throughout the Project and shall be used in the preparation of the final record drawings.

PART 2 - PRODUCTS

2.1 PIPE AND FITTINGS

A. Pipe and fittings shall be as listed herein and shall be used for the services indicated.

B. Schedule 40 polyvinyl chloride pipe & fitting ASTM D2665-78:
1. Aboveground sanitary, waste, and vent piping .
2. Aboveground rainwater piping.

C. Schedule 40 polyvinyl chloride pipe and fitting ASTM D2665-78 with solvent weld joints meeting ASTM D2466-78 using solvent cement conforming to ASTM D2564-80.
1. Sanitary, waste and vent piping below slab on grade.
2. Rainwater piping below slab on grade.

D. Type "K" copper tubing, ASTM B88-1988a, with 95-5 soldered joints and wrought copper, ANSI B16.22-1988a, or cast bronze, ANSI 95-5 B16.18-1988a, socket fittings for:
1. Underground water service piping 3" in size and smaller to a point 1'-0" above the finished floor.

E. Type "L" hard drawn copper tubing, ASTM B88-1988a, with 95-5 soldered joints and wrought copper, ANSI B16.22-1988a, or cast bronze, ANSI 95-5 B16.18-1988a, socket fittings for:

1. Water piping above slab.

F. Type "L" soft drawn copper tubing, ASTM B88-1988a for:
   1. Water piping below slab on grade without joints.

G. Schedule 40 black steel pipe with standard weight, banded black malleable iron fittings.
   1. Natural gas piping.

2.2 DIELECTRIC ADAPTERS

A. Dielectric adapters shall be provided between copper and iron pipe connections and between ferrous and nonferrous piping or equipment.

2.3 VALVES

A. General
   1. Valves of the same type on the project shall be of one manufacturer.
   2. Valves shall have the name or trademark of the manufacturers and the working pressure stamped or cast on the valve body.
   3. Valve handwheels shall be oriented, when installed, to provide maximum accessibility for operation.

B. Valves for Domestic Water System:
   1. Gate valves 3" in size and smaller shall have bronze body, rising stem, solid wedge, threaded bonnet for 125# SWP. Valves shall be:

Threaded Ends

a.	Milwaukee	1105
b.	Crane	438
c.	Stockham	B-103
d.	Nibco	T-113

   2. Check valves 2" in size and smaller shall be horizontal swing type with bronze body, bronze disc for 125# SWP. Valves shall be:

Threaded Ends

a.	Milwaukee	509
b.	Crane	34
c.	Stockham	B-319
d.	Nibco	T-413-B

2.4 CLEANOUTS

A. Provide cleanouts in soil and waste lines as shown, as required by the governing code as follows:
   1. At the bottom of each exposed fixture trap which is not integral with the fixture.
   2. At the end of each branch drainage line.
   3. At each change of horizontal direction greater than 45 degrees.

4. At the foot of each soil stack.
5. In horizontal drain lines at intervals of not more than 50' for inside piping and 100' for outside piping.

B. For Walls; Cleanouts shall be extra heavy cleanout tee with countersunk bronze plug trapped for machine screw, shallow stainless steel face-of-wall access cover, securing screw. Cleanouts shall be:
1. J.R. Smith 4472
2. Josam 58890
3. Zurn Z-1460-8
4. Wade W-8470-R-75

C. For Piping Concealed in Pipe Chase or Shaft: Cleanout shall have cast iron ferrule, bronze plug trapped for machine screw, shallow stainless steel face-of-wall access cover, and securing screw. Cleanouts shall be:
1. J.R. Smith 4472
2. Josam 58890
3. Zurn Z-1470
4. Wade W-8590-D

D. For Concrete Floors: Cleanouts shall have cast iron body, adjustable round scoriated nickel bronze cover and rim, securing screw, and countersunk plug. Cleanouts shall be:
1. J.R. Smith 4028
2. Josam 56000
3. Zurn ZN-1405-2
4. Wade W-6010/W-7040

E. For Tile Floors: Cleanouts shall have cast iron body, adjustable square scoriated nickel bronze cover and rim, securing screw, and countersunk plug. Cleanouts shall be:
1. J.R. Smith 4048
2. Josam 56020
3. Zurn ZN-1405-3
4. Wade W-6010-S/W-7040-S

F. For Carpeted Floors: Cleanouts shall have cast iron body, adjustable square nickel bronze cover and rim, carpet marker, and countersunk plug. Cleanouts shall be:
1. J.R. Smith 4048-Y
2. Josam 56020-14
3. Zurn ZN-1405-15
4. Wade W-6000-3-75

G. For Cleanouts to Grade: Cleanouts shall have cast iron ferrule and countersunk bronze plug. Cleanouts shall be set in a 12" x 12" x 6" deep poured concrete pad set flush with grade. Cleanouts shall be:
1. J.R. Smith 4400
2. Josam 58500-25
3. Zurn Z-1440

4. Wade WL-8550-S

2.5 TRAPS

A. Provide traps for all fixtures, and drains, except as noted otherwise. Set traps true and level. Provide exposed traps with brass cleaning screws.

B. Full "S" traps, bell traps, or crown vented traps shall not be used.

C. Traps for handicap lavatories shall be installed parallel to wall and as close to wall as possible.

2.6 UNIONS

A. Provide a union in each connection to each piece of equipment so it may be readily removed.

B. Unions in drainage pipes on fixture side of traps may be slip or flange type with soft rubber or plastic gaskets.

C. Unions in steel pipe 2" or smaller shall be ground joint with brass to iron seat.

D. Unions in pipes larger than 2" shall be flange and gasket type. Flanges in steel and wrought iron pipe shall be cast iron.

2.7 HANGERS AND SUPPORTS

A. Plumbing piping underground shall be firmly bedded on solid ground on the body of the pipe.

B. Block cast iron water pipe with concrete to undisturbed earth to prevent blowing out joints. Provide the rods for all outside joints.

C. Where several pipes 2-1/2" and smaller run parallel and in the same plane, they maybe supported on gang or multiple hangers; larger piping shall be hung, parallel and equally spaced.

D. Supports for steel pipe and for copper tubing 1-1/4" or larger, shall not be more than 10' apart. Supports for copper tubing 1" and smaller shall be not more than 8' apart. Pipes shall be supported within 1' of each elbow.

E. Support each horizontal length of sanitary, waste and vent pipe, excluding fittings. Maximum distance between hangers shall be 5'-0".

F. Vertical pipe subject to movement shall be supported from wall by means of pipe clamp.

G. Support domestic hot and cold water piping in spaces behind plumbing fixtures by brackets and U-bolts secured to waste and vent stacks. Size U-bolts to bear on the

piping.

H. Hangers shall be complete with rods and supports proportioned to the size of pipe 2nd insulation to be supported, in accordance with manufacturer's recommendations.

I. Inserts installed in existing concrete construction and for piping 2-1/2" and smaller shall be Rawl "SABER-TOOTH", or Phillips "RED HEAD", self-drilling shells.

J. Do not pierce waterproofing with support bolts.

K. Size hangers for insulated piping to bear on outside of insulation.

L. Provide insulation protectors at hangers bearing on outside of insulation. Provide rigid insert or rigid section of insulation at each insulation protector.

M. After hanger rods are installed in inserts in finished concrete ceiling, fill the remaining opening with cement so that no hole shows at the ceiling.

N. Pipe hangers and supports shall be installed and furnished in accordance with recommendations set forth in Manufacturers Standardization Society Standard Practices No. SP-69 and SP-58.

O. Hangers and supports shall be manufactured by:
1. Grinnell
2. Michigan
3. F&S

2.08 SLEEVES

A. Provide where pipes pass through walls, floors and roofs.

B. Sleeves shall be standard weight steel pipe in concrete and masonry construction.

C. Sleeves through interior drywall construction shall be 26 gauge galvanized sheet metal.

D. Sleeves are not required at individual plumbing fixtures.

E. Omit pipe sleeves in concrete floor slabs on grade.

F. Wall sleeves shall be full thickness of walls.

G. Sleeves may be omitted when openings are core drilled for concealed vertical and horizontal piping.

H. Make sleeves through outside walls watertight. Caulk between plumbing pipe and sleeve with oakum and lead. Pack with fiberglass and caulk, 1" deep at each face with non-hardening sealant between pipe and sleeve.

I. Size sleeves for insulated pipes to allow full thickness insulation.

J. Pipes penetrating walls below grade shall be sealed with a waterproof, modular, mechanical expansion seal consisting of interlocking synthetic rubber links shaped to continuously fill the annular space between the pipe and wall opening. Sizing of links and wall sleeve shall be determined by manufacturer.

K. Sleeves for all piping penetrating fire rated walls and floor shall be provided with 3M Fire Barrier No. CP-25 fire proofing caulking, or equal, in annular space between sleeve and piping.

2.09 FLOORS, WALLS AND CEILING PLATES

A. Where exposed piping passes through floors, walls and ceilings, except in mechanical or equipment rooms, escutcheons shall be provided.
   1. Escutcheons shall be chrome-plated steel plates, hinged type with setscrew.
   2. Escutcheons shall be as manufactured by Michigan, F&S or Grinnell.
   3. Escutcheons for chrome-plated connections at plumbing fixtures shall be as specified under the plumbing fixtures.

2.10 WATER PRESSURE REDUCING VALVES (If static pressure exceeds 80 psig)

A. Provide in the cold water service to the building.

B. Each valve shall have capacities and characteristics as shown on drawings.

C. Each pressure reducing valve shall be provided with a strainer.

D. Provide a 3-1/2" 0-200 psig dial pressure gauge at the inlet and outlet of each valve.

E. Main pressure reducing valves shall be:
   1. Watts Series 223-S
   2. Mueller Co. Series No. H-9300
   3. Clayton Series 90-01

2.11 INSULATION

A. All pipe insulation material shall have a permanent composite insulation, jacket and adhesive with a fire and smoke hazard rating as tested by procedure ASTM E-84, NFPA 255 and UL 723, not exceeding:
   1. flame spread - 25
   2. smoke developed - 50

B. The use of staples for securing insulation will <u>not</u> be permitted.

C. Insulation shall be applied on clean, dry surfaces. All insulation shall be continuous through walls, ceiling openings,sleeves and hangers.

D. The following shall be insulated:

1. aboveground, hot and hot water circulating piping. Any cold water in attic space.
2. all hot water supply pipes, tailpiece, P-trap and horizontial waste pipe for all handicap lavatories and sinks.
3. Condensate drain piping and horizontal drain lines receiving condensate.

E. Do not insulate the following lines:
1. chrome-plated piping at plumbing fixtures.
2. unions.

F. Insulation shall be one-piece fibrous glass sectional pipe insulation with factory applied glass reinforced aluminum foil and white kraft paper flame retardant vapor barrier jacket. Longitudinal jacket laps and butt strips shall be self-sealing. Insulation shall have an average thermal conductivity not to exceed 0 23 BTU-in per square foot per degrees F per hour at a mean temperature of 75 degrees F. Insulation shall be:
1. Johns-Manville Flame Safe AP-T
2. Owens-Corning Fiberglass 25 ASJ/SSL
3. CertainTeed Fiberglass 500 degrees Snap-On ASJ/SSL
4. "Truewrap" KIT500R Std. White - By Brocar Products, Inc. to be used for all handicap lavatories and sinks.

G. Insulate piping with 1" thick insulation for water piping and ½" for waste piping.

H. Seal all ends of pipe insulation with white vapor barrier coating.

I. Butt all joints of pipe insulation together and secure all jacket laps with lap adhesive. Seal all butt joints with joint strips furnished with insulation.

J. Insulate fittings, flanges, valves (including packing nut) with preformed or mitered fiberglass fittings of equal thickness and composition to adjacent pipe insulation. Wire fittings in place and cover with a smoothing coat of finishing cement. Finish with glass fabric embedded into a coat of white breather coating. Glass fabric shall overlap adjoining insulation at least 2". White fabric and mastic shall be used on exposed fittings.

2.12 PLUMBING FIXTURES

A. Fixtures shall have smooth impervious surfaces, free from defects and concealed fouling surfaces and be Grade "A" with name or trademark of the manufacturer printed on or pressed into closets and lavatories. A label which cannot be removed without destroying it, containing the manufacturer's name or trademark and the quality or class of the fixture shall be affixed to all fixtures and not removed until after the work is accepted.

B. Set fixtures level and in alignment with walls.

C. Caulk between fixtures and mounting surfaces.

2.13 FIXTURES Must be equal in quality to those specified in this specification. The fixtures shown on the drawing schedule are to describe a level of quality, finish, color, and material type. The franchise requires that approved plumbing fixtures be used. Contractor to verify selection of fixtures with Owner, Architect, and Franchise approval before purchasing or installing.

A. Water Closet Standard:

Fixture	American Standard, Kohler,Proflo	
Seat	American Standard, Church	
Bolt Caps	CR1912DL	Brasscraft

B. Water Closet ADA:

Fixture	American Standard, Kohler, Proflo	
Seat	American Standard, Church	
Bolt Caps	CR1912DL	Brasscraft

C. Lavatory : 21-1/4" X 17-3/4"

Fixture	American Standard, Kohler, Proflo	
Faucet	American Standard, Delta, Moen	

D. Bathtub Standard – Enameled Cast iron, Americast

Fixture	American Standard, Kohler	
Shower/Tub Trim	American Standard, Delta, Moen	

E. Bar Sink

Fixture	American Standard, Elkay, Kohler	
Faucet	Delta, American Standard, Kohler, Moen	

F. Pantry Sink

Fixture	American Standard, Kohler, Elkay	
Faucet	American Standard, Delta, Moen	

G. Washing Machine Connection

Fixture	4512	Water-Tite

H. Shower to be field fabricated or as noted on drawing

Shower Valve	American Standard, Delta, Moen
Hand Shower	American Standard, Delta, Moen

2.14 FIXTURE SUPPLY STOPS

A. Supply stops for regular lavatories and sinks shall be Brass Craft CS-500-A with 1/2" sweat inlets, bell escutcheons, angle stop valve, flexible tube risers with faucet sink adaptors as required for faucets with female thread connections. All exposed piping and parts shall be chromium-plated.

