A NEW CAFETERIA
AND
MULTI-PURPOSE ROOM

on the

Strawberry, AR School Campus

HILLCREST SCHOOL DISTRICT

South Main /Highway 25, PO Box 50

Strawberry, Arkansas 72469

PROJECT NO. 1920-3809-001

SPECIFICATIONS

December 27, 2020

All information and documents herein in these specifications and along with separate bound drawings will be a part of the General Contract for Construction

This project will be bid in conjunction with a NEW CAFETERIA AND OFFICE BUILDING In Lynn, AR for the same school district

PREPARED BY

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A NEW CAFETERIA and MULTI-PURPOSE ROOM
Strawberry, AR School Campus

HILLCREST SCHOOL DISTRICT
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HILLCREST SCHOOL DISTRICT
JOINT BID DOCUMENTS

NOTICE TO BIDDERS /INVITATION TO BID

Sealed proposals will be received by the **HILLCREST SCHOOL DISTRICT**, South Main /Highway 25, PO Box 50, Strawberry, Arkansas 72469,, hereinafter referred to as "OWNER" in the Office of the Superintendent of Hillcrest Schools at Strawberry, Arkansas, on Tuesday, March the twentythird (23rd), 2021 until 2:00 pm local time for the construction of: A NEW CAFETERIA AND OFFICE ADDITION on the Lynn, AR School Campus and A NEW CAFETERIA AND MULTI-PURPOSE ROOM BUILDING on the Strawberry, AR School Campus.

PROJECT A: A NEW CAFETERIA AND OFFICE ADDITION on the LYNN, AR campus is a ONE STORY BUILDING OF APPROXIMATELY 13,168 SF. Construction is a pre-fab metal building type structure atop a concrete floor slab with additional minor steel framing and masonry construction for interior walls and exterior walls. The building shall have additional masonry veneer at most locations. The building shall sit on fill contained by poured concrete retaining walls, partially on at least 2 sides. The project includes the cafeteria kitchen equipment. Building demolition shall be a part of the project.

PROJECT B, A NEW CAFETERIA AND MULTI-PURPOSE ROOM BUILDING on the STRAWBERRY, AR campus is a pre-fab ONE STORY metal building type structure OF APPROXIMATELY 7,683 SF on the existing school campus. Construction involves primarily a pre-fab metal building on a concrete slab with additional steel framing and masonry construction for exterior and interior walls with associated structural fill and other site work. The project includes the cafeteria kitchen equipment. Building demolition shall be a part of the project.

This project will be bid as two projects in conjunction with one lump sum bid provided by the bidders. The bid documents provided are two separate sets of building plans, 2 separate bound book type building specifications and 1 bound book type bid instructions and bid form. Each building project shall have a specific set of book specifications that govern the construction of each project. In addition, General Contractors bidding these two projects must have the separate set of joint bid documents that shall govern the requirements for general contractors and the submission of bids. These joint bid documents shall be available from the same source as the building plans and specifications and shall be a part of this bid and the general contract for construction. Contractors shall be required to bid on both building projects. Contractors submitting bids on just one project shall be disqualified.

A MANDATORY PRE-BID CONFERENCE. A Pre Bid Conference will be held Thursday, March eleventh (11th), 2021 at 11:00 am at the project site on the school campuses in both Strawberry, AR and Lynn, AR and will be mandatory for all GENERAL

A NEW CLASSROOM AND OFFICE ADDITION / LYNN, AR School Campus
AND
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CONTRACTORS bidding the project. The Pre-bid meeting shall start at the Strawberry, AR campus location and then proceed to the Lynn, AR campus location. Failure to attend shall be grounds for disqualification of bids. Current COVID-19 rules for gatherings shall be followed during the pre-bid conference and the bid opening.

Plans and Specifications, and Contract Documents may be obtained from SOUTHERN REPROGRAPHICS, 901 West 7th Street Little Rock, Arkansas 72201, Telephone (501) 372-4011 upon sending a deposit of $400.00 per set (for both building plans) to SOUTHERN REPROGRAPHICS. Deposit will be refunded to bona-fide bidders if Plans are returned in good condition to SOUTHERN REPROGRAPHICS within 10 days after Bidding Date. Deposits will not be returned to the successful contractor and subcontractors.
Information regarding bidding procedures is covered in the Instructions to Bidders section of the Specifications. All Bidders must comply with the requirements of the Contractor's Licensing Law of the State of Arkansas.

To obtain Plans and Specifications, you must call SOUTHERN REPROGRAPHICS. To obtain refund of Deposit, Plans must be returned to SOUTHERN REPROGRAPHICS. The issuance of plans and specifications, addendums, list of bidders registered with SOUTHERN REPROGRAPHICS and the issuance final bid results will be done by SOUTHERN REPROGRAPHICS. The Architect will keep no list of bidders and will not issue plans, specifications or addendums directly.

DO NOT CALL ARCHITECT FOR PLANS OR ADDENDUMS. DO NOT CALL ARCHITECT FOR BIDDERS LISTS. DO NOT RETURN PLANS TO ARCHITECT. DEPOSITS OF SUCESSFUL CONTRACTOR AND SUB-CONTRACTORS WILL NOT BE REFUNDED.FOR PLANS CALL SOUTHERN REPROGRAPHICS: 501-372-4011

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A NEW CAFETERIA AND MULTI-PURPOSE ROOM
Strawberry, AR School Campus
HILLCREST SCHOOL DISTRICT

OWNER AND PROJECT INFORMATION

Any reference herein these documents to "OWNER", "SCHOOL DISTRICT", or "SCHOOL" is referring to the **HILLCREST SCHOOL DISTRICT**, South Main /Highway 25, PO Box 50 Strawberry, Arkansas 72469, as represented by the Superintendent of Schools, Mr. Greg Crabtree

These bound specifications and drawings refer to the project to construct:

A NEW CAFETERIA AND MULTI-PURPOSE ROOM BUILDING FOR THE STRAWBERRY CAMPUS.

for the HILLCREST School District. To be located on:

the Strawberry AR School Campus, South Main/Highway 25, Strawberry, AR 72469

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SECTION 01000

SPECIAL CONDITIONS

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this Section

All Subcontractors, as well as the General Contractor, shall be governed by all applicable Sections of these Documents with reference to their respective areas of work. It shall be the responsibility of the General Contractor to apprise their Subcontractors and suppliers of these requirements.

RELATIONS WITH ADJOINING PROPERTY OWNERS

To facilitate his work, the Contractor may choose to make necessary arrangements for use and subsequent rehabilitation of the adjoining Owner's property. Such arrangements are solely the Contractor's responsibility.

GENERAL

The Contractor shall provide sufficient and adequate labor, materials and equipment necessary to properly correlate all phases of the work to the end that the approved Progress Schedule can be adhered to and the Contract completion date met.

SUPERINTENDENT

The General Contractor's Superintendent shall be at the job full-time, during normal working days and hours, continuously from the start of the job.The Contractor's Superintendent shall maintain up-to-date records, including as-built Drawings.

PERMITS, FEES, DEPOSITS, AND NOTICES

The General Contractor shall secure and pay for all permits and certificates of inspection incidental to this work required by City, County, State, or any other governing authority having jurisdiction over premises.

The General Contractor shall ensure that all Subcontractors and Sub-subcontractors have obtained all permits, paid all fees, made any required deposits, and posted all notices required by law before any of their work is started.

Should it be required that any permits or notices be posted at the job site, the General Contractor shall make proper provision for such posting with adequate protection for their preservation throughout the course of the work.

Copies of all permits shall be sent to the Owner's representative and the Architect by the General Contractor.

The General Contractor will coordinate all required inspections by governing authorities.

MEETINGS

Before any work is started, responsible representatives for the Contractor, including his designated job superintendent for the project, shall meet at the site with the Owner's representative to review the requirements and conditions under which the project will be performed.

Progress meetings shall be held at the site under the direction of the Owner's representative. The Contractor shall attend or be represented by someone fully empowered to speak for and commit them to any agreement reached.

EXAMINATION OF THE SITE

All Contractors submitting proposals for this work shall first examine the site and all conditions thereon. All proposals shall take into consideration all such conditions as may affect the work under this Contract.

GRADES, LINES, LEVELS, AND SURVEYS

All grades, lines, levels, and bench marks for the building shall be established and maintained by the General Contractor who shall be responsible for same.

Verify all grades, lines, levels, and dimensions as shown on the Drawings, and report any errors or inconsistencies discovered in the above to the Architect before commencing work. Provide and maintain established bench marks in not less than two widely separated places.

FIELD MEASUREMENTS

The General Contractor shall take measurements in the field to verify or supplement dimensions indicated on Drawings and shall be responsible for accurate fit of specified work. Any discrepancy between the Drawings and the actual conditions shall be reported immediately to the Architect.

Tolerances: The General Contractor shall be responsible to maintain dimensions for spaces requiring close tolerances for such items as equipment or fixtures by "grounding" such locations. Uneven surfaces and joints will not be accepted which prevent the installation of units whose dimensions are shown in the documents.

PROTECTION

It shall be the responsibility of each Contractor to see that all personnel comply with Specific Safety Requirements of the agencies of jurisdiction relating to construction and the latest Federal Regulations of the Department of Labor, Bureau of Labor Standards, and the Occupational Safety and Health Act (O.S.H.A.).

Each Contractor shall provide and maintain guard lights for his work at all barricades, railings, obstructions in the streets, roads, or sidewalks, and at all trenches or pits. Remove such work when directed after necessity for same ceases.

Each Contractor will be held responsible for all of his work and materials provided for by the plans and Specifications until the work is completed and accepted.

FIRE PROTECTION

Free access shall be maintained at all times from the street to fire hydrants and to outside connections for standpipes. Fire doors shall be installed and in operation at the earliest possible time.

During the construction period, the General Contractor shall furnish 20 pound ABC all-purpose dry chemical type extinguishers to be located strategically throughout the building. In lieu of the above, the Contractor may substitute 2-1/2 gallon anti-freeze type water extinguishers and 10 pound carbon dioxide extinguishers.

The General Contractor shall appoint one of his personnel who is continually employed on the job site (such as the Superintendent) whose additional duty it will be to act as fire warden for the project. The fire warden shall institute and vigorously enforce a program of fire safety for the project.

The General Contractor shall maintain fire protection equipment, institute fire prevention measures, and direct the prompt removal of all unnecessary combustible material and waste. He shall be responsible for the correct and safe use of soldering coppers, extension lights, flammable liquids, welding and metal cutting apparatus, wax pots, or other open flame tools. This type of work shall be done only when properly supervised and with adequate fire extinguishing equipment available.

Combustible materials shall not be stored in the building.

The use of wood scaffolding shall be kept to a minimum and entirely eliminated when possible, in order to eliminate fire hazards from this source. No part of the building where forms are in place shall be used for the storage of flammable materials of any kind. Temporary structures of combustible material shall be located not less than 30 feet from the building.

No smoking or use of tobacco in any form shall be permitted within the building or on the roof surfaces.

Paints, varnishes, volatile oils, etc., shall be stored in a room having good ventilation and containing no other material, or in metal lockers or metal boxes with self-closing covers. Gasoline and other volatile and flammable liquids shall be stored in metal barrels well away from other structures or other combustible materials.

Special precautions shall be taken to reduce fire hazards where electric or gas welding or cutting work is done and suitable fire extinguishing equipment shall be maintained near such operations.

The General Contractor shall install and maintain portable fire extinguishers in tool houses and other temporary buildings.

USE OF SITE

The General Contractor shall designate areas for location of parking, storage, and construction trailers.

Material Delivery and Storage

It shall be the responsibility of each Contractor to direct all deliveries to the construction site and not the Owner.

Temporary storage facilities shall be provided to protect equipment and/or materials delivered to the job site which may be damaged by exposure to weather. It shall be the General Contractor's responsibility to provide all labor and materials necessary to provide such protection. The Owner shall be consulted as to the "adequacy" of such temporary protection.

All Contractors shall exercise control over all trucks and equipment using public roads and the Owner's property to preclude spillage, tracking of dirt or debris thereon. Should spillage occur, that Contractor is held to promptly clean and remove same.

Mud from the construction site shall be removed from public and the Owner's roads daily. Failure to remove mud promptly could result in roads being cleaned by the Owner at the responsible Contractor's expense.

WEATHER PROTECTION

All Contractors shall at all times provide protection against weather --- rain, wind, storms, frost, or heat --- so as to maintain his work, materials, apparatus, and fixtures free from injury or damage. At the end of the day's work, all work likely to be damaged shall be covered.

During cold weather, the General Contractor shall protect the work from damage. If low temperatures make it impossible to continue operations safely in spite of cold weather precautions, the Contractor shall cease work.

Any work damaged by failure to provide above protection shall be removed and replaced with new work at the Contractor's expense.

RESTORATION

Where existing properties, streets, paving, curbs, etc., are removed or damaged as a result of work operations, the responsible Contractor shall restore the foregoing items to match the original or as required by local authorities.

PROTECTION OF INSTALLED WORK

All Contractors shall:

Provide temporary protection for installed products. Control traffic in immediate area to minimize damage.

Prohibit traffic and storage on waterproofed and roofed surfaces, and on lawn and landscaped areas.

Provide protective coverings at walls, projections, jambs, sills, and soffits or openings. Protect finished floors and stairs from traffic, movement of heavy objects, and storage.

WATER CONTROL

All Contractors shall provide, operate, and maintain pumps or other equipment necessary to drain his work. Keep excavation pits, trenches, and ditches including the entire subgrade free of any water under any circumstances that may arise.

REMOVAL

Remove temporary materials, equipment, services, and construction prior to Substantial Completion inspection.

Clean and repair damage caused by installation or use of temporary facilities.

SURPLUS FINISH MATERIALS

Unless specified otherwise, a minimum of one percent (1%) of all finish materials shall be turned over the the Owner at the completion of the Project for maintenance and repair work, including, but not limited to touch-up paint, etc.

Refer to respective Specification Sections for further requirements.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

SECTION 01010

SUMMARY OF WORK AND HAZARDOUS MATERIALS

PART 1 - GENERAL

REQUIREMENTS INCLUDED

Description of Work

DESCRIPTION OF WORK

Project Description: WORK IS AS SHOWN ON DRAWINGS AS LISTED IN THE INDEX OF DRAWINGS AND AS SPECIFIED HEREIN and associated work.

Extent: Contractor shall furnish all labor, tools, equipment and materials to complete all work under this heading as indicated on the Drawings and described in the Specifications.

Items Included: The work to be performed under this Section shall include, but is not limited to, the following:

Items to be furnished by the Owner and installed by the Contractor (F.B.O. - I.B.C.).

Items to be furnished and installed by the Owner (F.B.O. - I.B.O.).

The Drawings and Specifications are complementary and what is required by any one shall be as binding as if required by all.

Drawings and General Provisions of Contract, including General Conditions, Supplementary Conditions, and Division 1 Specification Sections, apply to work specified in this Section.

QUALITY ASSURANCE

Qualifications of Contractors: In order to assure that Bidders are qualified to perform the work bid upon, the Owner, at his sole discretion, may require bidder to submit a list of three (3) similar projects which have been completed by the Bidder. Such list shall include descriptions of the work performed and a specific person (reference) whom the Owner may contact. If Owner requires such list, submit promptly within five (5) days. Non-compliance may cause rejection of bid. It is the intent of the Owner and the Project Manual to conform with the AMERICANS WITH DISABILITIES ACT OF 1991 and any later revisions or updated requirements .

CONTRACTOR USE OF PREMISES

General: Contractors shall limit their use of the premises to construction activities in areas indicated.

Confine operations to areas within Contract limits indicated. Portions of the site beyond areas in which construction operations are indicated are not to be disturbed.

Keep driveways and entrances serving the premises clear and available to the Owner and the Owner's employees at all times. Do not use these areas for parking or storage of materials. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on site.

Contractor shall assume full responsibility for protection and safe keeping of products under this Specification.

PROGRESS SCHEDULE

A Progress Schedule listing the major items of work and dates of completion shall be submitted in bar-graph form for the Architect's approval no more than 14 days after the date of the Owner's award of Contract. This Schedule shall be updated before every construction meeting.

HAZARDOUS MATERIALS

In the event the Contractor encounters material reasonably believed to contain asbestos or other hazardous materials which have not been identified or rendered harmless, the Contractor shall immediately stop work in the area affected and report the condition to the Owner in writing. The work in the affected area shall be resumed in the absence of asbestos, as verified by the Owner.

To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Engineer, Architect, Engineer's and Architect's consultants and agents and employees of any of them from and against claims, damages, losses, and expenses, including, but not limited to, attorney's fees arising out of or resulting from performance of the work in the affected area if, in fact, the material is asbestos and has not been rendered harmless, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the work itself), including loss of use resulting there from, but only to the extent caused in whole or in part by negligent acts or omissions of the Owner, anyone directly or indirectly employed by the Owner or anyone for whose acts the Owner may be liable, regardless of whether or not such claim, damage, loss, or expense if caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity which would otherwise exist as to a part or person described in this Subparagraph.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

SECTION 01020
ALLOWANCES

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

A. Include the Contract Sum allowances stated in the Contract for Construction.
B. Designate in the construction progress schedule the delivery dates for Products specified under each allowance.

1.02 RELATED REQUIREMENTS

A. Conditions of the Contract.
B. Section 01300 - Submittals.

1.03 ALLOWANCES FOR PRODUCTS

A. The amount of each allowance for services to be provided by the Owner but to be paid for out of the Contract Sum includes:
   1. The cost of service to the Owner.
B. The amount of each allowance includes:
   1. The cost of the Product to the Contractor, or Sub-Contractor, less any applicable trade discounts.
   2. Delivery to the site or F.O.B. plant, as applicable.
   3. Applicable taxes.
   4. Labor required under the allowance, only when labor is specified to be included in the allowance.
C. In addition to the amount of each allowance, include in the Contract Sum the Contractor's or Sub-Contractor's costs for:
   1. Handling of the site, including unloading, uncrating and storage.
   2. Hauling from the plant to the site, if applicable.
   3. Protection from the elements and from damage.
   4. Labor for installation and finishing, except where labor is specified to be a part of the allowance.
   5. Other expenses required to complete the installation.
   6. Contractor's and Sub-Contractor's overhead and profit.

1.04 SELECTION OF PRODUCTS AND SUB-CONTRACTOR UNDER ALLOWANCES

A. Architect/Engineer's duties
   1. Consult with the Contractor in consideration of Products, Suppliers and Sub-Contractors.
   2. Make product selection in consultation with the Owner. Obtain Owner's written decision, designating:
      a. Product, type or model, color and finish.
      b. Supplier.
      c. Cost to Contractor, delivered to job site.
   3. Prepare Change Orders.
B. Contractor's Duties

1. Assist Architect/Engineer and Owner in determining qualified Suppliers.
2. Obtain proposals from Suppliers when requested by Architect/Engineer and the Owner.
3. Make appropriate recommendations for consideration of the Architect/Engineer and the Owner.
4. Notify Architect/Engineer promptly of:
    a. Any reasonable objections Contractor may have against any Supplier.
    b. Any effect on the construction Schedule anticipated by selections under consideration.

1.05 CONTRACTOR RESPONSIBILITY FOR PURCHASE, DELIVERY AND INSTALLATION

A. On notification of selection, execute purchase agreement with designated Supplier, or contract with Sub-Contractor
B. Arrange for and process Shop Drawings, Product Data and Samples, as required.
C. Make all arrangements for delivery.
D. Upon delivery, promptly inspect products for damage or defects.
E. Submit claims for transportation damage.
F. Install and finish products in compliance with requirements of referenced Specification sections.

1.06 ADJUSTMENT OF COSTS

A. Should the net cost be more or less than the specified amount of the allowance, the Contract Sum will be adjusted accordingly by Change Order.
    1. For products specified under a unit cost allowance, the unit cost shall apply to the quantity listed in the Schedule of Values.

PART 2 - PRODUCTS

See Bid Form.

PART 3 - EXECUTION

(NOT USED)

END OF SECTION

SECTION 01040

PROJECT COORDINATION

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and General Provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

This Section specifies requirements for project coordination including, but not necessarily limited to:

Coordination

Administrative and Supervisory Personnel

General Installation Provisions

Cleaning and Protection

Coordination: Coordinate activities included in various Sections to assure efficient and orderly installation of each component. Coordinate operations included under different Sections that are dependent on each other for proper installation and operation.

Where installation of one component depends on installation of other components before or after its own installation, schedule activities in the sequence required to obtain the best results.

Coordinate installation of different components to assure maximum accessibility for maintenance, service and repair.

Make provisions to accommodate items scheduled for later installation installation.

Prepare memoranda for distribution to each party involved outlining required coordination procedures. Include required notices, reports, and attendance at meetings.

Prepare similar memoranda for the Owner and separate Contractors where coordination of their Work is required.

Administrative Procedures: Coordinate scheduling and timing of administrative procedures with other activities to avoid conflicts and ensure orderly progress. Such activities include:

Preparation of Schedules

Installation and Removal of Temporary Facilities

Delivery and Processing of Submittals

Progress Meetings

Project Closeout Activities

Coordination Drawings: Prepare Coordination Drawings where close coordination is required for installation of products and materials fabricated off-site by separate entities, and where limited space necessitates maximum utilization of space for efficient installation of different components.

Show relationship of components shown on separate Shop Drawings.

Indicate required installation sequences.

Refer to Division 15 Section "Basic Mechanical Requirements", and Division 16 Section "Basic Electrical Requirements", for requirements for mechanical and electrical installations.

Staff Names: Within 15 days of Notice to Proceed, submit a list of Contractor's staff assignments, including Superintendent and personnel at the site; identify individuals, their duties and responsibilities, addresses and telephone numbers.

Post copies in the Project meeting room, the field office, and at each temporary telephone.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

INSPECTION OF CONDITIONS: The installer of each component shall inspect the substrate and conditions under which work is performed. Do not proceed until unsatisfactory conditions have been corrected.

MANUFACTURER'S INSTRUCTIONS: Comply with the manufacturer's installation instructions and recommendations, to the extent that those instructions and recommendations are more explicit or stringent than requirements contained in Contract Documents.

Inspect materials or equipment immediately upon delivery and again prior to installation. Reject damaged and defective items.

Provide attachment and connection devices and methods necessary for securing work. Secure work true to line and level. Allow for expansion and building movement.

VISUAL EFFECTS: Provide uniform joint widths in exposed work. Arrange joints in exposed work to obtain the best visual effect. Refer questionable choices to the Architect for final decision.

Recheck measurements and dimensions before starting each installation.

Install each component during weather conditions and project status that will ensure the best possible results. Isolate each part of the completed construction from incompatible material as necessary to prevent deterioration.

ENCLOSURE OF THE WORK: Coordinate temporary enclosures with required inspections and tests, to minimize the necessity of uncovering completed construction for that purpose.

MOUNTING HEIGHTS: Where mounting heights are not indicated, install individual components at standard mounting heights recognized within the industry for the particular application indicated. Refer questionable mounting height decisions to the Architect for final decision.

CLEANING AND PROTECTION: During handling and installation, clean and protect construction in progress and adjoining materials in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

Clean and maintain completed construction as often as necessary through the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

Limiting Exposures: Supervise operations to ensure that no part of construction, completed or in progress, is subject to harmful or deleterious exposure. Such exposures include, but are not necessarily limited to, the following:

Excessive Weathering

Excessively High or Low Temperatures or Humidity

Water or Ice

Chemicals or Solvents

Heavy Traffic, Soiling, Staining and Corrosion

Contact Between Incompatible Materials

Theft or Vandalism

Excessive Static or Dynamic Loading

Thermal Shock

Combustion

END OF SECTION

SECTION 01045

CUTTING AND PATCHING

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and General Provisions of Contract, including General and Supplementary Condition and other Division 1 Specification Sections, apply to this Section.

Refer to other Sections of these Specifications, including Divisions 15 and 16, for specific requirements and limitations applicable to cutting and patching individual parts of the work.

CUTTING AND PATCHING PROPOSAL: Where approval of procedures is required before proceeding, submit a proposal describing procedures in advance of the time cutting and patching will be performed. Include the following information, as applicable:

Describe the extent of cutting and patching required and how it is to be performed. Indicate why it cannot be avoided.

Describe anticipated results, include changes to structural elements and operating components and changes in the building's appearance and other visual elements.

List products to be used and entities that will perform work.

Indicate dates when cutting and patching is to be performed.

List utilities that will be disturbed, including those that will be relocated and those that will be temporarily out-of service. Indicate how long service will be disrupted.

Approval by the Architect and Owner's Representative to proceed does not waive the Architect's right to later require complete removal and replacement of work found to be unsatisfactory.

STRUCTURAL WORK: Do not cut and patch structural elements in a manner that would reduce the load-carrying capacity or load deflection ratio. Obtain approval of the cutting and patching proposal before cutting and patching structural elements.

OPERATIONAL AND SAFETY LIMITATIONS: Do not cut and patch operating elements or safety components in a manner that would reduce their capacity to perform as intended, or would increase maintenance, or decrease operational life or safety. Obtain approval of the cutting and patching proposal before cutting and patching operating elements or safety related systems.

VISUAL REQUIREMENTS: Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would reduce the building's aesthetic qualities or result in visual evidence of cutting and patching. Remove and replace Work cut and patched in a visually unsatisfactory manner.

PART 2 - PRODUCTS

MATERIALS: Use materials identical to existing materials. If identical materials are not available or cannot be used where exposed surfaces are involved, use materials that match existing adjacent surfaces to the fullest extent possible. Use materials whose performance will equal or surpass that of existing materials.

PART 3 - EXECUTION

INSPECTION: Before cutting, examine surfaces to be cut and patched and conditions under which cutting and patching is to be performed. Take corrective action before proceeding if unsafe or unsatisfactory conditions are encountered.

TEMPORARY SUPPORT: Provide temporary support of work to be cut.

PROTECTION: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions that might be exposed during cutting and patching operations.

Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

Take all precautions to avoid cutting existing pipe, conduit, or ductwork serving the building, but scheduled to be removed, or relocated until provisions have been made to bypass them.

PERFORMANCE: Employ skilled workmen to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time and complete without delay.

Cut existing construction to provide for the installation of other components or the performance of other construction activities and the subsequent fitting and patching required to restore surfaces to their original condition.

CUTTING: Cut existing construction using methods least likely to damage elements to be retained or adjoining construction. Where possible, review procedures with the original installer. Comply with the original installer's recommendations.

All cutting of areas shall be by Contractor requiring cutting, except where noted otherwise in the Specifications and/or Drawings.

Where cutting is required, use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut holes and slots to size required with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.

Cut through concrete and masonry using a cutting machine such as a carborundum saw or diamond core drill. Overcuts are **NOT** allowed

Comply with requirements of applicable sections of Division 2 where cutting and patching requires excavating and backfilling.

PATCHING: Patch with durable seams that are as invisible as possible. Comply with specified tolerances.

All patching shall be by Contractor doing cutting work and shall be performed by trade who would customarily be performing that type of work.

Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.

Where patching occurs in a smooth painted surface, extend final paint coat over entire unbroken surface containing the patch, after the patched area has received primer and second coat.

CLEANING: Thoroughly clean areas and spaces where cutting and patching is performed or used as access. Remove paint, mortar, oils, putty and similar items. Thoroughly clean piping, conduit, and similar features before painting or finishing is applied. Restore damaged pipe covering to its original condition.

END OF SECTION

SECTION 01300

SUBMITTALS AND SUBSTITUTIONS

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and General Provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

DESCRIPTION OF WORK

Wherever possible throughout the Contract Documents, the minimum acceptable quality of workmanship and materials has been defined either by manufacturer's name and catalog number or reference to recognized industry standards.

To ensure that the specified products are furnished and installed in accordance with the design intent, procedures have been established for advance submittal of design data for its review and approval or rejection by the Architect.

This Section specifies administrative and procedural requirements for submittals required for performance of the work, including:

Contractor's Construction Schedule

Shop Drawings

Product Data

Samples

RELATED WORK

Contractual Requirements for Submittals: General Conditions

Five (5) copies of all Submittals by Contractors of Documents, plus number of copies to be returned to Contractor, shall be submitted unless otherwise specified.

Individual Submittals Required: Pertinent Sections of these Specifications.

PRODUCT HANDLING: Make all submittals of Shop Drawings, samples, requests for substitutions, and other similar items, in strict accordance with the provisions of this Section of these Specifications.

SUBMITTAL PROCEDURES

Coordination: Coordinate preparation and processing of Submittals with performance of construction activities. Transmit each Submittal sufficiently in advance of performance of related construction activities to avoid delay.

Coordinate each Submittal with fabrication, purchasing, testing, delivery, other Submittals and related activities that require sequential activity.

Coordinate transmittal of different types of Submittals for related elements of the work so processing will not be delayed by the need to review Submittals concurrently for coordination.

The Architect reserves the right to withhold action on a Submittal requiring coordination with other Submittals until related Submittals are received.

No extension of Contract Time will be authorized because of failure to transmit Submittals to the Architect sufficiently in advance of the work to permit processing.

Deliver Submittals to the Architect.

Submittal Preparation: Place a permanent label or title block on each Submittal for identification. Indicate the name of the entity that prepared each Submittal on the label or title block.

Provide a space approximately 10" x 10" on the label or beside the title block on Shop Drawings to record the Contractor's review and approval markings and the action taken.

Include the following information on the label for processing and recording action taken:

Project Name

Name of the Owner

Date

Name and Address of Architect

Name and Address of Contractor

Name and Address of Subcontractor or Vendor

Location Where Item is to be Used

Name of Manufacturer

Drawing Number and Detail References, as Appropriate

Certification by the Contractor

Submittal Transmittal: Package each Submittal appropriately for transmittal and handling. Transmit each Submittal from Contractor to Architect using a transmittal form. Submittals received from sources other than the Contractor will be returned without action.

On the transmittal, record relevant information and requests for data. On the form, or separate sheet, record deviations from Contract Document requirements, including minor variations and limitations. Include Contractor's certification that information complies with Contract Document requirements.

When Resubmittal is required for any reason, transmit under new letter of transmittal, indicating by reference to a previous Submittal that this is a Resubmittal.

After Architect's review of Submittal, revise and resubmit as required, identifying changes made since previous Submittal.

Distribute copies of reviewed Submittals to concerned persons. Instruct recipients to promptly report any inability to comply with provisions.

All Submittals shall bear the stamp of approval of the General Contractor submitting same as evidence that they have been checked by him, or they will be rejected.

SHOP DRAWINGS

Submit newly prepared information drawn to accurate scale. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not considered Shop Drawings.

Shop Drawings shall be drawn at a scale to clearly indicate all of the above conditions and allow for corrections or modifications which the Architect may wish to make. The Architect shall be the sole judge as to the acceptability of manufacturer's literature and catalog sheets as Shop Drawings.

Shop Drawings shall clearly indicate all dimensional data for all parts of the item; types and materials for all connections; finishes; the exact relation of the item to adjacent materials and equipment in the completed structure including clearance, any necessary isolation, and fastening methods and devices; and mechanical and electrical connections.

Shop Drawings include fabrication and installation Drawings, setting diagrams, schedules, patterns, templates, and similar Drawings. Include the following information:

Dimensions

Identification of Products and Materials Included

Compliance With Specified Standards

Notation of Coordination Requirements

Notation of Dimensions Established by Field Measurement

Sheet Size: Except for templates, patterns, and similar full-size Drawings, submit Shop Drawings on sheets at least 8-1/2" x 11", but no larger than 36" x 48".

Submit in the form of one reproducible transparency and one opaque reproduction, or three opaque reproductions plus required amount to be returned to Contractor. After review, reproduce and distribute in accordance with requirements in Article on Procedures, above.

Do not permit Shop Drawing copies, without an appropriate final "Action" marking by the Architect, to be used in connection with the work.

The Contractors shall be responsible for distribution of additional prints to vendors, etc.

Refer to General Conditions for additional requirements.

PRODUCT DATA

Collect Product Data into a single submittal for each element of construction or system. Product Data includes printed information such as manufacturer's installation instructions, catalog cuts, standard color charts, roughing-in diagrams and templates, standard wiring diagrams and performance curves. Where Product Data must be specially prepared because standard printed data is not suitable for use, submit as "Shop Drawings."

Mark each copy to show applicable choices and options. Where printed Product Data includes information on several products, some of which are not required, mark copies to indicate the applicable information. Include the following information:

Manufacturer's Printed Recommendations

Compliance with Recognized Trade Association Standards

Compliance with Recognized Testing Agency Standards

Application of Testing Agency Labels and Seals

Notation of Dimensions Verified by Field Measurement

Notation of Coordination Requirements

Type and Model Numbers

Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed.

Submittals: Submit six (6) copies of each required Submittal. Submit nine (9) copies where required for maintenance manuals. The Architect will retain three (3) and will return the others marked with action taken and corrections or modifications required.

Distribution: Furnish copies of final Submittal to installers, subcontractors, suppliers, manufacturers, fabricators, and others required for performance of construction activities. Show distribution on transmittal forms.

Do not proceed with installation until a copy of Product Data applicable is in the installer's possession.

Do not permit use of unmarked copies of Product Data in connection with construction.

SAMPLES

Submit full-size, fully fabricated Samples cured and finished as specified and physically identical with the material or product proposed. Samples include partial sections of manufactured or fabricated components, cuts or containers of materials, full color-range sets, and swatches showing color, texture, and pattern.

Mount, display, or package Samples in the manner specified to facilitate review of qualities indicated. Include the following:

Generic Description of the Sample

Sample Source

Product Name or Name of Manufacturer

Compliance with Recognized Standards

Availability and Delivery Time

Colors

General: Unless the precise color and pattern is specifically described in the Contract Documents, whenever a choice of color or pattern is available in a specified product, submit accurate color charts and pattern charts to the Architect for his review . Owner will make final selection of color.

Submit Samples for review of kind, color, pattern, and texture for a final check of these characteristics with other elements and for a comparison of these characteristics between the final Submittal and the actual component as delivered and installed.

Where variation in color, pattern, texture, or other characteristics are inherent in the material or product represented, submit multiple units (not less than 3) that show approximate limits of the variations.

Refer to other Specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation, and similar construction characteristics.

Refer to other Sections for Samples to be returned to the Contractor for incorporation in the work. Such Samples must be undamaged at time of use. On the transmittal, indicate special requests regarding disposition of Sample Submittals.

Preliminary Submittals: Where Samples are for selection of color, pattern, texture, or similar characteristics from a range of standard choices, submit a full set of choices for the material or product.

Preliminary Submittals will be reviewed and returned with the Architect's mark indicating selection and other action.

Maintain sets of Samples, as returned, at the Project site for quality comparisons throughout the course of construction.

Unless noncompliance with Contract Document provisions is observed, the Submittal may serve as the final Submittal.

Sample sets may be used to obtain final acceptance of the construction associated with each set.

Distribution of Samples: Prepare and distribute additional sets to Subcontractors, manufacturers, fabricators, suppliers, installers, and others as required for performance of the work.

Field Samples specified in individual Sections are special types of Samples. Field Samples are full-size examples erected on site to illustrate finishes, coatings, or finish materials and to establish the standard by which the work will be judged.

Comply with submittal requirements to the fullest extent possible. Process transmittal forms to provide a record of activity

ARCHITECT'S ACTION

Except for Submittals for record, information or similar purposes, where action and return is required or requested, the Architect will review each Submittal, mark to indicate action taken, and return within a reasonable time.

Compliance with specified characteristics is the Contractor's responsibility.

Action Stamp: The Architect will stamp each Submittal with a uniform, self-explanatory action stamp. The stamp will be appropriately marked, as follows, to indicate the action taken:

Final Unrestricted Release:

Where Submittals are marked "APPROVED" OR "APPROVED AS SUBMITTED", that part of the work covered by the Submittal may proceed, provided it complies with requirements of the Contract Documents. Final payment will depend upon that compliance.

Final-But-Restricted Release:

When Submittals are marked "APPROVED AS NOTED", that part of the work covered by the Submittal may proceed, provided it complies with notations or corrections on the Submittal and requirements of the Contract Documents. Final payment will depend on that compliance.

Returned for Re-submittal:

When Submittal is marked "REVISE AND RESUBMIT", do not proceed with that part of the work covered by the Submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new Submittal in accordance with the notations. Resubmit without delay. Repeat, if necessary, to obtain a different action mark.

Do not permit submittals marked "REVISE AND RESUBMIT" to be used at the Project site or elsewhere where work is in progress.

Other Action: Where a Submittal is primarily for information or record purposes, special processing or other activity, the Submittal will be returned marked "ACTION NOT REQUIRED".

PART 2 - PRODUCTS

SUBSTITUTIONS

Source Limitations: To the greatest extent possible for each unit of work, provide products, materials, or equipment of a singular generic kind from a single source.

Compatibility of Options: Where more than one choice is available as options for Contractor's selection of a product or materials, select an option which is compatible with other products and materials already selected (which may have been from among options for those other products and materials). Total compatibility among options, if not assured by limitations within contract documents, must be provided by Contractor. Compatibility is a basic general requirement of product/material selections.

Architect's Approval Required

The Contract is based on the materials, equipment, and methods described in the Contract Documents.

The Contract Drawings and Specifications establish the "minimum standard of quality" each product and/or system must meet to be considered acceptable. Products of other manufacturers will be considered if the product and/or system meets or exceeds the "minimum standard of quality" established by the Contract Documents.

The Architect will consider proposals for substitutions under the "or approved equal" provision of materials, equipment, and methods by Addendum, prior to Bid due date, only when such proposals are accompanied by full and complete technical data and all other information required by the Architect to evaluate the proposed substitutions.

It will be the responsibility of the submitting Contractor to prove equality.

The Submittal shall include a line-by-line, item-by-item description of the specified and proposed product.

Requests for substitutions must be submitted to the Architect NO later than ten (10) days prior to Bid due date.

If the proposed product and/or system is acceptable as an equal, as herein described, an Addendum will be issued noting the specific items accepted.

DO NOT SUBSTITUTE MATERIALS, EQUIPMENT, OR METHODS UNLESS SUCH SUBSTITUTIONS HAVE BEEN SPECIFICALLY APPROVED FOR THIS WORK BY THE ARCHITECT, BY ADDENDUM.

"Or Approved Equal"

Where the phrase "or approved equal" occurs in the Contract Documents, do not assume that material, equipment, or methods will be approved as equal by the Architect unless the item has been specifically approved for this work by the Architect.

Color choices will be one of the determining factors for approval.

The decision of the Architect will be final.

Availability of Specified Items

Verify prior to bidding that all specified items will be available in time for installation during orderly and timely progress of the work.

In the event specified item or items will not be so available, so notify the Architect prior to the receipt of Bids.

Costs of delay caused on non-availability of specified items, when such delays could have been avoided by the Contractor, will be back-charged as necessary and shall not be borne by the Owner.

Whenever the Contractor secures approval for changing any items and such change involves a corresponding change or adjustment in any adjacent or related item, the responsibility for making the required change, or seeing that it is made, rests with the Contractor. The cost of these changes and/or adjustments shall be paid for by the Contractor unless it is otherwise agreed, in writing, at the time the change is approved. The acceptance of any change will not, in any way, relieve the Prime Contractor from full compliance with the Contract Documents.

MANUALS

General: Where Manuals are required to be submitted covering items included in this work, prepare all such Manuals in durable plastic binders approximately 8-1/2 x 11 inches in size with at least the following:

Identification on or readable through the front cover stating the general nature of the Manual.

Neatly typewritten index near the front of the Manual furnishing immediate information as to location of all emergency data regarding the installation.

Complete instructions regarding operating and maintenance of all equipment involved.

Complete nomenclature of all replaceable parts, their part numbers, current cost, and name and address of nearest vendor of parts.

Copy of all guarantees and warranties issued.

Copy of approved Shop Drawing(s) with all data concerning all changes made during construction

MISCELLANEOUS SUBMITTALS

Inspection and Test Reports Not Performed by Owner: Classify each inspection and test report as being either "Shop Drawings" or "product data" depending on whether the report is specially prepared for the project or a standard publication of workmanship control testing at the point of production. Process inspection and test reports accordingly.

Warranties (Guarantees)

Categories of Specific Warranties: Warranties on the work are in several categories, including those of General Conditions, and including (but not necessarily limited to) the following specific categories related to individual units of work specified in sections of Divisions 2 through 16 of these Specifications.

Special Project Warranty (Guarantee): A warranty specifically written and signed by Contractor for a defined portion of the work and, where required, countersigned by Subcontractor, installer, manufacturer, or other entity engaged by Contractor.

Specified Product Warranty: A warranty which is required by Contract Documents, to be provided for a manufactured product incorporated into the work, regardless of whether manufacturer has published a similar warranty without regard for specific

incorporation of product into the work, or has written and executed a special project warranty as a direct result of Contract Documents requirements.

Coincidental Product Warranty: A warranty which is not specifically required by Contract Documents (other than as specified in this Section), but which is available on a product incorporated into the work by virtue of the fact that manufacturer of product has published warranty in connection with purchases and uses of product without regard for specific applications, except as otherwise limited by terms of warranty.

Refer to individual Sections of Divisions 2 through 16 for the determination of units of work which are required to be specifically or individually warranted, and for the specific requirements and terms of those warranties (or guarantees).

Specific Warranty Forms: Where a special project warranty (guarantee) or specified product warranty is required, prepare a written document to contain terms and appropriate identification, ready for execution by required parties. Submit draft to the Owner (through Architect) for approval prior to final execution.

PART 3 - EXECUTION

COORDINATION OF SUBMITTALS

General: Prior to submittal for Architect's review, use all means necessary to fully coordinate all material, including the following:

Determine and verify all field dimensions and conditions, catalog numbers, and similar data.

Coordinate, as required, with all trades and public agencies involved.

Secure all necessary approvals from public agencies and others. Signify by stamp or other means that all required approvals have been obtained.

Clearly indicate all deviations from the Contract Documents.

The General Contractor shall submit a prioritized tabulation by date of Submittals required during the first 90 days of construction. List those Submittals required to maintain orderly progress of the work, and those required early because of long lead time for manufacture or fabrication.

These dates may be shown on construction schedule at Contractor's option.

TIMING OF SUBMITTALS

General

Make all Submittals enough in advance of scheduled dates for installation to provide all required time for reviews for securing necessary approvals, for possible revision and Resubmittals, and for placing orders and securing delivery.

In scheduling, allow a minimum of fourteen (14) full working days for the Architect's initial review following receipt of the Submittals. Allow additional time if the Architect requires coordination with subsequent Submittals.

The Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until all related Submittals are received.

If an Intermediate Submittal is necessary, process the same as the initial Submittal. Allow fourteen (14) working days for reprocessing each Submittal .

No extension of Contract time will be authorized because of failure to transmit Submittals to the Architect sufficiently in advance of the work to permit processing.

END OF SECTION

SECTION 01500

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and General Provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

SUMMARY: This Section specifies temporary services and facilities, including utilities, construction and support facilities, security and protection. Provide facilities ready for use. Maintain, expand and modify as needed. Remove when no longer needed, or replaced by permanent facilities.

DESCRIPTION OF WORK: Work of this Section shall include, but not necessarily be limited to, the following:

Electricity, Lighting

Heat, Ventilation

Telephone Service

Water

Storm and Sanitary Sewer

Sanitary Facilities

Barriers, Barricades, Warning Signs, and Lights

Enclosures

Hoisting

Water Control

Field Office and Storage Sheds

Dust Control

Snow Removal

Environmental Protection

RELATED SECTIONS

General Conditions

Refer to General Conditions for additional requirements.

Section 01000 - Special Conditions

Section 01010 - Summary of Work

Section 01710 - Cleaning

QUALITY ASSURANCE

Regulations: Each Contractor shall comply with industry standards and with applicable laws and regulations of authorities having jurisdiction, including but not limited to:

Owner's Requirements

Building Code Requirements

Health and Safety Regulations

Utility Company Regulations

Police, Fire Department, and Rescue Squad Rules

Environmental Protection Regulations

Standards: Comply with NFPA Code 241, "Standard for Safeguarding Construction, Alterations and Demolition Operations", ANSI-A10 Series standards for "Safety Requirements

for Construction and Demolition", and NECA Electrical Design Library "Temporary Electrical Facilities."

Refer to "Guidelines for Bid Conditions for Temporary Job Utilities and Services", prepared jointly by AGC and ASC for industry recommendations.

Trade Jurisdictions: Assigned responsibilities for installation and operation of temporary utilities are not intended to interfere with the normal application of trade regulations and union jurisdictions.

Electrical Service: Comply with NEMA, NECA, and UL standards and regulations for temporary electric service. Install service in compliance with National Electric Code (NFPA 70).

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

PROJECT CONDITIONS

Temporary Utilities: Prepare a schedule indicating dates of the implementation and termination of each temporary utility. At the earliest feasible time, when acceptable to the Owner, change over from use of the temporary service to use of the permanent service.

Temporary Use of Permanent Facilities: The installer of each permanent service or facility shall assume responsibility for its operation, maintenance and protection during its use as a construction service or facility prior to the Owner's acceptance, regardless of previously assigned responsibilities.

Conditions of Use: Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. take necessary fire prevention measures. Do not overload facilities, or permit them to interfere with progress. Do not allow hazardous, dangerous, or unsanitary conditions, or public nuisances to develop or persist on the site.

GENERAL

Any Contractor requiring one of the temporary services before it can be provided as specified, or whose requirements with respect to a particular service differ from the service specified, shall provide such service as suits his needs, at his own expense, and in a manner satisfactory to the Architect and Owner.

USE CHARGES

General: Cost or use charges for temporary facilities are not chargeable to the Owner or the Architect. Contractor's cost or use charges for temporary services or facilities will not be accepted as a basis of claim for an adjustment in the Contract Sum or Contract Time.

Utility Company Charges: Power, sewer and water easements, permanent property assessments, charges required for construction, connection charges, tap fees and the like will be paid for by the Owner.

Water Service: Water is to be extended from the nearest water distribution system to a location to be determined by the General Contractor. The Plumbing Contractor shall provide a water meter to be used during construction and it shall be removed at the completion of the project.

The General Contractor will pay for all metered water used by all Contractors during the entire construction period, in accordance with meter readings.

Sewer Service Use Charges: The General Contractor will shall pay sewer service use charges, if required, for sewer usage by all parties engaged in construction at the project site.

Electric Power Service: The General Contractor will pay electric power use charges, whether metered or otherwise, for electricity used by all entities engaged in construction activities at the project site.

Heating Fuel Charges:

Prior to building enclosure: each Contractor shall provide any necessary temporary heating and associated fuel charges.

After building enclosure: HVAC Contractor shall pay for all fuel required for temporary heating and ventilation, other than electric power use.

The term "Enclosure" shall mean when all permanent walls and roofs are in place, insulated and weather tight, windows are covered and all entrances are permanently in place or are provided with suitable temporary enclosure.

Meters required for metering use charges will be furnished and installed by the Contractor responsible for installing distribution equipment.

Other entities using temporary services and facilities include, but are not limited to:

Other Non-prime Contractors

The Owner's Work Forces

Occupants of the Project

The Architect

Testing Agencies

Personnel of Government Agencies.

PART 2 - PRODUCTS

MATERIALS

General: Provide new materials; if acceptable to the Architect, undamaged previously used materials in serviceable condition may be used. Provide materials suitable for the use intended.

Lumber and Plywood: Comply with requirements in Section 06100 -Rough Carpentry.

Tarpaulins: Provide waterproof, fire-resistant, UL labeled tarpaulins with flame-spread rating of 15 or less. For temporary enclosures, provide translucent nylon reinforced laminated polyethylene or polyvinyl chloride fire-retardant tarpaulins.

Water: Provide potable water approved by local health authorities.

EQUIPMENT

Water Hoses: provide 3/4" heavy-duty, abrasion-resistant, flexible rubber hoses 100 ft. long, with pressure rating greater than the maximum pressure of the water distribution system; provide adjustable shut-off nozzles at hose discharge.

Electrical Outlets: Provide properly configured NEMA polarized outlets to prevent insertion of 110-120 volt plugs into higher voltage outlets. provide receptacle outlets equipped with ground-fault circuit interrupters, reset button and pilot light, for connection of power tools and equipment.

Electrical Power Cords: Provide maximum 100 foot long grounded extension cords; use "hard-service" cords where exposed to abrasion and traffic. Provide waterproof connectors to connect separate lengths of electric cords, if single lengths will not reach areas where construction activities are in progress.

Lamps and Light Fixtures: Provide general service incandescent lamps of wattage required for adequate illumination. Provide guard cages or tempered glass enclosures, where exposed to breakage. Provide exterior fixtures where exposed to moisture.

Heating Units: Provide temporary heating units that have been tested and labeled by UL, FM, or another recognized trade association related to the type of fuel being consumed.

Sanitary Facilities: Toilet rooms within the new building shall not be used by construction personnel. Provide sanitary facilities that include temporary toilets, wash facilities and drinking water fixtures. Comply with OSHA and other regulations and health codes for the type, number, location, operation, and maintenance of fixtures. Install where facilities will best serve the Project. Provide toilet tissue, paper towels, paper cups, and similar disposable materials for each facility. Provide covered waste containers for used materials.

Toilets: The General Contractor shall install self-contained single-occupant toilet units of the chemical, aerated recirculation, or combustion type, properly vented and fully enclosed with a glass fiber reinforced polyester shell or similar nonabsorbent material. Use of pit-type privies will not be permitted.

Wash Facilities: The Plumbing Contractor shall install wash facilities supplied with potable water at convenient locations for personnel involved in handling materials that require wash-up. Dispose of drainage properly. Supply cleaning compounds.

Drinking Water Facilities: Each Contractor shall provide containerized tap-dispenser bottled-water type drinking water units for their employees and subcontractors.

First Aid Supplies: Comply with governing regulations.

Fire Extinguishers: Provide hand-carried, portable UL-rated, class `A' fire extinguishers for temporary offices and similar spaces. In other locations, provide hand-carried, portable, UL-rated, class `ABC' dry chemical extinguishers, or a combination of extinguishers of NFPA recommended classes for the exposures.

Comply with NFPA 10 and 241 for classification, extinguishing agent, and size required by location and class of fire exposure.

TEMPORARY FIELD OFFICE

The General Contractor shall provide and maintain clean, temporary weather-tight offices at the site, in location as approved by the Owner, for the use of the General Contractor, his Subcontractors' agents, Owner's Representative, and the Architect, and at which location he or his authorized agent shall be present, or to which either may be readily called at all times. While the work is in progress, copies of permits, approved Shop Drawings, and a complete set of Contract Drawings and Specifications marked up to date with any revisions, shall be kept at said office ready for use at all times.

All expenses in connection with the field office, including the installation cost, and use of heat, light, water, and janitor service shall be borne by the General Contractor.

Field office shall be maintained until final acceptance and then be removed by the respective using contractors, no later than 15 days after acceptance of building unless the Architect orders earlier removal by them.

Other Contractors shall provide, maintain, and remove upon completion any necessary temporary field office, shanties, and sheds required to coordinate and control his field operations. Location and construction shall be approved by the General Contractor. If necessary, this location may be off-site. All costs of maintaining, including heat, power, water, telephone/fax, fire protection and clean-up, is the General Contractor's responsibility.

If the job conditions require relocation of any temporary office, shanty or shed, the Contractor shall relocate as directed by the General Contractor or Architect, at no increase in the Contract Amount.

HOISTING

Each Contractor is responsible for hoisting his materials, tools, equipment, etc.

Any temporary openings required by any Contractor for access of material and equipment must be coordinated with the General Contractor. Any costs involved are the Contractor's responsibility.

PART 3 - EXECUTION

INSTALLATION

Use qualified personnel for installation of temporary facilities. Locate facilities where they serve the project adequately and result in minimum interference with performance of the work. Relocate and modify facilities as required.

Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are not longer needed, or are replaced by authorized use of completed permanent facilities.

TEMPORARY UTILITY INSTALLATION

Each Contractor shall provide all temporary and/or permanent requirements necessary to maintain utilities and services for existing facilities and new facilities made necessary by this Construction

Temporary long-term shutdowns required to complete the work require the Contractor to provide temporary requirements necessary to maintain services for new facilities, at no increase in the Contract Amount.

General: Engage the appropriate local utility company to install temporary service or connect to existing service. Where the company provides only part of the service, provide the remainder with matching, compatible materials and equipment; comply with the company's recommendations.

Arrange with the company and existing users for a time when service can be interrupted, where necessary, to make connections for temporary services.

Provide adequate capacity at each stage of construction. Prior to temporary utility availability, provide trucked-in services.

Obtain easements to bring temporary utilities to the site, where the Owner's easements cannot be used for that purpose.

Water Service: Install water service connected to nearest system, and distribution piping of sizes and pressures adequate for construction until permanent water service is in use.

Sterilization: Sterilize temporary water piping prior to use.

The Plumbing Contractor shall furnish and install the temporary water service for construction work and be responsible for protecting temporary water lines from freezing and shall remove same upon completion of the project.

The Plumbing Contractor shall remove temporary water service at the completion of the Project.

Temporary Electric Power Service: The Electrical Contractor shall provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics during construction period. Include meters, transformers, overload protected disconnects, automatic ground-fault interrupters and main distribution switch gear.

Any Contractor requiring more than included herein above shall provide same including energy consumption cost at no increase in the Contract Amount.

Power Distribution System: Install wiring, overhead, and rise vertically where least exposed to damage. Where permitted, wiring circuits not exceeding 125 volts, AC 20 ampere rating, and lighting circuits may be nonmetallic sheathed cable where overhead and exposed for surveillance.

Temporary wiring is to be laid out, balanced, and sized so as to produce a voltage drop of no more than five percent at the extreme end of the line when operating at full load.

Temporary work shall be installed in such a manner as not to interfere with the permanent construction. If such interference does occur, it shall be the responsibility of the Contractor to make such changes as may be required to overcome the interference. The cost of these changes will be included as part of the contract price.

The electrical work for construction purposes shall conform to all Federal, State (Ohio Safety Code IC-3) Specific Safety Requirements as well as the requirements of the National Electric Code and National Electrical Safety Code. The Electrical Contractor shall obtain and pay for required applications, permits, and inspection pertaining to this work. This cost shall also be included in the Contractor's price.

All temporary facilities are to be maintained and kept in good operating condition. Maintenance personnel necessary to perform this work shall be provided in accordance with the requirements. Maintenance time will include normal working hours for all trades and start up and shut down overtime as required.

Protect installation against weather damage, the normal operations of other trades, Owner's personnel, and visitors to the site.

The Electrical Contractor shall remove temporary power equipment at the completion of the project.

Temporary Lighting: Whenever overhead floor or roof deck has been installed, the Electrical Contractor shall provide temporary lighting including lamps, with local switching.

Install and operate temporary lighting that will fulfill security and protection requirements, without operating the entire system, and will provide adequate illumination for construction operations and traffic conditions all as necessary and as required by state and federal safety codes and ordinances.

The Electrical Contractor shall remove temporary lighting equipment at the completion of the Project.

Temporary Telephones: Provide temporary telephone service for all personnel engaged in construction activities, throughout the construction period.

All local calls shall be paid for by the General Contractor.

All long distance and toll calls shall be paid for by the party making the call.

At each telephone, post a list of important telephones numbers.

Sewers and Drainage: If sewers are available, the Plumbing Contractor shall provide temporary connections to remove effluent that can be discharged lawfully. If sewers are not available or cannot be sued, provide drainage ditches, dry wells, stabilization ponds and similar facilities. If neither sewers nor drainage facilities can be lawfully used for discharge of effluent, provide containers to remove and dispose of effluent off the site in a lawful manner.

Filter out excessive amounts of soil, construction debris, chemicals, oils and similar contaminants that might clog sewers or pollute waterways before discharge.

Provide earthen embankments and similar barriers in and around excavations and subgrade construction, sufficient to prevent flooding by runoff of storm water from heavy rains.

Dewatering Facilities and Drains: For temporary drainage and dewatering operations not associated with construction, comply with requirements of applicable Division 2 Sections. Where feasible, utilize the same facilities. Maintain excavations and construction free of water.

The Plumbing Contractor shall remove temporary sewer and drainage work at the completion of the Project.

TEMPORARY CONSTRUCTION AND SUPPORT FACILITIES INSTALLATION

Locate field offices, storage sheds, sanitary facilities and other temporary construction and support facilities for easy access, in locations approved by General Contractor.

Maintain temporary construction and support facilities until near Substantial Completion. Remove prior to Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to the Owner.

Temporary Heat: Provide temporary heat required by construction activities, for curing or drying of completed installations or protection of installed construction from adverse effects of low temperatures or high humidity. Select safe equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce the ambient condition required and minimize consumption of energy.

After building enclosure, either permanent or temporary, as approved by the Architect, the Heating Contractor shall provide heat, supplied with air, as follows:

At all times during normal working hours, provide sufficient heat to maintain a temperature of not less than 50 degrees F., and from 40 degrees to 50 degrees F. during periods other than specified herein below.

At all times during the placing, setting, and curing of concrete, provide sufficient heat to ensure heating of the spaces involved to not less than 50 degrees F.

Well before gypsum board work begins and continuous throughout the setting and drying periods, a temperature range between 55 and 70 degrees F. shall be maintained day and night. During this period, no finish woodwork, wood finish flooring, resilient flooring or flexible wall coverings shall be installed or stored in the buildings, and no finish painting or applying of finish wall coatings shall be undertaken.

For a period of ten (10) days previous to the placing of interior wood finish and throughout the placing of this and other interior finishing, varnishing, painting, etc., and until final acceptance of the work or until full occupancy by the Owner, provide sufficient heat to produce a temperature of not less than 70 degrees F.

Heat and air shall be supplied in a manner which shall avoid the rapid drying of material but thoroughly dry to such an extent that no remaining moisture will affect finish material.

Ventilation requirements may be supplemented by the building's permanent heating system if approved, but primary responsibility rests with the Heating Contractor.

The Heating Contractor shall operate the heating and ventilating systems each day, including Saturdays, Sundays, and holidays; operating shall include necessary labor and approved operating personnel in attendance as required by agencies having jurisdiction.

It shall be each Contractor's responsibility to inform the Heating Contractor of the range of temperatures required for temporary heating, during this period, that temperature as recommended by the manufacturer of the materials as mentioned are stored in the building or being installed, and for the length of time recommended, following installation.

The Heating Contractor shall remove all temporary heating, cooling and ventilation equipment at the completion of the Project.

Temporary heating and ventilating equipment, piping, etc., shall be installed in such a manner as not to interfere with work of other trades or the permanent construction. If such interference does occur, it shall be the responsibility of the Heating Contractor to make any changes required to overcome the interference.

Except as hereinafter specified, the permanent heating and ventilating systems may be used for temporary heat. The HVAC Contractor shall provide, operate, and maintain approved adequate heating and ventilating units for the purposes specified before the permanent system is operable and as required to supplement the systems. (The use of salamanders or similar, open-type smoke producing devices, will not be approved.) Only gas (natural or LP) direct-fired forced air heaters or units employing steam-heated coils will be approved for use. (Electrical resistance heaters, electrical boilers, or electric furnaces will not be approved for use.) The units shall be arranged to bring in sufficient outdoor air (min. 1-1/2 air changes per hour) to ventilate the building and to prevent build-up of harmful dusts and fumes and remove excess moisture, especially to prevent damage to built-up roofing. During warm weather, the Heating Contractor shall provide an adequate supply of fresh air (min. 1-1/2 air changes per hour) when necessary to properly ventilate for moisture, dust, and fumes from paints, cements, or adhesives in tightly enclosed areas where natural ventilation will not be sufficient.

All heating and ventilation work for construction purposes shall comply with all local, state and federal requirements and manufacturer's recommendations. Warranties and guarantees for permanent mechanical equipment used for temporary purposes shall not be affected by this use. Maintenance of the equipment shall be the responsibility of this Contractor. Any heating units to be turned over with the building shall be thoroughly checked, cleaned and filters replaced prior to turnover.

When permanent enclosure is achieved and when approved by the Owner, use and maintain the permanent HVAC system for heating and ventilation. Maintenance shall include the following:

Proper operation and maintenance of the HVAC plant until acceptance of building by Owner.

Maintenance of temporary filters in all equipment to prevent accumulation of dust and direct coils, housings and ductwork.

Before Final Inspection: Replacement of all (temporary and existing) filters with new filters, thorough cleaning of coils and other equipment, putting entire system into first class condition, cleaning traps and devices, adjustment and renewal of all materials and equipment not functioning correctly.

Use of permanent heating or cooling equipment for temporary heating or cooling shall not affect guarantee. Guarantee shall take effect at time of building acceptance by Owner.

Provide temporary filters over all return air registers before operating system. These shall remain in place until area is clean and system is ready for final balancing.

Replace filters in all equipment to prevent accumulation of dust and dirt in coils, housings and ductwork.

Should the permanent HVAC system not be operable or capable of furnishing temporary heating and ventilation at the time of permanent enclosure of the building, the HVAC Contractor shall bear the cost of equipment, fuel and power consumed until such time as the permanent HVAC system can furnish the required temporary heating and ventilation.

Before Final Inspection:

Replace temporary filters with new filters.

Thoroughly clean coils and other equipment.

Clean traps and devices, adjust and renew any and all materials and equipment not functioning correctly.

Vacuum clean the duct system.

Restore equipment to original condition.

Temporary Paving: The General Contractor shall construct and maintain temporary roads and paving to adequately support the indicated loading and to withstand exposure to traffic during the construction period. Locate temporary paving for roads, storage areas, and parking, where the same permanent facilities will be located.

Paving: Comply with Division 2 Section "Asphalt Concrete Paving" for construction and maintenance of temporary paving.

Coordinate development of temporary paving with subgrade grading, compaction, installation, and stabilization of sub-base, and installation of base and finish courses of permanent paving.

Install temporary paving to minimize the need to rework the installations and result in permanent roads and paved areas that are without damage or deterioration when occupied by the Owner.

Delay installation of the final course of permanent asphalt concrete paving until immediately before Substantial Completion. Coordinate with weather conditions to avoid unsatisfactory results.

Extend temporary paving in and around the construction area as necessary to accommodate delivery and storage of materials, equipment usage, administration, and supervision.

Temporary Enclosures: Provide temporary enclosure for protection of construction from exposure, foul weather, other construction operations, and similar activities. Where heat is needed and the building enclosure is incomplete, provide enclosures where there is no other

provision for containment of heat. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions.

The General Contractor will provide, maintain and remove upon completion, any required closures.

Install tarpaulins securely, with incombustible wood framing and other materials. Close openings of 25 square feet or less with plywood or similar materials.

Close openings through floor or roof decks and horizontal surfaces with load-bearing wood-framed construction.

Cold Weather Protection:

The General Contractor shall provide any necessary cold weather protection (enclosure, temporary heat, fuel, straw, etc.) to continue with his work so as not to delay the Project. This includes any necessary protection of excavations to prevent freezing.

Cold Weather Protection for Masonry Work: The General Contractor shall provide any necessary cold weather protection (enclosures, temporary heat, fuel, etc.) to continue with his work so as not to delay the Project.

Project Identification and Temporary Signs: The General Contractor shall prepare project identification and other signs of the size indicated; install signs where indicated to inform the public and persons seeking entrance to the project. Support on posts or framing of preservative treated wood or steel. Do not permit installation of unauthorized signs.

Temporary Signs: Prepare signs to provide directional information to construction personnel and visitors.

Temporary Exterior Lighting: The General Contractor shall Install exterior yard and sign lights so that signs are visible when work is being performed.

Collection and Disposal of Waste: The General Contractor shall be responsible to collect waste from construction areas and elsewhere daily. Comply with requirements of NFPA 241 for removal of combustible waste material and debris. Enforce requirements strictly. Do not hold materials more than seven (7) days during normal weather or 3 days when the temperature is expected to rise above 80 degrees F. (27 degrees C.). Handle hazardous, dangerous, or unsanitary waste materials separately from other waste by containerizing properly. Dispose of material in a lawful manner.

Stairs: Until permanent stairs are available, the General Contractor shall provide temporary stairs where ladders are not adequate. Cover finished permanent stairs with a protective covering of plywood or similar material so finishes will be undamaged at the time of acceptance.

WATER CONTROL

Each Contractor shall provide, operate, and maintain pumps or other equipment necessary to drain his work and keep excavation pits, trenches, and ditches including the entire sub-grade free of water under any circumstances that may arise.

SNOW REMOVAL

Each Contractor is responsible for snow and ice removal in their own work areas and shall provide same at the direction of the General Contractor as required so as not to delay the Project.

SECURITY AND PROTECTION FACILITIES INSTALLATION: Except for use of permanent fire protection as soon as available, do not change from use of temporary security and protection facilities to permanent facilities until Substantial Completion.

Fire Protection: Until fire protection is supplied by permanent facilities, install and maintain temporary fire protection of types needed to protect against predictable and controllable fire losses.

Refer to Special Conditions for additional requirements.

Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire protection facilities, stairways and other access routes for fighting fires. Prohibit smoking in hazardous fire exposure areas.

Store combustible materials in containers in fire-safe locations.

Provide supervision of welding operations, combustion type temporary heating units, and sources of fire ignition.

Permanent Fire Protection: At the earliest date, complete installation of the permanent fire protection facility, including connected services, and place into operation. Instruct key personnel on use of facilities.

Barricades, Warning Signs, and Lights: Comply with standards and code requirements for erection of barricades. Paint appropriate warning signs to inform personnel and the public of the hazard being protected against. Where needed, provide lighting, including flashing lights.

Refer to Special Conditions for additional requirements.

The General Contractor shall provide barriers around trees and plants designated to remain to protect against vehicular traffic, stored materials, dumping, chemically injurious materials, and puddling or continuous running water.

Enclosure Fence: When excavation begins, the General Contractor shall install an enclosure fence around the work area.

Covered Walkway: Where required by governing authorities, erect a structurally adequate protection covered walkway for passage of personal along the adjacent public street. Coordinate with entrance gates, other facilities, and obstructions. Comply with regulations of authorities having jurisdiction.

Construct using scaffold or shoring framing, waterproofed wood plank overhead decking, protective plywood enclosure walls, handrails, barricades, warning signs, lights, safe, and well-drained walkways and similar provision for protection and safe passage. Extend the backwall beyond the structure to complete the enclosure fence. Paint and maintain in a manner acceptable to the Architect.

Environmental Protection: Operate temporary facilities and conduct construction by methods that comply with environmental regulations, and minimize the possibility that air, waterways, and subsoil might be contaminated or polluted. Avoid use of tools and equipment which produce harmful noise. Restrict use of noise making tools and equipment to hours that will minimize complaints.

OPERATION: Enforce strict discipline in use of temporary facilities. Limit availability to intended use to minimize abuse. Maintain facilities in good operating condition until removal.

Protect from damage by freezing temperatures and the elements.

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

Prevent piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.

TERMINATION AND REMOVAL: Remove each facility when the need has ended, or replaced by a permanent facility, or no later than Substantial Completion. Complete or restore construction delayed because of interference with the facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

Temporary facilities are property of the installing Contractor.

Remove paving that is not acceptable for integration into permanent paving. Where the area is intended for landscape development, remove soil and fill that does not comply with requirements. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials. Repair or replace street paving, curbs, and sidewalks at the temporary entrances.

At Substantial Completion, renovate permanent facilities used during the construction period, including but not limited to:

Replace air filters and clean inside of ductwork and housings.

Replace worn parts and parts subject to unusual operating conditions.

Replace lamps burned out or noticeably dimmed by substantial hours of use.

INSTALLATION

Use qualified personnel for installation of temporary facilities. Locate facilities where they serve the project adequately and result in minimum interference with performance of construction activities. Relocate and modify facilities as required.

Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed, or are replaced by authorized use of completed permanent facilities.

END OF SECTION

SECTION 01580

PROJECT SIGN

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and General Provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

DESCRIPTION OF WORK: Work of this Section shall include, but not necessarily be limited to, the following:

The General Contractor shall provide and maintain at the site one 4' x 8' project sign. He shall employ and pay an approved sign painter to letter the sign.

No other signs or advertisements will be allowed to be displayed on the premises.

QUALITY ASSURANCE

Design sign and structure to withstand 50 mph wind velocity.

Sign Painter: Engaged as professional sign painter for not less than three years.

Finishes, Painting: Adequate to withstand weathering, fading, and chipping for duration of construction.

PART 2 - PRODUCTS

SIGN MATERIALS

Structure and Framing: New wood, 4' x 4' treated posts, structurally adequate.

Sign Surfaces: 4' x 8', exterior grade, GPX yellow or green plywood with medium density overlay, minimum 3/4 inch thick.

Rough Hardware: Galvanized

Paint and Primers: Exterior quality, two coats. Colors designated by Architect. Paint to be special mix for sign painting.

Lettering: Exterior quality paint, contrasting colors designated by Architect.

PART 3 - EXECUTION

GENERAL

Design of sign shall be submitted to the General Contractor after award of the Contract.

Install project identification sign within 30 days after date fixed by Owner-Contractor Agreement.

Erect at designated location as directed by Architect.

Erect supports and framing with uprights 36 inches below surface, braced and framed to resist wind loadings.

Install sign surface plumb and level, with butt joints. Anchor securely.

Paint sight-exposed surfaces of sign, supports, and framing.

MAINTENANCE

Maintain signs and supports clean. Repair deterioration and damages.

REMOVAL

Remove signs, framing, supports, and foundations at completion of the Project, when directed by Architect, and restore the area.

END OF SECTION

SECTION 01700

PROJECT CLOSEOUT

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and General Provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

DESCRIPTION OF WORK

Definitions: Closeout is hereby defined to include general requirements near end of Contract Time, in preparation for final acceptance, final payment, normal termination of contract, occupancy by Owner, and similar actions evidencing completion of the work. Specific requirements for individual units of work are specified in sections of Divisions 2 through 15. Time of closeout is directly related to "Substantial Completion", and therefore may be either a single time period for entire work or a series of time periods for individual parts of the work which have been certified as substantially complete at different dates. That time variation (if any) shall be applicable to other provisions of this Section.

PREREQUISITES TO SUBSTANTIAL COMPLETION

General: Prior to requesting inspection for certification of substantial completion (for either entire work or portions thereof), complete the following and list known exceptions in request:

Include supporting documentation for completion as indicated in these Contract Documents.

Submit statement showing accounting of changes to Contract Sum.

The General Contractor shall prepare, submit and complete a punch list in accordance with General Conditions.

Submit specific warranties, workmanship/maintenance bonds, maintenance agreements, final certifications, and similar documents.

Obtain and submit releases enabling Owner's full and unrestricted use of the work and access to services and utilities, including (where required) occupancy permits, operating certificates, waivers of lien, and similar releases.

Submit record drawings, maintenance manuals, and similar final record information.

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

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.

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

Touch-up and otherwise repair and restore marred, exposed finishes.

INSPECTION PROCEDURES: Upon receipt of Contractor's request, the Architect will either proceed with inspection or advise Contractor of prerequisites not fulfilled. Following initial inspection, the Architect will either prepare certificate of substantial completion, or advise Contractor of work which must be performed prior to issuance of certificate; and repeat inspection when requested and assured that work has been substantially completed. Results of completed inspection will form initial "punch-list" for final acceptance.

RECORD DOCUMENT SUBMITTALS

General: Specific requirements for record documents are indicated in individual sections of these Specifications. Other requirements are indicated in General Conditions. General submittal requirements are indicated in "Submittals" sections. Do not use record documents for construction purposes; protect from deterioration and loss in a secure, fire-resistive location; provide access to record documents for Architect's reference during normal working hours.

Record Drawings: The General Contractor shall maintain in white-print set (blue-line or black-line) of Contract Drawings and Shop Drawings in clean, undamaged condition, with mark-up of actual installations which vary substantially from the work as originally shown. Mark whichever drawing is most capable of showing "field" condition fully and accurately; however, where Shop Drawings are used for mark-up, record a cross reference at corresponding location on working drawings. Mark with red eraseable pencil and, where feasible, use other colors to distinguish between variations in separate categories of work. Mark-up new information which is recognized to be of importance to Owner, but was for some reason not shown on either Contract Drawings or Shop Drawings. Give particular attention to concealed work, which would be difficult to measure and record at a later date. Note related change order numbers where applicable. Organize record drawing sheets into manageable sets, bind with durable paper cover sheets, and print suitable titles, dates, and other identification on cover of each set.

Record Specifications: The General Contractor shall maintain one copy of specifications, including addenda, change orders, and similar modifications issued in printed form during construction, and mark-up variations (of substance) in actual work in comparison with text of specifications and modifications as issued. Give particular attention to substitutions, selection of option, and similar information on work where it is concealed or cannot otherwise be readily discerned at a alter date by direct observation. Note related record drawing information and product data, where applicable. Upon completion of mark-up, submit to Architect for Owner's records.

Maintenance Manuals: Organize maintenance-and-operating manual information into suitable sets of manageable size, and bind into individual binders properly identified and indexed (thumb-tabbed). Include emergency instructions, spare parts listing, copies of warranties, wiring diagrams, recommended "turn-around" cycles, inspection procedures, shop drawings, product data, and similar applicable information. Bind each manual of each set in a heavy-duty two- or three-ring vinyl-covered binder, and include pocket folders for folded sheet information. Mark identification on both front and spine of each binder.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

FINAL CLEANING

General: Special cleaning for specific units of work is specified in sections of Divisions 2 through 16. General cleaning during progress of work is specified in General Conditions and as temporary services in "Special Conditions" section of this Division. Provide final cleaning of the work, at time indicated, consisting of cleaning each surface or unit of work to normal "clean" condition expected for a first-class building cleaning and maintenance program. Comply with manufacturer's instructions for cleaning operations. Refer to Section 01710 of these Specifications.

Where extra materials of value remain after completion of associated work have become Owner's property, dispose of these to Owner's best advantage as directed.

END OF SECTION

SECTION 01710

CLEANING

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and General Provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

DESCRIPTION OF WORK: Throughout all phases and items of the construction period, maintain the building and site in a standard of cleanliness as described in this Section.

RELATED WORK

In addition to standards described in this Section, comply with all requirements for cleaning-up as described in various other Sections of these Specifications.

QUALITY ASSURANCE

Inspection: Conduct daily inspection, and more often if necessary, to verify that requirements of cleanliness are being met

Codes and Standards: In addition to the standards described in this Section, comply with all pertinent requirements of Governmental agencies having jurisdiction.

Disposal of volatile fluid wastes (such as mineral spirits, oil, or paint thinner) in storm or sanitary sewer systems or into streams or waterways is not permitted.

PART 2 - PRODUCTS

CLEANING MATERIALS AND EQUIPMENT: Provide all required personnel, equipment, and materials needed to maintain the specified standard of cleanliness.

COMPATIBILITY: Use only the cleaning materials and equipment which are compatible with the surface being cleaned, as recommended by the manufacturer of the material or as approved by the Architect.

PART 3 - EXECUTION

PROGRESS CLEANING

General

Retain all stored items in an orderly arrangement allowing maximum access, not impeding traffic, and providing the required protection of materials.

Do not allow the accumulation of scrap, debris, waste material, and other items not required for the construction of this work.

Twice weekly, and more often if necessary, the General Contractor shall completely remove all scrap, debris, and waste material from the job site, and shall place into container furnished by the General Contractor.

Provide adequate storage for all items awaiting removal from the job site, observing all requirements for fire protection.

Project Site; The General Contractor shall:

Daily, and more often if necessary, inspect the project site and pick up all scrap, debris, and waste material. Remove all such items to the place designated for their storage.

Weekly, and more often if necessary, sweep all interior places clean. "Clean", for the purpose of this subparagraph, shall be interpreted as meaning free from dust and other material capable of being removed by reasonable diligence using a hand held broom.

As required preparatory to installation of succeeding materials, clean the structures or pertinent portions thereof to the degree of cleanliness recommended by the manufacturer

of the succeeding material, using all equipment and materials required to achieve the required cleanliness.

Following the installation of finish floor materials, protect by covering with temporary coverings and/or clean the finish floor daily (and more often if necessary) at all times while work is being performed in the space in which finish materials have been installed. "Clean", for the purpose of this subparagraph, shall be interpreted as meaning free from all foreign material, which in the opinion of the Architect, may be injurious to the finish floor material.

FINAL CLEANING

Definition: Except as otherwise specifically provided, "Clean" (for the purpose of this Article) shall be interpreted as meaning the level of cleanliness generally provided by commercial building maintenance Subcontractors using commercial quality building maintenance equipment and materials.

General: Prior to completion of the work, remove from the job site all tools, temporary structures, surplus materials, equipment, scrap, debris, and waste. Conduct final progress cleaning as described in Article 3.1 above.

Interior: Visually inspect all interior surfaces and remove all traces of soil, waste material, smudges, and other foreign matter. Remove all traces of splashed materials from adjacent surfaces. Remove all paint droppings, spots, stains, and dirt from finished surfaces. Use only the specified cleaning materials and equipment.

Repair, patch, and touch-up marred or damaged surfaces to match adjacent finishes.

Clean the following if located within the project area:

Plumbing Fixtures, Strainers and Floor Drains

Light Fixtures and Lamps

Replace filters of ventilating equipment when units have been operating during construction. In addition, clean grilles and louvers.

Excess lubrication is to be removed from mechanical and electrical equipment.

All Electrical Panels

Clean all transparent materials, including glass and mirrors. Remove glazing compound and other substances that are noticeable from vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials.

Remove labels that are not permanent labels.

Polished and Resilient Surfaces: To all surfaces requiring the routine application of protective waxes and/or buffed polish, apply the specified coating and/or polish as recommended by the manufacturer of the material being treated, as specified in individual Specification Sections.

Leave concrete floors broom clean. Vacuum carpeted surfaces.

Clean areas traversed by construction personnel.

Clean the site, including landscape development areas, of rubbish, litter, and other foreign substances. Sweep paved areas broom clean. Remove stains, spills, and other foreign deposits.

Maintain cleaning until the building, or portion thereof, is accepted by the Owner.

Timing: Schedule final cleaning as approved by the Architect to enable the Owner to accept a completely clean project.

END OF SECTION

SECTION 02200
EARTHWORK

1. GENERAL

A. Applicable provisions of ALL CONDITIONS OF THE CONTRACT as hereinbefore set forth govern work under this section and are made a part hereof.

2. SCOPE

A. Stripping of topsoil in the building, and sidewalk areas. Topsoil is to be stockpiled at a designated area of the property.

B. Excavate for the foundations.

C. Backfill.

D. All earthwork shall be in accordance with recommendations as described in the subsurface investigation which is part of these specifications.

3. SITE CLEARANCE

A. Strip all topsoil in building area and parking lot area and stockpile this material at a designated area of the property. Remove all trees and stumps from the building and parking areas. Remove stone retaining walls.

4. BUILDING AND SITE FILL

A. The building area shall be cut where indicated by finish grades and used as fill. Fill shall be placed to the elevations indicated on the plot plan.

B. The fill shall be applied in layers not to exceed 6" with the excavation equipment working over the top to compact the fill. Fill to be compacted to 95% proctor density with a vibratory compactor roller or to the density specified on the subsurface investigation recommendations.

C. The filling operation shall be under the strict control of the Project Manager, General Contractor and Construction Engineer. Compaction tests will be performed at a minimum of every 18" of fill or more frequently if specified by the Construction Engineer, Project Manager, or site engineering firm. Proof rolling will be performed at the request of the Project Manager.