B. Supply stops for all handicap lavatories and sinks shall be offset type and installed as close to wall as possible. Stops shall be chrome plated.

C. Supply stop for electric water coolers shall be Brass Craft R-14 straight stop or R-19 angle stop with 1/2" sweat inlet with 3/8" O.D. compression riser outlet. Valve shall be contained within fountain cabinet.

D. Supply stops for sink faucets and other equipment not furnished with stops shall be gate valves as specified herein.

E. Equal products - Eastman Central, Sterling Faucet (Rockwell) McGuire.

2.15 FIXTURE P-TRAPS

A. P-traps for handicap lavatories and sinks shall be installed parallel to wall and as close to wall as possible.

C. Lavatory P-traps - 1-1/4" size.

D. Sink P-traps - 1-1/2" size;

PART 3 - EXECUTION

3.1 GENERAL FOR PIPING INSTALLATION

A. Install horizontal drains and waste pipes with a fall of 1/8" per foot, unless otherwise required by code or noted on the plans.

B. Use reducing fittings between different size pipe. Ream steel, brass and copper pipe after cutting, turn on end and knock loose dirt and scale out.

C. Install water service pipes in trenches separate from sewers.

D. Install water piping outside the building with not less than 36" cover.

E. Slope water piping to drain back to the mains.

F. Make changes in horizontal direction in soil and waste piping with long radius fittings or with Y-branches and 1/8 or 1/16 bends.

G. Group exposed pipe together neatly and arrange control valves at fixture for ease of

operation.

H. Piping installed below the level of footings shall be installed one foot horizontally from the footing for each foot of depth below the footing.

3.2 EXCAVATING, TRENCHING AND BACKFILLING

A. Perform all excavating to install piping herein specified. All excavated materials not to be used for backfilling shall be removed and disposed of. All excavating shall be made by open cut. No tunneling shall be done.

B. The bottom of the trenches shall be graded to provide uniform bearing and support for each section of the pipe on undisturbed soil at every point along its entire length, except for the portions of the pipe sections excavated for sealing of pipe joints. Depressions for joints shall be dug after the trench bottom has been graded. Overdepths shall be backfilled with loose, granular, moist earth, tamped.

C. The trenches shall not be backfilled until all specified pressure tests are performed. Trenches shall be backfilled with sandy clay gravel, free from large clods of earth and stones, in deposited layers and tamped until the pipe has a cover of not less than the adjacent existing ground. The compaction of the filled trench shall be 95% Protor unless otherwise approved by the engineer.

D. Settling the backfill with water will not be permitted.

E. Reopen any trenches not meeting compaction requirements or where settlement occurs, refill, compact, and restore the surface to the grade and compaction specified above.

3.3 TESTS

A. Test drainage and vent piping before fixtures are installed by capping or plugging and filling the system with water, allowing it to stand filled for 1 hour. If tested in sections, each section shall be subjected to not less than a 10' head.

B. Test water supply piping before fixtures and faucets are connected by applying a hydrostatic pressure of 125 psi test pressure for 1 hour.

C. Test each fixture for soundness, stability of support and operation.

D. Test piping under floor slabs and in floor fill before slabs are poured. Test pressure shall be held for 1 hour.

E. Piping which is not tight under tests shall be taken down and reassembled.

F. Tests of the piping system shall be made in the presence of the Architect or his representative.

G. The final test shall be made while pipe is exposed to view where possible.

3.4 PAINTING

A. Factory painted equipment that has been scratched or marred shall be repainted to match original color.

3.5 CLEANING AND ADJUSTING

A. All equipment, fixtures, pipe, valves and fittings shall be cleaned of grease, oil, paint spots, metal cuttings, sludge, and construction debris before final inspection.

3.6 STERILIZATION

A. Upon completion of installation and test of potable water supply piping, all such piping shall be disinfected in accordance with the following procedure:
   1. All potable water piping shall be disinfected by a mixture containing not less than 0 6 pounds of high-test calcium hypochlorite, or 2 pounds of chlorinated lime to each 1,000 gallons of water to provide not less than 50 ppm of available chlorine. The mixture shall be injected into the system and retained for not less than twenty-four (24) hours at which time the chlorine level shall be at 10 ppm or greater. The system shall then be drained, flushed with potable water until only a normal chlorine residual remains (2 ppm) and placed in service or,
   2. If local Health Authority required different and/or additional procedures, these requirements shall be meet.
   3. A certificate, or letter certifying acceptance by the Health Authority shall be submitted.

3.7 WELDING QUALIFICATIONS

A. Welding shall be in accordance with procedures of the National Certified Pipe Welding Bureau, or other approved procedure, and conform to requirements of the ASME Boiler and Pressure Vessel Code or the ASA Code for Pressure Piping. Welders shall be qualified under the above procedures and certified by the National Certified Pipe Welding Bureau or other recognized testing authority.

3.8 PIPE JOINTS

A. Joints in brass and steel pipe 2 1/2" and smaller, except as otherwise specified, shall be screwed. Apply Rectorseal #5 joint compound to the male threads only, or make joint with teflon tape.

B. No threads shall show in exposed chromium plated piping.

C. Slip joints of coupling joints in brass drainage pipe are permitted of fixture's side of traps only.

D. Nipples having less than one inch between threads shall be extra strong.

END OF SECTION 15400

SECTION 15430

PLUMBING SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following plumbing specialties:
   1. Balancing valves.
   2. Trap seal primer valves.
   3. Miscellaneous piping specialties.
   4. Cleanouts.
   5. Floor drains.

1.2 PERFORMANCE REQUIREMENTS

A. Provide components and installation capable of producing piping systems with following minimum working-pressure ratings, unless otherwise indicated:

   1. Domestic Water Piping: **125 psig** .
   2. Sanitary Waste and Vent Piping: 10-foot head of water .
   3. Storm Drainage Piping: 10-foot head of water .
   4. Force-Main Piping: **100 psig** .

1.3 SUBMITTALS

A. Product Data: Include rated capacities and indicate materials, finishes, dimensions, required clearances, and methods of assembly of components; and piping and wiring connections for the following:

   1. Balancing valves and strainers.
   2. Water hammer arresters, air vents, and trap seal primer valves and systems.
   3. Hose bibbs and hydrants.
   4. Backwater valves, cleanouts, floor drains, open receptors, and trench drains.

B. Field quality-control test reports.

C. Operation and maintenance data for the following:

   1. Backflow preventers and water regulators.
   2. Thermostatic water mixing valves and water tempering valves.
   3. Trap seal primer valves and systems.

1.4 QUALITY ASSURANCE

A. Plumbing specialties shall bear label, stamp, or other markings of specified testing agency.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. ASME Compliance: Comply with ASME B31.9, "Building Services Piping," for piping materials and installation.

D. NSF Compliance:

1. Comply with NSF 14, "Plastics Piping Components and Related Materials," for plastic domestic water piping components. Include marking "NSF-pw" on plastic potable-water piping and "NSF-dwv" on plastic drain, waste, and vent piping.
2. Comply with NSF 61, "Drinking Water System Components--Health Effects, Sections 1 through 9," for potable domestic water plumbing specialties.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the products specified.
2. Products: Subject to compliance with requirements, provide one of the products specified.
3. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.
4. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 BALANCING VALVES

A. Calibrated Balancing Valves: Adjustable, with two readout ports and memory setting indicator. Include manufacturer's standard hoses, fittings, valves, differential pressure meter, and carrying case.

B. Manufacturers:

1. Calibrated Balancing Valves:
   a. Armstrong Pumps, Inc.

b. Armstrong-Yoshitake, Inc.
c. Flow Design, Inc.
d. ITT Industries; Bell & Gossett Div.
e. Taco, Inc.
f. Watts Industries, Inc.; Water Products Div.

2. NPS 2 and Smaller: Bronze body with brass ball, adjustment knob, calibrated nameplate, and threaded or solder-joint ends.
3. NPS 2 and Smaller: Bronze, Y-pattern body with adjustment knob and threaded ends.
4. NPS 2-1/2 and Larger: Cast-iron, Y-pattern body with bronze disc and flanged or grooved ends.

2.3 TRAP SEAL PRIMER VALVES

A. Supply-Type Trap Seal Primer Valves: ASSE 1018, water-supply-fed type, with the following characteristics:

1. Manufacturers:
   a. Josam Co.
   b. Precision Plumbing Products, Inc.
   c. Smith, Jay R. Mfg. Co.
   d. Watts Industries, Inc.; Drainage Products Div.
   e. Watts Industries, Inc.; Water Products Div.
   f. Zurn Industries, Inc.; Jonespec Div.
   g. Zurn Industries, Inc.; Specification Drainage Operation.

2. 125-psig minimum working pressure.
3. Bronze body with atmospheric-vented drain chamber.
4. Inlet and Outlet Connections: NPS 1/2 threaded, union, or solder joint.
5. Gravity Drain Outlet Connection: NPS 1/2 threaded or solder joint.
6. Finish: Chrome plated, or rough bronze for units used with pipe or tube that is not chrome finished.

B. Drainage-Type Trap Seal Primer Valves: ASSE 1044, fixture-trap, waste-drainage-fed type, with the following characteristics:

1. Manufacturers:

   a. Smith, Jay R. Mfg. Co.

2. Chrome-plated, cast-brass, NPS 1-1/4 minimum, lavatory P-trap with NPS 3/8 minimum, trap makeup connection.

2.4 MISCELLANEOUS PIPING SPECIALTIES

A. Water Hammer Arresters: ASSE 1010 or PDI-WH 201, metal-bellows type with pressurized metal cushioning chamber. Sizes indicated are based on ASSE 1010 or PDI-WH 201, Sizes A through F.

1. Manufacturers:

   a. Josam Co.
   b. Smith, Jay R. Mfg. Co.
   c. Zurn Industries, Inc.; Specification Drainage Operation.

B. Hose Bibbs: Bronze body with replaceable seat disc complying with ASME A112.18.1M for compression-type faucets. Include NPS 1/2 or NPS 3/4 threaded or solder-joint inlet, of design suitable for pressure of at least 125 psig integral or field installed nonremovable, drainable hose-connection vacuum breaker; and garden-hose threads complying with ASME B1.20.7 on outlet.

1. Finish for Equipment Rooms: Rough bronze, or chrome or nickel plated.
2. Finish for Service Areas: Chrome or nickel plated.
3. Finish for Finished Rooms: Chrome or nickel plated.
4. Operation for Equipment Rooms: Wheel handle or operating key.
5. Operation for Service Areas: Wheel handle.
6. Operation for Finished Rooms: Operating key.
7. Include operating key with each operating-key hose bibb.
8. Include integral wall flange with each chrome- or nickel-plated hose bibb.

C. Air-Admittance Valves: Plastic housing with mechanical-operation sealing diaphragm, designed to admit air into drainage and vent piping and to prevent transmission of sewer gas into building.

1. Manufacturers:

   a. B & K Industries, Inc.
   b. Durgo, Inc.
   c. IMI Cash Valve.
   d. IPS Corporation.
   e. J & B Products.
   f. Magic Vent Co., Inc.
   g. Oatey.
   h. Sioux Chief Manufacturing Co., Inc.
   i. Studor, Inc.

2. Stack Vent Valve: ASSE 1050, designed for installation as terminal on soil, waste, and vent stacks, instead of stack vent extending through roof, in NPS 2 to NPS 4 .
3. Fixture Vent Valve: ASSE 1051, designed for installation on waste piping, instead of vent connection, for single fixture, in NPS 1-1/4 to NPS 2 .

D. Deep-Seal Traps: Cast-iron or bronze casting, with inlet and outlet matching connected piping and cleanout trap seal primer valve connection.

1. NPS 2 : 4-inch- minimum water seal.
2. NPS 2-1/2 and Larger: 5-inch- minimum water seal.

E. Floor-Drain Inlet Fittings: Cast iron, with threaded inlet and threaded or spigot outlet, and trap seal primer valve connection.

F. Fixed Air-Gap Fittings: Manufactured cast-iron or bronze drainage fitting with semiopen top with threads or device to secure drainage inlet piping in top and bottom spigot or threaded outlet larger than top inlet. Include design complying with ASME A112.1.2 that will provide fixed air gap between installed inlet and outlet piping.

G. Stack Flashing Fittings: Counterflashing-type, cast-iron fitting, with bottom recess for terminating roof membrane, and with threaded or hub top for extending vent pipe.

H. Vent Caps: Cast-iron body with threaded or hub inlet and vandal-proof design. Include vented hood and set-screws to secure to vent pipe.

I. Vent Terminals: Commercially manufactured, shop- or field-fabricated, frost-proof assembly constructed of galvanized steel, copper, or lead-coated copper. Size to provide 1-inch enclosed air space between outside of pipe and inside of flashing collar extension, with counterflashing.

J. Downspout Boots: ASTM A 74, Service class, hub-and-spigot, cast-iron soil pipe.

K. Conductor Nozzles: Bronze body with threaded inlet for connected conductor size, and bronze wall flange with mounting holes.

1. Finish: Polished bronze.

2.5 CLEANOUTS

A. Cleanouts: Comply with ASME A112.36.2M.

1. Application: Floor cleanout, Wall cleanout.

2. Use items as scheduled on drawing or equal.
3. Products:

a. Josam Co
b. Smith, Jay R. Mfg. Co
c. Watts Industries, Inc., Drainage Products Div
d. Zurn Industries, Inc., Jonespec Div
e. Zurn Industries, Inc., Specification Drainage Operation.

2.6 FLOOR DRAINS

A. Floor Drains: Comply with **ASME A112.21.1M**.

1. Application: Area drain, Floor drain.
2. Products:

    a. Josam Co
    b. Smith, Jay R. Mfg. Co
    c. Watts Industries, Inc., Drainage Products Div
    d. Zurn Industries, Inc., Jonespec Div
    e. Zurn Industries, Inc., Specification Drainage Operation
3. Us e items with characteristics as scheduled on the drawings, or equal.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for piping joining materials, joint construction, and basic installation requirements.

B. Install trap seal primer valves with outlet piping pitched down toward drain trap a minimum of 1 percent and connect to floor-drain body, trap, or inlet fitting. Adjust valve for proper flow.

C. Install expansion joints on vertical risers, stacks, and conductors if indicated.

D. Install cleanouts in aboveground piping and building drain piping according to the following, unless otherwise indicated:

1. Size same as drainage piping up to NPS 4. Use NPS 4 for larger drainage piping unless larger cleanout is indicated.
2. Locate at each change in direction of piping greater than 45 deg rees.
3. Locate at minimum intervals of 75 feet for piping NPS 4 and smaller and 75 feet for larger piping.
4. Locate at base of each vertical soil and waste stack.

E. Install cleanout deck plates with top flush with finished floor, for floor cleanouts for piping below floors.

F. Install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall, for cleanouts located in concealed piping.

G. Install flashing flange and clamping device with each stack and cleanout passing through floors with waterproof membrane.

H. Install vent flashing sleeves on stacks passing through roof. Secure over stack flashing according to manufacturer's written instructions.

I. Install frost-proof vent caps on each vent pipe passing through roof. Maintain 1-inch clearance between vent pipe and roof substrate.

J. Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor, unless otherwise indicated.

1. Position floor drains for easy access and maintenance.
2. Set floor drains below elevation of surrounding finished floor to allow floor drainage. Set with grates depressed according to the following drainage area radii:

    a. Radius, 30 Inches or Less: Equivalent to 1 percent slope, but not less than 1/4-inch total depression.
    b. Radius, 30 to 60 Inches: Equivalent to 1 percent slope.
    c. Radius, 60 Inches or Larger: Equivalent to 1 percent slope, but not greater than 1-inch total depression.

3. Install floor-drain flashing collar or flange so no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes where penetrated.
4. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.

K. Fasten wall-hanging plumbing specialties securely to supports attached to building substrate if supports are specified and to building wall construction if no support is indicated.

L. Fasten recessed-type plumbing specialties to reinforcement built into walls.

M. Install wood-blocking reinforcement for wall-mounting and recessed-type plumbing specialties.

N. Install individual shutoff valve in each water supply to plumbing specialties. Use ball, gate, or globe valve if specific valve is not indicated. Install shutoff valves in accessible locations. Refer to Division 15 Section "Valves" for general-duty ball, butterfly, check, gate, and globe valves.

O. Install air vents at piping high points. Include ball, gate, or globe valve in inlet and drain piping from outlet to floor drain.

P. Install traps on plumbing specialty drain outlets. Omit traps on indirect wastes unless trap is indicated.

Q. Install escutcheons at wall, floor, and ceiling penetrations in exposed finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding pipe fittings.

3.2 CONNECTIONS

A. Install piping adjacent to equipment to allow service and maintenance.

B. Connect plumbing specialties and devices that require power according to Division 16 Sections.

3.3 PROTECTION

A. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION 15430

SECTION 15485

ELECTRIC, DOMESTIC WATER HEATERS

GENERAL

SUMMARY

This Section includes household and commercial electric water heaters.

SUBMITTALS

Product Data: Include rated capacities, furnished specialties, and accessories for each type and size of water heater indicated.

QUALITY ASSURANCE

Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

ASME Compliance: Fabricate and label water heater, hot-water storage tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, "Pressure Vessels," Division 1.

ASHRAE Standards: Comply with performance efficiencies prescribed for the following:

ASHRAE 90.1, "Energy Efficient Design of New Buildings except Low-Rise Residential Buildings," for commercial water heaters.

ASHRAE 90.2, "Energy Efficient Design of New Low-Rise Residential Buildings," for household water heaters.

PRODUCTS

MANUFACTURERS

See Editing Instruction No. 1 in the Evaluations for cautions about naming manufacturers and products.

In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

Coordinate subparagraphs retained below with subparagraph titles retained in other Part 2 articles. Refer to Division 1 Section "Product Requirements."

Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.

Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

HOUSEHOLD, STORAGE, ELECTRIC WATER HEATERS

Description: Complywith UL 174.

Retain "Available" in first subparagraph below for nonproprietary and delete "Available" for semiproprietary specifications.

[Available]Manufacturers:

American Water Heater Co.

Bradford White Corp.

Electric Heater Co.

Rheem Manufacturing Co.; Rheem Water Heater Div.

Rheem Manufacturing Co.; Ruud Water Heater Div.

Smith, A. O. Water Products Co.

State Industries.

Storage Tank Construction: Steel with 150-psig (1035-kPa) working-pressure rating.

Tappings: Factory fabricated of materials compatible with tank for piping connections, relief valve, drain, anode rod, and controls as required. Attach tappings to tank before testing and labeling. Include ASME B1.20.1, pipe thread.

Interior Finish: Materials and thicknesses complying with NSF 61, barrier materials for potable-water tank linings. Extend finish into and through tank fittings and outlets.

Insulation: Comply with ASHRAE 90.2. Surround entire storage tank except connections and controls.

Jacket: Steel, with enameled [finish] [front and sides and porcelain-enameled top].

Shape: Round and 36 inches (915 mm) high maximum.

Color: White, unless otherwise indicated.

Heating Elements: Two electric, screw-in, immersion type.

Temperature Control: Adjustable thermostat for each element with wiring arrangement for nonsimultaneous operation.

Anode Rod: Factory installed, magnesium.

Dip Tube: Factory installed. Not required if cold-water inlet is near bottom of storage tank.

Drain Valve: ASSE 1005, factory installed.

Heat Trap: Factory-installed, integral piping arrangement or cold-type inlet and hot-type outlet fittings complying with ASHRAE 90.2.

LIGHT-COMMERCIAL, STORAGE, ELECTRIC WATER HEATERS

Description: Comply with UL 174 or UL 1453, and listed by manufacturer for commercial applications.

Retain "Available" in first subparagraph below for nonproprietary and delete "Available" for semiproprietary specifications.

Manufacturers:

American Water Heater Co.

Bradford White Corp.

Rheem Manufacturing Co.; Rheem Water Heater Div.

Rheem Manufacturing Co.; Ruud Water Heater Div.

Smith, A. O. Water Products Co.

Storage Tank Construction: ASME-code steel with 150-psig (1035-kPa) working-pressure rating.

Tappings: Factory fabricated of materials compatible with tank for piping connections, relief valve, pressure gage, thermometer, drain, anode rod, and controls as required. Attach tappings to tank before testing and labeling. Include ASME B1.20.1, pipe thread.

Interior Finish: Materials and thicknesses complying with NSF 61, barrier materials for potable-water tank linings. Extend finish into and through tank fittings and outlets.

Insulation: Comply with ASHRAE 90.1. Surround entire storage tank except connections and controls.

Jacket: Steel, with enameled finish.

Heating Elements: Two electric, screw-in, immersion type.

Temperature Control: Adjustable thermostat for each element with wiring arrangement for simultaneous operation.

Safety Controls: Automatic, high-temperature-limit and low-water cutoff devices or systems. Drain Valve: ASSE 1005, corrosion-resistant metal, factory installed.

Anode Rod: Factory installed, magnesium.

Dip Tube: Factory installed. Not required if cold-water inlet is near bottom of storage tank.

Special Requirement: NSF 5 construction.

WATER HEATER ACCESSORIES

Combination Temperature and Pressure Relief Valves: ASME rated and stamped and complying with ASME PTC 25.3. Include relieving capacity at least as great as heat input and include pressure setting less than water heater working-pressure rating. Select relief valve with sensing element that extends into tank.

Option: Separate temperature and pressure relief valves are acceptable instead of combination relief valve.

Exception: Omit combination temperature and pressure relief valve for tankless water heater, and furnish pressure relief valve for installation in piping.

Pressure Relief Valves: ASME rated and stamped and complying with ASME PTC 25.3. Include pressure setting less than heat-exchanger working-pressure rating.

Vacuum Relief Valves: Comply with ASME PTC 25.3. Furnish for installation in piping.

Exception: Omit if water heater has integral vacuum-relieving device.

Water Regulators: ASSE 1003, water-pressure reducing valve. Set at 25-psig- (172.5-kPa-) maximum outlet pressure.

Shock Absorbers: ASSE 1010 or PDI WH 201, Size A water hammer arrester.

Water Heater Stand and Drain Pan Units: High-density-polyethylene-plastic, 18-inch- (457-mm-) high, enclosed-base stand complying with IAPMO PS 103 and IAS No. 2. Include integral or separate drain pan with raised edge and NPS 1 (DN 25) drain outlet with ASME B1.20.1, pipe thread.

Water Heater Stands: Water heater manufacturer's factory-fabricated, steel stand for floor mounting and capable of supporting water heater and water. Include dimension that will support bottom of water heater a minimum of 18 inches (457 mm) above the floor.

Water Heater Mounting Brackets: Water heater manufacturer's factory-fabricated, steel bracket for wall mounting and capable of supporting water heater and water.

Drain Pans: Corrosion-resistant metal with raised edge. Include dimensions not less than base of water heater and include drain outlet not less than NPS 3/4 (DN 20).

Piping Manifold Kits: Water heater manufacturer's factory-fabricated inlet and outlet piping arrangement for multiple-unit installation. Include piping and valves for field assembly that is capable of isolating each water heater and of providing balanced flow through each water heater.

Piping-Type Heat Traps: Field-fabricated piping arrangement according to ASHRAE 90.1 or ASHRAE 90.2.

EXECUTION

INSTALLATION

Install commercial water heaters on concrete bases. Omit concrete bases for commercial water heaters if installation on stand, bracket, suspended platform, or direct on floor is indicated.

Install water heaters, level and plumb, according to layout drawings, original design, and referenced standards. Maintain manufacturer's recommended clearances. Arrange units so controls and devices needing service are accessible.

Anchor water heaters to substrate.

Install temperature and pressure relief valves in top portion of storage tanks. Use relief valves with sensing elements that extend into tanks. Extend relief valve outlet with water piping in continuous downward pitch and discharge onto closest floor drain.

Install pressure relief valves in water piping for water heaters without storage. Extend relief valve outlet with water piping in continuous downward pitch and discharge onto closest floor drain.

Install vacuum relief valves in cold-water-inlet piping.

Install water heater drain piping as indirect waste to spill into open drains or over floor drains. Install hose-end drain valves at low points in water piping for water heaters that do not have tank drains. Refer to Division 15 Section "Plumbing Specialties" for drain valves.

Assemble and install inlet and outlet piping manifold kits for multiple water heaters. Fabricate, modify, or arrange manifolds for balanced water flow through each water heater. Include shutoff valve, and thermometer in each water heater inlet and outlet, and throttling valve in each water heater outlet. Refer to Division 15 Section "Valves" for general-duty valves and Division 15 Section "Meters and Gages" for thermometers.

Install water regulator, with integral bypass relief valve, in booster-heater inlet piping and water hammer arrester in booster-heater outlet piping.

Install piping-type heat traps on inlet and outlet piping of water heater storage tanks without integral or fitting-type heat traps.

Install piping adjacent to machine to allow service and maintenance.

CONNECTIONS

Connect hot- and cold-water piping with shutoff valves and unions. Connect hot-water-circulating piping with shutoff valve, check valve, and union.

Make connections with dielectric fittings where piping is made of dissimilar metal.

Electrical Connections: Power wiring and disconnect switches are specified in Division 16 Sections. Arrange wiring to allow unit service.

FIELD QUALITY CONTROL

Delete first paragraph below if factory-authorized service representative is not required.

Engage a factory-authorized service representative to perform startup service and to train Owner's maintenance personnel to adjust, operate, and maintain water heaters.

In addition to manufacturer's written installation and startup checks, perform the following:

Check for clear relief valve inlets, outlets, and drain piping.

Test operation of safety controls, relief valves, and devices.

Adjust operating controls.

Adjust hot-water-outlet temperature settings. Do not set above 140 deg F (60 deg C) unless piping system application requires higher temperature.

Balance water flow through manifolds of multiple-unit installations.

DEMONSTRATION

Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain electric, domestic water heaters.

END OF SECTION 15485

SECTION 15838

POWER VENTILATORS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Centrifugal roof ventilators.
2. Centrifugal wall ventilators.
3. Ceiling-mounting ventilators.
4. In-line centrifugal fans.

1.2 SUBMITTALS

A. Product Data: Include rated capacities, furnished specialties, and accessories for each type of product indicated and include the following:

1. Certified fan performance curves with system operating conditions indicated.
2. Certified fan sound-power ratings.
3. Motor ratings and electrical characteristics, plus motor and electrical accessories.
4. Material gages and finishes, including color charts.
5. Dampers, including housings, linkages, and operators.

B. Shop Drawings: Detail equipment assemblies and indicate dimensions, required clearances, method of field assembly, components, and location and size of each field connection.