5. EXCAVATION AND BACKFILL

A. Excavate to the required depth and width for all work. Excavation for floors on ground to be sufficient depth to receive the filling specified under sub-grading.

1. Topsoil Stripping: Remove and stockpile soils encountered containing organics and loam primarily, found at the original grades. Remove and stockpile topsoil in locations shown on the Drawings or designated by the Owner’s Representative. Over excavation of material will not be an addition to the Contract. After completing topsoil stripping and prior to further excavation or fills, cross-section the area so that volumes may be calculated.

2. Excavation: Unclassified includes excavation to sub grade elevations indicated, regardless of character of materials and obstructions encountered unless the use of rock equipment or blasting is required.

B. Place no foundations on earth fill. Any excess cut under foundations due to negligence shall be filled with concrete at the Contractor’s expense.

C. Excavate to the exact size for footings, trenches, and other work where forms are not used. Clean, level, and trim excavations as required. Do this work immediately before placing concrete.

D. Provide, maintain, and operate sufficient pumping equipment to keep excavations free of water at all times.

E. Before backfilling, remove all rubbish and foreign matter or materials.

F. No fill material shall be placed during unfavorable weather conditions, or while the material is frozen or thawing.

G. Ground Surface Preparation: Remove vegetation, debris, unsatisfactory soil material, obstructions and deleterious materials from ground surface prior to placement of fills. Prior to placement of fill, proof roll the grade to verify stability.

1. Place mass fills in layers not to exceed 8 inches. Compact building and pavement areas to a minimum of 95 percent maximum dry density as determined by the standard proctor method, ASTM D-698 or to 92 percent of modified proctor ASTM D-1557. Include in the building area a minimum buffer area of 20 feet outside the building lines or as shown on the Drawings.

2. Place initial trench backfill by hand in 6 inch lifts after compaction. After a minimum of one foot cover over the pipe, structure or appurtenance, place backfill lifts not to exceed 12 inches. Compact each lift to maximum dry density on the Drawings or as specified in above paragraph B. Place the final backfill lift to the grades indicated on the Drawings or to original grade.

3. Place backfill and fill materials evenly adjacent to structures, piping, or conduit to required elevations. Prevent wedging action of backfill against structures or displacement of piping or conduit by carrying material uniformly around structure, piping, or conduit to approximately same elevation in each lift.

4. Control soil and fill compaction, providing minimum percentage of density specified for each area classification indicated below. Correct improperly compacted areas of lifts as directed by Owner's Representative if soil density tests indicate inadequate compaction.

a. Moisture Control: Before compaction, moisten or aerate each layer as necessary to provide optimum moisture content. Compact each layer to required percentage of maximum dry density for each area classification. Do not place backfill of fill material on surfaces that are muddy, frozen, contain frost or ice, or have not been compacted to the specified percentage of maximum dry density.
   1). Where sub-grade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of sub-grade or layer of soil material. Apply water in minimum quantity as necessary to prevent free water from appearing on surface during or subsequent to compaction operations.
   2). Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.
   3). Stockpile or spread soil material that has been removed because it is too wet to permit compaction. Assist drying by disking, harrowing, or pulverizing until moisture content is reduced to a satisfactory value.

H. Quality Control Testing During Construction: Employ, at Contractor's expense, a testing laboratory acceptable to the Owner to perform material evaluation tests. Allow testing service to inspect and approve each sub-grade and fill layer before further backfill or construction work is performed.

1. Perform field density tests in accordance with ASTM D 1556 (sand cone method) or ASTM D 2922 (nuclear method) as applicable.

    a. Periodically check and adjust field density test with ASTM D 2922, to correlate to tests performed using ASTM D 1556. In conjunction with each density calibration check, check the calibration curves furnished with the moisture gages in accordance with ASTM D 3017.
    b. If field tests are performed using nuclear methods, make calibration checks of both density and moisture gages at beginning of work, on each different type of material encountered, and at intervals reviewed by the Engineer.

2. Footing Sub-grade: For each strata of soil on which footings will be placed, perform at least one test to verify required design bearing capacities, Subsequent verification and approval of each footing sub grade may be based on a visual comparison of each sub grade with related tested strata when reviewed by the Engineer.

3. Paved Areas and Building Slab Sub grade: Perform at least one field density test of sub grade for every 2,000 sq. ft. of paved area or building slab, but in no case fewer than three tests in each compacted fill layer.

4. Foundation Wall Backfill: Perform at least two field density tests at locations and elevations as directed.

5. If in the opinion of the Owner's Representative, based on testing service reports and inspection, sub grade of fills that have been placed are below specified density, perform additional compaction and testing until specified density is obtained.

I. Disposal of excess and waste materials: Remove and transport excess excavated material to an off-site location.

1. Secure necessary permits to legally dispose of excess material, including unacceptable excavated material, trash, and debris off-site.

6. ROCK

A. If rock is encountered, contact the Architect to discuss removal and disposal methods and costs.

END OF SECTION 02200

SECTION 02281

TERMITE CONTROL

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Soil treatment under slab for termite control.

B. Soil treatment at concrete foundation for termite control.

C. Soil treatment in crawl spaces.

D. Termite damage guarantee with annually renewable termite inspection control contract.

1.02 RELATED WORK

A. Section 02220 - Structure Excavation and Backfill.

B. Section 03001 - Concrete Work.

1.03 QUALITY ASSURANCE

A. The applicator shall be licensed by the State of Arkansas to perform the Work of this section.

B. The applicator shall be bonded and insured by an insurance company authorized to practice business in the State of Arkansas.

1.04 REGULATORY REQUIREMENTS

A. Local Laws: All Work performed under this section shall conform with North Carolina Law.

1.05 GUARANTEE

A. Submit a five year written guarantee stating that all additional treatment of areas where termites appear, and any damages caused by the termite appearance, will be performed at no cost to the Owner.

B. Provide the Owner an annually renewable termite inspection control contract, effective five years from date of the original soil treatment, to assure necessary re-treatment and liability for termite damage.

C. The damage guarantee shall provide service and re-service for any subterranean termite infestation without cost to the Owner and shall cover all such damage to the structure or contents thereof in a maximum amount of five thousand dollars ($5,000.00).

D. Draw the guarantee in favor of the Owner, with copies of the guarantee of the renewable inspection control contract provided for the Owner, the Contractor, the Consulting Architect, and the Architect/Engineer.

E. No payment will be made for termite control Work until the above guarantee has been

submitted in satisfactory form.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Chemicals:

1. Use chemicals formulated as an emulsive concentrate for subsequent dilution with water.
2. Fuel oil will not be permitted as a dilutent.
3. Use chemicals of a type currently known to give insurable protection for the soil and fill at the foundation and under the new addition.

B. Mixing Solution

1. Deliver chemicals to the job site in factory-sealed cans.
2. Prepare the working solution by diluting the chemicals with water at the job site.

PART 3 - EXECUTION

3.01 PREPARATION

A. The applicator shall visit the job site to determine the soil texture or otherwise obtain the information from the County Agent, the U.S. Soil Conservation Service or other approved authorities.

B. The Contractor shall remove all wood and other cellulose containing materials from the area within the building walls before the solution is applied.

C. The Contractor shall set tentative dates with the applicator for initial treatment services and schedule subsequent service as deemed necessary for completion of the termite control work.

D. The Contractor shall give the applicator 24 hour notice prior to installing the moisture barrier in preparation for placement of the floor slabs.

3.02 APPLICATION

A. Soil Conditions:

1. Do not apply the working solution when the soil is frozen, excessively wet, or immediately after heavy rains.
2. Do not disturb treated areas during subsequent construction operations.

B. Apply the working solution to the soil over the entire surface under slabs and at the concrete foundations at the rate of application recommended by the chemicals manufacturers and in accordance with regulatory requirements to provide the required guarantee.

END OF SECTION 02281

SECTION 02416

STRUCTURE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:
   1. Demolition and removal of buildings and site improvements.
   2. Removing below-grade construction.
   3. Disconnecting, capping or sealing, and removing site utilities.

B. Related Sections include the following:
   1. Division 31 Section "Site Clearing" for site clearing and removal of above- and below-grade site improvements not part of building demolition.

1.3 DEFINITIONS

A. Demolish: Completely remove and legally dispose of off-site.

B. Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner. Include fasteners or brackets needed for reattachment elsewhere.

1.4 MATERIALS OWNERSHIP

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

B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.
   1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.5 SUBMITTALS

A. Qualification Data: For refrigerant recovery technician.

B. Proposed Protection Measures: Submit informational report, including drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control and for noise control. Indicate proposed locations and construction of barriers.
   1. Adjacent Buildings: Detail special measures proposed to protect adjacent buildings to remain.

C. Schedule of Building Demolition Activities: Indicate the following:
   1. Detailed sequence of demolition work, with starting and ending dates for each activity.
   2. Temporary interruption of utility services.
   3. Shutoff and capping or re-routing of utility services.

D. Predemolition Photographs: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by building demolition operations. Submit before the Work begins.

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

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

1.6 QUALITY ASSURANCE

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

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

C. Standards: Comply with ANSI A10.6 and NFPA 241.

D. Predemolition Conference: Conduct conference at Project site.

1.7 PROJECT CONDITIONS

A. Buildings to be demolished will be vacated and their use discontinued before start of the Work.

B. Buildings immediately adjacent to demolition area will be occupied. Conduct building demolition so operations of occupied buildings will not be disrupted.
   1. Provide not less than 72 hours' notice of activities that will affect operations of adjacent occupied buildings.
   2. Maintain access to existing walkways, exits, and other facilities used by occupants of adjacent buildings. Do not close or obstruct walkways, exits, or other facilities used by occupants of adjacent buildings without written permission from authorities having jurisdiction.

C. Owner assumes no responsibility for buildings and structures to be demolished. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
   1. Hazardous materials will be removed by Owner before start of the Work.
   2. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

E. On-site storage or sale of removed items or materials is not permitted.

1.8 COORDINATION

A. Arrange demolition schedule so as not to interfere with operations of adjacent occupied buildings.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. Satisfactory Soils: Comply with requirements in Division 31 Section "Earth Moving."

PART 3 - EXECUTION

3.1 EXAMINATION

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

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

C. Inventory and record the condition of items to be removed and salvaged. Provide photographs of conditions that might be misconstrued as damage caused by salvage operations.

D. Engage a professional engineer to perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during building demolition operations.

E. Verify that hazardous materials have been remediated before proceeding with building demolition operations.

3.2 PREPARATION

A. Refrigerant: Remove refrigerant from mechanical equipment according to 40 CFR 82 and regulations of authorities having jurisdiction before starting demolition.

B. Existing Utilities: Locate, identify, disconnect, and seal or cap off indicated utilities serving buildings and structures to be demolished.
   1. Arrange to shut off indicated utilities with utility companies.
   2. If removal, relocation, or abandonment of utility services will affect adjacent occupied buildings, then provide temporary utilities that bypass buildings and structures to be demolished and that maintain continuity of service to other buildings and structures.
   3. Cut off pipe or conduit a minimum of 24 inches below grade. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing according to requirements of authorities having jurisdiction.

C. Existing Utilities: Refer to Divisions 22 and 26 Sections for shutting off, disconnecting, removing, and sealing or capping utilities. Do not start demolition work until utility disconnecting and sealing have been completed and verified in writing.

D. Temporary Shoring: Provide and maintain interior and exterior shoring, bracing, or structural support to preserve stability and prevent unexpected movement or collapse of construction being demolished.
   1. Strengthen or add new supports when required during progress of demolition.

E. Salvaged Items: Comply with the following:
   1. Clean salvaged items of dirt and demolition debris.
   2. Pack or crate items after cleaning. Identify contents of containers.
   3. Store items in a secure area until delivery to Owner.
   4. Transport items to storage area designated by Owner.
   5. Protect items from damage during transport and storage.

3.3 PROTECTION

A. Existing Facilities: Protect adjacent walkways, loading docks, building entries, and other building facilities during demolition operations. Maintain exits from existing buildings.

B. Existing Utilities: Maintain utility services to remain and protect from damage during demolition operations.
   1. Do not interrupt existing utilities serving adjacent occupied or operating facilities unless authorized in writing by Owner and authorities having jurisdiction.
   2. Provide temporary services during interruptions to existing utilities, as acceptable to Owner and authorities having jurisdiction. Provide at least 72 hours' notice to occupants of affected buildings if shutdown of service is required during changeover.

C. Temporary Protection: Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction and as indicated.
   1. Protect adjacent buildings and facilities from damage due to demolition activities.
   2. Protect existing site improvements, appurtenances, and landscaping to remain.
   3. Erect a plainly visible fence around drip line of trees to remain.
   4. Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
   5. Provide protection to ensure safe passage of people around building demolition area and to and from occupied portions of adjacent buildings and structures.

D. Remove temporary barriers and protections where hazards no longer exist. Where open excavations or other hazardous conditions remain, leave temporary barriers and protections in place.

3.4 DEMOLITION, GENERAL

A. General: Demolish indicated existing buildings and site improvements completely. Use methods required to complete the Work within limitations of governing regulations and as follows:
   1. Do not use cutting torches until work area is cleared of flammable materials. Maintain portable fire-suppression devices during flame-cutting operations.
   2. Maintain fire watch during and for at least 2 hours after flame cutting operations.
   3. Maintain adequate ventilation when using cutting torches.
   4. Locate building demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.

B. Engineering Surveys: During demolition, perform surveys to detect hazards that may result from building demolition activities.

C. Site Access and Temporary Controls: Conduct building demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
   1. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
   2. Use water mist and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations. Do not use water when it may damage adjacent construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.

D. Explosives: Use of explosives is not permitted.

3.5 DEMOLITION BY MECHANICAL MEANS

A. Proceed with demolition of structural framing members systematically, from higher to lower level. Complete building demolition operations above each floor or tier before disturbing supporting members on the next lower level.

B. Remove debris from elevated portions of the building by chute, hoist, or other device that will convey debris to grade level in a controlled descent. Remove structural framing members and lower to ground by method suitable to minimize ground impact and dust generation.

C. Below-Grade Construction: Demolish foundation walls and other below-grade construction.
   1. Remove below-grade construction, including basements, foundation walls, and footings, completely.

D. Existing Utilities: Demolish and remove existing utilities and below-grade utility structures.
   1. Piping: Disconnect piping at unions, flanges, valves, or fittings.
   2. Wiring Ducts: Disassemble into unit lengths and remove plug-in and disconnecting devices.

3.6 SITE RESTORATION

A. Below-Grade Areas: Completely fill below-grade areas and voids from building demolition operations with satisfactory soil materials according to backfill requirements in Division 31 Section "Earth Moving."

B. Site Grading: Uniformly rough grade area of demolished construction to a smooth surface, free from irregular surface changes. Provide a smooth transition between adjacent existing grades and new grades.

3.7 REPAIRS

A. Promptly repair damage to adjacent buildings caused by demolition operations.

3.8 DISPOSAL OF DEMOLISHED MATERIALS

A. Remove demolition waste materials from Project site and legally dispose of them in an EPA-approved landfill acceptable to authorities having jurisdiction.
   1. Do not allow demolished materials to accumulate on-site.
   2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Do not burn demolished materials.

3.9 CLEANING

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

END OF SECTION 024116

SECTION 02500
PAVING

1. GENERAL

A. Applicable provisions of THE CONDITIONS OF THE CONTRACT as hereinbefore set forth govern work under this section and are made a part hereof.

2. SCOPE

A. The Contractor shall furnish all labor, material, equipment, and services necessary to, or required by, the completion of the aggregate base work and bituminous concrete shown or indicated in the drawings, and as specified herein.

3. AGGREGATE BASE

A. MATERIAL

1. The aggregate base material shall be as dictated by the site engineer on drawings and as approved by Project engineer. The aggregate base material is largely existing on the site. Some additional base may need to be provided and installed as required to produce a workmanship like job. See additional information on the plans.

B. INSTALLATION

1. The aggregate base shall be constructed over a previously prepared sub-base, which will be thoroughly compacted and properly sloped for drainage. This Contractor shall do all fine grading required to meet the finish grade indicated on the drawings for work under this section. The base aggregate shall be placed only on firm sub-base. Construct aggregate base and uncapped surfaces of two courses of material, compacted to a uniform thickness as per plans (8" or more). Thorough compaction with at least a ten ton roller or vibrator shall be required to produce a uniform stabilized mass of at least 95% maximum dry density as determined by the standard proctor method, ASTM D-698 or to 92% of modified proctor ASTM D-1557.

4. BITUMINOUS CONCRETE PAVEMENT

A. All materials, methods, and workmanship shall conform to the requirements of the Governing code.

B. INSTALLATION

1. The bituminous concrete pavement shall be installed over the aggregate base course. The pavement shall be constructed in two courses to a minimum total thickness as follows:

   a. Parking area and drives
      The binder course as dictated by the site engineer on drawings.

C. Minimum bituminous content shall be 6% (7% if blast furnace slag is used).

D. BOND COAT BETWEEN COURSE

1. 0.05 gal/SY (ss-1H).

E. While newly surfaced area is warm, thoroughly inspect for "bird baths" and other imperfections. Add material where necessary and roll out. Surfaces looking "patched" will not be accepted.

5. QUANTITIES OF MATERIAL

The following minimum quantities of bituminous concrete mix shall be furnished by the Contractor in order to ensure uniform density; 98 pounds of bituminous concrete using slag aggregate for each square yard of 2" thick pavement. Delivery tickets shall be given to the Contractor; tickets shall be made available upon request by the Owner.

6. ROAD RIGHT-OF-WAY CONSTRUCTION

A. The work shall consist of construction of:

1. Approach and Parking area

A. The Contractor shall obtain all permits, pay all fees, provide all bonds, etc., as may be required by the Supervising Authority.

C. Excavate for new work to depths required. Prepare subgrade as specified by this section.

D. Locate drainage ditches and regrade as required to maintain positive drainage through new and existing culverts.

E. CONCRETE CURBS
1. none required

7. WARRANTY

A. Final payment shall not be made until a warranty is furnished that the bituminous surface shall remain free from cracking and crumbling and that depressions will not appear for a period of one (1) year from date of acceptance by Owner. During the period of this warranty, assume all costs of material and labor to repair any defective areas.

8. VARIATIONS TO SPECIFICATIONS

A. If no specifications are on the plan, these specifications will be followed.

B. If plan specifications and these specifications conflict, the Project Engineer will determine which specification to use in writing.

SECTION 02510
SIDEWALKS

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Providing 4 or 6 inch thick concrete sidewalks where shown and as indicated on Drawings.

1.02 RELATED WORK

A. Section 02200 - Site Grading.

B. Section 02220 - Structure Excavation and Backfill.

1.03 REFERENCE STANDARDS

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

1. ASTM D 994, Specification for Preformed Expansion Joint Fillers for Concrete (Bituminous Type).

PART 2 - PRODUCTS

2.01 MATERIALS

A. General: Materials for use in sidewalk construction shall conform to the requirements of the Section 2515, and shall be 4000 psi air entrained concrete.

B. Pre-formed expansion joint filler: ASTM D994.

PART 3 - EXECUTION

3.01 PREPARATION

A. Prepare subgrade for walks by excavating or filling to a depth below the top of an intended pavement equal to the thickness of the finished walk and in exact conformity to the grade approved by the Engineer. Remove vegetable matter or material that will not compact properly and replace with suitable material. Place all fill required to bring the subgrade to the proper level in thin layers not exceeding 4 inches deep, and thoroughly ram, tamp, or roll each layer to a minimum density of 98- of the maximum dry density at or near optimum moisture content as determined by Standard Proctor procedures, ASTM D 698. Bring subgrade to true grade in a uniformly firm condition before the placing of the concrete. Do not place concrete on the subgrade until the Consulting Architect has inspected and approved both grade and condition of subgrade.

3.02 INSTALLATION

A. Refer to Drawings for location and sizes

B. Stake the Work and execute sidewalk construction in accordance with plans and details

END OF SECTION

SECTION 02577
PAVEMENT MARKINGS

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Providing pavement markings as shown on Drawings.

1.02 RELATED WORK

A. Section 02513 - Asphaltic Concrete Paving.

1.03 REFERENCE STANDARDS

A. Federal Specifications (FS):

1. TT-P-115E Paint, Traffic, Highway, White and Yellow

2. TT-P-1952B Paint, Traffic, and Airfield Marking, Water Emulsion Base

B. Federal Standard (Fed. Std):

1. No. 141B Paint, Varnish, Lacquer, and related materials, Methods of Testing of.

1.04 SUBMITTALS

A. Comply with requirements of Section 01300.

B. Submit a test report showing either that the proposed batch meets all specified requirements or that a previous batch manufactured using the same formulation as that used in manufacturing the proposed batch for the following properties required in the material specification: weight per gallon, viscosity, fineness of grind, drying time, and gradation. Testing procedures and reports shall be as specified in paragraph 5 of Method 1031.2 of Fed. Std. 141.

1.05 DELIVERY, HANDLING AND STORAGE

A. Deliver material in sealed containers that plainly show the designated name, formula or specification number, batch number, color, date of manufacture, manufacturer's name, formulation number and directions, all of which shall be plainly labeled at the time of use.

B. Furnish paint in containers not larger than five gallons.

C. Store paint on project site. Store emulsion paints to prevent freezing.

1.06 SITE CONDITIONS

A. Unless otherwise recommended by the paint manufacturer apply pavement marking materials only when the ambient temperature is between 40 and 95 degrees F.

PART 2 - PRODUCTS

2.01 MATERIAL

A. Paint:

1. Manufactured according to FS TT-P-115E or FS TT-P-1952R.

2. Color: Yellow

3. Paint shall be homogeneous, easily stirred to smooth consistency, and shall show no hard settlement or other objectionable characteristics during a storage period of six months.

PART 3 - EXECUTION

3.01 SURFACE PREPARATION

A. Allow new pavement surfaces to cure for a period of not less than 30 days before application of marking materials.

B. Thoroughly clean all surfaces to be marked before application of paint. Remove dust, dirt, and other granular surface deposits by sweeping, blowing with compressed air, rinsing with water or a combination of these methods as required.

C. Completely remove rubber deposits, surface laitance, existing paint markings, and other coatings adhering to the pavement with scrapers, wire brushes, sandblasting, approved chemicals, or mechanical abrasion as directed.

D. Where oil or grease are present on old pavements to be marked, scrub affected areas with several applications of trisodium phosphate solution or other approved detergent or degreaser, and rinse thoroughly after each application. After cleaning, seal oil-soaked areas with cut shellac to prevent bleeding through the new paint.

3.02 EQUIPMENT

A. General: Use only approved machines, tools, and equipment. Maintain equipment in satisfactory operating condition. Hand-operated push-type machines of a type commonly used for application of paint to pavement surfaces will be acceptable for marking small street and parking areas. Use applicator machine equipped with the necessary paint tanks and spraying nozzles. Equipment shall be capable of applying paint uniformly at coverage specified. Provide sandblasting equipment as required for cleaning surfaces to be painted. Use hand-operated spray guns for use in areas where push-type machines cannot be used.

B. Sandblasting Equipment: Sandblasting equipment shall include an air compressor, hoses, and nozzles of proper size and capacity as required for cleaning surfaces to be painted. The compressor shall be capable of furnishing not less than 150 c.f.m. of air at a pressure of not less than 90 p.s.i. at the nozzle for each nozzle used.

3.03 APPLICATION

A. Rate of Application: Apply paint evenly to the pavement surface to be coated at a rate of 105 plus or minus five square feet per gallon.

B. Paint: Apply paint in stripes of specified width to clean, dry surfaces, and unless otherwise

approved, only when air and pavement temperatures are above 40 F and less than 95 F. Maintain paint temperature within these limits. Apply paint pneumatically with approved equipment at rate of coverage specified herein. Provide guide lines and templates as necessary to control paint application. Take special precautions in marking numbers, letters, and symbols. Sharply outline all edges of markings. Maintain the maximum drying time requirements of the paint specifications to prevent undue softening of bitumen, and pickup, displacement, or discoloration by tires of traffic. If there is a deficiency in drying of the markings, discontinue painting operations until cause of the slow drying is determined and corrected.

3.04 PROTECTION

A. Prevent damage to newly painted surfaces by either placing small markers along newly painted lines or controlling traffic to keep vehicles away from area of newly painted lines.

END OF SECTION 02577

SECTION 02600
WATER SERVICE PIPING

1. GENERAL

A. Related Documents

1. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this section.

B. Summary

1. This Section includes water service piping and appurtenances from the source or existing system to a point 5 feet outside the building or to limits shown.

C. Quality Assurance

1. Comply with requirements of utility supplying water to the project.

2. Comply with local Fire Department/Marshall Standards pertaining to materials, hose threads and installation.

3. Comply with local Health Department or Agency requirements.

D. Project Conditions

1. Site Information: Verify existing utility locations and verify that water service piping may be installed in compliance with the original design and referenced standards. If existing conditions are found not to be compatible with the design intent, give the Owner's Representative sufficient notice to prevent delays.

E. Sequencing and Scheduling

1. Coordinate connection to public water main with utility company.

2. Coordinate with other utility work.

2. PRODUCTS

A. Pipe and Pipe Fittings, General

1. Pipe and pipe fitting materials shall be compatible with each other. Supply pipe, pipe fittings and appurtenances in accordance with Authority having jurisdiction or as shown on Drawings.

2. Copper Water Tube: Supply ASTM B 88; Type K. seamless, annealed temper unless indicated differently on Drawings or otherwise required by Authority having jurisdiction.

a. Copper Fittings: Type required by Authority having jurisdiction and conforming to AWWA C800.

B. Valves

1. Valves, Valve Boxes, Curb Stops, Curb Boxes, Tapping Sleeves, Tapping Saddles,

Corporations and Other Appurtenances: Type specified by Authority having jurisdiction and compatible with pipe and fittings specified.

2. Non rinsing Stem Gate Valves 3 Inches and Larger: AWWA C500, cast-iron double disc, bronze disc and seat rings, or AWWA C509, resilient seated; bronze stem, cast-iron or ductile-iron body and bonnet, stem nut, 250-psi working pressure, mechanical joint ends.

3. Valve Boxes: Cast-iron box having top section and cover with lettering “WATER,” bottom section with base of size to fit over valve and barrel approximately 5 inches in diameter, and adjustable cast-iron extension of length required for depth of bury of valve.

4. Curb Stops: Bronze body, ground key plug or ball, and wide tee head, with inlet and outlet to match service piping material.

5. Service Boxes for Curb Stops: Cast-iron box having telescoping top section of length required for depth of bury of valve and cover having lettering “WATER,” and bottom section with base of size to fit over curb stop and barrel approximately 3 inches in diameter.

6. Tapping Sleeve and Tapping Valve: Complete assembly, including tapping sleeve, tapping valve, and bolts and nuts. The sleeve and valve shall be compatible with the tapping machine to be used.

    a. Tapping Sleeve: Cast-iron or ductile-iron 2-piece bolted sleeve with flanged outlet for new branch connection. Sleeve may have mechanical joint ends with rubber gaskets or have sealing rings in the sleeve body. Sleeve shall mate with the size and type pipe material being tapped. Outlet flange shall be size required for branch connection.

7. Service Clamps and Corporation Stops: Complete assembly, including service clamp, corporation stop, and bolts and nuts. The clamp and stop shall be compatible with the drilling machine to be used.

    a. Service Clamp: Cast-iron or ductile-iron with gasket and AWWA C800 threaded outlet for corporation stop, and threaded end straps.
    b. Corporation Stops: Bronze body and ground key plug, with AWWA C800 threaded inlet and outlet to match service piping material.

C. Anchorages

1. Perform anchorages in accordance with Authority having jurisdiction and as shown on Drawings. Provide sufficient anchorages, sized in accordance with pressure rating of pipe being installed.

D. Fire Hydrants

1. Hydrants: Of type acceptable to Authority having jurisdiction over water system as well as the Fire Department/Marshall. Coordinate required type hydrant, color and threads.

2. Hydrant Requirements: Conform to AWWA C502.

3. EXECUTION

A. Preparation of Buried Pipe Foundation

1. Grade trench bottom to provide a smooth, firm, stable, and rock-free foundation throughout the length of the piping. If bedding or encasement is required, excavate, install and compact to lines shown.

2. Remove unstable, soft, and unsuitable materials at the surface upon which pipes are to be laid and backfill with indicated encasement or select backfill.

3. Shape bottom of trench to fit bottom of piping. Fill unevenness with tamped sand backfill. Dig bell holes at each pipe joint to relieve the bells of all loads and to ensure continuous bearing of the pipe barrel on the foundation.

SECTION 02650
WASTE WATER COLLECTION SYSTEM

1. GENERAL

A. Related Documents

1. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 0 and Division 1 Specification Sections, apply to this Section.

B. Summary

1. This Section includes sanitary sewer system piping and appurtenances from a point 5 feet outside the building to the point of disposal.

C. Quality Assurance

1. Environmental Compliance: Comply with applicable portions of local environmental agency regulations pertaining to sanitary sewer systems.

2. Utility Compliance: Comply with local utility regulations and standards pertaining to sanitary sewer systems.

D. Project Conditions

1. Site Information: Verify existing utility locations and that sanitary sewer system piping may be installed in compliance with original design and referenced standards. If existing conditions are found not to be compatible with the design intent, give the Owner's Representative sufficient notice to prevent delays.

    a. Locate existing sanitary sewer system piping and structures.

2. PRODUCTS

A. Pipe and Fittings

1. General: Provide pipe and pipe fitting materials compatible with each other. Provide materials specified by Agency having jurisdiction or as indicated on Drawings.

2. PVC (Polyvinyl Chloride) Sewer Pipe and Fittings: ASTM D 3034, SDR 35, unless otherwise shown on Drawings or required by Agency having jurisdiction, use elastomeric seal gasket joints.

    a. Gaskets: ASTM D 3212, elastomeric seal.
    b. Solvent Cement: ASTM D 2564.

B. Cleanouts

1. Supply cleanouts of same pipe and fitting materials as lateral unless required otherwise on Drawings of by local Authority.

2. Cleanout Cover: Cast iron, ASTM A48, Class 30B as shown on Drawings or as required by Authority having jurisdiction.

C. Oil/Water Separator

1. Provide precast, 2 chamber concrete, fiberglass or steel 1,000 gallon tank with lid, clean-out and manhole sections as required. Refer to drawings. Steel/FRP tank available at

Containment Solutions 410-552-9343 Penske National account.

2. Provide cast iron ring and manhole cover with 24" interior clearance. Heavy duty in traffic areas.

3. EXECUTION

A. Preparation of Foundation for buried Sanitary Sewer Systems.

1. Grade trench bottom to provide a smooth, firm, stable, and rock-free foundation, throughout the length of the pipe.

2. Remove unstable, soft, and unsuitable material at the surface upon which pipes are to be laid, and backfill with acceptable fill as specified in Division 2C, “Earthwork”.

3. Over excavate bottom of trench to provide bedding or encasement as shown on Drawings or as required by Authority having jurisdiction.

4. Shape bottom of trench to fit bottom of pipe. Fill unevenness with crushed stone bedding material. Dig bell holes at each pipe joint to relieve the bells of all loads and to ensure continuous bearing of the pipe barrel on the foundation.

B. Installation, General

C.

1. General Locations and Arrangements: Drawings (plans and details) indicate the general location and arrangement of the underground sanitary sewer system piping.

2. Install piping beginning at low point of systems, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and coupling in accordance with manufacturer’s recommendations for use of lubricants, cements, and other installation requirements. Maintain swab or drag in line and pull past each joint as it is completed.

3. Use proper size increasers, reducers, and couplings, where different size or material of pipes and fittings are connected. Reduction of the size of piping in the direction of flow is prohibited.

D. Pipe Joint Construction and Installation

1. Join and install PVC pipe as follows:

   a. Pipe and gasketed fitting, joining with elastomeric seals in accordance with ASTM D 3212.
   b. Solvent cement joint pipe and fittings, joining with solvent cement in accordance with ASTM D 2855 and ASTM D 2321.
   c. Installation in accordance with ASTM D 2321.

E. Cleanouts

1. Install cleanouts in appropriate encasement and in accordance with applicable pipe requirements.

F. Tap Connections

1. Make connections to existing piping and underground structures so that finished work will conform as nearly as practicable to the requirements specified for new work. Perform work in accordance with Authority having jurisdiction, and as reviewed by Engineer.

2. Use commercially manufactured wye fittings for piping branch connections. Remove

section of existing pipe, install wye fitting into existing piping, and encase entire wye fitting plus 6-inch overlap, with not less than 6 inches of 3000-psi 28-day compressive-strength concrete.

3. Make branch connections from side into existing piping by cutting a hole in the existing pipe and installing the appropriate saddle or sleeve fitting onto existing piping. Encase entire system with not less than 6 inches of 3000 psi 28-day compressive-strength concrete.

4. Protect existing piping and structures to prevent concrete or debris from entering while making tap connections. Remove debris, concrete, or other extraneous material that may accumulate.

G. Field Quality Control

1. Testing: Perform testing of completed piping in accordance with local authorities having jurisdiction.

Cleaning: Clear interior of piping and structures of dirt and other superfluous material as work progresses. Maintain swab or drag in piping and pull past each joint as it is completed.

SECTION 02700
STORM SEWER SYSTEM

1. GENERAL

A. Related Documents

1. Drawings and general provisions of the contract, including General and Supplementary Conditions and other Division 0 and Division 1 Specification Sections, apply to this section.

B. Summary

1. This Section includes storm sewer system piping and appurtenance from a point 5 feet outside the building, or as shown on Drawings, to the point of disposal at the site water retention pond. It also includes leaders and underground connecting all the roof drainage downspouts from the building to this system.

C. Quality Assurance

1. Environmental Compliance: Comply with applicable portions of local environmental agency regulations pertaining to storm sewerage systems.

2. Utility Compliance: Comply with local utility regulations and standards pertaining to storm sewer systems.

2. EXECUTION

A. Preparation of Foundation for Buried Storm Sewer Systems

1. Grade trench bottom to provide a smooth, firm, and rock-free foundation, throughout the length of the pipe. If bedding is required, over excavate to provide proper depth.

2. Remove unstable, soft, and unsuitable materials at the surface upon which pipes are to be laid, and backfill with select backfill.

3. Shape bottom of trench to fit bottom of pipe. Fill unevenness with tamped sand backfill. Dig bell holes at each pipe joint to relieve the bells of all loads and to ensure continuous bearing of the pipe barrel on the foundation.

B. Installation, General

1. General Locations and Arrangements: Drawings (plans and details) indicate the general location and arrangement of the underground storm sewer system piping. Location and arrangement of piping layout take into account many design considerations.

2. Install piping beginning at low point of systems, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings in accordance with manufacturer's recommendations for use of lubricants, cements, and other installation requirements. Maintain swab or drag in line and pull past each joint as it is completed.

3. Use manholes or catch basins for changes in direction, except where a fitting is indicated. Use fittings for branch connection, except where direct tap into existing sewer is indicated.

C. Pipe and Tube Joint Construction and Installation

1. Corrugated Polyethylene Pipe and Couplings: Install in accordance with ASTM F449-85 and to lines and grades shown on Drawings.

2. Join different types of pipe with standard manufactured couplings and fittings intended for that purpose.

D. Catch Basins and Manholes

1. Construct catch basins and manholes to sizes and shapes indicated.

2. Set frames and grates to elevations indicated.

E. Field Quality Control

1. Testing: Perform testing of completed piping in accordance with local authorities having jurisdiction.

   a. When required by Authority having jurisdiction, perform infiltration and exfiltration test on the complete system in accordance with ASTM C 969.

   b. After gravity mains have been in place for a minimum of 30 days, lamp each section between manholes for alignment, cleanliness and defects.
   c. Any section of pipe failing the required tests will be subject to repair acceptable to the Engineer or removed and replaced, at no additional cost.

2. Cleaning: Clear interior of piping and structures of dirt and other superfluous material as work progressed. Maintain swab or drag in piping and pull past each joint as it is completed.

END OF SECTION 02700

SECTION 02841
FENCES & GATES

1. GENERAL

A. Applicable provisions of THE CONDITIONS OF THE CONTRACT as hereinbefore set forth govern work under this Section and are made a part thereof.

2. SCOPE

A. Provide chain link fence and gates as indicated on the drawings with all necessary accessories required for a complete installation.

3. REFERENCED SPECIFICATIONS

A. ASTM - reference is to the latest revision of ASTM specifications, practices and test methods.

A 90 Test Method for Weight of Coating on Zinc Coated Iron and Steel Articles
A 392 Specification for Zinc-Coated Steel Chain Link Fence Fabric
A 428 Test Method for Weight of Coating on Aluminum Coated Iron and Steel Articles
A 491 Specification for Aluminum-Coated Steel Chain Link Fence Fabric
A 824 Specification for Metallic-Coated Steel Marcelled Tension Wire for Use with Chain Link Fence
C 94 Specification for Ready-Mixed Concrete
F 567 Standard Practice for Installation of Chain Link Fence
F 669 Strength Requirements for Framework
F 900 Specification for Industrial and Commercial Swing Gates
F 1083 Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures
F 1184 Specification for Industrial and Commercial Horizontal Slide Gates
F 1234 Protective Coatings for Fence Framework

4. GENERAL REQUIREMENTS

A. TOLERANCES

1. Standard tolerances contained in the referenced specifications shall be used for all framework members and chain link fabric.

B. HEIGHT

1. The total height of the fence shall be as shown on plans – no more than 6’ in height if not specified.

5. FENCING

A. FABRIC

1. The fabric shall be 72" high, manufactured from 9 gage wire woven into a 2" mesh. Both top and bottom salvages shall be twisted and barbed. The fabric shall conform to the requirements of the ASTM specification appropriate for the type of metallic coating:

   a. Zinc coated conforming to ASTM A 392 Class 2. The minimum average zinc coating weight shall be 2.0 ounces per square foot of uncoated wire surface, with no specimen having less than 1.8 ounces per square foot of uncoated wire surface. The weight of zinc coating shall be determined in accordance with ASTM test method A 90.

   b. Aluminum coated conforming to ASTM A 491. The minimum average aluminum coating weight shall be 0.40 ounces per square foot of uncoated wire surface. The weight of coating shall be determined in accordance with ASTM test method A 428. Aluminum coated wire shall be cleaned and given a clear acrylic organic coating by the complete immersion process after fabric.

c. Vinyl coated fence may be specified in some instances.

B. BOTTOM TENSION WIRE

1. The bottom tension wire shall be a 7 gage coated spring coil or crimped steel wire confirming to ASTM specification A 824, Type I, aluminum coated or Type II, zinc coated.

2. METALLIC COATING

a. The zinc coating shall be a minimum of 1.2 ounces per square foot of uncoated wire surface. The weight of coating shall be determined in accordance with ASTM A 90.

b. The aluminum coating shall be a minimum of 0.40 ounces per square foot of uncoated wire surface. The weight of coating shall be determined in accordance with ASTM specification A 428.

3. Tension wire shall be stretched taut from terminal post to terminal post and securely fastened to the fence fabric with aluminum hog rings spaced no more than 24" apart.

C. FABRIC CONNECTION

1. The chain link fence fabric shall be securely fastened to all terminal posts using 3/16" x 3/4" tension bars and heavy 11 gage tension bands. Tension bands shall be spaced no greater than one foot, o.c. The fabric shall be fastened to all intermediate posts with 9 gage tie wires, spacing not to exceed 14" and to top rail with 9 gage tire wires, spacing not to exceed 24".

6. FRAMEWORK

A. Posts - All posts used in conjunction with this fence shall conform to the requirements of ASTM F 669 for strength requirements and ASTM F 1234 for protective coatings. Tubular sections shall be Grade A (schedule 40 pipe) or Grade B (high strength pipe, minimum tensile strength 50,000 psi) and provided with the following nominal weights and dimensions.

1. Intermediate (line posts) - All intermediate posts shall be 2.375" o.d. pipe, nominal weight of 3.65 lbs. per lineal foot (Grade A) or 3.12 lbs. per lineal foot (Grade B).

2. Terminal posts - All end, corner and pull posts shall be 2.875" o.d. pipe, nominal weight 5.79 lbs. per lineal foot (Grade A) or 4.64 lbs. per lineal foot (Grade B).

B. POST SETTING

1. The posts shall be evenly spaced in the line of the fence no further apart than 10 feet, o.c.

2. The posts shall be of sufficient length to extend 36" into concrete footings.

C. TOP RAIL

1. Top rail shall be 1.660" o.d. pipe, nominal weight 2.27 lbs. per lineal foot (Grade A) or 1.82 lbs. per lineal foot (Grade B), provided in manufacturer's longest continuous lengths, and is to pass through the line post tops, with couplings to provide a continuous brace from end to end of each stretch of fence. Couplings shall be galvanized steel, outside sleeve type, at least 6 inches long. The top rail shall be securely fastened to the terminal posts by galvanized heavy pressed steel brace bands and galvanized malleable iron rail end connections.

D. BRACES

1. Brace pipe shall be the same material as the top rail and shall be installed midway between the top rail and the ground and extended from the terminal post to the first adjacent line

post. Braces shall be securely fastened to posts by galvanized heavy pressed steel and malleable iron fittings, then securely trussed from line post to the base of the terminal post with a 3/8" galvanized truss rod and tightener. Brace pipe is required only in heights of 6 feet or higher.

E. POST TOPS

1. All posts shall be fitted with galvanized pressed steel or malleable iron post tops to exclude water.

F. FENCE INSERTS

1. Inserts are required for dumpster screen fence or any other installation where screening is desirable.

2. Inserts shall be vertically placed 1-1/8" redwood slats or dark brown color PVT slats.

7. GATES, SWING, AND/OR SLIDE

A. All components of the frame shall be galvanized pipe to match fence. Filler fabric shall be as specified for the fence.

B. Swing Gates shall conform to the requirements of ASTM F 900.

C. Slide Gates shall conform to the requirements of ASTM F 1184.

1. On overhead track assemblies, no exposed wheels will be permitted.

2. No overhead beams or tracks over openings will be permitted.

8. INSTALLATION

A. Installation shall conform to the requirements of ASTM practice F 567 except as otherwise specified herein. Installation shall be made in a workmanlike manner by skilled mechanics experienced in erection of this type of fence.

2. The fence shall be erected on line and to grade provided by the drawings and plans.

3. All posts are to be set in concrete footings in the ground to a minimum depth of 36". The diameter of the footing shall be a minimum of 10", except for gate posts, for which the minimum diameter of the footing shall be a minimum of 3 times the outside diameter of the gate posts. Concrete for the footing shall conform to ASTM C 94. All footings shall extend approximately 2" above the ground and shall be crowned to allow for proper drainage.

4. The fabric shall be stretched to proper tension between the terminal posts and securely fastened to the framework members (see paragraph 5C). The bottom of the fabric shall be held as uniformly as possible to the finished grade.

9. SECURITY WIRE

A. Security wire, when specified, shall consist of three strands of barbed wire hung on single 45 degree arms, one per post.

B. Barbed wire , when specified, shall be two strand 12 gauge galvanized steel wire with 14 gauge point barbs spaced not more than 5 inches on center and shall conform to the requirements of ASTM A121.

10. CLEAN UP

A. Upon completion of the installation, all debris created by the installation shall be removed from the premises of the Owner and/or properly disposed of as directed by the General Contractor.

SECTION 02950
LANDSCAPE PLANTINGS

1. GENERAL

A. Related Document

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

B. Summary

1. This section includes providing all labor, materials, equipment and services to complete the landscape plantings including initial maintenance and guarantee.

C. Quality Assurance

1. Landscape work to be performed by a single firm specializing in landscape work.

2. Source Quality Control:

a. General: Ship landscape materials with certifications of inspection required by governing authorities. Comply with regulations applicable to landscape materials.
b. Do not make substitutions. If specified landscape material is not obtainable, submit proof of non-availability to Owner's Representative, together with proposal for use of equivalent material.
c. Label at least one plant of each variety with a securely attached waterproof tag bearing legible designation of botanical and common name.
d. Inspection: Notify Owner's Representative to perform an inspection of plant materials prior to commencing planting operations. The Owner's Representative may inspect plants either at place of growth or at site before planting, for compliance with requirements for genus, species, variety, size and quality. Owner's Representative retains the right to further inspect trees and shrubs for size and quality. Owner's Representative retains the right to further inspect trees and shrubs for size and condition of balls and root systems, insects, injuries and latent defects, and to reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from project site.

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this Section.

DESCRIPTION OF WORK: Work in this Section includes, but is not necessarily limited to, furnishing and installing the following:

Extent of cast-in-place concrete is shown on drawings. This Section includes the following miscellaneous materials associated with cast-in-place concrete:

Waterstops

Premolded joint filler

Underslab moisture barrier

SUBMITTALS

Shop Drawings:

Shop Drawings/Reinforcement: See ACI 301, Section 5.1 Detailing shall conform to ACI 315-80 "Details of concrete reinforcement".

Shop drawing submittals shall consist of a direct reading transparency plus 2 prints of each drawing.

"Standard Specifications for Structural Concrete for Buildings, ACI-301-Chapter 4, Formwork"

"Recommended Practice for Concrete Formwork, ACI-347-78 Chapter 1, Design"

Mix Design: See paragraph 2.7 herein for submittal requirements.

Product Data: Submit data for proprietary materials and items, including reinforcement and forming accessories, admixtures, patching compounds, waterstops, joint systems, curing compounds, dry-shake finish materials, and as requested by Architect.

Laboratory Test Reports: Submit laboratory test reports for concrete materials and mix design.

Materials Certificates: Provide materials certificates in lieu of materials laboratory test reports when permitted by Owner's Representative. Materials certificates shall be signed by manufacturer and Contractor, certifying that each material item complies with, or exceeds, specified requirements. Provide certification that total chloride content of concrete complies with specification requirements. Maximum water-soluble chloride ion in concrete, percent by mass of cement shall be 0.10.

QUALITY ASSURANCE

Codes and Standards: Comply with provisions of following codes, specifications, and standards, except where more stringent requirements are shown or specified:

Reference Specification: To be complete, this Specification Section requires the use of ACI 301-89 "Specifications for Structural Concrete for Buildings". This specification Section is intended to supplement and modify ACI 301, and will take precedence where conflict exists. Requirements of ACI 301 shall govern the work, except as noted herein.

Field References: Attention is called to requirement (see ACI 301, Section 1.6) for keeping a copy of ACI SP-15 Field Reference manual, in the Concrete Installer's field office at all times. Supervisory personnel shall be familiar with ACI 301 and other standards contained in SP015, as well as with the project specification.

ACI 305-77 (82) "Hot Weather Concreting"

ACI 306-88 "Cold Weather Concreting"

All Admixtures shall be produced by a single manufacturer, unless otherwise approved by Architect.

Materials and installed work may require testing and retesting at anytime during progress of work. Tests, including retesting of rejected materials for installed work, shall be done at Contractor's expense.

Source Quality Control: Materials are subject to inspection and tests in field, conducted by a qualified inspection agency. Such inspections and tests will not relieve contractor of responsibility for providing materials in compliance with specification requirements. Promptly remove and replace materials or components which do not comply.

Concrete Testing Service: The Owner shall engage a testing laboratory to perform material evaluation tests and to design concrete mixes.

The reinforcing steel supplier shall certify that all reinforcing steel has been manufacturer in the United States and meets the designated ASTM specifications.

Testing: As per ACI 301, Chapter 16, except as noted.

Required testing services of Sections 16.3 and 16.4 will be performed by an independent testing laboratory employed by the Owner. Testing services required in Section 16.5 shall be performed by same laboratory but at Contractor's expense.

All samples shall be taken after any addition of water at the job site is complete. When pumping or pneumatic equipment is used, samples shall be taken at discharge end. This is for both cylinders and slump tests.

Mold and cure three specimens (cylinders) in accordance with ASTM C31. Three specimens constitute a strength test. Test on cylinder at 7 days and 2 at 28 days. Acceptance of structure will be based on results of 28 day tests.

Air Content:

Determine air content of concrete for each strength test by either the pressure method (ASTM C231) or the volumetric method (ASTM C173). The "chase" air indicator shall not be used.

A minimum of one air content test shall be made in the morning and one in the afternoon. Air content tests shall be made on all concrete whether the concrete is designate as air-entrained or not.

Additional air content tests, for concrete specified as air-entrained, shall be made when any of the following conditions occur:

A change in appearance or consistency of concrete.

Possible reduction of air content due to time delays of truck and/or hot weather.

When air temperature is over 80 degrees F, check each truck load.

Inform Engineer immediately of any slump and/or air content tests that do not meet these specifications. If strength, durability or aesthetics of the structure would be impaired, that concrete shall not be used.

Concrete test reports shall contain the following information: Concrete supplier, quantity of concrete represented, location of samples taken, design strength requirement at 28 days, list of all materials and admixtures used with quantity and brand or source, actual slump, actual air content, air temperature, concrete temperature, weather, cylinder weight as received, date molded, number of days on job site, date tested, test results for 7 and 28 days, and any other information necessary to evaluate test results.

Send one copy of reports on all required laboratory testing directly to the Owner's Representative, one copy to the Contractor and one copy to the concrete supplier. A copy of all test reports shall be in Owner's Representative's office within a minimum of five (5) working days from date of test or inspection.

Verbal information on any concrete not meeting these specifications shall be communicated to the Owner's Representative immediately by phone.

Contractor's responsibility: Provide a box for storing concrete test specimens while on job; maintain temperature in the box between 60 and 80 degrees F; prevent loss of moisture from specimens in accordance with ASTM C31.

Evaluation and acceptance of Concrete: Chapter 17 and as follows: Any test results on in-place concrete conducted without prior knowledge and input of the Owner's

Representative, will not be accepted. Owner's Representative reserves the right to reject any nondestructive test results that he considers improperly calibrated or correlated.

Acceptance of Structure: Chapter 18 and as follows: If 28 day test results do not meet requirements of Section 17.2, the Engineer shall have the right to order a change in mix proportions for remaining portions of structure. he may require core test in accordance with Section 17.3.2 to be made at Contractor's expense. Any such testing shall be done by an independent testing agency acceptable to the Owner's Representative.

Testing agencies affidavit that construction is in conformance with the Drawings and specifications.

Contractor shall be responsible for construction loads and necessary supplemental support of members during construction with regard to project safety and construction damage.

Concrete floor sample panel in accordance with item 3.14.3 of ACI-89 shall be placed and maintained as a standard of quality during construction of this project.

PROJECT CONDITIONS

Protection of Footings Against Freezing: Cover completed work at footing level with sufficient temporary or permanent cover as required to protect footings and adjacent subgrade against possibility of freezing; maintain cover for time period as necessary.

Protect adjacent finish materials against spatter during concrete placement.

DELIVERY, STORAGE AND HANDLING

See ACI 301, Section 2.5.

Store reinforcement off the ground to avoid soling by foreign materials.

PART 2 - PRODUCTS

MATERIALS, GENERAL

Where applicable, reference is made herein to material requirements given in ACI 301.

Use manufactured materials in accordance with manufacturer's recommendations. If such recommendations differ from requirements specified herein, call to Engineer's attention before proceeding. Generally, the more stringent requirements will apply.

FORM MATERIALS

General: As per ACI 301, Sections 4.2 and 10.2, except as noted.

Forms for Exposed Finish Concrete: Unless otherwise indicated, construct formwork for exposed concrete surfaces with plywood, metal, metal-framed plywood faced or other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sized to minimize number of joints and to conform to joint system shown on Drawings. Provide form material with sufficient thickness to withstand pressure of newly placed concrete without bow or deflection.

Plywood shall comply with U.S. Product Standard PS-1 "B-B (Concrete Form) Plywood", Class I, Exterior Grade or better, mill-oiled and edge-sealed, with each piece bearing legible inspection trademark.

Forms for Unexposed Finish Concrete: Form concrete surfaces which will be unexposed in finished structure with plywood, lumber, metal or other acceptable material. Provide lumber dressed on at least 2 edges and one side for tight fit.

Form Coatings: Provide commercial formulation form-coating compounds that will not bond with, stain, nor adversely affect concrete surfaces, and will not impair subsequent treatments of concrete surfaces.

Carton Forms: Waffle configuration, Jefferson-Smurfit Corporation of America or equal, double wall, laminated using water-resistant adhesive and coated with paraffin containing 10% polyethylene, sizes as indicated. Materials in sheets of 2 to 3 feet wide and 8 feet long of thickness shown on Drawings with protection board. Distributor: Redipackaging, Contact: Darrel Maples (214) 330-9286.

Form Ties: Factory-fabricated, adjustable-length, removable or snap-off metal form ties, designed to prevent form deflection and to prevent spalling concrete upon removal. Provide units which will leave no metal closer than 1-1/2" to surface.

Provide ties which, when removed, will leave holes not larger than 1" diameter in concrete surface.

REINFORCING MATERIALS

Reinforcement: As per ACI 301, Section 5.2, with Selections and Supplements as follows:

Reinforcing Bars: ASTM A 615-87, Grade 60, deformed.

Steel Wire: ASTM A 82-85, plain, cold-drawn steel.

Welded Wire Fabric: ASTM A 185-85, for plain wire, welded steel wire fabric.

Supports for Reinforcement: Provide bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place. Use wire bar type supports complying with CRSI specifications.

For slabs-on-grade, use supports with sand plates or horizontal runners where base material will not support chair legs.

For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with legs which are plastic protected (CRSI, Class 1) or stainless steel protected (CRSI, Class 2).

Slab Bolsters: For support of all reinforcement over carton forms.

CONCRETE MATERIALS

General:

Cements, admixtures, water and aggregates shall conform to ACI 301, Chapter 2, with selections and supplements as specified herein.

Cements: All cements used shall be Portland Cements conforming to ASTM C150, Type I or III, unless otherwise acceptable to Architect. Types 1A and 1P and fly ash are not acceptable. Use one brand of cement throughout project.

Normal Weight Aggregates: ASTM C 33-86, and as specified. Provide aggregates from a single source for exposed concrete.

For exterior exposed surfaces, do not use fine or coarse aggregates containing spalling-causing deleterious substances.

Local aggregates not complying with ASTM C33 but which have shown by special test or actual service to produce concrete of adequate strength and durability may be used when acceptable to the Architect.

Water: Drinkable.

Air-Entraining Admixture: ASTM C 260-86, certified by manufacturer to be compatible with other required admixtures. Allowable admixture shall be a Vinsol Resin.

Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:

"Air-Mix"; Euclid Chemical Co.

"MB-AE 90"; Master Builders.

Approved Equal

Water-Reducing Admixture: ASTM C 494-86, Type A, and containing not more than 0.1 percent chloride ions.

Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:

"Pozzolith Normal" Master Builders

"Polyheed"; Master Builders

"Plastocrete 160"; Sika Chemical Corp

"Chemtard"; Chem-Masters Corp

Approved Equal

High-range, water-reducing admixture (super plasticizer) conforming to ASTM C494, Type F or G. Free of chlorides and alkalines, batch plant added, providing a minimum of 20 percent water reduction. Slump shall not exceed 9 inches.

Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:

"Rheobuild"; Master Builders

"Sikament 300", Sika Corporation

Approved Equal

Freeze Protection Admixture: At the contractor's option, a water-reducing, non-chloride accelerating admixture conforming to ASTM C-494, Type E containing not more than 0.1% chloride ions, specially formulated to provide concrete protection from freezing to as low as 20 degrees F., may be used.

Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:

"Pozzutec 20"; Master Builders

"Accelguard 80", Euclid Chemicals Company

Approved Equal

Prohibited Admixtures: Calcium chloride thyocyanates or admixtures containing more than 0.1 percent chloride ions by weight of cement are not permitted.

RELATED MATERIALS

Granular Base: Evenly graded mixture of fine and coarse aggregates to provide, when compacted, a smooth and even surface below slabs on grade.

Non-Shrink Grout: CRD-C 621, Factory Pre-Mixed Grout

Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:

"Set Grout"; Master Builders.

"Euco-NS"; Euclid Chemical Co.

"Sika Grout 212", Sika Corporation

"Sono Grout 14K", Sonneborn

Vapor Retarder: Provide vapor retarder cover over prepared base material where indicated below slabs on grade. Use only materials which are resistant to decay when tested in accordance with ASTM E 154, as follows:

Polyethylene sheet not less than 15 mils thick.

Curing Materials:

General: As per ACI 301, Sections 12.1 and 12.2, with selections and supplements as specified herein.

Moisture Retaining Cover: One of the following, complying with ASTM C-171.

Waterproof Paper

4 mil (.004") Polyethylene Film

White Polyethylene-Coated Burlap

Liquid Membrane-Forming Curing Compound: Liquid type, membrane-forming curing compound complying with ASTM C 309, Type I Class A. Moisture loss not more than 0.055 gr./sq. c.m. when applied at 200 sq. ft./gal.

Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following.

Exposed Flooring: Two (2) coats of one of the following liquid membrane-forming curing compounds:

"Kure-N-Seal", Sonneborn

"Spray Cure and Seal 15", Spray-Cure.

"Eucocure", Euclid Chemicals.

Concrete to be covered with coating material, such as floor hardener, flooring (carpet, tile), painting, or other finish materials. Contractor to verify compatibility with adhesive manufacturer.

"Kure-N-Seal", Sonneborn-Rexnord.

"Spray Cure and Seal 15", Spray-Cure.

"Eucocure", Euclid Chemicals.

Bonding Compound: Polyvinyl acetate (interior only) or acrylic base.

Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:

Sonocrete; Sonneborn-Contech

"Euco Weld", Euclid Chemicals

"Weld-Crete", Larsen Products Corporation

"Polyweld", Chem-Masters Corporation

"Daraweld"; W.R. Grace

"Everbond"; L & M Construction Chemicals

Epoxy Adhesive: ASTM C 881, two component material suitable for use on dry or damp surfaces. Provide material "Type", "Grade", and "Class" to suit project requirements.

Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:

"Sikadur 32-Hi-Mod", Sika Chemical Corporation

"Concresive LPL", Master Builders

Euco Epoxy System #452 or #620", Euclid Chemical Company

Waterstops: Provide flat, dumbbell type or centerbulb type waterstops at construction joints and other joints as indicated, sized to suit joints, either rubber, Corps of Engineers (CE) CRD-C 513, or polyvinyl chloride (PVC), CE CDR-C, 572.

Sealing Materials: For laps in sheet covering, provide pressure sensitive tape, nonstaining mastic, or other effective adhesive recommended by covering manufacturer.

Finishing Aid: Sprayable material designed to form a monomolecular film on fresh plastic concrete, and to retard moisture evaporation prior to finishing; such as Confilm of Master Builders Company.

PROPORTIONING AND DESIGN OF MIXES

General: As per ACI 301, Chapter 3, except as noted.

Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 301. If trial batch method used, use an independent testing facility acceptable to Architect for preparing and reporting proposed mix designs. The testing facility shall not be the same as used for field quality control testing.

Submit written reports to Owner's Representative of each proposed mix for each class of concrete at least 15 days prior to start of work. Do not begin concrete production until mixes have been reviewed by and acceptable to the Owner's Representative. No concrete shall be placed until the mixes have been approved in writing by the Owner's Representative.

All concrete shall be normal weight to concrete, 145 pcf, except where otherwise specified and all concrete shall have minimum slump of 4" unless noted otherwise.

Maximum permissible water cement ratio by weight including free surface moisture on aggregate and liquid admixtures shall be as follows:

Non Air-Entrained Concrete

3000 PSI - 0.60

4000 PSI - 0.55

Air-Entrained Concrete

3000 PSI - 0.50

4000 PSI - 0.45

Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant; at no additional cost to Owner and as accepted by Architect. Laboratory test data for revised mix design and strength results must be submitted to and accepted by Architect before using in work.

Concrete Quality: Delete Section 3.14 ACI 301 and accompanying tables from this specification. See notes on Structural Drawings for compressive strength, cement content, and other quality requirements for various areas.

Use of Admixtures:

All concrete shall contain the specified water-reducing admixture. Concrete slabs placed at temperatures below 50 degrees F. shall contain an accelerator. When increase workability or pumpability, lower water-cement ratio and higher ultimate and/or initial strength are required, superplasticizer may be used.

When more than one admixture is used in a concrete mix, they shall be of the same manufacturer.

Use air-entraining admixture in all exterior exposed concrete, unless otherwise indicated. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having total air content of 6% with a tolerance of plus-or-minus 1 percent.

Use admixtures for water-reducing and set-control in strict compliance with manufacturer's directions.

Minimum Cement Factor: Provide concrete for following conditions with minimum cement factor as follows:

Subjected to freezing and thawing; 564 pounds per cubic yard.

Concrete containing superplasticizer shall have a maximum slump of 8" after the addition of superplasticizer at the truck, unless otherwise directed by the Owner's Representative. This concrete shall arrive at the job site having slump between 2" and 3", to be verified, and then the superplasticizer added to reach approved slump level.

Selection of Proportions

Proportions for all classes of concrete shall be selected by one of the methods described in Sections 3.9 and 3.10 of ACI 301. Mixes must be approved by the Owner's Representative before use on the job. No deviations from the approved mixes will be permitted without the Owner's Representative prior approval.

Mix designs proportioned on the basis of previous field experience or trial mixtures (Section 3.9) shall be been prepared by an independent testing laboratory within the past 12 months.

For computation of standard deviation referred to in Section 3.9.1.1 of ACI 301, show data in tabular form.

CONCRETE PRODUCTION

General: As per ACI 301, Chapter 7, except as noted.

Ready-Mixed Concrete: Use for all work, except that when small quantities (not over 1/2 cu yd) are needed for isolated or relatively unimportant items, concrete may be batch mixed at site, subject to Owner's Representative prior approval.

Delivery Ticket: In addition to information required on the delivery ticket in ASTM C 94, the following data regarding water, expressed in gal./cu. yd., shall be shown on the delivery ticket or on an attached batch ticket for each truckload of concrete:

Mix design water requirement

Free water in aggregate

Water added at plant

Permissible water to add at job site.

Mixing Time: Concrete which has attained its initial set or as contained water for longer than listed below, shall not be deposited in the work.

Concrete Temperature at Time of Placement, Degrees	Maximum Time Before Placement, Hour
Under 80	1-1/2
80 t0 85	1-1/4
86 to 90	1
Over 90	1, with Architect's approval dependent on slump and use

FABRICATING REINFORCEMENT

General: As per ACI 301, Sections 5.3 and 5.4, except as follows:

No welding of reinforcing bars will be permitted without approval of the Architect.

PART 3 - EXECUTION

GENERAL

General: As per ACI 301, Chapter 4, except as noted.

Coordinate the installation of joint materials and vapor barriers with placement of forms and reinforcing steel.

FORMS

Design, erect, support, brace, and maintain formwork to support vertical and lateral, static, and dynamic loads that might be applied until such loads can be supported by concrete structure. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation, and position. Maintain formwork construction complying with ACI 117.

Design formwork to be readily removable without impact, shock, or damage to cast-in-place concrete surfaces and adjacent materials.

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

Carton Forms:

Forms to be assembled and placed in accordance with manufacturer's directions.

Sequence of construction over cardboard carton forms is of utmost importance. The carton form base of sand must be level and compacted to provide a stable base for the forms.

Forms must not be placed if rain is expected within the next several days. The reinforcing mat should follow so that a given section of slab can be formed, reinforcing laid and slab poured in the shortest time possible.

It is critical that these forms are protected from moisture. A dewatering under slab trench system should be installed to allow any surface water a route out from under the slab and cardboard forms, in the event the pour/project is subject to a rain storm. If Forms are water soaked after installation, they must be allowed adequate time to dry before concrete is paced over them.

If water has destroyed the structural integrity of the forms and they are unable to withstand the concrete slab load, the forms **must be removed and replaced**.

All forms are to be supported with temporary shoring so as to resist any lateral movement which may result in the forms being crushed when the concrete is placed.

An accurate record of the required concrete quantity must be maintained to assure that no concrete has crushed the forms and has filled the resulting cavity.

The top protective board shall be installed perpendicular to the form sheets and nailed down as per the manufacturer's written instructions.

It will be the concrete subcontractor's responsibility to inspect the forms prior to concrete placement and to assure all voids, cracks, seams, pipe and electrical penetrations have been adequately sealed so that no concrete can flow into the void below.

Reinforcing steel to be supported from forms should be carried on slab bolsters with runners to prevent puncture of forms and consequent displacement of steel.

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

Provide temporary openings where interior area of formwork is inaccessible for cleanout, for inspection before concrete placement, and for placement of concrete. Securely brace temporary openings and set tightly to forms to prevent loss of concrete mortar. Locate temporary openings on forms at inconspicuous locations.

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

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

Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris just before concrete is placed. Retightening forms and bracing after concrete placement is required to eliminate mortar leaks and maintain proper alignment.

VAPOR BARRIER INSTALLATION

Following leveling and tamping of granular base for slabs on grade, place vapor barrier sheeting with longest dimension parallel with direction of pour.

Lap joints 6" and seal with appropriate tape.

After placement of moisture barrier, cover with granular material and compact to depth as shown on drawings.

PLACING REINFORCEMENT

General: As per ACI 301, Sections 5.4 and 5.5, except as noted:

Comply with Concrete Reinforcing Steel Institute's recommended practice for "placing reinforcing bars", for details and methods of reinforcement placement and supports, and as herein specified.

Avoiding cutting or puncturing vapor barrier during reinforcement placement and concreting operations.

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

Accurately position, support, and secure reinforcement against displacement by formwork, construction, or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as required.

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

Install welded wire fabric in sheets. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset end laps in adjacent widths to prevent continuous laps in either directions.

JOINTS

General: As per ACI 301, Chapter 6, with joint locations as noted:

Construction Joints: Locate and install construction joints as indicated or, if not indicated, locate so as not to impair strength and appearance of the structure, as acceptable to Architect.

Provide keyways at least 1-1/2" deep in construction joints in walls, slabs, and between walls and footings: accepted bulkheads designed for this purpose may be used for slabs.

Place contraction joints perpendicular to main reinforcement. Continue reinforcement across construction joints, except as otherwise indicated.

Construction joints shall be spaced at a maximum of 125 feet at all footings.

Isolation Joints in slabs-on-ground: Construct isolation joints in slabs-on-ground at points of contact between slabs-on-ground and vertical surfaces, such as column pedestals, foundation walls, grade beams, and elsewhere as indicated.

Joint filler and sealant materials are specified in Division 7 Sections of these Specifications.

Contraction (Control) Joints in Slabs-on-Ground: Construct contraction joints in slabs-on-ground to form panels of patterns as shown. Use saw cuts 1/8" x 1/3 slab depth or inserts 1/4" wide x 1/3 of slab depth, unless otherwise indicated.

Form contraction joints by inserting premolded plastic, hardboard or fiberboard strip into fresh concrete until top surface of strip is flush with slab surface of strip is flush with slab surface. Tool slab edges round on each side of insert. After concrete has cured, remove inserts and clean groove of loose debris.

Contraction Joints in unexposed floor slabs may be formed by saw cuts as soon as possible after slab finishing as may be safely done without dislodging aggregate.

If joint pattern is not shown, provide joints not exceeding 15' in either direction and located to conform to bay spacing wherever possible (at column centerlines, half bays, third-bays).

Joint sealant material is specified in Division 7 Sections of these Specifications.

INSTALLATION OF EMBEDDED ITEMS

General: It is this Contractor's responsibility to coordinate with all trades for the setting of the sleeves, anchors, dovetail slots, inserts, frames, flashing reglets, and other embedded items and provide all openings required for the installation of other work in accordance with the Contractor's shop drawings and certified prints.

Structural Integrity: Provide no sleeves or openings in structural concrete unless shown on the structural drawings or approved by the Architect.

Edge Form and Screed Strips for Slabs: Set edge forms or bulkheads and intermediate screed strips for slabs to obtain required elevations and contours in finished slab surface. Provide and secure units sufficiently strong to support types of screed strips by use of strike-off templates or accepted compacting type screeds.

PREPARATION OF FORM SURFACES

Clean reused forms of concrete matrix residue, repair and patch as required to return forms to acceptable surface condition.

Coat contact surfaces of forms with a form-coating compound before reinforcement is placed.

Thin form-coating compounds only with thinning agent of type, amount, and under conditions of form-coating compound manufacturer's directions. Do not allow excess form-coating material to accumulate in forms or to come into contact with in-place concrete surfaces against which fresh concrete will be placed. Apply in compliance with manufacturer's instructions.

CONCRETE PLACEMENT

General: As per ACI 301, Chapter 8, except as noted.

Preplacement Inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast-in. Notify other crafts to permit installation of their work; cooperate with other trades in setting such work. Moisten wood forms immediately before placing concrete where form coatings are not used.

Apply temporary protective covering to lower two feet of finished walls adjacent to poured floor slabs and similar conditions, and guard against spattering during placement.

Placing: No concrete shall be placed except when Architect or independent testing laboratory representative is present, unless this requirement is specifically waived by the Architect. Give adequate notice to the Architect, the testing laboratory, and all contractors affected before placing concrete. Allow adequate time for installation of all necessary parts.

General: Comply with ACI 304 R-85 "Guide for Measuring, Mixing, Transporting, and Placing Concrete", and as herein specified.

Deposit concrete continuously or in layers of such thickness that no concrete will be placed on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as herein specified. Deposit concrete as nearly as practicable to its final location to avoid segregation.

Placing Concrete in Forms: Deposit concrete in forms in horizontal layers not deeper than 24" and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.

Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures for consolidation of concrete in accordance with ACI 309(R-87).

Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than visible effectiveness of machine. Place vibrators to rapidly penetrate placed layer and at least 6" into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion limit duration of vibration to time necessary to consolidate concrete and complete embediment of reinforcement and other embedded items without causing segregation of mix.

Placing Concrete Slabs: Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until the placing of a panel or section is completed.

Consolidate concrete during placing operations so that concrete is thoroughly worked around reinforcement and other embedded items and into corners.

Bring slab surfaces to correct level with straightedge and strikeoff. Use bull floats or darbies to smooth surface, free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations.

Maintain reinforcing in proper position during concrete placement operations.

Cold Weather Placing: Protect concrete work from physical damage or reduced strength which could be caused by frost, freezing actions, or low temperatures, in compliance with ACI 306 R-88 (new specification) and as specified.

When air temperature has fallen to or is expected to fall below 40 deg F (4 deg. C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg. F (10 deg. C), and not more than 80 deg F (27 deg C) at point of placement.

Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.

Do not use calcium chloride, salt, and other materials containing antifreeze agents or chemical accelerators, unless otherwise accepted in mix designs.

Water-reducing, non-chloride accelerator admixture may be allowable only with prior approval by Architect.

Hot Weather Placing: When hot weather conditions exist that would seriously impair quality and strength of concrete, place concrete in compliance with ACI 305 R-72 (88) and as herein specified.

Cool ingredients before mixing to maintain concrete temperature at time of placement below 90 degrees Fahrenheit. Mixing water may be chilled, or chopped ice may be used to control temperature provided water.

Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedment

in concrete. Fog spray forms, reinforcing steel and subgrade just before concrete is placed.

REPAIR OF SURFACE DEFECTS

General: As per ACI 301, Chapter 9, except that concealed concrete surfaces not exposed to view upon completion, may be patched with nonshrink mortar in lieu of ACI specified mortar.

FINISH OF FORMED SURFACES

General: As per ACI 301, Chapter 10, with sections as follows:

Rough Form Finish: For formed concrete surfaces not exposed-to-view in the finish work or by other construction, unless otherwise indicated. This is the concrete surface having texture imparted by form facing material used, with tie holes and defective areas repaired and patched and fins and other projections exceeding 1/4" in height rubbed down or chipped off.

Smooth Form Finish: For formed concrete surfaces exposed-to-view, or that are to be covered with a coating material applied directly to concrete, or a covering material applied directly to concrete, such as waterproofing, dampproofing, veneer plaster, painting, or other similar system. This is as-cast concrete surface obtained with selected form facing material, arranged orderly and symmetrically with a minimum of seams. Repair and patch defective areas with fins or other projections completely removed and smoothed.

Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces occurring adjacent to formed surfaces, strike-off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

MONOLITHIC SLAB FINISHES

General: Finish concrete floor surfaces in accordance with ACI 301.

Examination:

Verify that all floor surfaces are ready to receive Work.

Starting Work constitutes acceptance of the existing conditions and this Contractor shall then, at their expense, be responsible for correcting all unsatisfactory and defective Work encountered.

Initial Working:

Remove surface irregularities with bull float before water appears on concrete surface.

Do no further working of the surface until time for floating; do not work surface while water is present.

"Dry Sprinkle" method finishing is not acceptable and will be cause for rejection.

Scratch Finish: Apply scratch finish to monolithic slab surfaces that are to receive concrete floor topping or mortar setting beds for tile, portland cement terrazzo, and other bonded applied cementitious finish flooring material, and as otherwise indicated.

After placing slabs, plane surface to tolerances for floor flatness (FF) of 15 and floor levelness (FL) of 13. Slope surfaces uniformly to drains where required. After leveling, roughen surface before final set, with stiff brushes, brooms, or rakes.

Float Finish: Apply float finish to monolithic slab surface to receive trowel finish and other finishes as hereinafter specified, and slab surfaces which are to be covered with membrane or elastic waterproofing, membrane or elastic roofing, or sand-bed terrazzo, and as otherwise indicated.

After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating when surface water has disappeared or when concrete has stiffened sufficiently to permit operation of power-driven floats, or both. Walking on surface shall not leave heel prints more than 1/4 inch deep. Consolidate surface with power-driven floats, or by hand-floating if area is small or inaccessible to power units. Check and level surface plane to tolerances of FF 18 - FL 15. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to a uniform, smooth, granular texture.

Trowel Finish: Apply trowel finish to monolithic slab surfaces to be exposed-to-view, and slab surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile, paint, or other thin film finish coating, system.

After floating, begin first trowel finish operation using a power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-troweling operation, free of trowel marks, uniform in texture and appearance, and with surface leveled to tolerances of FF 20 - FL 17. Grind smooth surface defects which would telegraph through applied floor covering system.

Trowel and Fine Broom Finish: Where ceramic or quarry tile is to be installed with thin-set mortar, apply trowel finish as specified, then immediately follow with slightly scarifying surface by fine brooming.

Non-Slip Broom Finish: Apply non-slip broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.

Immediately after float finishing, slightly roughen concrete surface by brooming with fiber bristle broom perpendicular to main traffic route. Coordinate required final finish with Owner's Representative before application.

CONCRETE CURING AND PROTECTION

General: As per ACI 301, Chapter 12, except as noted. Requirements for curing and protection specified in ACI 301 shall be strictly observed, with particular emphasis on the following:

Initial curing may be accomplished by any of the methods given in ACI 301, Section 12.2, except as noted, using materials specified herein.

Maintain initial curing for approximately 12 hours after finishing. Increase this period to 24 hours when air temperature is 75 degrees F and above.

Total curing period shall consist of 7 cumulative days, (3 days for high-early strength concrete) not necessarily consecutive, during which air in contact with concrete is above 50 degrees F.

For formed surfaces, keep wood forms in contact with concrete wet, as well as steel forms heated by the sun. After form removal, maintain curing for any time remaining of required curing period.

General: Protect freshly place concrete from premature drying and excessive cold or hot temperatures.

Warm, Dry or Windy Weather: Use finishing aid specified herein to reduce moisture evaporation from freshly placed concrete when it is exposed to rapid dry conditions: direct sunlight, low humidity, heated interior, high wind, etc. Prepare dilute solution and spray apply on rate of 10 to 20 gallons solution/5000 sq. ft. if drying conditions are particularly severe, make additional applications as required following various finishing steps.

Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting, keep continuously moist for not less than 7 days.

Begin final curing procedures immediately following initial curing and before concrete has dried. Continue final curing for at least 7 days in accordance with ACI 301 procedures. Avoid rapid drying at end of final curing period.

Curing Methods: Perform curing of concrete by curing and sealing compound, by moist curing, by moisture-retaining cover curing, or by combinations thereof, as specified.

Provide curing and sealing compound to interior slabs and to exterior slabs, walks, and curbs, as follows:

Apply specified curing and sealing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours). Apply uniformly in continuous operation by power-spray or roller in accordance with manufacturer's directions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.

Reflective Materials: During hot sunny weather (generally 75 degrees F. and above) use of white or light colored curing materials is recommended to help keep down concrete surface temperature. White or gray pigmented curing compound shall not be used when determined by the Architect to be objectionable.

Do not use membrane curing compounds on surfaces which are to be covered with coating material applied directly to concrete, liquid chemical floor hardener, waterproofing, dampproofing, membrane roofing, flooring (such as ceramic or quarry tile, glue-down carpet), painting, and other coatings and finish materials, unless otherwise acceptable to Architect.

Membrane curing compounds may be used where flooring (i.e., carpet, tile) is scheduled upon verifying compatibility with adhesive manufacturer.

Where membrane curing and sealing compound is not permitted, Contractor shall provide moisture curing by the following method:

Cover concrete surfaces with moisture-retaining cover for curing concrete placed in widest practicable width with sides and ends lapped at least three inches and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

Curing Formed Surfaces: Cure formed concrete surfaces, including undersides of beams, supported slabs, and other similar surfaces by moist curing with forms in place for full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.

Curing Unformed Surface: Cure unformed surfaces, such as slabs, floor topping, and other flat surfaces by application of appropriate curing method.

Final cure concrete surfaces to receive finish flooring by use of moisture retaining cover, unless specified otherwise.

Sealer and Dustproofer: Apply a second coat of specified curing and sealing compound only to surfaces given a first coat.

REMOVAL OF FORMS

Formwork not supporting weight of concrete, such as sides of beams, walls, columns, and similar parts of the work, may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for 24 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form removal operations, and provided curing and protection operations are maintained.

Formwork supporting weight of concrete, such as beam soffits, joists, slabs, and other structural elements, may not be removed in less than 14 days and until concrete has attained design minimum compressive strength at 28 days. Determine potential compressive strength of in-place concrete by testing field-cured specimens representative of concrete location or members.

Form facing material may be removed 4 days after placement, only if shores and other vertical supports have been arranged to permit removal of form facing material without loosening or disturbing shores and supports.

RE-USE OF FORMS

Clean and repair surfaces of forms to be reused in work. Split, frayed, delaminated, or otherwise damaged form facing material will not be acceptable for exposed surfaces. Apply new form coating compound as specified for new formwork.

When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joint to avoid offsets. Do not use "patched" forms for exposed concrete surfaces, except as acceptable to Architect.

MISCELLANEOUS CONCRETE ITEMS

Filling-In: Fill-in holes and openings left in concrete structures for passage of work by other trades, unless otherwise shown or directed, after work of other trades is in place. Mix, place, and cure concrete as herein specified, to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete work.

Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

Equipment Bases and Foundations: Provide machine and equipment bases and foundations, as shown on drawings. Set anchor bolts for machines and equipment to template at correct elevations, complying with certified diagrams or templates of manufacturer furnishing machines and equipment.

Grout base plates and foundations as indicated, using specified non-shrink grout. Use non-metallic grout for exposed conditions, unless otherwise indicated.

CONCRETE SURFACE REPAIRS

Patching Defective Areas: Repair and patch defective areas with cement mortar immediately after removal of forms, when acceptable to Architect.

Cut out honeycomb, rock pockets, voids over 1/4" in any dimension, and holes left by tie rods and bolts, down to solid concrete but, in no case to a depth of less than 1". Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water, and brush-coat the area to be patched with specified bonding agent. Place patching mortar after bonding compound has dried.