1. Wiring Diagrams: Power, signal, and control wiring.
2. Vibration Isolation Base Details: Detail fabrication, including anchorages and attachments to structure and to supported equipment. Include auxiliary motor slides and rails, and base weights.

C. Operation and maintenance data.

1.3 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. AMCA Compliance: Products shall comply with performance requirements and shall be licensed to use the AMCA-Certified Ratings Seal.

C. NEMA Compliance: Motors and electrical accessories shall comply with NEMA standards.

D. UL Standard: Power ventilators shall comply with UL 705.

1.4 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Belts: **One set** for each belt-driven unit.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraphs titles below introduce lists, the following requirements apply for product selection:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.
2. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 CENTRIFUGAL ROOF VENTILATORS

A. Description: Belt-driven or direct-driven centrifugal fans consisting of housing, wheel, fan shaft, bearings, motor and disconnect switch, drive assembly, curb base, and accessories.

1. Manufacturers:
   a. Broan Mfg. Co., Inc.
   b. Carnes Company HVAC.
   c. Cook, Loren Company.
   d. Greenheck Fan Corp.
   e. JennFan; Div. of Breidert Air Products, Inc.
   f. NuTone Inc.
   g. Penn Ventilation Companies, Inc.

B. Housing: Removable, spun-aluminum, dome top and outlet baffle; square, one-piece, aluminum base with venturi inlet cone.

C. Fan Wheels: Aluminum hub and wheel with backward-inclined blades.

D. Belt-Driven Drive Assembly: Resiliently mounted to housing, with the following features:

1. Fan Shaft: Turned, ground, and polished steel; keyed to wheel hub.
2. Shaft Bearings: Permanently lubricated, permanently sealed, self-aligning ball bearings.
3. Pulleys: Cast-iron, adjustable-pitch motor pulley.
4. Fan and motor isolated from exhaust airstream.

E. Accessories:

1. Disconnect Switch: Nonfusible type, with thermal-overload protection mounted inside fan housing, factory wired through an internal aluminum conduit.
2. Bird Screens: Removable, 1/2-inch mesh, aluminum or brass wire.
3. Dampers: Counterbalanced, parallel-blade, backdraft dampers mounted in curb base; factory set to close when fan stops.
4. Motorized Dampers: Parallel-blade dampers mounted in curb base with electric actuator; wired to close when fan stops.

F. Roof Curbs: Galvanized steel; mitered and welded corners; 1-1/2-inch- thick, rigid, fiberglass insulation adhered to inside walls; and 1-1/2-inch wood nailer. Size as required to suit roof opening and fan base.

1. Configuration:**Built-in cant and mounting**.
2. Overall Height:**12 inches** .
3. Sound Curb: Curb with sound-absorbing insulation matrix.
4. Pitch Mounting: Manufacture curb for roof slope.
5. Metal Liner: Galvanized steel.
6. Hinged Subbase: Galvanized-steel hinged arrangement permitting service and maintenance.
7. Mounting Pedestal: Galvanized steel with removable access panel.

2.3 CENTRIFUGAL WALL VENTILATORS

A. Description: Belt-driven or direct-driven centrifugal fans consisting of housing, wheel, fan shaft, bearings, motor and disconnect switch, drive assembly, and accessories.

1. Manufacturers:

a. Acme Engineering & Mfg. Corp.
b. Aerovent; a Twin City Fan Company.
c. Carnes Company HVAC.
d. Cook, Loren Company.
e. Greenheck Fan Corp.
f. NuTone Inc.
g. Penn Ventilation Companies, Inc.

B. Housing: Heavy-gage, removable, spun-aluminum, dome top and outlet baffle; venturi inlet cone.

C. Fan Wheel: Aluminum hub and wheel with backward-inclined blades.

D. Belt-Driven Drive Assembly: Resiliently mounted to housing, with the following features:

1. Fan Shaft: Turned, ground, and polished steel; keyed to wheel hub.
2. Shaft Bearings: Permanently lubricated, permanently sealed, self-aligning ball bearings.
3. Pulleys: Cast-iron, adjustable-pitch motor pulley.
4. Fan and motor isolated from exhaust airstream.

E. Accessories:

1. Disconnect Switch: Nonfusible type, with thermal-overload protection mounted inside fan housing, factory wired through internal aluminum conduit.
2. Bird Screens: Removable, 1/2-inch (13-mm) mesh, aluminum or brass wire.
3. Wall Grille: Ring type for flush mounting.
4. Dampers: Counterbalanced, parallel-blade, backdraft dampers mounted in wall sleeve; factory set to close when fan stops.
5. Motorized Dampers: Parallel-blade dampers mounted in curb base with electric actuator; wired to close when fan stops.

2.4 CEILING-MOUNTING VENTILATORS

A. Description: Centrifugal fans designed for installing in ceiling or wall or for concealed in-line applications.

1. Manufacturers:
   a. Broan Mfg. Co., Inc.
   b. Carnes Company HVAC.
   c. Cook, Loren Company.
   d. Dayton Electric Manufacturing Co.
   e. Greenheck Fan Corp.
   f. Penn Ventilation Companies, Inc. B.

Housing: Steel, lined with acoustical insulation.

C. Fan Wheel: Centrifugal wheels directly mounted on motor shaft. Fan shrouds, motor, and fan wheel shall be removable for service.

D. Grille: Plastic, louvered grille with flange on intake and thumbscrew attachment to fan housing.

E. Electrical Requirements: Junction box for electrical connection on housing and receptacle for motor plug-in.

F. Accessories:

1. Manual Starter Switch: Single-pole rocker switch assembly with cover and pilot light.
2. Ceiling Radiation Damper: Fire-rated assembly with ceramic blanket, stainless-steel springs, and fusible link. Only in required locations.
3. Isolation: Rubber-in-shear vibration isolators.
4. Manufacturer's standard roof jack or wall cap, and transition fittings.

2.5 IN-LINE CENTRIFUGAL FANS

A. Description: In-line, belt-driven centrifugal fans consisting of housing, wheel, outlet guide vanes, fan shaft, bearings, motor and disconnect switch, drive assembly, mounting brackets, and accessories.

1. Manufacturers:

a. Acme Engineering & Mfg. Corp.
b. Carnes Company HVAC.
c. Cook, Loren Company.
d. Greenheck Fan Corp.
e. JennFan; Div. of Breidert Air Products, Inc.
f. Penn Ventilation Companies, Inc.

B. Housing: Split, spun aluminum with aluminum straightening vanes, inlet and outlet flanges, and support bracket adaptable to floor, side wall, or ceiling mounting.

C. Direct-Driven Units: Motor encased in housing outside of airstream, factory wired to disconnect switch located on outside of fan housing.

D. Belt-Driven Units: Motor mounted on adjustable base, with adjustable sheaves, enclosure around belts within fan housing, and lubricating tubes from fan bearings extended to outside of fan housing.

E. Fan Wheels: Aluminum, airfoil blades welded to aluminum hub.

F. Accessories:

1. Volume-Control Damper: Manually operated with quadrant lock, located in fan outlet.
2. Companion Flanges: For inlet and outlet duct connections.
3. Fan Guards: 1/2- by 1-inch mesh of galvanized steel in removable frame. Provide guard for inlet or outlet for units not connected to ductwork.
4. Motor and Drive Cover (Belt Guard): Epoxy-coated steel.

2.6 MOTORS

A. Refer to Division 15 Section "Motors" for general requirements for factory-installed motors.

B. Motor Construction: NEMA MG 1, general purpose, continuous duty, Design B.

C. Enclosure Type: Open dripproof.

2.7 SOURCE QUALITY CONTROL

A. Sound-Power Level Ratings: Comply with AMCA 301, "Methods for Calculating Fan Sound Ratings from Laboratory Test Data." Factory test fans according to AMCA 300, "Reverberant Room Method for Sound Testing of Fans." Label fans with the AMCA-Certified Ratings Seal.

B. Fan Performance Ratings: Establish flow rate, pressure, power, air density, speed of rotation, and efficiency by factory tests and ratings according to AMCA 210, "Laboratory Methods of Testing Fans for Rating."

PART 3 - EXECUTION

3.1 INSTALLATION

A. Support units using spring isolators having a static deflection of **1 inch** . Vibration- and seismic-control devices are specified in Division 15 Section "Mechanical Vibration and Seismic Controls."

1. Secure vibration and seismic controls to concrete bases using anchor bolts cast in concrete base.

B. Secure roof-mounting fans to roof curbs with cadmium-plated hardware. Refer to Division 7 Section "Roof Accessories" for installation of roof curbs.

C. Ceiling Units: Suspend units from structure; use steel wire or metal straps.

D. Support suspended units from structure using threaded steel rods and spring hangers. Vibration-control devices are specified in Division 15 Section "Mechanical Vibration and Seismic Controls."

1. In seismic zones, restrain support units.

E. Install units with clearances for service and maintenance.

3.2 CONNECTIONS

A. Duct installation and connection requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of ducts and duct accessories. Make final duct

connections with flexible connectors. Flexible connectors are specified in Division 15 Section "Duct Accessories."

B. Install ducts adjacent to power ventilators to allow service and maintenance.

3.3 FIELD QUALITY CONTROL

A. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation. Remove malfunctioning units, replace with new units, and retest.

B. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

C. Shut unit down and reconnect automatic temperature-control operators.

D. Refer to Division 15 Section "Testing, Adjusting, and Balancing" for testing, adjusting, and balancing procedures.

E. Replace fan and motor pulleys as required to achieve design airflow.

F. Repair or replace malfunctioning units. Retest as specified above after repairs or replacements are made.

END OF SECTION 15838

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SECTION 15900 – AUTOMATIC TEMPERATURE CONTROL SYSTEM

PART 1 – GENERAL

1.1 DESCRIPTION OF WORK:

A. The extent of Automatic Temperature Control work is indicated on the drawings and the schedules and by the requirements of this section and Section 15050.

1.2 RELATED WORK:

A. All electrical control wiring in connection with the Automatic Temperature Controls (ATC) shall be furnished and installed under this section, unless shown on the electrical drawings. Power wiring shall be provided by Division 16-Electrical.

B. All duct smoke detectors shall be furnished and wired into the Fire Alarm system under Division 16-Electrical. These detectors shall be installed and wired for fan shutdown under this section.

C. All automatic dampers furnished under this section shall be installed by the Mechanical Contractor. It shall be the responsibility of the Mechanical Contractor to provide and install blank off plates when the control application requires dampers smaller than duct size.

D. All cutting and patching necessary for the installation of Control System shall be done by the General Contractor.

1.3 SUBMITTALS:

A. Diagrams: Separate diagrams for each system, including power supply through starters and motors; motor starting and interlock wiring; pushbuttons; all control wiring; interior electrical circuits of control instruments with terminal designations; control motors; colors of wires; location of instruments and remote elements; horsepower of motors; normal position of valves, dampers, and relays, etc. A detailed description of the operation of the control system, including control device designation shall accompany the drawings.

1.4 WARRANTY:

A. The system shall be warranted for a period of one year following the date of beneficial use. Any manufacturing defects arising during this warranty period shall be corrected without cost to the owner.

PART 2 – PRODUCTS

2.1 DAMPER ACTUATORS:

A. Actuators shall be of the rotary drive type, for either modulating or two–position control. Actuators shall have spring return to return the damper to its normal po–sition upon power failure. Actuator shall have adjustable stop pins for stroke limit and shall fit directly over the damper shaft.

B. In lieu of rotary actuators, oil–immersed gear train push pull actuators may be provided.

2.2 CONTROL DAMPERS:

A. All automatic control dampers shall be opposed blade type with blades made of 16 gauge galvanized steel and a maximum of 8 inches wide. Frames shall be roll formed galvanized steel, double thickness reinforced for structural strength equal to 13 gauge channel type frames.

B. Flexible metal jamb seals and EPDM blade seals shall be provided to allow no more than 0.5% maximum leakage, i.e. less than 10 CFM per square foot leakage at 4 inches w.g.

C. Specification Reference: See Louvers and Dampers Section.

2.3 SENSORS:

A. Room Thermostats:
   1. Thermostats shall be of two-position or multi-stage type as required for se–quenced specified. No room thermostat shall operate on voltage in excess of 120 volts, unless specifically noted otherwise.
   2. Thermostats shall be low voltage double set point with sub–base, fan on-auto, and heat-off-cool control. Thermostats shall have locking cover.
   3. For spaces accessible to the public provide a programmable thermostat with a remote temperature sensor.

PART 3 – EXECUTION

3.1 ELECTRIC WIRING:

A. Low voltage control wiring shall be run in EMT conduit in exposed areas and in vertical risers between floors. Plenum rated wire may be used without conduit in concealed but accessible areas.

B. Line voltage control wiring shall be run in EMT conduit.

3.2 TEST AND CALIBRATION:

A. After completion of installation, all controls shall be tested and calibrated to operate as required in this specification.

B. Upon request by the Architect's representative, demonstration of proper control system operation shall be provided prior to final job acceptance.

3.3 SEQUENCE OF OPERATION:

A. Each HVAC system shall be controlled by its respective room thermostat.

END OF SECTION 15900

SECTION 16005

ELECTRICAL GENERAL

PART 1 - GENERAL

1.1 The work covered by this division consists of providing all labor, equipment and materials and performing all operations necessary for the installation of the electrical work as herein called for and shown on the Drawings. The work shall include but shall not be limited to the following:

Provide all power, lighting, fire alarm, intercom, telephone, communications, and other electrical systems for the project. Fully coordinate all electrical requirements of equipment being furnished by other Divisions under this construction contract. Each system shall be complete and fully functional.