For exposed-to-view surfaces, blend white portland cement and standard portland cement so that, when dry, patching mortar will match color surrounding. Provide test areas at inconspicuous location to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.

Repair of Formed Surfaces: Remove and replace concrete having defective surfaces if defects cannot be repaired to the satisfaction of Architect. Surface defects, as such, include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets; fins and other projections on surface; and stains and other discolorations that cannot be removed by cleaning. Flush out form tie holes, fill with dry pack mortar, or precast cement cone plugs secured in place with bonding agent.

Correct high areas in uniformed surfaces by grinding, after concrete has cured at least 14 days.

Correct low areas in uniformed surfaces during or immediately after completion of surface finishing operations by cutting out low areas and replacing with fresh concrete. Finish repaired areas to blend into adjacent concrete. Proprietary patching compounds may be used when acceptable to Architect.

Repair methods not specified above may be used, subject to acceptance of Architect.

END OF SECTION

SECTION 03460
SUBDRAINAGE

PART 1 GENERAL

1.01
SUMMARY

A. Section Includes: Geocomposite Foundation Drainage Installation.

B. Related Sections:

1. Section 03300 – Cast in Place Concrete
7. Section 04200 – Masonry
8. Section 07620 – Flashing & Sheet Metal

1.02 REFERENCES

A. Standards of the following as referenced

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

1.03 SUBMITTALS

A. General: Submit listed submittals in accordance with Conditions of the Contract and Division 1 SubmittalProcedures Section.

B. Product Data: Submit manufacturer's product data and installation instructions. C. Quality Assurance/Control Submittals: Submit the following:

1. Certificates: Submit certificate that applicator complies with requirements of this section.

1.04 QUALITY ASSURANCE

A. Preinstallation conference: Coordinate with conference scheduled for waterproofing materials. Follow requirements indicated in waterproofing materials section.

1.05 DELIVERY, STORAGE & HANDLING

A. General: Comply with Division 1 Product Requirement Section.

B. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

C. Storage and Protection: Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer.

1.06 SEQUENCING AND SCHEDULING

A. Schedule installation after waterproofing installation but prior to backfill.

1.07 WARRANTY

A. Manufacturer's Material Only Warranty available.

PART 2 PRODUCTS

A. Manufacturer: Marflex Building Solutions

1. Contact: 6866 Chrisman Lane, Middletown, OH 45042; Telephone: (800) 498-1411, (513) 422-7285; Fax: (513) 422-7282
2. E-mail: technicalsupport@mar-flex.com; Website: www.MarflexBuildingSolutions.com

B. Proprietary Products/Systems should be purchased through an Authorized Dealer of Marflex Products.

2.01 Geocomposite Foundation Drainage – Section 334613.16

B. Type II DrainCore Foundation Drainage Roll: (or equal)

1. Core Material: Black, high impact polypropylene
    a. Moderate duty, impermeable polymeric sheet
    b. Foundation drainage rate: 21gal/min/ft²
    2. Fabric Material: White, non-woven filter fabric
    a. Flow – 140 gal/min/ft²
    b. Puncture – 65 lbs

2.03 Vertical Collection Drainage – Section 334616.16

A. 6" 522 DrainAway and 12" 523 DrainAway:

1. Core Material: Black, high impact polystyrene
    a. Formed dimpled core
    b. Flow- 170 gpm/ft width

2. Fabric Material: Black, non-woven filter fabric
    a. Flow – 140 gal/min/ft²
    b. Puncture – 65 lbs

2.04 PRODUCT SUBSTITUTIONS

A. Substitutions: Similar products are acceptable if they meet or exceed the specifications in this section

2.05 ACCESSORY MATERIALS

A. Provide proprietary accessory materials or comparable, including the following:

1. Marflex's 362 Mastic:
    a. Material: Plastic or resin material compatible with the waterproofing membrane.

2. Marflex's 6" 522 DrainAway Connectors
3. Marflex's 12" 523 DrainAway Connectors

PART 3 EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS

A. Comply with the most current written installation instructions and recommendations of the manufacturer.

3.02 EXAMINATION

A. Site Verification of Condition:
    1. Verify that waterproofing is in place.
    2. Verify that site conditions are acceptable for application of the roll.
    3. Do not proceed with application until unacceptable conditions are corrected.

3.03 PREPARATION

A. Surface Preparation:
    1. Application of waterproofing membrane

3.04 APPLICATION/INSTALLATION

A. Install Type II DrainCore after membrane has been applied. Place and secure to substrate according to manufacturer's current written instructions.

1. While the membrane is still tacky, begin installation at a corner. Install horizontally against the waterproofing membrane with the polypropylene geotextile mat side facing out-ward.
2. Install panels from top of footing extending to finish grade level. If there is overlapping off the membrane once you have reached the grade line, a utility knife or similar tool can be used to cut the rolls to the correct height.
3. For good adherence, apply uniform pressure throughout the surface area, not just the edges and corners.
4. When two edges come together from two separate pieces, overlap the dimples to create a continuous coverage of the wall.
5. Secure the Geo-Mat Plus to the wall with Geo-Mat accessories.
6. If the board overlaps the membrane once you have reached the grade line, a utility knife or similar tool can be used to cut the boards to the correct height.

B. Backfill and Drainage

1. #57 Gravel or equivalent must go no less than 2' high at the base of the foundation and 1' in depth away from the foundation walls.
2. Adequate interior and exterior foundation drainage at the base of the foundation walls, across any floors or adjacent flower beds must be properly installed and functioning properly.
3. Backfilling should begin no sooner than 24 hours after the installation of the board, but must be backfilled within 15 days.

C. 6" 522 DrainAway or 12" 523 DrainAway Vertical Collection System Installation

1. Unroll material along foundation base; adhere to partially cured waterproofing acceptable to waterproofing material manufacturer for cured waterproofing or other not requiring curing.
2. Install preformed corner fittings at foundation interior and exterior corners.
3. Install outlet fittings where indicated; connect to corrugated drainage pipe if present system installation; leave ready for connection to corrugated drainage pipe if not

3.06 CLEAN UP

A. Dispose of scrap in project dumpster and as required by law.

SECTION 04100
MORTAR

PART 1 -GENERALSUMMARY

Related sections:

Section 04150: Masonry Accessories.
Section 04220: Concrete Unit Masonry.

REFERENCES: Standards of the following are referenced:

American Society for Testing and Materials (ASTM).
Portland Cement Association (PCA).

DEFINITIONS: Terms:

AMU: Architectural unit masonry.
CMU: Concrete unit masonry or concrete masonry unit.

SUMITTALS:

Product data: Submit manufacturer's product specifications and mixing and installation instructions for each manufactured product.
Samples: Submit actual mortal samples for colored mortar; indicate color range of each color selected.

DELIVERY, STORAGE, AND HANDLING:

Packing and shipping: Provide bagged materials in original unopened packages or containers with manufacturer's labels intact and legible.
Acceptance at site: Punctured or wet bagged materials will not be accepted; immediately remove from site.
Storage and protection: Store materials under cover and off ground away from damp surfaces; remove wet or deteriorated bagged materials.

QUALITY ASSURANCE:

Qualifications:

Use only one brand of cement for each type specified throughout Project.
Provide sand for all Work from single source and pit, consistent in color.

PART 2 –PRODUCTS and MATERIALS

Portland cement:

Meeting ASTM C150-86, natural color, domestic manufacturer.
Normal weather and conditions: Type 1.
Cold weather: Type III or Type IIIA.

Hydrated lime: Meeting ASTM C207-79, Type S.
Masonry cement:

Acceptable manufacturers:

Blue Circle, Inc.
Giant Cement Company
U.S. Cement Company

Characteristics:

Meeting ASTM C91-87a, non-staining, 22% maximum air content by volume.
Color:

AMU: To match Architect's selection.
Normal CMU: Natural, similar to Giant Cement Company; Giant Dark Gray.

Aggregate:

Mortar: Clean, hard, natural, washed sand meeting ASTM C144084 and ASTM C404-85, Size No. 2, Natural.
Cement grout: Meeting ASTM C404-85, fine aggregate, Size No. 1.

Prepackaged color admixture for AMU Work: Submit standard color for architect's selection; made available for purchase from AMU manufacturer.

Integral water repellent mortar additive fro exterior CMU and AMU Work: Compatible with integral system in CMU and AMU; made available for purchase from CMU and AMU manufacturers. MORTAR TO BE MIXED WITH "ACME SHIELD" INTEGRAL WATER REPELLENT ADMIXTURE and integral color as used in the manufacture of the CMU's

Nonshrink grout: Mix prepared nonshrink grout product with water as directed by manufacturer's product data to achieve a minimum compressive strength of 7000 psi at 28 days.

Water: Clean, potable, free from deleterious amounts of alkalies, acids, and organic materials.

MIXES

Mortar proportions:

Type "S" job mixed or bag mixed mortar:

Proportion materials by volume in accord with ASTM C270-87a OR;
One part Portland cement and over ¼ to ½ parts Type "S" hydrated lime to aggregate proportioned at not less tan 2-1/4 nor more than three times combined volume of cement and lime used OR;
½ part Portland cement to one part Type N masonry cement to aggregate proportioned at not less than 2-1/4 nor more than three times volumes of cementitious materials used OR;
One part Type S premixed masonry cement to aggregate proportioned at not less than 2-1/4 nor more than three times volumes of cementitious materials used.

Type "N" job mixed or bag mixed mortar:

Proportion materials by volume in accord with ASTM C270-87a OR;
One part Portland cement and over ½ to 1-1/4 parts hydrated lime to aggregate proportioned at not less than 2-1/4 nor more than three times combined volume of cement and lime used OR;
One part Type N premixed masonry cement to aggregate proportioned at not less than 2-1/4 nor more than three times volumes of cementitious materials used.

Grout proportions:

Fine grout: Proportion materials by volume in accord with ASTM C476-83 at one part Portland cement to 0.0 to 1/10 part hydrated lime to fine aggregate proportioned at not less than 2-1/4 nor more than three times sum of volumes of cement and lime used.
Course grout: Proportion materials by volume in accord with ASTM C476-83 at one part Portland cement and 0.0 to 1/10 part lime to coarse aggregate proportioned at not less than one nor more than two times sum of volumes of cement and lime used and slump measured according to ASTM C143-78 of 8".

Mixing:

Mix mortar and cement grout in power driven mixers. Operate mixer minimum of five minutes after addition of all materials.

Job mixed CMU and AMU mortars: Add water repellent mortar additive in accord with admixture manufacturer's product data.
Addition of other admixtures including anti-freeze ingredients are prohibited.
Measure materials for job mixed mortars in containers with known volume; measurement by shovels is prohibited.

Masonry/Mortar combination:

CMU: Type "S"; exterior units with water repellent additive.
AMU masonry:

Veneer construction: Type "N", colored mortar to match AMU.
Load bearing walls: Type "S", colored mortar to match AMU.

PART 3 –EXECUTION

INSTALLATION:

General:

Place mortar under Concrete Unit Masonry and Architectural Unit Masonry (Brick) sections.
Use masonry/mortar combination indicated above.
Use pan type mortar boards where colored mortar is required.
Retemper mortar as necessary to keep plastic; retempering AMU matched mortar is prohibited.
Use of mortar after setting has begun or after 2-1/2 hours has elapsed since initial mixing is prohibited.

Grouts: Placement specified in other sections.

END OF SECTION

SECTION 04150
MASONRY ACCESSORIES

PART 1 –GENERAL

SUMMARY

Related Sections:

Section 04100: Mortar.
Section 04210: Brick.
Section 04220: Concrete Unit Masonry.
Section 07600: Flashing and Sheet metal.
Section 07650: Flexible Flashing.

REFERENCES:

Standards of the following as referenced:

American Concrete Institute (ACI).
American Society for Testing and Materials (ASTM).

SUBMITTALS:

Product data:

Submit complete list of products for use; indicate compliance with specified requirements. Indicate manufacturer, product, and correlation to specified item if from other manufacturer than specified item.
Intent to use specified products does not relieve responsibility of submitting product line.

PART 2 –PRODUCTS

MANUFACTURERS:

Acceptable manufacturers:

Products specified as standard of quality are manufactured by Dur-O-Wal, Inc.
Products of the following manufacturers similar in type and quality are acceptable, subject to compliance with specified requirements.

AA Wired Products Company.
Heckmann building Products, Inc.
Hohmann & Barnard, Inc.
Masonry Reinforcing Corp. of America.
National Wire Products Corp.

MANUFACTURED UNITS:

Masonry joint reinforcement:

Fabricate from cold drawn wire meeting ASTM A82-85.
Galvanize all items in accord with ASTM A153-82, Class B-2.
Longitudinal rods: Nine gauge deformed wires.
Cross wires: Nine gauge deformed wires.
Type:

At single wythe masonry: Truss type.
At double wythe masonry: Ladder type with three longitudinal rods.
At double wythe masonry where veneer coursing does not align with coursing of masonry back-up: Ladder type with adjustable box ties.

Reinforcement width: 2” less than total wall width.
Provide reinforcement in 10’-0” lengths with prefabricated “L” and “T” units at intersecting walls of same design and finish as joint reinforcement.

Column or beam anchors, select from either type:

Type: Channel slots and anchors.

Slots: Dur-O-Wal, Inc.; D/A 904; 16 gauge steel; galvanize in accord with ASTM A153-82, Class B-2; fasteners type recommended by manufacturer for substrate face and embed 2” minimum in bed joints.

Anchors: Dur-O-Wal, Inc.; D/A 918-921; 3/16" wire; galvanize in accord with ASTM A153-82, Class B-2, minimum; length required to attach to substrate face and embed 2" minimum in bed joints.

Adjustable weld-on anchors and flexible ties:

Type: Two piece anchor and tie

Anchor: Dur-O-Wal, Inc.; D/A 710; ¼" dia., steel meeting ASTM A82-85; galvanize in accord with ASTM A153-82, Class B-2, minimum; for weld-on attachment to structural column, 9" long with 4" vertical adjustment.

Triangular tie: Dur-O-Wal, Inc.; D/A 709-711; 3/16" dia., steel meeting ASTM A82-85; galvanize in accord with ASTM A153-82, Class B-2, minimum; sizes required for conditions encountered.

Provide code required lateral restraint while permitting horizontal and vertical movement in system.

Reinforcement bar positioners:

Horizontal bars: Dur-O-Wal D/A 811; nine gauge basic brite finish steel wire meeting ASTM A82-85.

Vertical bars: Dur-O-Wal D/A 810; nine gauge basic brite finish steel wire meeting ASTM A82-85.

Extruded control joints: Dur-O-Wal D/A 2000 Series: extruded natural or synthetic rubber, meeting ASTM D2000-80, Type 2AA-805, 80 durometer hardness.

Mesh hardware cloth: Dur-O-Wal, Inc.: Dur-O-Stop: monofilament corrosion resistant screen; width 2" less than wall width.

PART 3 –EXECUTION

INSTALLATION

General: Install accessories in accord with manufacturer's product data.

Masonry joint reinforcement:

Install in single wythe and double wythe masonry walls at 1'-4" o.c. vertically unless otherwise indicated on drawings. Lap side rods 6" minimum at splices.

Fully embed longitudinal rods in mortar for entire length with 5/8" minimum cover on exterior wall side and ½" minimum cover at other locations.

Stop reinforcement 1" back from expansion and control joints and openings in masonry walls.

Masonry openings over 1-0" wide: Install reinforcement in first and second bed joint above and under openings with non-continuous reinforcement; extend 2'-0" beyond jamb, each side; bridge control joints.

Build prefabricated "L" and "T" sections to provide continuity at corners and intersections.

Cut and bend units as indicated in manufacturer's offsets, pipe enclosures, and special conditions.

Parapets: Space reinforcing at 8" O.C. vertically, unless otherwise indicated.

Column or beam anchors:

Channel slots and anchors: Fasten to steel column's or beam's flange at 1'-4" O.C. vertically at columns; horizontally at beams.

Weld-on anchors: Weld to steel columns or beam's flange at 1'-4" O.C. vertically at columns; horizontally at beams. Wire brush clean; paint welded areas at column or beam and anchor with zinc and rich primer.

Install triangular ties at anchors; set in mortar bed.

Reinforcement bar positioners:

Vertical type: Install in accord with ACE Committee 530 Code recommendations.

Horizontal type: Install in U-block or lintel block in accord with code requirements.

Rubber control joints: Install in concrete Unit Masonry and Architectural Unit Masonry sections; locate rubber control joints in unit masonry construction as required.

Mesh hardware cloth: Install in bed joints of unit masonry as required to prevent migration of grout.

SECTION 04200

UNIT MASONRY

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this Section.

DESCRIPTION OF WORK: The work of this Section includes, but is not necessarily limited to, furnishing and installing the following:

Extent of each type of masonry work is indicated on Drawings.

Types of masonry work required include:

Standard Concrete Masonry Units.

Special Masonry Shapes.

Required Masonry Anchors.

QUALITY ASSURANCE

Unit Masonry Standard: Comply with ACI 530.1/ASCE 6, "Specifications for Masonry Structures", except as otherwise indicated.

Revise ACI 530.1/ASCE 6 to exclude Sections 1.4 and 1.7; Parts 2.1.2, 3.1.2, and 4.1.2; and Articles 1.5.1.2, 1.5.1.3, 2.1.1.1, 2.1.1.2, and 2.3.3.9 and to modify Article 2.1.1.4 by deleting requirement for installing vent pipes and conduits built into masonry.

Fire Performance Characteristics: Where indicated, provide materials and construction which are identical to those of assemblies whose fire endurance has been determined by testing in compliance with ASTM E 119 by a recognized testing and inspecting organization or by another means, as acceptable to authority having jurisdiction.

Single Source Responsibility for Masonry Units: Obtain exposed masonry units of uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from one manufacturer for each different product required for each continuous surface or visually related surfaces.

Single Source Responsibility for Mortar Materials: Obtain mortar ingredients of uniform quality, including color for exposed masonry, from one manufacturer for each cementitious component and from one source and producer for each aggregate.

SUBMITTALS

Product Data: Submit manufacturer’s product data for each type of masonry unit, accessory, and other manufactured products, including certifications that each type complies with specified requirements.

For information only, submit copies of referenced standards utilized for this project unless duplicated in product data.

Samples for Verification Purposes: Submit samples of unit masonry of each type and shape of exposed unit required. Include in each set, the full range of exposed color and texture.

DELIVERY, STORAGE, AND HANDLING

Deliver masonry materials to project in undamaged condition.

Store and handle masonry units to prevent their deterioration or damage due to moisture, temperature changes, contaminants, corrosion or other causes.

Limit moisture absorption of concrete masonry units during delivery and until time of installation to the maximum percentage specified for Type I units for the average annual relative humidity as reported by the U.S. Weather Bureau Station nearest project site.

Store cementitious materials off the ground, under cover and in dry location.

Store aggregates where grading and other required characteristics can be maintained.

Store masonry accessories, including metal items, to prevent deterioration by corrosion and accumulation of dirt.

PROJECT CONDITIONS

Protection of Work: During erection, cover top of walls with waterproof sheeting at end of each day's work. Cover partially completed structures when work is not in progress.

Extend cover a minimum of 24 inches down both sides and hold cover securely in place.

Do not apply uniform roof loading for at least 12 hours after building masonry walls or columns.

Do not apply concentrated loads for at least 3 days after building masonry walls or columns.

Staining: Prevent grout or mortar or soil from staining the face of masonry to be left exposed or painted. Remove immediately, grout or mortar in contact with such masonry.

Protect base of walls from rain-splashed mud and mortar splatter by means of coverings spread on ground and over wall surface.

COLD WEATHER PROTECTION

Do not lay masonry units which are wet or frozen.

Remove any ice or snow formed on masonry bed by carefully applying heat until top surface is dry to the touch.

Remove masonry damaged by freezing conditions.

Concrete Masonry Units: Heat masonry units so that they are above 20 deg. F. at time of laying.

Provide enclosure and auxiliary heat to maintain an air temperature of at least 40 deg. F. for 24 hours after laying units.

Do not heat water for mortar to above 160 deg. F.

PART 2 - PRODUCTS

CONCRETE MASONRY UNITS

General: Comply with referenced standards and other requirements indicated below applicable to each form of concrete masonry unit required.

Provide special shapes where required for lintels, corners, jambs, sash, control joints, headers, bonding and other special conditions.

Concrete Masonry Units: Provide units complying with characteristics indicated below for grade, type, face size, exposed face and, under each form of block included, for weight classification:

Grade N-1

Sizes:Manufacturer's standard units with nominal face dimensions of 16" long x 8" high (15-5/8" x 7-5/8" actual) x thickness indicated.Type I, Moisture-Controlled Units, as Indicated on Drawings. BLOCKS TO BE MANUFACTURED WITH "ACME SHIELD" INTEGRAL WATER REPELLENT ADMIXTURE and integral color as manufactured by ABC Block Company

Exposed Faces

Manufacturer's Standard Colors and Texture

Manufacturer's Standard Colors Split Face

Manufacturer's Standard Colors Striface

Hollow Loadbearing Block: ASTM C 90, and as follows:

Weight Classification: Medium weight, minimum compressive strength of 2000 psi (net area).

Solid Loadbearing Block: ASTM C 145, and as follows:

Weight Classification: Medium weight, minimum compressive strength of 2000 psi.

SPECIAL SHAPES: Provide where shown and where required for lintels, corners, jambs, sash, control joints, headers, bonding, pilasters and other special conditions.

FIRE RATINGS: Where fire ratings on masonry walls are shown on the Drawings, the Contractor shall make certain that the fire-resistant units to be used qualify for the ratings.

MORTAR AND GROUT MATERIALS

Masonry Cement: ASTM C-91

Acceptable Manufacturers

Medusa Cement Co.

Leheigh

Approved Equal

Grout for Unit Masonry: Comply with ASTM C-476 for grout for use in construction of reinforced and nonreinforced unit masonry. Use grout of consistency indicated or, if not otherwise indicated, of consistency (fine or coarse) at time of placement which will completely fill all spaces intended to receive grout. Minimum compressive strength shall be 2,500 psi in 28 days.

Use fine grout in grout spaces less than 2" in horizontal direction, unless otherwise indicated.

Use coarse grout (maximum 3/8" aggregate) in grout spaces 2" or more in least horizontal dimension, unless otherwise indicated.

Mortar color as selected by Architect.

JOINT REINFORCEMENT, TIES AND ANCHORING DEVICES

Materials: Comply with requirements indicated below for basic materials and with requirements indicated under each form of joint reinforcement, tie and anchor for size and other characteristics:

Zinc-Coated (galvanized) Steel Wire: ASTM A 82 for uncoated wire and with ASTM C 641 for zinc coating of class indicated below:

Class 1 (0.40 oz. per sq. ft. of wire surface).

Joint Reinforcement: Provide welded-wire units prefabricated with deformed continuous side rods and plain cross rods into straight lengths of not less than 10', with prefabricated corner and tee units, and complying with requirements indicated below:

Width: Fabricate joint reinforcement in units with widths of approximately 2" less than nominal width of walls and partitions as required to provide mortar coverage of not less than 5/8" on joint faces exposed to exterior.

Wire Size for Side and Cross Rods: #9 Gauge

Side Rods: 3/16 Inch

Cross Rods: No. 9 Gauge

For single-wythe masonry, provide type as follows with single pair of side rods:

Truss design with continuous diagonal cross rods spaced not more than 16" o.c.

For multi-wythe masonry with cavity filled solid with mortar, provide type as follows:

Truss design with diagonal cross rods spaced not more than 16" o.c. and number of side rods as follows:

Number of Side Rods for Multiple-Wythe Concrete Masonry: One side rod for each face shell of concrete masonry back-up and of concrete masonry facing wythe.

Flexible Anchors: Where flexible anchors are indicated for connecting masonry to structural framework, provide 2-piece anchors, which permit vertical or horizontal differential movement between wall and framework parallel to, but resist tension and compression forces perpendicular to, plane of wall.

Anchors and Ties for Masonry with Wood Frame Backup:

Corrosion-resistant metal meeting or exceeding ASTM A153, corrugated veneer ties, 22 gage, 7/8" minimum width, 6" length minimum. Fasten to wood frame with corrosion-resistant nails of sufficient length to penetrate a minimum of 1-1/2" into studs.

MISCELLANEOUS MASONRY ACCESSORIES

Reinforcing Bars: Deformed Steel, ASTM A 615, Grade 60 for Bars No. 3 to No. 18

Premolded Control Joint Strips: Material as indicated below, designed to fit standard sash block and to maintain lateral stability in masonry wall. Size and configuration as indicated.

Polyvinyl Chloride Complying with ASTM D 2287, General Purpose Grade, Designation PVC-63506

Bond Breaker Strips: Asphalt-Saturated Organic Roofing Felt Complying with ASTM D 226, Type I (No. 15 Asphalt Felt)

Weepholes: Provide the following for weepholes:

Plastic Tubing: Medium Density Polyethylene with Rope Insert, Outside Diameter and Length as Indicated Below:

3/8" X 4"

Anchor Bolts: Provide steel bolts wit hex nuts and flat washers complying with ASTM A-307, Grade A, hot-dip galvanized to comply with ASTM C-153, Class C, in sizes and configuration indicated.

MASONRY CLEANERS

Job-Mixed Detergent Solution: Solution of trisodium phosphate (1/2cup dry measure) and laundry detergent (1/2 cup dry measure) dissolved in one gallon of water.

Acidic Cleaner: Manufacturer's standard strength general purpose cleaner designed for new masonry surfaces of type indicated; composed of blended organic and inorganic acids combined with special wetting systems and inhibitors; expressly approved for intended use by manufacturer of masonry units being cleaned.

Available Products: Subject to compliance with requirements, a product which may be used to clean unit masonry surfaces includes, but is not limited to, the following:

"Sure Klean" No. 600 Detergent; ProSoCo, Inc.

MORTAR AND GROUT MIXES

General: Do not add admixtures including coloring pigments, air-entraining agents, accelerators, retarders, water repellent agents, anti-freeze compounds or other admixtures, unless otherwise indicated.

Do not use calcium chloride in mortar or grout.

Mixing: Combine and thoroughly mix cementitious, water and aggregates in a mechanical batch mixer; comply with referenced ASTM standards for mixing time and water content.

Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification, for types of mortar required, unless otherwise indicated.

Use Type mortar as shown on Drawings.

Minimum compressive strength as shown on Drawings.

PART 3 - EXECUTION

INSTALLATION, GENERAL

Do not wet concrete masonry units.

Cleaning Reinforcing: Before placing, remove loose rust, ice and other coatings from reinforcing.

Thickness: Build cavity and composite walls, floors and other masonry construction to the full thickness shown. Build single-wythe walls (if any) to the actual thickness of the masonry units, using units of nominal thickness indicated.

Build chases and recesses as shown or required for the work of other trades. Provide not less than 8" of masonry between chase or recess and jamb of openings, and between adjacent chases and recesses.

Leave openings for equipment to be installed before completion of masonry work. After installation of equipment, complete masonry work to match work immediately adjacent to the opening.

Cut masonry units using motor-driven saws to provide clean, sharp, unchipped edges. Cut units as required to provide continuous pattern and to fit adjoining work. Use full-size units without cutting where possible.

Use dry cutting saws to cut concrete masonry units.

CONSTRUCTION TOLERANCES

Variation from Plumb: For vertical lines and surfaces of columns, walls and arises do not exceed 1/4" in 10', or 3/8" in a story height not to exceed 20'. For external corners, expansion joints, control joints and other conspicuous lines, do not exceed 1/4" in any story or 20' maximum, nor 1/2" in 40' or more. For vertical alignment of head joints, do not exceed plus or minus 1/4" in 10'.

Variation from Level: For bed joints and lines of exposed lintels, sills, parapets, horizontal grooves and other conspicuous lines, do not exceed 1/4" in any bay or 20' maximum, nor 1/2" in 40' or more. For top surface of bearing walls, do not exceed 1/8" between adjacent floor elements in 10' or 1/16" within width of a single unit.

Variation of Linear Building Line: For position shown in plan and related portion of columns, walls and partitions, do not exceed 1/2" in any bay or 20' maximum, nor 3/4" in 40' or more.

Variation in Mortar Joint Thickness: Do not exceed bed joint thickness indicated by more than plus or minus 1/8", with a maximum thickness limited to 1/2". Do not exceed head joint thickness indicated by more than plus or minus 1/8".

LAYING MASONRY WALLS

Layout walls in advance for accurate spacing of surface bond patterns with uniform joint widths and to accurately locate openings, movement-type joints, returns and offsets. Avoid the use of less-than-half-size units at corners, jambs and wherever possible at other locations.

Lay-up walls to comply with specified construction tolerances, with courses accurately spaced and coordinated with other work.

Pattern Bond: Lay exposed masonry in the bond pattern shown or, if not shown, lay in running bond with vertical joint in each course centered on units in courses above and below. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 2". Bond and interlock each course of each wythe at corners. Do not use units with less that nominal 4" horizontal face dimensions at corners or jambs.

Stopping and Resuming Work: Rack back 1/2-unit length in each course; do not tooth. Clean exposed surfaces of set masonry, wet units lightly (if required) and remove loose masonry units and mortar prior to laying fresh masonry.

Built-in Work: As the work progresses, build-in items specified under this and other Sections of these Specifications. Fill in solidly with masonry around built-in items.

Fill space between hollow metal frames and masonry solidly with mortar, unless otherwise indicated.

Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath in the joint below and rod mortar or grout into core.

Fill cores in hollow concrete masonry units with grout 3 courses (24") under bearing plates, beams, lintels, posts and similar items, unless otherwise indicated.

MORTAR BEDDING AND JOINTING

Lay solid masonry units with completely filled bed and head joint; butter ends with sufficient mortar to fill head joints and shove into place. Do not slush head joints.

Lay hollow concrete masonry units with full mortar coverage on horizontal and vertical face shells. Bed webs in mortar in starting course on footings and in all courses of piers, columns and pilasters, and where adjacent to cells or cavities to be reinforced or filled with concrete or grout. For starting course on footings where cells are not grouted, spread out full mortar bed including areas under cells.

Maintain joint widths shown, except for minor variations required to maintain bond alignment. If not shown, lay walls with 3/8" joints.

Cut joints flush for masonry walls which are to be concealed or to be covered by other materials, unless otherwise indicated.

All exposed joints shall be well-tooled to a concave or rodded profile, unless otherwise indicated.

Provide raked joints at all vertical scores in scored brick units. Strike to match concave or rodded profile of horizontal joints.

Rake-out expansion joints and joints indicated on Drawings to receive sealant.

Mortar joints shall be struck at a consistent time interval when mortar is at the same medium stiff consistency in order to minimize color variations.

Remove masonry units disturbed after laying; clean and reset in fresh mortar. Do not pound corners or jambs to shift adjacent stretcher units which have been set in position. If adjustments are required, remove units, clean off mortar and reset in fresh mortar.

Collar Joints: After each course is laid, fill the vertical longitudinal joint between wythes solidly and with mortar for the following masonry work:

All exterior walls, except cavity walls, and interior walls and partitions.

Use continuous horizontal joint reinforcement installed in horizontal mortar joints for bond tie between wythes. Install at not more than 16" o.c. vertically.

Corners: Provide interlocking masonry unit bond in each course at corners, unless otherwise shown.

Intersecting and Abutting Walls: Unless vertical expansion or control joints are shown at juncture, provide same type of bonding specified for structural bonding between wythes and space as follows:

Provide individual metal ties at not more than 24" o.c. vertically.

Provide weep holes in exterior wythe of cavity wall located immediately above ledges and flashing, spaced 2’-0" o.c., unless otherwise indicated.

HORIZONTAL JOINT REINFORCEMENT

General: Provide continuous horizontal joint reinforcement as indicated. Install longitudinal side rods in mortar for their entire length with a minimum cover of 5/8" on exterior side of walls. Lap reinforcing a minimum of 6".

Cut or interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.

Reinforce walls with continuous horizontal joint reinforcing, unless specifically noted to be omitted.

Provide continuity at corners and wall intersections by use of prefabricated "L" and "T" sections. Cut and bend reinforcement units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures and other special conditions.

Space continuous horizontal reinforcement as follows:

For multi-wythe walls (solid or cavity) which are structurally bonded by masonry headers or individual wire ties, space horizontal reinforcement 24" o.c. vertically.

For single-wythe walls, space reinforcement at 16" o.c. vertically, unless otherwise indicated.

For parapets, space reinforcement at 8" o.c. vertically, unless otherwise indicated.

Reinforce masonry openings greater than 1’-0" wide, with horizontal joint reinforcement placed in 2 horizontal joints approximately 8" apart, immediately above the lintel and immediately below the sill. Extend reinforcement a minimum of 2’-0" beyond jambs of the opening, except at control joints.

In addition to wall reinforcement, provide additional reinforcement at openings as required to comply with the above.

ANCHORING MASONRY WORK

General: Provide anchor devices of type indicated.

Anchor single wythe masonry veneer to metal studs with masonry veneer anchors to comply with the following requirements:

Fasten each anchor section through sheathing to metal studs with two metal fasteners of type indicated.

Embed tie section in masonry joints. Provide not less than 1" air space between back of masonry veneer wythe and face of sheathing.

Locate anchor section relative to course in which tie section is embedded to allow maximum vertical differential movement of tie up and down.

Space anchors as indicated, but not more than 16" o.c. vertically and 24" o.c. horizontally. Install additional anchors within 1’-0" of openings and at intervals around perimeter not exceeding 3’-0".

CONTROL AND EXPANSION JOINTS

General: Provide vertical and horizontal expansion, control and isolation joints in masonry where shown. Build-in related items as the masonry work progresses.

Control Joint Spacing: If location of control joints is not shown, place vertical joints spaced not to exceed 35’-0: o.c. for concrete masonry wythes if reinforced, or 30’-0" o.c. if not reinforced. Locate control joints at points of natural weakness in the masonry work.

Build-in nonmetallic joint fillers where indicated.

LINTELS

Provide masonry lintels where shown and wherever openings of more than 2’-0" for block size units are shown without structural steel or other supporting lintels. Provide precast or formed-in-place masonry lintels. Cure precast lintels before handling and installation. Temporarily support formed-in-place lintels.

Provide minimum bearing of 8" at each jamb, unless otherwise indicated.

FLASHING OF MASONRY WORK

General: Provide concealed flashing in masonry work at, or above, shelf angles, lintels, ledges and other obstructions to the downward flow of water in the wall so as to divert such water to the exterior. Prepare masonry surfaces smooth and free from projections which could puncture flashing. Place through-wall flashing on sloping bed of mortar and cover with mortar. Seal penetrations in flashing with mastic before covering with mortar. Extend flashings through exterior face of masonry and turn down to form drip.

Refer to Division 7 Specification Sections for flashing materials.

Extend flashing the full length of lintels and shelf angles and minimum of 4" into masonry each end. Extend flashing from exterior face of outer wythe of masonry, through the outer wythe, turned up a minimum of 4", and through the inner wythe to within 1/2" of the interior face of the wall in exposed work. Where interior surface of inner wythe is concealed by furring, carry flashing completely through the inner wythe and turn up approximately 2". At heads and sills, turn up ends not less than 2" to form a pan.

Install flashing to comply with manufacturer’s instructions.

Provide weep holes in the head joints of the first course of masonry immediately above concealed flashings. Space 24" o.c., unless otherwise indicated.

REPAIR, POINTING AND CLEANING

Remove and replace masonry units which are loose, chipped, broken, stained or otherwise damaged, or if units do not match adjoining units as intended. Provide new units to match adjoining units and install in fresh mortar or grout, pointed to eliminate evidence of replacement.

Pointing: During the tooling of joints, enlarge any voids or holes, except weep holes, and completely fill with mortar. Point-up all joints including corners, openings and adjacent work to provide a neat, uniform appearance, prepared for application of sealants.

Final Cleaning: After mortar is thoroughly set and cured, clean masonry as follows:

Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.

Test cleaning methods on sample wall panel. Leave 1/2 panel uncleaned for comparison purposes. Obtain Engineer's and Architect's approval of sample cleaning before proceeding with cleaning of masonry.

Protect adjacent stone and non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film or waterproof masking tape.

Clean concrete unit masonry to comply with masonry manufacturer's directions and applicable NCMA "Tek" bulletins.

PROTECTION

Provide final protection and maintain conditions in a manner acceptable to Installer, which ensures unit masonry work being without damage and deterioration at time of substantial completion.

END OF SECTION

SECTION 04816

PRECAST CONCRETE SPLASH BLOCKS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Precast concrete splash blocks for downspouts.

B. Related Sections:
1. Division 01: Administrative, procedural, and temporary work requirements.

1.2 SUBMITTALS

A. Submittals for Review:
1. Product Data: Provide unit configuration and dimensions.

PART 2 PRODUCTS

2.1 MATERIALS

A. Concrete Mix:
1. Minimum [5000] psi compressive strength at 28 days, air entrained to 5 to 7 percent.

2.2 FABRICATION

A. Use rigid molds, constructed to maintain precast units uniform in shape, size and finish. Maintain consistent quality during manufacture.

B. Cure units to develop concrete quality, and to minimize appearance blemishes including non uniformity, staining, and surface cracking.

C. Minor patching in plant is acceptable, providing appearance of units is not impaired.

D. Nominal Size: [4] inches high x [16] inches wide x [30] inches long.

E. Provide raised lip at sides and rear edge.

F. Finish: Manufacturer's standard.

PART 3 EXECUTION

3.1 INSTALLATION

A. Place splash blocks under each downspout.

END OF SECTION

SECTION 05120

STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:
1. Structural steel.
2. Grout.

B. Related Sections include the following:
1. Division Section 014000 "Quality Requirements" for independent testing agency procedures and administrative requirements.
2. Division Section 055000 "Metal Fabrications" for miscellaneous steel fabrications and other metal items not defined as structural steel.
3. Division 09 painting Sections for surface preparation and priming requirements.

1.3 DEFINITIONS

A. Structural Steel: Elements of structural-steel frame, as classified by AISC's "Code of Standard Practice for Steel Buildings and Bridges," that support design loads.

1.4 PERFORMANCE REQUIREMENTS

A. Connections: Provide details of simple shear connections required by the Contract Documents to be selected or completed by structural-steel fabricator to withstand loads indicated and comply with other information and restrictions indicated.
1. Select and complete connections using AISC's "Manual of Steel Construction, Load and Resistance Factor Design," Volume 2, Part 9 and AISC's "Manual of Steel Construction, Allowable Stress Design," Part 4.
2. Engineering Responsibility: Fabricator's responsibilities include using a qualified professional engineer to prepare structural analysis data for structural-steel connections.

1.5 SUBMITTALS

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

B. Shop Drawings: Show fabrication of structural-steel components.
1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
2. Include embedment drawings.
3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld.
4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical high-strength bolted connections.
5. For structural-steel connections indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Welding certificates.

D. Qualification Data: For Installer and fabricator.

E. Mill Test Reports: Signed by manufacturers certifying that the following products comply with requirements:
   1. Structural steel including chemical and physical properties.
   2. Bolts, nuts, and washers including mechanical properties and chemical analysis.
   3. Non-shrink grout.

F. Source quality-control test reports.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category CSE.

B. Fabricator Qualifications: A qualified fabricator who participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category Sbd.

C. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel."

D. Comply with applicable provisions of the following specifications and documents:
   1. AISC's "Code of Standard Practice for Steel Buildings and Bridges."
   2. AISC's "Seismic Provisions for Structural Steel Buildings" and "Supplement No. 2."
   3. AISC's Load and Resistance Factor Design Specification for Structural Steel Buildings."
   4. AISC's "Manual of Steel Construction, Allowable Stress Design."
   5. AISC's "Specification for the Design of Steel Hollow Structural Sections."
   6. AISC's "Specification for Load and Resistance Factor Design of Single-Angle Members."
   7. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

E. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from erosion and deterioration.
   1. Store fasteners in a protected place. Clean and relubricate bolts and nuts that become dry or rusty before use.
   2. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

1.8 COORDINATION

A. Furnish anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

PART 2 - PRODUCTS

2.1 STRUCTURAL-STEEL MATERIALS

A. W-Shapes: ASTM A 36 and ASTM A 529, Grade 50.

B. Channels, Angles, M, S-Shapes: ASTM A 36.

C. Plate and Bar: ASTM A 36.

D. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B, structural tubing.

E. Steel Pipe: ASTM A 53, Type E or S, Grade B., and standard weight class
   1. Finish: Black.

F. Medium-Strength Steel Castings: ASTM A 27, Grade 65-35, carbon steel.

G. Welding Electrodes: Comply with AWS requirements.

2.2 BOLTS, CONNECTORS, AND ANCHORS

A. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy hex steel structural bolts; ASTM A 563 heavy hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers.
   1. Finish: Plain.

B. Shear Connectors: ASTM A 108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1, Type B.

C. Unheaded Anchor Rods: ASTM F 1554, Grade 36.
   1. Configuration: Straight, unless otherwise indicated on Drawings.
   2. Nuts: ASTM A 563 hex carbon steel.
   3. Plate Washers: ASTM A 36 carbon steel.
   4. Washers: ASTM F 436 hardened carbon steel.
   5. Finish: Plain.

D. Headed Anchor Rods: ASTM F 1554, Grade 36, straight.
   1. Nuts: ASTM A 563 hex carbon steel.
   2. Plate Washers: ASTM A 36 carbon steel.
   3. Washers: ASTM F 436 hardened carbon steel.
   4. Finish: Plain.

E. Threaded Rods: ASTM A 193.
   1. Nuts: ASTM A 563 hex carbon steel.
   2. Washers: ASTM F 436 hardened carbon steel.
   3. Finish: Plain.

F. Clevises and Turnbuckles: ASTM A 108, Grade 1035, cold-finished carbon steel.

G. Eye Bolts and Nuts: ASTM A 108, Grade 1030, cold-finished carbon steel.

H. Sleeve Nuts: ASTM A 108, Grade 1018, cold-finished carbon steel.

I. Anchor Bolts exposed to weather: ASTM F 1554, Grade 36, threaded carbon-steel hex-headed bolts and carbon-steel nuts; flat hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153, Class C.

2.3 PRIMER

A. Primer: SSPC-Paint 25, Type II, iron oxide, zinc oxide, raw linseed oil, and alkyd.

B. Primer: Fabricator's standard lead and chromate-free, non-asphaltic, rust-inhibiting primer.

2.4 GROUT

A. Non-metallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, non-corrosive, non-staining, mixed with water to consistency suitable for application and a 30-minute working time.

2.5 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges," AISC's "Load and Resistance Factor Design Specification for Structural Steel Buildings," and AISC's "Manual of Steel Construction, Allowable Stress Design."
   1. Camber structural-steel members where indicated.
   2. Identify high-strength structural steel according to ASTM A 6 and maintain markings until structural steel has been erected.
   3. Mark and match-mark materials for field assembly.
   4. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.

B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
   1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1.

C. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.

D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.

E. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1 and manufacturer's written instructions.

F. Holes: Provide holes required for securing other work to structural steel and for passage of other work through steel framing members.
   1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
   2. Base-Plate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
   3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.6 SHOP CONNECTIONS

A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
   1. Joint Type: Snug tightened.

B. Weld Connections: Comply with AWS D1.1 for welding procedure specifications, tolerances, appearance, and quality of welds and for methods used in correcting welding work.

2.7 SHOP PRIMING

A. Shop prime steel surfaces except the following:
   1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members full depth.
   2. Surfaces to be field welded.
   3. Surfaces to be high-strength bolted.
   4. Surfaces to receive sprayed fire-resistive materials, where required to meet fire rating requirements.

B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
   1. SSPC-SP 3, "Power Tool Cleaning."

C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a dry film thickness of not less than

1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
2. Apply two coats of shop paint to inaccessible surfaces after assembly or erection. Change color of second coat to distinguish it from first.

2.8 SOURCE QUALITY CONTROL

A. Owner will engage an independent testing and inspecting agency to perform shop tests and inspections and prepare test reports. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.

B. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

C. Bolted Connections: Shop-bolted connections will be inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

D. Welded Connections: In addition to visual inspection, shop-welded connections will be tested and inspected according to AWS D1.1 and the following inspection procedures, at testing agency's option:

1. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
2. Ultrasonic Inspection: ASTM E 164.

E. In addition to visual inspection, shop-welded shear connectors will be tested and inspected according to requirements in AWS D1.1 for stud welding and as follows:

1. Bend tests will be performed if visual inspections reveal either a less-than- continuous 360-degree flash or welding repairs to any shear connector.
2. Tests will be conducted on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify elevations of concrete and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments, with steel erector present, for compliance with requirements.

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

3.2 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place, unless otherwise indicated.

3.3 ERECTION

A. Set structural steel accurately in locations and to elevations indicated and according to AISC's "Code of Standard Practice for Steel Buildings and Bridges," AISC's "Load and Resistance Factor Design Specification for Structural Steel Buildings," and AISC's "Manual of Steel Construction, Allowable Stress Design."

B. Base and Bearing Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting base and bearing plates. Clean bottom surface of base and bearing plates.

1. Set base and bearing plates for structural members on wedges, shims, or setting nuts as required.
2. Weld plate washers to top of base plate.
3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of base or bearing plate before packing with grout.
4. Promptly pack grout solidly between bearing surfaces and base or bearing plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

C. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."

D. Align and adjust various members forming part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
1. Level and plumb individual members of structure.
2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.

E. Splice members only where indicated.

F. Do not use thermal cutting during erection, unless approved by Architect. Finish thermally cut sections within smoothness limits in AWS D1.1.

G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

H. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1 and manufacturer's written instructions.

3.4 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
1. Joint Type: Snug tightened.

B. Weld Connections: Comply with AWS D1.1 for welding procedure specifications, tolerances, appearance, and quality of welds and for methods used in correcting welding work.
1. Comply with AISC's "Code of Standard Practice for Steel Buildings and Bridges," AISC's "Load and Resistance Factor Design Specification for Structural Steel Buildings," and AISC's "Manual of Steel Construction, Allowable Stress Design," for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections.

B. Bolted Connections: Shop-bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

C. Welded Connections: Field welds will be visually inspected according to AWS D1.1.
1. In addition to visual inspection, field welds will be tested according to AWS D1.1 and the following inspection procedures, at testing agency's option:

a. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
b. Ultrasonic Inspection: ASTM E 164.

D. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

3.6 REPAIRS AND PROTECTION

A. Touchup Painting: After installation, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted joists and accessories, bearing plates, and abutting structural steel.
1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.
2. Apply a compatible primer of same type as shop primer used on adjacent surfaces.

END OF SECTION 051200

SECTION 05310

STEEL DECKING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Roof deck.

B. Related Sections include the following:

1. Division Section 055000 "Metal Fabrications" for framing deck openings with miscellaneous steel shapes.

2. Division 09 painting Sections for repair painting of primed deck.

1.3 SUBMITTALS

A. Product Data: For each type of deck, accessory, and product indicated.

B. Shop Drawings: Show layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.

C. Product Certificates: For steel deck, signed by product manufacturer.

D. Welding certificates.

E. Field quality-control test and inspection reports.

F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that each of the following complies with requirements:

1. Power-actuated mechanical fasteners.

G. Research/Evaluation Reports: For steel deck.

1.4 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent agency qualified according to ASTM E 329 for testing indicated.

B. Welding: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code - Sheet Steel."

C. Fire-Test-Response Characteristics: Where indicated, provide steel deck units identical to those tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.

1. Fire-Resistance Ratings: Indicated by design designations of applicable testing and inspecting agency.

2. Steel deck units shall be identified with appropriate markings of applicable testing and inspecting agency.

D. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."

E. FMG Listing: Provide steel roof deck evaluated by FMG and listed in its "Approval Guide, Building Materials" for Class 1 fire rating and Class 1-90 windstorm ratings.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.

B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Steel Deck:

a. Epic Metals Corporation.

b. Nucor Corp.; Vulcraft Division.

c. Roof Deck, Inc.

d. United Steel Deck, Inc.

e. Verco Manufacturing Co.

f. Wheeling Corrugating Company; Div. of Wheeling-Pittsburgh Steel Corporation.

2.2 ROOF DECK

A. Steel Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 30, and with the following:

1. Prime-Painted Steel Sheet: ASTM A 1008, Structural Steel (SS), Grade 33 minimum, shop primed with manufacturer's standard baked-on, rust-inhibitive primer.

a. Color: Gray or white

2. Galvanized and Shop-Primed Steel Sheet: ASTM A 653, Structural Steel (SS), Grade 33, G60 zinc coating; cleaned, pretreated, and primed with manufacturer's standard baked-on, rust-inhibitive primer

a. Color: Gray or white

3. Deck Profile: Type WR, wide rib, Type "B"-composite

4. Profile Depth: 2 inches and 3 inches as shown on plans or as otherwise indicated on Drawings.

5. Design Uncoated-Steel Thickness: 20 gauge, 18 gauge and 16 gauge as shown on drawingsor as otherwise indicated on drawings,

6. Span Condition: Triple span or more

7. Side Laps: Overlapped

8. End Joints: Overlapped 2" minimum

2.3 ACCESSORIES

A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.

B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.

C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 minimum diameter.

D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.

E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi, not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.

F. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck, unless otherwise indicated.

G. Weld Washers: Uncoated steel sheet, shaped to fit deck rib, 0.0598 inch thick, with factory-punched hole of 3/8-inch minimum diameter.

H. Flat Sump Plate: Single-piece steel sheet, 0.0747 inch thick, of same material and finish as deck. For drains, cut holes in the field.

I. Galvanizing Repair Paint: ASTM A 780.

J. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance.

3.2 INSTALLATION, GENERAL

A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 30, manufacturer's written instructions, and requirements in this Section.

B. Install temporary shoring before placing deck panels, if required to meet deflection limitations.

C. Locate deck bundles to prevent overloading of supporting members.

D. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.

E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.

F. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.

G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.

H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.

I. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions.

3.3 ROOF-DECK INSTALLATION

A. Fasten roof-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated or arc seam welds with an equal perimeter that is not less than 1-1/2 inches long, and as follows:

1. Weld Diameter: 5/8 inch nominal.

2. Weld Spacing: Weld edge and interior ribs of deck units with a minimum of two welds per deck unit at each support. Space welds 12 inches apart in the field of roof and 6 inches apart in roof corners and perimeter, based on roof-area definitions in FMG Loss Prevention Data Sheet 1-28, unless otherwise indicated on Drawings.

3. Weld Washers: Install weld washers at each weld location.

B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of 1/2 of the span or 36 inches, and as follows:

1. Mechanically fasten with self-drilling, No. 10 diameter or larger, carbon-steel screws.

2. Fasten with a minimum of 1-1/2-inch long welds.

C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches, with end joints as follows:

1. End Joints: Lapped 2 inches minimum.

D. Roof Sump Pans and Sump Plates: Install over openings provided in roof deck and weld flanges to top of deck. Space welds not more than 12 inches apart with at least one weld at each corner.

1. Install reinforcing channels or zees in ribs to span between supports and weld.

E. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. Weld or mechanically fasten to substrate to provide a complete deck installation.

1. Weld cover plates at changes in direction of roof-deck panels, unless otherwise indicated.

F. Flexible Closure Strips: Install flexible closure strips over partitions, walls, and where indicated. Install with adhesive according to manufacturer's written instructions to ensure complete closure.

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Field welds will be subject to inspection.

C. Testing agency will report inspection results promptly and in writing to Contractor and Architect.

D. Remove and replace work that does not comply with specified requirements.

E. Additional inspecting, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

3.5 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Repair Painting: Wire brush and clean rust spots, welds, and abraded areas on both surfaces of prime-painted deck immediately after installation, and apply repair paint.

1. Apply repair paint, of same color as adjacent shop-primed deck, to bottom surfaces of deck exposed to view.

2. Wire brushing, cleaning, and repair painting of bottom deck surfaces are included in Division 09 Section "Interior Painting."

C. Provide final protection and maintain conditions to ensure that steel deck is without damage or deterioration at time of Substantial Completion.

END OF SECTION 053100

SECTION 05400

COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Interior non-load-bearing wall framing.

B. Related Sections include the following:

1. Division Section 092216 "Non-Structural Metal Framing" for interior non-load-bearing, metal-stud framing and ceiling-suspension assemblies.

1.3 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide cold-formed metal framing capable of withstanding design loads within limits and under conditions indicated.

1. Design Loads: As indicated on structural drawings.

2. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:

a. Exterior Load-Bearing Wall Framing: Horizontal deflection of 1/240 of the wall height.

b. Exterior Non-Load-Bearing Framing: Horizontal deflection of 1/360 of the wall height.

c. Roof Trusses: Vertical deflection of 1/360 of the span.

3. Design framing systems to provide for movement of framing members without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F.

4. Design framing system to accommodate deflection of primary building structure and construction tolerances and to maintain clearances at openings.

B. Cold-Formed Steel Framing, General: Design according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions."

1. Headers: Design according to AISI's "Standard for Cold-Formed Steel Framing - Header Design."

2. Design exterior non-load-bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.

1.4 SUBMITTALS

A. Product Data: For each type of cold-formed metal framing product and accessory indicated.

B. Shop Drawings: Show layout, spacing, sizes, thicknesses, and types of cold-formed metal framing; fabrication; and fastening and anchorage details, including mechanical fasteners. Show reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.

1. For cold-formed metal framing indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Welding certificates.

1.5 QUALITY ASSURANCE

A. Engineering Responsibility: Preparation of Shop Drawings, design calculations, and other structural data by a qualified professional engineer.

B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of cold-formed metal framing that are similar to those indicated for this Project in material, design, and extent.

C. Product Tests: Mill certificates or data from a qualified independent testing agency indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.

D. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."

E. AISI Specifications and Standards: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" and its "Standard for Cold-Formed Steel Framing - General Provisions."

1. Comply with AISI's "Standard for Cold-Formed Steel Framing - Header Design."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling.

B. Store cold-formed metal framing, protect with a waterproof covering, and ventilate to avoid condensation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide cold-formed metal framing by one of the following:

1. Dietrich Metal Framing; a Worthington Industries Company.

2. Unimast.

2.2 MATERIALS

A. Steel Sheet: ASTM A 1003, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:

1. Grade: ST33H.

2. Coating: G60.

B. Steel Sheet for Vertical Deflection Clips: ASTM A 653, structural steel, zinc coated, of grade and coating as follows:

1. Grade: As required by structural performance.

2. Coating: G90.

2.3 INTERIOR LOAD-BEARING WALL FRAMING

A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0428 inch.

2. Flange Width: 1-5/8 inches, unless otherwise indicated on Drawings.

B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with straight flanges, and as follows:

1. Minimum Base-Metal Thickness: Matching steel studs.

2. Flange Width: 1-1/4 inches, unless otherwise indicated on Drawings.

C. Steel Box or Back-to-Back Headers: Manufacturer's standard C-shapes used to form header beams, of web depths indicated, punched, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0428 inch.
2. Flange Width: 2 inches.

2.4 INTERIOR NON-LOAD-BEARING WALL FRAMING

A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0428 inch.
2. Flange Width: 1-5/8 inches, unless otherwise indicated on Drawings.

B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: Matching steel studs.
2. Flange Width: 1-1/4 inches, unless otherwise indicated on Drawings.

C. Vertical Deflection Clips: Manufacturer's standard head clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.

D. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal and lateral loads and transfer them to the primary structure, and as follows:

1. Minimum Base-Metal Thickness: 0.0428 inch.
2. Flange Width: 1 inch plus the design gap for 1-story structures.

2.5 FRAMING ACCESSORIES

A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.

B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:

1. Supplementary framing.
2. Bracing, bridging, and solid blocking.
3. Web stiffeners.
4. Anchor clips.
5. End clips.
6. Foundation clips.
7. Gusset plates.
8. Stud kickers, knee braces, and girts.
9. Hangers and end closures.
10. Hole reinforcing plates.
11. Backer plates.

2.6 ANCHORS, CLIPS, AND FASTENERS

A. Steel Shapes and Clips: ASTM A 36, zinc coated by hot-dip process according to ASTM A 123.

B. Anchor Bolts: ASTM F 1554, Grade 36, threaded carbon-steel hex-headed bolts and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153, Class C.

C. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.

D. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing per ASTM E 1190 conducted by a qualified independent testing agency.

E. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping steel drill screws.

1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.

F. Welding Electrodes: Comply with AWS standards.

2.7 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035.

B. Cement Grout: Portland cement, ASTM C 150, Type I; and clean, natural sand, ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.

C. Non-metallic, Non-shrink Grout: Premixed, nonmetallic, non-corrosive, non-staining grout containing selected silica sands, portland cement, shrinkage-compensating agents, and plasticizing and water-reducing agents, complying with ASTM C 1107, with fluid consistency and 30-minute working time.

D. Shims: Load bearing, high-density multi-monomer plastic, non-leaching.

E. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to match width of bottom track or rim track members.

2.8 FABRICATION

A. Fabricate cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.

1. Fabricate framing assemblies using jigs or templates.

2. Cut framing members by sawing or shearing; do not torch cut.

3. Fasten cold-formed metal framing members by welding, screw fastening, clinch fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.

a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.

b. Locate mechanical fasteners and install according to Shop Drawings, with screw penetrating joined members by not less than three exposed screw threads.

4. Fasten other materials to cold-formed metal framing by welding, bolting, or screw fastening, according to Shop Drawings.

B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.

C. Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:

1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

2. Squareness: Fabricate each cold-formed metal framing assembly to a maximum out-of-square tolerance of 1/8 inch.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting substrates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance.

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

3.2 PREPARATION

A. Before sprayed fire-resistive materials are applied (when required by construction), attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials, when required.

B. After applying sprayed fire-resistive materials (when required by construction), remove only as much of these materials as needed to complete installation of cold-formed framing without reducing thickness of fire-resistive materials below that are required to obtain fire-resistance rating indicated. Protect remaining fire-resistive materials from damage, when required.

C. Install load bearing shims or grout between the underside of wall bottom track or rim track and the top of foundation wall or slab at stud or joist locations to ensure a uniform bearing surface on supporting concrete or masonry construction.

D. Install sealer gaskets to isolate the underside of wall bottom track or rim track and the top of foundation wall or slab at stud or joist locations.

3.3 INSTALLATION, GENERAL

A. Cold-formed metal framing may be shop or field fabricated for installation, or it may be field assembled.

B. Install cold-formed metal framing according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions" and to manufacturer's written instructions unless more stringent requirements are indicated.

C. Install shop or field-fabricated, cold-formed framing and securely anchor to supporting structure.

1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch.

D. Install cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened.

1. Cut framing members by sawing or shearing; do not torch cut.

2. Fasten cold-formed metal framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.

a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.

b. Locate mechanical fasteners and install according to Shop Drawings, and complying with requirements for spacing, edge distances, and screw penetration.

E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.

F. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.

G. Do not bridge building expansion and control joints with cold-formed metal framing. Independently frame both sides of joints.

H. Install insulation, specified in Division Section 072100 "Thermal Insulation," in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.

I. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's standard punched openings.

J. Erection Tolerances: Install cold-formed metal framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:

1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.4 LOAD-BEARING WALL INSTALLATION

A. Install continuous top and bottom tracks sized to match studs. Align tracks accurately and securely anchor at corners and ends, and at spacings as follows:

1. Anchor Spacing: 24 inches.

B. Squarely seat studs against top and bottom tracks with gap not exceeding of 1/8 inch between the end of wall framing member and the web of track. Fasten both flanges of studs to top and bottom tracks. Space studs as follows:

1. Stud Spacing: 16 inches.

C. Set studs plumb, except as needed for diagonal bracing or required for non plumb walls or warped surfaces and similar configurations.

D. Align studs vertically where floor framing interrupts wall-framing continuity. Where studs cannot be aligned, continuously reinforce track to transfer loads.

E. Align floor and roof framing over studs. Where framing cannot be aligned, continuously reinforce track to transfer loads.

F. Anchor studs abutting structural columns or walls, including masonry walls, to supporting structure as indicated.

G. Install headers over wall openings wider than stud spacing. Locate headers above openings as indicated. Fabricate headers of compound shapes indicated or required to transfer load to supporting studs, complete with clip-angle connectors, web stiffeners, or gusset plates.

1. Frame wall openings with not less than a double stud at each jamb of frame as indicated on Shop Drawings. Fasten jamb members together to uniformly distribute loads.

2. Install runner tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with clip angles or by welding, and space jack studs same as full-height wall studs.

H. Install supplementary framing, blocking, and bracing in stud framing indicated to support fixtures, equipment, services, casework, heavy trim, furnishings, and similar work requiring attachment to framing.

1. If type of supplementary support is not indicated, comply with stud manufacturer's written recommendations and industry standards in each case, considering weight or load resulting from item supported.

I. Install horizontal bridging in stud system, spaced 48 inches. Fasten at each stud intersection installed according to manufacturer's written instructions.

J. Install steel sheet diagonal bracing straps to both stud flanges, terminate at and fasten to reinforced top and bottom tracks. Fasten clip-angle connectors to multiple studs at ends of bracing and anchor to structure.

K. Install miscellaneous framing and connections, including supplementary framing, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.5 EXTERIOR NON-LOAD-BEARING WALL INSTALLATION

A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.

B. Fasten both flanges of studs to top and bottom track, unless otherwise indicated. Space studs as follows:

1. Stud Spacing: 16 inches.

C. Set studs plumb, except as needed for diagonal bracing or required for non-plumb walls or warped surfaces and similar requirements.

D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.

1. Install single-leg deflection tracks and anchor to building structure.

2. Connect vertical deflection clips to infill studs and anchor to building structure.

E. Install horizontal bridging in wall studs, spaced in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.

1. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches of single deflection track. Install a combination of flat, taut, steel sheet straps of width and thickness indicated and stud or stud-track solid blocking of width and thickness matching studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.

   a. Install solid blocking at 96-inch centers.

2. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.

F. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, fasteners, and stud girts, to provide a complete and stable wall-framing system.

3.6 FIELD QUALITY CONTROL

A. Testing: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Field and shop welds will be subject to testing and inspecting.

C. Testing agency will report test results promptly and in writing to Contractor and Architect.

D. Remove and replace work where test results indicate that it does not comply with specified requirements.

E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.7 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed metal framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed metal framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 054000

SECTION 05500

METAL FABRICATIONS

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this Section.

DESCRIPTION OF WORK: Work in this Section includes, but is not necessarily limited to, furnishing and installing the following:

Rough Hardware

Loose Bearing and Leveling Plates

Miscellaneous Steel Trim

Steel Columns and Beams

RELATED SECTIONS

SUBMITTALS

General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

Product data for products used in miscellaneous metal fabrications, including paint products and grout.

Shop Drawings detailing fabrication and erection of each metal fabrication indicated. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide templates for anchors and bolts specified for installation under other sections.

Samples representative of materials and finished products as may be requested by Architect.

QUALITY ASSURANCE

Quality welding processes and welding operators in accordance with AWS D1.1 "Structural Welding Code - Steel," D1.3 "Structural Welding Code - Sheet Steel", and D1.2 "Structural Welding Code - Aluminum."

Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

PROJECT CONDITIONS

Field Measurements: Check actual locations of walls and other construction to which metal fabrications must fit, by accurate field measurements before fabrication; show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay of Work.

PART 2 - PRODUCTS

FERROUS METALS

Metal Surfaces, General: For metal fabrications exposed to view upon completion of the Work, provide materials selected for their surface flatness, smoothness, and freedom from surface blemishes. Do not use materials whose exposed surfaces exhibit pitting, seam marks, roller marks, rolled trade names, roughness, and, for steel sheet, variations in flatness exceeding those permitted by reference standards for stretcher-leveled sheet.

Steel Plates, Shapes, and Bars: ASTM A 36

Steel Pipe: ASTM A53

Black finish, unless otherwise indicated.

Galvanized finish for exterior installations.

Type F, standard weight (schedule 40), unless otherwise indicated, or another weight, type, and grade required by structural loads.

Gray Iron Castings: ASTM A 48, Class 30

Malleable Iron Castings: ASTM A 47, Grade 32510

Brackets, Flanges and Anchors: Cast or formed metal of the same type material and finish as supported rails, unless otherwise indicated.

Concrete Inserts: Threaded or wedge type; galvanized ferrous castings, either malleable iron, ASTM A 47, or cast steel, ASTM A 27. Provide bolts, washers, and shims as required, hot-dip galvanized per ASTM A 153.

Welding Rods: Select in accordance with AWS Specifications for the metal alloy to be welded.

GROUT AND ANCHORING CEMENT

Nonshrink Nonmetallic Grout: Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with CE CRD-C 621. Provide grout specifically recommended by manufacturer for interior and exterior applications of type specified in this Section.

Interior Anchoring Cement: Factory-prepackaged, nonshrink, nonstaining, hydraulic controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound. Use for interior applications only.

FASTENERS

General: Provide zinc-coated fasteners for exterior use or where built into exterior walls. Select fasteners for the type, grade, and class required for each application and complying with applicable standards.

Bolts and Nuts: Regular hexagon head type, ASTM A-307, Grade A

Lag Bolts: Square head type, FS FF-B-561

Machine Screws: Cadmium plated steel FS FF-S-92

Wood Screws: Flat head carbon steel, FS FF-S-111

Plain Washers: Round, carbon steel, FS FF-W-92

Drilled-in Expansion Anchors: Expansion Anchors Complying with FS FF-S-325, Group VIII (anchors, expansion), Type I (internally threaded tubular expansion anchor); and machine bolts complying with FS FF-B-S75, Grade 5.

PAINT

Shop Primer for Ferrous Metal: Manufacturer's or fabricator's standard, fast-curing, lead-free, universal modified alkyd primer selected for good resistance to normal atmospheric corrosion, for compatibility with finish paint systems indicated, and for capability to provide a sound foundation for field-applied topcoats despite prolonged exposure complying with performance requirements of FS TT-P-645.

Galvanizing Repair Paint: High zinc dust content paint for regalvanizing welds in galvanized steel, with dry film containing not less than 94 percent zinc dust by weight, and complying with DOD-P-21035 or SSPC-Paint-20.

Bituminous Paint: Cold-applied asphalt mastic complying with SSPC-Paint 12 except containing no asbestos fibers.

Zinc Chromate Primer: FS TT-P-645.

FABRICATION

Form metal fabrications from materials of size, thickness, and shapes indicated but not less than that needed to comply with performance requirements indicated. Work to dimensions indicated or accepted on shop drawings, using proven details of fabrication and support. Use type of materials indicated or specified for various components of each metal fabrication.

Allow for thermal movement resulting from the following maximum change (range) of exterior metalwork in ambient temperature in the design, fabrication, and installation of installed metal assemblies to prevent buckling, opening up of joints, and overstressing of welds and fasteners. Base design calculations on actual surface temperatures of metals due to both solar heat gain and nighttime sky heat loss. Temperature Change (Range): 150 deg. F.

Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges. Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flathead (countersunk) screws or bolts. Locate joints where least conspicuous.

Weld corners and seams continuously to comply with AWS recommendations and the following:

Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

Obtain fusion without undercut or overlap.

Remove welding flux immediately.

At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and contour

Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space anchoring devices to provide adequate support for intended use.

Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation. Cut, reinforce, drill and tap miscellaneous metal work as indicated to receive finish hardware, screws, and similar items.

Fabricate joints that will be exposed to weather in a manner to exclude water, or provide weep holes where water may accumulate.

ROUGH HARDWARE

Furnish bent or otherwise custom fabricated bolts, plates, anchors, hangers, dowels, and other miscellaneous steel and iron shapes as required for framing and supporting woodwork, and for anchoring or securing woodwork to concrete or other structures. Fabricate items to sizes, shapes, and dimensions required. Furnish malleable-iron washers for heads and nuts which bear on wood structural connections; elsewhere, furnish steel washers.

LOOSE BEARING AND LEVELING PLATES

Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction, made flat, free from warps or twists, and of required thickness and bearing area. Drill plates to receive anchor bolts and for grouting as required. Galvanize after fabrication.

LOOSE STEEL LINTELS

Fabricate loose structural steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Weld adjoining members together to form a single unit where indicated.

Galvanize loose steel lintels located in exterior walls.

Size loose lintels for equal bearing of one inch per foot of clear span but not less than 8 inches bearing at each side of openings, if not indicated on Drawings.

MISCELLANEOUS FRAMING AND SUPPORTS

General: Provide steel framing and supports for applications indicated or which are not a part of structural steel framework, as required to complete work.

Fabricate units to sizes, shapes, and profiles indicated and required to receive adjacent other construction retained by framing and supports. Fabricate from structural steel shapes, plates, and steel bars of welded construction using mitered joints for field connection. Cut, drill, and tap units to receive hardware, hangers, and similar items.

Equip units with integrally welded anchors for casting into concrete or building into masonry. Furnish inserts if units must be installed after concrete is placed. Spacing of anchors shall not be more than 24" o.c.

MISCELLANEOUS STEEL TRIM

Provide shapes and sizes indicated for profiles shown. Unless otherwise indicated, fabricate units from structural steel shapes, plates, and steel bars, with continuously welded joints and smooth exposed edges. Use concealed field splices wherever possible. Provide cutouts, fittings, and anchorages as required for coordination of assembly and installation with other work.

Galvanize miscellaneous framing and supports in exterior locations and where shown to be painted.

CONCRETE FILL AND REINFORCING MATERIALS

Concrete Materials and Properties: Comply with requirements of Concrete Specifications shown on Drawings.

Non-slip Aggregate Finish: Factory-graded, packaged material containing fused aluminum oxide grits or crushed emery as abrasive aggregate; rustproof and non-glazing; unaffected by freezing, moisture, or cleaning materials.

Reinforcing Bars: ASTM A-615, Grade 60, unless noted otherwise.

FINISHES, GENERAL

Comply with NAAMM "Metal Finishes Manual" for recommendations relative to application and designations of finishes. Finish metal fabrications after assembly.

STEEL AND IRON FINISHES

Galvanizing: For those items indicated for galvanizing, apply zinc-coating by the hot-dip process in compliance with the following requirements:

ASTM A-153 for galvanizing iron and steel hardware.

ASTM A-123 for galvanizing both fabricated and unfabricated iron and steel products made of uncoated rolled, pressed, and forged shapes, plates, bars, and strip 0.0299 inch thick and heavier.

Preparation for Shop Priming: Prepare uncoated ferrous metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed metal fabrications: Interiors (SSPC Zone 1A): SSPC0SP3 "Power Tool Cleaning".

Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finish or to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with requirements of SSPC-PA1 "Paint Application Specification No. 1" for shop painting. Stripe paint all edges, corners, crevices, bolts, welds, and sharp edges.

PART 3 - EXECUTION

PREPARATION

Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions, and directions for installation of anchorages, including concrete inserts, sleeves, anchor bolts, and miscellaneous items having integral anchors that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to project site.

Set sleeves in concrete with tops flush with finish surface elevations; protect sleeves from water and concrete entry.

INSTALLATION, GENERAL

Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction; include threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors as required.

Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installation of miscellaneous metal fabrications. Set metal fabrication accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

Provide temporary bracing or anchors in formwork for items that are to be built into concrete masonry or similar construction.

Field Welding: Comply with AWS Code for procedures of manual shielded metal-arc welding, appearance and quality of welds made, methods used in correctly welding work, and the following:

Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

Obtain fusion without undercut or overlap.

Remove welding flux immediately.

At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and contour of welded surface matches those adjacent.

SETTING LOOSE PLATES

Clean concrete and masonry bearing surfaces of any bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of bearing plates.

Set loose leveling and bearing plates on wedges, or other adjustable devices. After the bearing members have been positioned and plumbed, tighten the anchor bolts. Do not remove wedges or shims, but if protruding, cut off flush with the edge of the bearing plate before packing with grout.

Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

Use nonmetallic nonshrink grout, unless otherwise indicated.

TOUCH-UP PAINTING: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA requirements for touch-up of field painted surfaces.

Apply by brush or spray to provide a minimum dry film thickness of 2.0 mils.

For galvanized surfaces clean welds, bolted connections and abraded areas and apply galvanizing repair paint to comply with ASTM A 780.

END OF SECTION

SECTION 05521

PIPE AND TUBE RAILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:
   1. Steel pipe railings.

1.3 PERFORMANCE REQUIREMENTS

A. General: In engineering railings to withstand structural loads indicated, determine allowable design working stresses of railing materials based on the following:
   1. Steel: 72 percent of minimum yield strength.

B. Structural Performance: Provide railings capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
   1. Top Rails of Guards:
      a. Uniform load of 50 lbf/ ft. applied horizontally and concurrently with 100 lbf/ ft. applied vertically downward.
      b. Concentrated load of 200 lbf applied in any direction.
      c. Uniform and concentrated loads need not be assumed to act concurrently.
   2. Infill of Guards:
      a. Concentrated load of 200 lbf applied horizontally on an area of 1 sq. ft.
      b. Infill load and other loads need not be assumed to act concurrently.

C. Thermal Movements: Provide exterior railings that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
   1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

D. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1.4 SUBMITTALS

A. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
   1. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

B. Welding certificates.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain railing through one source from a single manufacturer.

B. Welding: Qualify procedures and personnel according to the following:
   1. AWS D1.1, "Structural Welding Code--Steel."

PART 2 - PRODUCTS

2.1 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

2.2 STEEL AND IRON

A. Pipe: ASTM A 53, Type F or Type S, Grade B, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.
   1. Provide galvanized finish for exterior installations and where indicated.

B. Steel Bars: ASTM A 36.

2.3 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

B. Zinc-Rich Primer: Complying with SSPC-Paint 20 or SSPC-Paint 29 and compatible with topcoat.
   1. Use primer with a VOC content of 420 g/L (3.5 lb/gal.) or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
   2. Products: Subject to compliance with requirements, provide one of the following:
      a. Benjamin Moore & Co.; Epoxy Zinc-Rich Primer CM18/19.
      b. ICI Devoe Coatings; Catha-Coat 313.
      c. PPG Architectural Finishes, Inc.; Aquapon Zinc-Rich Primer 97-670.
      d. Sherwin-Williams Company; Corothane I GalvaPac Zinc Primer.
      e. Tnemec Company, Inc.; Tneme-Zinc 90-97.

C. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

D. Non-Shrink, Non-Metallic Grout: Factory-packaged, non-staining, non-corrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

E. Anchoring Cement: Factory-packaged, non-shrink, non-staining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.
   1. Water-Resistant Product: At exterior locations provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

2.4 FABRICATION

A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch, unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Form work true to line and level with accurate angles and surfaces.

D. Fabricate connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

E. Connections: Fabricate railings with welded connections, unless otherwise indicated.

F. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
   1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
   2. Obtain fusion without undercut or overlap.
   3. Remove flux immediately.
   4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.

G. Form changes in direction by radius bends of radius indicated.

H. Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

2.5 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

2.6 STEEL AND IRON FINISHES

A. Galvanized Railings: Hot-dip galvanize exterior steel and iron railings after fabrication.

B. Fill vent and drain holes that will be exposed in the finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.

C. Preparation for Shop Priming: After galvanizing, thoroughly clean railings of grease, dirt, oil, flux, and other foreign matter, and treat with metallic-phosphate process.

D. Apply shop primer to prepared surfaces of railings, unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.
   1. Do not weld, cut, or abrade surfaces of railing components that have been coated or finished after fabrication.
   2. Set posts plumb within a tolerance of 1/16 inch in 3 feet.

3.2 RAILING CONNECTIONS

A. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in Part 2 "Fabrication" Article whether welding is performed in the shop or in the field.

3.3 ANCHORING POSTS

A. Form or core-drill holes not less than 5 inches deep and 3/4 inch larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with non-shrink, non-metallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions.

B. Cover anchorage joint with flange of same metal as post, welded to post after placing anchoring material.

3.4 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

3.5 PROTECTION

A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.

B. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION 05521

SECTION 06100

ROUGH CARPENTRY

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and General Provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

DESCRIPTION OF WORK: Work of this Section includes, but is not necessarily limited to, furnishing and installing the following:

Wood Grounds, Nailers, and Blocking

Wall Sheathing.

All fasteners, adhesives, and other attachment devices shall be furnished by this Contractor.

RELATED WORK

Section 06200 - Finish Carpentry

Section 06400 - Casework

Section 07620 - Sheet Metal Flashing and Trim

SUBMITTALS: Submit the following:

Product data, installation instructions and recommendations from manufacturer, including data that materials comply with requirements.

Shop Drawings for wood trusses showing sizes, design values, materials, and dimensional relationships of components, as well as bearing and anchorage details.

Provide Shop Drawings that have been signed and stamped by a professional engineer legally authorized to practice in jurisdiction where project is located.

Wood treatment data, including treatment plant's certification of compliance with indicated requirements.

QUALITY ASSURANCE

Single-Source Responsibility for Trusses and Engineered Wood Products: Obtain each type of engineered wood products from one source from a single manufacturer.

Single-Source Responsibility for Fire Retardant Treated Wood: Obtain each type of fire-retardant-treated wood products from one source for both treatment and fire-retardant formulation.

Standards: Comply with N.F.P.A. "National Design Specification for Wood Construction" and with TPI standards, including "Quality Standard for Metal Plate Connected Wood Trusses", "Commentary and Recommendations for Handling and Erecting Wood Trusses", "Commentary and Recommendations for Bracing Wood Trusses", and "Design Specification for Metal Plate Connected Wood Trusses".

DEFINITIONS

Gypsum Board Construction Terminology Standard: Refer to ASTM C 11 and GA 505 for definitions of terms for gypsum board construction not otherwise defined in this Section or other referenced standards.

PRODUCT HANDLING

Delivery and Storage: Keep materials under cover and dry. Protect against exposure to weather and contact with damp or wet surfaces. Stack lumber as well as plywood and other panels. Provide for air circulation within and around stacks and under temporary coverings, including polyethylene and similar materials.

For lumber and plywood pressure treated with waterborne chemicals, sticker between each course to provide air circulation.

Handle and store trusses with care and comply with TPI recommendations to avoid damage from bending, overturning, or other cause.

COORDINATION

Fit carpentry work to other work. Scribe and cope as required for accurate fit. Correlate location of nailers, blocking, grounds, and similar supports to allow attachment of other work.

PART 2 - PRODUCTS

LUMBER, GENERAL

Lumber Standards: Manufacture lumber to comply with PS 20 "American Softwood Lumber Standard" and with applicable grading rules of inspection agencies certified by American Lumber Standards Committee's (ALSC) Board of Review.

Grade Stamps: Factory-mark each piece of lumber with grade stamp of inspection agency evidencing compliance with grading rule requirements and identifying grading agency, grade, species, moisture content at time of surfacing, and mill.

Nominal sizes are indicated, except as shown by detail dimensions. Provide actual sizes as required by PS 20 for moisture content specified for each use.

Provide dressed lumber, S4S, unless otherwise indicated.

Provide seasoned lumber with 15 percent maximum moisture content at time of dressing and shipment for sizes 2" or less in nominal thickness, unless otherwise indicated.

Framing lumber unless noted otherwise, shall be of a structural grade with minimum allowable working stresses as shown on Drawings.

Studs, furring, plates, and sills shall be standard construction grade lumber unless noted otherwise on Drawings.

Miscellaneous Lumber: Provide wood for support or attachment of other work including support bases, cant strips, bucks, nailers, blocking, furring, grounds, stripping, and similar members. Provide lumber of sizes indicated, worked into shapes shown.