1.2 Related Documents:

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

B. Provisions of this Section apply to work of all Division 16 Sections.

C. All control wiring for Division 15 shall be governed by Division 16 requirements. All control wiring shall be in conduit in compliance with the Specifications.

D. Review all project Drawings to be aware of conditions affecting work herein.

1.3 Definitions:

A. Provide: Furnish, install, and test, complete and ready for intended use.

B. Furnish: Supply and deliver to project site, ready for subsequent requirements.

C. Install: Operations at project site, including unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar requirements.

1.4 Permits and Fees: Contractor shall obtain all necessary permits, meters, and inspections required for his work and pay all fees and charges incidental thereto.

1.5 Verification of Owner's Survey Data: Prior to commencing any excavation or grading the Contractor shall satisfy himself as to the accuracy of all survey data indicated on the Drawings and/or provided by the Owner. Should the Contractor discover any inaccuracies, errors, or omissions in the survey data, he shall immediately notify the Engineer. Commencement by the Contractor of any excavation or upgrading shall be held as an acceptance of the survey data by him after which time the Contractor has no claim against the Owner resulting from alleged errors, omissions or inaccuracies of the said survey data.

1.6 Delivery and Storage of Materials: Materials delivered to site shall be inspected for damage, unloaded, and stored with a minimum of handling. All material shall be stored to provide protection from the weather and accidental damage.

1.7 Extent of work is indicated in the Drawings, Schedules, and Specification. Singular references shall not be construed as requiring only one device if multiple devices are shown on the Drawings or are required for proper system operation.

1.8 Field Measurements and Coordination:

A. The intent of the Drawings and Specifications is to obtain a complete and satisfactory installation. Separate divisional Drawings and Specifications shall not relieve the Contractor or Subcontractors from full compliance of work of his trade indicated on any of the Drawings or in any Section of the Specifications. Report conflicts prior to start of work.

B. Verify all field dimensions and locations of equipment to insure close, neat fit with other trades' work. Make use of all Contract Documents and approved shop drawings to verify exact dimension and locations. Do not scale electrical drawings; rely on dimensions shown on architectural or structural drawings.

C. Coordinate work in this Division with all other trades in proper sequence to insure that the total work is completed within Contract time schedule and with minimum cutting and patching.

D. Locate all equipment, materials, and apparatus symmetrical with architectural elements. Install to exact height and locations when shown on architectural drawings. When locations are shown only on mechanical drawings, be guided by architectural details and conditions existing at job and correlate this work with that of others. Provide all required work clearances as defined in the NEC.

E. Install work as required to fit structure, avoid obstructions, and retain clearance, headroom, openings and passageways. Cut no structural members without written approval from Engineer or Architect.

F. Carefully examine any existing conditions, piping, and premises. Compare Drawings with existing conditions. Report any observed discrepancies. Written instructions will be issued by the Engineer to resolve discrepancies.

G. Because of the small scale of the Drawings, it is not possible to indicate all offsets and fittings or to locate every accessory. Drawings are essentially diagrammatic. Study carefully the sizes and locations of structural members, wall and partition locations, trusses, and rooms dimensions and take actual measurements on the job. Locate material, equipment and accessories with sufficient space for installing and servicing. Contractor is responsible for accuracy of his measurements and shall not order materials or perform work without verification. No extra compensation will be allowed because field measurements vary from the dimensions on the Drawings. If field measurements show that equipment or material cannot be fitted, the Engineer shall be consulted. Remove and relocate, without additional compensation, any item that is installed and is later found to encroach on space assigned to another use.

H. Coordinate all equipment being supplied in other divisions to ensure proper electrical connections. Obtain full manufacturer's electrical information and coordinate with electrical system specified. Make adjustments prior to submitting electrical shop drawings. Mark on shop drawings necessary modifications due to equipment being supplied. Contractor shall be responsible for replacement and upgrade of electrical equipment if at time of completion, it is apparent that electrical requirements do not meet the electrical system's supply.

I. Verify all ceiling clearances prior to ordering panelboards and loadcenters. Dimensioned drawings are required for all electrical rooms showing actual plan and elevation layouts. Any equipment ordered prior to verifying that it will fit, will be returned at the contractor's expense. Coordinate panelboard and switchboard locations with structural members, beams and column foundations.

J. Coordinate location of electrical equipment with pipes and duct work being supplied by other Divisions. The equipment space included all referenced NEC clearances shall be maintained. If any pipes or duct work violate any electrical clearance requirements, it shall be removed and relocated at the contractor's expense. Drip pans are not permitted unless specifically called for in the construction documents.

K. Guarantee and Service:

1. The Contractor shall guarantee labor, materials and equipment for a period of one (1) year from Substantial Completion, or from Owner's occupancy, whichever is earlier. Contractor shall make good any defects and shall include all necessary adjustments to and replacement

of defective items without expense to the Owner.

2. In addition to the manufacturer's guarantee of each item, Contractor shall provide his standard guarantee after final acceptance and make good any defects of materials or workmanship occurring during this period without expense to the Owner.

3. Owner reserves the right to make emergency repairs as required to keep equipment in operation without voiding Contractor's Guarantee Bond nor relieving Contractor of his responsibilities during guarantee period.

1.9 Shop Drawings:

A. Before ordering any materials or equipment, and within 30 days after the award of Contract the Contractor shall submit to the Engineer one complete schedule showing the make, type, manufacturer's name and trade designation of all equipment.

1. This schedule shall be accompanied by six (6) copies of the manufacturer's printed specifications and shop drawings for each piece of equipment or specialty and shall give dimensions, diagrams, descriptive literature, capacity or rating, kind of material, finish, guarantee, etc., and such other detailed information as the Engineer may require.

2. When approved, such schedule shall be an addition to these Specifications, and shall be of equal force in that no deviation will be permitted except with the approval of the Engineer.

3. Each shop drawing shall reference the Specification section.

4. The submittal should reference any delivery/scheduling problems with the equipment being supplied.

5. The submittal shall not contain any equipment and/or systems that have not been either listed in the construction documents or provided in an addendum as "approved for bidding". This formality may be waved by the Engineer, if in his opinion, it is to the Owner's benefit.

B. If shop drawings show variation from the requirements of the Contract Documents, the Contractor shall make specific mention of such variation in his letter of transmittal. If acceptable, Contractor will not be relieved of the responsibility for executing the work in accordance with the Contract.

C. Review of shop drawings, descriptive literature, catalog data, or schedules by the Engineer shall not relieve the Contractor from responsibility for deviations from Contract Drawings or Specifications, unless he has in writing called to the attention of the Engineer such deviation at the time of submission, nor shall it relieve him from responsibility for errors of any sort in shop drawings, descriptive literature, catalog data, or schedules.

D. Submit shop drawings and any other drawings specifically called for in other sections. Shop drawings shall consist of plans, sections, elevations and details to scale (not smaller than 1/4" per foot), with dimensions clearly showing the installation. Direct copies of small-scale project drawings issued to the Contractor are not acceptable. Drawings shall take into account equipment furnished under other Sections and shall show space allotted for it. Include construction details and materials.

E Submit product data after award of the Contract and before any equipment or materials are purchased. Product data are defined as manufacturer's printed literature specifically marked to indicate size and model and accompanied by rating sheets listing values showing that equipment meets scheduled or specified values. Properly coded stamp from the Engineer on returned submittal is required before ordering equipment.

F. Coordinate with other division's supplying equipment prior to submitting shop drawings.

G. Shop drawings shall be submitted in one package unless approved otherwise by the Engineer. Provide an index of sections list manufacturers and "as-specified" or not. Each Specification Section shall be tabbed with equipment inserted.

H. Electrical Room Drawings: A detailed, 1/4"=1'-0" scaled plan view drawing shall be submitted for each electrical room to ensure that the equipment being supplied will fit properly. Include on the drawings and obstruction from building structural or mechanical. Review all duct work and piping

shop drawings to ensure proper clearance. Specific grounding requirements shall be noted on the drawings. This includes additional driven grounds and bonding to building steel, water piping, and foundation rebar. This drawing shall make specific mention of any NEC violation. Conduit and/or equipment placement shall take into account any structural or foundation interference. All equipment within the electrical room shall be labeled and actual dimensions shown. The drawings shall be submitted with the shop drawings and manufacturer's product sheets. **Failure to supply scaled drawings shall be the basis of rejecting the entire submittal package.**

PART 2 - PRODUCTS

2.1 All materials shall be new and unused, Owner-supplied, or reused as shown on the Drawings, the best of their respective kinds, suitable for the conditions and duties imposed on them. The description, characteristics, and requirements of materials to be used shall be in accordance with qualifying conditions established in the following Sections.

2.2 Equipment and Materials

A. Equipment and materials furnished under this Division shall be the product of a manufacturer regularly engaged in the manufacture of such items for a period of three years. Where practical, all of the components shall be products of a single manufacturer in order to provide proper coordination and responsibility. Where required, Contractor shall furnish proof of installation of similar equipment or materials.

B. Each item of equipment shall bear a nameplate showing the manufacturer's name, trade name, model number, serial number, ratings and other information necessary to fully identify it. This plate shall be permanently mounted in a prominent location and shall not be concealed, insulated or painted.

C. The label of the approving agency, such as UL or NEMA, by which a standard has been established for the particular item shall be in full view. Materials shall be UL-listed for the application specified or indicated on the Drawings or Specifications.

D. Materials and equipment are specified herein by a single or by multiple manufacturers to indicate quality, material and type of construction desired. Manufacturer's products shown on the Drawings have been used as basis for design; it shall be the Contractor's responsibility to ascertain that alternate manufacturer's products meet detailed specifications and that size and arrangement of equipment are suitable for installation.

E. Model Numbers: Catalog numbers and model numbers indicated in the Drawings and Specifications are used as a guide in the selection of the equipment and are only listed for the Contractor's convenience. The Contractor shall determine the actual model numbers for ordering equipment and materials in accordance with the written description of each item and with the intent of the Drawings and Specifications.

2.3 Requests for Substitution:

A. Where a particular system, product or material is specified by name, consider it as standard basis for bidding, and base proposal on the particular system, product or material specified. Other systems, products, equipment or materials may be accepted only if in the opinion of the Engineer, they are equivalent in quality and workmanship and will perform satisfactorily its intended purpose. The Engineer shall approve all such substitutions in materials or equipment in writing. This shall occur prior to bidding.

B. In making requests for substitutions, the Contractor shall list the particular system, product, equipment or material he wishes to substitute and at bid time the Contractor shall state the amount he will add or deduct from his base bid if the substitution is approved by the Engineer. If the Contractor allows no deduction or addition to the base bid for such substitution, it shall be so stated on the request.

C. Requests by Contractor for substitution will be considered only when reasonable, timely, fully documented, and qualifying under one or more of the following circumstances.

1. Required product cannot be supplied in time for compliance with Contract time requirements.
2. Required product is not acceptable to governing authority, or determined to be non-compatible, or cannot be properly coordinated, warranted or insured, or has other recognized disability as certified by Contractor.
3. Substantial cost advantage is offered Owner after deducting offsetting disadvantages including delays, additional compensation for redesign, investigation, evaluation and other necessary services and similar considerations.

D. All requests for substitution shall contain a "Comparison Schedule" and clearly and specifically indicate any and all differences or omissions between the product specified as the basis of design and the product proposed for substitution. Differences shall include but shall not be limited to data as follows for both the specified and substituted products:

1. Principle of operation.
2. Materials of construction or finishes.
3. Thickness of materials.
4. Weight of item.
5. Deleted features or items.
6. Added features or items.
7. Changes in other work caused by the substitution.
8. Performance and rating data.

If the approved substitution contains differences or omissions not specifically called to the attention of the Engineer, the Owner reserves the right to require equal or similar features to be added to the substituted products at the Contractor's expense.

2.4 Prior Approval: Prior Approval shall be required for any manufacturer other than those listed for all specified items in the Drawings and Specifications. Submit all requests for approval of the alternate manufacturer's products two weeks prior to bid opening. Approval will be in the form of an Addendum to the Specifications and Drawings. Clearly indicate all differences between the specified and proposed product following the guidelines for substitution herein. This requirement may be waived if, in the opinion of the Engineer, it is in the best interest of the Owner. Submittals received after the award of the bid for equipment that has not been Prior Approved is subject to immediate rejection. **Any Engineering time required due to equipment that has not been Prior Approved is subject to billing charged directly to the contractor at the Engineer's current billing rate.**

PART 3 - EXECUTION

3.1 Workmanship: All materials, fixtures, and equipment shall be installed and completed in a first-class workmanlike manner and in accordance with the best modern methods and practice. Any materials installed which do not present an orderly and reasonably neat and/or workmanlike appearance, or do not allow adequate space for maintenance, shall be removed and replaced when so directed by the Engineer.

3.2 Coordination

A. The Contractor shall be responsible for full coordination of the electrical systems with shop drawings of the building construction so the proper openings and sleeves or supports etc., are provided for conduit, devices, or other equipment passing through slabs or walls.

B. Any additional steel supports required for the installation of any electrical equipment, etc., shall provided by the Contractor.

C. It shall be the Contractor's responsibility to see that all equipment that may require maintenance and operation are made easily accessible, regardless of the diagrammatic location shown on the Drawings.

D. All connections to fixtures and equipment shown on the Drawings shall be considered diagrammatic unless otherwise indicated by a specific detail on the Drawings. The actual connections shall be made to fully suit the requirements of each case and adequately provide for servicing.

E. The Contractor shall protect equipment and fixtures at all times during storage and construction. He shall replace all equipment and fixtures, which are damaged as a result of inadequate protection. Any electrical equipment with electronic components shall be stored off-site in a climate controlled facility until the building conditions are suitable for installation. Any equipment damaged or compromised by unprotected climate control, in the opinion of the Engineer, shall be replaced at contractor's cost with factory new equipment.

F. Prior to starting and during progress of work, examine work and materials installed by others as they apply to work in this division. Report conditions, which will prevent satisfactory installation.

G. Start of work will be construed as acceptance of suitability of work of others.

H. The Contractor shall review all equipment being supplied by other divisions prior to ordering electrical equipment. Any conflicts between equipment being supplied and the electronic requirements on the drawings shall be corrected and incorporated into the electrical submittals prior to ordering equipment. Installation of the electrical system is the contractor's acceptance of equipment requirements. Any conflict with equipment's electrical requirements after electrical system has been installed shall be the responsibility of the contractor to make corrective action. Any corrective action shall be at the contractor's expense.

3.3 Utilities Coordination: The Contractor shall meet with respective personnel of the telephone, cable TV and electric utilities and review all details of the service and distribution. All details shown on contract documents shall be verified for adequacy and accuracy. The Contractor shall incorporate any required revisions without additional cost to the Owner.

3.4 Construction Electrical Utilities: Provide all temporary wiring for power and light required for construction purposes and remove such temporary wiring when use is no longer required. The contractor shall be responsible to provide all cabinets, meter enclosures and conduit required by the local utility for the permanent electrical service.

3.5 Interruption of Service: Before any equipment is shut down for disconnecting or tie-ins, arrangements shall be made with the Engineer and this work shall be done at the time best suited to the Owner. Outages must be scheduled through the Engineer. The Engineer shall review extent, length, and timing of outages. Services shall be restored the same day. Provide temporary power or other services as required during outages.

3.6 Cutting and Patching: Contractor shall be responsible for cutting and patching of all holes, chases, sleeves, and other openings required for installation of equipment furnished and installed under these Specifications. Obtain permission from Engineer before cutting any structural items.

3.7 Equipment Setting: Bolt equipment directly to concrete pads or foundations, using hot-dipped galvanized anchor bolts, nuts and washers. Level equipment. All floor mounted equipment shall be provided with an 4" housekeeping pad.

3.8 Painting: Touch-up factory finishes on equipment located inside and outside shall be done under Division 16. Obtain matched color coatings from the manufacturer and apply as directed by manufacturer. If corrosion is found during inspection on the surface of any equipment, clean, prime, and paint, as required. If corrosion is found to be extensive by the Engineer, the equipment shall be removed and replaced with factory new at the expense of the contractor.

3.9 Clean-up: Thoroughly clean all exposed parts of apparatus and equipment of cement, plaster, and other materials and remove all oil and grease spots. Repaint or touch up as required to look like new. During progress of work, Contractor is to carefully clean and leave premises free from debris and in a safe condition.

3.10 Start-up and Operational Test: Start each item of equipment in strict accordance with the manufacturer's instructions; or where noted under equipment specification, a qualified representative of the manufacturer shall do start-up. Alignment, lubrication, safety, and operating control shall be included in start-up check.

3.11 Record Drawings:

A. During the progress of the work the Contractor shall record on their field set of Drawings the corrections, variations, and deviations for systems which are not installed exactly as shown on the Contract Drawings.

B. Upon completion of the work, record drawings shall be prepared as described in the General Conditions, Supplementary Conditions, and Division 1 Sections.

3.12 Certificate of Occupancy:

Following items are required for issue of Certificate of Occupancy. These shall be provided at or before of Substantial Completion Inspection:

A. Provide certification that asbestos containing products were not used in the project.

B. Fire Alarm Certification. In addition, the documentation shall contain witnessed accounts of the shut-down of electrical and mechanical equipment and the operation of fire doors as required by Code and the Construction Documents.

C. Provide certification that the Intercommunications System is fully operational (If applicable).

D. Provide certification that all emergency lights and exit signs are operational.

E. Provide certification that all selective protective devices have been set according to the coordination study/recommendations including all ground fault selections.

3.13 ACCEPTANCE

A. Request inspections as required under the Supplementary or General Conditions. Conceal no work until inspected.

B. Punch List: Submit written confirmation that all punch lists have been checked and the required work completed. **The contractor at the Engineer's current billing rate shall pay for additional field time required by the Engineer to report or check on past punch list deficiencies.**

C. Instructions: At completion of the work, provide a competent and experienced person who is thoroughly familiar with the project, for a period deemed necessary by the Owner to instruct permanent operating personnel in the operation of equipment and control systems.

D. Operation and Maintenance Manuals: Furnish four complete manuals bound in ring binders and organized by system or section. Manuals shall contain:

1. Detailed operating instructions and instructions for making minor adjustments.
2. Complete wiring and control diagrams.
3. Routine maintenance operations.
4. Manufacturer's catalog data, service instructions, and parts list for each piece of operating equipment.

E. Control Diagrams: Frame under glass and mount on equipment room wall. Include copy in O and M Manuals.

F. Test together and separately to determine that:

1. System is free from short circuits and other faults.
2. Motor starter overload devices are sized correctly.
3. Motors rotate correctly.
4. All equipment operates correctly and as specified.

G. Warranties: Submit copies of all manufacturers' warranties.

H. Record Drawings: Submit "Record Drawings".

I. Install engraved metal or plastic nameplates or tags on controls, panels, switches, starters, timers, and similar operable equipment, keyed by number to operating instructions. Dymo type labels are not acceptable.

J. Acceptance will be on the basis of tests and inspections of the work. A representative of the firm, which performed the testing, shall be in attendance to assist during inspection. Contractor shall furnish necessary electricians to operate system, make any necessary adjustments and assist with final inspection.

END OF SECTION 16005

SECTION 16020

CODES AND STANDARDS

PART 1 - GENERAL

1.1 All work under Division 16 shall be constructed in accordance with the codes and standards listed herein. The design has been based on the requirements of these codes and standards. While it is not the responsibility of the Contractor to verify that all work called for complies with these codes and standards, he shall be responsible for calling to the Engineer's attention any details on the Drawings and/or Specifications that are not in conformance with these or other codes and standards. Current issue of code applies unless specifically noted otherwise.

1.2 Comply with regulations and codes of suppliers of utilities.

1.3 Where no specific method or form of construction is called for in the Contract Documents, the Contractor shall comply with code requirements when carrying out such work.

1.4 Where code conflict exists, generally the most stringent requirement applies.

1.5 Codes or standards applying to a specific part of the work may be included in that section.

PART 2 - CODES AND STANDARDS

2.1 CODES:

a. 2012 International Building Code
b. National Electrical Code (NFPA 70), 2014
c. National Electrical Safety Code (NESC)
d. Life Safety Code (NFPA 101)
e. Physically Handicapped (ANSI A117.1)

2.2 STANDARDS: All electrical materials, installation and systems shall meet the requirements of the following standards, including the latest addenda and amendments:

a. American National Standard Institutes (ANSI)
b. Illuminating Engineering Society (IES).
c. Institute of Electrical and Electronics Engineers (IEEE).
d. National Electrical Manufacturer's Associations (NEMA).
e. National Fire Protection Association (NFPA).
f. Occupational Safety and Health Act (OSHA).
g. Underwriter's Laboratories, Inc. (UL).

PART 3 - EXECUTION

3.1 Not used.

END OF SECTION 16020

SECTION 16055

OVERCURRENT PROTECTIVE DEVICE COORDINATION

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 computer-based, fault-current and overcurrent protective device coordination studies, and the setting of these devices.

1. Coordination of series-rated devices is permitted where indicated on Drawings.

1.3 SUBMITTALS

A. Product Data: For computer software program to be used for studies.

B. Product Certificates: For coordination-study and fault-current-study computer software programs, certifying compliance with IEEE 399.

C. Qualification Data: For coordination-study specialist.

D. Other Action Submittals:

1. Complete fault current and coordination-study as described herein. Provide hard copy and electronic copy of the results. The electronic copy shall be in the same format used to prepare the calculations. For example, if Easy Power software is used to prepare the calculations, submit data files used to print the results.

2. Arc Flash Report.

3. Equipment evaluation report.

4. Setting report.

5. Certification: Two weeks prior to final inspection, submit four copies to the Engineer that the protective devices have been adjusted and set in accordance with the approved protective device study.

1.4 QUALITY ASSURANCE

A. Studies shall use computer programs that are distributed nationally and are in wide use. Software algorithms shall comply with requirements of standards and guides specified in this Section. Manual calculations are not acceptable.

B. Coordination-Study Specialist Qualifications: An organization experienced in the application of computer software used for studies, having performed successful studies of similar magnitude on electrical distribution systems using similar devices.

C. Testing Agency Qualifications: Member company of the International Electrical Testing Association.

1. Testing Agency's Field Supervisor: Person currently certified by the International Electrical Testing Association to supervise testing specified in Part 3.

D. Comply with IEEE 399 for general study procedures.

E. Comply with IEEE 242 for short-circuit currents and coordination time intervals.

PART 2 - PRODUCTS

2.1 COMPUTER SOFTWARE DEVELOPERS

A. Available Computer Software Developers: Subject to compliance with requirements, companies offering computer software programs that may be used in the Work include, but are not limited to, the following:

B. Computer Software Developers: Subject to compliance with requirements, provide computer software programs developed by one of the following:

1. SKM Systems Analysis, Inc.

2.2 COMPUTER SOFTWARE PROGRAM REQUIREMENTS

A. Comply with IEEE 399.

B. Analytical features of fault-current-study computer software program shall include "mandatory," "very desirable," and "desirable" features as listed in IEEE 399, Table 7-4.

C. Computer software program shall be capable of plotting and diagramming time-current-characteristic curves as part of its output. Computer software program shall report device settings and ratings of all overcurrent protective devices.

1. Optional Features:

a. Arcing faults.

b. Simultaneous faults.

c. Explicit negative sequence.

d. Mutual coupling in zero sequence.

2.3 STUDY REQUIREMENTS

A. The complete study shall include a system one line diagram, fault current and ground fault analysis and protective coordination plots.

B. Single Line Diagram:

1. Indicate all electrical equipment and wiring to be protected by the overcurrent devices installed under this project. Show the schematic wiring to the electrical distribution system.
2. Indicate the following information on the single line:
   a. Calculated fault impedance, X/R ratios, and short circuit values at each bus.
   b. Breaker and fuse ratings.
   c. Generator kW and transformer kVA and voltage ratings, percent impedance, X/R ratios, and wiring connections.

d. Voltage at each bus.
e. Identification of each bus.
f. Conduit material, feeder sizes, length and X/R ratios.

C. Fault Current Study:
1. Source Impedance: **Utility company's fault-current contribution as indicated** or **As an infinite bus on primary side of utility transformer**.
2. Study electrical distribution system from normal and alternate power sources throughout electrical distribution system for Project and use approved computer software program to calculate values. Include studies of system-switching configurations and alternate operations that could result in maximum fault conditions.
3. Calculate momentary and interrupting duties on the basis of maximum available fault current.
4. Calculations to verify interrupting ratings of overcurrent protective devices shall comply with the following:
a. Low-Voltage Circuit Breakers: IEEE 1015 and IEEE C37.50.
b. Low-Voltage Fuses: IEEE C37.46.
c. Circuit Breakers: IEEE C37.13.
5. Study Report: Enter calculated X/R ratios and interrupting (5-cycle) fault currents on electrical distribution system diagram of the report. List other output values from computer analysis, including momentary (1/2-cycle), interrupting (5-cycle), and 30-cycle fault-current values for 3-phase, 2-phase, and phase-to-ground faults. Incorporate the motor contribution in determining the momentary and interrupting ratings of the protective devices.
6. The study shall be calculated by means of a computer program. Pertinent data and the rationale employed in developing the calculations shall be incorporated in the introductory remarks of the study.
7. Equipment Evaluation Report: Prepare a report on the adequacy of overcurrent protective devices and conductors by comparing fault-current ratings of these devices with calculated fault- current momentary and interrupting duties.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine Project overcurrent protective device submittals for compliance with electrical distribution system coordination requirements and other conditions affecting performance. Devices to be coordinated are indicated on Drawings.

B. Proceed with coordination study only after relevant equipment submittals have been assembled. Overcurrent protective devices not submitted for approval with coordination study may not be used in study.

3.2 COORDINATION STUDY

A. Gather and tabulate the following input data to support coordination study:

1. Product Data for overcurrent protective devices specified in other Division 16 Sections and involved in overcurrent protective device coordination studies. Use equipment designation tags that are consistent with electrical distribution system diagrams, overcurrent protective device submittals, input and output data, and recommended device settings.

2. Impedance of utility service entrance.

3. Electrical distribution system diagram showing the following:

a. Load current that is the basis for sizing continuous ratings of circuits for cables and equipment.

b. Circuit-breaker and fuse-current ratings and types.

c. Relays and associated power and current transformer ratings and ratios.

d. Transformer kilovolt amperes, primary and secondary voltages, connection type, impedance, and X/R ratios.

e. Generator kilovolt amperes, size, voltage, and source impedance.

f. Cables. Indicate conduit material, sizes of conductors, conductor insulation, and length.

g. Busway ampacity and impedance.

h. Motor horsepower and code letter designation according to NEMA MG 1.

4. Data sheets to supplement electrical distribution system diagram, cross-referenced with tag numbers on diagram:

a. Special load considerations, including starting inrush currents and frequent starting and stopping.

b. Magnetic inrush current overload capabilities of transformers.

c. Motor full-load current, locked rotor current, service factor, starting time, type of start, and thermal-damage curve.

d. Ratings, types, and settings of utility company's overcurrent protective devices.

e. Special overcurrent protective device settings or types stipulated by utility company.

f. Time-current-characteristic curves of devices indicated to be coordinated.

g. Manufacturer, frame size, interrupting rating in amperes rms symmetrical, ampere or current sensor rating, long-time adjustment range, short-time adjustment range, and instantaneous adjustment range for circuit breakers.

h. Manufacturer and type, ampere-tap adjustment range, time-delay adjustment range, instantaneous attachment adjustment range, and current transformer ratio for overcurrent relays.

i. Panelboards, switchboards, motor-control center ampacity, and interrupting rating in amperes rms symmetrical.