CONSTRUCTION SIP ROOF PANELS, GENERAL

See Specification section for SIP structural roof panels.

WALL SHEATHING

Exterior Fire-Rated Gypsum Sheathing: 5/8" thick "Dens-Glass Gold Firestop Type X", by Georgia-Pacific, 5/8" thick "Fiberbond Wall Sheathing", by Louisiana Pacific Corporation.

Oxboard, by Potlach Corporation or approved equal; thickness as shown on drawings.

MISCELLANEOUS MATERIALS

Fasteners and Anchorages: Provide size, type, material, and finish as indicated and as recommended by applicable standards, complying with applicable federal Specifications for nails, staples, screws, bolts, nuts, washers, and anchoring devices. Provide metal hangers and framing anchors of the size and type recommended by the manufacturer for each use including recommended nails.

Where rough carpentry work is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners and anchorages with a hot-dip zinc coating (ASTM A-153).

Foundation Anchors and Wall Bracing: Galvanized steel as manufactured by Teco, Simpson, or Kant Sag.

WOOD TREATMENT MATERIALS

Preservative Treatment: Where lumber or plywood is indicated as "Treated," or is specified herein to be treated, comply with applicable requirements of AWPA Standards C2 (Lumber and C9 Plywood) and of AWPB Standards listed below. Mark each treated item with the AWPB Quality Mark Requirements.

Pressure-treat above-ground items with water-borne preservatives to comply with AWPB LP-2. After treatment, kiln-dry lumber and plywood to a maximum moisture content of 15 percent. Treat indicated items and the following:

Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers and waterproofing.

Wood sills, sleepers, blocking, furring, stripping and similar concealed members in contact with masonry or concrete.

Wood floor plates installed over concrete slabs directly in contact with earth.

Pressure-treat the following with water-borne preservatives for ground contact use complying with AWPB LP-22:

Wood members in contact with ground.

Complete fabrication of treated items prior to treatment, where possible. If cut after treatment, coat cut surfaces with heavy brush coat of same chemical used for treatment and to comply with AWPA M-4. Inspect each piece of lumber or plywood after drying and discard damaged or defective pieces.

Fire-Retardant Treatment: Where fire-retardant treated wood is indicated, pressure impregnate lumber and plywood with fire-retardant chemical to comply with AWPA C20 and C27, respectively, for treatment type indicated below. Identify fire-retardant treated wood lumber with appropriate classification marking of Underwriters Laboratories, Inc., U.S. Testing, Timber Products Inspection or other testing and inspecting agency acceptable to authorities having jurisdiction.

Interior Type A: Use where fire-retardant treated wood is indicated for interior applications.

Exterior type: Use where fire-retardant treated wood is indicated for exterior, exposed applications.

Inspect each piece of treated lumber of plywood after drying and discard damaged or defective pieces.

Kiln dry wood after pressure treatment to maximum 19 percent moisture content.

ADHESIVE

Adhesive shall be PL-400, Liquid Nail, or an equal approved by the Architect.

PART 3 - EXECUTION

WOOD TREATMENT

Shop pressure treat and deliver to site ready for installation, wood materials requiring pressure impregnated preservatives.

INSTALLATION, GENERAL

Discard units of material with defects which might impair quality of work, and units which are too small to use in fabricating work with minimum joints or optimum joint arrangement.

Set carpentry work to required levels and lines, with members plumb and true to line and cut and fitted.

Fit rough carpentry to other construction. Scribe and cope as required for accurate fit. Correlate location of nailers, blocking, grounds, and similar supports to allow attachment of other construction.

Securely attach carpentry work to substrate by anchoring and fastening as shown, and to comply with "Recommended Nailing Schedule" of "Manual for Wood Frame Construction" and "National Design Specifications for Wood Construction" published by N.F.P.A.

Countersink nail heads on exposed carpentry work and fill holes.

Use common wire nails, except as otherwise indicated. Use finishing nails for finish work. Select fasteners of size that will not penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting of wood. Predrill as required.

WOOD GROUNDS, NAILERS, BLOCKING, AND SLEEPERS

Provide wherever shown and where required for screeding or attachment of other work. Form to shapes as shown and cut as required for true line and level of work to be attached. Coordinate location with other work involved.

Attach to substrates as required to support applied loading. Countersink bolts and nuts flush with surfaces, unless otherwise indicated. Build into masonry during installation of masonry work. Where possible, anchor to formwork before concrete placement.

INSTALLATION OF CONSTRUCTION PANELS

General: Comply with applicable recommendations BY SIP PANEL MANUFACTURERER for types of construction panels and applications indicated.

Fastening Methods: Fasten panels as indicated below:

Roof Panels: Screw and glue to wood nailers on steel framing PER mfr recommendations. No staples will be permitted.

At Roof Sheating, provide suitable edge support as recommended by ADA by use of panel clips, or lumber blocking between Joist. Panel End Joints shall occur over framing. Provide 1/8" spacing at Panel Edges and Ends.

INSTALLATION OF GYPSUM SHEATHING

General: Install gypsum sheathing to comply with manufacturer's instructions, GA-253, and the following:

Cut boards at penetrations, edges, and other obstructions of the work. Fit tightly against abutting construction, except provide a 3/8" setback where non-load-bearing construction abuts structural elements.

Coordinate sheathing installation with flashing and joint sealant installation so that these combined materials are installed in the sequence and manner that prevents exterior moisture from passing through completed exterior wall assembly.

Apply fasteners so that screw heads bear tightly against face of gypsum sheathing boards, but do not cut into face paper.

Do not bridge building expansion joints with gypsum sheathing. Cut and space edges to match spacing of structural support elements.

Vertical Installation: Install four-foot-wide gypsum sheathing boards vertically with vertical edges centered over flanges of studs. Abut ends and edges of each board with those of adjoining boards. Screw-attach boards at perimeter and within field of board to each steel stud as follows:

Fasteners spaced approximately 8" o.c. and set-back 3/8" minimum from edges and ends of boards.

PROTECTION

Protect gypsum sheathing that will be left exposed to weather for more than one month as follows:

Protect cutouts, corners, and joints in the sheathing by filling with a flexible sealant or by applying sheathing tape recommended by sheathing manufacturer at the time sheathing is applied.

END OF SECTION

SECTION 06410
CASEWORK

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this Section.

DESCRIPTION OF WORK: Work in this Section includes, but is not necessarily limited to, furnishing and installing the following:

Plastic Laminate Countertops, Aprons, and Backsplashes

Custom Cabinet Units

RELATED SECTIONS

Section 06100 - Rough Carpentry

Section 06200 - Finish Carpentry

REFERENCES

FS MM-L-736 - Lumber, Hardwood

FS MMM-A-130 - Adhesive, Contact

NEMA LD3 - High Pressure Decorative Laminates

PS 1 - Construction and Industrial Plywood

PS 20 - American Softwood Lumber Standard

PS 51 - Hardwood and Decorative Plywood

PS 58 - Basic Hardboard

QUALITY ASSURANCE

Perform work to (custom) quality in accordance with "Quality Standards" of the Architectural Woodwork Institute (AWI).

SUBMITTALS

Submit Shop Drawings and product data. Include materials, component profiles, fastening methods, assembly methods, joint details, accessory listings, and schedule of finishes.

Submit cabinet door sample and sample of all proposed materials.

PART 2 - PRODUCTS

PLASTIC LAMINATE COUNTERTOPS, APRONS, BACKSPLASHES

Plastic Laminate: Shall be standard grade, 1/16" thick, general purpose material complying with current NEMA Standard LP-2. Comply with ANSI A161.2. Acceptable manufacturers shall include:

Formica Corporation

WilsonArt

Laminart

Adhesive: Shall be that which is recommended by the supplier of plastic laminate.

Core: Shall be Particleboard, complying with ANSI A208.1, 45-lb. density, minimum 3/4" thick, or plywood, 5-ply hardwood faced, Type II, Grade BD or better, minimum 3/4" thick, complying with ASTM D 1037.

Where shown, all countertops shall have 3/4" x 4" high separate matching backsplash and matching aprons.

LAMINATE CLAD CUSTOM BOX CABINET UNITS

Acceptable Manufacturers:

American Millwork, Inc.

Artone Manufacturing

Arwood Industries

Brownfield Industries

Creative Cabinets

or Approved Equal

Modular Box-Type Cabinets: Where shown on Drawings, system shall be modular box-cabinet type construction.

Laminate Clad Cabinets

Quality Standard: Comply with AWI Section 400 and Division 400B, "Laminate Clad Cabinets".

AWI Type of Cabinet Construction: As Indicated

Laminate Cladding

Plastic Laminate: NEMA LD 3 as manufactured by one of the following:

Formica Corporation

Wilson Plastics Company, WilsonArt

Laminart

Particle Board: ANSI A208.1, Mat-Formed Particle Board, Grade 1-M-2, with minimum density of 45 pcf. Internal bond of 60 psi, and minimum screw holding capacity of 225 lb. on faces and 200 lb. on edges.

Concealed Surfaces: Sound and dry solid wood, plywood, or particleboard without defects affecting strength, utility, or stability.

Sides, Dividers, Tops, Bottoms, Shelves, and Stretchers: Plastic laminate GP 50 (0.50 inch nominal thickness) on 3/4 inch thick particleboard. Provide stretchers for top of base cabinet.

Back Panels: 1/8 inch thick hardboard with thermoset decorative panels on interior surfaces fastened to rear edge of end panels and to top and bottom rails.

Exposed Edge Treatment: Edge doors and drawer fronts with PVC Edgebanding: Kwick-Edge PVC, and Accent Edge PVC, as manufactured by Woodtape, or approved equal.

Semi-Exposed Edge Treatment: Edge top of drawer body with PVC Edgebanding: Kwick-Edge PVC and Accent Edge PVC, as manufactured by Woodtape, or approved equal.

Doors, Drawer Fronts, Fixed Panels, Toeboards, and Ends: Plastic laminate GP 50 (0.50 inch nominal thickness) on 5/8 inch thick particleboard.

Drawers: Fabricate with front, bottom, and back rabbeted in sides and secured with glue and mechanical fasteners as follows:

Subfronts, Sides, and Backs: 3/8 inch thick particleboard.

Bottoms: Not less than 1/4 inch thick particleboard.

Joinery: Rabbet backs flush into end panels and secure with concealed mechanical fasteners. Connect tops and bottoms of wall cabinets and bottoms and stretchers of base cabinets to ends and dividers with mechanical fasteners. Rabbet tops, bottoms, and backs into end panels.

Toe Board: 5/8 inch thick particleboard attached to subbase with concealed fasteners.

CABINET HARDWARE

General: Unless scheduled otherwise, manufacturer's standard hardware units of type, size, material and finish indicated, complying with ANSI A-156.9.

Hardware Schedule

Drawer Slides

Guest Rooms: MR 2031, self-closing, 3/4 extension with 75 lb. rating, by Mepla or approved equal.

Front Desk: MR 2080, full extension with 75 lb. rating, by Mepla or approved equal.

Hinges: 1/2 overlay, as manufactured by Grass.

Wall Cabinet Hanging System: Hangstrip System by Grass or approved equal.

Base Cabinet Leg Leveling: Leg leveling system by Grass or approved equal.

Pulls: Recessed pulls, No. SP-036, by Siro Designs, Inc., or approved equal (305-968-0104).

Fasteners: Size and type to suit application.

ACCESSORIES

Valance Moulding: 1/2" x 1/2" L channel, .063 thick, 8700 PVC rigid white. R-1119, by SFR Industries, Inc., or approved equal (715-723-4343).

Fastener Cover Caps: Cover cap (white gloss) and screw base flat, as manufactured by Ark-Plas Products, Inc., or approved equal (501-453-2343).

Gromets: 1" o.d., 3/4" hole, AG series, as manufactured by Doug Mockett & Company, or approved equal (800-523-1269).

PVC Edgebanding: Kwick-Edge PVC and Accent Edge PVC, as manufactured by Woodtape, or approved equal. Sizes and locations as shown on Drawings (800-833-8428).

Drawer Bumpers: Transparent, self-adhesive door bumper by Hafele America Co., or approved equal (800-334-1873).

Door Bumpers: Transparent, self-adhesive door bumper, 12.5mm x 3mm, by Hettich America LP, or approved equal (800-277-2111).

Closet Rod and Flange: OVA wardrobe rail, rolled, with butted seam, steel, nickel plated and wardrobe rail support, 32mm hole distance, with 5mm pegs, zinc alloy nickel plated, as manufactured by Hafele America Co., or approved equal (800-334-1873).

LOCKS

At all locations in drawers and doors shown on Drawings, furnish and install 986 drawer lock by Knape and Vogt, or approved equal.

FABRICATION

Shop assemble casework for delivery to site in units easily handled and to permit passage through building openings.

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

Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Make corners and joints hairline. Locate counter butt joints minimum 2 feet from sink cut-outs.

Apply laminate backing sheet to reverse side of plastic laminate finished surfaces, where shown on Drawings.

Provide cutouts for plumbing fixtures, inserts, appliances, outlet boxes, and other fixtures and fittings.

PART 3 - EXECUTION

INSPECTION

Verify adequacy of backing and support framing.

INSTALLATION

All cabinets, countertops, and shelving shall be installed as shown on Drawings and as specified by manufacturer.

Set and secure casework in place rigid, plumb, and level.

Use purpose designed fixture attachments at concealed locations for wall-mounted components.

Use threaded steel concealed joint fasteners to align and secure adjoining cabinet units and counter tops.

Carefully scribe casework which is against other building materials, leaving gaps of 1/32 inch maximum. Do not use additional overly trim for this purpose.

Secure cabinet and counter bases to floor using appropriate angles and anchorages.

Countersink anchorage devices at exposed locations used to wall-mount components, and conceal with solid plugs of species to match surrounding wood. Finish flush with surrounding surfaces.

PLASTIC LAMINATE

INSTALLATION: The plastic laminate shall be bonded to a suitable substrate. Rigid setting type adhesive is recommended. The temperature of the materials, surfacing, substrate, and adhesive, and the area in which the actual fabrication is to be done shall not be less than 65 degrees F. with a relative humidity of not less than 35% and not more than 85%. All inside corners of cutouts in plastic laminate shall be radiused as large as possible with 1/8"R minimum. File edges of the radius smooth and free of cracks and crazes.

METHOD: Assembly of components should be accomplished using approved procedures, materials, and equipment, and the workmanship should conform to established industry practices, conditions, procedures, and recommendations.

ADJUSTING AND CLEANING

Adjust doors, drawers, hardware, fixtures and other moving or operating parts to function smoothly and correctly.

Clean casework, counters, shelves, hardware, fittings and fixtures.

Clean surfaces of plastic laminate with a damp cloth or ordinary bar soap and water. Harsh abrasive cleansers shall not be used. Stubborn dirt may be removed with lacquer thinner, methlethyl Ketone, contact adhesive solvents or cleaner waxes.

END OF SECTION

SECTION 07113

Masonry Waterproofing

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Cold applied water based emulsified asphalt vapor retarding coating for exterior above grade cavity walls.

B. Related Sections:
   1. Section 04 21 00 – Masonry Assemblies Unit Masonry.

1.2 SYSTEM DESCRIPTION

A. Performance Requirements: Provide material complying with the following requirements:
   1. Nonflammable.
   2. VOC Content:
      a. 0.25 pounds per gallon (30 g/L) less water and exempt solvents.
   3. Service Temperature Range:
      a. Minus 40 degrees F (Minus 40 degrees C) to 150 degrees F to (66 degrees C).
   4. Compliance:
      a. Trowel applied long fiber reinforced complying with ASTM D1227, Type 2, Class I and ASTM D1187, Type 1.

1.3 SUBMITTALS

A. Comply with Submittal Section

B. Product Data: Submit manufacturer’s technical bulletins and MSDS on each product.

C. Submit list of project references as documented in this Specification under Quality Assurance Article. Include contact name and phone number of person charged with oversight of each project.

D. Quality Control Submittals:
   1. Provide protection plan of surrounding areas and surfaces not to receive damproofing.

1.4 QUALITY ASSURANCE

A. Comply with Section.

B. Qualifications:
   1. Manufacturer Qualifications: Company with minimum 15 years of experience in manufacturing of specified products and systems.
   2. Manufacturer Qualifications: Company shall be ISO 9001:2000 Certified.
   3. Applicator Qualifications: Company with minimum of 5 years experience in application of specified products and systems on projects of similar size and scope, and is acceptable to product manufacturer.
      a. Successful completion of a minimum of 5 projects of similar size and complexity to specified Work.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Comply with Section.

B. Comply with manufacturer's ordering instructions and lead-time requirements to avoid construction delays.

C. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

D. Store tightly sealed materials off ground and away from moisture, direct sunlight, extreme heat, and freezing temperatures.

1.6 PROJECT CONDITIONS

A. Environmental Requirements:
   a. Keep from freezing in the container.
   b. Do not apply at temperatures below 40 degrees F (4 degrees C) or when temperatures are expected to fall to 40 degrees F (4 degrees C) within 24 hours.
   c. Protect from rain until coating has set.
   d. Application shall be protected or covered within 7 days of application.
   e. Do not expose to long-term UV.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with requirements, provide products from the following manufacturer:
   1. BASF Building Systems
      889 Valley Park Drive

Shakopee, MN 55379
Customer Service: 800- 433-9517
Technical Service: 800-243-6739
Direct Phone: 952-496-6000
Internet: http://www.BASFbuildingsystems.com

B. Substitutions: Comply with Section.

C. Specifications and Drawings are based on manufacturer's proprietary literature from BASF Building Systems. Other manufacturers shall comply with minimum levels of material, color selection, and detailing indicated in Specifications or on Drawings. Architect will be sole judge of appropriateness of substitutions.

2.2 MATERIALS

A. Cold applied water based emulsified asphalt:
1. Long-fiber Fibrated Product: Hydrocide 700 by BASF Building Systems.

B. Insulation Board: – 1-1/2" rigid polyurethane board refer to other section.

C. Chemical Cleaner: Reducer 990 by BASF Building Systems.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Comply with Section.

3.2 SURFACE PREPARATION

A. Protect adjacent Work areas and finish surfaces from damage during damproofing application.

B. Surface should be free of oil, grease, dirt, laitance, and loose material. Dry surfaces shall be dampened with water and kept damp until application.

3.3 APPLICATION

1. Apply long fiber fibrated material in 1 coat by trowel.
2. Fill in crevices and grooves, providing continuous coating and free from breaks and pinholes. Carry coating over exposed top and outside edge of footing. Spread around joints, grooves, and slots, and into chases, corners, reveals, and soffits. Bring coating to finished grade.
3. Place backfill at least 24 to 48 hours after application, but within 7 days. Do not rupture or damage film or displace coating or membranes.
.

B. Cavity wall construction Above Grade – Vapor Retarder:

1. Apply fibrated material in 1 coat, carrying coating in and around joints, grooves, and slots, following reveals and soffits of windows, and continuing 12 inches (305 mm) out on adjoining partitions and soffits.

C. Install above grade insulation board in conjunction with bituminous material application with fibrated asphalt material.

3.4 CLEANING

A. Clean tools and equipment immediately with hot, soapy water. Cured material can be removed with solvent.

B. Clean up and properly dispose of debris remaining on Project site related to application.

C. Remove temporary coverings and protection from adjacent Work areas.

3.5 PROTECTION

A. Protect application from damage during construction.

END OF SECTION

SECTION 07121

Concrete Masonry Unit Waterproofing

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and General Provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

DESCRIPTION OF WORK: Work in this Section includes, but is not necessarily limited to, waterproofing exterior surface of all concrete masonry units

RELATED SECTIONS

Section 07620 - Sheet Metal Flashing and Trim

SUBMITTALS

Submit product data, samples and manufacturer's surface preparation and installation instructions.

For information only, submit copies of all referenced standards utilized for this project, unless duplicated in product data.

QUALITY ASSURANCE.

Test Area

Test a minimum 4 ft. by 4 ft. area on each type of masonry. Use the manufacturer's application instructions. Let test area protective treatment cure before inspection. Keep test panels available for comparison throughout the protective treatment project.

WARRANTY

Submit two copies of a written guarantee agreeing to repair or replace waterproofing applications which fail to perform as water tight surfaces and watertight joints; or fail weather resistance, or general durability; or appear to deteriorate in any other manner not clearly specified by submitted manufacturer's data as an inherent quality of the material for the exposure indicated. Provide two-year warranty.

Replace sealants which fail because of loss of cohesion or adhesion or do not cure.

PART 2 - PRODUCTS

WATER PROOFING PRODUCT: **Manufacturer:** PROSOCO, Inc., 3741 Greenway Circle, Lawrence, KS 66046. Phone: (800) 255-4255; Fax: (785) 830-9797. E-mail: ustomerCare@prosoco.com

Product Description

Sure Klean® Weather Seal Siloxane WB Concentrate is a concentrated water repellent designed for dilution with fresh water at the job site. This solvent-free blend of silanes and oligomeric alkoxysiloxanes mixes easily with water to produce a penetrating low-VOC water repellent ideal for application to dense or porous masonry surfaces.

Technical Data

FORM: Clear amber liquid
SPECIFIC GRAVITY: 0.96
ACTIVE CONTENT: 100%
pH: N/A
WT./GAL.: 7.9 lbs.
FLASH POINT: 69 degrees F (21 degrees C) concentrate ASTM D 3278
140 degrees F (60 degrees C) in 1:9 dilution
145 degrees F (62 degrees C) in 1:14 dilution
FREEZE POINT: < -22 degrees F (< -30 degrees C)
VOC CONTENT: Complies with all known national, state and district AIM VOC regulations at recommended dilutions.

Limitations

- Product must be applied within 24 hours of dilution for maximum effectiveness.
- Will not prevent water penetration through structural cracks, defects or open joints.

PART 3 - EXECUTION

Application

Before applying, read “Preparation” and “Safety Information” sections in the Manufacturer’s Product Data Sheet for Weather Seal Siloxane WB Concentrate. Refer to the Product Data Sheet for additional information about application and dilution rates of Weather Seal Siloxane WB Concentrate.

Dilution

Dilute with clean, potable water only. Mixing vessels must be clean, dry and free of contaminants. When added to water, Siloxane WB turns milky white. Mix lightly to produce a uniform consistency.

Siloxane WB is most effective when prepared solutions are applied within 8 hours of dilution, and must be applied within 24 hours of dilution.

Dilution Ratios

Vertical Surfaces

Porous 1 part concentrate : 9 parts water
Semiporous 1 part concentrate : 14 parts water
Dense 1 part concentrate : 19 parts water

Horizontal Surfaces

Porous 1 part concentrate : 7 parts water
Semiporous 1 part concentrate : 9 parts water
Dense 1 part concentrate : 14 parts water

Vertical Application Instructions

For best results, apply diluted protective treatment “wet-on-wet” to a visibly dry and absorbent surface.

Spray: Saturate from the bottom up, creating a 4” to 8” (15 to 20 cm) rundown below the spray contact point. Let the first application penetrate for 2-3 minutes. Resaturate. Less material will be needed for the second application.

Brush or roller: Saturate uniformly. Let diluted protective treatment penetrate for 2 to 3 minutes. Brush out heavy runs and drips that do not penetrate.

Fluted architectural block:

Spray in an "overlapping X pattern" for complete coverage of recessed surfaces.

Horizontal Application Instructions

1. Saturate in a single application. Use enough to keep the surface wet for 2 to 3 minutes before penetration.
2. Broom out puddles until they penetrate the surface.

Note: Protect treated surfaces from rain for 4 hours and from pedestrian and vehicular traffic until visibly dry.

END OF SECTION 07121

SECTION 07132

SELF-ADHERING SHEET WATEPROOFING

PART 1 — GENERAL

1.01 RELATED DOCUMENTS

A. All of the Contract Documents, including General and Supplementary Conditions and Division 1 General Requirements, apply to the work of this section.

1.02 SUMMARY

A. The work of this section includes, but is not limited to, the following:

1. Rubberized asphalt sheet membrane waterproofing
2. Prefabricated drainage composite
3. Protection board

B. Related Sections: Other specification sections which directly relate to the work of this section include, but are not limited to, the following:

1. Section 033000 – Cast-In-Place Concrete
2. Section 042000 – Unit Masonry
3. Section 071100 – Dampproofing
4. Section 076000 – Flashing and Sheet Metal
5. Section 079200 – Joint Sealants
6. Section 079500 – Expansion Control
7. Section 334600 – Subdrainage

1.03 REFERENCE STANDARDS

A. The following standards and publications are applicable to the extent referenced in the text.

B. American Society for Testing and Materials (ASTM)

C 836 Standard Specification for High Solids, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course

D 412 Standard Test Methods for Rubber Properties in Tension

D 570 Standard Test Method for Water Absorption of Plastics

D 882 Standard Test Methods for Tensile Properties of Thin Plastic Sheeting

D 903 Standard Test Method for Peel or Stripping Strength of Adhesive Bonds

D 1876 Standard Test Method for Peel Release of Adhesives (T-Peel)

D 1970 Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection

D 3767 Standard Practice for Rubber - Measurements of Dimensions

D 5385 Standard Test Method for Hydrostatic Pressure Resistance of Waterproofing Membranes

E 96 Standard Test Methods for Water Vapor Transmission of Materials

E 154 Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover

1.04 SUBMITTALS

A. Product Data: Submit manufacturer's product data, installation instructions, use limitations and recommendations. Include certification of data indicating VOC (Volatile Organic Compound) content of all components of waterproofing system.

B. Samples: Submit representative samples of the following for approval:

1. Sheet membrane
2. Protection board
3. Prefabricated drainage composite

1.05 QUALITY ASSURANCE

A. Manufacturer: Sheet membrane waterproofing shall be manufactured and marketed by a firm with a minimum of 20 years experience in the production and sales of self-adhesive sheet membrane waterproofing. Manufacturers proposed for use but not named in these specifications shall submit evidence of ability to meet all requirements specified, and include a list of projects of similar design and complexity completed within the past 5 years.

B. Installer: A firm which has at least 3 years experience in work of the type required by this section.

C. Materials: For each type of material required for the work of this section, provide primary materials which are the products of one manufacturer.

D. Pre-Installation Conference: A pre-installation conference shall be held prior to commencement of field operations to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work. Agenda for meeting shall include review of special details and flashing.

1.06 DELIVERY, STORAGE AND HANDLING

A. Deliver materials and products in labeled packages. Store and handle in strict compliance with manufacturer's instructions, recommendations and material safety data sheets. Protect from damage from sunlight, weather, excessive temperatures and construction operations. Remove damaged material from the site and dispose of in accordance with applicable regulations.

1. Do not double-stack pallets of membrane on the job site. Provide cover on top and all sides, allowing for adequate ventilation.
2. Protect mastic and adhesive from moisture and potential sources of ignition.
3. Store drainage composite or protection board flat and off the ground. Provide cover on top and all sides.

B. Sequence deliveries to avoid delays, but minimize on-site storage.

1.07 PROJECT CONDITIONS

A. Perform work only when existing and forecasted weather conditions are within the limits established by the manufacturer of the materials and products used.

B. Proceed with installation only when substrate construction and preparation work is complete and in condition to receive sheet membrane waterproofing.

1.08 WARRANTY

A. Sheet Membrane Waterproofing: Provide written 5 year material warranty issued by the membrane manufacturer upon completion of the work.

PART 2 — PRODUCTS

2.01 MATERIALS (equals allowed)

A. Sheet Membrane Waterproofing: Bituthene® 3000/Low Temperature Membrane by Grace Construction Products; a self-adhesive, cold-applied composite sheet consisting of a thickness of 1.4 mm (0.056 in.) of rubberized asphalt and 0.1 mm (0.004 in.) of cross-laminated, high density polyethylene film. Provide rubberized asphalt membrane covered with a release sheet, which is removed during installation. No special adhesive or heat shall be required to form laps.

B. Sheet Membrane Waterproofing (or equal)

PHYSICAL PROPERTIES FOR BITUTHENE 3000/LOW TEMPERATURE MEMBRANE:

Property	Test Method	Typical Value
Color		Dark gray-black
Thickness	ASTM D 3767 Method A	1.5 mm (0.060 in.) nominal
Flexibility, 180° bend over 25 mm (1 in.) mandrel at -43°C (-45°F)	ASTM D 1970	Unaffected
Tensile Strength, Membrane Die C	ASTM D 412 Modified[1]	2240 kPa (325 lbs/in.^{2}) minimum
Tensile Strength, Film	ASTM D 882 Modified[1]	34.5 MPa (5,000 lbs/in.^{2}) minimum
Elongation, Ultimate Failure of Rubberized Asphalt	ASTM D 412 Modified[1]	300% minimum
Crack Cycling at -32°C (-25°F), 100 Cycles	ASTM C 836	Unaffected
Lap Adhesion at Minimum Application Temperature	ASTM D 1876 Modified[2]	700 N/m (4 lbs/in.) – Bituthene 3000 880 N/m (5 lbs/in.) – Low Temp
Peel Strength	ASTM D 903 Modified[3]	1576 N/m (9 lbs/in.)
Puncture Resistance, Membrane	ASTM E 154	222 N (50 lbs) minimum
Resistance to Hydrostatic Head	ASTM D 5385	60 m (200 ft) of water
Permeance	ASTM E 96, Section 12 – Water Method	2.9 ng/m^{2}sPa (0.05 perms) maximum
Water Absorption	ASTM D 570	0.1% maximum

Footnotes:

1. *The test is run at a rate of 50 mm (2 in.) per minute.*
2. *The test is conducted 15 minutes after the lap is formed and run at a rate of 50 mm (2 in.) per minute at -4°C (25°F).*
3. *The 180° peel strength is run at a rate of 300 mm (12 in.) per minute.*

C. Prefabricated Drainage Composite: (Hydroduct® 220) (Hydroduct® 660) Drainage Composite by Grace Construction Products. Drainage Composite shall be designed to promote positive drainage while serving as a protection course.

D. Protection Board:

1. Expanded Polystyrene Protection Board: 25 mm (1 in.) thick for vertical applications with the following characteristics. Adhere to waterproofing membrane with Bituthene Protection Board Adhesive.

   Normal Density: 16 kg/m^3 (1.0 lb/ft^3)

   Thermal Conductivity, K factor: 0.24 at 5°C (40°F), 0.26 at 24°C (75°F)

   Thermal Resistance, R-Value: 4 per 25 mm (1 in.) of thickness.

E. Waterstop: Adcor™ ES hydrophilic non-bentonite waterstop by Grace Construction Products for non-moving concrete construction joints.

F. Miscellaneous Materials: Surface conditioner, mastic, liquid membrane, tape and accessories specified or acceptable to manufacturer of sheet membrane waterproofing.

PART 3 — EXECUTION

3.01 EXAMINATION

A. The installer shall examine conditions of substrates and other conditions under which this work is to be performed and notify the contractor, in writing, of circumstances detrimental to the proper completion of the work. Do not proceed with work until unsatisfactory conditions are corrected.

3.02 PREPARATION OF SUBSTRATES

A. Refer to manufacturer's literature for requirements for preparation of substrates. Surfaces shall be structurally sound and free of voids, spalled areas, loose aggregate and sharp protrusions. Remove contaminants such as grease, oil and wax from exposed surfaces. Remove dust, dirt, loose stone and debris. Use repair materials and methods which are acceptable to manufacturer of sheet membrane waterproofing.

B. Cast-In-Place Concrete Substrates:

1. Do not proceed with installation until concrete has properly cured and dried (minimum 7 days for normal structural concrete and minimum 14 days for lightweight structural concrete).
2. Fill form tie rod holes with concrete and finish flush with surrounding surface.
3. Repair bugholes over 13 mm (0.5 in.) in length and 6 mm (0.25 in.) deep and finish flush with surrounding surface.
4. Remove scaling to sound, unaffected concrete and repair exposed area.
5. Grind irregular construction joints to suitable flush surface.

C. Masonry Substrates: Apply waterproofing over concrete block and brick with smooth trowel-cut mortar joints or parge coat.

D. Wood Substrates: Apply waterproofing membrane over securely fastened sound surface. All joints and fasteners shall be flush to create a smooth surface.

E. Related Materials: Treat joints and install flashing as recommended by waterproofing manufacturer.

3.03 INSTALLATION

A. Refer to manufacturer's literature for recommendations on installation, including but not limited to, the following:

1. Apply primer at rate recommended by manufacturer. Recoat areas not waterproofed if contaminated by dust. Mask and protect adjoining exposed finish surfaces to protect those surfaces from excessive application of primer.
2. Delay application of membrane until primer is completely dry. Dry time will vary with weather conditions.
3. Seal daily terminations with troweled bead of mastic.
4. Apply protection board and related materials in accordance with manufacturer's recommendations.

3.04 CLEANING AND PROTECTION

A. Remove any masking materials after installation. Clean any stains on materials which would be exposed in the completed work.

B. Protect completed membrane waterproofing from subsequent construction activities as recommended by manufacturer.

END OF SECTION

SECTION 07210

BUILDING BATT AND SHEET FOAM INSULATION

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and General Provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

WORK INCLUDED: Work included under this Section includes, but is not necessarily limited to, furnishing and installing the following:

Batt Insulation below pre-fab metal roof and exterior walls and limited other uses.

Foundation Wall and Under Slab Insulation

Insulation baffles if required

RELATED SECTIONS

Section 04200 - Unit Masonry

Section 09221 – Non-structural metal framing

Section 13121 – Pre-fab building

QUALITY ASSURANCE

Thermal Resistivity: Where thermal resistivity properties of insulation materials are designated by r-values, they represent the rate of heat flow through a homogeneous material exactly 1" thick, measured by test method included in referenced material standard or otherwise indicated. They are expressed by the temperature difference in degrees F between the two exposed faces required to cause one BTU to flow through one square foot per hour at mean temperatures indicated.

Fire Performance Characteristics: Provide insulation materials which are identical to those whose fire performance characteristics, as listed for each material or assembly of which insulation is a part, have been determined by testing, per methods indicated below, by UL or other testing and inspecting agency acceptable to authorities having jurisdiction.

Surface Burning Characteristics: ASTM E-84

Fire Resistance Ratings: ASTM E-119

Combustion Characteristics: ASTM E-136

Asbestos Content of Inorganic Insulations: provide insulations composed of mineral fibers or mineral ores which contain no asbestos of any type of mixture of types occurring naturally as impurities as determined by polarized light microscopy test per Appendix A of 40 CFR 763.

All insulation in roof and wall assemblies shall be approved for use without an additional thermal barrier in accordance with Local Building Codes.

SUBMITTALS

Product Data: Submit manufacturer's product literature and installation instructions for each type of insulation and vapor retarder material required.

Certified Test Reports: With product data, submit copies of certified test reports showing compliance with specified performance values, including R-values (aged values for plastic insulations), densities, compression strengths, fire performance characteristics, perm ratings, water absorption ratings and similar properties.

DELIVERY, STORAGE, AND HANDLING

Deliver insulation in original labeled bundles.

General Protection: Protect insulations from physical damage and from becoming wet, soiled, or covered with ice or snow. Comply with manufacturer's recommendations for handling, storage, and protection during installation.

Protection for Plastic Insulation

Do not expose to sunlight, except to extent necessary for period of installation and concealment.

Protect against ignition at all times. Do not deliver plastic insulating materials to project site ahead of installation time.

Complete installation and concealment of plastic materials as rapidly as possible in each area of work.

JOB CONDITIONS

The Installer must examine the substrate and the conditions under which insulation work is to be performed and notify the Architect in writing of unsatisfactory conditions. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.

Weather Conditions: Proceed with work only when weather conditions are in compliance with manufacturer's recommended limitations, and when conditions will permit the work to proceed in accordance with requirements and the manufacturer's recommendations.

Do not apply insulation to damp, frozen, dirty, dusty, or surfaces unacceptable to manufacturer.

Coordinate this work with all trades and protect it after installation.

PART 2 - PRODUCTS

ACCEPTABLE INSULATION MANUFACTURERS

Unfaced Glass Fiber Batt Insulation

Owens-Corning Fiberglass Corp.

Schuller International (Manville).

Certainteed Corp.

Approved Equal

Extruded Polystrene Foam Board Insulation

Foundation Walls and Under Slab.

"Styrofoam Square Edge" by Dow Chemical Company.

"Foamular 150" by UC Industries.

Approved Equal.

INSULATING MATERIALS

General: Provide insulating materials which comply with requirements indicated for materials, compliance with referenced standards, and other characteristics.

Extruded Polystyrene Board Insulation: Rigid, cellular thermal insulation with closed-cells and integral high density skin, formed by the expansion of polystyrene base resin in an extrusion process to comply with ASTM C-578 for Type indicated; with 5-year aged r-values of 5.4 and 5 at 40 and 75 deg. F. (4.4 and 23.9 deg. C.), respectively; and as follows:

Type IV, 1.6 lb./cu. ft. min. density, unless otherwise indicated.

UnFaced Mineral Fiber Blanket/Batt Insulation: Thermal insulation produced by combining glass mineral fibers with thermosetting resins to comply with ASTM C 665 for Type I.

Insulation Baffles: Preformed Rigid fiberboard or Plastic Sheets designed and sized to fit between Roof Framing Members, and to provide Cross Ventilation between insulated Attic Spaces and Vented Eaves..

PART 3 - EXECUTION

INSPECTION AND PREPARATION

Require Installer to examine substrates and conditions under which insulation work is to be performed. A satisfactory substrate is one that complies with requirements of the section in which substrate and related work is specified. Obtain Installer's written report listing conditions

detrimental to performance of work in this section. Do not proceed with installation of insulation until unsatisfactory conditions have been corrected.

Verify adjacent materials are dry and ready to receive insulation.

Verify mechanical and electrical services within insulated spaces have been installed and tested.

Verify substrate surface is flat, free of honeycomb, fins, irregularities, and materials that will impede adhesive bond.

Clean substrates of substances harmful to insulations or vapor retarders, including removal of projections which might puncture vapor retarders.

INSTALLATION, GENERAL

Comply with manufacturer's instructions for particular conditions of installation in each case. If printed instructions are not available or do not apply to project conditions, consult manufacturer's technical representative for specified recommendations before proceeding with work.

Verify insulation boards are unbroken and free of damage.

Extend insulation full thickness as shown over entire area to be insulated. Cut and fit tightly around obstructions, and fill voids with insulation. Remove projections which interfere with placement.

Apply a single layer of insulation of required thickness, unless otherwise shown or required to make up total thickness.

Trim insulation neatly to fit spaces. Use boards free of damage.

Fit insulation tight in spaces and tight to exterior side of mechanical and electrical services within the plane of insulation. Leave no gaps or voids.

Install all insulation in accordance with manufacturer's specifications.

INSTALLATION OF PERIMETER AND UNDERSLAB INSULATION

On vertical surfaces, set units in adhesive applied in accordance with manufacturer's instructions. Use type of adhesive recommended by manufacturer of insulation.

Protect top surface of horizontal insulation (from damage during concrete work) by application of protection board.

INSTALLATION OF GENERAL BUILDING INSULATION

Apply insulation units to substrate by method indicated, complying with manufacturer's recommendations. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.

Set vapor retarder faced units with vapor retarder to warm side of construction, except as otherwise indicated. Do not obstruct ventilation spaces, except for firestopping.

Tape joints and ruptures in vapor retarder, and seal each continuous area of insulation to surrounding construction to ensure airtight installation.

Pour granular fill insulation into cavities as shown, to completely fill void spaces. Maintain inspection ports to show presence of insulation at extremities of each pour area. Close ports after complete coverage has been confirmed. Limit fall of insulation to one story in height, but not to exceed 10'-0".

PROTECTION

General: Protect installed insulation and vapor retarders from harmful weather exposures and from possible physical abuses, where possible by non-delayed installation of concealing work or, where that is not possible, by temporary covering or enclosure.

END OF SECTION

SECTION 07211

FOAMED-IN-PLACE CMU INSULATION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Foamed-in-place insulation in all open cell masonry cavities.
2. Foamed-in-place insulation at junctions of dissimilar wall and roof materials to achieve a thermal and air seal.

B. Related Sections:
1. Division 01: Administrative, procedural, and temporary work requirements.

1.2 REFERENCES

A. ASTM International (ASTM):
1. C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.
2. C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
3. D5116 - Standard Guide for Small-Scale Environmental Chamber Determinations of Organic Emissions From Indoor Materials/Products.
4. E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

1.3 SUBMITTALS

A. Submittals for Review:
1. Product Data: Provide product description, insulation properties, and preparation requirements.

B. Quality Control Submittals:
1. Certificates of Compliance: Certification from an independent testing laboratory that insulation meets fire hazard classification requirements.

C. Sustainable Design Submittals:
1. Low-Emitting Materials.

1.4 QUALITY ASSURANCE

A. Applicator Qualifications: Minimum 5 years documented experience in work of this Section.

B. Fire Hazard Classification: Maximum flame spread/smoke developed rating of 25/450, tested to ASTM E84.

1.5 PROJECT CONDITIONS

A. Do not install insulation when ambient temperature is below[70 degrees F.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers:
1. Core Foam. (www.cfifoam.com)
2. Demilec USA (www.demilecusa.com)
3. Polymaster, Inc. (www.polymaster.com)
4. Thermal Corp. of America. (www.thermcofoam.com)

Substitutions: [Under provisions of Division 01.]

2.2 MATERIALS

A. Foamed-In-Place Insulation:
   1. Type: Two component, plastic resin and catalyst, cold setting foam, [open] [closed] cell.
   2. R-value: Minimum 4.4 per inch at [75] [__] degrees F, tested to ASTM C177 or ASTM C518.
   3. No CFC or HCFC emissions and total formaldehyde emissions less than 1 percent, cured for 7 days and tested to ASTM D5116 for 24 hours.

PART 3 EXECUTION

3.1 PREPARATION

A. Protect adjacent surfaces from accidental application.

3.2 APPLICATION

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

B. Apply insulation by froth method, to uniform monolithic density without voids.

3.3 ADJUSTING

A. Patch damaged areas.

END OF SECTION

SECTION 07270

FIRE BARRIER SYSTEMS

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this Section.

DESCRIPTION OF WORK: Work of this Section shall include, but not necessarily be limited to, furnishing and installing the following:

Penetrations through fire-resistance-rated floor and roof construction, including both empty openings and openings containing cables, pipes, ducts, conduits, and other penetrating items.

Penetrations through fire-resistance-rated walls and partitions, including both empty openings and openings containing cables, pipes, ducts, conduits, and other penetrating items.

RELATED SECTIONS

Refer to Division 15 and 16 Sections for additional requirements.

SYSTEM PERFORMANCE REQUIREMENTS

General: Provide firestopping systems that are produced and installed to resist the spread of fire, according to requirements indicated, and the passage of smoke and other gases.

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

T-Rated Through-Penetration Firestop Systems: Provide through-penetration firestop systems with T ratings, in addition to F ratings, as determined per ASTM E 814, where indicated and where systems protect penetrating items exposed to contact with adjacent materials in occupiable floor areas. T-rated assemblies are required where the following conditions exist:

Where firestop systems protect penetrations located outside of wall cavities.

Where firestop systems protect penetrations located outside fire-resistive shaft enclosures.

Where firestop systems protect penetrations located in construction containing doors required to have a temperature-rise rating.

Where firestop systems protect penetrating items larger than a 4-inch-diameter nominal pipe or 16 sq. in. in overall cross-sectional area.

For firestopping exposed to view, traffic, moisture, and physical damage, provide products that do not deteriorate when exposed to these conditions.

For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.

For floor penetrations with annular spaces exceeding 4 inches or more in width and exposed to possible loading and traffic, provide firestop systems capable of supporting the floor loads involved either by installing floor plates or by other means.

For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.

SUBMITTALS

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

Product data for each type of product specified.

Certification by firestopping manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOCs) and are nontoxic to building occupants.

Product certificates signed by manufacturers of firestopping products certifying that their products comply with specified requirements.

Product test reports from, and based on tests performed by, a qualified testing and inspecting agency evidencing compliance of firestopping with requirements based on comprehensive testing of current products.

QUALITY ASSURANCE

Fire-Test-Response Characteristics: Provide firestopping that complies with the following requirements and those specified under the "System Performance Requirements" article:

Firestopping tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL, Warnock Hersey, or another agency performing testing and follow-up inspection services for firestop systems that is acceptable to authorities having jurisdiction.

Through-penetration firestop systems are identical to those tested per ASTM E 814 under conditions where positive furnace pressure differential of at least 0.01 inch of water is maintained at a distance of 0.78 inch below the fill materials surrounding the penetrating items in the test assembly. Provide rated systems complying with the following requirements:

Through-penetration firestop system products bear classification marking of qualified testing and inspecting agency.

Through-penetration firestop systems correspond to those indicated by reference to through-penetration firestop system designations listed by UL in their "Fire Resistance Directory", by Warnock Hersey or by another qualified testing and inspecting agency.

Information within construction documents referring to specific design designations of through-penetration firestop systems is intended to establish requirements for performance based on conditions that are expected to exist during installation. Any changes in conditions and designated systems require the Architect's prior approval. Submit documentation showing that the performance of proposed substitutions equals or exceeds that of the systems they would replace and are acceptable to authorities having jurisdiction.

Single-Source Responsibility: Obtain through-penetration firestop systems for each kind of penetration and construction condition indicated from a single manufacturer.

Provide firestopping products containing no detectable asbestos as determined by the method specified in 40 CFR Part 763, Subpart F, Appendix A, Section 1, "Polarized Light Microscopy".

Coordinate Work: Coordinate construction of openings and penetrating items to ensure that designated through-penetration firestop systems are installed per specified requirements.

DELIVERY, STORAGE, AND HANDLING

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

Store and handle firestopping materials to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

PROJECT CONDITIONS

Environmental Conditions: Do no install firestopping when ambient or substrate temperatures are outside limits permitted by firestopping manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.

Ventilation: Ventilate firestopping per firestopping manufacturers' instructions by natural means or, where this is inadequate, forced air circulation.

PART 2 - PRODUCTS

FIRESTOPPING, GENERAL

Compatibility: Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by firestopping manufacturer based on testing and field experience.

Accessories: Provide components for each firestopping system that are needed to install fill materials and to comply with "System Performance Requirements" article in Part 1. Use only components specified by the firestopping manufacturer and approved by the qualified testing and inspecting agency for the designated fire-resistance-rated systems. Accessories include, but are not limited to, the following items:

Permanent Forming/Damming/Backing Materials, Including the Following:

Semirefractory Fiber (mineral wool) Insulation

Ceramic Fiber

Sealants Used in Combination with Other Forming/Damming Materials to Prevent Leakage of Fill Materials in Liquid State

Fire-rated Formboard

Temporary Forming materials

Substrate Primers

Collars

Steel Sleeves

Fire barrier penetration sealing systems shall be as manufactured by one of the following:

3M Brand Fire Protection Products

"Firemaster", by Thermal Ceramics

Tremco

United States Gypsum Company

Hilti

INSTALLATION DETAILS: Refer to details at the end of this Section.

Systems shall include all necessary items for use in areas as shown on the Drawings.

3M fire protection product details are included in these Specifications only to establish the level of quality, except where specific manufacturer products not listed above is specified. Equivalent products by any of the listed manufacturers will be acceptable, as approved by the Architect.

Under normal environmental conditions, all material used shall be non-corrosive to metal and compatible with synthetic cable jackets. When exposed to flame or heat, it should be capable of expanding up to ten times.

Provide all miscellaneous items required to attach materials as specified and shown on Drawings.

PART 3 - EXECUTION

EXAMINATION

Examine substrates and conditions, with installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of firestopping. Do not proceed with installation until unsatisfactory conditions have been corrected.

PREPARATION

Surface Cleaning: Clean out openings and joints immediately prior to installing firestopping to comply with recommendations of firestopping manufacturer and the following requirements:

Remove all foreign materials from surfaces of opening and joint substrates and from penetrating items that could interfere with adhesion of firestopping.

Clean opening and joint substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with firestopping. Remove loose particles remaining from cleaning operation.

Remove laitance and form release agents from concrete.

Priming: Prime substrates where recommended by firestopping manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond. Do not allow spillage and migration onto exposed surfaces.

Masking Tape: Use masking tape to prevent firestopping from contacting adjoining surfaces that will remain exposed upon completion of work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestopping materials. Remove tape as soon as it is possible to do so without disturbing firestopping's seal with substrates.

INSTALLING THROUGH-PENETRATION FIRESTOPS

General: Comply with the "System Performance Requirements" article in Part 1 and the through-penetration firestop manufacturer's installation instructions and drawings pertaining to products and applications indicated.

Install forming/damming materials and other accessories of types required to support fill materials during their application and in the position needed to produce the cross-sectional shapes and depths required to achieve fire ratings of designated through-penetration firestop systems. After installing fill materials, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.

Install fill materials for through-penetration firestop systems by proven techniques to produce the following results:

Completely fill voids and cavities formed by openings, forming materials, accessories, and penetrating items.

Apply materials so they contact and adhere to substrates formed by openings and penetrating items.

For fill materials that will remain exposed after completing work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

CLEANING

Clean-off excess fill materials and sealants adjacent to openings and joints as work progresses by methods and with cleaning materials approved by manufacturers of firestopping products and of products in which opening and joints occur.

Protect firestopping during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated firestopping immediately and install new materials to produce firestopping complying with specified requirements.

Promptly remove any excess materials from any exposed finish surfaces. Repair floors, walls, or other surfaces which have been stained, marred, or otherwise damaged during installation of fire barrier materials.

END OFSECTION 07270

SECTION 07620

SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and General Provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

DESCRIPTION OF WORK: Work of this Section includes, but is not necessarily limited to, furnishing and installing the following:

Exposed Trim and Fascia

Roof Drainage Systems

Metal Flashing

Flashing at Windows, Doors and other locations as shown on Drawings.

RELATED SECTIONS

Section 06100 - Rough Carpentry: Installation of Wood Blocking, Nailers, and Grounds.

Section 07530 – Membrane roofing

Section 07900 - Joint Sealers

QUALITY ASSURANCE

Installer Qualifications: Engage an experienced installer who has completed sheet metal flashing and trim work similar in material, design, and extent to that indicated for this project and with a record of successful in-service performance.

SUBMITTALS

Submit Shop Drawings, color samples, product information, and samples clearly detailing shaping, jointing, length of sections, fastening, and installation details.

For information only, submit two copies of Specifications, installation instructions, and general recommendations by the manufacturer of flashing and sheet metal materials. Include published data or certified test data for each material showing compliance with the requirements. Indicate by transmittal form that one copy of each installation instruction has been distributed to the installer.

EXISTING CONDITIONS

Exercise care when working on or about roof surfaces to avoid damaging or puncturing membrane or flexible flashings.

Place plywood panels on roof surfaces adjacent to work of this Section and on access routes. Keep in place until completion of work.

Roofing and flashing shall not be applied during precipitation and shall not be started in the event there is a probability of precipitation during application. Metal faced flashing shall not be applied when ambient temperature is below 35 degrees F.

WARRANTY

Provide Owner with warranty stating that flashing material and metal wall fascia will properly shed water and protect roof and wall from physical damage for a minimum period of five years from date of Substantial Completion and the damage resulting from failure to provide above stated performances will be repaired to satisfaction of Owner at no additional cost.

PART 2 - PRODUCTS

ALUMINUM FLASHING

Materials

Aluminum Sheet: ASTM B209, Alloy 3003, Temper H14, AA-C22A41, minimum .027 inch thick (24 gauge) sheet of smooth finish with factory applied anodized finish.

Fasteners: Concealed type; of same material as flashings; sized to suit application.

Size and shape as shown on Drawings.

GUTTERS AND DOWNSPOUTS

Materials

Minimum .024 inch thick sheet aluminum conforming to requirements of ASTM B209, with factory applied anodized finish.

Anchorage Devices: Type recommended by manufacturer and acceptable to the Architect.

Size and shape as shown on Drawings.

WALL FLASHING: Perm-A-Barrier wall flashing and Perm-A-Barrier primer as manufactured by W.R. Grace & Company.

MISCELLANEOUS MATERIALS AND ACCESSORIES

Bituminous Paint: Acid and alkali-resistant type; black color; FS TT-C-494 or SSPC-Paint 12 solvent type, nominally free of sulfur, compounded for 15-mil dry film thickness per coat.

Fasteners: Same metal as sheet metal flashing or other noncorrosive metal as recommended by sheet metal manufacturer. Match finish of exposed heads with material being fastened.

Elastomeric Sealant: Generic type recommended by sheet metal manufacturer and fabricator of components being sealed and complying with requirements for joint sealants as specified in Division 7 Section "Joint Sealants".

Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior and interior nonmoving joints, including riveted joints.

Adhesives: Type recommended by flashing sheet metal manufacturer for waterproof and weather-resistant seaming and adhesive application of flashing sheet metal.

Metal Accessories: Provide sheet metal clips, straps, anchoring devices, and similar accessory units as required for installation of work, matching or compatible with material being installed; noncorrosive; size and thickness required for performance.

FABRICATION, GENERAL

Sheet Metal Fabrication Standard: Fabricate sheet metal flashing and trim to comply with recommendations of SMACNA’s "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of the item indicated.

Form gutters and downspouts of profiles and sizes indicated and as required to properly collect and remove water. Fabricate complete with required connection pieces.

Form sections square, true, and accurate in size, in maximum possible lengths and free of distortions and defects detrimental to appearance or performance. Hem exposed edges. Allow for expansion at joints.

Comply with details shown to fabricate sheet metal flashing and trim that fit substrates and result in waterproof and weather-resistant performance once installed. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.

Form exposed sheet metal work that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems.

Seams: Fabricate nonmoving seams in aluminum with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.

Expansion Provisions: Comply with SMACNA standards. Space movement joints at maximum of 10 feet (3 m) with no joints allowed within 24 inches (610 mm) of corner or intersection. Where lapped or bayonet-type expansion provisions in work cannot be used or would not be sufficiently weatherproof and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with mastic sealant (concealed within joints).

Sealed Joints: Form non expansion, but movable, joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.

Separate metal from non compatible metal or corrosive substrates by coating concealed surfaces at locations of contact with asphalt mastic or other permanent separation as recommended by manufacturer.

Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of sheet metal exposed to public view.

Fabricate cleats and attachment devices from same material as sheet metal component being anchored or from compatible, noncorrosive metal recommended by sheet metal manufacturer.

Size: As recommended by SMACNA manual or sheet metal manufacturer for application, but never less than thickness of metal being secured.

PART 3 - EXECUTION

GENERAL INSTALLATION REQUIREMENTS

Comply with manufacturer's instructions and recommendations for handling and installation of flashing and sheet metal work.

Performance: Coordinate the work with other work for the correct sequencing of items which make up the entire membrane or system of weatherproofing or waterproofing and rain drainage. It is required that the flashing and sheet metal work be permanently watertight, and not deteriorate in excess of manufacturer's published limitations.

Examine substrates and conditions under which sheet metal flashing and trim are to be installed and verify that work may properly commence. Do not proceed with installation until unsatisfactory conditions have been corrected.

INSTALLATION

GENERAL: Unless otherwise indicated, install sheet metal flashing and trim to comply with performance requirements, manufacturer's installation instructions, and SMACNA's "Architectural Sheet Metal Manual". Anchor units of work securely in place by methods indicated, providing for thermal expansion of metal units; conceal fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weatherproof.

Install exposed sheet metal work that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.

Roof-Edge Flashings: Secure metal flashings at roof edges according to FM Loss Prevention Data Sheet 1-49 for specified wind zone.

Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate elastomeric sealant to comply with SMACNA standards. Fill joint with sealant and form metal to completely conceal sealant.

Use joint adhesive for nonmoving joints specified not to be soldered.

Seams: Fabricate nonmoving seams in sheet metal with flat-lock seams. Tin edges to be seamed, form seams, and solder. Fabricate nonmoving seams in aluminum with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.

Separations: Separate metal from noncompatible metal or corrosive substrates by coating concealed surfaces, at locations of contact, with asphalt mastic or other permanent separation as recommended by manufacturer.

Roof-Penetration Flashing: Coordinate roof-penetration flashing installation with roofing and installation of items penetrating roof. Install flashing as follows:

Turn lead flashing down inside vent piping, being careful not to block vent piping with flashing

Seal and clamp flashing to pipes penetrating roof, other than lead flashing on vent piping.

Cleaning and Protection

Clean exposed metal surfaces, removing substances that might cause corrosion of metal or deterioration of finishes.

Provide final protection and maintain conditions that ensure sheet metal flashing and trim work during construction is without damage or deterioration other than natural weathering at the time of Substantial Completion.

END OF SECTION

SECTION 07900

JOINT SEALERS

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and General Provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

DESCRIPTION OF WORK: Work in this Section includes, but is not necessarily limited to, furnishing and installing the following:

Clean and Prepare Joint Surfaces

Sealant and Backing Materials

RELATED SECTIONS

Section 07620 - Sheet Metal Flashing and Trim

SUBMITTALS

Submit product data, samples and manufacturer's surface preparation and installation instructions.

For information only, submit copies of all referenced standards utilized for this project, unless duplicated in product data.

Submit samples of each color required for each type of joint sealer exposed to view.

WARRANTY

Submit two copies of a written guarantee agreeing to repair or replace joint sealers which fail to perform as air tight and watertight joints; or fail in joint adhesion, cohesion, abrasion resistance weather resistance, or general durability; or appear to deteriorate in any other manner not clearly specified by submitted manufacturer's data as an inherent quality of the material for the exposure indicated. Provide two-year warranty.

Replace sealants which fail because of loss of cohesion or adhesion or do not cure.

PART 2 - PRODUCTS

SEALANT MATERIALS - GENERAL CAULKING: Masonry walls, window perimeters, Ceramic Tile and other exterior joints as shown on Drawings.

Sealant composition shall be an epoxidized polyurethane terpolymer in a multicomponent form.

Specified products are "Dymeric 511", as manufactured by Tremco or "Sonolastic NPII" as manufactured by Sonneborn Building Products. Color to be selected from Tremco "Fastpack" color system or approved equal.

Performance Characteristics: Hardness, Average 35 (Shore A) after 5 years, Sagging - none up to 122 degrees F, low temperature flexibility -64 degrees F, meets U.S. Spec. TT-S-00227E, Class A.

SEALANT MATERIALS - GLAZING

Sealant composition shall be a silicone base, single component, solvent curing, capable of withstanding movement of up to 50 percent of joint width and shore a hardness of 26. Sealant shall conform to ASTM C920, TTS-S-001543A and TT-S-00230C (COM-NBS).

Specified product is "SILGLAZE N" as manufactured by General Electric Company, "SPECTREM 2" by Tremco, or approved equal.

SEALANT MATERIALS - HOLLOW METAL FRAMES

Sealant composition shall be an epoxidized polyurethane terpolymer in a single component form.

Specified products are "Dymonic" as manufactured by Tremco, "Sonolastic NPI" as manufactured by Sonneborn Building Products, or approved equal.

Sealant shall be used continuously between the intersection of the frame and adjacent wall material.

ACCESSORIES

Primer: Non-staining type, recommended by sealant manufacturer to suit application.

Joint Cleaner: Non-corrosive and nonstaining type, recommended by sealant manufacturer; compatible with joint forming materials.

Joint Filler: ASTM D1056; D1565; round, closed cell polyethylene, non-gassing rod oversized 30 percent.

"Sonofoam Soft Backer-Rod", by Sonneborn

Approved Equal

Bond Breaker: Pressure sensitive polyethylene tape recommended by sealant manufacturer to suit application.

Cleaners for Nonporous Surfaces: Provide nonstaining, chemical cleaners of type which are acceptable to manufacturers of sealants and sealant backing materials, which are not harmful to substrates and adjacent non-porous materials, and which do not leave oily residues or otherwise have a detrimental effect on sealant adhesion or in-service performance.

Masking Tape: Provide nonstaining, nonabsorbent type compatible with joint sealants and to surfaces adjacent to joints.

PART 3 - EXECUTION

EXAMINATION

Examine joints indicated to receive joint sealers, with Installer present, for compliance with requirements for joint configuration, installation tolerances and other conditions affecting joint sealer performance. Do not proceed with installation of joint sealers until unsatisfactory conditions have been corrected.

PREPARATION

Surface Cleaning of Joints: Clean out joints immediately before installing joint sealers to comply with recommendations of joint sealer manufacturers and the following requirements:

Remove all foreign material from joint substrates which could interfere with adhesion of joint sealer, including dust; paints, except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer; old joint sealers; oil; grease; waterproofing; water repellents; water; surface dirt; and frost.

Clean concrete, masonry, unglazed surfaces of ceramic tile and similar porous joint substrate surfaces, by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealers. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air. Remove laitance and form release agents from concrete.

Joint Priming: Prime joint substrates where indicated or where recommended by joint sealer manufacturer based on pre-construction joint sealer-substrate tests or prior experience. Apply primer to comply with joint sealer manufacturer's recommendations. Confine primers to areas of joint sealer bond, do not allow spillage or migration onto adjoining surfaces.

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

INSTALLATION OF JOINT SEALERS

General: Comply with joint sealer manufacturers' printed installation instructions applicable to products and applications indicated, except where more stringent requirements apply.

Installation of Sealant Backings: Install sealant backings to comply with the following requirements:

Install joint fillers of type indicated to provide support of sealants during application and at position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths which allow optimum sealant movement capability. Do not leave gaps between ends of joint fillers. Do not stretch, twist, puncture, or tear joint fillers. Remove absorbent joint fillers which have become wet prior to sealant application and replace with dry material.

Install bond breaker tape between sealants and joint fillers, compression seals, or back of joints where adhesion of sealant to surfaces at back of joints would result in sealant failure. Bond breaker must be used in all conditions where three-sided adhesion may be possible.

Install compressible seals serving as sealant backings to comply with requirements indicated above for joint fillers.

Installation of Sealants: Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross-sectional shapes and depths relative to joint widths which allow optimum sealant movement capability.

Tooling of Nonsag Sealants: Immediately after sealant application and prior to time skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated, to eliminate air pockets, and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents which discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

Provide concave joint configuration per Figure 6A in ASTM C 962, unless otherwise indicated.

Use masking tape to protect adjacent surfaces of recessed tooled joints.

All joints shall be free of air pockets, foreign embedded matter, ridges, and sags.

CURE: Cure sealant in compliance with manufacturer's instructions and recommendations to obtain high, early bond strength, internal cohesion strength and surface durability.

CLEANING: Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by manufacturers of joint sealers and of products in which joints occur.

PROTECTION: Protect joint sealers during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage and deterioration occurs, cut out and remove damaged or deteriorated joint sealers immediately and reseal joints with new materials to produce joint sealer installations with repaired areas indistinguishable from original work.

END OF SECTION 07900

SECTION 08100

HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Standard and custom hollow metal doors and frames.
2. Steel sidelight, borrowed lite and transom frames.
3. Factory finishing hollow metal doors and frames and factory machining for hardware.
4. Louvers installed in hollow metal doors
5. Light frames and glazing installed in hollow metal doors.

B. Related Sections:

1. Division 01 Section "Sustainable Design Requirements" for additional LEED documentation and requirements.
2. Division 04 Section "Unit Masonry" for embedding anchors for hollow metal work into masonry construction.
3. Division 08 Section "Glazing" for glass view panels in hollow metal doors.
4. Division 08 Sections "Door Hardware" for door hardware for hollow metal doors and frames.
5. Division 09 Sections "Exterior Painting" and "Interior Painting" for field painting hollow metal doors and frames.

C. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI/SDI A250.8 - Recommended Specifications for Standard Steel Doors and Frames.
2. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames, Frames Anchors and Hardware Reinforcing.
3. ANSI/SDI A250.6 - Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames.
4. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.
5. ANSI/SDI A250.11 - Recommended Erection Instructions for Steel Frames.
6. ANSI/SDI A250.13 - Testing and Rating of Sever Windstorm Resistant Components for Swing Door Assemblies.
7. ASTM A1008 - Standard Specification for Steel Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.

8. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
9. ASTM A924 - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
10. ASTM C 1363 - Standard Test Method for Thermal Performance of Building Assemblies by Means of a Hot Box Apparatus.
11. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
12. ASTM E283 - Standard Test Method for Determining Rate of Air Leakage Through Exterior Doors Under Specified Pressure Differences Across the Specimens.
13. ASTM E330 - Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
14. ASTM E 413 - Classification for Rating Sound Insulation.
15. ASTM E1332 - Standard Classification for Determination of Outdoor-Indoor Transmission Class.
16. ASTM E1886 - Test Method for Performance of Exterior Windows, Curtin Walls, Doors and Shutters Impacted by Missiles and Exposed to Cyclic Pressure Differentials.
17. ASTM E1996 - Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors and Storm Shutters Impacted by Windborne Debris in Hurricanes.
18. ANSI/NAMM/HMMA 867-06 - Guide Specifications for Commercial Laminated Core Hollow Metal Doors and Frames.
19. ANSI/BHMA A156.15 - Hardware Preparation in Steel Doors and Frames.
20. ANSI/SDI 122 - Installation and Troubleshooting Guide for Standard Steel Doors and Frames.
21. ANSI/NFPA 80 - Standard for Fire Doors and Fire Windows; National Fire Protection Association.
22. ANSI/NFPA 105: Standard for the Installation of Smoke Door Assemblies.
23. FEMA 361 2008 – Design and Construction Guidance for Community Safe Rooms
24. ICC 500 - ICC/NSSA Standard for the Design and Construction of Storm Shelters.
25. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; National Fire Protection Association.
26. TAS-201-94 - Impact Test Procedures.
27. TAS-202-94 - Criteria for Testing Impact and Non-Impact Resistant Building Envelope Components using Uniform Static Air Pressure.
28. TAS-203-94 - Criteria for Testing Products Subject to Cyclic Wind Pressure Loading.
29. UFC 4-010-0 - Department of Defense Minimum Antiterrorism Standards for Building, October 2003, including Change 1, January 2007.
30. UL 10C - Positive Pressure Fire Tests of Door Assemblies; UL 10B - Fire Test of Door Assemblies; UL 1784 - Standard for Air Leakage Tests of Door Assemblies.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, hardware reinforcements, profiles, anchors, fire-resistance rating, and finishes.

B. Door hardware supplier is to furnish templates, template reference number and/or physical hardware to the steel door and frame supplier in order to prepare the doors and frames to receive the finish hardware items.

C. Shop Drawings: Include the following:

1. Elevations of each door design.
2. Details of doors, including vertical and horizontal edge details and metal thicknesses.
3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
4. Locations of reinforcement and preparations for hardware.
5. Details of anchorages, joints, field splices, and connections.
6. Details of accessories.
7. Details of moldings, removable stops, and glazing.
8. Details of conduit and preparations for power, signal, and control systems.

D. Samples for Verification:

1. Samples are only required by request of the architect and for manufactures that are not current members of the Steel Door Institute.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain hollow metal doors and frames through one source from a single manufacturer wherever possible.

B. Quality Standard: In addition to requirements specified, comply with ANSI/SDI A250.8, latest edition, "Recommended Specifications for Standard Steel Doors and Frames".

C. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 (neutral pressure at 40” above sill) or UL 10C..
1. Smoke Control Door Assemblies: Comply with NFPA 105.

a. Smoke "S" Label: Doors to bear “S” label, and include smoke and draft control gasketing applied to frame and on meeting stiles of pair doors.

D. Fire-Rated, Borrowed-Light Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled, by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257. Provide labeled glazing material.

E. Severe Storm Shelter Openings: Provide complete door systems for hurricane or tornado storm shelters, and other areas of refuge, complying and tested according to FEMA 361, Second Edition (2008), Design and Construction Guidance for Community Safe Rooms; and ICC 500 (2008), ICC/NSSA Standard for the Design and Construction of Storm Shelters.

1. Each unit to bear third party permanent label indicating compliance with the referenced testing standards.

F. Pre-Submittal Conference: Conduct conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier, Installer, and Contractor to review proper methods and procedures for installing hollow metal doors and frames and to verify installation of electrical knockout boxes and conduit at frames with electrified or access control hardware.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow metal work palletized, wrapped, or crated to provide protection during transit and Project site storage. Do not use non-vented plastic.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch high wood blocking. Do not store in a manner that traps excess humidity.

1. Provide minimum 1/4-inch space between each stacked door to permit air circulation. Door and frames to be stacked in a vertical upright position.

1.6 PROJECT CONDITIONS

A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.7 COORDINATION

A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.

B. Warranty includes installation and finishing that may be required due to repair or replacement of defective doors.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. CECO Door Products.
2. Curries Company.
3. Steelcraft.

2.2 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.

C. Frame Anchors: ASTM A 653/A 653M, Commercial Steel (CS), Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.

2.3 STANDARD HOLLOW METAL DOORS

A. General: Provide 1-3/4 inch doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8.

B. Exterior Doors: Face sheets fabricated of commercial quality hot-dipped zinc coated steel that complies with ASTM A 653/A 653M, Coating Designation A60. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:

1. Design: Flush panel.
2. Core Construction: Manufacturer's standard kraft-paper honeycomb, polystyrene, polyurethane, mineral core, or vertical steel-stiffener core.
    a. Polystyrene and Polyurethane (Insulated) Doors: Where indicated, provide doors fabricated as thermal-rated assemblies with a minimum R-value 11 or better.
    b. Standard Vertical Steel-Stiffener Core: Minimum 22 gauge steel-stiffeners at 6 inches on-center construction attached by spot welds spaced not more than 5" on centers. Spaces between stiffeners filled with fiberglass insulation (minimum density 0.8#/cubic ft.).
    c. Fire Door Core: As required to provide fire-protection and temperature-rise ratings indicated.
3. Level/Model: Level 3 and Physical Performance Level A (Extra Heavy Duty), Minimum 16 gauge (0.053-inch - 1.3-mm) thick steel, Model 2.
4. Level/Model: Level 2 and Physical Performance Level B (Heavy Duty), Minimum 18 gauge (0.042-inch - 1.0-mm) thick steel, Model 2.
5. Vertical Edges: Vertical edges to have the face sheets joined by a continuous weld extending the full height of the door. Welds are to be ground, filled and dressed smooth. Beveled Lock Edge, 1/8 inch in 2 inches (3 mm in 50 mm).
6. Top and Bottom Edges: Reinforce tops and bottoms of doors with a continuous steel channel not less than 16 gauge, extending the full width of the door and welded to the face sheet. Doors with an inverted top channel to include a steel closure channel, screw attached, with the web of the channel flush with the face sheets of the door. Plastic or composite channel fillers are not acceptable.
7. Hinge Reinforcement: Minimum 7 gauge (3/16") plate 1-1/4" x 9" or minimum 14 gauge continuous channel with pierced holes, drilled and tapped.
8. Hardware Reinforcements: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.

C. Interior Doors: Face sheets fabricated of commercial quality cold rolled steel that complies with ASTM A 1008/A 1008M. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:

1. Design: Flush panel.
2. Core Construction: Manufacturer's standard kraft-paper honeycomb, or one-piece polystyrene core, securely bonded to both faces.

    a. Fire Door Core: As required to provide fire-protection and temperature-rise ratings indicated.

3. Level/Model: Level 2 and Physical Performance Level B (Heavy Duty), Minimum 18 gauge (0.042-inch - 1.0-mm) thick steel, Model 2.
4. Level/Model: Level 3 and Physical Performance Level A (Extra Heavy Duty), minimum 16 gauge (0.053-inch - 1.3-mm) thick steel, Model 2.
5. Vertical Edges: Vertical edges to have the face sheets joined by a continuous weld extending the full height of the door. Welds are to be ground, filled and dressed smooth. Beveled Lock Edge, 1/8 inch in 2 inches (3 mm in 50 mm).
6. Top and Bottom Edges: Reinforce tops and bottoms of doors with a continuous steel channel not less than 16 gauge, extending the full width of the door and welded to the face sheet. Doors with an inverted top channel to include a steel closure channel, screw attached, with the web of the channel flush with the face sheets of the door. Plastic or composite channel fillers are not acceptable.
7. Hinge Reinforcement: Minimum 7 gauge (3/16") plate 1-1/4" x 9" or minimum 14 gauge continuous channel with pierced holes, drilled and tapped.
8. Hardware Reinforcements: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.

D. Manufacturers Basis of Design:

1. CECO Door Products (C): Regent Series.
2. Curries Company (CU): 607 Series.

2.4 HOLLOW METAL DOORS FOR SEVERE STORM SHELTERS

A. General: Provide complete tornado or hurricane resistant door and frame shelter assemblies constructed to resist the design wind pressures for components and cladding and missile impact loads as described in ICC 500 - 2008, ICC/NSSA Standard for the Design and Construction of Storm Shelters. Only single opening and paired opening doors and their frames constructed to resist calculated design wind pressures and laboratory tested missile impacts are acceptable.

1. Door systems, both single doors and paired openings, tested and complying with ICC 500 and FEMA 361 (2008), Design and Construction Guidance for Community Safe Rooms and supported by third party test results.
2. Sheets fabricated on exterior openings from commercial quality hot dipped zinc coated steel complying with ASTM A924 A60. Gauges to be in accordance with manufacturers tested assemblies.

3. Vertical Edges: Vertical edges to have the face sheets joined by a continuous weld extending the full height of the door. Welds are to be ground, filled and dressed smooth. Beveled Lock Edge, 1/8 inch in 2 inches (3 mm in 50 mm).
4. Top Edge: Reinforce top of doors with a continuous steel channel extending the full width of the door and welded to the face sheet. Doors with an inverted top channel to include a steel closure channel, screw attached and welded in place with the web of the channel flush with the face sheets of the door. Plastic or composite channel fillers are not acceptable.
5. Hinge Reinforcement: Minimum 7 gauge (3/16") plate 1-1/4" x 9".

B. Manufacturers Basis of Design:

1. CECO Door Products (C) - StormPro Series.
2. Curries Company (CU) - StormPro Series.

2.5 STANDARD HOLLOW METAL FRAMES

A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.

B. Exterior Masonry Frames: Fabricated of hot-dipped zinc coated steel that complies with ASTM A 653/A 653M, Coating Designation A60.

1. Fabricate frames with mitered or coped corners.
2. Fabricate frames, with the exception of knock down types, with "closed and tight" miter seams continuously welded on face, finished smooth with no visible seam unless otherwise indicated.
3. Frames for Level 3 Steel Doors (up to 48 inches in width): Minimum 14 gauge (0.067-inch -1.7-mm) thick steel sheet.
4. Frames for Level 3 Steel Doors (48 inches and up in width): Minimum 12 gauge (0.081-inch -2.7-mm) thick steel sheet.
5. Frames for Level 2 Steel Doors: Minimum 16 gauge (0.053-inch -1.3-mm) thick steel sheet.
6. Manufacturers Basis of Design:

    a. CECO Door Products (C) - SQ Series.

C. Interior Frames: Fabricated from cold-rolled steel sheet that complies with ASTM A 1008/A 1008M.

1. Fabricate frames with mitered or coped corners.
2. Fabricate frames, with the exception of slip-on drywall types, with "closed and tight" miter seams continuously welded on face, finished smooth with no visible seam unless otherwise indicated.
3. Frames for Level 2 Steel Doors: Minimum 16 gauge (0.053-inch -1.3-mm) thick steel sheet.
4. Frames for Level 3 Steel Doors (up to 48 inches in width): Minimum 16 gauge (0.053-inch -1.3-mm) thick steel sheet.]
5. Frames for Level 3 Steel Doors (48 inches and up in width): Minimum 14 gauge (0.067-inch -1.7-mm) thick steel sheet.]
6. Frames for Wood Doors: Minimum 16 gauge (0.053-inch-1.3-mm-) thick steel sheet.

7. Frames for Borrowed Lights: Minimum 16 gauge (0.053-inch-1.3-mm-) thick steel sheet.
8. Manufacturers Basis of Design:

    a. CECO Door Products (C) - SQ Series (Masonry).
    b. CECO Door Products (C) - SR Series (Masonry).
    c. CECO Door Products (C) - SU Series (Masonry).
    d. Curries Company (CU) - G Series (Masonry).
    e. Curries Company (CU) - M Series (Masonry).

D. Fire rated frames: Fabricate frames in accordance with NFPA 80, listed and labeled by a qualified testing agency, for fire-protection ratings indicated.

E. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 Table 4 with reinforcement plates from same material as frames.

2.6 FRAMES FOR SEVERE STORM SHELTERS

A. General: Subject to the same compliance standards and requirements as standard hollow metal frames, provide complete tornado or hurricane resistant door and frame assemblies, for both single doors and paired openings, tested and labeled as complying with ICC 500 and FEMA 361 and supported by third party test results.

1. Fabricate exterior frames from 14 gauge hot dipped zinc coated steel that complying with ASTM designations A924 A60.
2. Manufacturers Basis of Design:

    a. CECO Door Products - StormPro Series.
    b. Curries Company - StormPro Series.

2.7 FRAME ANCHORS

A. Jamb Anchors:

1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, formed from A60 metallic coated material, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
2. Stud Wall Type: Designed to engauge stud and not less than 0.042 inch thick.
3. Compression Type for Drywall Slip-on (Knock-Down) Frames: Adjustable compression anchors.
4. Windstorm Opening Anchors: Types as tested and required for indicated wall types to meet specified wind load design criteria.
5. FEMA 361 Storm Shelter Anchors: Masonry T-shaped, wire masonry type, or existing opening type anchors.

B. Floor Anchors: Floor anchors to be provided at each jamb, formed from A60 metallic coated material, not less than 0.042 inches thick.

C. Mortar Guards: Formed from same material as frames, not less than 0.016 inches thick.

2.8 HOLLOW METAL PANELS

A. Provide hollow metal panels of same materials, construction, and finish as specified for adjoining hollow metal work.

2.9 LOUVERS

A. Metal Louvers: Door manufacturer's standard metal louvers unless otherwise indicated.

1. Blade Type: Vision proof inverted V or inverted Y.
2. Metal and Finish: Galvanized steel, 0.040 inch thick, factory primed for paint finish with baked enamel or powder coated finish. Match pre-finished door paint color where applicable.

B. Louvers for Fire Rated Doors: Metal louvers with fusible link and closing device, listed and labeled for use in doors with fire protection rating of 1-1/2 hours and less.

1. Manufacturers: Subject to compliance with requirements, provide door manufacturers standard louver to meet rating indicated.
2. Metal and Finish: Galvanized steel, 0.040 inch thick, factory primed for paint finish with baked enamel or powder coated finish. Match pre-finished door paint color where applicable.

2.10 LIGHT OPENINGS AND GLAZING

A. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints at fabricators shop. Fixed and removable stops to allow multiple glazed lites each to be removed independently. Coordinate frame rabbet widths between fixed and removable stops with the type of glazing and installation indicated.

B. Moldings for Glazed Lites in Doors and Loose Stops for Glazed Lites in Frames: Minimum 20 gauge thick, fabricated from same material as door face sheet in which they are installed.

C. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch (16 mm) high unless otherwise indicated. Provide fixed frame moldings and stops on outside of exterior and on secure side of interior doors and frames

D. Preformed Metal Frames for Light Openings: Manufacturer's standard frame formed of 0.048-inch-thick, cold rolled steel sheet; with baked enamel or powder coated finish; and approved for use in doors of fire protection rating indicated. Match pre-finished door paint color where applicable.

E. Glazing: Comply with requirements in Division 08 Section "Glazing" and with the hollow metal door manufacturer's written instructions.

1. Factory Glazing: Factory install glazing in doors as indicated. Doors with factory installed glass to include all of the required glazing material.