B. Perform coordination study and prepare a written report using the results of fault-current study and approved computer software program. Comply with IEEE 399.

C. Comply with NFPA 70 for overcurrent protection of circuit elements and devices.

D. Comply with [**IEEE 141**] [**IEEE 242**] recommendations for fault currents and time intervals.

E. Transformer Primary Overcurrent Protective Devices:

1. Device shall not operate in response to the following:

a. Self-cooled, full-load current or forced-air-cooled, full-load current, whichever is specified for that transformer.

b. Permissible transformer overloads according to IEEE C57.96 if required by unusual loading or emergency conditions.

2. Device shall protect transformer according to IEEE C57.12.00, for fault currents.

F. Motors served by voltages more than 600 V shall be protected according to IEEE 620.

G. Conductor Protection: Protect cables against damage from fault currents according to ICEA P-32-382, ICEA P-45-482, and conductor melting curves in IEEE 242. Verify adequacy of phase conductors at

maximum three-phase bolted fault currents, equipment grounding conductors, and grounding electrode conductors at maximum ground-fault currents.

H. Coordination-Study Report: Prepare a written report indicating the following results of coordination study:

1. Tabular Format of Settings Selected for Overcurrent Protective Devices:

   a. Device tag.

   b. Relay-current transformer ratios; and tap, time-dial, and instantaneous-pickup values.

   c. Circuit-breaker sensor rating; and long-time, short-time, and instantaneous settings.

   d. Fuse-current rating and type.

   e. Ground-fault relay-pickup and time-delay settings.

2. Coordination Curves: Prepared to determine settings of overcurrent protective devices to achieve selective coordination. Graphically illustrate that adequate time separation exists between series devices, including power utility company's upstream devices. Show the following specific information:

   a. Device tag.

   b. Voltage and current ratio for curves.

   c. Three-phase and single-phase damage points for each transformer.

   d. No damage, melting, and clearing curves for fuses.

   e. Cable damage curves.

   f. Transformer inrush points.

   g. Maximum fault-current cutoff point.

3. Completed data sheets for setting of overcurrent protective devices.

3.3 OVERCURRENT PROTECTIVE DEVICE SETTING

A. Manufacturer's Field Service: Engage a factory-authorized service representative, of electrical distribution equipment being set and adjusted, **to set** overcurrent protective devices within equipment.

B. Testing: Perform the following device setting and prepare reports:

1. After installing overcurrent protective devices and during energizing process of electrical distribution system, perform the following:

   a. Verify that overcurrent protective devices meet parameters used in studies.

   b. Adjust devices to values listed in study results.

END OF SECTION 16055

SECTION 16107

SERVICE ENTRANCE METHODS AND MATERIALS – UNDERGROUND

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.

B. Division-16 Basic Electrical Materials and Methods Sections apply to work of this Section.

C. Review all project drawings to be aware of conditions affecting work herein.

PART 2 - PRODUCTS

2.1 Materials for this section are specified in the Section "Basic Materials and Methods."

PART 3 - EXECUTION

3.1 Installation shall comply with the requirements of the Utilities Company and the applicable paragraphs in Article "3.0 EXECUTION" of the Section "Basic Materials and Methods."

3.2 Comply with NEC 70 - Underground Services.

3.3 Comply with the Section "Excavation and Backfill."

3.4 Provide concrete pads as shown on the Drawings. Coordinate requirements with Utility company. The Utility Company will provide transformer. Confirm adequacy of dimensions and size and number of openings in concrete pad with Utilities Company.

3.5 The Utility Company will furnish and install the current transformers, potential transformer. The contractor shall coordinate the installation of service feeders with the Utility Company so that the current transformers can be installed. The Utility Company will furnish and install the meter. The contractor shall furnish and install CT cabinets, meter cabinets and all associated conduit. Coordinate exact requirements with local utility.

3.6 The electrical contractor shall provide the raceways and service conductors from the reinforced concrete transformer pad to the service equipment as indicated on the Drawings.

3.7 The Electrical Contractor shall provide the raceways from the transformer pad to the meter cabinet. Minimum conduit size is 1" and shall be RGS. Unless otherwise noted, the meter shall be mounted on the east wall, and installed by the contractor. The location of the meter shall be approved by the Utility Company.

3.8 Raceways for service conductors shall be schedule 80 PVC or bitumastic coated rigid metal conduit for straight lengths and bitumastic coated rigid metal conduit for any bends of 45 or 90 degrees. Service entrance raceways shall be concrete encased where specifically noted on the Drawings.

3.9 The 45 or 90-degree bends shall have a minimum radius of 36 inches.

3.10 Rigid metal conduit shall receive two undiluted coats of bitumastic free from holidays and pinholes.

3.11 The Electrical Contractor shall provide 200# test poly cord in each spare raceway.

END OF SECTION 16107

SECTION 16120 – ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following individually mounted, enclosed switches and circuit breakers:

1. Fusible switches.
2. Nonfusible switches.
3. Molded-case circuit breakers.
4. Enclosures.

1.3 DEFINITIONS

A. GFCI: Ground-fault circuit interrupter.

B. HD: Heavy duty.

C. RMS: Root mean square.

D. SPDT: Single pole, double throw.

1.4 SUBMITTALS

A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

1. Enclosure types and details for types other than NEMA 250, Type 1.
2. Time-current curves, including selectable ranges for each type of circuit breaker.
3. Manufacturer's written instructions for testing and adjusting enclosed switches and circuit breakers.
4. Current and voltage ratings.

5. Short-circuit current rating.

6. Features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA 70.

C. All products shall be UL listed.

D. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Rate equipment for continuous operation under the following conditions, unless otherwise indicated:

1. Ambient Temperature: Not less than minus 22 deg F (minus 30 deg C) and not exceeding 104 deg F (40 deg C).

2. Altitude: Not exceeding 6600 feet (2010 m).

1.7 COORDINATION

A. Coordinate layout and installation of switches, circuit breakers, and components with other construction, including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.
   a. Square D Co.
   b. Eaton Corp.; Cutler-Hammer Products.
   c. General Electric Co.; Electrical Distribution & Control Division.

2.2 FUSIBLE AND NONFUSIBLE SWITCHES

A. Manufacturers:
   1. Eaton Corporation; Cutler-Hammer Products.
   2. General Electric Co.; Electrical Distribution & Control Division.
   3. Square D/Group Schneider.

B. Fusible Switch: NEMA KS 1, Type Heavy Duty, with clips or bolt pads to accommodate specified fuses, lockable handle with capability to accept two padlocks, and interlocked with cover in closed position. All fusible switches rated 100 thru 600 amperes at 240 volts, and 30 thru 600 amperes at 600 volts, shall have the capability of field conversion from standard Class H fuse spacing to Class J fuse spacing without affecting the UL listing. The switch also must accept Class R fuses and have field installable UL listed rejection feature to reject all fuses except Class R. UL listed short circuit ratings, when equipped with Class R fuses shall be 200,000 ampere RMS symmetrical. 800 and 1200 ampere switches shall have provisions for Class L fuses.

C. Nonfusible Switch: NEMA KS 1, Type Heavy Duty, lockable handle with capability to accept two padlocks, and interlocked with cover in closed position.

D. Accessories:
   1. Equipment Ground Kit: Copper material internally mounted and labeled for copper ground conductors. Provide with each switch. Attach to enclosure with stainless steel, self tapping screws.

2.3 MOLDED-CASE CIRCUIT BREAKERS AND SWITCHES

A. Manufacturers:
   1. Eaton Corporation; Cutler-Hammer Products.
   2. General Electric Co.; Electrical Distribution & Control Division.
   3. Square D/Group Schneider.

B. Molded-Case Circuit Breaker: NEMA AB 1, with interrupting capacity to meet available fault currents.

1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits. Unless indicated otherwise, breakers smaller than 250A frame shall be thermal-magnetic.

2. Adjustable Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting. Unless indicated otherwise, breakers smaller than 800A frame and at least 250A frame shall be adjustable thermal-magnetic.

3. Electronic Trip-Unit Circuit Breakers: Unless indicated otherwise, breakers 800A frame and larger shall be electronic trip type. RMS sensing; field-replaceable rating plug; with the following field-adjustable settings:

   a. Instantaneous trip.

   b. Long- and short-time pickup levels.

   c. Long- and short-time time adjustments.

   d. Ground-fault pickup level, time delay, and I^2t response.

4. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller and let-through ratings less than NEMA FU 1, RK-5.

5. Integrally Fused Circuit Breakers: Thermal-magnetic trip element with integral limiter-style fuse listed for use with circuit breaker and trip activation on fuse opening or on opening of fuse compartment door.

6. GFCI Circuit Breakers: Single- and two-pole configurations with 5-mA trip sensitivity.

C. Molded-Case Circuit-Breaker Features and Accessories:

1. Standard frame sizes, trip ratings, and number of poles.

2. Lugs: Mechanical style suitable for number, size, trip ratings, and conductor material.

3. Application Listing: Type SWD for switching fluorescent lighting loads; Type HACR for heating, air-conditioning, and refrigerating equipment.

4. Shall have overcenter, trip free, toggle-type operating mechanisms with quick-make, quick-break action and positive handle indication. All breakers shall be bolt-on type.

5. Circuit breaker shall have a permanent trip unit containing individual thermal and magnetic trip elements in each pole.

6. Provide with shunt trip features where indicated on the Drawings.

2.4 ENCLOSURES

A. NEMA AB 1 and NEMA KS 1 to meet environmental conditions of installed location and shall be dead front type.

1. Outdoor Locations: NEMA 250, Type 3R.
2. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.
3. Hazardous Areas Indicated on Drawings: NEMA 250, Type 7C.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance.

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

3.2 INSTALLATION

A. Comply with applicable portions of NECA 1, NEMA PB 1.1, and NEMA PB 2.1 for installation of enclosed switches and circuit breakers.

B. Mount individual wall-mounting switches and circuit breakers with tops at uniform height, unless otherwise indicated. Anchor floor-mounting switches to concrete base.

C. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.

3.3 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs as specified in Division 16 Section "Basic Electrical Materials and Methods."

B. Enclosure Nameplates: Label each enclosure with engraved metal or laminated-plastic nameplate as specified in Division 16 Section "Basic Electrical Materials and Methods."

3.4 ADJUSTING

A. Set field-adjustable switches and circuit-breaker trip ranges.

3.5 CLEANING

A. On completion of installation, vacuum dirt and debris from interiors; do not use compressed air to assist in cleaning.

B. Inspect exposed surfaces and repair damaged finishes.

END OF SECTION 16120

SECTION 16121 - CONDUCTORS AND CABLES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes building wires and cables and associated connectors, splices, and terminations for wiring systems rated 600 V and less.

B. Related Sections include the following:

1. Division 16 Section "Control/Signal Transmission Media" for transmission media used for control and signal circuits.
2. Division 16 Section "Undercarpet Cables" for flat cables for undercarpet installations.
3. Division 16 Section "Medium-Voltage Cables" for single-conductor and multiconductor cables, cable splices, and terminations for electrical distribution systems with 2001 to 35,000 V.

1.3 SUBMITTALS

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

B. Qualification Data: For testing agency.

C. Field Quality-Control Test Reports: From **a qualified testing and inspecting agency engaged by** Contractor.

1.4 QUALITY ASSURANCE

A. Testing Agency Qualifications: Testing agency as defined by OSHA in 29 CFR 1910.7 or a member company of the International Electrical Testing Association and that is acceptable to authorities having jurisdiction.

1. Testing Agency's Field Supervisor: Person currently certified by the International Electrical Testing Association or the National Institute for Certification in Engineering Technologies to supervise on-site testing specified in Part 3.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Comply with NFPA 70.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.

2. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 CONDUCTORS AND CABLES

A. **Available** Manufacturers:

1. Alcan Aluminum Corporation; Alcan Cable Div.

2. American Insulated Wire Corp.; a Leviton Company.

3. General Cable Corporation.

4. Senator Wire & Cable Company.

5. Southwire Company

B. Refer to Part 3 "Conductor and Insulation Applications" Article for insulation type, cable construction, and ratings.

C. Conductor Material: **Copper, except feeders No. 4 AWG and larger may be aluminum** complying with NEMA WC **5 or 7**; **solid conductor for No. 10 AWG and smaller, stranded for No. 8 AWG and larger**.

D. Conductor Insulation Types: Type **THHN-THWN**, **XHHW** complying with NEMA WC **5 or 7**.

E. Multiconductor Cable: **Armored cable, Type AC**, **Metal-clad cable, Type MC** with ground wire.

2.3 CONNECTORS AND SPLICES

A. Manufacturers:

1. AFC Cable Systems, Inc.
2. AMP Incorporated/Tyco International.
3. Hubbell/Anderson.
4. O-Z/Gedney; EGS Electrical Group LLC.
5. 3M Company; Electrical Products Division.

B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

PART 3 – EXECUTION

3.1 CONDUCTOR AND INSULATION APPLICATIONS

A. Service Entrance: Type **XHHW, single conductors in raceway**.

B. Exposed Feeders: **Type THHN-THWN, single conductors in raceway, Armored cable, Type AC Metal-clad cable, Type MC**.

C. Feeders Concealed in Ceilings, Walls, and Partitions: **Type THHN-THWN, single conductors in raceway**, **Armored cable, Type AC**, **Metal-clad cable, Type MC**.