2.11 ACCESSORIES

A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.

B. Grout Guards: Formed from same material as frames, not less than 0.016 inches thick.

2.12 FABRICATION

A. Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. When shipping limitations so dictate, frames for large openings are to be fabricated in sections for splicing or splining in the field by others.

B. Tolerances: Fabricate hollow metal work to tolerances indicated in ANSI/SDI A250.8.

C. Hollow Metal Doors:

1. Exterior Doors: Provide optional weep-hole openings in bottom of exterior doors to permit moisture to escape where specified.
2. Glazed Lites: Factory cut openings in doors with applied trim or kits to fit. Factory install glazing where indicted.
3. Louvers: Factory cut openings in door and install louvers into prepared openings where indicated.
4. Astragals: Provide overlapping astragals as noted in door hardware sets in Division 08 Section "Door Hardware" on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted.
5. Continuous Hinge Reinforcement: Provide welded continuous 12 gauge strap for continuous hinges specified in hardware sets in Division 08 Section "Door Hardware".
6. Electrical Raceways: Provide hollow metal doors to receive electrified hardware with concealed wiring harness and standardized Molex™ plug connectors on both ends to accommodate up to twelve wires. Coordinate connectors on end of the wiring harness to plug directly into the electrified hardware and the through-wire transfer hardware or wiring harness specified in hardware sets in Division 08 Sections "Door Hardware" and "Access Control Hardware". Wire nut connections are not acceptable.

D. Hollow Metal Frames:

1. Shipping Limitations: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
2. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.

    a. Welded frames are to be provided with two steel spreaders temporarily attached to the bottom of both jambs to serve as a brace during shipping and handling. Spreader bars are for bracing only and are not to be used to size the frame opening.

3. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
4. Equal Rabbet Frames: Provide frames with equal rabbet dimensions unless glazing and removable stops require wider dimensions on glass side of frame.
5. High Frequency Hinge Reinforcement: Provide high frequency hinge reinforcements at door openings 48-inches and wider with mortise butt type hinges at top hinge locations.
6. Continuous Hinge Reinforcement: Provide welded continuous 12 gauge straps for continuous hinges specified in hardware sets in Division 08 Section "Door Hardware".
7. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated for removable stops, provide security screws at exterior locations.
8. Mortar Guards: Provide guard boxes at back of hardware mortises in frames at all hinges and strike preps regardless of grouting requirements.
9. Electrical Thru-Wiring: Provide hollow metal frames receiving electrified hardware with loose wiring harness (not attached to open throat components or installed in closed mullion tubes) and standardized Molex™ plug connectors on one end to accommodate up to twelve wires. Coordinate connectors on end of the wiring harness to plug directly into the electric through-wire transfer hardware or wiring harness specified in hardware sets in Division 08 Sections "Door Hardware" and "Access Control Hardware".
10. Electrical Knock Out Boxes: Factory weld 18 gauge electrical knock out boxes to frame for electrical hardware preps; including but not limited to, electric through wire transfer hardware, electrical raceways and wiring harnesses, door position switches, electric strikes, magnetic locks, and jamb mounted card readers as specified in hardware sets in Division 08 Sections "Door Hardware" and "Access Control Hardware".

    a. Provide electrical knock out boxes with a dual 1/2-inch and 3/4-inch knockouts.
    b. Conduit to be coordinated and installed in the field (Division 26) from middle hinge box and strike box to door position box.
    c. Electrical knock out boxes to comply with NFPA requirements and fit electrical door hardware as specified in hardware sets in Division 08 Section "Door Hardware".
    d. Electrical knock out boxes for continuous hinges should be located in the center of the vertical dimension on the hinge jamb.

11. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
12. Jamb Anchors: Provide number and spacing of anchors as follows:

    a. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

        1) Two anchors per jamb up to 60 inches high.
        2) Three anchors per jamb from 60 to 90 inches high.
        3) Four anchors per jamb from 90 to 120 inches high.
        4) Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.

    b. Stud Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

1) Three anchors per jamb up to 60 inches high.
2) Four anchors per jamb from 60 to 90 inches high.
3) Five anchors per jamb from 90 to 96 inches high.
4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
5) Two anchors per head for frames above 42 inches wide and mounted in metal stud partitions.

c. Severe Storm Shelter Openings: Provide jamb, head, and sill anchors in accordance with manufacturer's tested and approved assemblies.

13. Door Silencers: Except on weatherstripped or gasketed doors, drill stops to receive door silencers. Silencers to be supplied by frame manufacturer regardless if specified in Division 08 Section "Door Hardware".

14. Bituminous Coating: Where frames are fully grouted with an approved Portland Cement based grout or mortar, coat inside of frame throat with a water based bituminous or asphaltic emulsion coating to a minimum thickness of 3 mils DFT, tested in accordance with UL 10C and applied to the frame under a 3rd party independent follow-up service procedure.

E. Hardware Preparation: Factory prepare hollow metal work to receive template mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware."

1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
2. Reinforce doors and frames to receive non-template, mortised and surface mounted door hardware.
3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 Sections.

2.13 STEEL FINISHES

A. Prime Finishes: Doors and frames to be cleaned, and chemically treated to insure maximum finish paint adhesion. Surfaces of the door and frame exposed to view to receive a factory applied coat of rust inhibiting shop primer.

1. Shop Primer: Manufacturer's standard, fast-curing, lead and chromate free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; and compatible with substrate and field-applied coatings.

B. Factory Pre-Finishes: Factory apply electrostatic paint finish to doors and frames in accordance with ANSI A250.3 test procedure acceptance criteria for steel doors and frames with factory applied finished coatings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. General Contractor to verify the accuracy of dimensions given to the steel door and frame manufacturer for existing openings or existing frames (strike height, hinge spacing, hinge back set, etc.).

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

3.2 PREPARATION

A. Remove welded in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

B. Prior to installation, adjust and securely brace welded hollow metal frames for squareness, alignment, twist, and plumbness.

C. Tolerances shall comply with SDI-117 "Manufacturing Tolerances Standard Steel Doors and Frames."

D. Drill and tap doors and frames to receive non-template, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.

B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11 and NFPA 80 at fire rated openings.

1. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete and frames properly set and secured, remove temporary braces, leaving surfaces smooth and undamaged. Shim as necessary to comply with installation tolerances.

2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with post-installed expansion anchors.
3. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with mortar.
4. Grout Requirements: Do not grout head of frames unless reinforcing has been installed in head of frame. Do not grout vertical or horizontal closed mullion members.

C. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-Fire-Rated Standard Steel Doors:

    a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.
    b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
    c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
    d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.

2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.

D. Field Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with hollow metal manufacturer's written instructions.

3.4 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.

B. Remove grout and other bonding material from hollow metal work immediately after installation.

C. Prime-Coat and Painted Finish Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat, or painted finishes, and apply touchup of compatible air drying, rust-inhibitive primer, zinc rich primer (exterior and galvanized openings) or finish paint.

END OF SECTION

08100

SECTION 08141

FLUSH WOOD DOORS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Wood veneer faced flush doors.
2. Factory finishing.

B. Related Sections:
1. Division 01: Administrative, procedural, and temporary work requirements.
2. Section 08 7100 - Door Hardware.
3. Section 08 8000 - Glazing.

1.2 REFERENCES

A. Architectural Woodwork Institute (AWI) - Architectural Woodwork Quality Standards.

B. ASTM International (ASTM) E90 - Standard Test Method for Measurement of Airborne-Sound Transmission Loss of Building Partitions.

C. Forest Stewardship Council (FSC) STD-40-004 - Chain of Custody Standard.

D. National Fire Protection Association (NFPA) 80 - Standard for Fire Doors and Fire Windows.

E. Underwriters Laboratories (UL):
1. 10B - Standard for Fire Tests of Door Assemblies.
2. 10C - Standard for Positive Pressure Fire Tests of Door Assemblies.

F. Window and Door Manufacturers Association (WDMA) - I.S.1A - Industry Standard for Architectural Flush Wood Doors.

1.3 SUBMITTALS

A. Submittals for Review:
1. Shop Drawings: Show locations, elevations, dimensions, [fire] [acoustical] ratings, and preparation for hardware.
2. Samples:
a. 6 x 6 inch door samples showing edges, core, and faces.

B. Quality Control Submittals:
1. Certificates of Compliance: Manufacturer’s certification that doors comply with specified acoustical requirements.

1.4 QUALITY ASSURANCE

A. Flush Wood Doors: [AWI [Premium] [Custom] [Economy] Grade.] [WDMA [Premium] [Custom] Grade.]

B. Fire Door Construction: Conform to UL [10B.] [10C.]

C. Installed Fire Rated Door Assembly: Conform to NFPA 80.

D. Acoustic Rated Doors: Tested by independent testing laboratory in accordance with ASTM E90 and certified for STC Class of [__].

1.5 DELIVERY, STORAGE AND HANDLING

A. Package doors in heavy plastic with identifying marks; slit plastic wrap on site to permit ventilation, but do not remove from plastic until ready to install.

B. Do not deliver doors until building is substantially water and weather tight and HVAC system is operational.

C. Store doors flat and level, with spacers between doors to allow for air circulation, in protected, dry area.

D. Maintain humidity in storage areas between 25 and 55 percent.

1.6 WARRANTIES

A. Furnish[manufacturer's 2 year warranty providing coverage against defects in materials and workmanship and warpage beyond specified amount.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers:
1. Algoma Hardwoods, Inc. (www.algomahardwoods.com)
2. Eggers Industries. (www.eggersindustries.com)
3. Marshfield DoorSystems, Inc. (www.marshfielddoors.com)
4. Oshkosh Door Co. (www.oshkoshdoor.com)
5. VT Industries, Inc. (www.vtindustries.com)
6. [____].
7. [____].
8. [____].

B. Substitutions: [Under provisions of Division 01.] [Not permitted.]

2.2 MATERIALS

A. Flush Wood Doors: AWI Section 1300.
1. Core type:
   a. Solid, fire rated: Mineral.
   b. Solid, non rated: [PC - Bonded Particle Core.] [SLC - Bonded Staved Lumber Core.] [FPC - Nonbonded Particle Core.] [SLC - Nonbonded Staved Lumber Core.]
   c.
2. Number of plies: [5.] [7.]
3. Wood veneers faces:
   a. Species: [oak.]
   b. Cut: [book match.]
   c. Certified to FSC STD-04-004.]
4. Fiberboard faces: Minimum 1/8 inch thick high density fiberboard, [flush.] [paneled profile.]

**** OR ****

B. Flush Wood Doors: WDMA I.S.1A.
1. Core type:
   a. Solid, fire rated: [FD - Neutral Pressure Tested Fire Door.] [FD-PP - Positive Pressure Tested Fire Door.]
   b. Solid, non rated: Type [PC - Particleboard Core, bonded.] [FPC] - Particleboard Core, non-bonded.] [SCLC - Structural Composite Lumber Core, bonded.] [FSCLC - Structural Composite Lumber Core, non-bonded.] [SLC - Stave Lumber Core, bonded.] [FSLC - Stave Lumber Core, non-bonded.]
2. Number of plies: [5.] [7.]
3. Performance duty level: [Extra Heavy Duty.] [Heavy Duty.] [Standard Duty.]
4. Wood veneer faces:
   a. Species: [____.]

b. Cut: [____.]
c. Grade: [A.] [AA.] [B.]

5. Fiberboard faces: Minimum 1/8 inch thick high density fiberboard, [flush.] [paneled profile.]
6. Veneer matching:
   a. Piece match: [Book.] [Slip.]
   b. Face match: [Running.] [Balance.] [Center.]
   c. Appearance of pairs, sets, and transoms: [Matched.] [Not matched.]
7. Glazing beads: [Solid wood [of species and cut to match face veneers].] [Formed metal.]
8. Adhesives: [Waterproof] [Water Resistant] type.
9. Louvers: [Solid wood, of species and cut to match face veneers,] [Steel,] [Aluminum,] [straight 45 degree slat] [inverted Y] [____] profile, [sightproof].

2.3 ACCESSORIES

A. Glass and Glazing Accessories: Specified in Section 08 8000.

2.4 FABRICATION

A. Fabricate doors in accordance with [AWI Section 1300.] [WDMA I.S.1A.]

B. Prefitting: Factory fit doors to frames.

C. Premachining: Factory machine doors to receive hardware specified in Section 08 7100.

2.5 FINISHES

A. Transparent Finish System:
   1. Finish system: AWI Section 1500, [Premium] [Custom] Economy] Grade, [Conversion Varnish.] [Post-Catalyzed Lacquer.] [Pre-Catalyzed Lacquer.] [CAB and Water Acrylic Lacquer.] [Nitrocellulose Lacquer.] [____.]
   2. Stain color [To be selected from manufacturer's full color range.
   3. Sheen: [Satin.

PART 3 EXECUTION

3.1 PREPARATION

A. Condition doors to average humidity that will be encountered after installation.

3.2 INSTALLATION

A. Install doors in accordance with [AWI Section 1700.] [WDMA I.S.1A.]

B. Install doors plumb and level.

C. Field Fitting to Frames:
   1. [Fire] [and] [Acoustic] rated doors:
      a. Width: Cut lock edge only; [3/16] [__] inch maximum.
      b. Height: Cut bottom edge only; [1] [__] inch maximum.
   2. Non-rated doors:
      a. Width: Cut hinge and lock edges equally.
      b. Height: Cut bottom edge only; maximum [3/4] [__] inch.
   3. Edge clearances:
      a. Jambs and head: [1/8] [__] inch maximum between door and frame.
      b. Sills without thresholds: [1/8] [__] inch maximum between door and top of finish floor.
      c. Sills with thresholds: [1/4] [__] inch maximum between door and top of threshold.
      d. Meeting stiles of pairs: [1/8] [__] inch maximum between doors.
   4. Lock edge: Bevel [1/8] [__] inch in 2 inches.

5. Do not cut doors down to opening sizes smaller than those for which they were manufactured.

**** OR ****

D. If field cutting for height is necessary, cut bottom edge only, [3/4] [__] inch maximum.

E. Seal field cut surfaces with [paint.] [same finish as door faces.]

F. Install door hardware in accordance with Section 08 7100.

G. Install glass as specified in Section 08 8000.

H. Installation Tolerances:
1. Warp: Maximum [1/4] [__] inch in any 3’-0" x 7’-0" portion of door, measured with taut string or straight edge on concave face of door.

END OF SECTION

SECTION 08410

ALUMINUM ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this Section.

DESCRIPTION OF WORK: Work in this Section includes, but is not necessarily limited to, furnishing and installing the following:

Interior and Exterior Aluminum Storefront Framing, Doors, Door Frames and Lights

Anchors, Brackets, and Attachments

Door Hardware

Perimeter Sealant

WORK INSTALLED BUT FURNISHED UNDER OTHER SECTIONS

Section 08700 - Hardware: Additional Door hardware items other than specified in this Section, and keying requirements.

RELATED WORK

Section 00870 - Finish Color Schedule

Section 07900 - Joint Sealers: Perimeter Sealant and Back-Up Materials

Section 08700 - Finish Hardware

Section 08800 - Glass and Glazing

REFERENCES

ANSI/ASTM A36 - Structural Steel

ANSI/ASTM A386 - Zinc Coating (Hot-Dip) on Assembled Steel Products

ANSI/ASTM A446 - Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality

ANSI/ASTM B221 - Aluminum-Alloy Extruded Bar, Rod, Wire, Shape, and Tube

ANSI/ASTM E283 - Rate of Air Leakage through Exterior Windows, Curtain Walls and Doors

PERFORMANCE

System to provide for expansion and contraction within system components caused by a cycling temperature range of 170 degrees F. without causing detrimental effects to system or components.

Design for windload of 30 PSF with maximum deflection in both vertical and horizontal mullions not to exceed 1/175 of span.

Drain water entering joints, condensation occurring in glazing channels, or migrating moisture occurring within system, to exterior.

Limit air infiltration through assembly to 0.6 CFM\SF of assembly surface area, measured at a reference differential pressure across assembly of 0.3 inches water gage as measured in accordance with ANSI/ASTM E283.

System to accommodate, without damage to system or components, or deterioration of perimeter seal: Movement within system; movement between system and perimeter framing components; dynamic loading and release of loads; and deflection of structural support framing.

QUALITY ASSURANCE

Inspection: General Contractor shall provide, in writing to Owner, an inspection of all aluminum entrances and storefronts for conformance to specifications. Inspection shall include checking for fit tolerance plumb and level, as well as proper hardware and operation.

SUBMITTALS: Submit Shop Drawings and product data and manufacturer's installation instructions. Include system and component dimensions; components within assembly; framed opening requirements and tolerances; anchorage and fasteners; glass and infills; door hardware requirements; and affected related work.

DELIVERY, STORAGE, AND HANDLING

TRANSPORTATION AND HANDLING: Transport products by methods to avoid product damage; deliver in undamaged condition in manufacturer's unopened containers or packaging, dry. Provide equipment and personnel to handle products by method to prevent soiling or damage. Promptly inspect shipments to assure that products comply with requirements, quantities are correct, and products are undamaged.

STORAGE AND PROTECTION: Store products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive products in weather-tight enclosures; maintain within temperature and humidity ranges required by manufacturer's instructions.

SPECIAL WARRANTY

The work of this Section shall be jointly guaranteed by the manufacturer and installer for a period of five (5) years after final payment.

All materials shall be free from manufacturing defects and defects in installation workmanship. Any material or workmanship judged defective during this period shall be removed and replaced at no cost to the Owner.

PART 2 - PRODUCTS

ACCEPTABLE MANUFACTURERS

For purpose of designating design and quality of aluminum storefront system, fixed window system, Drawings and Specifications are based on the following:

Entry Framing System:

"350 Tuffline Entrance Framing" by Kawneer Company

Approved equal, by Tubelite Architectural Products

Approved equal, by EFCO Corporation.

For purpose of designating design and quality of entrance doors, Drawings and Specifications are based on Tuffline Series, Continuous Hinge-Hung Doors with 1/4" clear tempered glazing as manufactured by Kawneer Company with 3 1/2" Stiles, 6" Rails and 5/16" vertical and horizontal mutins, as shown on Drawings. Door frames to be heavy wall frames. Standard wall thickness for door frames is not acceptable.

Other manufacturer's aluminum doors, as manufactured by EFCO, and Tubelite are acceptable upon approval when design fabrication and installation meet or exceed requirements specified and detailed on Drawings.

MATERIALS

All framing members shall be extruded aluminum of 6063T-5 alloy and shall be of the size, shape, and intended function as shown on the Drawings. Performance requirements shall conform to standards established by local jurisdiction in relation to wind load and deflection limits.

FASTENERS: Stainless Steel

FINISH: All exposed aluminum surfaces shall have a manufactured-applied, 20-year warrantied, Kynar 500 fluorocarbon finish, free from blemishes and surface defects. Color as scheduled in Section 00870.

FABRICATION

Aluminum door shall have tight hairline joints where rails are fitted against stiles and shall be fastened by means of tensioned steel tie rods in top and bottom rails. Doors shall have an adjusting mechanism in the toprail to provide for minor clearance adjustments. Glass stops shall be snap-in type with bulb type glazing strips. Weather stripping shall be pile.

Store front sections shall be square cut and assembled with the proper clips and screws as provided by the manufacturer to form neat hairline joints. All fastenings shall be concealed except those specifically detailed otherwise at certain transition areas. All glazing gaskets shall be cut over length and installed in slight linear compression to prevent shrinkage from the corners. All framing shall be erected square and true into correct size rough openings prepared by others and in strict accord with the Drawings.

HARDWARE

Standard Kawneer entrance door hardware shall be supplied with doors as follows, unless indicated otherwise:

Exterior Main Entry Doors, pair 3'-0" X 7'-0", ALD X ALF

2 each - Continuous Hinges, SL-11HD, Select Products Limited, white

2 each - Pull Handles, 550 GK, as manufactured by Hewi, Inc., white

1 each - Exit Device, concealed rod type, 8610 x Less Pull x US26D, by Sargent

1 each - Exit Device, concealed rod type, 8610 x US26D, by Sargent

2 each - Closers, surface mounted type, 4020N x 4020-18, by LCN

1 each - Weather Stripping (3 sides), white

2 each - Bottom Sweep, white

1 each - Handicapped Threshold

2 each - Floor or Wall Stops

Note: Cylinder by Section 08700

SEALANTS

For metal to metal joints use Standard Products Company Stan Pro Urethane Epoxy Sealant No. 103, Dow Corning Silicone Rubber Sealant, or approved equal, color to match finish of aluminum to which applied.

For perimeter of framing members, refer to Section 07900 - Joint Sealers.

PART 3 EXECUTION

INSPECTION

Verify wall openings and adjoining air and vapor seal materials are ready to receive work of this Section.

Beginning of installation means acceptance of existing conditions.

INSTALLATION

Install doors, frames, glazing and hardware in accordance with manufacturer's instructions.

Use anchorage devices to securely attach frame assembly to structure.

Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.

Coordinate attachment and seal of air and vapor barrier materials. Install sill flashings where required.

Apply one coat of bituminous paint to concealed aluminum and steel surfaces in contact with cementitious, stone or other dissimilar materials.

Install glass and infill panels in accordance with Section 08800, using exterior wet method of glazing.

Install perimeter non-hardening, non-skinning type sealant, and installation requirements in accordance with Section 07900.

Adjust operating hardware.

TOLERANCES

Variation from Plane: 0.03 inches per foot maximum or 0.25 inches per 30 feet, whichever is less.

Misalignment of Two Adjoining Members Abutting in Plane: 0.015 inches.

CLEANING

Remove protective material from prefinished aluminum surfaces.

Wash-down exposed surfaces using a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.

Remove excess sealant by moderate use of mineral spirits or other solvent acceptable to sealant manufacturer.

END OF SECTION

SECTION 08520
ALUMINUM WINDOWS

1. GENERAL

A. Applicable provisions of THE CONDITIONS OF THE CONTRACT as hereinbefore set forth govern work under which section and are made a part hereof.

2. DESCRIPTION OF WORK

A. The extent of aluminum window units is shown on the accompanying documents. The applications of aluminum windows on the project include the following:

1. OPERABLE SINGLE HUNG Units set in masonry work.

3. QUALITY ASSURANCE

A. STANDARDS

1. Except as otherwise indicated, the requirements for aluminum windows, and the terminology and standards of performance and fabrication workmanship, are those specified and recommended in ANSI A134.1, and the applicable general recommendations published by AAMA, NAAMM, and AA.

B. MANUFACTURER

1. Provide double paned thermal aluminum window units produced by a single firm, capable of showing prior successful production of units similar to those required. Manufacturers offering products to comply with the requirements include the following:

a. Tri-fab 451T or Insulcast 45 as made by Kawneer. Aluminum extrusions shall be **THERMALLY BROKEN** so that there is no metal to metal contact through the frame.

C. PERFORMANCE AND TESTING:

1. Except as otherwise indicated, comply with the air infiltration tests, water resistance tests and applicable load tests specified in ANSI A134.1 (sponsored by AAMA) for the type and classification of window unit required in each case.

4. SUBMITTALS

A. SHOP DRAWINGS

1. Submit shop drawings for the fabrication and installation of aluminum window units and associated components of the work. Include wall elevations at 1/4" scale, typical unit elevations at 1" scale, and full-size detail sections of every typical composite member. Show anchors, hardware, and other components not included in manufacturer's standard data. Include glazing details.

B. GUARANTEE

1. Submit 2 copies of written guarantee signed by the manufacturer, installer and contractor, agreeing to replace aluminum window units which fail in materials or workmanship within 3 years of the date of acceptance. Failure of materials or workmanship shall include (but not limited to) excessive leakage or air infiltration, excessive deflections, faulty operation of sash, deterioration of finish or metal in excess of normal weathering, and defects in hardware, weather-stripping, and other components of the work.

5. MATERIALS

A. ALUMINUM EXTRUSIONS

1. Allow and temper recommended by window manufacturer for strength, corrosion resistance, and application of required finish, but not less than 22,000 psi ultimate tensile strength and not less than 0.062" thickness at any location for main frame and sash members.

B. FASTENERS

1. Aluminum, stainless steel or other metallic or non-metallic materials guaranteed by the manufacturer to be non-corrosive and compatible with the aluminum window members, trim, hardware, anchors, and other components of the window units.
   a. Do not use fasteners except where unavoidable for the application of hardware. Match the finish of the metal surrounding the fastener, unless otherwise indicated.

C. SEALANT

1. Unless otherwise indicated for sealants required within the fabricated window units, provide type recommended by window manufacturer for the joint size and movement, to remain permanently elastic, non-shrinking and non-migrating.

D. GLASS AND GLAZING MATERIALS

1. Refer to Section 08800 Glazing.

E. OPERABLE SINGLE HUNG WINDOWS

1. Thermo-Break Type: Construct entire unit, including frame and sash with locked-in plastic or rubber thermo-breaks, so that none of the aluminum exposed to the exterior has metal-to-metal contact with the aluminum exposed on the interior.

2. Fabricate units with corners and intersections of frames and sash mortised and welded or rivets, and sealed by welding to prevent leakage. Fabricate secondary joints similarly, or use concealed mechanical fasteners and sealants.

3. Provide metal thickness as required for performance, but not less than 0.062", tapered to 0.050" for projecting fins, for main sash and frame units.

6. FABRICATION AND ACCESSORIES

A. GENERAL

1. Provide manufacturer's standard fabrication and accessories, except to the extent more specific or more stringent requirements are indicated. Include complete system for assembly of components and anchorage of window units, and prepare sash for glazing.

B. SIZES AND PROFILES

1. The required sizes for window units and the profile requirements are shown on the drawings. Variable dimensions as required to achieve design requirements and coordination with other work. The details shown are based upon standard details by one manufacturer. It is intended that similar details by other manufacturers will be acceptable, provided they comply with the size requirements, and with minimum/maximum profile requirements as shown.

7. ALUMINUM WINDOW FINISHES

A. COLOR ANODIZED FINISHES

1. NAAHM AA-C22A42, Class 1 (minimum thickness of 0.7 mils), integral color anodized finish as follows:

    a. Provide standard aluminum industry color similar to Duranodic Dark Bronze. Apply protective coating of clear acrylic lacquer, not less than 0.5 mil dry film thickness, over anodized finish.

8. PREGLAZED FABRICATION

A. It is required that the window units, wherever installation requirements will permit, be glazed in the shop prior to installation. However, Contractor, at his option may elect to glaze the units after installation to facilitate the overall project construction requirements. Comply with manufacturer's specification and recommendations for the installation of window units, hardware, operators, and other components of the work.

B. Set units plumb, level, and true to line, without warp or rack of frames or sash. Anchor securely in place. Separate aluminum and other corrodible metal surfaces from sources of corrosion of electrolytic action at points of contact with other materials. Set sill members in a bed of compound, or with joint fillers or gaskets to provide weathertight construction.

C. Clean aluminum surfaces promptly after installation of windows, exercising care to avoid damage of the protective coating. Remove excess glazing and sealant compounds, dirt, and other substances. Advise Contractor of protective treatment and other precautions required through the remainder of the construction period, to ensure that window units will be without damage or deterioration (other than normal weathering) at time of acceptance.

END OF SECTION

SECTION 08700
DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes commercial door hardware for the following:

1. Swinging doors.
2. Sliding Doors
3. Other doors to the extent indicated.

B. Door hardware includes, but is not necessarily limited to, the following:

1. Mechanical door hardware.
2. Cylinders specified for doors in other sections.

C. Related Sections:

1. Section 06 10 00 – Rough Carpentry.
2. Section 06 20 00 – Finish Carpentry.
3. Section 08 01 00 – Operations and Maintenance.
4. Section 08 06 10 – Door Schedule.
5. Section 08 06 71 – Door Hardware Schedule.
6. Section 08 11 13 – Hollow Metal Doors and Frames.
7. Section 08 14 16 – Flush Wood Doors.
8. Section 08 14 23 – Clad Wood Doors.
9. Section 08 14 33 – Stile and Rail Wood Doors.
10. Section 08 17 00 – Integrated Door Opening Assemblies.
11. Section 08 41 13 – Aluminum-Framed Entrances and Storefronts.
12. Section 08 42 26 – All-Glass Entrances.
13. Section 08 42 29 – Automatic Entrances.
14. Section 08 71 13 – Automatic Door Operators.
15. Section 08 71 63 – Detention Door Hardware.
16. Section 08 74 00 – Access Control Hardware.
17. Section 08 81 00 – Glass and Glazing.
18. Section 09 90 00 – Painting and Coating.
19. Section 28 13 00 – Access Control.

D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.

2. ANSI/SDI A250.13 - Testing and Rating of Severe Windstorm Resistant Components for Swing Door Assemblies.
3. ASTM E1886 - Test Method for Performance of Exterior Windows, Curtin Walls, Doors and Shutters Impacted by Missiles and Exposed to Cyclic Pressure Differentials.
4. ASTM E330 - Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure difference.
5. ASTM E1996 - Standard specification for performance of exterior windows, curtain walls, doors and storm shutters impacted by Windborne Debris in Hurricanes.
6. FEMA 361 2008 - Design and Construction Guidance for Community Safe Rooms.
7. ICC 500 - ICC/NSSA Standard for the Design and Construction of Storm Shelters.
8. ICC/IBC - International Building Code.
9. NFPA 70 - National Electrical Code.
10. NFPA 80 - Fire Doors and Windows.
11. NFPA 101 - Life Safety Code.
12. NFPA 105 - Installation of Smoke Door Assemblies.
13. TAS-201-94 - Impact Test Procedures.
14. TAS-202-94 - Criteria for Testing Impact and Non-Impact Resistant Building Envelope Components using Uniform Static Air Pressure.
15. TAS-203-94 - Criteria for Testing Products Subject to Cyclic Wind Pressure Loading.
16. State Building Codes, Local Amendments.

E. Standards: All hardware specified herein shall comply with the following industry standards:

1. ANSI/BHMA Certified Product Standards - A156 Series
2. UL10C – Positive Pressure Fire Tests of Door Assemblies

1.3 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.

B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.

C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.4 COORDINATION

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

B. Door Hardware and Electrical Connections: Coordinate the layout and installation of scheduled electrified door hardware and related access control equipment with required connections to

source power junction boxes, low voltage power supplies, detection and monitoring hardware, and fire and detection alarm systems.

C. Door and Frame Preparation: Related Division 08 Sections (Steel, Aluminum and Wood) doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.5 WARRANTY

A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:

1. Structural failures including excessive deflection, cracking, or breakage.
2. Faulty operation of the hardware.
3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
4. Electrical component defects and failures within the systems operation.

C. Standard Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.

D. Special Warranty Periods:

1. Ten years for mortise locks and latches.
2. Ten years for extra heavy duty cylindrical (bored) locks and latches.
3. Seven years for heavy duty cylindrical (bored) locks and latches.
4. Five years for standard duty cylindrical (bored) locks and latches.
5. Five years for exit hardware.
6. Ten years for manual door closers.
7. Two years for electromechanical door hardware.

1.6 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

B. Continuing Service: Beginning at Substantial Completion, and running concurrent with the specified warranty period, provide continuous (6) months full maintenance including repair and replacement of worn or defective components, lubrication, cleaning, and adjusting as required

for proper door opening operation. Provide parts and supplies as used in the manufacture and installation of original products.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.

1. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:

a. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.

2. Products furnished, but not installed, under this Section include the following. Coordinating, purchasing, delivering, and scheduling remain requirements of this Section.

a. Permanent cylinders, cores, and keys to be installed by Owner.

B. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01, Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

2.2 HANGING DEVICES

A. Hinges: ANSI/BHMA A156.1 certified butt hinges with number of hinge knuckles as specified in the Door Hardware Sets.

1. Quantity: Provide the following hinge quantity, unless otherwise indicated:

a. Two Hinges: For doors with heights up to 60 inches.
b. Three Hinges: For doors with heights 61 to 90 inches.
c. Four Hinges: For doors with heights 91 to 120 inches.
d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.

2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:

a. Widths up to 3’0”: 4-1/2” standard or heavy weight as specified.
b. Sizes from 3’1” to 4’0”: 5” standard or heavy weight as specified.

3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:

a. Exterior Doors: Heavy weight, non-ferrous, ball bearing hinges unless Hardware Sets indicate standard weight.
b. Interior Doors: Standard weight, steel, ball bearing hinges unless Hardware Sets indicate heavy weight.
c. Tornado Resistant Assemblies: At a minimum, provide heavy weight hinges with stainless steel screws used in accordance with and specified as part of a Severe Storm Shelter Opening meeting ICC 500 and FEMA 361.

4. Hinge Options: Comply with the following where indicated in the Hardware Sets or on Drawings:

a. Non-removable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the following applications:

1) Out-swinging exterior doors.
2) Out-swinging access controlled doors.

5. Acceptable Manufacturers:

a. McKinney Products (MK).

2.3 DOOR OPERATING TRIM

A. Flush Bolts and Surface Bolts: ANSI/BHMA A156.3 and A156.16, Grade 1, certified automatic, self-latching, and manual flush bolts and surface bolts. Manual flush bolts to be furnished with top rod of sufficient length to allow bolt location approximately six feet from the floor. Furnish dust proof strikes for bottom bolts. Surface bolts to be minimum 8” in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.

1. Acceptable Manufacturers:

a. Door Controls International (DC).
b. Rockwood Manufacturing (RO).
c. Trimco (TC).

2.4 CYLINDERS AND KEYING

A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.

B. Source Limitations: Obtain each type of keyed cylinder and keys from the same source manufacturer as locksets and exit devices, unless otherwise indicated.

C. Cylinders: Original manufacturer cylinders complying with the following:

1. Mortise Type: Threaded cylinders with rings and straight- or clover-type cam.
2. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
3. Bored-Lock Type: Cylinders with tailpieces to suit locks.
4. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.

D. Keying System: Each type of lock and cylinders to be factory keyed. Conduct specified "Keying Conference" to define and document keying system instructions and requirements. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner. Incorporate decisions made in keying conference, and as follows:

1. Master Key System: Cylinders are operated by a change key and a master key.
2. Grand Master Key System: Cylinders are operated by a change key, a master key, and a grand master key.
3. Great-Grand Master Key System: Cylinders are operated by a change key, a master key, a grand master key, and a great-grand master key.
4. Existing System: Master key or grand master key locks to Owner's existing system.
5. Keyed Alike: Key all cylinders to same change key.

E. Key Quantity: Provide the following minimum number of keys:

1. Top Master Key: One (1)
2. Change Keys per Cylinder: Two (2)
3. Master Keys (per Master Key Group): Two (2)
4. Grand Master Keys (per Grand Master Key Group): Two (2)
5. Construction Control Keys (where required): Two (2)
6. Permanent Control Keys (where required): Two (2)

F. Construction Keying: Provide construction master keyed cylinders or temporary keyed construction cores where specified. Provide construction master keys in quantity as required by project Contractor. Replace construction cores with permanent cores. Furnish permanent cores for installation as directed under specified "Keying Conference".

2.5 MECHANICAL LOCKS AND LATCHING DEVICES

A. Multi-Point Locksets, Security: Three-point locking system device engineered for in-swinging door applications on windstorm safe shelter rooms. Extra heavy duty steel component construction securing the door to the frame at top, bottom and center latch positions. All three latching points are automatically activated when the device is locked.

1. Acceptable Manufacturers:

a. Corbin Russwin Hardware (RU) - FE6800 Series.

b. Sargent Manufacturing (SA) - FM7100 Series.

B. Cylindrical Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.2, Series 4000, Grade 1 certified cylindrical (bored) locksets furnished in the functions as specified in the Hardware Sets. Lock chassis fabricated of heavy gauge steel, zinc dichromate plated, with through-bolted application. Furnish with solid cast levers, standard 2 3/4” backset, and 1/2" (3/4" at rated paired openings) throw brass or stainless steel latchbolt. Locks are to be non-handed and fully field reversible.

1. Acceptable Manufacturers:

a. Corbin Russwin Hardware (RU) – CL3300 Series.
b. Sargent Manufacturing (SA) – 10 Line.

C. Lock Trim Design: As specified in Hardware Sets.

2.6 AUXILIARY LOCKS

A. Push-Pull Latches, Ligature Resistant, Cylindrical: ANSI/BHMA A156.2, Series 4000, Operational Grade 1 hospital type push-pull latches with ligature-resistant paddle trim capable of being mounted vertically, horizontally, or in mixed combinations. Non-handed units, standard 2 3/4", 5", or 7" backsets available, and UL listed for all labeled metal or wood doors. Provide optional lead-lining and engraved cases or handles as specified in Hardware Sets.

1. Acceptable Manufacturers:

a. Corbin Russwin (RU) – HP3000 Series.
b. Sargent Manufacturing (SA) - HPU Series.

2.7 LOCK AND LATCH STRIKES

A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:

1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.

B. Standards: Comply with the following:

1. Strikes for Mortise Locks and Latches: BHMA A156.13.
2. Strikes for Bored Locks and Latches: BHMA A156.2.
3. Strikes for Auxiliary Deadlocks: BHMA A156.5.
4. Dustproof Strikes: BHMA A156.16.

2.8 CONVENTIONAL EXIT DEVICES

A. Security Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 certified rim panic and fire exit hardware devices furnished in the functions specified in the Hardware Sets. Mounting rails to be formed from smooth stainless steel, brass or bronze architectural materials no less than 0.072" thick, with push rails a minimum of 0.062" thickness. Painted or aluminum metal rails are not acceptable. Exit device latch to be constructed of high grade, heat treated, corrosion resistant nickel steel alloy, and have a full 3/4" throw projection with slide action positive deadlocking.

1. Static Load Force Resistance: Minimum 3000 lbs certified independent tested.

2. Acceptable Manufacturers:

    a. Corbin Russwin Hardware (RU) - ED4000S / ED5000S Series.
    b. Yale Locks and Hardware (YA) - 7150 / 7250 Series.

B. Multi-Point Exit Devices for Severe Storm Shelters Openings: Multi-point exit devices specifically engineered for out-swinging door applications on tornado or hurricane resistant safe shelter rooms. Extra heavy duty steel component construction with each of the latching points automatically activated when the device is locked. The multi-point exit device is approved for usage as part of a complete ICC 500 (2008) and FEMA 361 door, frame and hardware assembly.

1. Acceptable Manufacturers:

    a. Corbin Russwin Hardware (RU) - FE5400S Series.
    b. Sargent Manufacturing (SA) - FM8700 Series.

C. Tube Steel Removable Mullions: ANSI/BHMA A156.3 removable steel mullions with malleable-iron top and bottom retainers and a primed paint finish. Provide keyed removable feature, stabilizers, and mounting brackets as specified in the Hardware Sets. At openings designed for severe wind load conditions due to hurricanes or tornadoes, provide manufacturers approved mullion and accessories to meet applicable state and local windstorm codes.

1. Acceptable Manufacturers:

    a. Corbin Russwin Hardware (RU) - 700/900 Series.
    b. Sargent Manufacturing (SA) - 980S Series.

2.9 DOOR CLOSERS

A. Door Closers, Surface Mounted (Commercial Duty): ANSI/BHMA 156.4, Grade 1 certified surface mounted, institutional grade door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck, closing sweep, and latch speed control valves. Provide non-handed units with high impact, non-corrosive plastic covers standard.

1. Acceptable Manufacturers:

    a. Corbin Russwin Hardware (RU) - DC6000 Series.
    b. Norton Door Controls (NO) - 8500 Series.
    c. Sargent Manufacturing (SA) - 1431 Series.

2.10 ARCHITECTURAL TRIM

A. Door Protective Trim

1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.

2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.

3. Metal Protection Plates: ANSI/BHMA A156.6 certified metal protection plates (kick, armor, or mop), beveled on four edges (B4E), fabricated from the following.

    a. Stainless Steel: 050-inch thick, with countersunk screw holes (CSK).
    b. Brass or Bronze: 050-inch thick, with countersunk screw holes (CSK).
    c. Laminate Plastic or Acrylic: 1/8-inch thick, with countersunk screw holes (CSK).

4. Fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets.

5. Metal Door Edging: Door protection edging fabricated from a minimum .050-inch thick metal sheet, formed into an angle or "U" cap shapes, surface or mortised mounted onto edge of door. Provide appropriate leg overlap to account for protection plates as required. Height to be as specified in the Hardware Sets.

6. Acceptable Manufacturers:

    a. Rockwood Manufacturing (RO).
    b. Trimco (TC).

2.11 DOOR STOPS AND HOLDERS

A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.

B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 certified door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.

1. Acceptable Manufacturers:

    a. Rockwood Manufacturing (RO).
    b. Trimco (TC).

2.12 ARCHITECTURAL SEALS

A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.

B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.

1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.

C. Fire Labeled Gasketing: :Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.

1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and UBC 7-2, Fire Tests of Door Assemblies.

D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated, based on testing according to ASTM E 1408.

E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

F. Acceptable Manufacturers:

1. Pemko Manufacturing (PE).
2. Reese Enterprises, Inc. (RS).

2.13 FABRICATION

A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.14 FINISHES

A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.

B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware.

C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

D. Antimicrobial Finishes: Where specified, finishes on locksets, latchsets, exit devices and push/pull trim to incorporate an FDA recognized. Silver Ion, antimicrobial coating (MicroShield™) listed for use on equipment as a suppressant to the growth and spread of a broad range of bacteria, algae, fungus, mold and mildew.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.

B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.3 INSTALLATION

A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.

1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.

B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:

1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."

3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.

C. Integrated Wiegand access control products are required to be installed through current members of the ASSA ABLOY "Certified Integrator" (CI) program.

D. Power Operator products and accessories are required to be installed through current members of the manufacturer's "Power Operator Preferred Installer" program.

E. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

F. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

G. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.4 FIELD QUALITY CONTROL

A. Field Inspection: Supplier will perform a final inspection of installed door hardware and state in report whether work complies with or deviates from requirements, including whether door hardware is properly installed, operating and adjusted.

3.5 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.6 CLEANING AND PROTECTION

A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.

B. Clean adjacent surfaces soiled by door hardware installation.

C. Clean operating items as necessary to restore proper finish. and provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.7 DEMONSTRATION

A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.8 DOOR HARDWARE SCHEDULE

A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.

B. Manufacturer’s Abbreviations:

1. MK - McKinney
2. RO - Rockwood
3. RU - Corbin Russwin
4. NO - Norton
5. RF - Rixson
6. PE – Pemko

HARDWARE TO BE BY ALLOWANCE

END OF SECTION 087100

SECTION 08800

GLASS AND GLAZING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Flat glass materials.

B. Insulating glass units.

C. Glazing accessories.

1.2 RELATED SECTIONS

Section 07900 - Sealants

Section 08110 - Steel Doors and Frames

Section 08211 - Flush Wood Doors.

Section 08410 - Aluminum Entrances and Storefronts (exterior and interior)

Section 08441- Glazed Aluminum Curtain Walls Systems

1.3 REFERENCES

1.4 DEFINITIONS

A. Sealed Insulating Glass Unit Surfaces:

Surface 1 - Exterior surface of outer pane.

Surface 2 - Interior surface of outer pane.

Surface 3 - Interior surface of inner pane.

Surface 4 - Exterior surface of inner pane.

1.5 SYSTEM DESCRIPTION

A. Design requirements:

1. Size glass to withstand dead loads and positive and negative live loads acting normal to plane of glass in accordance with IBC CODE 2006.

2. Size glass to withstand dead loads and positive and negative live loads acting normal to plane of glass to a design pressure of (PER IBC CODE 2006 of specified pound per square foot) in accordance with ASTM E 1300.

3. Limit glass deflection to 3/4 inch or flexure limit of glass with full recovery of glazing materials, whichever is less.

1.6 SUBMITTALS

1.7 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer, Flat Glass Materials: Minimum five (5) years documented experience producing glass products specified this section.

2. Fabricator, Sealed Insulating Glass Units: Minimum five (5) years documented experience producing sealed insulating glass units specified this section.

3. Installer: Minimum five (5) years documented experience installing products specified in this

section, and approved by fabricator.

1.8 PROJECT/SITE CONDITIONS

A. Environmental Requirements: Installation of glass products at ambient air temperature below 50 degrees F (10 degrees C) is prohibited.

B. Field Measurements: When construction schedule permits, verify field measurements with drawing dimensions prior to fabrication of glass products.

1.9 WARRANTY

A. Provide ten (10) year warranty to include replacement of sealed glass units exhibiting seal failure, interpane dusting or misting.

B. Provide ten (10) year warranty to include replacement for laminated glass exhibiting delamination.

1.10 MAINTENANCE

A. Extra Materials: Supply two of each size and type of insulating glass units.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Flat Glass Materials:

Sun Management Glass System, supplied by Pilkington; P.O. Box 799, 811 Madison Ave., Toledo, OH 43697-0799; Telephone 419-247-4721, FAX 419-247-4517, Internet Address: www.pilkington.com.

PPG Industries, Inc.

LOF, Libbey-Owens-Ford Company

AFG, American Float Glass

B. Substitutions will be considered in accordance with Section 01630 - Product Options and Substituions.

2.2 MATERIALS - Exterior surfaces

A. Pyrolytic Relective Low-E Glass

1. Acceptable Product: Pilkington EverGreen Eclipse Advantage™™ Reflective Low-E Glass

2. Description: Pyrolytic Relective Low-E Glass meeting requirements of ASTM C 1036, Type 1, Class 2, Quality q3.

3. Nominal Glass Thickness: 1/4 inch (6 mm).

4. Performance Characteristics:

a. Visible Light Transmittance: 49 Percent.

b. Visible Light Glass Surface Reflectance: 14 Percent.

c. Visible Light Pyrolytic Surface Reflectance: 26 Percent.

d. Total Solar Energy Transmittance: 23 Percent.

e. Total Solar Energy Reflectance: 8 Percent.

f. UV Transmittance: 7 Percent.

B. Solar-Control Low-Emmissivity Pyrolytic Float Glass

1. Acceptable Product: Pilkington Solar E™™ Solar Control Low-E

2. Description: Solar-Control Low-Emmissivity Pyrolytic Float Glass meeting requirements of ASTM C 1036, Type 1, Class 1, Quality q3.

3. Nominal Glass Thickness: 1/4 inch (6 mm).

4. Performance Characteristics:

a. Visible Light Transmittance: 60 Percent.

b. Visible Light Pyrolytic Surface Reflectance: 9 Percent.

c. Visible Light Glass Surface Reflectance: 7 Percent.

d. Total Solar Energy Transmittance: 42 Percent.

e. Total Solar Energy Reflectance: 7 Percent.

f. UV Transmittance: 41 Percent.

C. Setting Blocks: ASTM C 864, neoprene, 80 to 90 Shore A durometer hardness; length 4 inches (100 mm), width of glazing rabbet space less 1/16 inch (1.5 mm), height required for glazing method, pane weight, and pane area.

D. Spacer Shims: ASTM C 864, neoprene, 50 to 60 Shore A durometer hardness; length 3 inches (75 mm), one half height of glazing stop, thickness required for application , one face self-adhesive.

E. Glazing Tape: Butyl compound tape with integral resilient tube spacer, 10 to 15 Shore A durometer hardness, black color, coiled on release paper; widths required for specified installation.

F. Glazing Tape: Closed cell polyvinyl chloride foam, maximum water absorption by volume 2 percent, designed for 25 percent compression percent for air barrier and vapor retarder seal, black color, coiled on release paper over adhesive on two sides; widths required for specified installation.

G. Glazing Splines: ASTM C 864, resilient polyvinyl chloride, extruded shape to fit glazing channel retaining slot; black color.

H. Glazing Gaskets: ASTM C 864, resilient polyvinyl chloride, extruded shape to fit glazing channel retaining slot; black color.

I. Glazing Clips: Manufacturer's standard type.

J. Sealants: Specified in Section 07900.

K. Silicone Polyester Enamel: Type recommended by flat glass materials manufacturer; color selected by Architect.

L. Smoke Removal Unit Targets: Adhesive targets for application to glass, identifying glass units designed for removal for smoke control.

2.3 MATERIALS – Interior Surfaces

A. Interior glass at storefront glazing: 1/4" Clear Plate Glass , tempered as required by code and location,

B. Interior Mirror Glass: 3/16" smoked plate glass conforming to FS DD-M-00411B with 15 year guarantee against silver spoilage. Polish all edges.

1. Mirror Mounting: Mirror Mastic: An adhesive setting compound, produced specifically for setting mirrors by spot application, certified as compatible with glass coating by organic protective coating manufacturer and approved by mirror manufacturer for use in high humidity conditions. Acceptable manufacturers:

"Pazwall Multi-Purpose Adhesive" by Paz Systems, Inc.

Approved equal.

2.4 FABRICATION

A. Acceptable Fabricators: Minimum five (5) years documented experience producing sealed insulating glass units specified this section.

B. Heat-Strengthened Glass:

1. Cut float glass materials to indicated sizes and provide cut-outs and holes, if indicated, before heat strengthening.

2. Heat strengthen float glass materials in accordance with ASTM C 1048, Kind HS.

C. Tempered Glass:

1. Cut float glass materials to indicated sizes and provide cut-outs and holes, if indicated, before heat strengthening.

2. Fully temper float glass materials in accordance with ASTM C 1048, Kind FT.

D. Laminated Glass:

1. Cut float glass materials to indicated sizes and provide cut-outs and holes, if indicated, before heat strengthening.

2. Heat strengthen float glass materials in accordance with ASTM C 1048, Kind HS.

3. Laminate plastic interlayer between glass panes in accordance with ASTM C 1172.

4. Laminated glass to conform to GANA (LGDG) and requirements of ANSI Z97.1.

E. Sealed Insulating Glass Units:

1. Fabricate units in accordance with ASTM E 774, Class CBA, with components and performance characteristics specified in SCHEDULES Article of this section.

2. Fabricate units in accordance with ASTM E 774, Class CBA:

3. Components:

a. Outer Pane:

(1) Glass Type: Pilkington EverGreen Eclipse Advantage™™ Reflective Low-E Glass Pyrolytic Surface #2

(2) Glass Color: Natural Green

(3) Glass Thickness: 1/4 inch (6 mm).

(4) Heat Treating: Heat strengthened or Fully tempered as required by condition near exits or by Spandrel glass

b. Air Space: 1/2 inch wide, hermetically sealed, argon-filled.

c. Inner Pane:

(1) Glass Type: Pilkington Solar E™™ Solar Control Low-E Glass #3 Surface

(2) Glass Color: Clear.

(3) Glass Thickness: 1/4 inch (6 mm).

(4) Heat Treating: Heat strengthened or Fully tempered as required by condition near exits or by Spandrel glass

4. Performance Characteristics:

a. Visible Light Transmittance: 29 Percent. /(spandrel required at some locations) - see drawings

b. Visible Light Exterior Reflectance: 18 Percent.

c. Visible Light Interior Reflectance: 17 Percent.

d. Total Solar Energy Transmittance: 12 Percent.

e. Total Solar Energy Reflectance: 9 Percent.

f. UV Transmittance: 4 Percent.

g. Summer U-Value: 0.25

h. Winter U-Value: 0.26

i. Solar Heat Gain Coefficient: 0.26

j. Shading Coefficient: 0.30

5. Provide unit edge seals meeting requirements of ASTM E 773, with aluminum spacers having mitered and corners, and silicone sealant for glass-to-spacer seals.

PART 3 EXECUTION

3.1 ACCEPTABLE INSTALLERS Minimum five (5) years documented experience installing products specified in this section, and approved by fabricator.

3.2 EXAMINATION

A. Verify that openings for glazing are correct size and within tolerance.

B. Verify that glazing channels and recesses are clean and free of obstructions, that weeps are clear, and that channels and recesses are ready for glazing.

3.3 PREPARATION

A. Clean contact surfaces to receive sealant with solvent; wipe dry.

B. Seal porous glazing channels and recesses with primer or sealer compatible with substrate.

C. Prime surfaces to receive sealant in accordance with sealant manufacturer's instructions.

3.4 INSTALLATION

A. Install Outboard Pyrolytic glass with Pyrolytic surface to interior (Surface 2).

B. Install Inboard Pyrolytic glass, if used, with Pyrolytic surface #3.

C. Install sealants in accordance with sealant manufacturers' written instructions and recommendations.

D. Exterior Dry Method (Tape and Gasket Spline):

1. Apply glazing tape or spline to glass; butt-joint tape edges; seal joints with butyl sealant.

2. Place setting blocks with edge blocks maximum 6 inches from glass edges and intermediate blocks at 1/4 points of glass panel length.

3. Set glass unit on setting blocks; apply pressure against fixed stop for full contact.

4. Install removable stops without displacing glazing tape or spline; apply pressure for full continuous contact.

5. Trim sight-exposed tape flush with stop.

E. Exterior Wet/dry Method (Formed Tape and Sealant):

1. Apply glazing tape to glass; butt-joint tape edges; seal joints with butyl sealant.

2. Apply glazing tape to permanent stops, 1/4 inch below sight line; butt-joint tape edges; seal joints with butyl sealant.

3. Apply heel bead of butyl sealant along intersection of permanent stop with frame; ensure full perimeter seal between glass and frame for continuity of air and vapor seal.

4. Place setting blocks with edge blocks maximum 6 inches from glass edges and intermediate blocks at 1/4 points of glass panel length.

5. Set glass unit on setting blocks; apply pressure against fixed stop for full contact.

6. Install removable stops without displacing glazing tape; insert spacer strips between glazing and applied stops; terminate spacer strips 1/4 inch below sight line; apply pressure for full continuous contact.

7. Fill gap between glazing and stop with sealant to depth equal to bite of frame on glazing and to 3/8 inch below sight line.

8. Apply cap bead of sealant along void between stop and glazing to uniform line flush with sight line; tool sealant surface smooth.

F. Exterior Wet Method (Sealant and Sealant):

1. Place setting blocks at 1/4 points; install glazing unit.

2. Install removable stops; center glass unit in space by inserting spacer shims both sides at intervals of 24 inches; set spacer shims 1/4 inch below sight line.

3. Fill gaps between glazing and stops with sealant to depth equal to bite of frame on glazing and to 3/8 inch below sight line; ensure full contact with glazing for continuity of air and vapor seal.

4. Apply sealant to uniform line flush with sight line. Tool sealant surface smooth.

G. Exterior Butt Glazed Method (Sealant Only):

1. Brace glass in position for duration of glazing process; mask edges of glass at adjoining glass edges and between glass edges and framing members.

2. Secure small diameter non-adhering foamed rod on back side of joint.

3. Apply sealant to open side of joint in continuous operation; completely fill joint without displacing foam rod; tool sealant surface smooth to concave profile.

4. Allow sealant to cure, then remove foam backer rod.

5. Apply sealant to opposite side; tool sealant smooth to concave profile.

6. Remove masking tape.

H. Interior Dry Method (Tape and Tape):

1. Apply glazing tape to permanent stops, allowing tape edge to project 1/16 inch above stop; butt-joint tape edges; seal joints with butyl sealant.

2. Place setting blocks with edge blocks maximum 6 inches from glass edges and intermediate blocks at 1/4 points of glass panel length.

3. Set glass unit on setting blocks; apply pressure against fixed stop for full contact.

4. Apply glazing tape on free perimeter of glazing as described above.

5. Install removable stops without displacing glazing tape; apply pressure for full continuous contact.

6. Trim sight-exposed tape flush with stop.

I. Interior Wet/Dry Method (Tape and Sealant):

1. Apply glazing tape to glass; butt-joint tape edges; seal joints with butyl sealant.

2. Place setting blocks with edge blocks maximum 6 inches from glass edges and intermediate blocks at 1/4 points of glass panel length.

3. Set glass unit on setting blocks; apply pressure against fixed stop for full contact.

4. Install removable stops without displacing glazing tape; insert spacer strips between glazing and applied stops; terminate spacer strips 1/4 inch below sight line; apply pressure for full continuous contact.

5. Fill gap between glazing and stop with sealant to depth equal to bite of frame on glazing and to uniform line flush with sight line; tool sealant surface smooth.

6. Trim sight-exposed tape flush with stop.

J. Interior Wet Method (Compound and Compound):

1. Place setting blocks at 1/4 points; install glazing unit.

2. Install applied stops; center glass unit in space by inserting spacer shims both sides at intervals of 24 inches; set spacer shims 1/4 inch below sight line.

3. Locate and secure glazing pane using glazers' clips.

4. Fill gaps between glazing and stops with glazing compound to flush with sight line; tool surface to straight line.

L. Installation of glazing in flush wood doors is specified in Section 08210.

M. Installation of glazing in aluminum entrances and storefronts is specified in Section 08410.

N. Installation of glazing in aluminum curtain wall system is specified in Section 8441

O.MIRROR INSTALLATION General: Install mirrors to comply with printed directions of mirror manufacturer, and with referenced FGMA standard and NAMM document. Mount mirrors in place to avoid distorting reflected images and provide space for air circulation between back of mirror and face of mounting surface.

Mastic Spot Installation System: Install mirrors with mastic as follows: Identify and examine surfaces over which mirror is to be mounted. Comply with manufacturer's printed installation directions for preparation of mounting surfaces including coating surfaces with mastic manufacturer's special bond coating where applicable. Apply barrier coat to mirror backing where approved by manufacturers of mirror and backing material. Apply mastic in spots to comply with mastic manufacturer's printed directions for coverage and to allow air circulation between back of mirror and face of mounting surface. After mastic is applied, align mirror and press into place while maintaining a minimum air space of 3/16 inch between back of mirror and mounting surface.

3.5 CLEANING

Protect exterior glass from breakage immediately upon installation by use of crossed streamers attached to framing and held away from glass. Do not apply markers to surfaces of glass. Remove nonpermanent labels and clean surfaces. Remove glazing materials from finish surfaces.

Protect glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove immediately by method recommended by glass manufacturer. Remove labels after glass installation is complete.

Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less often than once a month, for buildup of dirt, scum, alkali deposits or staining. When examination reveals presence of these forms of residue, remove by method recommended by glass manufacturer.

Remove and replace glass which is broken, chipped, cracked, abraded or damaged in other ways during construction period, including natural causes, accidents and vandalism.

Clean glass surfaces and adjacent surfaces. Wash glass on both faces not more than 4 days prior to date scheduled for inspections intended to establish date of substantial completion.

3.6 SCHEDULES

A. See drawings. All exterior glass is to be of the same type and color as specified herein

END OF SECTION O8810

SECTION 09221

NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes non-load-bearing steel framing members for the following applications:
   1. Interior framing systems (e.g., supports for partition walls, framed soffits, furring, etc).
   2. Interior suspension systems (e.g., supports for ceilings, suspended soffits, etc).

B. Related Sections include the following:
   1. Division 05 Section "Cold-Formed Metal Framing" for exterior and interior load-bearing and exterior non-load-bearing wall studs.
   2. Division 07 Section "Thermal Insulation" for insulation installed with Z-shaped furring members.
   3. Division 07 Section "Fire-Resistive Joint Systems" for head-of-wall joint systems installed with non-load-bearing steel framing.

1.3 SUBMITTALS

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

1.4 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

PART 2 - PRODUCTS

2.1 NON-LOAD-BEARING STEEL FRAMING, GENERAL

A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.
   1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal, unless otherwise indicated.
   2. Protective Coating: ASTM A 653, G40, hot-dip galvanized, unless otherwise indicated.

2.2 SUSPENSION SYSTEM COMPONENTS

A. Tie Wire: ASTM A 641, Class 1 zinc coating, soft temper, 0.0625-inch diameter wire, or double strand of 0.0475-inch diameter wire.

B. Wire Hangers: ASTM A 641, Class 1 zinc coating, soft temper, 0.162-inch diameter.

C. Carrying Channels: Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.0538 inch and minimum 1/2-inch wide flanges.
   1. Depth: 2-1/2 inches, unless otherwise indicated on Drawings.

D. Furring Channels (Furring Members):

1. Cold-Rolled Channels: 0.0538-inch bare-steel thickness, with minimum 1/2-inch wide flanges, 3/4 inch deep.
2. Steel Studs: ASTM C 645.
   a. Minimum Base-Metal Thickness: 0.0179 inch, unless otherwise indicated on Drawings or to meet performance requirements.
   b. Depth: 3-5/8 inches, 6-inches, or 8-inches, as indicated on Drawings.
3. Resilient Furring Channels: 1/2-inch deep members designed to reduce sound transmission.
   a. Configuration: Asymmetrical or hat shaped.

E. Grid Suspension System for Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.
1. Products: Subject to compliance with requirements, provide one of the following:
   a. Armstrong World Industries, Inc.; Drywall Grid Systems.
   b. USG Corporation; Drywall Suspension System.

2.3 STEEL FRAMING FOR FRAMED ASSEMBLIES

A. Steel Studs and Runners: ASTM C 645.
1. Minimum Base-Metal Thickness: 0.0179 inch, unless otherwise indicated on Drawings or to meet performance requirements.
   a. Provide 0.0312 inch thick metal stud framing at walls to support ceramic tile finishes.
   b. Depth: 3-5/8 inches, 6-inches, or 8-inches, as indicated on Drawings.

B. Slip-Type Head Joints: Where indicated, provide the following:
1. Single Long-Leg Runner System: ASTM C 645 top runner with 2-inch- deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top runner and with continuous bridging located within 12 inches of the top of studs to provide lateral bracing.

C. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
1. Minimum Base-Metal Thickness: 0.0538 inch.

D. Cold-Rolled Channel Bridging: 0.0538-inch bare-steel thickness, with minimum 1/2-inch- wide flanges.
1. Depth: 1-1/2 inches, unless otherwise indicated on Drawings.
2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches, 0.068-inch- thick, galvanized steel.

E. Hat-Shaped, Rigid Furring Channels: ASTM C 645.
1. Minimum Base Metal Thickness: 0.0179 inch, unless otherwise indicated on Drawings.
2. Depth: 7/8 inch.

F. Resilient Furring Channels: 1/2-inch deep, steel sheet members designed to reduce sound transmission.
1. Configuration: Asymmetrical or hat shaped.

G. Cold-Rolled Furring Channels: 0.0538-inch bare-steel thickness, with minimum 1/2-inch- wide flanges.
1. Depth: 3/4 inches, unless otherwise indicated on Drawings.
2. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with minimum bare-steel thickness of 0.0312 inch.
3. Tie Wire: ASTM A 641, Class 1 zinc coating, soft temper, 0.0625-inch- diameter wire, or double strand of 0.0475-inch- diameter wire.

H. Z-Shaped Furring: With slotted or non-slotted web, face flange of 1-1/4 inches, wall attachment flange of 7/8 inch, minimum bare-metal thickness of 0.0179 inch, and depth required to fit insulation thickness indicated.

2.4 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards.
   1. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

B. Isolation Strip at Exterior Walls: Provide one of the following:
   1. Asphalt-Saturated Organic Felt: ASTM D 226, Type I (No. 15 asphalt felt), non-perforated.
   2. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.
   1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

B. Coordination with Sprayed Fire-Resistive Materials: Where required by construction or where indicated on Drawings.
   1. Before sprayed fire-resistive materials are applied, attach offset anchor plates or ceiling runners (tracks) to surfaces indicated to receive sprayed fire-resistive materials. Where offset anchor plates are required, provide continuous plates fastened to building structure not more than 24 inches o.c.
   2. After sprayed fire-resistive materials are applied, remove them only to extent necessary for installation of non-load-bearing steel framing. Do not reduce thickness of fire-resistive materials below that required for fire-resistance ratings indicated. Protect adjacent fire-resistive materials from damage.

3.3 INSTALLATION, GENERAL

A. Installation Standard: ASTM C 754, except comply with framing sizes and spacing indicated.
   1. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.

B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

C. Install bracing at terminations in assemblies.

D. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.4 INSTALLING SUSPENSION SYSTEMS

A. Install suspension system components in sizes and spacings indicated on Drawings, but not less than those required by referenced installation standards for assembly types and other assembly components indicated.

B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.

C. Suspend hangers from building structure as follows:
   1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.
      a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
   2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.
      a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.
   3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
   4. Do not attach hangers to steel roof deck.
   5. Do not connect or suspend steel framing from ducts, pipes, or conduit.

D. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.

E. Seismic Bracing: Sway-brace suspension systems with hangers used for support.

F. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

G. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

3.5 INSTALLING FRAMED ASSEMBLIES

A. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.

B. Install studs so flanges within framing system point in same direction.
   1. Space studs as follows:
      a. Single-Layer Application: 16 inches o.c., unless otherwise indicated.
      b. Multilayer Application: 16 inches o.c., unless otherwise indicated.
      c. Tile backing panels: 16 inches o.c., unless otherwise indicated.

C. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.
   1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
   2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.

a. Install two studs at each jamb, unless otherwise indicated.
b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.
c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.

3. Other Framed Openings: Frame openings other than door openings the same as required for door openings, unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.
   a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.

D. Direct Furring:
1. Screw to wood framing.
2. Attach to masonry with stub nails, screws designed for masonry attachment, or power-driven fasteners spaced 24 inches o.c.

E. Z-Furring Members:
1. Erect insulation (specified in Division 07 Section "Thermal Insulation") vertically and hold in place with Z-furring members spaced 16 inches o.c.
2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12 inches from corner and cut insulation to fit.

F. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

END OF SECTION 092216

SECTION 09260

GYPSUM WALLBOARD SYSTEMS

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this Section.

DESCRIPTION OF WORK: Work of this Section shall include, but not necessarily be limited to, furnishing and installing the following:

Gypsum Board, and Required Accessories

Spray-Applied Acoustical Plaster Finish

Sound Deadening Board

RELATED SECTIONS

Section 06100 - Rough Carpentry

Section 07200 - Insulation

Section 07270 - Fire Barrier Systems

Section 09900 - Painting

DEFINITIONS

Gypsum Board Construction Terminology: Refer to ASTM C-11 and GA-505for definitions of terms for gypsum board assemblies not defined in this section or in other referenced standards.

QUALITY ASSURANCE

Fire-Resistance Ratings: Where indicated, provide materials and construction which are identical to those of assemblies whose fire-resistance rating has been determined per ASTM E-119 by a testing and inspecting organization acceptable to authorities having jurisdiction.

Provide fire-resistance-rated assemblies identical to those indicated by reference to GA File Nos. in GA-600 "Fire Resistance Design Manual" or to design designations in U.L. "Fire Resistance Directory" or in listing of other testing and agencies acceptable to authorities having jurisdiction.

Single Source Responsibility for Panel Products: Obtain each type of gypsum board, other panel products, and related joint treatment materials from a single manufacturer.

Sound Transmission Characteristics: For gypsum board assemblies indicated to have STC ratings, provide materials and construction identical to those of assemblies whose STC ratings were determined per ASTM E 90 and classified per ASTM E 413 by a qualified independent testing agency.

DELIVERY, STORAGE, AND HANDLING

Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer or supplier. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes. Neatly stack gypsum panels flat to prevent sagging. Handle gypsum board to prevent damage to edges, ends, and surfaces. Do not bend or otherwise damage metal corner beads and trim.

PROJECT CONDITIONS

Environmental Conditions, General: Establish and maintain environmental conditions for application and finishing gypsum board to comply with ASTM C-840 and with gypsum board manufacturer's recommendations, whichever are more stringent.

Minimum Room Temperatures: For nonadhesive attachment of gypsum board to framing, maintain not less than 40 deg. F. (4 deg. C.). For adhesive attachment and finishing of

gypsum board maintain not less than 50 deg. F. (10 deg. C.) for 48 hours prior to application and continuously thereafter until drying is complete. Do not exceed 95 deg. F (35 deg. C) when using temporary heat sources.

Ventilation: Ventilate building spaces as required for drying joint treatment materials. Avoid drafts during dry, hot weather to prevent materials from drying too rapidly.

REFERENCES

Gypsum Association, GA-216 Recommended Specifications for the application and finishing of gypsum board.

PART 2 - PRODUCTS

GYPSUM BOARD PRODUCTS

Acceptable Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include the following:

Domtar Gypsum Company

Georgia-Pacific Company

Gold Bond Building Products Div., National Gypsum Company

United States Gypsum Company

General: Provide gypsum board of types indicated in maximum lengths available to minimize end-to-end butt joints.

Thickness: Provide gypsum board in thicknesses indicated or, if not otherwise indicated, in 1/2 and 5/8 inch thicknesses to comply with ASTM C 840 for application system and support spacing indicated.

Gypsum Wallboard: ASTM C 36 and as follows:

Type: Type X

Type: Sag-resistant type for ceiling surfaces.

Type: Moisture-resistant type for all toilet rooms.

Edges: Tapered and featured (rounded or beveled) for prefilling.

Sound Deadening Board: Provide 1/2" thick "G-P Hushboard" wood fiber sound deadening board by Georgia-Pacific.

TRIM ACCESSORIES

Accessories for Interior Installation: Corner beads, edge trim, and control joints complying with ASTM C 1047 and requirements indicated below:

Material: Formed metal or metal combined with paper, unless otherwise indicated, complying with the following requirement:

Metal shall be sheet steel zinc-coated by hot-dip process.

All metal trims to be mud-set type

Shapes indicated below by reference to Fig. 1 designations in ASTM C 1047:

Cornerbead on outside corners, unless otherwise indicated.

LC-bead with both face and back flanges; face flange formed to receive joint compound. Use LC-beads for edge trim, unless otherwise indicated.

L-bead with face flange only; face flange formed to receive joint compound. Use L-bead where indicated.

At Joints between Gypsum Board and exterior door and window frames, trim shall be USG RP Series, rigid vinyl, or approved equal.

JOINT TREATMENT MATERIALS

General: Provide materials complying with ASTM C-475, ASTM C-840, and recommendations of manufacturer of both gypsum board and joint treatment materials for the application indicated.

Joint Tape: Paper reinforcing tape, unless otherwise indicated.

Use pressure sensitive or staple-attached open-weave glass fiber reinforcing tape with compatible joint compound where recommended by manufacturer of gypsum board and joint treatment materials for application indicated.

Setting-Type Joint Compounds for Gypsum Board: Factory-packaged, job-mixed, chemical-hardening powder products formulated for uses indicated.

For prefilling gypsum board joints, use formulation recommended by gypsum board manufacturer for this purpose.

For filling joints and treating fasteners of water-resistant gypsum backing board behind base for ceramic tile, use formulation recommended by the gypsum board manufacturer for this purpose.

For topping compound, use sandable formulation.

Drying-Type Joint Compounds for Gypsum Board: Factory-packaged vinyl-based products complying with the following requirements for formulation and intended use.

Ready-Mixed Formulation: Factory-Mixed Product

Taping compound formulated for embedding tape and for first coat over fasteners and face flanges of trim accessories.

Topping compound formulated for fill (second) and finish (third) coats.

All-purpose compound formulated for both taping and topping compounds.

SPRAY-APPLIED TEXTURED FINISH: Abestos-free spray finish applied at a rate of 8 sq. ft. per pound minimum. Acceptable products shall include:

Spary Quick (Medium Finish), as manufactured by Gold Bond Building Products.

Imperial QT E-2 (Medium Finish), as manufactured by United States Gypsum Company.

Approved equal.

ACOUSTICAL SEALANT

Latex Acoustical Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834 and the following requirements:

Product is effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies per ASTM E 90.

Product has flame-spread and smoke-developed ratings of less than 25 per ASTM E 84.

Acoustical Sealant for Concealed Joints: Manufacturer's standard nondrying, non-hardening, nonskinning, nonstaining, gunnable, synthetic rubber sealant recommended for sealing interior concealed joints to reduce transmission of airborne sound.

MISCELLANEOUS MATERIALS

General: Provide auxiliary materials for gypsum drywall construction which comply with referenced standards and the recommendations of the manufacturer of the gypsum board.

Laminating Adhesive: Special adhesive or joint compound recommended for laminating gypsum boards.

Spot Grout: ASTM C-475, setting-type joint compound of type recommended for spot grouting hollow metal door frames.

Gypsum Board Screws: ASTM C-1002

Gypsum Board Nails: ASTM C-514

Water: All water used in joint system shall be clean and free from deleterious amounts of foreign material.

Other Materials: All other materials not specifically described but required for a complete and proper installation of gypsum drywall shall be as selected by the Contractor, subject to approval by the Architect.

PART 3 - EXECUTION

EXAMINATION

Examine substrates to which gypsum board assemblies attach or abut, installed hollow metal frames, cast-in-anchors, and structural framing, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of assemblies specified in this Section. Do not proceed with installation until unsatisfactory conditions have been corrected.

APPLICATION AND FINISHING OF GYPSUM BOARD, GENERAL

Gypsum Board Application and Finishing Standards: Install and finish gypsum board to comply with ASTM C-840 and GA-216.

Install Batt insulation where indicated, prior to gypsum board unless readily installed after board has been installed on one side.

Locate exposed end-butt joints as far from center of walls and ceilings as possible and stagger not less than 24 inches in alternate courses of board.

Install ceiling boards across framing in the manner which minimizes the number of end-butt joints and which avoids end joints in the central area of each ceiling. Stagger end joints at least 24inches.

Install wall/partition boards in manner which minimizes the number of end-butt joints or avoids them entirely where possible. At stairwells and similar high walls, install boards horizontally with end joints staggered over studs.

Install exposed gypsum board with face side out. Do not install imperfect, damaged, or damp boards. Butt boards together for a light contact at edges and ends with not more than 1/16 inch open space between boards. Do not force into place.

Locate both edge or end joints of sound board & gypsum board over supports, except in horizontal applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Position boards so that like edges abut, tapered edges against tapered edges and mill-cut or field-cut ends against mill-cut or field-cut ends. Do not place tapered edges against cut edges or ends. Stagger vertical joints over different studs on opposite sides of partitions.

Attach gypsum board to studs so that leading edge or end of each board is attached to open (unsupported) edge of stud flanged first.

Attach gypsum board to supplementary framing and blocking provided for additional support at openings and cutouts.

Form control joints and expansion joints at locations indicated, with space between edges of boards, prepared to receive trim accessories.

Isolate perimeter of non-load-bearing drywall partitions at structural abutments. Provide 1/4 inch to 1/2 inch space and trim edge with "U" bead edge trim. Seal joints with acoustical sealant.

Where STC-rated gypsum board assemblies are indicated, seal construction at perimeters, control and expansion joints, openings and penetrations with a continuous bead of acoustical sealant including a bead at both faces of partitions. Comply with ASTM C-919 and manufacturer's recommendations for location of edge trim and close off sound-flanking paths around or through construction, including sealing of partitions above acoustical ceilings.

Space fasteners in gypsum boards in accordance with referenced gypsum board application and finishing standard and manufacturer's recommendations.

GYPSUM BOARD APPLICATION METHODS

Single-Layer Application: Install gypsum wallboard as follows:

On ceilings, apply gypsum board prior to wall/partition board application to the greatest extent possible, at right angles to framing, unless otherwise indicated.

On partitions/walls, apply gypsum board vertically (parallel to framing), unless otherwise indicated, and provide panel lengths that will minimize end joints.

On Z-furring members, apply gypsum board vertically (parallel to framing) with no end joints. Locate edge joints over furring members.

Multiple-Layer Application: Install gypsum backing board for base layer and gypsum wallboard for face layer.

On ceilings, apply base layer prior to applying base layer on walls/partitions; apply face layers in same sequence. Offset face-layer joints at least 16 inches from parallel base-layer joints. Apply base layers at right angles to framing members unless otherwise indicated.

On partitions/wall, apply base layer and face layers vertically (parallel to framing) with joints of base layer over supports and face layer joints offset at least 10 inches with base layer joints.

On furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.

Single-Layer Fastening Methods: Apply gypsum boards to supports as follows:

Fasten with screws.

Multiple-Layer Fastening Methods: Apply base layer of gypsum board and face layer to base layer as follows:

Fasten both base layers and face layers separately to supports with screws.

Direct-Bonding to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members or base layer of gypsum board), comply with gypsum board manufacturer's recommendations, and temporarily brace or fasten gypsum panels until fastening adhesive has set.

INSTALLING TRIM ACCESSORIES

General: Where feasible, use the same fasteners to anchor trim accessory flanges as required to fasten gypsum board to the supports. Otherwise, fasten flanges to comply with manufacturer's recommendations.

Install corner beads at external corners.

Install edge trim where edge of gypsum panels would otherwise be exposed or semi-exposed. Provide edge trim type with face flange formed to receive joint compound except where other types are indicated.

Install edge trim where edge of gypsum board would otherwise be exposed or semi-exposed. Provide edge trim-type with face flange to receive joint compound except where other types are indicated.

Install "LC" bead where gypsum panels are tightly abutted to other construction and back flange can be attached to framing or supporting substrate.

Install "L" bead where edge trim can only be installed after gypsum board is installed.

Install U-type trim where edge is exposed, revealed, gasketed, or sealant-filled (including expansion joints).

FINISHING OF GYPSUM BOARD ASSEMBLIES

General: Apply joint treatment at gypsum board joints (both directions), flanges of corner bead, edge trim, and control joints, penetrations, fastener heads, surface defects and

elsewhere as required to prepare work for decoration and level of gypsum board finish indicated.

Prefill open joints, rounded or beveled edges, and damaged areas, using setting-type joint compound.

Apply joint tape over gypsum board joints except those with trim accessories having concealed face flanges not requiring taping to prevent cracks from developing in joint treatment at flange edges.

Levels of Gypsum Board Finish: Provide the following levels of gypsum board finish per GA-214.

Level 1 for ceiling plenum areas, concealed areas, and where indicated, unless a higher level of finish is required for fire-resistive-rated assemblies and sound-rated assemblies.

Level 2 where water-resistant gypsum backing board panels form substrates for tile, and where indicated.

Level 4 for gypsum board surfaces indicated to receive light-textured finishes, wallcoverings, and flat paints over light textures.

Level 4 for gypsum board surfaces indicated to receive gloss and semi-gloss enamels, nontextured flat paints, and where indicated.

Level 5 for gypsum board exposed ceilings to receive paint.

For Level 4 gypsum board finish, embed tape in finishing compound plus two separate coats applied over joints, angles, fastener heads, and trim accessories using one of the following combinations of joint compounds (not including prefill), and sand between coats and after last coat.

Where Level 5 gypsum board finish is indicated, apply joint compound combination specified for Level 4 plus a thin, uniform skim coat of joint compound over entire surface. Use joint compound specified for the finish (third coat) or a product specially formulated for this purpose and acceptable to gypsum board manufacturer. Produce surfaces free of tool marks and ridges ready for decoration of type indicated.

Where Level 2 gypsum board finish is indicated, apply joint specified for first coat in addition to embedding coat.

Where Level 1 gypsum board finish is indicated, apply joint compound specified for embedding coat.

Allow not less than 24 hours drying time between coats.

SPRAY-APPLIED ACOUSTICAL PLASTER: Apply in strict accordance with manufacturer's specifications. Prepare surface as directed. Apply a full coat of good quality flat white primer, as recommended and approved by manufacturer, over entire surface prior to applying textured finish.

ADJUST AND CLEAN

Cut, patch, repair, and point-up gypsum board as required. Repair cracks and indented surfaces.

Promptly remove compound from door frames, windows, and other surfaces. Repair floors, walls, and other surfaces which have been stained, marred, or otherwise damaged during the framing and gypsum board work. Daily remove unused materials, containers, and equipment. Clean floors of all gypsum board and wood debris and leave broom clean.

PROTECTION

Provide final protection and maintain conditions, in a manner suitable to installer, which ensures gypsum drywall construction being without damage or deterioration at time of Substantial Completion.

END OF SECTION 09260

SECTION 09510

SUSPENDED ACOUSTICAL CEILING

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this Section.

DESCRIPTION OF WORK: Work of this Section includes, but is not necessarily limited to, furnishing and installing the following:

Suspended Metal Grid Systems Complete With Wall Trim

Ceiling Tiles

All in locations as shown on Drawings.

QUALITY ASSURANCE

Qualifications of Installers

The suspended ceiling Subcontractor shall have a record of successful installations of similar ceilings acceptable to the Architect.

For the actual fabrication and installation of all components of the system, use only personnel who are thoroughly trained and experienced in the skills required and completely familiar with the requirements established for this work.

CODES AND STANDARDS: In addition to complying with all pertinent codes and regulations, suspension system shall be installed according to ASTM C636, Installation of Metal Ceiling Suspension System for Acoustical Tile and Lay-in Panels.

PRODUCT HANDLING: Use all means necessary to protect the materials of this Section before, during, and after installation and to protect work and materials of all other trades.

ENVIRONMENTAL REQUIREMENTS

Do not install acoustical ceilings until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.

SUBMITTALS

Submit samples of all ceiling tile materials for approval.

PART 2 - PRODUCTS

STRUCTURAL EXPOSED SUSPENSION SYSTEM

Manufacturer: Design for this system is based on use of USG Interiors (Donn Products). System used shall be that upon which design was based, by Armstrong, Chicago Metallic, or an equal approved in advance by the Architect.

Type I Grid: DX-24 System

System used shall be double-web, direct hung, exposed system.

Main Runners

Number DX-24 with 1-1/2" ht., 15/16" face, steel.

The main runner shall have a non-directional bayonet coupling.

Cross Runners: Number DX-216 or DX-424 designed to support lay-in lighting fixtures and to receive acoustical tile at sides of fixture opening.

Perimeter Wall Angles: Hemmed Edge, 7/8" x 7/8".

Accessories: Provide all accessories needed for proper installation of system.

Finish: All exposed surfaces shall be finished to match color of ceiling tile.

General: The systems shall be such that the ceiling panels may be removed without damage; that the main runner and cross runners may be removed and replaced without deforming the runners or disturbing the balance of the grid system.

Type I: 24" x 24" x 3/4" ceiling panels with square-cut shadowline edge for use with Type I Grid System. Color to be white.

"Sandrift No. 808", by U.S.G. Interiors, Inc.

Approved Equal by Armstrong

Approved Equal by Celotex Corporation

LIGHTING: Contractor shall be responsible for providing sufficient support on grid systems to support light fixtures. All fixtures shall be supported at each and every corner.

REPLACEMENT STOCK: This Contractor shall supply Owner with replacement stock amounting to 2% of each type of tile and suspension system specified.

PART 3 - EXECUTION

SURFACE CONDITIONS

Inspection: Prior to all work of this Section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence. Verify that suspended ceiling systems may be installed in strict accordance with all pertinent codes and regulations, and the manufacturer's recommendations.

Discrepancies: In the event of discrepancy, immediately notify the Architect. Do not proceed in areas of discrepancy until all such discrepancies have been fully resolved.

INSTALLATION: Fabricate and install all components of the suspended ceiling systems in strict accordance with all pertinent codes and regulations, and the manufacturer's recommendations, firmly anchoring all items in place for long life under hard use.

Suspension from electrical or mechanical equipment will not be allowed.

CLEANING UP: Completely remove all finger prints and traces of soil and damage from the surfaces of grid and acoustical materials, using only those cleaning materials recommended for that purpose by the manufacturer of the material being cleaned. Replace units which are damaged or improperly installed.

END OF SECTION

SECTION 09650

RESILIENT FLOORING

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this Section.

DESCRIPTION OF WORK: Work in this Section includes, but is not necessarily limited to, furnishing and installing the following:

Vinyl Composition Tile

Sheet Vinyl Flooring

Rubber Flooring

Resilient Base

Stair Treads Risers and Stringers

Carpet Edge Guards

RELATED SECTIONS

QUALITY ASSURANCE

Single-Source Responsibility for Floor Tile: Obtain each type, color and pattern of flooring from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the work.

DELIVERY, STORAGE, AND HANDLING

Deliver tiles and installation accessories to Project site in original manufacturer's unopened cartons and containers each bearing names of product and manufacturer, Project identification, and shipping and handling instructions.

Store flooring materials in dry spaces protected from the weather with ambient temperatures maintained between 50 degrees F. (10 degrees C.) and 90 degrees F. (32 degrees C.). Store tiles on flat surfaces. Move tiles and installation accessories into spaces where they will be installed at least 48 hours in advance of installation.

PROJECT CONDITIONS

Maintain a minimum temperature of 70 degrees F. (21 degrees C.) in spaces to receive tiles for at least 48 hours prior to installation, during installation, and for not less than 48 hours after installation. After this period, maintain a temperature of not less than 55 degrees F. (13 degrees C.).

Do not install tiles until they are at the same temperature as the space where they are to be installed. Close spaces to traffic during tile installation.

SEQUENCING AND SCHEDULING

Do not install resilient flooring materials over concrete slabs until the slabs have cured and are sufficiently dry to bond with adhesive as determined by tile manufacturer's recommended bond and moisture test.

TEST MATERIALS

Deliver extra materials to Owner. Furnish extra materials matching products installed as described below, packaged with protective covering for storage and identified with labels clearly describing contents. Furnish not less than one box for each 50 boxes or fraction thereof, of each class, wearing surface, color, pattern, and size of resilient floor tile installed.

SUBMITTALS

Submit manufacturer's product and maintenance data for each type of resilient flooring and accessory.

Asbestos Content: Provide written certification that tile and adhesive materials containing no asbestos of any type or mixture of types occurring naturally as impurities as determined by polarized light microscopy test per Appendix A of 40 CFR 763 will be utilized on this Project.

Certification by resilient flooring manufacturer that products supplied for flooring installation comply with local regulations controlling use of volatile organic compounds (VOCS).

Submit color selection in the form of actual sections of resilient flooring, including accessories, for each type of resilient flooring required showing full range of colors and patterns available.

PART 2 - PRODUCTS

VINYL COMPOSITION TILES: All vinyl tile shall be the maximum extent possible of a single batch number. Tile shall be 12" x 12" x 1/8" thick, with uniform disbursement of color and texture throughout the thickness of the tile. Comply with ASTM F 1066, Composition 1 (nonasbestos formulated).

Acceptable Manufacturers

Armstrong: "Imperial Excelon"

Approved Equal

SHEET VINYL FLOORING: All sheet vinyl shall be the maximum extent possible of a single batch number.

Flooring shall be .085 thick vinyl. Width shall be selected and installed with the fewest seams appropriate to the area. Color and pattern, see Section 00870. Acceptable manufacturer:

Armstrong: "Seagate"

Approved equal.

RUBBER FLOORING

Raised Disc Tiles: Minimum .125 mm thick, minimum 24" X 24" size, with .025" high raised square patter. Color as scheduled in Section 00870. Acceptable manufacturers:

"Roundel RT" by Johnsonite

"Endura .130 Gauge" by Endura

"Norament 825C Square" by Nora Rubber Flooring

Cerrito Group II, "Raised Square Design" by Roppe Corporation

RESILIENT STAIR ACCESSORIES

Rubber Stair Treads/Risers/Landings/Stringers: Two piece nosing, tread, and riser with low profile (0.40") raised square. Color per Section 00870. Acceptable manufacturers:

"Roundel" square nosing treads, landings, and matching risers/stringers, by Johnsonite.

Provide 930 Johnsonite epoxy caulking compound in the tread.

"Endura System", 3/16" Square Profile Treads, with matching landings, risers and stringers by Endura

Norament 825C/S1029U/S1030U, by Nora Rubber Flooring.

"Cerrito" raised square design, Type 94, with matching landings, risers/stringers, by Roppe Corporation.

BASE: Where called for in finish schedule, resilient bases shall be extruded rubber, cove type, 1/8" thick, 4" high with premolded inside and outside corners. Job mitering of corners will not be permitted. Colors shall be per Section 00870 from standard and designer colors. Acceptable manufacturers include:

Armstrong

Approved Equal

VINYL CARPET EDGE GUARDS

Between carpet and resilient floor tile, system shall be CE-XX-B with CBD-00-A track base, as manufactured by Johnsonite or approved equal. Color per Section 00870.

INSTALLATION ACCESSORIES

Concrete Slab Primer: Nonstaining type as recommended by flooring manufacturer.

Trowelable Underlayments and Patching Compounds: Latex-modified, portland-cement-based formulation provided or approved by tile manufacturer for applications indicated.

Adhesives to be **Non-Toxic, Low Odor, and Solvent Free** with no alcohol, glycol, or ammonia. Adhesive shall be antimicrobial with no hazardous vapors and contain no carcinogenic materials, per OSHA Regulation 29 CFR 1910-1200. All containers shall contain material safety data sheets (MSDS) and be available at job site for inspection. Provide product as manufactured by W.F. Taylor Co., Inc. (800-397-4583) recommended for intended installation, as approved by base manufacturer, or approved equal.

Stair Tread Nose Filler: Two-part epoxy compound recommended by resilient tread manufacturer to fill nosing substrates not conforming to tread contours.

Other materials, including edge strips not specifically described, but required for a complete and proper installation of resilient flooring, shall be only as recommended by the manufacturer of material to which it is applied.

PART 3 - EXECUTION

INSPECTION: Installer must examine the areas and conditions under which resilient flooring and accessories are to be installed and notify the Contractor in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.

CONCRETE SUBFLOORS: Verify that concrete slabs comply with ASTM F 710 and the following:

Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials whose presence would interfere with bonding of adhesive. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by tile manufacturer.

Finishes of subfloors comply with tolerances and other requirements specified in Division 3 Section, "Cast-In-Place Concrete" for slabs receiving resilient flooring.

PREPARATION

General: Comply with manufacturer's installation specifications for preparing substrates to receive products indicated.

Prior to laying flooring, vacuum surfaces to be covered and inspect subfloor. Start of flooring installation indicates acceptance of subfloor and full responsibility for completed work.

This Contractor to remove coatings, including curing compounds, adhesives, plastics, and other substances that are incompatible with flooring adhesives and that contain soap, wax, oil, or silicone, by using a terrazzo or concrete grinder, a drum sander, or a polishing machine equipped with a heavy-duty wire brush. Surface to receive new flooring shall be prepared, including removal of existing materials not acceptable for proper installation of new materials, as required by manufacturer.

Use leveling compound as recommended by flooring manufacturer for filling small cracks and depressions in subfloors.

Apply concrete slab primer, if recommended by flooring manufacturer, prior to application of adhesive. Apply in compliance with manufacturer's directions.

Use stair tread nose filler per tread manufacturer's directions to fill nosing substrates not conforming to tread contours.

INSTALLATION - GENERAL: Install flooring after finishing operations, including painting, have been completed. Moisture content of concrete slabs, building air temperature, and relative humidity must be within limits recommended by flooring manufacturer's directions.

Patch and repair floors and walls to receive flooring for proper installation of flooring, stair accessories, and base.

Place flooring with adhesive cement in strict compliance with manufacturer's recommendations. Butt tightly to vertical surfaces and edgings. Scribe around obstructions and to produce neat joints, laid tight, even, and straight. Extend flooring into toe spaces.

Maintain reference markers, holes, or openings that are in place or plainly marked for future cutting by repeating on finish flooring as marked on subfloor. Use chalk or other non-permanent marking device.

Install flooring on covers for telephone and electrical ducts and other such items as occur within finished floor areas.

Maintain overall continuity of color and pattern with pieces of flooring installed in these covers. Tightly cement edges to perimeter of floor around covers and to covers.

Tightly cement flooring to subbase without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, or other surface imperfections.

INSTALLATION - VINYL COMPOSITION TILE FLOORS: Lay tile from center marks established from center of area so that tile at opposite edges of the area are of equal width. Adjust as necessary to avoid use of cut widths less than 1/2 tile at edge perimeters. Lay tile square to room axis unless otherwise indicated.

Match tiles for color and pattern by using tile from cartons in same sequence as manufactured and packaged. Cut tile neatly in and around all fixtures. Broken, cracked, chipped, or deformed tiles are not acceptable. Lay tile with grain in tile running in same direction.

INSTALLATION - SHEET VINYL FLOORING: Heat weld seams in accordance with manufacturer's specifications with matching color seam.

INSTALLATION - RUBBER TILE FLOORING: Install rubber tile in strict accordance with manufacturer's installation instructions with nonflammable adhesive recommended by the manufacturer.

ACCESSORIES: Apply resilient base to walls, columns, pilasters, casework, and other permanent fixtures in rooms or areas where base is required. Install base in as long lengths as practicable. Tightly bond base to backing throughout the length of each piece with continuous contact at horizontal and vertical surfaces. On irregular surfaces, fill voids along top edge of resilient wall base with manufacturer's recommended adhesive filler material.

Place resilient edge strips tightly butted to adjacent materials of type indicated and bond to substrates with adhesive. Install edging strips at all unprotected edges of flooring unless otherwise shown. Apply resilient accessories to stairs and risers as indicated and according to manufacturer's installation instructions.

CLEANING AND PROTECTION: Remove any excess adhesive or other surface blemishes using neutral type cleaners as recommended by floor manufacturer.

Protect flooring against mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period. Use protection methods indicated or recommended by manufacturer of resilient product involved.

Clean products specified in this Section not more than four days prior to dates scheduled for inspections intended to establish date of Substantial Completion in each area of Project. Clean products using method recommended by manufacturer. Strip protective floor polish that was applied after completing installation, prior to cleaning.

FINISHING: After completion of project and just prior to final inspection of work, thoroughly clean floors and accessories. Apply wax and buff with type of wax, number of coats, and buffing procedures in compliance with flooring manufacturer's instructions.

END OF SECTION

SECTION 09672

DECORATIVE LAMINATE EPOXY FLOORING SPECIFICATION

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

1. Furnish and install the decorative epoxy flooring system as specified and indicated. Prior to installation, provide decontamination and cleaning as specified. The term “decorative epoxy flooring system” as used in this section will include the primers, resin systems and aggregate materials, topcoats, cove building materials, and any related materials for the project.

2. Complete the decorative epoxy flooring system installation in strict accordance with these specifications, the coating system manufacturer’s most current requirements for surface preparation, application and inspection, and the instructions for safety. In the event of a conflict between these specifications and the manufacturer’s instructions, the more stringent requirements will apply.

3. The Contractor shall be responsible for providing ventilation, initial cleaning, inspection, supervision, dust control and equipment protection as specified herein and related sections for the work associated with this Section. The Contractor is responsible for all other work associated with this Section including protection of existing equipment and structures in the work area, surface preparation, flooring application, curing, coating repair, rework, inspection and supervision.

1.02 RELATED SECTIONS

Division 1 General Requirements

1.03 REFERENCES:

1. Society for Protective Coatings (SSPC) Specifications and Standards:

    1. SSPC-PA-3: “A Guide to Safety in Paint Application”.

    2. SSPC-SP-13: “Surface Preparation of Concrete”.

2. NACE (National Association of Corrosion Engineers)

    1. NACE Publication 6D-173, “A Manual for Painter Safety”.

    2. NACE Publication 6G-164, “Surface Preparation Abrasives for Industrial Maintenance Painting”.

3. ASTM (American Society for Testing and Materials)

    1. ASTM D4541 - L.R. “Standard Method for Pull-Off Strength of Coatings using Portable Adhesion Testers”.

    2. ASTM E337 - L.R. “Standard Practice Test Method for Measuring Humidity with a Psychrometer”.

3. ASTM D4263-83 (1999), “Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method”.

4. ASTM F1869-98, “Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride”.

5. ASTM D4414-95, “Standard Practice for Measurement of Wet Film Thickness by Notched Gages”.

6. ICRI Guide No. 03732, “Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings and Polymer Overlays,” International Concrete Repair Institute, Sterling, VA.

7. ASTM 4262, “Standard Test Method for Measuring Surface pH of Acid Etched Concrete”.

8. ASTM D4259, “Standard Practice for Abrading Concrete”.

1.04 DEFINITIONS

1. Terms used in this Section are defined as follows:

1.	Decorative Epoxy Flooring Work	The aspects involved with proper application of the specified high solids flooring system, including but not limited to cleaning, surface preparation, mixing, application, curing, and quality control.
2.	Approved Materials	The coating system, blast media, and other specified materials for this coating work.
3.	Wet Film Thickness	The primer or coating films’ actual thickness immediately following application. Wet film thickness is measured in mils or thousandths of an inch (0.001") and is abbreviated WFT.
4.	Dry Film Thickness	The primer or coating films’ actual thickness following curing and drying. Dry film thickness is measured in mils or thousandths of an inch (0.001") and is abbreviated DFT.
5.	Coating System Manufacturer	Refers to the approved coating Manufacturer abbreviated as CSM in this Section.
6.	Manufacturer’s Technical	Refers to the technical representative(s) of the Representative(s) approved CSM.
7.	A/E	Architectural or Engineering Firm.

1.05 QUALITY ASSURANCE

1. The Contractor shall meet the following requirements:

1. The Contractor is ultimately responsible for the workmanship and quality of the decorative epoxy flooring system installation. Inspections by the Owner, the Engineer, or others do not limit the Contractor's responsibility.

2. Do not use or retain contaminated, outdated, or diluted materials for flooring. Do not use materials from previously opened containers.

3. Use only products of the approved CSM. Provide the same products for repairs as for the original coating.

4. If any requirements of this specification are contradicted by a referenced standard or vice-versa, the matter shall be resolved in writing by the A/E or its representative.

5. Make available at all times all locations and phases of the work for access and inspection by the Engineer, the Owner, or other personnel designated by the Owner. The Contractor shall provide ventilation, egress, and whatever other means are required for the Owner, Engineer, or designated personnel to access and exit the work areas safely.

6. Conduct work so that the decorative epoxy flooring system is installed as specified herein. Inspect work continually to ensure that the coating system is installed as specified herein. The A/E shall inspect the work to determine conformance with the contract documents.

7. The Contractor's Supervisor shall be on site at all times and will be thoroughly familiar with the work in progress. This Supervisor shall have authority to receive and execute all direction provided by the A/E or the Owner.

8. The methods of construction shall be in accordance with all requirements of this specification and the best trade practices. Any changes in the decorative epoxy flooring system installation requirements shall be allowed only with the written approval of the A/E.

9. Installation shall be performed by an applicator having satisfactory experience in the application of these or similar materials or with on-site consultation by a qualified field service representative of the CSM.

1.06 SUBMITTALS

1. Submit the following prior to commencing with any phase of the work covered by this Section:

   1. Manufacturer's current printed recommendations and product data sheets for all decorative epoxy flooring system products including performance criteria, surface preparation and applications, volatile organic compound (V.O.C.) data, and safety requirements.

   2. Material Safety Data Sheets (MSDS) for any materials brought on-site including all coating system materials, solvents, and abrasive blast media.

   3. Contractor's written verification that the personnel who will perform this work have the required experience as specified in 1.05 1.9. This document must list the names of all of the Contractor's supervisors and tradespeople who will work on the project covered by this Section.

4. List of cleaning and thinner solutions allowed by the CSM.

5. Storage requirements including temperature, humidity, and ventilation for Coating System Materials.

2. Owner, contractor, and manufacturer's representative shall review and mutually agree upon color, grade, and final texture of coating system before starting installation. The acceptance of a sample will constitute the job standard by which installation will proceed.

1.07 DELIVERY, STORAGE, AND HANDLING

1. Material shall be delivered to project site in manufacturer's original unopened containers.

2. Materials shall be stored indoors, protected from damage, moisture, direct sunlight and temperatures below 40 degrees F or above 90 degrees F.

3. Store all materials only in area or areas designated by the Owner solely for this purpose. Confine mixing, thinning, clean-up and associated operations, and storage of coating materials related debris before authorized disposal, to these areas. All materials are to be stored on pallets or similar storage/handling skids off the ground.

4. Mix all coating materials in a designated enclosed mixing area. This enclosed area must protect the mixing operation and materials from direct sunlight, inclement weather, freezing, or other means of damage or contamination. Protect all other concrete and metallic surfaces and finishes from any spillage of material(s) within the mixing area.

5. Do not use drain piping for disposal of coating materials.

6. The Contractor shall take all precautions and implement all measures necessary to avert potential hazards associated with the decorative epoxy flooring system materials as described on the pertinent Material Safety Data Sheets or container labels.

7. Deliver all materials to the job site in new, unopened containers. Each container shall bear the CSM's name and label.

    1. Labels on all material containers must show the following information:

        1. Name or title of product.
        2. Manufacturer's batch number.
        3. Manufacturer's name.
        4. Generic type of material.
        5. Application and mixing instructions.
        6. Hazardous material identification label.
        7. Shelf life date.

    2. All containers shall be clearly marked indicating any personnel safety hazards associated with the use of or exposure to the materials.

    3. All materials shall be handled and stored to prevent damage or loss of label.

    4. Do not use or retain contaminated, outdated, prematurely opened, diluted materials, or materials which have exceeded their shelf life.

1.08 ENVIRONMENTAL CONDITIONS

1. Surfaces and surrounding air temperatures must exceed 55 degrees F, but must be less than 90 degrees F, with materials at not less than 70 degrees F during application.

2. Do not apply coating materials when dust is being generated.

3. If existing facility lighting is not adequate for flooring system application, the Contractor shall provide all temporary lighting during the work equivalent to one 200 watt explosion proof incandescent lamp per 100 square feet of work area.

PART 2 - PRODUCTS

2.01 MATERIALS

1. Laminate Resinous Flooring: Series 222 Deco-Tread consisting of a two-component modified polyamine cured epoxy liquid and a colored quartz broadcast aggregate applied by double broadcast or as a slurry broadcast to provide a minimum 1/8" thickness.

   The Series 222 Deco-Tread is self-priming when installed as a double broadcast or prime with Series 201 when Series 222 is installed as a slurry broadcast. Apply Series 201 in this case at 6 to 8 dry mils.

2. Top Coat: Series 284 Deco-Clear two-component, modified polyamine cured epoxy glaze. Thickness and number of coats will vary depending on desired finish.

3. Coving (Optional): Series 222 Deco-Tread, a two-component, modified polyamine cured epoxy liquid, blended as a mortar with decorative aggregate applied to form a cant or rolled radius cove.

4. Flexible Underlayment (Optional): Series 206, flexible elastomeric epoxy underlayment used for bridging small substrate cracks in concrete and as a protective membrane under aggregate reinforced flooring systems. To be applied at 30 to 40 dry mils. Thickness and number of coats will vary depending on substrate roughness or profile depth.

2.02 MANUFACTURER

1. Tnemec Company, Incorporated.

PART 3 - EXECUTION

3.01 GENERAL

1. Protection

   Mask, cover, or otherwise protect all surfaces, equipment, and finishes not to receive the decorative epoxy flooring system specified in this Section.

2. Strictly follow the approved CSM's written instructions and the requirements of this specification regarding all aspects of decorative epoxy flooring work including: mixing, application, recoat times and curing.

3. Mock-up

    1. Prior to commencing the installation, the Contractor shall install with the owner's approval, a mutually agreed upon mock-up test sample to show final color and appearance of the decorative epoxy flooring system.

3.02 PREPARATION

1. Allow new concrete to cure for 28 days. Verify dryness by testing for moisture with a "plastic film tape-down test". (Reference ASTM D4263)

2. Shot-blast or mechanically abrade to remove laitance, curing compounds, sealers and other contaminants and to provide surface profile. (Reference ASTM D4259, ICRI CSP 4-6).

3. Vacuum clean concrete to remove all dirt, dust, and other loose materials.

4. After mechanically abrading, verify that all surfaces are clean, dry and free of any contaminants, which could adversely affect the adhesion of the flooring system.

5. If between final surface preparation work and decorative epoxy flooring system application, contamination of the prepared and cleaned substrates occurs, recleaning shall be required until the requirements of this Section are met.

3.03 INSTALLATION

1. For Slurry Broadcast Application: The primer shall be mechanically mixed, applied and cured in strict accordance with manufacturer's printed instructions. Apply uniformly at a film thickness of 6 to 8 dry mils.

2. Cant Cove or rolled radius cove bases shall be installed in accordance with the CSM's written instructions and as indicated on the Standard Flooring Details.

3. Decorative Laminate Epoxy Resinous Flooring: The material shall be mixed, applied and cured in strict accordance with the manufacturer's printed instructions. Apply by double broadcast (self-priming) or slurry broadcast to a minimum of 1/8" thickness.

    Note to Specifier: Floor and wall transitions can be formed to have a cant cove or rolled radius cove. This will provide a seamless wall to floor transition.

4. Top Coat: The high-solids, epoxy glaze coat shall be mechanically mixed, applied and cured in strict accordance with manufacturer's printed instructions. Apply at a film thickness of 6 to 12 dry mils. Skid resistance properties can be adjusted by the film thickness and number of topcoats and should be determined at the time the mock-up is completed.

5. Finish Coat (Optional): The high-solids, orange-peel, epoxy finish coat shall be mechanically mixed, applied and cured in strict accordance with manufacturer's printed instructions. Apply at a film thickness of 4 to 6 dry mils.

6. Fill all cracks and recessed joints, such as control and construction joints with Tnemec Series 201 Epoxoprime and fumed silica. When filled, joint should be flush with the floor surface.

3.04 CLEANUP

1. Remove waste materials, rubbish, and debris and dispose of them at the owner's direction. Leave work areas in a clean and tidy condition.

3.05 PROTECTION

1. Protect the completed work from water, airborne particles or other surface contaminants until cured for a minimum of 24 hours after application.

2. Protect from traffic, physical abuse, immersion and chemical exposure until the complete system has thoroughly cured for 24 hours at 75 degrees F. For different temperatures, consult the manufacturer's representative about curing times.

3.06 FIELD QUALITY CONTROL INSPECTION AND TESTING

1. Inspection by the Engineer, Owner or others does not limit the Contractor's responsibilities for quality as specified herein or as required by the CSM's instructions.

2. The Contractor shall perform the Q.C. procedures listed below in conjunction with the requirements of this Section. The Engineer will inspect the work to determine conformance to the contract documents.

    1. Degree of Cleanliness.

        Visually inspect the degree of cleanliness of substrates to meet the requirements of this Section. The pH of the concrete substrates will be measured using pH indicating papers. pH testing is to be performed once every 100 sq. ft. of surface area to be coated.

        Acceptable pH values shall be between 8.0 and 11.0 as measured by a full-range (1-12) color indicating pH paper with readable color calibrations and a scale at whole numbers (minimum). Use Hydrion Insta-Chek Jumbo 0-13 or 1-12 or equal. The paper shall be touched to the surface once using moderate finger pressure. The surface shall not be wiped or moved laterally to disturb the surface during pH testing. Following the one touch, lift the paper vertically to not "wipe" the surface. Compare the color indicated with the scale provided and record the pH.

        Note: If the surface of the concrete is dry, it is not possible to take a pH measurement. However, pH values are still important on dry surfaces. When a dry concrete substrate is encountered for a pH test, the surface where the pH test is to be performed shall be sprayed lightly with distilled, deionized water from a commercially available spray bottle that has been properly rinsed to preclude any dissolved solids. The spray shall just wet the surface to a "shiny" appearance. Wait 60 seconds to allow chemical equilibria to be established and then test the pH of the water on the surface. Perform this test in accordance with ASTM D4262.

    2. Concrete Surface Profile

        Using the replicate rubber specimens inspect the concrete surface profile in accordance with ICRI Guide No. 03732. This should be performed once for every 100 square feet of surface area to be coated.

    3. Measure and record ambient air temperature once every two hours of each shift

using a thermometer and measure and record substrate temperature once every two hours using a surface thermometer.

4. Measure and record relative humidity every two hours of each shift using a sling psychrometer in accordance with ASTM E337.

5. Inspect correct mixing of coating materials in accordance with the CSM's instructions.

6. Inspect and record that the "pot life" of coating materials used are not exceeded during installation.

7. Measure and record the thickness of the coating system using a notched gauge in accordance with ASTM D4414 for Wet Film Thickness at least once every 10 sq. ft. of coating area.

8. Perform moisture tests on concrete as follows:

    1. Once for every 500 square feet of surface area to be coated, perform the plastic sheet test in accordance with ASTM D4263. If moisture is indicated, proceed to step 2 below.

    2. Perform calcium chloride moisture tests in accordance with ASTM D1869 once for every 1000 square feet of surface area to be coated. The maximum limit for moisture vapor emissions rate should be 3.0 lbs. per 24 hours per 1000 sq. ft. If tests indicate rates higher than 3.0, consult with Tnemec's Technical Service Department for further evaluation.

9. Inspect to verify proper curing of the decorative epoxy flooring system as recommended by the CSM.

End of Section

SECTION 09900

PAINTING

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and General Provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

DESCRIPTION OF WORK: The work under this Section includes the furnishing of all labor, material, equipment, appliances, and tools to perform the work indicated on the Drawings or specified herein. The work shall include, but not be limited to, the following:

This Section includes surface preparation and the application of paint materials to exposed interior and exterior items and surfaces scheduled. Surface preparation, prime and finish coats specified are in addition to shop-priming and surface treatments.

Paint all exposed surfaces, whether or not colors are designated, except where a surface or material is indicated not to be painted or is to remain natural. Where an item or surface is not mentioned, paint the same color as similar adjacent materials or surfaces. If color or finish is not designated, the Owner will select from standard colors or finishes available.

Paint all exposed plumbing, heating, and electrical material to match the walls and ceilings of that area unless noted otherwise. This shall include, but not be limited to, pipes, insulation, conduit ducts, access panels, grilles, diffusers, whether the adjacent surfaces receive paint or not, and the like. Include dampers or baffles behind grilles.

Painting is not required on prefinished items, finished metal surfaces, concealed surfaces, operating parts, or labels.

Labels: Do not paint over Underwriter's Laboratories, Factory Mutual or other code-required labels, or equipment name, identification, performance rating, or nomenclature plates.

DEFINITIONS: "Paint" includes coating systems materials, primers, emulsions, enamels, stains, sealers and fillers, and other applied materials whether used as prime, intermediate or finish coats.

RELATED SECTIONS: The following listed work is included under other Sections:

Section 00870 - Finish Color Schedule

Prime coat on new hollow metal work shall be furnished under the "Steel Doors and Frames" Section 08110.

Prime coat on lintels shall be furnished under the Division 5 Sections.

SUBMITTALS

Product Data: Submit manufacturer's technical information, label analysis, and application instructions for each paint material proposed for use.

QUALITY ASSURANCE

SINGLE SOURCE RESPONSIBILITY: Provide primers and undercoat paint produced by the same manufacturer as the finish coats.

COORDINATION OF WORK: Review Sections in which primers are provided to ensure compatibility of the total systems for various substrates.

MATERIAL QUALITY: Provide the manufacturer's best quality trade sale type paint material of the various types specified. Paint material containers not displaying manufacturer's product identification will not be acceptable. Proprietary names used to designate colors or materials are not intended to imply that products named are required or to exclude of equal products of other manufacturers.

DELIVERY AND STORAGE

Deliver materials to the job site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label with trade name and manufacturer's instructions.

Store materials not in use in tightly covered containers in a well ventilated area at a minimum ambient temperature of 45 deg. F. (7 deg. C.). Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily.

PROJECT CONDITIONS: Do not apply paint in snow, rain, fog, or mist, or when the relative humidity exceeds 85 percent, or at temperatures less than 5 degrees F. (3 degrees C.) above the dew point, or to damp or wet surfaces.

MATERIALS: All finishing materials, thinners, etc., shall be the best quality, first line materials as manufactured by:

Pratt and Lambert, Inc.

Martin-Senour

Benjamin Moore

Pratt and Lambert materials are mentioned in these Specifications only to establish the level of quality, except where specific manufacturer product not listed above is specified. Equivalent products by any of the listed manufacturers will be acceptable, as approved by the Architect.

Raw linseed oil, turpentine, benzine, gloss oil, or coal oil shall not be used in any of the materials for painting work.

PART 2 - PRODUCTS

Detailed specifications for the various surfaces follow. If these specifications conflict with the recommendations of the manufacturer, this discrepancy shall be brought to the attention of the Architect, and he (the Architect) shall decide which method shall be followed:

Surface	Dry Mill Type & Luster	No of Coats	Product	Thicknesses (Per Coat)
A. Interior Ferrous Metal Shop Primed or Previously Painted	Acrylic Latex Semi-Gloss	1	P&L Suprime "1" 100% Acrylic Multi-Purpose Primer (Z1001)	1.25
		2	P&L Accolade Interior Semi-Gloss	1.50
B. Interior Gypsum Board	Acrylic Latex Satin	1	P&L Suprime "4" Interior Latex Wall Primer (Z1004)	1.50
		2	P&L Accolade Interior Velvet	1.50
C. Interior Gypsum Board	Acrylic Latex Satin Enamel	1	P&L Prohide Primer (Z8160)	1.00
		2	P&L Prohide Gold (Z8300)	1.20

Surface	Dry Mill Type & Luster	No of Coats	Product	Thicknesses (Per Coat)
D. Interior Concrete Masonry Units or Concrete	Acrylic Latex Semi-Gloss	2	P&L Primafil (50 sf/gal)	12.00
		1	P&L Accolade Interior Semi-Gloss	1.50
E. Interior Concrete	Alkyd	2	P&L Withstand	1.25

	Floor			Alkyd Floor Paint	
F.	Interior Wood	Acrylic Latex Semi-Gloss	1	P&L Suprime "1" 100% Acrylic Multi-Purpose Primer (Z1001)	1.25
			2	P&L Accolade Interior Semi-Gloss	1.50
G.	Interior Wood	Natural Finish	1	P&L Tonetic Wood Stain	Nominal
		Stain Satin	1	P&L Filler Sealer	1.00
				Finish	1.00
		Clear Finish	2	P&L Varmor	0.75
H.	Exterior Wood	Acrylic Latex	1	P&L Stainshield EggShell Primer	2.3
			2	P&L Accolade Exterior Eggshell	1.25
I.	Exterior Wood	Natural Finish	2	P&L Stainshield Penetrating oil Rustic Stain	Nominal
		(wet-on-wet coats			
J.	Exterior Aluminum	Acrylic Latex	1	P&L Effecto Primer	1.25
		EggShell	2	P&L Accolade Exterior EggShell	1.25
K.	Exterior Ferrous Metal	Alkyd Satin	1	P&L Suprime "9" Int/Ext Alkyd Metal Primer (Z1009)	1.25
			2	P&L Effecto Enamel	1.25

Surface		Dry Mill Type & Luster	No of Coats	Product	Thicknesses (Per Coat)
L.	Pipes, Mechanical Equipment	Latex Acrylic Eggshell	1	P&L Techgard Acrylic Metal Primer (Z190)	1.25
			1	P&L Accolade Interior Velvet	1.50
M.	Galvanized Ductwork	Latex Acrylic Eggshell	1	P&L Suprime "3" Int/Ext Latex Metal Primer (Z1003)	1.25
			1	P&L Accolade Interior Velvet	1.50

COLOR SAMPLES: The Contractor shall furnish samples of all finishes in triplicate and obtain the approval of color match before starting work. Final colors must match exactly with the approved sample. Refer to Section 00870, Finish Color Schedule, for colors required.

PART 3 - EXECUTION

Examine substrates and conditions under which painting will be performed for compliance with requirements. Do not begin application until unsatisfactory conditions have been corrected.

PREPARATION: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and items in place that are not to be painted, or provide protection prior to surface preparation and painting. Remove items if necessary for complete painting of the items and adjacent surfaces. Following completion of painting, reinstall items removed using workmen skilled in the trades involved.

Clean surfaces before applying paint or surface treatments. Schedule cleaning and painting so dust and other contaminants will not fall on wet, newly painted surfaces.

Provide protection for adjacent surfaces as necessary to prevent paint from coming into contact with adjacent materials not scheduled for painting.

SURFACE PREPARATION: Clean and prepare surfaces to be painted in accordance with manufacturer's instructions for each particular substrate condition. Notify Architect in writing of problems anticipated using specified finish coat material with substrates primed by others.

Cementitious Surfaces: Prepare concrete, concrete masonry, cement plaster and similar surfaces to be painted by removing efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze.

Determine alkalinity and moisture content of surfaces to be painted. Do not paint surfaces where moisture content exceeds that permitted in manufacturer's printed directions.

Ferrous Metals: Clean non-galvanized ferrous metal surfaces that have not been shop-coated; remove oil, grease, dirt, loose mill scale and other foreign substances. Use solvent or mechanical cleaning methods that comply with recommendations of the Steel Structures Painting Council.

Touch-up shop-applied prime coats that have been damaged, and bare areas. Wire-brush, clean with solvents, and touch-up with the same primer as the shop coat.

Galvanized Surfaces: Utilize SSPC-SP1 solvent cleaning and chemical wash (tri-sodium phosphate). Power wash with tri-sodium phosphate type cleaner (5% solution at 140 degrees F.) and solvent clean after rinsing and drying with a non-petroleum based solvent cleaner so that surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock, by mechanical methods.

Touch-up shop-applied prime coats that have been damaged, and bare areas. Wire-brush clean with solvents, and touch-up with the same primer as the shop coat.

MATERIALS PREPARATION: Mix and prepare paint in accordance with manufacturer's directions.

Stir material before application to produce a mixture of uniform density; stir as required during application. Do not stir surface film into material. Remove film and, if necessary, strain before using.

Use only thinners approved by manufacturer, and only within recommended limits.

APPLICATION: Apply paint in accordance with manufacturer's directions. Use applicators and techniques best suited for substrate and type of material being applied. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.

Paint colors, surface treatments, and finishes are indicated in "schedules."

The number of coats and film thickness required is the same regardless of application method. Do not apply succeeding coats until previous coat has cured. Sand between applications where required to produce a smooth, even surface. Apply additional coats when undercoats or other conditions show through final coat, until paint film is of uniform finish, color, and appearance.

The term "exposed surfaces" includes areas visible when permanent or built-in items are in place. Extend coatings in these areas to maintain system integrity and provide desired protection.

Paint back sides of access panels and removable or hinged covers to match exposed surfaces.

Omit primer on metal surfaces that have been shop-primed, unless primer becomes worn, damaged, or more than six months old from date of delivery to job site.

MINIMUM COATING THICKNESS: Apply materials at the manufacturer's recommended spreading rate. Provide total dry film thickness of the system as recommended by the manufacturer.

BLOCK FILLERS: Apply block fillers at a rate to ensure complete coverage with pores filled.

PRIME COATS: Before application of finish coats, apply a prime coat as recommended by the manufacturer to material required to be painted or finished, and has not been prime coated by others.

Recoat primed and sealed substrates where there is evidence of suction spots or unsealed areas in the first coat to assure a finish coat with no burn-through or other defects due to insufficient sealing.

Back Priming

All wood trim shall be back primed before installation. Spot prime all ends of trim.

BRUSH APPLICATION: Brush-out and work brush coats into surfaces in an even film. Eliminate cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Draw neat glass lines and color breaks. Apply primers and first coats by brush unless manufacturer's instructions permit use of mechanical applicators.

MECHANICAL APPLICATIONS: Mechanical methods for paint application will ONLY be permitted by written permission of the Architect.

COMPLETED WORK: Match approved samples for color, texture and coverage. Remove, refinish or repaint work not in compliance with specified requirements.

CLEANING

At the end of each work day, remove empty cans, rags, rubbish, and other discarded paint materials from the site.

Upon completion of painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing, scraping, or other proper methods, using care not to scratch or damage adjacent finished surfaces.

Protect work of other trades, whether to be painted or not, against damage from painting. Correct damage by cleaning, repairing or replacing, and repainting, as acceptable to Architect.

Provide "Wet Paint" signs to protect newly-painted finishes. Remove temporary protective wrappings provided by others for protection of their work after completion of painting operations. At completion of construction activities of other trades, touch-up and restore damaged or defaced painted surfaces.

END OF SECTION

SECTION 10400

EXTERIOR AND INTERIOR SIGNAGE

EXTERIOR GENERAL:
Cast aluminum tablet for building- furnish and install one (1) cast aluminum tablet as manufactured by the James H. Matthews Company or approved equal. Size to be 20" wide, 30" high. Inscription and composition of tablet will be furnished later and in general will consist of name of school, date erected, names of the School Board, name of the Superintendent, name of the General Contractor and name of the Architect.

Contractor is to include an allowance AS SHOWN IN THE ALOWANCE SECTION for purchase EXTERIOR BUILDING ID SIGNS- MOUNT AS SHOWN ON ELEVATIONS… CONFIRM SIGNAGE AND MOUNTING LOCATIONS BEFORE INSTALLING.

INTERIOR GENERAL:
Interior signage shall be provided to direct guest to all appropriate facilities within the property. Signage shall be designed to be easily read, consistent with decor of property and relative uniform in size, letter style and color. Signage should include direction, information and restriction data. All signage must meet ADA requirements Signs shall be mounted adjacent to all doors on walls within the facility. One sign is required for each door. Mounting placement and wording/numbering of each sign will be verified by owner before installation

Contractor is to include an allowance AS SHOWN IN THE ALOWANCE SECTION for purchase of plastic name plates for name of rooms. Name of rooms are also to be in Braille. Mount name plates on wall on strike side of door and 60" above floor.

ALL SIGNS TO MEET ADA REQUIREMENTS FOR SIZE, COLOR, LETTER STYLE, MOUNTING HEIGHT AND ANY OTHER APPLICABLE ASPECT OF ADA REQUIREMENT.

Helvetica letter style is recommended, however others may be considered. ADA requires specific size raised letters with Braille characters.

Contractor shall submit drawings showing the location and the wording and numbering of each sign for approval before installation

The following other special room identification requirements should be considered:

END OF SECTION 10400

SECTION 10522

FIRE EXTINGUISHERS, CABINETS, AND ACCESSORIES

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this Section.

DESCRIPTION OF WORK: Work under this Section includes, but is not necessarily limited to, furnishing and installing the following:

Fire Extinguishers and Brackets
Fire Extinguisher Cabinets
Accessories

REFERENCES

NFPA 10 - Portable Fire Extinguishers

QUALITY ASSURANCE

Conform to NFPA 10 requirements for extinguishers.

SUBMITTALS

Submit product data which shall include physical dimensions, operational features, color and finish, anchorage details, rough-in measurements, location, and details.

Submit manufacturer's installation instructions.

OPERATION AND MAINTENANCE DATA

Do not install extinguishers when ambient temperatures may cause freezing.

PART 2 - PRODUCTS

ACCEPTABLE MANUFACTURERS

J. L. Industries, Inc.
Larsen's
Watrous

EXTINGUISHERS

Furnish and install where shown on Plans,
fire extinguishers to be Larsens or equal, Model MO-6, six (6) pound multipurpose dry chemical type.

Cabinets to be Larsens or equal – Surface mtd if safe room installed – semi recessed if non safe room installed #2409-6R with 2 ½" rolled edges. Cabinet inside dimensions are to be 24" x 9 ½" x 6" with rough opening of 25" x 10" x 4". Cabinet to have a satin finish pull handle with a self adjusting roller catch and a continuous piano hinge.

Mounting Hardware: Appropriate to Cabinet Fabrication

Form body of cabinet with tight inside corners and seams.
Pre-drill holes for anchorage.
Form perimeter trim and door stiles by welding, filling, and grinding smooth.
Hinge doors for 180 degree opening with continuous piano hinge. Provide pull handle and roller type catch.

FINISHES

Extinguishers: Red Enamel.

PART 3 - EXECUTION

INSPECTION-Verify rough openings for cabinet are correctly sized and located.

Beginning of installation means acceptance of existing conditions.

INSTALLATION-Install cabinets plumb and level in wall openings. Secure rigidly in place in accordance with manufacturer's instructions.

END OF SECTION

SECTION 10800

TOILET ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Public-use washroom accessories.
2. Under-lavatory guards.
3. Custodial accessories.

B. Related Sections include the following:

1. Division 09 Section "Tiling" for resilient flooring.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include the following:

1. Construction details and dimensions.
2. Anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
3. Material and finish descriptions.
4. Features that will be included for Project.
5. Manufacturer’s warranty.

B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.

1. Identify products using designations indicated on “Restroom Accessory Schedule” on Drawings.

C. Maintenance Data: For toilet accessories to include in maintenance manuals.

1.4 QUALITY ASSURANCE

A. Source Limitations: For products listed together in the same articles in Part 2, provide products of same manufacturer unless otherwise approved by Architect.

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.

1.5 COORDINATION

A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.

1.6 WARRANTY

A. Special Mirror Warranty: Manufacturer’s standard form in which manufacturer agrees to replace mirrors that develop visible silver spoilage defects and that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MIRRORS

A. Stainless Steel: ASTM A 666, Type 304, 0.0312-inch minimum nominal thickness, unless otherwise indicated.

B. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.

C. Mirrors: ASTM C 1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.

D. ABS Plastic: Acrylonitrile-butadiene-styrene resin formulation.

2.2 PUBLIC-USE WASHROOM ACCESSORIES

A. Basis-of-Design Product: The design for accessories is based on products indicated as manufactured by Bradley Corporation. Subject to compliance with requirements, provide the named product or a comparable product by one of the following:

1. A & J Washroom Accessories, Inc.
2. American Specialties, Inc.
3. Bobrick Washroom Equipment, Inc.

B. Manufacturers Supplier: Subject to compliance with requirements, provide toilet accessories as listed below

C. Toilet Tissue (Roll) Dispenser; TOTAL REQUIRED-SEE PLANS

1. Basis-of-Design Product: Bradely; #5412.
2. Description: Double-roll dispenser.
3. Mounting: Recessed.
4. Operation: Noncontrol delivery with theft-resistant spindle.
5. Capacity: Designed for 5-inch diameter tissue rolls.
6. Material and Finish: Stainless steel, No. 4 finish (satin).

D. Stainless Steel frame mirrors; TOTAL REQUIRED-SEE PLANS

Basis-of-Design Product: Bradley;

1. Mounting: surface.
2. Material and Finish: Stainless steel, No. 4 finish (satin)..

E. Combination Towel (Folded) Dispenser/Waste Receptacle; TOTAL REQUIRED-SEE PLANS

1. Basis-of-Design Product: Bradley; #2251.
2. Description: Combination unit for dispensing C-fold or multifold towels, with removable waste receptacle.
3. Mounting: Recessed.
    a. Designed for nominal 4-inch wall depth.
4. Minimum Towel-Dispenser Capacity: 250 C-fold or 450 multifold paper towels.
5. Minimum Waste-Receptacle Capacity: 5.3 gallon capacity.
6. Material and Finish: Stainless steel, No. 4 finish (satin).
7. Liner: Reusable, vinyl waste-receptacle liner.
8. Lockset: Tumbler type for towel-dispenser compartment and waste receptacle.
9. Materials: Stainless Steel piston and spout

F. Liquid-Soap Dispenser; TOTAL REQUIRED-SEE PLANS

1. Basis-of-Design Product: Bradley, #6542 (Universal Manufacturing Co.)
2. Description: Designed for dispensing soap in liquid or lotion form.
3. Mounting: Horizontally oriented, wall mounted.
4. Capacity: 40 ounces.
5. Material and Finish: Stainless steel, No. 4 finish (satin).

G. Grab Bar; Restroom Accessory Item- TOTAL REQUIRED-SEE PLANS

1. Basis-of-Design Product: Bradley, #812-001-42, #812-001-36, or #812-001-24 (Universal Manufacturing Co.)
2. Mounting: Flanges with concealed fasteners.
3. Material: Stainless steel, 0.05 inch thick.
    a. Finish: Smooth, No. 4, satin finish on ends and slip-resistant texture in grip area.
4. Outside Diameter: 1-1/2 inches].
5. Configuration and Length: Refer to Drawings for locations.

2.3 UNDERLAVATORY GUARDS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    1. Plumberex Specialty Products, Inc.
    2. TCI Products.
    3. Truebro, Inc.

B. Under-Lavatory Guard: TOTAL one per lavatory REQUIRED
    1. Description: Insulating pipe covering for supply and drain piping assemblies that prevent direct contact with and burns from piping, and allow service access without removing coverings.
    2. Material and Finish: Antimicrobial, molded-plastic, white.

2.4 CUSTODIAL ACCESSORIES

A. Basis-of-Design Product: The design for accessories is based on products indicated as manufactured by Bradley Corporation. Subject to compliance with requirements, provide the named product or a comparable product by one of the following:
    1. A & J Washroom Accessories, Inc.
    2. American Specialties, Inc.
    3. Bobrick Washroom Equipment, Inc.

B. Mop and Broom Holder: TOTAL REQUIRED-SEE PLANS
    1. Basis-of-Design Product: Bradley; #9983.
    2. Description: Unit with shelf, hooks, holders, and rod suspended beneath shelf.
    3. Length: 30 inches.
    4. Hooks: Two.
    5. Mop/Broom Holders: Three, spring-loaded, rubber hat, cam type.
    6. Material and Finish: Stainless steel, No. 4 finish (satin).
        a. Shelf: Not less than nominal 0.05-inch thick stainless steel.
        b. Rod: Approximately 1/4-inch diameter stainless steel.

2.5 FABRICATION

A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.

B. Keys: Provide universal keys for internal access to accessories for servicing and re-supplying. Provide minimum of six (6) keys to Area Construction Manager.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

B. Grab Bars: Install to withstand a downward load of at least 250 lbf, when tested according to method in ASTM F 446.

3.2 ADJUSTING AND CLEANING

A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.

B. Remove temporary labels and protective coatings.

C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

END OF SECTION 10800

SECTION 11 40 00 - KITCHEN EQUIPMENT

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. The drawings and general provisions of the contract, including general and supplementary conditions and general documents, apply to the work specified in this section.

1.2 SCOPE OF WORK

A. Include all labor, materials, and freight required to deliver, install, set in place, level, hang hood(s), erect walk in(s), run refrigeration line(s), etc. for the equipment specified in this section.

B. The kitchen equipment contractor shall provide the Kitchen Equipment Consultant with a point of contact that can be reached by phone Monday to Friday from 8:00 am to 5:00 pm who can answer questions and resolve coordination issues that quickly need attention and followed up in writing.

1.3 RELATED WORK SPECIFIED IN OTHER SECTIONS

A. Recessed and raised floor areas including reinforced concrete wearing bed and specified floor material with coved corner bases inside walk-ins by Division 03 00 00.

B. Millwork not specified in this section is to be provided under Division 06 00 00.

C. Rough-in, final connection, indirect drains, drain traps, grease traps, steam traps, PVC for drink lines, strainers, water coolers, hand sinks, mop sinks, tailpieces, valves, stops, shut off valves, pipes, line strainers, atmospheric vents, pipe fittings, ventilators, duct work, exhaust and supply fans, disconnection and reconnection of existing equipment and all materials not specified in this section are to be provided and installed by Division 22 00 00 and Division 23 00 00.

D. Rough-in, final connection, lines, disconnect switches, safety cut off, fittings, outlets, convenience outlets, pull boxes, wiring, conduit, junction boxes, fuse boxes, control panels, starters, shunt trip breakers (required for the shut off of all electrical outlets under the ventilator and shut off of ventilator fan(s) in the event the fire suppression systems is activated), contactors, disposer and walk-in control wiring, inter connection of fire suppression system with building alarm, disconnection and reconnection of existing equipment and all materials not specified in this section are to be provided and installed by Division 26 00 00, Division 27 00 00 and Division 28 00 00.

1.4 FEES, LICENSES, INSPECTION, PERMITS AND TAXES

A. Pay all fees, licenses, inspections, permits and taxes required by state and local authorities for the equipment specified in this section and furnish receipts for same.

1.5 JURISDICTIONS, TRADE AGREEMENTS AND RESTRICTIONS

A. Portions of this work may be sub-contracted to those qualified to do such work as may be required because of jurisdictional trade agreements and restrictions.

1.6 QUALITY ASSURANCE

A. Submit evidence to the owner, architect and consultant of qualifications listed below:

1. Successful completion of projects of comparable size and scope.
2. Maintain a staff experienced in the installation of Kitchen Equipment and the preparation of professional drawings and brochures.

1.7 SUBSTITUTIONS

A. It is the purpose of these plans and specifications to purchase for the owner equipment that conform to the best existing policies of the commercial kitchen equipment Industry. These items have been selected as preferred items as a result of past experiences, functional design, construction, material, maintenance and repair. If a contractor elects to quote on substitutions not specified, they will be permitted to do so provided that they list these substitutions on a separate form (do not use alternates in the base bid unless pre approved) outlining them as additions or deductions to the specified brand. Any contractor offering a substitution shall accompany the bid with complete construction details, and specification sheets.

B. If a proposed substitution is accepted the kitchen equipment contractor shall provide and pay for all changes to, space, structure, utilities, construction, professional services, modify other items, provide rough in drawings, specifications, etc. that may be required.

1.8 INTERPRETATION OF DOCUMENT

A. The specifications and drawings are complementary and what is called for by one shall be binding as if called for by both. Contractors shall examine the full set plans and specifications to be fully satisfied as to the conditions of the project. No allowance shall be subsequently made to the contractor by reason of error on his part or obvious oversight not called to the attention of the Owner, Architect, General Contractor and Consultant.

B. Questions regarding specifications and drawings will be responded to by written addendum only.

1.9 WARRANTIES

A. Warranties for parts and labor in writing for all new Kitchen Equipment for a period of one year from date of acceptance.

B. Refrigeration system compressors shall be warranted for an additional four years by the manufacturer.

C. Provide at no cost to owner, refrigeration service including freon, mileage, parts and labor to all refrigeration equipment within 24 hours of notification for one year from date of acceptance.

1.10 REGULATIONS AND CODES

A. Comply with all applicable laws, statues, building codes, regulations of state, local, public authorities and comply with the following:

1. National Sanitation Foundation.
2. National Fire Protection Association.
3. Underwriter’s Laboratories, Inc.
4. Department of Energy’s 2017 Energy Efficiency Standards.
5. 2016 Paris Climate Agreement.

6. 2009 Federal Energy Saving Standards.
7. Factory Mutual.
8. Building Official and Code Administrators.
9. National Electrical Code.
10. American Gas Association Labs.
11. Occupational Safety and Health Act.
12. National Electrical Manufactures Association.
13. Americans with Disabilities Act.
14. American National Standards Institute.
15. American Society of Mechanical Engineers.

1.11 SUBMITTALS

A. Kitchen equipment contractor shall review rough-in drawings provided and notify the Architect, Consultant and Construction Manager or General Contractor in writing with in 15 days of any utility changes required for the equipment. Submit in thirty days dimensioned drawings showing all Kitchen Equipment items with itemized schedules, mechanical rough-in, electrical rough-in and critical conditions plan.

B. Submit in thirty days dimensioned drawings showing complete construction details of all fabricated equipment.

C. Submit in thirty days brochures of regularly manufactured items with project label, project cover sheet, item cover sheet, and specification sheet.

D. Submit number and type drawings as requested by the owner, architect, consultant and general contractor.

E. Submit in thirty days material samples with manufacturer’s name plate and item number for review to the Owner, Architect, Consultant and Construction Manager or General Contractor.

F. Submit prior to kitchen equipment demonstration operation/instruction manuals with item cover sheet (indicate on item cover sheet for the kitchen equipment, make, model number, serial number and local service agency with address and phone number for the project location) and copy of manufacturer’s operation and instruction manual.

G. Provide pictures of completed punch list deficiencies to Contractor, Architect Owner and Consultant for review after all punch list work has been completed.

1.12 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver any Kitchen Equipment to the project until advised and building is weather and vandal safe.

1.13 JOB CONDITIONS

A. Before ordering Kitchen Equipment and starting work verify measurements at job site. Be responsible for fitting Kitchen Equipment into space provided. No extra charge or compensation will be allowed for minimal difference between dimensions indicated and actual field dimensions.

B. Verify that Kitchen Equipment will fit through openings provided.

C. Prior to ordering Kitchen Equipment verify all mechanical and electrical utilities available at the project site and coordinate.

1.14 SCHEDULING

A. Coordinate and schedule delivery and installation of Kitchen Equipment so as not to impede project construction schedule. Coordinate number of days required for equipment installation with owner and general contractor.

PART 2 – PRODUCT

2.1 MATERIALS

A. United States standard gauge 18-8, type 302, not over .012% maximum carbon stainless steel with a number 4 finish.

B. Armco Galvanized Steel.

2.2 MANUFACTURED EQUIPMENT

A. Standard finishes and accessories unless specifically deleted. Options shall be by same manufacturer.

B. Follow the manufactures installation instructions.

C. All equipment for high altitude operation, elevation approximately 7200 feet above sea level as required.

2.3 FABRICATION

A. General

1. Provide fabricated Kitchen Equipment as specified.
2. Fabricated by one manufacture with consistent construction for like items.
3. Grind all welds of stainless steel smooth and polish to a number 4 finish.
4. Use concealed type bolts to fasten trim to paneling and body of equipment, and secure to exposed sheet metal surface.
5. Use stainless steel bolts and screws.
6. Where threads of bolts and screws occur on inside of fixtures, are visible, or might come in contact with a wiping cloth, cover screw with washer and stainless steel acorn nut.
7. Do not use rivets to fasten body paneling together.

B. Sound deadening

1. Provide Schnee Butyl-Sealant ½" wide rope as a sound deadening material between all metal surfaces and tighten bolts for maximum compression of sealant.

C. Painting

1. Non-stainless steel finishes painted two coats of hammer tone gray, air-dried.
2. Oven baked finishes for 2 hours at a minimum temperature of 300º F.

D. Stainless Steel Tops

1. 14 gauge stainless steel tops with one piece fully welded construction. Free edges turned down 2" and back on slight angle ½" with corners fully welded, ½" high marine edge with fully welded corners or as detailed, indicated and specified.
2. Where tops fit adjacent to equipment, walls and columns cove up to specified height and back on 45º angle or as specified forming a back splash and Zee clip to wall, unexposed. Enclose ends of back splashes, extending full length of fixture including rolls.
3. Reinforce underside of tops with fully welded 14 gauge stainless steel angle and channel framework of suitable size and at locations as required to hold top flat and support heavy loads without deflection. Provide two hat channels to support drawer assemblies, enclosed bases and leg/gusset as required.
4. Provide cross members at 30" on centers maximum. No bolts or pop rivets in tops.

E. Field Joints

1. Fully weld grind smooth and polish to a number 4 finish. Field joints in bases pull tight and cover with pilaster of same material as base. Minimum field joints required for access into building.

F. Coved Corners

1. Vertical and horizontal corners coved on a ¾" radius and cove at intersections.

G. Enclosed Bases

1. 18 gauge stainless steel formed flat approximately 1" on bottom then formed up to the underside of the top then formed flat approximately 1" to the inside of the cabinet and formed down approximately ½" to create a rigid structure with all seams fully welded, ground smooth and polished. Front rails, mullions, and other components to provide appearance of one piece construction fully welded seamless with no open cracks or ledges.
2. 18 gauge stainless steel U channel filler behind mullions weld in place grind smooth and polish.

H. Legs & Cross rails

1. 1 5/8" outside diameter, 16 gauge stainless steel tubing, fully welded at cross rails, ground smooth, and polished.
2. Fit leg with adjustable stainless steel bullet or flange foot with holes secured to floor with non corrosive anchors.
3. Open base legs fit at top with stainless steel gusset welded 360 degrees to underbracing.

I. Under shelves

1. 18 gauge stainless steel shelves in enclosed bases, turn rear and ends up with a hug edge, fully weld corners grind smooth and polish. Flush shelf with base fully weld, grind smooth and polish.
2. 18 gauge stainless steel shelves in open based, free sides turn down 2" and back ½ ", at wall or tall equipment turn up 2" with corners notched and fully welded to legs, grind smooth and polish.

J. Casters

1. NSF, 5" diameter, polyurethane, all swivel, top operated foot brake, zerk grease fitting, and to support 300 pound load.

K. Drawers

1. Component Hardware S90-0020*M126 with four sided 14 gauge stainless steel frame fully welded corners, flange top in, and bolt to hat channels. S90-0015*M126 for smaller spaces.
2. Provide cylinder locks when specified in itemized specifications, all keyed alike.

L. Sinks and Drain boards

1. 14 gauge stainless steel fully welded construction with all corners coved on ¾" radius.
2. Double wall partitions between sink compartments.
3. Slope drain boards to sink compartment.
4. Crease bottom of sink for proper drainage.
5. Drain boards constructed integral with sink compartments.
6. Fisher 22411*M126 drain with 14 gauge stainless steel bracket.
7. T & S B-231*M126 faucet.

M. Over Shelves

1. 18 gauge stainless steel fully welded construction, form as specified for tops, provide stainless steel underbracing as required to support shelf without deflection turn up 2" at wall and equipment.
2. Table mounted shelves mounted on 1" tubing, 16 gauge stainless steel tubing fully welded to top or back splash.
3. Wall mount shelves on 14 gauge stainless steel brackets attached to wall with stainless steel screws.

2.4 SCHEDULE OF EQUIPMENT

A. Item 1 to 1E - Walk in cooler / freezer and refrigeration systems - one required

1. Thermo-kool Industries.
2. Fabricated according to details, drawings and specifications.
3. Provide the following:

a. Blower door testing (pressure testing) After complete installation (all electrical, drain and refrigerant piping and air tight sealing) prior to refrigeration system(s) start up, Kitchen Equipment Contractor shall blower door test the walk in compartment(s) for ambient air infiltration according to all standards and methods specified in the current ATTMA TSL2 (The Air Tightness Testing and Measuring Association TSL2) for non dwellings. Compartment(s) shall meet or exceed the air leakage standards between normal 0.35 to best practice 0.20 for cold stores (walk ins). Temporarily seal drains, pressure relief ports, etc. Test seams, penetrations, etc. for air leaks with a hand held fog generator, mark any air leaks with non staining bright peel off tape, repair any air leaks found with the fog generator, this may require disassembly, resealing and reassembly. Retest for air leaks until none are detected during the fog test. Test administrator, methods, procedures, testing equipment, written reports and include copy of testing equipment printouts shall be provided according to ATTMA TSL2. Test administrator shall be factory trained, certified and licensed. Testing equipment shall be calibrated before testing. Door opening(s) larger than 34" x 76” will require the Kitchen Equipment Contractor to temporarily reduce the size of the opening with a enclosure that is compatible with the testing equipment and that can withstand the pressure generated during the test. One year onsite parts, service, labor and air leak warranty.

b. The walk ins shall be fully installed sixty days before final completion of the project to allow time for testing and refrigeration system start up.

c. Kitchen equipment contractor shall start the refrigeration systems thirty days before the end of the project and allowed units to run until the end of the project. Any condensation, water or ice forming on seams, penetrations, etc. will require complete disassembly, drying out, resealing airtight, reassembly and blower door testing of the walk ins.

d. Kitchen equipment contractor shall seal all floor, wall and ceiling panel seams and joints airtight with two (2) continuous 3/8” beads of Kason 3701 butyl sealant apply with a battery operated caulk gun. BUTYL SHALL BE UNEXPOSED, DO NOT APPLY BUTYL TO EXTERIOR.

e. KITCHEN EQUIPMENT CONTRACTOR SHALL KEEP WALK IN PENETRATIONS TO A MINIMUM.

f. Kitchen equipment contractor shall furnish and seal airtight all penetrations in the walk in panels for all trades with spray polyurethane insulating foam sealant (rigid or closed cell) the thickness of the panel without any voids, allow sealant to fully cure, trim excess and seal the exposed urethane foam on both sides of the panel watertight with silver NSF food grade 100% silicone sealant. KEC SHALL KEEP WALK IN PENETRATIONS TO A MINIMUM.

g. Kitchen equipment contractor shall furnish, install, coordinate size and location with the electrician NEMA 4 (non metallic) PVC electrical components, conduits, junction boxes, etc. for walk in panel electrical penetrations. Seal airtight around the outside of the conduit with spray polyurethane insulating foam sealant the thickness of the panel without any voids. Seal airtight inside of the conduit around the wires the thickness of the panel without any voids. KEC SHALL KEEP WALK IN PENETRATIONS TO A MINIMUM.

h. All electrical components inside the walk in shall be watertight.

i. Disconnects used inside the walk ins for evaporators fans and evaporator electric defrost heaters shall be NEMA 4 rated.

j. Kitchen equipment contractor shall provide a Thermo-kool Industries factory trained and certified person onsite to supervise the complete assembly and installation of the walk in system. Provide name of factory trained and certified person in submittal documents for verification.

k. Kitchen equipment contractor shall level the floor or recess provided for the walk in, as required, with self leveling concrete allow to fully cure according to manufactures instructions before installing walk in. SAND IS NOT ALLOWED FOR RECESS LEVELING.

l. NSF certified construction and components. Bear NSF seal.

m. Non standard size as required to fit the space. Wall and ceiling panels shall be built in 1" increments up to 46" wide. Corner panels shall be 90 degree angle, 12" x 12". All like panels shall be fully interchangeable. Field verify all measurements prior to release for fabrication.

n. 0.040 embossed aluminum exposed exterior.

o. 26 gauge stucco embossed galvanized unexposed, exterior.

p. 0.040 embossed aluminum interior.

q. Trim openings on sides (at walls) with matching exterior material angles neatly attached with stainless steel screws.

r. Trim openings on top (at free sides) with matching exterior material, lift off, removable, enclosure panels, attach trim with stainless steel screws.

s. 4" thick zero ozone depleting urethane insulation foamed in place and bonded to interior surfaces of panels. All panels R-32.

t. The perimeter frame of all panels shall be formed with a rigid structural high density urethane insulation forming tongues and grooves (soft edge foam panel construction is not allowed). Cam locks shall be formed into the perimeter frame for easy assembly and disassembly.

u. Panels shall be constructed without interior metal, straps or wood.

v. Insta-Loks cam locks, three per wall, maximum 43" on centers for taller walls. Cam locks in ceiling panels maximum 36" on centers.

w. 8'-6" high above building finished floor, 8'-10" high over all.

x. Set in 4" deep recess in building floor.

y. Exterior of all walk in walls shall be installed 2" off all building walls.

z. Kitchen equipment contractor shall furnish and install below the walk in floor panels and up all sides of the recess 15 mil polyethylene sheeting with all seams sealed watertight with tape.

aa. Foamed in place 1/8" diamond tread aluminum tread plate flooring.

bb. 36" wide X 78" high doors with 14" x 24" view port and heated, triple pane safety glass, each door.

cc. 14 gauge stainless steel thresholds.

dd. Thermostatically controlled heated door jamb and threshold for cooler and freezer doors.

ee. Kason 1238C chrome polished latch (handle) with cylinder lock and interior glow in the dark twist off safety release, each door.

ff. Kason 1094 chrome polished hydraulic closer, each door.

gg. One Kason 1830, 120/1, heated pressure relief port in the wall between the cooler and freezer.

hh. One Kason 1830, 120/1, heated pressure relief port in the cooler door panel, pre wired to light fixture or junction box.

ii. Two Kason 1346 chrome polished performer adjustable spring loaded hinges, each door.

jj. Kason Thermalflex vinyl strip door curtains, each door.

kk. Modularm or Thermokool equal flush mounted multi monitor(s) with built in battery back up, flush mounted MD-1 motion detectors, flush mounted IP-1 illuminated push button panic switches and MC-1 magnetic door contacts pre wired into each door panel.

ll. Eiko VTS-5CS-40K-U (09712) 48” led light with 50,000 life hours, 120-277/1, 40 watts, 5200 lumen. Kitchen Equipment Contractor shall secure fixtures to the ceiling, unexposed, with stainless steel hardware. DO NOT PENETRATE EXTERIOR OF WALK IN CEILING PANELS TO INSTALL FIXTURES. One in cooler and one in freezer.

mm. Kason 1806 LED lights with frosted high impact lexan globe and LED bulbs centered over each door.

a. KE2 therm solutions evap oem controllers, recessed basic displays and electronic expansion valves for the cooler and freezer evaporator coils. KE2 switch. Furnish and install Cat5e data wires from evaporator coils to KE2 switch. Complete installation and system set up for access to KE2 smart access.

b. R448A refrigerant for refrigeration systems.

c. Scroll compressors for condensers.

d. ¾ horse power (8,020 btu) and sized to maintain +35 degree, pre wired preassembled remote cooler condensing unit (scroll), 208/3 with outside weatherproof cover, expansion valve, dryer, sight glass, temperature control, pump down solenoid valve, pressure control, suction line vibration eliminator, coil mounting kit, crankcase heater, headmaster valve, etc., pre wired disconnect, electronic expansion valves and unit rated for 100 degree ambient outside air temperature. Evaporator coil, 120/1.

e. 3 horse power (9,370 btu) and sized to maintain -10 degree, pre wired preassembled remote freezer condensing unit (scroll), 208/3 with outside weatherproof cover, expansion valve, dryer, sight glass, temperature control, pump down solenoid valve, freezer time clock (when required), pressure control, suction line vibration eliminator, coil mounting kit, crankcase heater, headmaster valve, etc., pre wired disconnect, electronic expansion valves and unit rated for 100 degree ambient outside air temperature. Evaporator coil, 208/1. Drain line heat tape hard wired to evaporator coil.

f. Kitchen equipment contractor shall furnish and install copper refrigeration lines from evaporator coils to condenser properly sized for length of run, suction lines insulated with 1” UV rated arma flex, liquid lines insulated with ½” UV rated arma flex, seal all arma flex seams water tight. Seal building penetrations air tight with insulation covered with building color

exterior matched trim (from general contractor) or 14 gauge stainless steel trim. Support refrigeration lines from structure and run refrigeration lines in chase(s) from condenser to evaporator coil. Refrigeration lines shall be wrapped with white Speedline or equal 0.020 mil. UV rated cut and curl PVC jacketing with SSL self seal lap with all seams sealed water tight with PVC liquid adhesive.

g. Refrigerant(s) and refrigeration system(s) shall comply with all current local, state, national and federal government energy efficiency and energy saving standards.

h. Electrical contractor to furnish and install NEMA 4 electrical disconnect for the cooler and or freezer evaporator coil fans and in the freezer a NEMA 4 electrical disconnect for the evaporator coil defrost heater.

i. Kitchen equipment contractor shall hang evaporator coils with nylon (only non metallic) all thread rod and stainless steel nuts and stainless steel washers, seal penetrations air tight.

j. Raychem H622, 208/1 (H612, 120/1), wet location winter guard self regulating drain line heat tape(s) with connection kits and H912 gel fill end seal kits. One piece tape with no tees or splices. Heat tape of sufficient length and installed to prevent freezing of walk in drain pipes. Hard wire heat tape to evaporator coil.

k. Set condensers air intake side 42” minimum from walls, etc. and 48” minimum exhaust side from walls, etc. Set ends 36” minimum from other condensers, walls, etc. Do not set condensers in the exhaust path of any other heat generating equipment.

l. Fabricated 24” high fully welded stainless steel rack (or wall mounting frame) for each condensing to set on with 14 gauge stainless steel solid top, 12 gauge stainless steel angle channels and legs with tabs at bottom for securing rack to mounting location with non corrosive anchors.

m. If condensers are roof/curb mounted set units on 4” x 4” ground contact treated runners. Secure units to 4” x 4” runners with stainless steel screws at four corners. Provide a layer of Duro-last DL-40 vinyl 40 mil material between the roof and the 4” x 4” runners.

n. Kitchen equipment contractor shall furnish and install 3/4” hard copper drain lines from evaporator coils to floor drain, slope 1/2” to 12” minimum, fully insulated with ¾” arma-flex insulation, provide clean out tees with plugs and P traps to prevent the back flow of air into freezer from the cooler, or exterior, and from the kitchen into the cooler. Drain pipe to exit the walk in approximately 12” above finished floor, seal penetrations air tight between compartments and cooler and exterior.

o. Provide all components required for the complete and proper operation of the walk-in cooler and freezer for the location, region, climate, altitude, etc. of the installation.

p. 3/16” diamond thread aluminum kick plate 36” high on interior and exterior of each door.

q. 3/16” diamond thread aluminum kick plate 36” high on interior and exterior of the door panels, notch above floor base material as required.

r. 3/16” diamond thread aluminum kick plate 36” high at exposed exterior, stop kick plate 4” from walls to allow space for installation of angle trim.

s. The walk in and refrigeration systems shall be set in the location shown on the kitchen plans. The kitchen equipment contractor will be required to disassemble, move and reinstall the walk-in and refrigeration systems if not set how and where shown.

t. Internal and or external structure and all hardware required to support, fully assemble and install walk in the location shown on the plans.

u. Kitchen equipment contractor shall provide and seal air tight all penetrations in the walk in panels for all trades, coordinate.

v. Kitchen equipment contractor shall fully insulate all fire sprinkler pipes as required to prevent condensation, water and ice and from forming on the pipe and dripping inside and or on to the exterior top of the walk in.

w. Kitchen equipment contractor shall furnish, install, coordinate size and location with the electrician of NEMA 4 PVC (only non metallic) electrical components for walk in panel electrical penetrations. Seal around the outside of the conduit airtight. Seal airtight inside of conduit around wires 4” thick from one side of the panel to the other.

x. KEC KEEP WALK IN PENETRATIONS TO A MINIMUM.

y. All electrical components inside the walk in shall be watertight.

z. Preassemble walk in at factory for a complete quality control inspection.

aa. Refrigerant(s) and refrigeration system(s) shall comply with all current local, state, national and federal government energy efficiency and energy saving standards.

bb. Kitchen equipment contractor personnel shall be onsite during all kitchen equipment ductwork, plumbing and electrical final connections.

cc. Assembly and installation according to the manufacture’s instructions.

dd. Startup, testing and or calibration by the manufacture’s service agency.

ee. Onsite demonstration by the manufacture’s representative.

ff. Ten year warranty on all wall, floor and ceiling panels.

gg. One year onsite parts, service and labor warranty.

hh. Addition manufacture’s warranties offered at no charge.

ii. Five year compressor warranty.

B. Item 2 - Walk in shelving – ten required

1. Metro metroseal 3*M126 super adjustable super erecta.
2. Provide the following:
   a. Four units with five 24” x 60” wire shelves and four 74” high post, each unit.
   b. Four units with four 24” x 30” wire shelves and four 63” high post, each unit by the evaporator coils.

c. Two New Age 2004*M126 20” x 36” x 12” aluminum dunnage rack or equal.

d. Field verify space and adjust sizes to fit as required.

e. Assemble onsite verify and coordinate shelf spacing with owner.

f. One year onsite parts, service and labor warranty.

C. Item 3 – Dry storage shelving – seven required

1. Metro metroseal 3*M126 super adjustable super erecta.
2. Provide the following:
   a. One unit with four 14” x 36” wire shelves and four 63” high post, Janitor closet.
   b. Five units with five 24” x 60” wire shelves and four 74” high post, each unit.
   c. One New Age 2004*M126 20” x 36” x 12” aluminum dunnage rack or equal.
   d. Ten Metro CR24E*M126 epoxy coated can racks.
   e. Field verify space and adjust sizes to fit as required.
   f. Assemble onsite verify and coordinate shelf spacing with owner.
   g. One year onsite parts, service and labor warranty.

D. Item 4 – Ice maker – one required

1. Manitowoc RNF-0320A*M126 or Scotsman, Follette and Hoshizaki equal.
2. Provide the following:
   a. 120/1.
   b. Cord and plug.
   c. Nugget ice cube.
   d. Minimum 308 pounds ice making per 24 hours.
   e. Adaptor(s) required to fit ice maker head on bin.
   f. D570*M126 stainless steel bin, 30” wide.
   g. Stainless steel legs.
   h. Cuno ICE120-S*M126 water filter. DO NOT MOUNT BEHIND ICE MAKER BIN OR HEAD.
   i. Refrigerant(s) and refrigeration system(s) shall comply with all current local, state, national and federal government energy efficiency and energy saving standards.
   j. All standard features unless specifically modified or deleted.

k. Kitchen equipment contractor personnel shall be onsite during all kitchen equipment ductwork, plumbing and electrical final connections.

l. Assembly and installation according to the manufacture's instructions.

m. Startup, testing and or calibration by the manufacture's service agency.

n. Onsite demonstration by the manufacture's representative.

o. One year onsite parts, service and labor warranty.

p. Addition manufacture's warranties offered at no charge.

q. Five year compressor warranty.

E. Item 5 - Pot and pan sink - one required

1. Fabricated according to details, drawings and specifications.
2. Provide the following:

a. 14 gauge stainless steel one piece coved corner top.

b. 2 1/2" high (or 3") with a 1½" diameter semi-roll at free sides.

c. 14" high splash (adjust to match dishtables 18" splash height) at walls from top of semi roll.

d. Weld in partition or split bowl construction between bowls.

e. Three 24" X 28" X 15" deep (12" deep from table top) 14 gauge stainless steel coved corner sinks.

f. Two approximately 24" long 14 gauge stainless steel coved corner integral drainboards.

g. 18 gauge stainless steel undershelf where space allows notched and fully welded to legs. Free sides turned down 1 ½" and back ½" on a slight angle and at all walls turn up 2".

h. 14 gauge stainless steel fully welded channels, cap front.

i. Copper flashed weld studs capped with stainless steel acorn nuts.

j. ¾" tacky tape between all metal surfaces, installed to create a vermin proof seal.

k. Stainless steel gussets fully welded 360 degrees to channels.

l. 1 5/8" 16 gauge stainless steel tubing legs.

m. 1 5/8" 16 gauge stainless steel tubing crossrails fully welded 360 degrees to legs.

n. Stainless steel adjustable bullet feet.

o. Stainless steel adjustable flanged feet with two holes at front corners secure to floor with two non corrosive anchors.

p. One T & S B-231-CR*M126 faucet with ceramic cartridges.

q. One T & S B-0184*M126 faucet with spray hose and ceramic cartridges.

r. Fisher 22411*M126 lever handle drain(s) with 14 gauge stainless steel handle bracket secure to sink bottom with weld studs and stainless steel acorn nuts, hole in bracket 1/8” maximum larger (LARGE HOLE OR ELONGATED SLOT IS NOT ALLOWED) than handle diameter. MODIFIED drain handle length (reduce or extend) to make the drain handle flush with the face of the sink bowl.

s. 16 gauge stainless steel overshelf mounted 14 gauge stainless steel brackets secured to the wall with non corrosive anchors, 2” X 3/16” stainless steel band fully weld to brackets full length with stainless steel double sided pot hooks 8” on centers. Mount 56” above finished floor (60” at pot sink/dishtable), coordinate height with mini pre rinse faucet and verify height with owner. Free sides turned down 1 ½” and back ½” on a slight angle and turn up 2” at walls.

t. Z clip splash to wall, unexposed.

u. Channels shall be welded to each other with a 1”x1” x 4” x 1”x 1” continuous weld, typical. Gussets shall be welded to channels or plate with a 360 degrees continuous weld, typical.

v. All welding and stainless steel surfaces grind smooth and polished to a number 4 finish.

w. Installation and assembly per the manufactures instructions and details.

x. Kitchen equipment contractor personnel shall be onsite during all kitchen equipment ductwork, plumbing and electrical final connections.

y. One year onsite parts, service and labor warranty.