D. Feeders Concealed in Concrete, below Slabs-on-Grade, and in Crawlspaces: Type THHN-THWN, single conductors in raceway.

E. Exposed Branch Circuits, including in Crawlspaces: **Type THHN-THWN, single conductors in raceway**, **Armored cable, Type AC**, **Metal-clad cable, Type MC**.

F. Branch Circuits Concealed in Ceilings, Walls, and Partitions: **Type THHN-THWN, single conductors in raceway**, **Metal-clad cable, Type MC**.

G. Branch Circuits Concealed in Concrete and below Slabs-on-Grade: Type THHN-THWN, single conductors in raceway.

H. Underground Feeders and Branch Circuits: Type UF multiconductor cable.

I. Cord Drops and Portable Appliance Connections: Type SO, hard service cord.

J. Fire Alarm Circuits: **Power-limited, fire-protective, signaling circuit cable**.

K. Class 1 Control Circuits: Type THHN-THWN, in raceway.

L. Class 2 Control Circuits: **Type THHN-THWN, in raceway**.

3.2 INSTALLATION

A. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.

B. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

D. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

E. Support cables according to Division 16 Section "Basic Electrical Materials and Methods."

F. Seal around cables penetrating fire-rated elements according to Division 7 Section "Through-Penetration Firestop Systems."

G. Identify and color-code conductors and cables according to Division 16 Section **"Basic Electrical Materials and Methods."**

3.3 CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

B. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

1. Use oxide inhibitor in each splice and tap conductor for aluminum conductors.

C. Wiring at Outlets: Install conductor at each outlet, with at least **6 inches** of slack.

3.4 FIELD QUALITY CONTROL

A. Testing: Owner will engage a qualified testing agency to perform the following field quality-control testing:

B. Testing: Engage a qualified testing agency to perform the following field quality-control testing:

C. Testing: Perform the following field quality-control testing:

1. After installing conductors and cables and before electrical circuitry has been energized, test for compliance with requirements.

2. Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Section 7.3.1. Certify compliance with test parameters.

D. Test Reports: Prepare a written report to record the following:

1. Test procedures used.
2. Test results that comply with requirements.
3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

END OF SECTION 16120

SECTION 16170

GENERAL WIRING DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Single and duplex receptacles, ground-fault circuit interrupters, integral surge suppression units, and isolated-ground receptacles.
2. Single- and double-pole snap switches and dimmer switches.
3. Device wall plates.
4. Pin and sleeve connectors and receptacles.
5. Floor service outlets, poke-through assemblies, service poles, and multioutlet assemblies.

1.3 DEFINITIONS

A. EMI: Electromagnetic interference.

B. GFCI: Ground-fault circuit interrupter.

C. PVC: Polyvinyl chloride.

D. RFI: Radio-frequency interference.

E. TVSS: Transient voltage surge suppressor.

F. UTP: Unshielded twisted pair.

1.4 SUBMITTALS

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

B. Samples: One for each type of device and wall plate specified, in each color specified.

1.5 QUALITY ASSURANCE

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

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Comply with NFPA 70.

D. UL Listed.

1.6 COORDINATION

A. Receptacles for Owner-Furnished Equipment: Match plug configurations.

1. Cord and Plug Sets: Match equipment requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Wiring Devices:
   a. Eagle Electric Manufacturing Co., Inc.
   b. Hubbell Incorporated; Wiring Device-Kellems.
   c. Leviton Mfg. Company Inc.
   d. Pass & Seymour/Legrand; Wiring Devices Div.

2. Wiring Devices for Hazardous (Classified) Locations:
   a. Crouse-Hinds/Cooper Industries, Inc.; Arrow Hart Wiring Devices.
   b. EGS/Appleton Electric Company.
   c. Killark Electric Manufacturing Co./Hubbell Incorporated.

3. Multioutlet Assemblies:
   a. Hubbell Incorporated; Wiring Device-Kellems.
   b. Wiremold Company (The).

4. Poke-Through, Floor Service Outlets and Telephone/Power Poles:
   a. Hubbell Incorporated; Wiring Device-Kellems.
   b. Pass & Seymour/Legrand; Wiring Devices Div.
   c. Square D/Groupe Schneider NA.
   d. Thomas & Betts Corporation.
   e. Wiremold Company (The).

2.2 RECEPTACLES

A. Straight-Blade-Type Receptacles: Comply with NEMA WD 1, NEMA WD 6, DSCC W-C-596G, and UL 498. Devices shall be heavy duty, specification grade. Use ivory finished devices throughout except as hereinafter noted otherwise.

B. Single Receptacle Devices:

20 amp, 2 pole, 3 wire, 125V, NEMA 5-20R Hubbell HBL5361
30 amp, 2 pole, 3 wire, 125V, NEMA 5-30R Hubbell HBL9308
50 amp, 2 pole, 3 wire, 125V, NEMA 5-50R Hubbell HBL9360
20 amp, 2 pole, 3 wire, 250V, NEMA 6-20R Hubbell HBL5461
30 amp, 2 pole, 3 wire, 250V, NEMA 6-30R Hubbell HBL9330
50 amp, 2 pole, 3 wire, 250V, NEMA 6-50R Hubbell HBL9367
30 amp, 2 pole, 3 wire, 277V, NEMA 7-30R Hubbell HBL9315
50 amp, 2 pole, 3 wire, 277V, NEMA 7-50R Hubbell HBL365
20 amp, 3 pole, 4 wire, 125/250V, NEMA 14-20R Hubbell HBL8410
30 amp, 3 pole, 4 wire, 125/250V, NEMA 14-30R Hubbell HBL9430A
50 amp, 3 pole, 4 wire, 125/250V, NEMA 14-50R Hubbell HBL9450A
60 amp, 3 pole, 4 wire, 125/250V, NEMA 14-60R Hubbell HBL9460A
20 amp, 3 pole, 4 wire, 250V, 3PH, No Neutral NEMA 15-20R Hubbell HBL8420
30 amp, 3 pole, 4 wire, 250V, 3PH, No Neutral NEMA 15-30R Hubbell HBL8430A
50 amp, 3 pole, 4 wire, 250V, 3PH, No Neutral NEMA 15-50R Hubbell HBL8450A
60 amp, 3 pole, 4 wire, 250V, 3PH, No Neutral NEMA 15-60R Hubbell HBL8460A

C. Duplex Receptacle Devices: The receptacle shall be specification grade and have the following features: back and side wiring, 0.032 inches thick brass triple wipe power contacts, brass center inset, all brass grounding system, impact resistant nylon face, thick wall thermoset base. 15 amp, 2 pole, 3 wire, 125V, NEMA 5-15R Hubbell HBL5252. 20 amp, 2 pole, 3 wire, 125V, NEMA 5-20R Hubbell HBL5352.

D. GFCI Receptacles: Straight blade, Devices shall be specification grade. Use ivory finished devices throughout except as hereinafter noted otherwise, with integral NEMA WD 6, Configuration 5-20R duplex receptacle; complying with UL 498 and UL 943. Design units for installation in a 2-3/4-inch-(70-mm-) deep outlet box without an adapter.

E. TVSS Receptacles: Straight blade, NEMA WD 6, Configuration 5-20R, with integral TVSS in line to ground, line to neutral, and neutral to ground.

1. TVSS Components: Multiple metal-oxide varistors; with a nominal clamp level rating of 500 volts and minimum single transient pulse energy dissipation of 140 J line to neutral, and 70 J line to ground and neutral to ground.

2. Active TVSS Indication: Visual and audible with light visible in face of device to indicate device is "active" or "no longer in service."

3. Identification: Distinctive marking on face of device to denote TVSS-type unit.

F. Hazardous (Classified) Location Receptacles: Comply with NEMA FB 11.

2.3 PENDANT CORD/CONNECTOR DEVICES

A. Description: Matching, locking-type plug and receptacle body connector, NEMA WD 6, Heavy-Duty grade.

1. Body: Nylon with screw-open cable-gripping jaws and provision for attaching external cable grip.

2. External Cable Grip: Woven wire-mesh type made of high-strength galvanized-steel wire strand, matched to cable diameter, and with attachment provision designed for corresponding connector.

2.4 CORD AND PLUG SETS

A. Description: Match voltage and current ratings and number of conductors to requirements of equipment being connected.

1. Cord: Rubber-insulated, stranded-copper conductors, with Type SOW-A jacket; with green-insulated grounding conductor and equipment-rating ampacity plus a minimum of 30 percent.

2. Plug: Nylon body and integral cable-clamping jaws. Match cord and receptacle type for connection.

2.5 SWITCHES

A. Single- and Double-Pole Switches: Comply with DSCC W-C-896F and UL 20.

1. Single Pole, 20 amp, 120/277 shall be Hubbell HBL1221 or approved equal.

2. Double Pole, 20 amp, 120/277V shall be Hubbell HBL1222 or approved equal.

3. Three-Way, 20 amp, 120/277V shall be Hubbell HBL1223 or approved equal.

4. Four-Way, 20 amp, 120/277V shall be Hubbell HBL1224 or approved equal.

B. Snap Switches: Specification grade, quiet type, abuse resistant nylon toggle, color coded base, one piece rivetless copper alloy spring contact arm & terminal plate, one piece integral grounding terminal with #8 brass screw, stainless steel automatic grounding clip, back wiring, one piece rivetless copper alloy spring contact arm and terminal plate. Provide 15 amp switch for circuits controlling up to but not exceeding 15 amperes. Provide 20 amp switch for circuit exceeding 15 amperes but less than or equal to 20 amperes. Provide 30 ampere switches for circuits exceeding 20 amperes but less than 30 amperes..

C. Dimmer Switches: Modular, full-wave, solid-state units with integral, quiet on/off switches and audible frequency and EMI/RFI filters.

1. Incandescent Dimming Switches: Provide 1500 watt slider type preset dimming switches gang mounted as indicated on the Drawings. The dimmer shall be Lutron NT-1503P. Color shall be grey with a stainless steel cover plate (clear anodized aluminum if 302SS is not available).

2. Fluorescent Dimming Switches: Provide slider type preset dimming switches gang mounted as indicated on the Drawings. The dimmer shall be Lutron NTF series with voltage and amperage as required. Color shall be grey with a stainless steel cover plate (clear anodized aluminum if 302SS is not available).

2.6 WALL PLATES

A. Single and combination types to match corresponding wiring devices.

1. Material for Finished Spaces: Provide UL listed one-piece device plates for outlets to suit the devices installed. Except as noted below, all wiring device plates shall be 302 stainless steel, 0.032 in. thick. Jumbo device plates shall be used on all walls, Hubbell 'SJ' series, 302 stainless steel or approved equal. Sectional type device plates will not be permitted. Screws shall be machine-type with countersunk heads in color to match finish of plate.

2. Material for Unfinished Spaces: Provide UL listed one-piece device plates for outlets to suit the devices installed. Except as noted below, all wiring device plates shall be 302 stainless steel, 0.032 in. thick. Jumbo device plates shall be used on all walls, Hubbell 'SJ' series, 302 stainless steel or approved equal. Sectional type device plates will not be permitted. Screws shall be machine-type with countersunk heads in color to match finish of plate.

3. Material for Wet Locations: Plates installed in wet locations shall be cast, gasketed and UL listed for "wet locations."

2.7 FLOOR SERVICE FITTINGS

A. Type: Modular, dual-service units suitable for wiring method used.

B. Compartments: Barrier separates power from voice and data communication cabling.

C. Power Receptacle: NEMA WD 6, Configuration 5-20R, unless otherwise indicated.

2.8 FINISHES

1. Wiring Devices Connected to Normal Power System: Ivory, unless otherwise indicated or required by NFPA 70.

2. Wiring Devices Connected to Emergency Power System: Red.

3. TVSS Devices: Blue.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install devices and assemblies level, plumb, and square with building lines.

B. Mounting Heights: Mounting heights for receptacle outlets shall be 18" above finished floor or as indicated on the Drawings. Mounting heights for receptacles over casework shall be 7" above counter top. Verify all receptacle heights prior to rough-in. Provide a written description to the Engineer, prior to rough-in, any conflicts. The Contractor shall at his expense, be responsible for the relocation of any receptacle not installed according to these specifications.

C. Prior to roughing-in wall outlet boxes, the Contractor shall verify from general construction drawings; door swings, type of wall finishes and locations for counters and work benches. Do not scale the plans; location of devices is shown on plans in desired vicinity. The Contractor shall carefully locate devices symmetrically and in coordination with architectural features.

D. Switches that control remote outlets, fans, etc., shall have engraved plastic name tags indicating the outlets, fans, etc. that are controlled.

E. Install wall dimmers to achieve indicated rating after derating for ganging according to manufacturer's written instructions.

F. Install unshared neutral conductors on line and load side of dimmers according to manufacturers' written instructions.

G. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical, and with grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.

H. Remove wall plates and protect devices and assemblies during painting.

I. Adjust locations of floor service outlets and service poles to suit arrangement of partitions and furnishings.

3.2 CONNECTIONS

A. Ground equipment according to Division 16 Section "Grounding and Bonding."

B. Connect wiring according to Division 16 Section "Conductors and Cables."

C. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.3 FIELD QUALITY CONTROL

A. Perform the following field tests and inspections:

1. After installing wiring devices and after electrical circuitry has been energized, test for proper polarity, ground continuity, and compliance with requirements.

2. Test GFCI operation with both local and remote fault simulations according to manufacturer's written instructions.

B. Remove malfunctioning units, replace with new units, and retest as specified above.

END OF SECTION 16170