F. Item 6 – Dish drying rack – two required

1. Metro MetroMax 4*M126.
2. Provide the following:
   a. Four 24” x 48” open grid shelves, each unit.
   b. Four 63” high post, each unit.
   c. Four 5PCB swivel polymer casters with brakes and 5” donut bumpers, each unit.
   d. 9992N 5” donut bumper, each post.
   e. One XTR2448XEA cutting board frame with 3" spacing, do not omit shelf mats, each unit.
   f. All standard features unless specifically modified or deleted.
   g. Assembly and installation according to the manufacture’s instructions.
   h. One year onsite parts, service and labor warranty.
   i. Addition manufacture’s warranties offered at no charge.

G. Item 7 – Booster heater – one required

1. Built into dishwasher.

H. Item 8 – Dishwasher vent - one required

1. Fabricated according to details, drawings and specifications.
2. Provide the following:
    a. 18 gauge stainless steel fully welded liquid tight one piece duct extending up from dishwasher vents at each end over controls, angled all sides in to one point at middle over dishmachine, extend duct up to 6” above finished ceiling line.
    b. 14 gauge stainless steel welded angle trim at ceiling penetration.
    c. All fans, ductwork, electrical final connections, etc. by others.
    d. Kitchen equipment contractor personnel shall be onsite during all kitchen equipment ductwork, plumbing and electrical final connections.
    e. One year onsite parts, service and labor warranty.

I. Item 9 - Soiled dishtable - one required

1. Fabricated according to details, drawings and specifications.
2. Provide the following:
    a. 14 gauge stainless steel one piece coved corner top.
    b. 3” high with a 1½” diameter semi-roll at free sides.
    c. 18” high splash at walls. Reduce to 8” thru pass thru opening.
    d. Notch splash for roll up door track, as required and coordinate. Hold track 1” above table top.
    e. 14 gauge stainless steel fully welded channels, cap front.
    f. Copper flashed weld studs capped with stainless steel acorn nuts.
    g. ¾” tacky tape between all metal surfaces, installed to create a vermin proof seal.
    h. 18 gauge stainless steel undershelf where space allows notched and fully welded to legs. Free sides turned down 1 ½” and back ½” on a slight angle and turn up 2” at walls.
    i. 21” X 21” X 5” deep 14 gauge stainless steel coved corner pre-rinse sink with removable perforated 16 gauge stainless steel scrap basket and 1” round stainless steel tubing rack runners fully welded to basket.
    j. One The Drain Strainer 1392 solids waster collector.
    k. 14 gauge stainless steel control bracket, set face of control back 2” of inside of semi roll. Secure bracket to top with studs capped with stainless steel acorn nuts, if required.

l. Marine edge at pass through opening extending 2” in to dining room, close both ends (at top and bottom) and 4” face to cover sill opening. 14 gauge stainless steel trim in dishroom and channel to support top.

m. T & S B-0133-CR-B08C*M126 pre rinse faucet with ceramic cartridges and riser support secured to wall with stainless steel screws.

n. Stainless steel gussets fully welded 360 degrees to channels.

o. 1 5/8” 16 gauge stainless steel tubing legs.

p. 1 5/8” 16 gauge stainless steel tubing crossrails fully welded 360 degrees to legs.

q. Stainless steel adjustable bullet feet.

r. Stainless steel adjustable flanged feet with two holes at all front legs secure to floor with two non corrosive anchors.

s. 14 gauge stainless steel soak sink sized for a standard dish rack with stainless steel legs and gussets, Fisher 22411*M126 drain with 14 gauge stainless steel handle bracket and four all swivel 5” diameter polyurethane casters two with brakes.

t. 14 gauge stainless steel silverware chute with 14 gauge stainless steel trim ring at opening in dish room, hem exposed edges of chute.

u. Z clip splash to walls, unexposed.

v. Channels shall be welded to each other with a 1” x 1” x 4” x 1”x 1” continuous weld, typical. Gussets shall be welded to channels or plate with a 360 degrees continuous weld, typical.

w. All welding and stainless steel surfaces grind smooth and polished to a number 4 finish.

x. Kitchen equipment contractor personnel shall be onsite during all kitchen equipment ductwork, plumbing and electrical final connections.

y. One year onsite parts, service and labor warranty.

J. Item 10 – Omit

K. Item 11 – Dishwasher – one required

1. Hobart CL44EN-EGR*M126 or equal by CMA.
2. Provide the following:

a. 208/3 machine motors, tank heat and separate booster heater.

b. Built in 30 KW, 70 degree rise booster heater with separate electrical connection.

c. Drain water tempering kit factory installed.

d. 24” clearance wash chamber.

e. Fan interlock control.

f. Electric tank heat.

g. Table limit switch, Enclosed in stainless steel housing with rounded corners.

h. Two stainless steel vent hood with locking damper. Hood curtains.

i. Two Hobart or equal racks for washing 18 x 26 bun pans.

j. Two combination (flat) racks.

k. Four peg racks.

l. Brass pressure regulator valve, as required.

m. Water shock absorber kit.

n. All standard features unless specifically modified or deleted.

o. Kitchen equipment contractor personnel shall be onsite during all kitchen equipment ductwork, plumbing and electrical final connections.

p. Assembly and installation according to the manufacture's instructions.

q. Startup, testing and or calibration by the manufacture's service agency.

r. Onsite demonstration by the manufacture's representative.

s. One year onsite parts, service and labor warranty.

t. Addition manufacture's warranties offered at no charge.

L. Item 12 – Clean dishtable – one required

1. Fabricated according to details, drawings and specifications.
2. Provide the following:

a. 14 gauge stainless steel one piece coved corner top.

b. 3" high with a 1½" diameter semi-roll at free sides.

c. 16" high splash at walls.

d. 14 gauge stainless steel fully welded channels, cap front.

e. Copper flashed weld studs capped with stainless steel acorn nuts.

f. ¾" tacky tape between all metal surfaces, installed to create a vermin proof seal.

g. 18 gauge stainless steel undershelf where space allows notched and fully welded to legs. Free sides turned down 1 ½" and back ½" on a slight angle and turn up 2" at walls.

h. Stainless steel gussets fully welded 360 degrees to channels.

i. 1 5/8" diameter 16 gauge stainless steel tubing legs.

j. 1 5/8" diameter 16 gauge stainless steel crossrails fully welded 360 degrees to legs.

k. Stainless steel adjustable bullet feet.

l. Stainless steel flanged feet with two holes at all front legs, secure to floor with two non corrosive anchors.

m. Table limit switch. Enclose limit switch in a stainless steel housing with rounded corners.

n. Channels shall be welded to each other with a 1” x 1” x 4” x 1”x 1” continuous weld, typical. Gussets shall be welded to channels or plate with a 360 degrees continuous weld, typical.

o. All welding and stainless steel surfaces grind smooth and polished to a number 4 finish.

p. Z clip splash to walls, unexposed.

q. 16 gauge stainless steel overshelf mounted 14 gauge stainless steel brackets secured to the wall with non corrosive anchors, 2” X 3/16” stainless steel band fully weld to brackets full length with stainless steel double sided pot hooks 8” on centers. Mount 56” above finished floor (60” at pot sink/dishtable), coordinate height with mini pre rinse faucet and verify height with owner. Free sides turned down 1 ½” and back ½” on a slight angle and turn up 2” at walls.

r. Kitchen equipment contractor personnel shall be onsite during all kitchen equipment ductwork, plumbing and electrical final connections.

s. One year onsite parts, service and labor warranty.

M. Item 13 - Milk cooler – two required

1. Provided and installed by Vendor.
2. Kitchen Equipment Contractor shall coordinate installation with kitchen equipment.

N. Item 14 – Tray cart – four required

1. Piper PT/1014MO*M126.
2. Provide the following:
   a. Four 4” diameter polyurethane casters*M126 two with brakes.
   b. Verify owners tray size. Obtain hard sample from owner prior to ordering.
   c. Calibrate with owners trays.
   d. One year on site parts, service and labor warranty.

O. Item 15 – Hot food counter – two required

1. Duke TEHF-60DSS*M126.
2. Fabricated according to details, drawings and specifications.

3. Provide the following:
    a. 120/208/1 with cord and plug, each unit.
    b. Hot wells and lights wired to one cord and plug.
    c. 34” high to top.
    d. 34” deep top.
    e. Field welding required for a seamless top and tray slide. DUKE MAY NOT PROVIDE.
    f. T & S B-0207 CR faucet with ceramic cartridges, each unit. DO NOT LOCATE FAUCET IN TRAY MAKE UP SPACE.
    g. Spacer for faucet mounting with bottom cutout for access to the water lines.
    h. 14 gauge stainless steel top, 34” deep and 34” high full length seamless other counters.
    i. 900 watt sealed hot food wells with manifold drains and drain valve*M126, each unit.
    j. Drain valve handle with bracket to extend to face of base on operators side, each unit.
    k. TS540*M126 full or self service guard with LED lights with switch and 18 gauge stainless steel top and ends, each unit. Extend glass to within 1” of the top.
    l. Stainless steel base.
    m. Plastic laminated on base fronts with non-standard color and pattern to be selected by Architect and Owner.
    n. Stainless steel legs and adjustable stainless steel feet*M126, each unit.
    o. All standard features unless specifically modified or deleted.
    p. Kitchen equipment contractor personnel shall be onsite during all kitchen equipment ductwork, plumbing and electrical final connections.
    q. Assembly and installation according to the manufacture’s instructions.
    r. Startup, testing and or calibration by the manufacture’s service agency.
    s. Onsite demonstration by the manufacture’s representative.
    t. One year onsite parts, service and labor warranty.
    u. Addition manufacture’s warranties offered at no charge.

P. Item 16 – Flat top counter – four required
    1. Two Duke TST-32DSS*M126 and Two TST-60DSS*M126.
    2. Fabricated according to details, drawings and specifications.
    3. Provide the following:

a. 14 gauge stainless steel top, 34” deep and 34” high. Full length seamless with item 15, each unit.

b. 34” high to top.

c. TS540*M126 full or self service guard with LED lights with switch and 18 gauge stainless steel top and ends, two units. Extend glass to within 1” of the top. Tray pass space. 120/1 with cord and plug.

d. Field welding required for a seamless top and tray slide. DUKE MAY NOT PROVIDE.

e. Omit middle shelf.

f. Stainless steel base.

g. Stainless steel legs and adjustable stainless steel feet*M126, each unit.

h. Plastic laminated on base fronts with non-standard color and pattern to be selected by Architect and Owner.

i. All standard features unless specifically modified or deleted.

j. Kitchen equipment contractor personnel shall be onsite during all kitchen equipment ductwork, plumbing and electrical final connections.

k. Assembly and installation according to the manufacture’s instructions.

l. Startup, testing and or calibration by the manufacture’s service agency.

m. Onsite demonstration by the manufacture’s representative.

n. One year onsite parts, service and labor warranty.

o. Addition manufacture’s warranties offered at no charge.

Q. Item 17 – UDS – one required

1. Provided and installed by the mechanical contractor.
2. Kitchen Equipment Contractor shall coordinate installation with kitchen equipment.

R. Item 18 – Table – one required

1. Fabricated according to details, drawings and specifications, 34” high to top.
2. Provide the following:

a. 14 gauge stainless steel one piece coved corner top.

b. 8” high splash at walls.

c. Top turned down 1½” and back ½” on a slight angle on all free sides.

d. 18 gauge stainless steel undershelf where space allows notched and fully welded to legs. Free sides turned down 1 ½" and back ½" on a slight angle and turn up 2" at walls.

e. Copper flashed weld studs capped with stainless steel acorn nuts.

f. ¾" tacky tape between all metal surfaces, installed to create a vermin proof seal.

g. Two 14 gauge stainless steel hat channels full length, fully welded to end channels. DO NOT OMIT OR NOTCH CHANNELS FOR DRAWER FRAME

h. Stainless steel gussets fully welded 360 degrees to channels.

i. 1 5/8" 16 gauge stainless steel tubing legs.

j. 1 5/8" 16 gauge stainless steel tubing crossrails fully welded to legs.

k. Stainless steel adjustable bullet feet.

l. One Component Hardware S90-0020-N*M126 20" drawer assembly with 18 gauge stainless steel bottom enclosure plate, secured to channels with stainless steel hardware (removable) on four sided 14 gauge stainless steel seamless fully welded frame studded to channels. DO NOT OMIT OR NOTCH CHANNELS FOR DRAWER FRAME. Drawer removable from frame and frame removable from the channels.

m. 16 gauge stainless steel overshelf mounted 14 gauge stainless steel brackets secured to the wall with non corrosive anchors, 2" X 3/16" stainless steel band fully weld to brackets full length with stainless steel double sided pot hooks 8" on centers. Mount 56" above finished floor (66" at pot sink/dishtable), coordinate height with mini pre rinse faucet and verify height with owner. Free sides turned down 1 ½" and back ½" on a slight angle and turn up 2" at walls.

n. Z clip splash to wall, unexposed.

o. Notched top and overshelf around building column as required by field conditions.

p. Channels shall be welded to each other with a 1"x1" x 4" x 1"x 1" continuous weld, typical. Gussets shall be welded to channels or plate with a 360 degrees continuous weld, typical.

q. One Edlund 203*M126 can opener (not shown), 120/1 with cord and plug.

r. All welding and stainless steel surfaces grind smooth and polished to a number 4 finish.

s. One year onsite parts, service and labor warranty.

S. Item 19 – Baker's table - one required

1. Fabricated according to details, drawings and specifications, 34" high to top.

2. Provide the following:

a. 14 gauge stainless steel one piece coved corner top.

b. 8" high splash at walls.

c. Top turned down 1½" and back ½" on a slight angle on all free sides.

d. Copper flashed weld studs capped with stainless steel acorn nuts.

e. ¾" tacky tape between all metal surfaces, installed to create a vermin proof seal.

f. Two 14 gauge stainless steel hat channels full length, fully welded to end channels. DO NOT OMIT OR NOTCH CHANNELS FOR DRAWER FRAME

g. Stainless steel gussets fully welded 360 degrees to channels.

h. 1 5/8" 16 gauge stainless steel tubing legs.

i. 1 5/8" 16 gauge stainless steel tubing crossrails fully welded to legs.

j. Stainless steel adjustable bullet feet.

k. Three Rubbermaid 3601*M126 or equal bins.

l. Two Component Hardware S90-0020-N*M126 20" drawer assembly with 18 gauge stainless steel bottom enclosure plate, secured to channels with stainless steel hardware (removable) on four sided 14 gauge stainless steel seamless fully welded frame studded to channels. DO NOT OMIT OR NOTCH CHANNELS FOR DRAWER FRAME. Drawer removable from frame and frame removable from the channels.

m. 16 gauge stainless steel overshelf mounted 14 gauge stainless steel brackets secured to the wall with non corrosive anchors, 2" X 3/16" stainless steel band fully weld to brackets full length with stainless steel double sided pot hooks 8" on centers. Mount 56" above finished floor (66" at pot sink/dishtable), coordinate height with mini pre rinse faucet and verify height with owner. Free sides turned down 1 ½" and back ½" on a slight angle and turn up 2" at walls.

n. Z clip splash to wall, unexposed.

o. Notched top and overshelf around building column as required by field conditions.

p. Channels shall be welded to each other with a 1" x 1" x 4" x 1"x 1" continuous weld, typical. Gussets shall be welded to channels or plate with a 360 degrees continuous weld, typical.

q. All welding and stainless steel surfaces grind smooth and polished to a number 4 finish.

r. One year onsite parts, service and labor warranty.

T. Item 20 - 40 Quart mixer - one required

1. Hobart HL400*M126 or equal by Globe.
2. Provide the following:
   a. 208/1.
   b. Cord and plug.
   c. Hobart Legacy 40 quart stainless steel bowl.
   d. Hobart Legacy 40 quart B beater.

e. Hobart Legacy 40 quart D wire whip.

f. Hobart Legacy 40 quart ED dough hook.

g. Hobart Legacy 40 quart ingredient chute.

h. Hobart Legacy 40 quart bowl truck.

i. Rubber foot pads.

j. Hobart 9” vegetable slicer with adjustable slicer plate, plate holder assembly, grater plate, 3/32”, 5/16”, 3/16” and ½” shredder plates.

k. All standard features unless specifically modified or deleted.

l. Kitchen equipment contractor personnel shall be onsite during all kitchen equipment ductwork, plumbing and electrical final connections.

m. Assembly and installation according to the manufacture’s instructions.

n. Startup, testing and or calibration by the manufacture’s service agency.

o. Onsite demonstration by the manufacture’s representative.

p. One year onsite parts, service and labor warranty.

q. Extended manufacture’s warranties offered at no charge.

U. Item 21 – Convection oven – two required

1. Blodgett SHO-100G double stack*M126 or equal by Southbend.
2. Provide the following:
   a. One future not part of the contract.
   b. Propane, verify and coordinate gas type.
   c. Gas pressure regulator, each unit.
   d. 120/1 with cord and plug, each section/unit.
   e. Double stack, each unit.
   f. Gas manifold kit, each unit.
   g. Stainless steel front, top, sides and legs, each unit.
   h. Non marking grease resistant casters two with brakes, each unit.
   i. Safety set or equal caster positioning system for both rear casters secure to floor in four places included anchor kit. Seal to floor with food grade 100% silicone adhesive, each unit.
   j. Gas/water hoses and cords and plugs shall be provided with the UDS.
   k. All standard features unless specifically modified or deleted.

l. Kitchen equipment contractor personnel shall be onsite during all kitchen equipment ductwork, plumbing and electrical final connections.

m. Assembly and installation according to the manufacture's instructions.

n. Startup, testing and or calibration by the manufacture's service agency.

o. Onsite demonstration by the manufacture's representative.

p. One year onsite parts, service and labor warranty.

q. Addition manufacture's warranties offered at no charge.

V. Item 22 - Heater/proofer cabinet – one required

1. Metro C539-CLFC-U*M126.
2. Provide the following:
   a. 120/1.
   b. Cord and plug.
   c. Low wattage unit, 1440 watts, 12 amps.
   d. Door(s) hinged right left (field convertible to left).
   e. See thru lexan door panel.
   f. All standard features unless specifically modified or deleted.
   g. Kitchen equipment contractor personnel shall be onsite during all kitchen equipment ductwork, plumbing and electrical final connections.
   h. Assembly and installation according to the manufacture's instructions.
   i. Startup, testing and or calibration by the manufacture's service agency.
   j. Onsite demonstration by the manufacture's representative.
   k. One year onsite parts, service and labor warranty.
   l. Extended manufacture's warranties offered at no charge.

W. Item 23 – Combi oven – one required

1. Rational iCombi Pro / iCombi Pro, double stacked*M126.
2. Provide the following:
   a. iCombi Pro on top iCombi Pro on bottom double stacked.
   b. Full size 18 x 26 bun pan cooking chamber.
   c. Propane, verify and coordinate gas type.

d. Gas, each unit.

e. 208/1, each unit.

f. One 8” high stainless steel leg kit.

g. One stacking kit.

h. One six level hinging rack for each section.

i. Six stainless steel wire grid shelves for each section, twelve total.

j. Six 12” x 20” fry baskets for each section, twelve total.

k. One Vari smoker, do not mount to the door.

l. 2” diameter Cool drain flow drain water tempering kit sized to reduce drain water to below 140 degrees. May not be offered or provide by Rational.

m. Water pressure regulator required for proper operation. May not be provide by Rational.

n. Backflow preventer required for proper operation. May not be provide by Rational.

o. Test local water source with free kit provide by Rational. Water quality that does not meet Rational standards may require proper water conditioning at an additional cost.

p. Heat shield on control side when less than 14” from open flame, as required.

q. Installation kit(s), one for each section.

r. Rational certified service agency installation with receiving, delivery, set up and testing and connections, for fully operational units.

s. One bucket of 150 active green clean tablets for each section, two total.

t. Four hours onsite training with a Rational certified chef.

u. Two year onsite parts and labor warranty, each unit.

v. Five year steam generator warranty, each unit.

w. All standard features unless specifically modified or deleted.

x. Kitchen equipment contractor personnel shall be onsite during all kitchen equipment ductwork, plumbing and electrical final connections.

y. Assembly and installation according to the manufacture’s instructions.

z. Startup, testing and or calibration by the manufacture’s service agency.

aa. Onsite demonstration by the manufacture’s representative.

bb. Extended manufacture’s warranties offered at no additional charge.

X. Item 24 - Work table – two required

1. Fabricated according to details, drawings and specifications.

2. Provide the following:
    a. 14 gauge stainless steel one piece top. 36” high to top.
    b. All free sides turned down 1 ½” and back ½” on a slight angle.
    c. 18 gauge stainless steel undershelf where space allows notched and fully welded to legs. Free sides turned down 1 ½” and back ½” on a slight angle and turn up 2” at walls.
    d. Copper flashed weld studs capped with stainless steel acorn nuts.
    e. ¾” tacky tape between all metal surfaces, installed to create a vermin proof seal.
    f. Two 14 gauge stainless steel hat channels full length, fully welded to end channels.
    g. 1 5/8” 16 gauge stainless steel tubing legs.
    h. Stainless steel gussets fully welded 360 degrees to channels.
    i. Four stainless steel all swivel polyurethane casters, 300 pound load capacity each, all with brakes.
    j. Channels shall be welded to each other with a 1”x1” x 4” x 1”x 1” continuous weld, typical. Gussets shall be welded to channels or plate with a 360 degrees continuous weld, typical.
    k. All welding and stainless steel surfaces grind smooth and polished to a number 4 finish.
    l. One year onsite parts, service and labor warranty.

Y. Item 25 – Refrigerator – one required
1. Traulsen RHT232WPUT-FHS*M126 or 57” wide equal by Continental.
2. Provide the following:
    a. Item 25 and 26 by same manufacturer.
    b. 120/1, each unit.
    c. Cord and plug, each unit.
    d. Right door hinged right and left door hinged left, both sides, each unit.
    e. Twenty pair of 16 gauge stainless steel universal tray slides with pilasters, each unit.
    f. Non marking grease resistant casters two with brakes, each unit.
    g. Refrigerant(s) and refrigeration system(s) shall comply with all current local, state, national and federal government energy efficiency and energy saving standards.
    h. All standard features unless specifically modified or deleted.
    i. Kitchen equipment contractor personnel shall be onsite during all kitchen equipment ductwork, plumbing and electrical final connections.
    j. Assembly and installation according to the manufacture’s instructions.

k. Startup, testing and or calibration by the manufacture's service agency.

l. Onsite demonstration by the manufacture's representative.

m. One year onsite parts, service and labor warranty.

n. Addition manufacture's warranties offered at no charge.

o. Five year compressor warranty.

Z. Item 26 – Heated cabinet – two required

1. Traulsen RHF232WP-FHS*M126 or 57" wide equal by Continental.
2. Provide the following:
   a. Item 25 and 26 by same manufacturer.
   b. 120/208/1, each unit.
   c. Cord and plug, each unit.
   d. Right door hinged right and left door hinged left, both sides, each unit.
   e. Twenty pair of 16 gauge stainless steel universal tray slides with pilasters, each unit.
   f. Non marking grease resistant casters two with brakes, each unit.
   g. Refrigerant(s) and refrigeration system(s) shall comply with all current local, state, national and federal government energy efficiency and energy saving standards.
   h. All standard features unless specifically modified or deleted.
   i. Kitchen equipment contractor personnel shall be onsite during all kitchen equipment ductwork, plumbing and electrical final connections.
   j. Assembly and installation according to the manufacture's instructions.
   k. Startup, testing and or calibration by the manufacture's service agency.
   l. Onsite demonstration by the manufacture's representative.
   m. One year onsite parts, service and labor warranty.
   n. Addition manufacture's warranties offered at no charge.

AA. Item 27 – Fryer – one required

1. Frymaster PH155 (H55) *M126.
2. Provide the following:
   a. 120/1.
   b. Propane, verify and coordinate gas type.

c. Cord and plug.

d. CM3.5 controller.

e. Automatic basket lifts.

f. Built in oi filter.

g. Fry pot cover.

h. Sediment tray.

i. Stainless steel legs and feet.

j. Standard twin baskets.

k. All standard features unless specifically modified or deleted.

l. Kitchen equipment contractor personnel shall be onsite during all kitchen equipment ductwork, plumbing and electrical final connections.

m. Assembly and installation according to the manufacture's instructions.

n. Startup, testing and or calibration by the manufacture's service agency.

o. Onsite demonstration by the manufacture's representative.

p. One year onsite parts, service and labor warranty.

q. Addition manufacture's warranties offered at no charge.

BB. Item 28 – Range – one required

1. US Range X36-6R*M126 or equal by Southbend.
2. Provide the following:

a. Propane, Verify and coordinate gas type.

b. Gas pressure regulator.

c. Stainless steel front, sides and high shelf.

d. Non marking grease resistant casters two with brakes.

e. Safety set or equal caster positioning system for both rear casters secure to floor in four places included anchor kit. Seal to floor with food grade 100% silicone adhesive.

f. Gas/water hoses and cords and plugs shall be provided with the UDS.

g. All standard features unless specifically modified or deleted.

h. Kitchen equipment contractor personnel shall be onsite during all kitchen equipment ductwork, plumbing and electrical final connections.

i. Assembly and installation according to the manufacture's instructions.

j. Startup, testing and or calibration by the manufacture's service agency.

k. Onsite demonstration by the manufacture's representative.

l. One year onsite parts, service and labor warranty.

m. Addition manufacture's warranties offered at no charge.

CC. Item 29 – Braising pan – one required

1. Cleveland SGL-40-TR*M126 or 48" wide equal by Groen.
2. Provide the following:
   a. Propane, verify and coordinate gas type.
   b. Gas pressure regulator.
   c. 120/1.
   d. Cord and plug.
   e. T & S B-0300-102A-CR hot and cold water faucet MODIFIED with ceramic cartridges with check valves, B-0107 spray valve and B-0104-D dummy wall hook. 14 gauge stainless steel fabricated faucet bracket mounted where shown. Hook mounted on front of bracket face.
   f. 14 gauge stainless steel faucet bracket where shown. Dummy hook mounted on front of face of bracket turn back.
   g. Manual tilt.
   h. Food strainer pouring spout, only one required.
   i. Secure rear flanged feet to floor with non corrosive anchors.
   j. Gas/water hoses and cords and plugs shall be provided with the UDS.
   k. All standard features unless specifically modified or deleted.
   l. Kitchen equipment contractor personnel shall be onsite during all kitchen equipment ductwork, plumbing and electrical final connections.
   m. Assembly and installation according to the manufacture's instructions.
   n. Startup, testing and or calibration by the manufacture's service agency.
   o. Onsite demonstration by the manufacture's representative.
   p. One year onsite parts, service and labor warranty.
   q. Addition manufacture's warranties offered at no charge.

DD. Item 30 – Work table – one required

1. Fabricated according to details, drawings and specifications, 34" high to top.

2. Provide the following:
    a. 14 gauge stainless steel one piece top.
    b. Free sides turned down 1 ½" and back ½" on a slight angle.
    c. 18 gauge stainless steel undershelf where space allows notched and fully welded to legs. Free sides turned down 1 ½" and back ½" on a slight angle and turn up 2" at walls.
    d. Two 14 gauge stainless steel hat channels full length, fully welded to end channels. DO NOT OMIT OR NOTCH CHANNELS FOR DRAWER FRAME.
    e. Copper flashed weld studs capped with stainless steel acorn nuts.
    f. ¾" tacky tape between all metal surfaces, installed to create a vermin proof seal.
    g. Stainless steel gussets fully welded 360 degrees to channels.
    h. 1 5/8" 16 gauge stainless steel tubing legs.
    i. 1 5/8" 16 gauge stainless steel tubing crossrails fully welded 360 degrees to legs.
    j. Stainless steel adjustable bullet feet.
    k. Component Hardware S90-0020-N*M126 20" drawer assembly with 18 gauge stainless steel bottom enclosure plate, secured to channels with stainless steel hardware (removable) on four sided 14 gauge stainless steel seamless fully welded frame studded to channels. DO NOT OMIT OR NOTCH CHANNELS FOR DRAWER FRAME. Drawer removable from frame and frame removable from the channels.
    l. Channels shall be welded to each other with a 1"x1" x 4" x 1"x 1" continuous weld, typical. Gussets shall be welded to channels or plate with a 360 degrees continuous weld, typical.
    m. All welding and stainless steel surfaces grind smooth and polished to a number 4 finish.
    n. One year onsite parts, service and labor warranty.

EE. Item 31 - Preparation table - one required
1. Fabricated according to details, drawings and specifications.
2. Provide the following:
    a. 14 gauge stainless steel one piece coved corner top.
    b. Marine edge where shown 33 ½" to top.
    c. 34" high to top of marine edge.
    d. 8" high splash at walls from top of marine edge, 8 ½" high from top.
    e. Notch splash around the office window, if required.
    f. 18 gauge stainless steel undershelf where space allows notched and fully welded to legs. Free sides turned down 1 ½" and back ½" on a slight angle and turn up 2" at walls.

g. Two 14 gauge stainless steel hat channels full length, fully welded to end channels. DO NOT OMIT OR NOTCH CHANNELS FOR DRAWER FRAME.

h. Copper flashed weld studs capped with stainless steel acorn nuts.

i. ¾" tacky tape between all metal surfaces, installed to create a vermin proof seal.

j. Stainless steel gussets fully welded 360 degrees to channels.

k. 1 5/8" 16 gauge stainless steel tubing legs.

l. 1 5/8" 16 gauge stainless steel tubing crossrails fully welded 360 degrees to legs.

m. Stainless steel adjustable bullet feet.

n. Stainless steel flanged feet at front corners with two holes, secure to floor with two non corrosive anchors.

o. Two 20" X 24" X 10" deep 14 gauge stainless steel coved corner sinks.

p. One T & S B-0184 faucet with spray hose and all ceramic cartridges.

q. Fisher 22411*M126 lever handle drain(s) with 14 gauge stainless steel handle bracket secure to sink bottom with weld studs and stainless steel acorn nuts, hole in bracket 1/8" maximum larger (LARGE HOLE OR ELONGATED SLOT IS NOT ALLOWED) than handle diameter. MODIFIED drain handle length (reduce or extend) to make the drain handle flush with the face of the sink bowl.

r. Component Hardware S90-0020-N*M126 20" drawer assembly with 18 gauge stainless steel bottom enclosure plate, secured to channels with stainless steel hardware (removable) on four sided 14 gauge stainless steel seamless fully welded frame studded to channels. DO NOT OMIT OR NOTCH CHANNELS FOR DRAWER FRAME. Drawer removable from frame and frame removable from the channels.

s. Coordinate overshelf length with the office window.

t. 16 gauge stainless steel overshelf mounted 14 gauge stainless steel brackets secured to the wall with non corrosive anchors, 2" X 3/16" stainless steel band fully weld to brackets full length with stainless steel double sided pot hooks 8" on centers. Mount 56" above finished floor (66" at pot sink/dishtable), coordinate height with mini pre rinse faucet and verify height with owner. Free sides turned down 1 ½" and back ½" on a slight angle and turn up 2" at walls.

u. Channels shall be welded to each other with a 1" x 1" x 4" x 1"x 1" continuous weld, typical. Gussets shall be welded to channels or plate with a 360 degrees continuous weld, typical.

v. All welding and stainless steel surfaces grind smooth and polished to a number 4 finish.

w. Z clip splash to wall, unexposed.

x. Installation and assembly per the manufactures instructions and details.

y. Kitchen equipment contractor personnel shall be onsite during all kitchen equipment ductwork, plumbing and electrical final connections.

z. One year onsite parts, service and labor warranty.

FF. Item 32 – Shelf – one required

1. Metro Metroseal 3 *M126 super adjustable super erecta.
2. Provide the following:
    a. Four 24” x 48” shelves, each unit.
    b. Four 63” high post, each unit.
    c. Four 5PCB swivel polymer casters with brakes and 5” donut bumpers, each unit.
    d. 5” donut bumper, each post.
    e. Super adjustable corner releases.
    f. All standard features unless specifically modified or deleted.
    g. Assembly and installation according to the manufacture’s instructions.
    h. One year onsite parts, service and labor warranty.
    i. Addition manufacture’s warranties offered at no charge.

GG. Item 33 – 20 quart mixer – one required

1. Hobart HL200*M126 or equal by Globe.
2. Provide the following:
    a. 120/1.
    b. Cord and plug.
    c. Rubber foot pads.
    d. Hobart Legacy 20 quart stainless steel bowl.
    e. Hobart Legacy 20 quart B beater.
    f. Hobart Legacy 20 quart D wire whip.
    g. Hobart Legacy 20 quart ingredient chute.
    h. Hobart Legacy 20 quart ED dough hook.
    i. Piper 121-23-29TSS*M126 stand with MX-52-R utensil rack or fabricated equal.
    j. All standard features unless specifically modified or deleted.
    k. Kitchen equipment contractor personnel shall be onsite during all kitchen equipment ductwork, plumbing and electrical final connections.
    l. Assembly and installation according to the manufacture’s instructions.

m. Startup, testing and or calibration by the manufacture's service agency.

n. Onsite demonstration by the manufacture's representative.

o. One year onsite parts, service and labor warranty.

p. Addition manufacture's warranties offered at no charge.

HH. Item 34 – Slicer – one required

1. Hobart HS7*M126 or Globe SG13A*M126.
2. Provide the following:
   a. 120/1.
   b. Cord and plug.
   c. Removable blade with carrying carriage.
   d. New age 98000 stand with casters two with brakes.
   e. All standard features unless specifically modified or deleted.
   f. Kitchen equipment contractor personnel shall be onsite during all kitchen equipment ductwork, plumbing and electrical final connections.
   g. Assembly and installation according to the manufacture's instructions.
   h. Startup, testing and or calibration by the manufacture's service agency.
   i. Onsite demonstration by the manufacture's representative.
   j. One year onsite parts, service and labor warranty.
   k. Addition manufacture's warranties offered at no charge.

II. Item 35 – Cashier's counter – two required

1. Duke TCS-30SS*M126.
2. Fabricated according to details, drawings and specifications.
3. Provide the following:
   a. 14 gauge stainless steel top.
   b. 34" high to top.
   c. 32" high to tray slide.
   d. Stainless steel base.
   e. Stainless steel drawer with cylinder lock and keys.

f. Four 5” diameter polyurethane casters two with brakes.

g. Stainless steel solid tray slides mounted on fold down brackets, notch corners 2” x 2”.

h. Opening in top with plastic grommet for cash register cord and plug.

i. Duplex outlet in base with cord and plug.

j. Plastic laminated on base front and both ends with non-standard color and pattern to be selected by Architect and Owner.

k. All standard features unless specifically modified or deleted.

l. Kitchen equipment contractor personnel shall be onsite during all kitchen equipment ductwork, plumbing and electrical final connections.

m. Assembly and installation according to the manufacture’s instructions.

n. Startup, testing and or calibration by the manufacture’s service agency.

o. Onsite demonstration by the manufacture’s representative.

p. One year onsite parts, service and labor warranty.

q. Addition manufacture’s warranties offered at no charge.

JJ. Item 36 – Floor trough – one required

1. Fabricated according to details, drawings and specifications.
2. Provide the following:

a. 14 gauge stainless steel coved corner pan per detail with anti splash.

b. CHG D34-Y011 drain assembly with removable basket drain fully welded to bottom.

c. 24” x 24” inside.

d. 1” x 3/16” stainless steel bar grate with four sided perimeter frame per detail in removable sections 18” long each max. Number grate section for each trough 1-1, 1-2, 1-3 / 2-1,2-2, 2-3.

e. Installation and assembly per the manufactures instructions and details.

f. Kitchen equipment contractor personnel shall be onsite during all kitchen equipment ductwork, plumbing and electrical final connections.

g. One year onsite parts, service and labor warranty.

KK. Item 37– Hand sink – three required

1. Provided and installed by the mechanical contractor.
2. Kitchen Equipment Contractor shall coordinate installation with kitchen equipment.

LL. Item 38 – Hood – one required

1. Provided and installed by the mechanical contractor.
2. Kitchen Equipment Contractor shall coordinate installation with kitchen equipment.

MM. Item 39 – Fire control system – one required

1. Provided and installed by the mechanical contractor.
2. Kitchen Equipment Contractor shall coordinate installation with kitchen equipment.

NN. Item 40 – Hood fans – one required

1. Provided and installed by the mechanical contractor.
2. Kitchen Equipment Contractor shall coordinate installation with kitchen equipment.

OO. Item 41 – Coffee brewer – one required

1. Future not part of the contract.

PP. Item 42 – Bun pan rack – two required

1. Advance PR18-3W*M126 or equal.
2. Provide the following:
    a. Equals must meet the specifications of the Advance PR18-3W.
    b. 18 pan capacity.
    c. 3” shelf spacing.
    d. Front loading (aka end loading).
    e. 500 pound load capacity.
    f. Pan angles fully welded to tubing uprights.
    g. All standard features unless specifically modified or deleted.
    h. One year onsite parts, service and labor warranty.
    i. Extended manufacture’s warranties offered at no charge.

QQ. Item 43 – Table – one required

1. Fabricated according to details, drawings and specifications, 34” high to top.

2. Provide the following:
    a. 14 gauge stainless steel one piece top.
    b. Free sides turned down 1 ½" and back ½" on a slight angle.
    c. 18 gauge stainless steel undershelf where space allows notched and fully welded to legs. Free sides turned down 1 ½" and back ½" on a slight angle and turn up 2" at walls.
    d. Two 14 gauge stainless steel hat channels full length, fully welded to end channels. DO NOT OMIT OR NOTCH CHANNELS FOR DRAWER FRAME.
    e. Copper flashed weld studs capped with stainless steel acorn nuts.
    f. ¾" tacky tape between all metal surfaces, installed to create a vermin proof seal.
    g. Stainless steel gussets fully welded 360 degrees to channels.
    h. 1 5/8" 16 gauge stainless steel tubing legs.
    i. 1 5/8" 16 gauge stainless steel tubing crossrails fully welded 360 degrees to legs.
    j. Four stainless steel all swivel polyurethane casters, 300 pound load capacity each, all with brakes.
    k. Channels shall be welded to each other with a 1" x 1" x 4" x 1"x 1" continuous weld, typical. Gussets shall be welded to channels or plate with a 360 degrees continuous weld, typical.
    l. All welding and stainless steel surfaces grind smooth and polished to a number 4 finish.
    m. One year onsite parts, service and labor warranty.

RR. Item 44 – Cook's table – one required

1. Fabricated according to details, drawings and specifications, 34" high to top.
2. Provide the following:
    a. 14 gauge stainless steel one piece coved corner top.
    b. Top turned down 1½" and back ½" on a slight angle on all free sides.
    c. 18 gauge stainless steel undershelf where space allows notched and fully welded to legs. Free sides turned down 1 ½" and back ½" on a slight angle and turn up 2" at walls.
    d. Two 14 gauge stainless steel hat channels full length, fully welded to end channels. DO NOT OMIT OR NOTCH CHANNELS FOR DRAWER FRAME.
    e. Copper flashed weld studs capped with stainless steel acorn nuts.
    f. ¾" tacky tape between all metal surfaces installed without gaps for a vermin proof seal.
    g. Stainless steel gussets fully welded 360 degrees to channels.
    h. 1 5/8" 16 gauge stainless steel tubing legs.

i. 1 5/8” 16 gauge stainless steel tubing crossrails fully welded 360 degrees to legs.

j. Stainless steel adjustable bullet feet.

k. 2” X 1/4” stainless steel three band fully welded pot rack mounted on 1 5/8” stainless steel tubing supports (7’-6” high) secured to undershelf with stainless steel hardware, penetrate top with stainless steel gusset inverted and fully welded to top and stainless steel double sided pot hooks 8” on center, 16 gauge stainless steel adjustable overshelf with 14 gauge stainless steel brackets fully welded to sockets, 14 gauge stainless steel channels fully welded, mounted on 5” stainless steel sockets with set screws, free sides turned down 1 ½” and back ½” on a slight angle.

l. Component Hardware S90-0020-N*M126 20” drawer assembly with 18 gauge stainless steel bottom enclosure plate, secured to channels with stainless steel hardware (removable) on four sided 14 gauge stainless steel seamless fully welded frame studded to channels. DO NOT OMIT OR NOTCH CHANNELS FOR DRAWER FRAME. Drawer removable from frame and frame removable from the channels.

m. Channels shall be welded to each other with a 1” x 1” x 4” x 1” x 1” continuously weld, typical. Gussets shall be welded to channels or plate with a 360 degrees continuously weld, typical.

n. All welding and stainless steel surfaces grind smooth and polished to a number 4 finish.

o. Onsite supervision and coordination for all of the utility connections.

p. One year onsite parts, service and labor warranty.

SS. Item 45 – Beverage table – two required

1. Fabricated according to details, drawings and specifications, 34” high to top.
2. Provide the following:

a. 14 gauge stainless steel one piece top.

b. Free sides turned down 1 ½” and back ½” on a slight angle.

c. 8” high splash at walls.

d. 18 gauge stainless steel undershelf where space allows notched and fully welded to legs. Free sides turned down 1 ½” and back ½” on a slight angle and turn up 2” at walls.

e. Two 14 gauge stainless steel hat channels full length, fully welded to end channels. DO NOT OMIT OR NOTCH CHANNELS FOR DRAWER FRAME.

f. Copper flashed weld studs capped with stainless steel acorn nuts.

g. ¾” tacky tape between all metal surfaces, installed to create a vermin proof seal.

h. Stainless steel gussets fully welded 360 degrees to channels.

i. 1 5/8” 16 gauge stainless steel tubing legs.

j. 1 5/8” 16 gauge stainless steel tubing crossrails fully welded 360 degrees to legs.

k. Stainless steel adjustable bullet feet.

l. Channels shall be welded to each other with a 1” x 1” x 4” x 1”x 1” continuous weld, typical. Gussets shall be welded to channels or plate with a 360 degrees continuous weld, typical.

m. All welding and stainless steel surfaces grind smooth and polished to a number 4 finish.

n. One year onsite parts, service and labor warranty.

TT. Item 46 – Heated merchandiser – two required

1. Hatco GR2SDS-24D*M126.
2. Provide the following:
   a. 120/1.
   b. Cord and plug.
   c. Special electrical cord length, if required, to reach floor mounted outlets.
   d. Designer colors for corner caps, unit and inset panel as selected by the Architect and Owner.
   e. All standard features unless specifically modified or deleted.
   f. Kitchen equipment contractor personnel shall be onsite during all kitchen equipment ductwork, plumbing and electrical final connections.
   g. Assembly and installation according to the manufacture’s instructions.
   h. Startup, testing and or calibration by the manufacture’s service agency.
   i. Onsite demonstration by the manufacture’s representative.
   j. One year onsite parts, service and labor warranty.
   k. Addition manufacture’s warranties offered at no charge.

UU. Item 47 – Ice/water dispenser – one required

1. Future not part of the contract.

2.5 ITEMIZED PRICES

1. Bidders that do not provide itemized prices for all specified Kitchen Equipment will be rejected.
2. List prices for alternates to specified items on a separate sheet with specifications.
3. Itemized prices may be submitted in Auto Quotes format or spread sheet.

Equipment Sub total (equipment only no labor) _____

State Taxes (equipment only no labor) _____

Local/County Taxes _____

Bond (when required) _____

Installation Labor _____

Total Bid Price _____$_____

PART 3 – EXECUTION

3.1 Installation of Kitchen Equipment

A. Unload, uncrate, assemble, set-in place, hang, level and adjust Kitchen Equipment. Tag parts shipped loose. Furnish necessary installation instructions. Clean up all trash immediately upon completion of installation and remove from the project site.

B. Neatly seal gaps of ¼" or less between Kitchen Equipment and walls, other equipment and floors with a "50 year" high quality food grade clear silicone sealant. Seal gaps of ¼" or more with 14 gauge stainless steel trim fully welded ground smooth and polished to No. 4 finish or neatly attach trim with concealed stainless steel blots and nuts silicon trim to wall.

C. Erect Kitchen Equipment at project site in full compliance with the codes and regulations of the state and local Health Department.

D. Remove all protective coatings and other markings from Kitchen Equipment before demonstration. Wash with soap and water, rinse clean and dry spotless.

E. Provide a competent foreman at the project site to supervise installation of all Kitchen Equipment, and to coordinate with other trades in reference to connections at time of installation. Tag and deliver plumbing and electrical parts, furnished loose and specified as part of the Kitchen Equipment to respective installing trades.

F. Provide all Zee clips and angles necessary for wall mounting of Kitchen Equipment.

G. Any sleeves, flanges of anchor bolts required to be built in to building structure to be provided to respective trades.

3.2 TESTING, CALIBRATION AND DEMONSTRATION

A. After completion of final connection by respective trades, test and calibrate Kitchen Equipment for proper operation. Make any necessary adjustments and re-test, repair or replace Kitchen Equipment producing objectionable noise.

B. Repair finishes marred during handling and installation or replace if required by the owner or consultant.

C. Schedule demonstration of Kitchen Equipment with manufacturer's representatives, and owner's personnel.

D. Provide pictures of completed punch list deficiencies to Contractor, Architect Owner and Consultant for review after all punch list work has been completed.

END OF SECTION

SECTION 13123
PREFABRICATED METAL BUILDING AND INSULATION

13-01
GENERAL--Furnish and/or furnish and erect prefabricated steel building and components as shown on the drawings including steel frames, purlins, girts, metal siding, metal roofing, insulation bracing, gutters, trim flashing, etc. as required for complete installation.

13-02
DESIGN LOAD-- The metal building shall be designed to 25 pounds per square foot roof live load on a horizontal projection plus 20 pounds per square foot wind load applied to the primary framing plus dead loads, plus concentrated loads.

NO REDUCTIONS IN THESE LOADS ARE PERMITTED. In addition to above loading, metal building shall be designed to meet SEISMIC ZONE 3 loading. Maximum deflection all structural members and roof and wall panels to be length/240. Horizontal wall displacement is to be height/240.

13-03
SHOP DRAWINGS –The building manufacturing, company shall furnish detailed shop drawings for architect's approval prior to fabrication, of steel building. The building manufacturing company shall furnish detailed anchor bolt setting plan showing size, location, spacing, etc. for contractor's use and for architect's approval.

13-04
ANCHOR BOLTS--The Metal Building Contractor shall furnish and set all anchor bolts of size shown on building manufacturer's shop drawings.

13-05
STRUCTURAL STEEL DESIGN --All structural mill sections or welded-up plate sections shall be designed in accordance with the 1978 edition of AISC "Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings." All cold-formed steel structural members shall be designed in accordance with the 1977 Edition of AISI "Specifications for the Design of Cold-Formed Steel Structural Members".

13-06
PRIMARY FRAMING

A. RIGID FRAMES

1. Frames shall consist of welded-up plate section columns and roof beams complete; with necessary splice plates for bolted field assembly.
   a. All base plated cap plates, compression splice, plates and stiffener plates shall be factory welded into place and have the connection holes shop fabricated.
   b. Columns and Roof Beams -- shall be fabricated complete with holes in webs and flanges for the attachment of secondary structural members and bracing except for field work as noted on manufacturer's erection drawing.
2. All bolts for field assembly of frame members shall be high strength bolts as indicated on erection drawings.

B. ENDWALL STRUCTURALS

1. Beam and Post Endwall--The endwall structurals shall be cold formed channel members designed in accordance with the- 1977 edition of AISI "Specifications for the Design of Gold Formed Steel Structural Members."
2. Endwall Frames--Shall consist of endwall corner posts, endwall roof beams, and endwall posts as required by design criteria.

a. All splice plates and base clips - Shall be shop fabricated, complete with bolt connection, holes.
b. Beams and posts - shall be shop fabricated complete with holes for the attachment of secondary structural members except for field work as noted on^ manufacturer's erection drawings.

3. . Intermediate frames--Shall be substituted for endwall roof beams when specified. Necessary endwall posts and holes for connection to the intermediate frame used in the endwall shall be shop fabricated.

13-07
SECONDARY STRUCTURAL MEMBERS

A. PURLINS AND GIRTS

1. Purlins and Girts --Shall be "Z" shaped and precision roll formed.
2. Girts--Shall be 8" deep "Z" sections.
1. Purlins --Shall be 12" or 10" deep "Z "sections- depending on structural computation by building fabricator's registered structural engineer.
2.
3. Outer Flange of all girts --Shall contain factory-punched holes for panel connections.

B. EAVE STRUTS

1. Eave struts --Shall be 12" or 10" deep "C" section- depending on structural computation by building fabricator's registered structural engineer.
2.

C. BRACING

1. Bracing shall be located as indicated on drawings or as required.
2. Diagonal bracing - Shall be hot-rolled of size indicated' on drawings and attached to columns and roof beams, where and as indicated on drawings.
3. Sag rods-- When required, shall be hot-rolled and installed as indicated on drawing.
4. Flange braces, purlin braces, etc. – when required, shall be cold-formed and installed as indicated on drawings.

13-08 WELDING

A. WELDING 'PROCEDURE AND OPERATOR QUALIFICATIONS AND WELDING QUALITY STANDARDS --Shall be in accordance with the American Welding Society Structural Welding code.

13-09 STRUCTURAL PAINTING

A. PRIOR TO PAINTING - The fabricator shall clean the steel of loose rust, loose mill scale, dirt, and other foreign material. Unless otherwise specified, the fabricator SHALL NOT sandblast, flame clean, or pickle prior to painting. The fabricator shall then factory coat all steel with one coat of primer paint formulated to equal or exceed the performance requirements of Federal Specification TT-P-636.

13-10
METAL ROOF --Shall be MBCI or equal Ultra-Deck-124panels. Panels may be other manufacturer's product such as Varco, Crown, Bayou, Star, Vic West, etc. Roof shall be a color as selected by owner from the manufacturer's standard colors.

A. GENERAL

1. Roof shall be constructed with precision roll-formed Ultra-Deck, 24 gauge colored panels or equal.

2. Details - shall be in accordance with the manufacturer's Specifications.

B. PANEL DESCRIPTION - Panels shall be 24" wide with 3" high rib, with 2 major corrugations and 2 minor corrugations at 6" o. c. Panel shall be made from Galvalume steel sheet, 0.5 ounces per square foot with minimum yield of 50,000 p. s. i., 24 gauge UL-90 rated. Panels shall have Pittsburg seam, utilizing male and female rib configurations, with factory applied hot melt mastic in female rib.

Finish shall be of color as selected by owner from standard color selections. Panels shall be designed in accordance with AISI Specifications of light gauge cold-formed steel structural members and in accordance with sound engineering methods.

C. PANEL APPLICATION --All panels shall be positioned and aligned by use of articulating clips, providing thermal expansion or contraction, correcting for out of plane subframing alignment. Panel laps to be at least 6" sealed with sealant and fastened together by clamping plates.

D. ENERGY- CONSERVATION '

1. Purlins --Shall be insulated so as to eliminate "thermal short circuits" between purlins and roof panels. The heat loss (thermal short circuit), caused by compression of the blanket insulation between structural and panel, is eliminated by the use of a spacer block at each purlin location.

E. ACCESSORIES

1. Accessories--i.e., ventilators, sky lights, gutter, fascia shall be as standard with MBC 1 manufacturing Co., or equal, unless otherwise noted and furnished as specified.
2. Location of standard accessories --shall be as shown on erection drawings as furnished by manufacturing company.

13-11

INSULATION SYSTEM FOR PRE-ENGINEERED METAL BUILDINGS ROOFS AND WALLS

A. Insulation systems under metal roofs and metal building walls to be:

B. 8" THICK SIMPLE SAVER SYSTEM as manufactured by Thermal Design Company of 601 N. Main St., Madison, Nebraska 68748; tel: 800-255-0776. OR EQUAL

C. ROOF INSULATION UNDER METAL ROOF

1. Shall consist of a grid of steel straps 1" wide, 100 KSI with white finish - straps attached to bottom of roof purlins at approximately 2'6" on center each way.
2. Over top of steel grid install a membrane water vapor SYSEAL 9801 sheet which covers from rigid frame to rigid frame and across entire building (custom sized)
3. Over top of membrane and between roof purlins install a 6"layer of unfaced fiber glass insulation
4. Over top of 8" insulation install a 3" thick unfaced fiberglass insulation which also goes over top of purlins
5. Install Snap R Thermal blocks over top of purlins or adhesive foam tape thermal break adhesive on top of roof purlins
6. Install standing seam metal roofs. Detailed installations may be obtained from Thermal Design company for insulation system

D. METAL BUILDING WALL INSULATION

1. Fasten FAST-R Metal strips pre-cut with barbed arrows into them every 8" oc. These metal strips are to run vertically between girts on outside face.
2. Install 8'' thick unfaced fiberglass between girts
3. Cover insulation with water vapor membrane SYSEAL 9801 sheet from base girt to eave purlin
4. Install white metal straps over vapor barrier from base girt (vertically) to eave strut.

13-12
EXTERIOR METAL, WALLS --Furnish and install as required for repair, 24 gauge exterior wall panels of color as selected by owner from standard colors available. Panels shall be precision roll formed panels as manufactured by MBCI Manufacturing Co. or equal, and installed in accordance with the manufacturer's instructions.

A. PANEL DESCRIPTION
    1. Panels—ShalL be MBCI DESIGNER SERIES 12.0. Shall be 12" wide, CONCEALED FASTENER 1.75" DEEP
    2. Panels--Shall be one piece from base to building eave.

B. PANEL DESIGN--Shall be in accordance with AISI "Specification for the Design of Light-Gauge, Cold-formed Steel Structural Members," and in accordance with sound engineering methods and practices.

C. PANEL MATERIAL --As specified, shall be 24 gauge galvanized steel (42000 psi yield) 1.25 ounce coating (G90) conforming to ASTM Galvanized Specification A525 (latest issue).
D. PANEL FINISH—MBCI SIGNATURE 200 FINISH- 20 YEAR WARRANTY .
E. PANEL APPLICATION
    1. Structural System-- shall be plumb before wall panels are attached.
    2. Panels --Shall be aligned and attached in accordance with erection drawings furnished by manufacturing company.
    3. All Side Laps -- Shall be at least one full corrugation.
F. FASTENERS
    1. Wall panel-to-structural connections --Shall be made with hex washer head Scrubolts. Panel-to-panel connections shall be made with No. 14, type A-B self - tapping screws. (Lock-Rivets are optional for panel-to-panel structural and/or panel-to-panel connections)
    2. Lock-rivets (optional) -- Shall be as set by a special lock-rivet tool.
    3. Fastener locations --Shall be as shown on erection drawings as furnished by manufacturing company.
    4. Plastic color caps to match wall color – Shall be furnished for all exposed locations of fasteners.

3-13
ACCESSORIES--Furnish and install all accessory items as shown on Plans including gutters, downspouts, rake trims, fascias, closures, etc. as required. Gutters, downspouts, and fascias to be of color to match existing

3-14
METAL ROOF WARRANTY--THE CONTRACTOR AND METAL ROOF INSTALLER SHALL GIVE A 20-YEAR JOINT WRITTEN WATER TIGHT WARRANTY FOR MAINTENANCE AGAINST DEFECTS DUE TO MATERIAL AND WORKMANSHIP.

SECTION 15010 - BASIC MECHANICAL REQUIREMENTS

PART 1 - GENERAL

1.1 REQUIREMENTS

A. The Conditions of the Contract, including the General Conditions and Supplementary Conditions, and Division One, apply to the work of this Division.

1.2 WORK INCLUDED

A. Provide all plant, labor, equipment, appliances, and material, in strict accordance with Project Manual and the applicable drawings and subject to the terms and conditions of the contract. Include all appurtenances necessary to the proper operation of the systems and equipment specified.

1.3 RELATED WORK

A. All Division One sections.

1.4 COORDINATION

A. Coordinate work with the Owner and all other contractors.

1.5 SUBMITTALS

A. Refer to Drawings.

1.6 CODES, ORDINANCES, INSPECTIONS, PERMITS AND FEES

A. Refer to the General Conditions of the Contract for construction.

B. Deliver to the Owner a copy of each certificate of approval from each inspection agency.

C. Should the Contractor perform any work that does not comply with the requirements of the applicable building codes, state laws, local ordinances, industry standards and utility company regulations, he shall bear all costs arising in correcting the deficiencies.

D. The Contractor shall obtain any and all required permits in connection with his work under the Contract and shall pay any and all fees in connection therewith. Contractor shall arrange with the Owner for the connections to all utilities and shall be responsible for all charges for same, including inspection fees if required.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect all materials and equipment from moisture and dust in a manner to prevent any damage. Do not store outside or expose to elements except with permission of the Owner.

1.8 GUARANTEE

A. The Contractor shall furnish a written certificate, guarantying all materials, equipment, and labor furnished by him to be free of all defects for a period of one year from and after the date of final acceptance of the work by the Owner. The Contractor shall further guarantee that if any defects appear within the stipulated guaranty period, such work shall be replaced without charges.

1.9 DRAWINGS

A. The Drawings show the general arrangement of all piping, equipment, and appurtenances and shall be followed as closely as actual building construction and the work of other trades will permit.

B. The Contractor shall investigate the structural and finish conditions affecting the work and shall arrange his work accordingly, providing such fittings, valves and accessories as may be required to meet such conditions.

1.10 INSPECTION OF PREMISES

A. Before submitting his bid, the Contractor shall visit the site of the proposed job and satisfy himself as to the conditions under which he would operate relating to his work.

1.11 CODES AND STANDARDS

A. All materials and workmanship shall comply with all applicable codes, specifications, local ordinances, industry standards, and utility company regulations.

B. In case of differences between building codes, specifications, state laws, local ordinances, industry standards, and utility company regulations, and the Contract Documents, the most stringent shall govern. The Contractor shall promptly notify the Architect in writing of any such differences.

C. Non-Compliance: Should the Contractor perform any work that does not comply with the requirements of applicable building codes, state laws, local ordinances, industry standards, and utility company regulations, he shall bear all costs arising in correcting the deficiencies.

D. The following specifications and standards form a part of these specifications:
1. National Electrical Code;
2. National Fire Protection Association's Recommended Practices;
3. Local, City and State Codes and Ordinances;
4. National Building Code Congress International (S.B.C.C.I.), International Mechanical Code
5. Underwriters' Laboratories;
6. Arkansas State Plumbing/Gas Codes;
7. American National Standards Association (ANSI);
8. American Society for Testing Materials;
9. Arkansas State Fire Prevention Code;
10. Occupational Health Safety Act.

The latest specifications and standards available shall be used for the above.

PART 2 - PRODUCTS

2.1 MATERIAL AND EQUIPMENT

A. General: Refer to Section 01600.

B. Each major component of equipment shall have a nameplate listing the manufacturer's name, address, catalog, and serial number. The nameplate shall be brass, aluminum, or other durable material attached to the equipment in a conspicuous location.

2.2 FLASHINGS

A. Unless otherwise indicated, for riser or other roof penetrations complete as per roofing manufacturer’s recommendations.

2.3 EQUIPMENT CONNECTIONS

A. Rough-in and make final connection to all equipment furnished under other Divisions of the specifications or by the Owner.

B. Provide unions or flanges at all connections to equipment to aid in equipment removal and maintenance.

2.4 ACCESS PANELS

A. Provide access panels as required to service valves in piping, controls, items in duct, etc.

B. Access doors shall be equal to the following MILCOR types:
   1. Style A Door for Acoustical Tile
   2. Style B Door for Acoustical Plaster
   3. Style K Door for Plastered Surfaces
   4. Style M Door for Masonry, Wallboard, etc.
   5. Fire-rated Door where required.

C. Furnish size and type as required for proper service or as shown on Drawings for specific locations.

PART 3 - EXECUTION

3.1 CUTTING AND PATCHING

A. Provide all cutting and patching required to perform the mechanical work.

B. Do not cut structural members except through explicit instructions of the Owner.

C. Accomplish patching work with workmen skilled in the trade required.

D. Perform all cutting and fitting in rough construction phases of the work.

3.2 INSTALLATION

A. The Contractor shall support plumb, rigid, and true to line all work and equipment furnished. The mechanical contractor shall study thoroughly all general, structural, electrical and mechanical drawings, shop drawings, and catalog data to determine how equipment, fixtures, piping, ductwork, etc., are to be supported, mounted, or suspended and shall provide extra steel bolts, inserts, pipe stands, brackets, and accessories for proper support whether or not shown on the Drawings.

3.3 EXCAVATION, TRENCHING AND BACKFILLING

A. Excavate banks of trenches nearly vertical or as shown on the Drawings.

B. Excavate width of trench to approximately 6" on each side of pipe bell. Round bottom of trench for sewers and culverts so that outside diameter of pipe rest on undisturbed soil wherever practicable. Excavate bell holes accurately to size by hand. In rock, excavations 8" below bottom of pipe. Use loose earth or gravel for backfill and tamp thoroughly.

C. Perform bracing and shoring as necessary to complete and protect excavation indicated on the Drawings as required for safety or to conform to governing laws.

D. After piping, conduit, ducts, etc., have been installed, inspected, tested, and approved by Architect/Engineer, backfill trenches with clean, stable soil free from large stones, or as detailed on the Drawings. Place backfill in layers, tamped under/around pipe and conduit to height of at least two feet above pipe. Perform tamping in such a manner as not to disturb underlying work. Backfill remainder of trenches and excavations with clean,

stable earth. Deposit in 6" layers and bring up to rough grade, compacting each layer to density of surrounding soil. Remove bracing and shoring as backfill is placed and fill space with dry sand.

E. Install sewer, gas, electrical, and water lines in separate trenches, except where otherwise noted on the Drawings.

F. Replace existing appurtenances removed or damaged in connection with work. Restore to original conditions, unless otherwise directed.

3.4 CLEAN UP

A. Do not allow waste material or rubbish to accumulate in or about the job site.

B. At completion of work, remove all rubbish, tools, scaffolding, and surplus materials from and about building, leaving work clean and ready for use.

C. Clean all equipment, piping, valves, fixtures, and fittings of grease, metal cuttings, insulation cement, dust, dirt, paper labels, etc.

D. Repair any discoloration or other damage to parts of building, its finish or furnishings due to failure to properly clean or keep clean, mechanical systems.

3.5 WORK SCHEDULING AND SYSTEM SHUT-DOWNS

A. All work shall be scheduled one week in advance with the Owner.

END OF SECTION

SECTION 15060 - PIPE AND PIPE FITTINGS

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Pipe, fittings, and connections.

1.2 RELATED WORK

A. Section 15010 - Basic Mechanical Requirements.

B. Section 15090 - Mechanical Supporting Systems.

C. Section 15120 - Valves.

D. Section 15190 - Mechanical Identification.

E. Section 15350 - Natural Gas Piping System

1.3 QUALITY ASSURANCE

A. Welding Materials and Procedures: Conform to ASME Code and applicable State labor regulations.

B. Employ certified welders in accordance with ASME Section 9.

C. Replace pipe, fittings, or equipment broken or leaking during warranty period.

1.4 REFERENCES

A. ANSI/ASME B16.3 - Malleable-Iron Threaded Fittings.

B. ANSI/ASME B16.22 - Wrought Copper and Bronze Solder-Joint Pressure Fittings.

C. ANSI/ASTM - Pipe, Steel, Black, and Hot-Dipped Zinc-Coated, Welded and Seamless.

D. ANSI/A120 - Pipe, Steel, Black, and Hot-Dipped Zinc-Coated (galvanized), Welded and Seamless.

E. ANSI/ASTM A126 - Gray Iron Castings for Valves, Flanges, and Pipe Fittings.

F. ANSI/ASTM B43 - Seamless Red Brass Pipe, standard sizes.

G. ANSI/AWS D.1.1 - Structural Welding Code.

PART 2 - PRODUCTS

2.1 PIPE AND TUBE

A. Steel Pipe: ANSI/ASTM A53 or A120 Black, Schedule 40 weight or as scheduled.

B. PVC.

2.2 PIPE AND TUBE JOINTS AND FITTINGS

A. Steel Pipe Fittings: ANSI/ASME B16.3; ANSI/ASTM A126; FS WW-P-521, Class 150.

B. PVC: ASTM D2665 and D3311 solvent weld for DWV, ASTM D3139 for push on joints and ASTM F466 for gaskets on pressure pipe.

2.3 UNIONS AND COUPLINGS

A. Pipe Size 2" and Under: 150 psi malleable iron for threaded ferrous piping; bronze for copper or brass pipe soldered joints.

B. Pipe Size Over 2": 150 psi forged steel slip-on flanges for ferrous piping; bronze flanges for copper or brass piping; synthetic rubber gaskets for gas service; preformed synthetic rubber elsewhere.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Route pipes parallel with, or perpendicular to, building lines. Wherever possible, group together for easier service and identification.

B. Lines requiring a definite grade for drainage shall have precedence in routing over all other lines.

C. Wherever possible, hold horizontal and vertical lines as close as possible to walls, ceilings, struts, and members so as to occupy minimum space consistent with the proper requirements for insulation, expansion, removal of pipe and access to valves.

D. Arrange for concealment of all piping in finished area of buildings unless otherwise noted.

E. Work piping shall be placed without springing and/or forcing. Arrange all piping so as not to interfere with removal of other equipment or devices, nor to block access to doors, windows, manholes, or other access openings.

F. Install all piping so as to avoid liquid or air pockets throughout the work. Erect and pitch piping to ensure proper draining.

3.2 ASSEMBLY

A. Cut all pipes square and remove burr and cutting slag by reaming or other cleaning methods.

B. Use unions or flanges at all connections to all equipment to facilitate dismantling, and elsewhere as required, in the erection of pipe or installation of valves.

C. Make all joints and changes of direction with standard fittings. Bending of pipe will be permitted, providing a hydraulic bender is used. Use reducers at pipe size changes.

D. Install an insulating coupling between dissimilar metal fittings and/or pipe.

E. Use nipples or same material and composition as pipe on which they are installed. Use extra heavy type when un-threaded shoulder is less than 1-1/2". Do not use running thread nipples.

F. Make joints between steel or copper pipe and cast iron with caulking ferrules.

G. Assemble galvanized steel pipe with galvanized screwed fittings.

H. Assemble black steel pipe with screwed or welded fittings. Use Weld-O-Lets or Thread-O-Let fittings where branch outlet is at least one pipe size smaller than the main.

3.3 SLEEVES AND PLATES

A. Use sleeves where piping passes through exterior walls, floors, or roofs; where required for sealing to meet any sanitation codes, ordinances or laws, and areas where water may accumulate.

B. Use Schedule 40 pipe sleeves in concrete or masonry construction and where collapse is possible. Use minimum 22-gage sheet metal for other sleeves.

C. Use sleeves accommodating insulated pipe of sufficient diameter to pass piping and full size of insulation.

D. After all piping has been inserted in sleeves, fill voids between pipe or insulation and sleeve with a suitable non-run, non-stain mastic.

E. In fire barrier penetrations fire stopping shall be applied.

3.4 THERMAL EXPANSION

A. Use swing joints, turns, expansion loops or long off-sets where necessary to allow for expansion and contraction.

3.5 OPEN ENDS

A. Cap open ends of pipe, including vents, drains, equipment connections, and fixture connections to keep building material from entering the pipe and traps during construction.

3.6 NOISE CONTROL

A. Install piping free of any objectionable self-generated noise.

B. Isolate piping from building where required to prevent transmission of noise.

3.7 TESTING

A. Test all piping systems provided under this contract and obtain approval of the engineer before acceptance.

B. Test and inspect piping located underground before backfilling.

C. Furnish equipment and personnel required for these tests without additional cost. Use testing equipment as required for each particular test, with all equipment and gages accurate and in good working order.

D. Remove equipment subject to damage at given test pressure before pressure is applied. Use proper plugs or caps.

E. Refer to specific piping system specification for test pressure, duration and medium.

F. Perform all testing in accordance with the local and state plumbing codes.

G. Do not pressure test existing piping unless otherwise indicated.

END OF SECTION

SECTION 15090 - MECHANICAL SUPPORTING SYSTEMS

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Pipe hangers and supports.

B. Duct hangers and supports.

C. Equipment foundation supports.

1.2 RELATED WORK

A. Section 15010 - Basic Mechanical Requirements

B. Section 15350 - Natural Gas Piping Systems

C. Section 15603 - Split Air Conditioning and Heating Equipment

D. Section 15604 - Exhaust Fans

E. Section 15800 - Air Distribution

1.3 QUALITY ASSURANCE

A. Pipe Hangers and Supports: ASA Code for Pressure Piping, ANSI B31.1, and Manufacturer's Standardization Society Documents MSS-SP-58 AND MSS-SP-69.

B. Auxiliary Steel: Design in accordance with AISC Handbook.

1.4 SYSTEM DESCRIPTION

A. Provide adequate pipe, duct, stack and equipment foundation and suspension system in accordance with recognized engineering practices, using, where possible, standard commercial hangers and accessories.

B. Where thermal movement will occur, provide pipe hanger assembly capable of supporting the pipe hanger throughout the range of operating temperature. Perform weight balance calculations to determine the force at each hanger to prevent over stressing the pipe or connected equipment.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Empire Tool and Manufacturing Co., Manchester, Connecticut.

B. ITT Grinnell, Providence, Rhode Island.

C. Approved equal.

2.2 MATERIALS

A. Pipe Hangers and Supports:
   1. Pipe 2" and larger shall be furnished with means of adjustment.
   2. Uninsulated Steel Pipe:
      a. 2" and smaller: Grinnell Figures 97, 70, 138, or 260.
      b. 2" and larger: 2" and larger: Grinnell Figures 104, 108 or 212.

c. Riser Clamp: Grinnell Figure 261.

3. Insulated stationary steel pipe: Grinnell Figures 295 and 300.
4. Insulated steel pipe subject to longitudinal movement: Grinnell Figures 171, 177, 181, 174, 175. Use Figure 178 spring cushion hanger where pipe subject to vertical movement. Furnish pipe covering protection saddle at each support point.
5. Uninsulated Copper Tubing 2" and Under: Copper finished, two hole tubing strap (Empire Figure 231 CT), copper finished wire tubing hook (Empire Figure 235 CT), or copper finished.
6. Insulated Copper Tubing 2" and Under: Empire Figure 11, Figure 110, Figure 310, or Figure 31, sized for O.D. of pipe insulation. Provide pipe covering protection shield (Empire Figure 167) at each hanger.
7. Refrigerant Lines: Grinnell Figure 260 clevis hanger. On insulated lines, provide Empire Figure 167 protection shield at each hanger.
8. Cast Iron Pipe: Grinnell Figure 590 clevis hanger. On insulated pipes, provide Empire Figure 167 protection shield at each hanger.

B. Brackets and Racks: For welded steel brackets, furnish Grinnell Figures 194, 195, and 199. Fabricate pipe racks and trapeze hangers from adequately sized Unistrut channel clamps and accessories.

C. Rods:
1. Hanger Rods: Grinnell Figures 140 and 146.
2. Eye Rods: Grinnell Figures 248 and 278WL.

D. Attachments:
1. Concrete Inserts: Empire Figure 81 or Figure 2500.
2. Beam Clamps: Grinnell Figures 218, 229, 131, 292, 228, 224 and 228; or Figure 87 "C" clamp with locknut and retaining strap.
3. Welded Beam Attachments: Grinnell Figures 66.

PART 3 - EXECUTION

3.1 GENERAL

A. All pipes, both horizontal and vertical, shall be adequately supported from the building structural members. Each hanger shall be properly sized to fit supported pipe.

B. Install hangers, inserts and supports as indicated, in accordance with manufacturer's written instructions and in compliance with recognized industry practices.

C. Coordinate installation of supporting devices with other work. Arrange for grouping of parallel runs of horizontal pipes to be supported together on trapeze type hangers where possible.

D. Where small pipes are supported under bar joists, hanger rods may be extended through the space between the bottom angles and secured with a washer and two nuts.

E. Where larger pipes are supported beneath bar joist, hanger rods shall be secured to angle irons of adequate size. Each angle iron shall span across two or more joists, as required, to distribute the weight effectively. Anchor these angle irons to the joist.

F. Where pipes are supported under exposed steel beams, approved type beam clamps shall be used.

G. Unless otherwise indicated perforated strap or wire will not be acceptable as hanger or fastening.

H. Do not support piping or equipment from ceilings or ceiling support systems.

3.2 ATTACHING TO STRUCTURE

A. Where equipment or piping is supported from building steel beam, use clamps or welded beam attachments. Do not drill holes in building steel for hanger support rods.

B. Anchor mechanical supports to wood structural beams and truss with lag screws, wood screws, nails or other appropriately sized fasteners complying with industry standard.

3.3 HANGER RODS AND SPACING

A. Where hanger rod sizes are catalog-listed for a specified hanger, this size shall govern. Where hanger rod sizes are not catalog-listed, the load on the hanger shall be the determining factor and the maximum recommended hanger rod load as catalog-listed, shall govern.

B. Pipe hanger spacing shall not exceed:

Pipe Size	Steel Pipe	Copper Pipe	PVC
to 3/4"	7'	5'	3’
1" to 2"	10'	8'	4’
2-1/2" to 4"	12'	10'	6’

3.4 AUXILIARY STEEL

A. Furnish all miscellaneous structural members necessary to hang or support pipe or mechanical equipment. Material members shall be consistent with that of the main structural system.

B. Furnish all auxiliary steel with one shop coat of primer paint.

C. Arrange for any adjustment necessary in main structural system for proper support of major equipment.

3.5 CONCRETE PADS

A. Where shown on the Drawings, provide concrete pads under all floor-mounted equipment and apparatus. Reinforce pads with 6 x 6 x W1.4 x W1.4 W.W.F.

B. Construct pads nominal 4" thick, unless indicated otherwise on Drawings.

C. Concrete to be 3000 psi.

D. Where extending the size of an existing concrete pad, dowel existing section to new section with dowel rods at 18 inches on center. Dowels shall extend a minimum of 4 inches into existing pad and minimum of 2 inches into new pad.

3.6 CONCRETE INSERTS

A. Provide concrete inserts where mechanical equipment, pipes and pipe racks are supported from concrete. Install concrete inserts during placing of concrete at appropriate intervals and location.

B. Drilling and anchoring systems such as by Ramset may be used for support of miscellaneous pipe and duct work in existing concrete.

END OF SECTION

SECTION 15120 - VALVES

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Providing valves, cocks, and safety relief valves.

1.2 RELATED WORK

A. Section 15010 - Basic Mechanical Requirements

B. Section 15060 - Pipe and Pipe Fittings

C. Section 15190 - Mechanical Identification

D. Section 15350 - Natural Gas Piping Systems

PART 2 - PRODUCTS

2.1 GENERAL

A. Manufacturer: Nibco, Crane or Milwaukee.

2.2 BALL VALVES

A. Nibco T or S-580-70, 600 pound, WOG, 150 pound SWP. Teflon seats, 2 piece red bronze body, adjustable Teflon packing lever. Federal Specification WW-V-35.

2.3 GAS STOP COCKS

A. Nibco T-580-70 UL, or approved equal, 125 pound. WOG, bronze body, ball valve.

B. For 2-1/2" and larger sizes: Nibco F-918, flanged, 125 SWP, 200 WOG, bolted bonnet. MSS-SP71.

2.7 BALANCING COCK

A. Resun Figure R-1431 lubricated plug valve, 200 psi WOG, 125 psi SWP, flanged semi-steel body, cylindrical plug, wrench operated.

PART 3 - EXECUTION

3.1 ARRANGEMENT OR LOCATION

A. Locate valves in an accessible position or make accessible through access panel.

B. Where several valves are related as to function, group valves in a battery.

C. Do not install a valve with stem below horizontal position.

END OF SECTION

SECTION 15170 - MOTORS

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Providing electric motors.

1.2 STANDARDS COMPLIANCE

A. Comply with NFPA 70, "National Electrical Code."

B. NRTL Listing: Provide NRTL listed motors. The term "Listed" shall be as defined in "National Electrical Code," Article 100. Listing agency (NRTL) shall be a "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7.

C. Comply with NEMA MG 1, "Motors and Generators" requirements.

1.3 RELATED WORK

A. Section 15900 - Electric Controls

B. Section 16010 - Basic Electrical Requirements

PART 2 - PRODUCTS

2.1 All motors shall conform to the requirements shown below except as otherwise indicated.

A. Motors 1 HP and Larger: Polyphase.

B. Motors Smaller Than 3/4 HP & smaller: Single-phase, with internal thermal overload protection.

C. Frequency Rating: 60 Hz.

D. Voltage Rating: Determined by voltage of circuit to which motor is connected for the following motor voltage ratings (utilization voltages):
1. 120 V Circuit: 115 V - motor rating.
2. 208 V Circuit: 200 V - motor rating.
3. 240 V Circuit: 230 V - motor rating.
4. 480 V Circuit: 460 V - motor rating.

E. Service factors indicated for motors are minimum values and apply at frequency and utilization voltage at which motor is connected. Provide motors that will not operate in service factor range when supply voltage is within 10 percent of motor voltage rating.

F. Capacity: Sufficient to start and operate connected loads at designated speeds in indicated environment, and with indicated operating sequence, without exceeding nameplate ratings. Provide motors rated for continuous duty at 100 percent of rated capacity.

G. Temperature Rise: Based on 40 deg C ambient except as otherwise indicated.

H. Enclosure: Open dripproof.

2.2 Polyphase Motors shall be squirrel-cage induction-type conforming to the following requirements except as otherwise indicated.

A. NEMA Design Letter Designation: "B."

B. Multi-Speed Motors: Separate winding for each speed.

C. Energy Efficient Motors: Nominal efficiency equal to or greater than that stated in NEMA MG 1, table 12-6B for that type and rating of motor.

D. Variable Speed Motors for Use With Solid-State Drives: Energy efficient, squirrel-cage induction, design B units with ratings, characteristics, and features coordinated with and approved by drive manufacturer.

E. Internal Thermal Overload Protection For Motors: For motors so indicated, protection automatically opens control circuit arranged for external connection. Protection operates when winding temperature exceeds safe value calibrated to the temperature rating of the motor insulation.

F. Bearings: Double-shielded, prelubricated ball bearings suitable for radial and thrust loading of the application.

G. Rugged Duty Motors: Totally enclosed with 1.25 minimum service factor. Provide motors with regreasable bearings and equipped with capped relief vents. Insulate windings with nonhygroscopic material. External finish shall be chemical resistant paint over corrosion resistant primer. Provide integral condensate drains.

H. Motors for Reduced Inrush Starting: Coordinate with indicated reduced inrush controller type and with characteristics of driven equipment load. Provide required wiring leads in motor terminal box to suit control method.

2.3 Single-Phase Motors shall conform to the following requirements except as otherwise indicated.

A. Energy Efficient Motors: One of the following types as selected to suit the starting torque and other requirements of the specific motor application.
   1. Permanent Split Capacitor.

B. Overload Protection for Motors: Protection automatically opens the power supply circuit to the motor, or a control circuit arranged for external connection. Protection operates when winding temperature exceeds a safe value calibrated to the temperature rating of the motor insulation. Provide device that automatically resets when motor temperature returns to normal range except as otherwise indicated.

C. Bearings, belt connected motors and other motors with high radial forces on motor shaft shall be ball bearing type. Sealed, prelubricated sleeve bearings may be used for other single phase motors.

PART 3 - EXECUTION

3.1 Install field-installed motors in accordance with manufacturer's published instructions and the following:

A. Direct Connected Motors: Mount securely in accurate alignment.

B. Belt Drive Motors: Use adjustable motor mounting bases. Align pulleys and install belts. Use belts with correct cross section matching sheaves installed. Provide and install new adjustable drive sheave at each new motor. On multiple belt drives furnish and install matched belts. Adjust drives for belt tension in accordance with manufacturer’s recommendations.

END OF SECTION

SECTION 15190 - MECHANICAL IDENTIFICATION

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Identification of piping in mechanical spaces, unfinished spaces, and above lift out ceiling.

B. Tagging and scheduling of valves.

C. Labeling HVAC equipment and control system enclosures.

1.2 RELATED WORK

A. Section 15010 - Basic Mechanical Requirements

B. Section 15060 - Pipe and Pipe Fittings

C. Section 15350 - Natural Gas Piping System

D. Section 15603 – Split Air Conditioning and Heating Equipment

E. Section 15604 - Exhaust Fans

F. Section 15737 – Split System Air Conditioners

G. Section 15738 – Ductless Split Systems

H. Section 15782 - Packaged Gas Heating and Electric Cooling Units

1.3 SUBMITTALS

A. Submit one (1) sample of each pipe marker, nameplate and valve tag.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Pipe markers: Provide markers with printed words to include identification shown on legend on Drawings and described in these specifications. Markers shall be manufactured by *Seton* Company.

B. Nameplates:
   1. Provide laminated plastic nameplates.
   2. Nameplates to be white in color engraved with 1/4" (approximately) high upper case letters. Letters to be black in color.

PART 3 - EXECUTION

3.1 NAMEPLATES

A. Install nameplates on each enclosure related to the temperature control system. This includes enclosures for sensors, terminals, devices, control panel, time clock, etc.

B. Install nameplates on each piece of HVAC equipment including A/C units, heaters, fans, etc. Wording shall match the designation shown on the drawings unless otherwise directed.

C. Attach nameplates to enclosures with self-tapping sheet metal screws.

END OF SECTION

SECTION 15250 - MECHANICAL INSULATION SYSTEMS

PART 1 - GENERAL

1.1 WORK INCLUDES

A. Providing insulation systems for refrigerant piping, domestic water piping, storm drainage piping and HVAC ductwork/air devices.

1.2 RELATED WORK

A. Section 15010 - Basic Mechanical Requirements

B. Section 15401 - Domestic Water System

C. Section 15651 - Refrigerant Piping

D. Section 15800 - Air Distribution

1.3 JOB CONDITIONS

A. Deliver materials to job site in original non-broken factory packaging, labeled with manufacturer's density and thickness.

B. Perform work at ambient and equivalent temperatures as recommend by the adhesive manufacturer.

1.4 SUBMITTALS

A. Submit product data for the items listed below. Submittals shall consist of descriptive literature indicating performances, physical size features, options and other certified information indicating compliance with the specifications and drawings.

B. Submit manufacturer's installation instructions.

1.5 REFERENCES

A. ASTM E84.

B. ASTM E96.

C. ASTM B209.

PART 2 - PRODUCTS

2.1 GENERAL

A. Fire Ratings:
   1. All Insulation, Coverings, Lining, Adhesives, and Accessories: Non-combustible as per NFPA National Fire Code, Section 200.
   2. Ratings determined by Underwriter's Laboratories, Incorporated, Method of Surface Burning Characteristics of Building Materials.
   3. Ductwork in air distribution systems shall further conform to NFPA Standard 90A.
   4. Flame Spread Rating: 25 or less, ASTM E84.
   5. Smoke Developed: 50 or less, ASTM E84.
   6. Furnish mastics, coatings, and adhesives certified by the manufacturer as being non-flammable as received and fire-resistive when dry.

B. Mildew Resistance: Furnish mildew-proof insulation, coverings, and coatings.

C. Vapor Transmission: 0.20 perm inches, ASTM E96.

2.2 DUCTWORK - INTERNAL INSULATION

A. Internal rectangular duct insulation: Flexible, resilient duct liner manufactured from long glass fibers with black, fire-resistant coating on surface fibers, 1" thick, 1.5 pounds per cubic feet density, as manufactured by "Knauf" or equal.

2.4 DUCTWORK AND AIR DEVICES - EXTERNAL INSULATION

A. 2" thick (R-5) fiberglass blanket with Kraft-Foil-Scrim Vapor Barrier, Knauf Duct Wrap or equal.

2.5 REFRIGERANT PIPING INSULATION - FLEXIBLE ELASTOMERIC CELLULAR

A. Material: Flexible expanded closed-cell structure with smooth skin on both sides.
   1. Tubular Materials: ASTM C 534, Type I.
   2. Sheet Materials: ASTM C 534, Type II.

B. Thermal Conductivity: 0.30 average maximum at 75 deg F.

C. Coating: Water based latex enamel coating recommended by insulation manufacturer.

D. 1/2" thick unless otherwise indicated.

2.6 FIBERGLASS PIPING INSULATION, ABOVE GROUND INTERIOR

A. Insulate above ground interior piping with Owens-Corning Fiberglass Corporations' heavy density sectional fiberglass pipe insulation, with a white fire retardant embossed vapor barrier laminate ASJ (all service jacket). Thickness of insulation shall be as follows:
   1. Domestic Cold Water, Roof Drains and Miscellaneous Drains:
      a. All sizes: 1/2" thick.
   2. Domestic Hot Water:
      a. 2" and larger: 1-1/2" thick.
      b. 2" to 1-1/2": 1" thick.
      c. 1-1/4" and smaller: 1/2" thick.
   3. Pipe Runouts (12' in length or less), to individual coils, terminal units, etc., may be insulated with material 1/2" less thickness than that listed above. Note: Minimum insulation thickness; 1/2".

2.7 COVER AND ACCESSORIES

A. Aluminum Jacket:
   1. ASTM B209.
   2. Thickness: 0.016 inch, sheet material.
   3. Finish: Smooth.
   4. Joining: Longitudinal slip joints and 2 inch laps.
   5. Fittings: 0.016 inch thick die shaped fitting covers with factory attached protective liner.
   6. Metal Jacket Bands: 3/8 inch wide, 0.015 inch thick aluminum.

B. PVC Insulation Cover
   1. Thickness: .020 inches.
   2. Finish: Smooth.
   3. Color: White.
   4. Fittings: Pre-molded PVC.
   5. Joints: Solvent weld.

C. Canvas Cover
   1. Weight: 8-ounce.

2. Finish: Apply a smooth coat of Foster 82-42W lagging adhesive. Paint as specified under Division 9 section.
3. Color: White.
4. Fittings: Canvas

2.8 INSULATING CEMENTS

A. Mineral Fiber: ASTM C 195.
1. Thermal Conductivity: 1.0 average maximum at 500 deg F mean temperature.
2. Compressive Strength: 10 psi at 5 percent deformation.

B. Expanded or Exfoliated Vermiculite: ASTM C 196.
1. Thermal Conductivity: 1.10 average maximum at 500 deg F mean temperature.
2. Compressive Strength: 5 psi at 5 percent deformation.

C. Mineral Fiber, Hydraulic-Setting Insulating and Finishing Cement: ASTM C 449.
1. Thermal Conductivity: 1.2 average maximum at 400 deg F mean temperature.
2. Compressive Strength: 100 psi at 5 percent deformation.

2.9 ADHESIVES

A. Flexible Elastomeric Cellular Insulation Adhesive: Solvent-based, contact adhesive recommended by insulation manufacturer.

B. Lagging Adhesive: MIL-A-3316C, non-flammable adhesive in the following Classes and Grades:
1. Class 1, Grade A for bonding glass cloth and tape to unfaced glass fiber insulation, sealing edges of glass fiber insulation, and bonding lagging cloth to unfaced glass fiber insulation.
2. Class 2, Grade A for bonding glass fiber insulation for metal surfaces.

PART 3 - EXECUTION

3.1 GENERAL

A. Apply all insulation using experienced mechanics, regularly employed in the trade. Unless otherwise specified, apply insulation in accordance with the manufacturer's recommendations.

B. Install insulation through all structural members.

C. Test and clean systems before insulation is applied.

D. Insulate the backside of supply air devices unless factory insulated.

3.2 PIPING - INDOOR

A. Adhere jacket, horizontal jacket and end joint laps with white vapor adhesive (field and/or factory applied) and further secure with outward clinching type staples. On all cold insulation, coat the staples with white colored Foster 85-75 vapor barrier mastic to maintain the vapor seal. Insulate fittings with factory and/or field fabricated fittings with vapor barrier mastic and glass fabric reinforcement finished smooth and uniform. Adhere ends and butt joint strips over end joints with Foster 30-35 coating. Also, where factory adhesive system is used, apply a Foster 30-35 coating on all joints and seams.

B. Provide semi-circular protection saddles of #16 gage galvanized steel, twelve inches long for insulated piping where hanger occur. On pipe sizes two inches and over, provide twelve inches length of high density insulation at hangers. Secure saddles to insulation with tape or plastic ties.

C. Neatly point up all exposed ends of pipe insulation with appropriate insulating cement.

D. Insulate fittings (ells, tees), valves, strainers, and generally all piping components. Do not insulate interior pumps and expansion tanks.

E. Insulate bowl of roof drains and connected drain piping.

3.3 ADDITIONAL COVER

A. All piping (including valves and fittings) and equipment located in mechanical rooms or exposed spaces (such as the shop) shall receive an additional cover. Piping in crawl spaces or chases is not considered exposed. At Contractor's option, this additional cover shall be PVC or canvas.

3.4 DUCTWORK - GENERAL

A. Unless indicated otherwise, externally insulate ductwork.

B. Insulate supply, return and outside air ductwork.

C. Insulate the backside of supply air devices unless factory insulated.

3.5 DUCTWORK - INTERNAL INSULATED

A. Install duct liner by cutting side pieces of insulation to lap both top and bottom sections for maximum support.

B. Attach side pieces and bottom piece with adhesive. Provide 100% adhesive coverage.

C. After applying adhesive further secure insulation with Stic-Klip fasteners. Space one fastener per two square feet of insulation.

D. Batt edges of insulation with adhesive to insure a tight joint and provide a smooth surface. No "raw" edges of insulation are allowed.

3.6 DUCTWORK AND AIR DEVICES - EXTERNAL INSULATED

A. Butt tightly at joints. Overlap vapor barrier facing a minimum of two inches.

B. Remove insulation from overlaps.

C. Staple all vapor barrier seams six inches on center with outward clinching staples. Then seal with SMACNA Foil Vapor Barrier Tape or Vapor Barrier Mastic.

3.7 FLEXIBLE ELASTOMERIC CELLULAR PIPE INSULATION INSTALLATION

A. Slip insulation on the pipe before making connections wherever possible. Seal joints with adhesive. Where the slip-on technique is not possible, cut one side longitudinally and apply to the pipe. Seal seams and joints with adhesive.

B. Valves, Fittings, and Flanges: Cut insulation segments from pipe or sheet insulation. Bond to valve, fitting, and flange and seal joints with adhesive.
   1. Miter cut materials to cover soldered elbows and tees.
   2. Fabricate sleeve fitting covers from flexible elastomeric cellular insulation for screwed valves, fittings, and specialties. Miter cut materials. Overlap adjoining pipe insulation.
   3. Coating shall be applied to exterior insulation. Apply 2 coats.

C. Apply 2 coats of coating on exterior portions of the insulation.

END OF SECTION

SECTION 15330 - WET-PIPE SPRINKLER SYSTEMS

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 specifies wet-pipe sprinkler systems for buildings and structures.

B. Provide a complete building wet pipe sprinkler system in compliance with the NFPA 13, The State Fire Prevention Code, The State and Local Health Department Codes, and the City Codes.

C. The Contractor shall be responsible for all aspects of the system including design, approval, installation and testing.

1.3 RELATED SECTIONS: The following Sections contain requirements that relate to this Section:

A. Section 15010 - Basic Mechanical Requirements

B. Section 15060 - Pipe and Pipe Fittings

C. Division 10 Section "Fire Extinguishers, Cabinets, and Accessories" for fire extinguishers and cabinets.

D. Division 16 Section "Fire Alarm Systems" for alarm devices not specified in this Section.

E. Division 7 Section 07270 "Fire Stopping" for Fire Barrier Sealers

1.4 CODES

A. All work must comply with the requirements of the Arkansas health Department, Arkansas State Fire Marshal, and local jurisdictional authorities.

B. This Contractor shall pay for all permits, fees, licenses, patents and certificates of approval.

C. All systems shall comply with the latest editions of NFPA pamphlets 13 & 14. This contractor shall include all labor and material to meet these standards even if not implicitly indicated on the plans or in the specifications.

D. The drawings and specifications shall take precedence over these codes only when their requirements are greater than those of NFPA, but not when less.

1.5 DEFINITIONS

A. Pipe sizes used in this Section are nominal pipe size (NPS) specified in inches. Tube sizes are standard tube size specified in inches. Equivalent or approximate SI (metric) sizes are indicated in millimeters (mm) in parentheses.
   1. Working plans as used in this Section refer to documents (including drawings and calculations) prepared pursuant to requirements in NFPA 13 for obtaining approval of authority having jurisdiction.
   2. Other definitions for fire protection systems are included in referenced NFPA standards.

1.6 SYSTEM DESCRIPTION

A. Wet-Pipe Sprinkler System: System with automatic sprinklers attached to piping system containing water and connected to water supply so that water discharges immediately from sprinklers when they are opened by fire.

B. Sprinkler System Protection Limits: All spaces within areas indicated. Include closets, toilet and locker room areas, each landing of each stair, and special applications areas.
   1. Exception: Areas with other fire extinguishing systems and areas indicated to be without sprinkler protection.

1.7 SYSTEM PERFORMANCE REQUIREMENTS

A. Design and obtain approval from authority having jurisdiction for fire protection systems specified.

B. Conduct fire hydrant flow tests as required to obtain hydraulic data needed to prepare design for hydraulically calculated systems.

C. Hydraulically design sprinkler systems according to NFPA 13.
   1. Components and Installation: Capable of producing piping systems with the following minimum working pressure ratings except where indicated otherwise.
      a. Sprinkler Systems: 175 psig (1200 kPa).

   2. Hydraulic Calculations shall maintain a minimum of 10 PSI safety margin between the available water supply and the required water system supply.

1.8 SUBMITTALS

A. WORKING PLANS
   1. Provide in 1/8 inch scale. The submittal shall include six bond sets and one electronic set on disk in PDF format of all floor plans detailing sprinkler layout and exact pipe routing.
   2. The submittal shall also include 6 sets of Hydraulic calculations and manufacturers data on all products used in the sprinkler system.
   3. These drawings shall be submitted to all applicable authorities, including the Insurance underwriter approval authority. After receiving these approvals, send all submittals to the engineer for review and approval prior to commencing work.

B. Product data for fire protection system components. Include the following:
   1. Backflow preventers.
      a. Valves.
      b. Specialty valves, accessories, and devices.
      c. Alarm devices. Include electrical data.
      d. Fire department connections. Include type of fire department connection; number, size, type, and arrangement of inlets; size and direction of outlet; and finish.
      e. Excess pressure pumps. Include electrical data.
      f. Sprinklers, escutcheons, and guards. Include sprinkler flow characteristics, mounting, finish, and other data.

C. Sprinkler system drawings identified as "working plans," prepared according to NFPA 13. Submit required number of sets to authority having jurisdiction for review, comment, and approval. Include system hydraulic calculations.

D. Test reports and certificates as described in NFPA 13. Include "Contractor's Material & Test Certificate for Aboveground Piping" and "Contractor's Material & Test Certificate for Underground Piping."

E. Maintenance data for each type of fire protection specialty specified, for inclusion in "Operating and Maintenance Manual" specified in Division 1 Section "Project Closeout."
   1. 2 copies of NFPA 13A "Recommended Practice for the Inspection, Testing and Maintenance of Sprinkler Systems." Deliver to Owner's maintenance personnel.

1.9 QUALITY ASSURANCE

A. Manufacturer Qualifications: Firms whose equipment, specialties, and accessories are listed by product name and manufacturer in UL Fire Protection Equipment Directory and FM Approval Guide and that conform to other requirements indicated.

B. Listing/Approval Stamp, Label, or Other Marking: On equipment, specialties, and accessories made to specified standards.

C. Listing and Labeling: Equipment, specialties, and accessories that are listed and labeled.
   1. The Terms "Listed" and "Labeled": As defined in "National Electrical Code," Article 100.

D. Comply with requirements of authority having jurisdiction for submittals, approvals, materials, hose threads, installation, inspections, and testing.

E. Comply with requirements of Owner's insurance underwriter for submittals, approvals, materials, installation, inspections, and testing.

F. Installer's Qualifications: Qualified firms shall include those who:
   1. Specialize in NFPA 13 sprinkler system design and installation.
   2. Are experienced (minimum of 5 previous projects similar in size and scope to this project) in such work, familiar with precautions required, and in compliance with the requirements of the authority having jurisdiction.
   3. Designers, supervisors and installers shall have the appropriate level of NICET certification. Submit evidence of qualifications to the Architect upon request.

G. NFPA Standards: Equipment, specialties, accessories, installation, and testing complying with the following:
   1. NFPA 13 "Standard for the Installation of Sprinkler Systems."
   2. NFPA 26 "Recommended Practice for the Supervision of Valves Controlling Water Supplies for Fire Protection."
   3. NFPA 70 "National Electrical Code."

PART 2 - PRODUCTS

2.1 GENERAL

A. All materials and equipment under this section of the specifications shall be listed by U.L. & F.M. for fire protection service installation.

2.2 PIPE AND FITTINGS

A. Steel pipe shall be used in accordance with NFPA 13.

B. Fitting shall be screwed 2" and below, and welded above 2", except where flanges may be required. Fitting shall be class 175.

C. Mechanical couplings and tees of the roll-grooved type by Victaulic, Gustin-Bacon, or Ward will be acceptable in lieu of threaded and/or welded piping, if U.L./F.M. listed and acceptable to all authorities involved.

D. Piping underground shall be class 50 ductile iron, with class 175 fittings and concrete thrust blocks at all changes in directions.

2.3 HANGERS AND SUPPORTS

A. Horizontal hangers shall be Grinnell figure 260, Tolco figure 1, Elcen figure 12.

2.4 FIRE PROTECTION SERVICE VALVES

A. General: UL-listed and FM-approved, with 175-psig (1200 kPa) non-shock minimum working pressure rating.
   1. Option: Valves for use with grooved piping may be grooved type.
   2. Gate Valves, 2 Inches (50 mm) and Smaller: UL 262, cast-bronze, threaded ends, solid wedge, outside screw and yoke, rising stem.
   3. Indicating Valves, 2-1/2 Inches (65 mm) and Smaller: Butterfly or ball type, bronze body with threaded ends, and integral indicating device.
      a. Indicator: Electrical 115 volts a.c., pre-wired, single-circuit, supervisory switch.
   4. Gate Valves, 2-1/2 Inches (65 mm) and Larger: UL 262, iron body, bronze mounted, taper wedge, outside screw and yoke, rising stem. Include replaceable, bronze, wedge facing rings and flanged ends.
   5. Gate Valves, 2-1/2 Inches (65 mm) and Larger for Use with Indicator Posts: UL 262, iron body, bronze mounted, solid wedge disc, non-rising stem with operating nut and flanged ends.
   6. Indicator Posts: UL 789, wall type, cast-iron body, with windows for target plates that indicate valve position, extension rod and coupling, locking device, and red enamel finish.
      a. Operation: Hand wheel.
   7. Swing Check Valves, 2-1/2 Inches (65 mm) and Larger: UL 312, cast-iron body and bolted cap, with bronze disc or cast-iron disc with bronze disc ring and flanged ends.
   8. Butterfly Check Valves, 4 Inches (100 mm) and Larger: UL 312, split-clapper style, cast-iron body with rubber seal, bronze alloy discs, stainless-steel spring and hinge pin.

2.5 SPECIALTY VALVES

A. Alarm Check Valves: UL 193, 175-psig (1200 kPa) working pressure, designed for horizontal or vertical installation, with cast-iron, flanged inlet and outlet, bronze grooved seat with O-ring seals, and single-hinge pin and latch design. Include trim sets for bypass, drain, electric sprinkler alarm switch, pressure gages, precision retarding chamber, and fill line attachment with strainer.

B. Ball Drip Valves: UL 1726, automatic drain valve, 3/4-inch (20 mm) size, spring-loaded, ball check device with threaded ends.

C. Detector Check Valves: UL 213, galvanized cast-iron body, bolted cover with air bleed device for access to internal parts, and flanged ends; designed for 175-psig (1200 kPa) working pressure. Include 1-piece bronze disc with bronze bushings, pivot, and replaceable seat. Include threaded bypass taps in the inlet and outlet for bypass meter connection. Set valve to allow minimal water flow through bypass meter when major water flow is required.

2.6 BACKFLOW PREVENTERS

A. General: ASSE standard backflow preventers, of size indicated for maximum flow rate indicated and maximum pressure loss indicated.
   1. Working Pressure: 300 psi minimum except where indicated otherwise.
   2. Bronze, cast-iron, steel, or stainless-steel body with flanged ends.
   3. Interior Lining: FDA-approved epoxy coating, for backflow preventers having cast-iron or steel ody.
   4. Interior Components: Corrosion-resistant materials.
   5. Strainer on inlet, where strainer is indicated.

B. Double-Check Detector Assembly Backflow Preventers: UL 312 and ASSE 1048, consisting of OS&Y gate valves on inlet and outlet and strainer on inlet. Include 2 positive-seating check valves and test cocks, and bypass with displacement-type water meter, valves, and double-check backflow preventer, for continuous pressure application.
   1. Pressure Loss: 5 psig (35 kPa) maximum, through middle third of flow range.

2.7 SPRINKLERS

A. General: Viking Models with brass construction K=5.5, temperature rating = 155° F in all areas except penthouse/attic where they are rated at 200° F. Similar and equal Star, Reliable or Central sprinklers will be allowed.

B. Sprinkler types and categories are as indicated and as required by application. Furnish automatic sprinklers with nominal 1/2-inch (12.7 mm) orifice for "Ordinary" temperature classification rating except where otherwise indicated and required by application.

C. Recessed chrome pendant heads and chrome escutcheon plates shall be used in all areas with finished ceilings, i.e., offices, toilets, corridors, etc. All other unfinished areas shall have upright regular heads. In the event that conditions prohibit upright heads, pendant heads may be installed provided they are equipped with guard cages. Provide head guards on all sprinklers within 7'-0" of floor and in rooms where sprinklers are subject to physical damage.

D. Wall Mounting: Sidewall sprinklers.

E. Spaces Subject to Freezing: Upright, pendent dry-type, and sidewall dry-type sprinklers.

F. Accessories
   1. Furnish and install at the sprinkler risers, a 24 head sprinkler cabinet complete with 2 sprinkler wrenches, and 24 extra sprinklers (a minimum of 3 of each type installed).

2.8 FIRE DEPARTMENT CONNECTION

A. Furnish and install a fire department connection as indicated on the plans with a 4 inch check valve with automatic ball drip valve. Fire department connection shall be top outlet, cast brass, two way inlet, with drop clappers, complete with Escutcheon Plate, plugs and chains. Escutcheon Plate to be marked "Auto Spkr." Finish shall be light brown brass. Threads shall conform to local fire department standards. The connection shall be by the following manufactures:

Manufacturer	Model Number
Potter-Roemer	5023
Crocker Standard	229

2.9 INSPECTORS TEST CONNECTIONS

A. Furnish and install inspector's test connections at the most remote sprinkler branch line, where shown on plans, or where required by NFPA 13. Test connections shall be furnished with a calibrated orifice to simulate the flow of one sprinkler head and shall terminate in a floor drain or mop sink. Test connections shall be clearly marked. Where test connections terminate indoors, provide approved site test connection with calibrated orifice equal to flow of one sprinkler head. AGF Test and Drain Model 1000.

2.10 AUXILIARY DRAINS

A. Auxiliary drains shall consist of plugs and globe valves, and shall be installed where system points are trapped cannot be drained back to a main. Drains shall be piped to nearest floor drain or mop sink. Drains shall be clearly labeled with appropriate signage.

2.11 ALARM DEVICES

A. Alarm Devices: Types and sizes that will match piping and equipment connections.

B. Audio-Visual Alarms: Furnish and install an audio-visual alarm at the fire alarm valve located at the exterior of the building, near the Siamese connection. Alarms shall be of the flashing type, flush mounted, and completely enclosed for exterior use, with Xenon Flash Tube. Sound output shall be 94DB, minimum at 10'. Alarm shall be equal to Gamewall 70674 with model 68454 backbox.

C. Waterflow Indicators: UL 346, electrical-supervision type, vane-type waterflow detector, rated to 250 psig (1725 kPa), and designed for horizontal or vertical installation. Include 2 SPDT (single-pole, double-throw) circuit switches to provide isolated alarm and auxiliary contacts, 7 ampere, 125 volts a.c. (7 A, 125 V a.c.) and 0.25 ampere, 24 volts d.c. (0.25 A, 24 V d.c.); complete with factory-set, field-adjustable retard element to prevent false signals, and tamper-proof cover that sends a signal when cover is removed.

D. Pressure Switches: UL 753, waterflow switch with retard, electrical-supervision type, SPDT (single-pole, double-throw), normally closed contacts, designed to operate on rising pressure and signal water flow.

E. Supervisory Switches: UL 753, for valves, electrical-supervision type, SPDT (single-pole, double-throw), normally closed contacts, designed to signal controlled valve in other than full open position.

F. Supervisory Switches: UL 753, for indicator posts, electrical-supervision type, SPDT (single-pole, double throw), normally closed contacts, designed to signal controlled valve in other than full open position.

2.12 PRESSURE GAGES

A. Pressure Gages: UL 393, 3-1/2 to 4-1/2 inches (90 to 115 mm) diameter dial, with dial range of 0-250 psig (0-1600 kPa).

2.13 SIGNS

A. Enameled metal signs shall be securely attached to all main drains, test connections, control valves, and alarms. Signs shall also be attached at all risers indicated riser number, density, system demand, and system number. A graphic diagram indicating areas protected by the system, and the corresponding riser numbers shall be attached to the wall at the risers within a frame protected by Plexiglass.

PART 3 - EXECUTION

3.1 GENERAL

A. Review all spaces in field prior to initiating any work for determining proper head locations and coverage.

3.2 COORDINATION WITH OTHER TRADES

A. Contractor shall carefully plan and coordinate the sprinkler piping layout and installation with the other trades.

B. Typically, routing of ductwork, and plumbing drainage lines shall take precedence over the routing of sprinkler related piping.

C. In the event of equipment, duct and/or piping conflicts, Contractor shall be cooperative and available to relocate piping.

3.3 ELECTRICAL CONNECTIONS

A. Conduits and wiring for alarm contacts, all power wiring from the starter to motors, and to the starters, shall be provided and wired complete by this contractor or his electrical subcontractor.

3.4 PIPING

A. Install all piping in complete accordance with NFPA standards. Pitch horizontal piping to allow it to drain at designated drain valves, and to allow it to be tested and easily emptied of water.

B. Support all piping independently from the structure using approved hangers and accessories.

3.5 TESTING

A. All portions of the system shall be Hydrostatically tested in accordance with NFPA.

B. All alarms shall be tested to assure proper operation.

C. All equipment required for testing (except water and electricity) shall be by this contractor.

D. Any deficiencies noticed in the tests will be promptly corrected by this contractor.

E. A report of all tests shall be submitted to the engineer for review prior to final acceptance.

3.6 CLEANING

A. After piping has been installed, and before system is put in service flush entire system in accordance with NFPA to remove any foreign substance.

B. Continue flushing until water is clear, and check sprinkler heads to assure debris has not clogged them.

3.7 CLOSE OUT: Before application for final payment is requested the contractor is to provide all requirements set forth by the General Conditions of the Specifications and deliver to the engineer of record (Architectural Engineering Consultants) the following:

A. One (1) full set of "AS BUILT" drawings. Provide "DBX As Built Drawings" cabinet, size D, by Space Age Electronics. Field locate cabinet adjacent to fire riser.

B. One (1) full set of Operating and Maintenance Manuals.

C. One (1) full set of applicable and executed test certificates for each system.

D. One (1) full set of electronic files (.dwg format) containing all fire protection shop drawings used in the performance of the contract. These files shall match the "AS BUILT" drawings stated in Section A above.

E. On-site training of owner specified personnel shall be coordinated through the General Contractor. Training session(s) shall be provided in order to familiarize the owner with the various operations of the systems installed. The sprinkler contractor shall direct and illustrate to the owner the function of the various sprinkler valves in his facility. The sprinkler contractor is to show the owner the location of all control valves and drain valves as well as illustrate these valves specifically. Upon completion of the training session the sprinkler contractor shall provide a letter to the owner for his signature containing the content of the training session. This letter shall be forwarded to the engineer of record and include dates of training and attendees' signatures.

END OF SECTION

SECTION 15350
FUEL PIPING SYSTEM

PART 1 GENERAL

1.1 SUMMARY

A. Section includes LP gas piping, fittings, and valves.

1.2 RELATED SECTIONS

A. Section 15050 – Basic Mechanical Materials and Methods

1.3 REFERENCES

A. ASME B16.3 (American Society of Mechanical Engineers) - Malleable Iron Threaded Fittings.

B. ASME/ANSI B16.5 (American Society of Mechanical Engineers) - Pipe Flanges and Flanged Fittings NPS 1/2 Through NPS 24.

C. ASME B16.9 (American Society of Mechanical Engineers) - Factory-Made Wrought Steel Buttwelding Fittings

D. ASME B16.11 (American Society of Mechanical Engineers) - Forged Fittings, Socket-Welding And Threaded

E. ASME/ANSI B16.39 (American Society of Mechanical Engineers) - Malleable Iron Threaded Pipe Unions Classes 150, 250 And 300.

F. ASME B31.9 - Building Service Piping.

G. ASME BPVC SEC VIII D1 (American Society of Mechanical Engineers) - Boiler and Pressure Vessel Code: Section VIII Pressure Vessels, Division 1.

H. ASTM A53 - Pipe, Steel, Black and Hot-Dipped Zinc Coated, Welded and Seamless.

I. ASTM D2513 - Thermoplastic Gas Pressure Pipe, Tubing and Fittings.

J. AWWA C105 (American Water Works Association) - Polyethylene Encasement for Ductile Iron Piping for Water and Other Liquids.

K. MSS SP58 (Manufacturers Standardization Society of the Valve and Fittings Industry) - Pipe Hangers and Supports - Materials, Design and Manufacture.

L. MSS SP69 (Manufacturers Standardization Society of the Valve and Fittings Industry) - Pipe Hangers and Supports - Selection and Application.

M. MSS SP89 (Manufacturers Standardization Society of the Valve and Fittings Industry) - Pipe Hangers and Supports - Fabrication and Installation Practices.

N. NACE RP-01-69 (NACE International) - Control of External Corrosion on Underground or Submerged Piping Systems.

O. NFPA 30 (National Fire Protection Association) - Flammable and Combustible Liquids Code.

P. NFPA 54 (National Fire Protection Association) - National Fuel Gas Code.

Q. UL 1479 (Underwriters Laboratories, Inc.) - Fire Tests of Through-Penetration Firestops.

1.4 SUBMITTALS

A. Division 01 - Submittal Procedures: Submittal procedures.

B. Shop Drawings: Indicate system layout, pipe sizes, location, and elevations.

C. Product Data: Submit data on pipe materials, pipe fittings, valves and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.

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

1.5 CLOSEOUT SUBMITTALS

A. Division 01 - Execution Requirements: Closeout procedures.

B. Project Record Documents: Record actual locations of piping system and system components.

C. Operation and Maintenance Data: Submit installation instructions and spare parts lists.

1.6 QUALITY ASSURANCE

A. Perform Work in accordance with Arkansas Fuel Gas Code.

1.7 QUALIFICATIONS

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

B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Division 01 - Product Requirements: Product storage and handling requirements.

B. Accept valves on site in shipping containers with labeling in place. Inspect for damage.

C. Protect piping and fittings from soil and debris with temporary end caps and closures. Maintain in place until installation. Provide temporary protective coating on steel valves.

1.9 ENVIRONMENTAL REQUIREMENTS

A. Division 01 - Product Requirements.

B. Do not install underground piping when bedding is wet or frozen.

1.10 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.11 WARRANTY

A. Division 01 Execution Requirements: Product warranties and product bonds.

B. Provide five-year manufacturer warranty for pumps and valves excluding packing.

PART 2 PRODUCTS

2.1 LP GAS PIPING, BURIED BEYOND 5 FEET OF BUILDING

A. Polyethylene Pipe: ASTM D2513, SDR 11, listed and labeled for fuel gas service.
   1. Fittings: ASTM D2683 or ASTM D2513 socket type.
   2. Joints: Fusion welded.

2.2 LP GAS PIPING, BURIED WITHIN 5 FEET OF BUILDING

A. Polyethylene Pipe: ASTM D2513, SDR 11, listed and labeled for fuel gas service.
   1. Fittings: ASTM D2683 or ASTM D2513 socket type.
   2. Joints: Fusion welded.

2.3 LP GAS PIPING, ABOVE GRADE

A. Steel Pipe:
   1. Pipe sizes to 2 inches: ASTM A53 Schedule 40, black, threaded ends.
   2. Pipe sizes over 2 inches: ASTM A53 schedule 40, black, plain end beveled for welding.

2.4 STAINLESS STEEL FLEXIBLE TUBING (FINAL CONNECTIONS TO EQUIPMENT ON BUILDING INTERIOR ONLY)

A. Tubing: ASTM A240, Type 300 Stainless Steel corrugated tubing with ASTM E84 compliant 10 mil polyethylene jacketing.

2.5 TRACER WIRE

A. Manufacturer: Copperhead Industries

B. Description: Direct burial #14 AWG solid (0.0641-inch conductor diameter), 21% conductivity annealed copper-clad high carbon steel high strength tracer wire, 230# average tensile break load, 30 mil. high molecular weight-high density yellow polyethylene jacket complying with ASTM D-1248, 30 volt rating.

C. Splice Kits: By tracer wire manufacturer.

2.6 FLANGES, UNIONS, AND COUPLINGS

A. Threaded Fittings: ASME B16.3, malleable iron.

B. Butt-Welding Fittings: ASME B16.9, with backing rings of compatible material.

C. Socket-Welding Fittings: ASME B16.11, forged steel.

D. Unions: ASME/ANSI B16.39, black malleable iron.

E. Flanges and Flanged Fittings: ASME/ANSI B16.5 steel flanges or convoluted steel flanges conforming to ASME BPVC SEC VIII D1. Flange faces shall have integral grooves of rectangular cross sections that afford containment for self-energizing gasket material.

2.7 PIPE HANGERS AND SUPPORTS

A. Conform to NFPA 31, MSS SP58, MSS SP69, and MSS SP89.

B. Uninsulated pipes 2 inches and smaller:
1. Adjustable steel swivel ring (band type) hanger.
2. Adjustable steel swivel J-hanger.
3. Adjustable steel clevis hanger.

C. Uninsulated pipes 2-1/2 inches and larger:
1. Adjustable steel clevis hanger.
2. Pipe roll with sockets.
3. Adjustable steel yoke pipe roll.

D. Multiple or Trapeze Hangers: 12 gauge roll formed steel channel, 1-5/8 inch X 1-5/8 inch minimum.

E. Wall Support for Pipe Sizes to 3 inches:
   1. Carbon steel hook.
   2. Carbon steel J-hanger.

F. Wall Support for Pipe Sizes 4 inches and Over: Welded steel brackets, roller chair or adjustable steel yoke pipe roll. Provide pipe protection shield or saddles on insulated lines.

G. Vertical Support: Steel riser clamp sized to fit outside diameter of pipe.

H. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.

2.8 VALVES

A. Provide materials in accordance with Arkansas Fuel Gas Code. Valves shall be certified by the American Gas Association.

PART 3 EXECUTION

3.1 EXAMINATION

A. Division 01- Administrative Requirements: Coordination and project conditions.

B. Verify that excavations are to required grade, dry, and not over-excavated.

3.2 PREPARATION

A. Ream pipe and tube ends. Remove burrs.

B. Remove scale and dirt, on inside and outside, before assembly.

C. Prepare piping connections to equipment with flanges or unions.

3.3 INSTALLATION

A. Contractor shall verify the primary regulator pressure at the existing LP storage tank to properly determine the appropriate secondary regulator needed for the scope of work of this project.

B. Provide anodeless riser at below grade to above grade transition of polyethylene to steel gas piping.

C. Provide tracer wire on all underground polyethylene piping as specified herein. Install and tracer wire including splice kits and test entire system for continuity in strict accordance with the tracer wire manufacturer’s instructions.

D. Provide non-conducting dielectric connections wherever jointing dissimilar metals. Install to NACE RP-01-69.

E. Route piping in orderly manner and maintain gradient.

F. Install piping to conserve building space and not interfere with use of space.

G. Group piping whenever practical at common elevations.

H. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

I. Provide clearance for access to valves and fittings.

J. Provide access where valves and fittings are not exposed.

K. Establish elevations of buried piping outside the building to ensure not less than 12 inches of cover.

L. Where pipe support members are welded to structural building framing, scrape, brush clean, weld, and apply one coat of zinc rich primer.

M. Provide support for utility meters in accordance with requirements of utility companies.

N. Pipe vents from gas pressure reducing valves to outdoors and terminate in weatherproof hood.

O. Prepare pipe, fittings, supports, and accessories not pre-finished, ready for finish painting. Unless otherwise waived by owner, all interior gas piping exposed to view shall be painted black with (2) coats of epoxy paint. Exterior gas piping shall be painted yellow with (2) coats of epoxy paint.

P. Identify piping systems including underground piping.

Q. Install valves with stems upright or horizontal, not inverted.

R. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

S. If necessary, provide new gas service complete with gas meter and regulators, in accordance with all State and Local Codes. Coordinate as required with local utility company. Contractor shall be responsible for all associated service and connection fees, including meter fee.

T. Final connections to equipment located on the building interior only may be made utilizing stainless steel flexible tubing as specified here-in. Maximum length shall be 24-inches. All final equipment connections on the building exterior shall be made with rigid piping.

U. Provide listed shut-off valve, union and min. 6-inch dirt leg at branch connections to individual pieces of equipment served.

3.4 SCHEDULES

PIPE HANGER SPACING
(Per MSS SP-69, Tables 3 and 4)

A. Horizontal Steel Piping:

Pipe Size (Inches)	Hanger Spacing (Max.)	Hanger Rod (Diameter)
1/2 to 1-1/4	7	3/8
1-1/2	9	3/8
2	10	3/8
2-1/2	11	1/2
3	11	1/2
4	14	5/8

END OF SECTION

SECTION 15604 - EXHAUST FANS

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Exhaust fans.

1.2 RELATED WORK

A. Section 15010 - Basic Mechanical Requirements

B. Section 15090 - Mechanical Supporting Systems

C. Section 15190 - Mechanical Identification

D. Section 15800 - Air Distribution

E. Section 15900 - Controls

1.3 QUALITY CONTROL

A. Testing Requirements: The following factory tests are required for fans:
   1. Sound Power Level Ratings: Comply with AMCA Standard 301 "Method for Calculating Fan Sound Ratings From Laboratory Test Data." Test fans in accordance with AMCA Standard 300 "Test Code for Sound Rating." Fans shall be licensed to bear the AMCA Certified Sound Ratings Seal.
   2. Fan Performance Ratings: Establish flow rate, pressure, power, air density, speed of rotation, and efficiency by factory tests and ratings in accordance with AMCA Standard 210/ASHRAE Standard 51 - Laboratory Methods of Testing Fans for Rating.

1.4 SUBMITTALS

A. Provide product data for the items listed below. Include descriptive literature indicating performances, physical size, features, options, and other certified data indicating compliance with the specifications.
   1. Exhaust Fans.

PART 2 - PRODUCTS

2.1 APPROVED MANUFACTURERS

A. Loren Cook.

B. Greenheck.

C. Acme.

D. Penn Barry.

2.2 CENTRIFUGAL VENTILATORS

A. General Description:
   1. Provide fans that are factory fabricated and assembled, factory tested, and factory finished with indicated capacities and characteristics.
   2. Belt-driven or direct-drive as indicated, centrifugal consisting of housing, wheel, fan shaft, bearings, motor and disconnect switch, drive assembly, curb base, and accessories.

B. Housing: Heavy-gage, removable, spun-aluminum, dome top and outlet baffle; square, one-piece, hinged aluminum base with venturi inlet cone.

C. Fan Wheel: Aluminum hub and wheel with backward-inclined blades.

D. Accessories: The following items are required as indicated:
   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, 16-gage, aluminum or brass wire.
   3. Dampers: Counterbalanced, parallel-blade, backdraft dampers mounted in curb base, factory set to close when fan stops.
      a. Blades: Die-formed sheet aluminum.
      b. Frame: Extruded aluminum, with waterproof, felt blade seals.
      c. Linkage: Nonferrous metals, connecting blades to counter weight or operator.
   4. Roof Curbs: By fan manufacturer.
   5. Variable-Speed Controller: Solid-state control to reduce speed from 100% to less than 50%.

2.3 CEILING EXHAUST FANS

A. Provide bathroom exhaust fans as indicated on the drawings:
   1. Fans to be UL listed and certified by AMCA.
   2. Minimum sizes and capacities: Refer to HVAC schedule on drawings.
   3. Lubricated fan motor to be cushioned with vibration isolators.
   4. Blower wheel to be balanced.
   5. Housing to be of painted steel or silver anodized aluminum.
   6. Provide decorative ceiling grille.

2.4 MOTORS

A. Motors required in connection with equipment shall be of sufficient size and speed for duty to be performed, not exceeding their full-rated load when drive equipment is operated at specified capacity under most severe conditions likely to be encountered.

B. Motors 3/4 HP and smaller shall have integral, internal thermal protection.

2.5 DRIVES

A. All equipment drives shall be direct drives unless scheduled otherwise.

2.6 GUARDS

A. Equip all exposed rotating machinery with guards.

PART 3 - EXECUTION

3.1 VIBRATION ISOLATION

A. Mount all equipment subject to vibration on vibration elimination neoprene pads or spring isolators. Comply with minimum static deflections recommended by ASHRAE, for selection and application of vibration isolation materials and units as indicated.

B. Except as otherwise indicated, comply with manufacturer's instructions for installation and load application to vibration control materials and units. Adjust to ensure that units have equal deflection, do not bottom out under loading, and are not short-circuited by other contacts or bearing points. Remove space blocks and similar devices intended for temporary support during installation.

C. Except as otherwise indicated, select vibration control products in accordance with ASHRAE Handbook, 1980 Systems Volume, Chapter 35 "Sound and Vibration Control", Table 27. Also, comply with manufacturer's recommendations for selection and application of vibration isolation materials and units. Where more than one type of product is offered, selection is Installer's option.

3.2 INSTALLATION

A. Secure roof-mounted fans to roof curbs with cadmium-plated hardware.

B. Arrange installation of units to provide access space around equipment for service and maintenance.

C. Duct installations and connections are specified in other Division 15 sections.

END OF SECTION

SECTION 15651 - REFRIGERANT PIPING

PART 1 - GENERAL

1.1 WORK INCLUDED

A. System consisting of a complete refrigerant piping system for each split D/X air conditioning system.

1.2 RELATED WORK

A. Section 15010 -Basic Mechanical Requirements

B. Section 15060 - Pipe and Pipe Fittings

C. Section 15090 - Mechanical Supporting Systems

D. Section 15250 - Mechanical Insulation Systems

E. Section 15737 - Split System Air Conditioners

F. Section 15738 – Ductless Split System Units

PART 2 - PRODUCTS

2.1 MATERIALS

A. Freon piping, including liquid, suction, and hot gas lines:
   1. 3/4" and Less: Soft temper, 50 feet refrigeration copper, dehydrated and capped.
   2. Above 3/4": Hard temper, Type L or K, dehydrated and capped.
   3. All copper to be CERRO copper of equal.

B. Joints: Wrought copper fittings and silfos. Silfos to be lead free with 12% to 15% silver content.

C. Freon Valves: Diaphragm packless bellows by Mueller, Brass, Kartest Manufacturing or equal.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install a liquid line filter dryer as per manufacturer's instructions. Size the filter-dryer as per manufacturer's recommendations.

B. Size and install liquid and suction refrigerant lines as per equipment manufacturer's recommendations.

3.2 EVACUATION AND CHARGING

A. Evacuate non-precharged refrigerant systems only.

B. Use a two stage rotary vane gas ballast vacuum pump and an electronic (thermocouple) vacuum gauge.

C. The pipe size between the piping system and the pump shall be 1/2" minimum.

D. Before charging with freon the following evacuation procedure shall be accomplished:
   1. 30 minutes or more at 1500 microns vacuum.
   2. Fill to zero gauge pressure with dry nitrogen for 10 minutes.
   3. 15 minutes or more at 1500 microns vacuum.
   4. Fill to zero gauge pressure with dry nitrogen.
   5. 30 minutes or more at 1500 microns vacuum.

E. After completion of the above evacuation procedure, and testing, charge the system with R-22 as per manufacturer's recommendations.

3.3 TESTING

A. Test during progress of work or at completion to ensure tight system. Use Nitrogen for testing. Soap test Freon 22 system at 245 psi. Allow system to stand for 24 hours under pressure and if no change is pressure, system may be considered tight.

END OF SECTION

SECTION 15737 – SPLIT SYSTEM AIR CONDITIONERS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Furnish and install direct expansion air conditioning system, including:
   1. Air handling.
   2. Outdoor condensing unit.
   3. 7- Day Programmable Digital Thermostat.

1.2 RELATED SECTIONS

A. Section 15010 – Basic Mechanical Requirements

B. Section 15090 – Mechanical Supporting Systems

C. Section 15190 – Mechanical Identification

D. Section 15800 – Air Distribution.

E. Section 15900 – Electric Controls.

F. Section 15990 – System Testing and Balancing.

1.3 REFERENCES

A. ARI 240 - Air Source Unitary Heat Pump Equipment.

B. ARI 270 - Sound Rating of Outdoor Unitary Equipment.

1.4 SUBMITTALS

A. Include product data and schematic layouts showing condensing units, air handling/fan coil unit, refrigerant piping and accessories required for complete system. Include complete pipe sizing data.

B. Include rated capacities, dimensions, weights, accessories, required clearances, electrical requirements, wiring diagrams and location and size of field connections.

C. Include manufacturer's installation instructions.

D. Provide operation and maintenance manual.

1.5 QUALITY ASSURANCE

A. Provide capacity ratings with ARI certification.

1.6 WARRANTY

A. Provide five-year manufacturer's replacement warranty on compressor.

PART 2 - - PRODUCTS

1.7 MANUFACTURERS

A. Tempmaster.

B. Carrier.

C. Daikin/McQuay.

D. Trane.

1.8 SYSTEM DESCRIPTION

A. Provide split system air conditioning system consisting of indoor air handling, outdoor condensing unit, refrigerant piping, fittings and accessories, and controls. Factory assemble components and test unit.

B. Heating and Cooling Capacities: As indicated on Drawings.

1.9 AIR HANDLING UNIT

A. Basic Unit:
   1. Fabricated exterior unit casing of heavy gauge galvanized steel, painted with epoxy based enamel paint. Provide color chart for color selection by Architect.
   2. All unit panels must be removable with a minimum 2 inch microbial resistant and cleanable glass fiber thermal insulation liner with sealed edges.
   3. Fabricate fan deck of galvanized steel. Fabricate drain pans of 304 stainless steel externally insulated with fire retardant, closed cell foam insulation.

B. Coils:
   1. Construct coils with copper tubes with aluminum fins mechanically bonded to the tubes.
   2. Test all coils for design working pressure of 250 psig @ 200EF.
   3. Cooling coils shall be sized as required to meet or exceed the capacities indicated on the drawings.

C. Fans: Centrifugal, forward-curved, double-width wheels. Mount frame on vibration isolators.

D. Motors: Resilient mounted, three-speed, permanent split capacitor type in total compliance with Section 16220 - Motors and Controllers.

E. Filters: 2 inch disposable with galvanized holding frame.

1.10 AIR COOLED CONDENSING UNITS

A. Provide air cooled condensing units as scheduled; self-contained, packaged, factory assembled and pre-wired units suitable for outdoor use consisting of cabinet, compressors, condensing coil and fans, integral sub-cooling coil, controls, liquid receiver and screens.

B. Provide corrosion resistant materials for unit parts which come in contact with refrigerant.

C. Provide short cycle timer to prevent rapid cycling of compressors.

D. Fabricate cabinet from galvanized steel, with baked enamel finish; provide hinged access panels with quick fasteners.

E. Compressor: [Hermetically sealed or semi-hermetic type], 1750 rpm, resiliently mounted with positive lubrication, crankcase heater, cylinder unloaders for capacity modulation, motor overload protection, service valves, filter drier, suction and discharge valves, with gauge ports, and high and low pressure safety controls.

F. Condenser:
   1. Seamless copper tubing with aluminum fins coil.
   2. Provide condenser fans which discharge, vertically and have direct drive fans resiliently mounted with guard and motor.
   3. Provide fan motor with permanently lubricated ball bearing type with built-in current and overload protection.

G. Provide unit with high and low pressure cutouts for compressor, non-recycling pumpdown, reset relay and oil pressure safety control (7 1/2 ton units and larger). Provide with controls to permit operation down to 0 degree F ambient temperature at minimum compressor load.

H. Provide louvered hail guard for condenser coil section.

1.11 PIPING

A. Provide one refrigerant line filter dryer, outside pressure taps, and Schrader valves in each refrigerant circuit.

1.12 CONTROLS

A. Refer to Section 15900 - Controls.

PART 3 - - EXECUTION

1.13 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Verify proper refrigerant charge and operating pressures. Supplement factory charge if necessary.

END OF SECTION

SECTION 15782 - PACKAGED GAS HEATING AND ELECTRIC COOLING UNITS

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Providing package electrical cooling, gas heating units.

1.2 RELATED WORK

A. Section 15010 - Basic Mechanical Requirements

B. Section 15090 - Mechanical Supporting Systems

C. Section 15190 - Mechanical Identification

D. Section 15800 - Air Distribution

E. Section 15900 - Controls

1.3 SUBMITTALS

A. Submittals: Submit manufacturer's technical product data, installation and start-up instructions, wiring diagrams, and maintenance data; in accordance with requirements of Division 1.

1.4 QUALITY ASSURANCE AND APPROVALS

A. Gas-fired furnace section construction shall be in accordance with AGA safety standards. Furnace shall bear the AGA label.

B. Testing and rating rooftop heating and cooling units of 135,000 btu/hr capacity or over shall be in accordance with ARI 360 "Standard for Commercial and Industrial Unitary Air-Conditioning Equipment".

C. Testing and rating of rooftop heating and cooling units under 135,000 btu/hr capacity shall be in accordance with ARI 210 "Standard for Unitary Air-Conditioning Equipment", and provide Certified Rating Seal. Sound testing and rating of units shall be in accordance with ARI 270 "Standard for Sound Rating of Outdoor Unitary Equipment". Units shall bear Certified Rating Seal.

D. Refrigerating system construction of rooftop units shall be in accordance with ASHRAE 15 "Safety Code for Mechanical Refrigeration".

E. Energy Efficiency Ratio (EER) of rooftop units shall be equal to or greater than scheduled values on drawings.

F. Rooftop units shall be listed by UL as an assembly and be tested as such.

1.5 WARRANTY

A. Warranty on Compressor and Heat Exchanger: Provide written warranty, signed by manufacturer, agreeing to replace or repair, within warranty period, compressors and heat exchangers with inadequate and defective materials and workmanship, including leakage, breakage, improper assembly, or failure to perform as required; provided manufacturer's instructions for handling, installing, protecting, and maintaining units have been adhered to during warranty period. Replacement is limited to component replacement only, and does not include labor for removal and reinstallation.

1. Warranty Period: 5 years from date of substantial completion.

1.6 EXTRA MATERIALS

A. Furnish to Owner, with receipt, the following spare parts for each rooftop heating and cooling unit:
   1. One set of matched fan belts for each belt-driven fan.
   2. One set filters for each unit.

PART 2 - PRODUCTS

2.1 ROOFTOP UNITS LESS THAN 20 TONS

A. General: Units shall be factory-assembled and tested, designed for roof or slab installation, and consisting of compressors, condensers, evaporator coils, condenser and evaporator fans, refrigeration and temperature controls, filters, dampers; capacities and electrical characteristics as scheduled.

B. Manufacturers: Subject to compliance with requirements, provide rooftop units of one of the following: TempMaster; Carrier Air Conditioning; Trane (The) Co; Daikin/McQuay, or approved equal.

C. Casing: manufacturer's standard casing construction, having corrosion protection coating, and exterior finish. Casings shall have removable panels or access doors for inspection and access to internal parts, a minimum of 1/2" thick thermal insulation, knockouts for electrical and piping connections, and an exterior condensate drain connection.

D. Evaporator Fans: forward-curved, centrifugal, belt-driven fans with adjustable sheaves or direct-driven fans; and permanently lubricated motor bearings.

E. Condenser Fans: propeller-type, direct-driven fans with permanently lubricated bearings.

F. Coils: For evaporator and condenser, provide non-ferrous construction with aluminum plate fins mechanically bonded to seamless copper tubes; with brazed tubing joints.

G. Compressors: serviceable, semi-hermetic, or fully hermetic compressors, in accordance with manufacturer's published technical data. Provide vibration isolators and crankcase heaters.

H. Refrigerant Circuits: An independent refrigerant circuit shall be provided for each compressor. Each refrigerant circuit shall have independent metering devices, service ports and line dryers factory installed.

I. Safety Controls:
   1. low pressure cutout;
   2. high pressure cutout;
   3. compressor motor overload protection.

J. Heat Exchangers: manufacturer's standard construction for gas- fired heat exchangers and burners.
   1. Controls:
      a. redundant gas valve;
      b. intermittent pilot ignition;
      c. electronic spark ignition system;
      d. high limit cutout;
      e. forced draft proving switch.
      f. flame roll-out switch.

K. Economizer Control: economizer control consisting of return and outside air dampers, power exhaust fan, outside air filter, fully modulating electric control system with enthalpy control, and adjustable mixed-air thermostat. Design system for 100 percent outside air capability. Provide automatic changeover through adjustable enthalpy control device. Provide Demand Control Ventilation kit including all factory programming for seamless operation of system in conjunction with remote CO2 sensor.

L. Low ambient: provide manufacturer furnished controls to operate cooling to 30^{o}F ambient.

M. Accessories: the following accessories as indicated and/or scheduled:
   1. Curb: insulated roof curb under unit, constructed in accordance with NRCA Standards. Provide seal strip between curb and unit, and wood nailer for flashing.
   2. Thermostat: assembly shall be for staged heating and cooling with manual changeover on standard subbase.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install rooftop heating and cooling units in accordance with manufacturer's installation instructions. Install units plumb and level, firmly anchored in locations indicated, and maintain manufacturer's recommended clearances.

B. Install units on roof curb, in accordance with National Roofing Contractor's Association (NRCA) installation recommendations.

C. Install electrical devices furnished by manufacturer but not specified to be factory-mounted. Furnish copy of manufacturer's wiring diagram submittal to Electrical Installer.

D. Verify that electrical wiring installation is in accordance with manufacturer's submittal and installation requirements of Division-16 sections. Do not proceed with equipment start-up until wiring installation is acceptable to equipment Installer.

E. Connect supply and return ducts to unit with flexible duct connections. Provide transitions to exactly match unit duct connection sizes.

F. Refer to Division-15 section "Natural Gas Piping Systems". Connect gas piping to unit gas train with shutoff cock and drip leg.

G. Provide positive equipment ground for rooftop heating and cooling unit components.

3.2 START UP AND TESTING

A. Start-Up rooftop heating and cooling units, in accordance with manufacturer's start-up instructions. ***Startup shall be performed by a Factory Authorized and trained Technician and not to be self-performed by the Mechanical Contractor.***

B. Test controls and demonstrate compliance with requirements. Replace damaged or malfunctioning controls and equipment.

3.3 TRAINING

A. Provide services of manufacturer's technical representative for one-half day to instruct Owner's personnel in operation and maintenance of rooftop heating and cooling units.

B. Schedule training with Owner, provide at least 7-day notice to Contractor and Engineer of training date.

END OF SECTION

SECTION 15800 - AIR DISTRIBUTION

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Supply, return, outside and exhaust air ductwork.

B. Grilles, registers, dampers, and air terminals devices.

C. Ductwork accessories.

1.2 RELATED WORK

A. Section 15010 - Basic Mechanical Requirements

B. Section 15090 - Mechanical Supporting Systems

C. Section 15250 - Mechanical Insulation Systems

D. Section 15990 - Testing, Adjusting and Balancing

1.3 REFERENCED

A. SMACNA Low Velocity Duct Construction Standards; latest edition.

B. ASHRAE Fundamentals Journal; latest edition.

C. Underwriter's Laboratory, Incorporated.

1.4 SUBMITTALS

A. Provide product data for the items listed below. Include descriptive literature indicating performances, physical size, features, options, and other certified data indicating compliance with the specifications:
   1. Grilles, diffusers, registers;
   2. Ductwork accessories.
   3. Louvers, fire dampers, roof hoods.

PART 2 - PRODUCTS

2.1 LOW PRESSURE DUCTWORK

A. Construct low pressure ductwork to withstand 2" positive and 2" negative static pressures.

B. Fabricate ductwork of galvanized steel sheets unless otherwise noted on plans or specified. Galvanized steel shall be of lock forming quality (LFQ) and shall have a galvanized coating of 1-1/2 ounces total for both sides of one square feet of a sheet.

C. Round ductwork shall be galvanized sheet metal.

D. All duct joints shall be sealed air tight (SMACNA Class B) under operating pressures. Seal metal duct before application of duct insulation.

E. Minimum duct sheet metal gauges shall be:

0" thru 30"	- 24 gauge
31" thru 54"	- 22 gauge
55" thru 84"	- 20 gauge
85" thru 120"	- 18 gauge

2.2 GRILLES, REGISTERS, DIFFUSERS

A. Titus, Metal Aire or Tuttle-Bailey as scheduled on Drawings. Prime coat all wall-mounted outlets, unless otherwise specified on Drawings.

B. Furnish opposed blade volume controls to provide control of the air flow of all supply diffusers. Operation shall be from face of the grille with a lever operator.

C. The backside of supply air devices shall have a factory fabricated, molded, insulation blanket installed. Field installed blanket insulation shall not be installed on the backside of supply air grilles.

D. All required above ceiling return air runs shall be installed using sheet metal ductwork; space above ceiling shall not to be used as a return air plenum. Ducted return air grilles installed in all lay-in ceiling locations shall include filter assembly, using readily available filter size & positioned for ease of maintenance.

2.3 DUCTWORK ACCESSORIES

A. Turning Vanes: Barber-Colman "Airturn".

B. Round Tap: ACME or equal. Provide with bell mouth transition. Do not provide air scoop. Damper to have ±2″ spacer at operator to compensate for thickness of insulation.

C. Operator handle to be locking quadrant type.

D. Extractors: Metalaire Model 101-1, 1" on center blades, aluminum, with accessible push-pull adjusting arm.

E. Opposed Blade Induct Manual Damper: Ruskin CD-50 opposed blade type with locking quadrant operator outside of duct. Damper to have ±2″ spacer at operator to compensate for thickness of insulation.

F. Flexible Connector: Duro-Dyne Junior reinforced neoprene fabric, UL listed.

G. Access Doors:
   1. Ruskin Model ADC2 removable door type.
   2. Door to be unhinged, with frame, interior and exterior panel, 1" insulation, cam latches.
   3. Frame to have foam gasket seal.
   4. Door and frame to be 24 gage galvanized steel.

2.4 DUCT SEALANT

A. Hardcast Iron Grip 601, or approved equal.

2.5 FIRE DAMPERS

A. Manufacturers: Ruskin or approved equal.

B. Fabricate in accordance with NFPA 90A and UL 555, and as indicated.

C. Fabricate curtain type dampers with blades out of air stream.

2.6 LOUVERS

A. 6 inches (100 mm) deep with blades on 45 degree slope, heavy channel frame, birdscreen with 1/4 inch (13 mm) square mesh.
   1. Material: 12 gage (2.50 mm) thick extruded aluminum.
   2. Finish: Factory baked enamel finish. Color to be selected.
   3. Installation: Frame and installation detail as prescribed by the architect..

2.7 ROOF HOODS

A. Fabricate air inlet or exhaust hoods in accordance with SMACNA HVAC Duct Construction Standards of aluminum, with removable hood; birdscreen with 1/4 inch mesh. Provide with factory mill finish.

PART 3 - EXECUTION

3.1 INSTALLATION - GENERAL

A. Adhere to Drawings as closely as possible. Where required to meet structural or other interferences, vary run and shape of ducts and made offsets during progress of work. Establish duct routes and take field measurements before ductwork is fabricated.

B. Install ductwork free of any objectionable self-generating noise or rattles.

C. Construct and install all dampers so that there shall be no vibration to air flow over damper.

D. Construct T's, bends, and elbows with radius of 1-1/2 times width of duct on center line. Where not possible provide turning vanes.

E. Increase duct sizes gradually, not exceeding 30 degrees divergence and 45 degrees convergence.

F. Fabricate splitter dampers of material same gage as duct to 24 inches (600 mm) size in either direction, and two gages heavier for larger sizes. Secure with continuous hinge or rod. Operate with minimum 1/4 inch (6 mm) diameter rod.

G. Connect diffusers or troffer boots to low pressure ducts with 5 feet (1.5 m) maximum length of flexible duct. Hold in place with strap or clamp.

H. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.

I. Provide fire dampers at penetrations of fire rated walls. Install with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushings and hinges.

J. Provide flexible connections immediately adjacent to equipment in ducts associated with fans and motorized equipment.

K. Provide balancing dampers on duct take-off to diffusers, and grilles and registers, regardless of whether dampers are specified as part of the diffuser, or grille and register assembly.

L. Cross-break duct surfaces 19" thru 60". Use angle reinforcing for duct sizes over 60".

M. All metal longitudinal seams shall be Pittsburgh Lock or other SMACNA listed seams. Button punch snaplock not acceptable.

N. Turning vanes shall be riveted into place for square elbows. Use SMACNA large single vane design spaced 3-1/4" apart on the diagonal of the elbow. Continuous vane (full length of elbow) required where elbow centerline radius is less than 1-1/2 times duct width.

3.2 ACCESS DOORS

A. Install access doors in ductwork where provided to service concealed equipment.

B. Provide duct access doors for inspection and cleaning before and after filters, coils, fans, automatic dampers, at fire dampers, and elsewhere as indicated. Provide minimum 8 x 8 inch size for hand access, 24 x 24 inch size where feasible.

3.3 CENTERING OF AIR DEVICES

A. Install grilles, registers and outlets centered and/or spaced equally along walls, floors, or ceilings. Coordinate with Architectural Drawings.

3.4 AIRTIGHTNESS

A. Install the ductwork system airtight and lightproof.

B. Connect round duct with sheet metal screws. Seal all joints.

C. Clean all dirt, oil, and moisture before applying "Hardcast" duct sealant.

D. Duct tape, caulk or glazing compounds are not acceptable.

3.5 DUCT SUPPORT

A. Rigidly support ductwork by metal straps from structural members of the building. Do not use furring members, plastered partitions, or other finished materials for support.

B. Support as per SMACNA guidelines for ductwork low pressure standard.

C. Suspend metal duct work, not exceeding 30" longest, side, at every joint, (not to exceed 10') using 1" x 18 gauge galvanized straps attached to bottom and side of duct. Support duct work, exceeding 30" longest side, at maximum 8' intervals using angles and rods.

3.6 PAINTING

A. In finished areas, paint flat black, visible sheetmetal surfaces behind grilles, registers, and diffusers.

END OF SECTION

SECTION 15861-AIR PURIFICATION SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

A. All indoor furnace units and packaged units shall have a GPS unit installed in the fan section.

1.2 DESCRIPTION OF WORK

A. This section describes the design, performance and installation of an air purification system intended for use as part of another manufacturer's air handling unit or mounted on the duct as shown on the plans, details and equipment schedules.

1.3 REFERENCED CODES & STANDARDS

A. The following codes and standards are referenced through out. The edition to be used is that currently enforced by the authority having jurisdiction (AHJ) or in absence of such direction that referenced by the current enforceable IBC code or as indicated by the contract documents, except where specifically referenced by this section of the specifications.
   1. ASHRAE Standards 62 & 52
   2. National Electric Code NFPA 70
   3. UL 867 including ozone chamber test required as of December 21, 2007

1.4 RELATED WORK

A. Testing, Adjusting and Balancing
B. Facility Access and Protection
C. Ductwork
D. Filters
E. Water and Refrigerant Piping
F. Electrical Wiring
G. Control Wiring

1.5 QUALITY & IP ASSURANCE

A. Basis of design is Global Plasma Solutions. American Ion shall be considered equal subject to meeting all specifications herein. All other manufacturers requesting prior approval must submit product drawings, specifications and test results specified in section 2.2 at least two weeks prior to bid date.
B. The Air Purification System shall be a product of an established manufacturer within the USA.
C. A qualified representative from the manufacturer shall be available to inspect the installation of the air purification system to ensure installation in accordance with manufacturer's recommendation.

D. Technologies that do not address gas disassociation such as UV Lights, Powered Particulate Filters and/or polarized media filters shall not be considered. Uni-polar ion generators shall not be acceptable. "Plasma" particulate filters shall not be acceptable.

E. Projects designed using ASHRAE Standard 62, IAQ Procedure shall require the manufacturer to provide Indoor Air Quality calculations using the formulas within ASHRAE Standard 62.1-2007 to validate acceptable indoor air quality at the quantity of outside air scheduled with the technology submitted. The manufacturer shall provide independent test data on a previous installation performed within the last two years and in a similar application, that proves compliance to ASHRAE 62 and the accuracy of the calculations.

F. The Air Purification System shall have been tested by UL or Intertek/ETL to prove conformance to UL 867-2007 including the ozone chamber testing and peak ozone test for electronic devices. Manufacturers that achieved UL 867 prior to December 21, 2007 and have not been tested in accordance with the newest UL 867 standard with the ozone amendment shall not be acceptable. All manufacturers shall submit their independent UL 867 test data with ozone results to the engineer during the submittal process. All manufacturers shall submit a copy with their quotation. Contractors shall not accept any proposal without the proper ozone testing documentation.

G. The maximum allowable ozone concentration per the UL 867-2007 chamber test shall be 0.007 PPM. The maximum peak ozone concentration per the UL 867-2007 peak test as measured 2 inches away from the electronic air cleaner's output shall be no more than 0.0042 PPM. Manufacturers with ozone output exceeding these ozone values shall not be acceptable.

1.6 SUBMITTALS

A. Product Data: Submit manufacturer's technical product data for ion generators including:
   1. Schedule of plasma generators indicating unit designation, number of each type required for each unit/application.
   2. Data sheet for each type of plasma generator, and accessory furnished; indicating construction, sizes, and mounting details.
   3. Performance data for each type of plasma device furnished.
   4. Indoor Air Quality calculations using the formulas within ASHRAE Standard 62.1-2007 to validate acceptable indoor air quality at the quantity of outside air scheduled (when projects are designed with outside air reduction).
   5. Product drawings detailing all physical, electrical and control requirements.
   6. Copy of UL 867 independent ozone test.

B. Operating & Maintenance Data: Submit O&M data and recommended spare parts lists.

1.7 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver in factory fabricated shipping containers. Identify on outside of container type of product and location to be installed. Avoid crushing or bending.

B. Store in original cartons and protect from weather and construction work traffic.

C. Store indoors and in accordance with the manufacturers' recommendation for storage.

1.8 WARRANTY

A. Equipment shall be warranted by the manufacturer against defects in material and workmanship for a period of eighteen months after shipment or twelve months from owner acceptance, whichever occurs first. Labor to replace equipment under warranty shall be provided by the owner or installing contractor.

PART 2 - PRODUCTS

2.1 GENERAL

A. The air purification system(s) shall be of the size, type, arrangement and capacity indicated and required by the unit furnished and shall be of the manufacturer specified.
B. Basis of Design: Global Plasma Solutions
C. All other Suppliers of comparable products requesting prior approval shall:
   1. Submit for prior approval in accordance with the requirements of Section 15010.
   2. In addition, manufacturers submitting for prior approval for Bi-Polar Ionization must as part of the prior approval request provide their ASHRAE 62.1-2007 calculations that prove conformance to the ASHRAE Standard with the reduction of outside air to the scheduled values. A letter on the manufacturer's letterhead requesting prior approval must accompany the request for prior approval stating their calculations are ASHRAE compliant. A third party validation study performed on a previous installation of the same application shall also be included.
   3. Submit independent test data from ETL or UL showing ozone levels produced during the UL 867 ozone chamber test. Manufacturers without this test data shall not be acceptable.

2.2 BI-POLAR IONIZATION DESIGN & PERFORMANCE CRITERIA

A. Each piece of air handling equipment, so designated on the plans, details, equipment schedules and/or specifications shall contain a Plasma Generator with Bi-polar Ionization output as described here within.
B. The Bi-polar Ionization system shall be capable of:
   1. Effectively killing microorganisms downstream of the bi-polar ionization equipment (mold, bacteria, virus, etc.).
   2. Controlling gas phase contaminants generated from human occupants, building structure and furnishings.
   3. Capable of reducing static space charges.
   4. Increasing the interior ion levels, both positive and negative, to a minimum of 800 ions/cm³ measured 5 feet from the floor.
   5. Self-cleaning requiring no maintenance or replacement parts.
C. The bi-polar ionization system shall operate in a manner such that equal amounts of positive and negative ions are produced. Uni-polar ion devices shall not be acceptable.
   1. Air exchange rates may vary through the full operating range of a constant volume or VAV system. The quantity of air exchange shall not be increased due to requirements of the air purification system.
   2. Velocity Profile: The air purification device shall not have maximum velocity profile.

D. Humidity: Plasma Generators shall not require preheat protection when the relative humidity of the entering air exceeds 85%. Relative humidity from 0 - 100%, condensing, shall not cause damage, deterioration or dangerous conditions within the air purification system. Air purification system shall be capable of wash down duty.

E. Equipment Requirements:

1. Electrode Specifications (Bi-polar Ionization):

a. Each Plasma Generator with Bi-polar Ionization output shall include the required number of electrodes and power generators sized to the air handling equipment capacity. A minimum of one electrode pair per 4,800 CFM of air flow shall be provided. Bi-polar ionization tubes manufactured of glass and steel mesh shall not be acceptable due to replacement requirements, maintenance, and performance output reduction over time, ozone production and corrosion.

b. Electrodes shall be energized when the main unit disconnect is turned on and the fan is operating. Electrodes shall be made from carbon fiber to prevent oxidation over time. Internal circuitry shall be provided to sense air flow across the electrode output. Ionization systems requiring the use of a mechanical air pressure switch to cycle the electrodes only when the fan is operating shall not be acceptable due to high failure rates and pressure sensitivity.

c. Electrode pair shall provide a minimum of 200 million ions per cubic centimeter as measured at 2 inches, both positive and negative ions, in equal quantities. Devices providing less than 200 million ions/cc per electrode pair shall not be acceptable.

d. Each Plasma Generator shall be provided with a self-cleaning system that is field programmable to change the number of days between the cleaning cycles. Systems without a no-maintenance, self-cleaning system shall not be acceptable.

e. Each electrode pair shall be designed with a banana style plug such that it can be field replaced if necessary.

f. Each Plasma Generator shall be provided with an inline on/off switch, universal voltage input (24VAC to 240VAC or DC), magnets for mounting to the fan inlet, replaceable carbon fiber emitters and a programmable self-cleaning system.

F. Air Handler & Plenum Mounted Units (non-ductless mini-split units):

1. Where so indicated on the plans and/or schedules Plasma Generator(s) shall be supplied and installed. The mechanical contractor shall mount the Plasma Generator and wire it to the AHU control power (24VAC) as instructed by the Air Purification Manufacturer's instructions or line voltage subject to power available. Each unit shall be designed with a molded casing, self-cleaning system, self-cleaning test button, power status LED and dry contacts to prove ion output is operating properly. The dry contacts shall close to prove the ion generator is working properly and may be daisy chained in series such that only one dry contact per AHU is required to interface to the BAS or the optional DDC controller. Dry contacts proving power has been applied in lieu of the ion output is actually operating, are not acceptable. Manufacturers providing

multiple ion modules that have alarm status wired in parallel, and not in series, shall not be acceptable.

G. Ionization Requirements:

2. Plasma Generators with Bi-polar ionization output shall be capable of controlling gas phase contaminants and shall be provided for all equipment listed above.
   a. The Bi-polar ionization system shall consist of Bi-Polar Plasma Generator and integral power supply. The Bi-polar system shall be installed where indicated on the plans or specified to be installed. The device shall be capable of being powered by 24VAC to 240VAC without the use of an external transformer. Ionization systems requiring isolation transformers shall not be acceptable.
   b. Ionization Output: The ionization output shall be controlled such that an equal number of positive and negative ions are produced. Imbalanced levels shall not be acceptable.
   c. Ionization output from each electrode shall be a minimum of 200 million ions/cc when tested at 2" from the ionization generator.
   d. All manufacturers shall provide documentation by an independent NELAC accredited laboratory that proves the product has minimum kill rates for the following pathogens given the allotted time and in a space condition:
      A. MRSA - >96% in 30 minutes or less
      B. E.coli - > 99% in 15 minutes or less
      C. TB - > 69% in 60 minutes or less
      D. C. diff - >86% in 30 minutes or less

      Manufacturers not providing the equivalent space kill rates shall not be acceptable. All manufactures requesting prior approval shall provide to the engineer independent test data from a NELEC accredited independent lab confirming kill rates and time meeting the minimum requirements stated in section 2.2 B, points 6A, 6B and 6C. Products tested only on Petri dishes to prove kill rates shall not be acceptable.

3. Ozone Generation:
   a. The operation of the electrodes or Bi-polar ionization units shall conform to UL 867-2007 with respect to ozone generation. There shall be no ozone generation during any operating condition, with or without airflow.

J. Electrical Requirements:

4. Wiring, conduit and junction boxes shall be installed within housing plenums in accordance with NEC NFPA 70. Plasma Generator shall accept an electrical service of 24VAC to 240VAC, universal 2 wire input, 1 phase, 50/60 Hz.

   The contractor shall coordinate electrical requirements with air purification manufacturer during submittals.

K. Control Requirements:

5. All Plasma Generators shall have internal short circuit protection, overload protection, and automatic fault reset circuit breakers. Systems with manual fuses shall not be allowed.

6. Integral airflow sensing shall modulate the Plasma output as the airflow varies or stops. A mechanical airflow switch shall not be acceptable as a means to activate the Plasma device due to high failure rates and possible pressure reversal.
7. The installing contractor shall mount and wire the Plasma device within the air handling unit specified or as shown or the plans. The contractor shall follow all manufacturer IOM instructions during installation.
8. All Plasma devices shall have a means to interface with the BAS system. Dry contacts shall be provided to prove there are ions being produced. Systems providing indication that power is applied to the Plasma device, but not directly sensing the power at the ion output, shall not be acceptable.

PART 3 - EXECUTION

3.1 GENERAL

A. The Contractor shall be responsible for maintaining all air systems until the owner accepts the building (Owner Acceptance).

3.2 ASSEMBLY & ERECTION: PLASMA GENERATOR WITH BI-POLAR IONIZATION

A. All equipment shall be assembled and installed in a workman like manner to the satisfaction of the owner, architect, and engineer.
B. Any material damaged by handling, water or moisture shall be replaced, by the mechanical contractor, at no cost to the owner.
C. All equipment shall be protected from dust and damage on a daily basis throughout construction.

3.3 TESTING

A. Provide the manufacturers recommended electrical tests.

3.4 COMMISSIONING & TRAINING

A. A manufacturer's authorized representative shall provide start-up supervision and training of owner's personnel in the proper operation and maintenance of all equipment.

END OF SECTION

SECTION 15900 - ELECTRIC CONTROLS

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Providing a complete system of gas heating and electric cooling controls for split air conditioning systems, heating systems and ventilation systems.

B. Providing training and instruction to Owner.

1.2 RELATED WORK

A. Section 15604 - Exhaust Fans

B. Section 15737 – Split System Air Conditioners

C. Section 15738 – Ductless Split System Units

D. Section 15782 - Packaged Gas Heating and Electric Cooling Units

E. See Electrical.

1.3 QUALITY ASSURANCE

A. The control system shall be installed by experienced personnel regularly engaged in control system installation.

B. Furnish control wiring diagrams, sequences of operation and submittal data on control devices.

PART 2 - PRODUCTS

2.1 EQUIPMENT - GENERAL

A. Voltage: Provide low voltage control components and system unless otherwise indicated.

B. 115 V Wire: 12 gauge.

C. 24 V Wire: 18 gauge or 16 gauge.

D. Conduit: EMT.

2.2 WALL MOUNTED THERMOSTATS

A. General:
   1. Provide 7-Day Programmable Digital Thermostats with time of day scheduling, keypad lockout feature, and supply fan scheduling.

2.3 THERMOSTAT ENCLOSURES

A. Provide a factory finished enamel painted steel, key lock, tamper-proof enclosure for each wall thermostat as required. Coordinate with Owner.

2.4 CONTROL SEQUENCES

A. Manufacturers standard unless otherwise indicated on the drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Thermostats shall be located where shown on Drawings unless otherwise instructed by the Owner. Locate thermostat 48" above floor or as otherwise indicated.

B. At completion of installation, regulate and adjust all thermostats and equipment specified in this Section.

C. Provide the owner two sets of thermostat enclosure keys.

3.2 CONTROL WIRING

A. Route all line voltage control wire in conduit.

B. Low Voltage (48 volt or less) control wiring.
   1. Route in conduit in exposed installations such as mechanical/electrical rooms and other unfinished installations.
   2. Route in conduit in walls, partitions, above plaster and gypboard ceilings and other inaccessible areas.
   3. Route in conduit where routed outdoors or other areas subject to damage.
   4. Route in conduit in ceiling spaces used as supply or return air plenums.
   5. Conduit is optional in above lay-in ceiling installations unless space is used as a supply or return air plenum.

C. Refer to electrical specification for wiring requirements.

D. Conduit and wire by controls contractor. Work to be completed by master electrician in the direct employ of the contractor.

3.3 TRAINING

A. Provide heating and cooling system training presentation for the Building Owner or someone designated by the Building Owner.

B. Coordinate the programming and scheduling of every thermostat prior to final occupancy with Owner.

C. Provide the Owner two sets of bound control system description wiring schematics.

END OF SECTION

SECTION 15990 - SYSTEM TESTING AND BALANCING

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Air systems.

B. System Testing and Balancing Contractor shall be a sub-contractor, and compensated by the General Contractor and not the Mechanical Contractor. The TAB Contractor shall not be contracted by the Mechanical Contractor.

1.2 RELATED WORK

A. Section 15010 - Basic Mechanical Requirements

B. Section 15604 - Exhaust Fans

C. Section 15737 – Split System Air Conditioners

D. Section 15738 – Ductless Split System Units

E. Section 15782 - Packaged Gas Heating and Electric Cooling Units

F. Section 15800 - Air Distribution

1.3 QUALITY ASSURANCE

A. Tester's Qualifications: NEBB or AABC Certified or Registered Professional Engineer.

B. Codes and Standards: NEBB Compliance.

1.4 SUBMITTALS

A. Submit certified test reports:
   1. Air flow test and balance report to be provided and signed by individual conducting that test.
   2. System operating test to be provided and signed by the installing contractor.

B. Include identification and types of instruments used, and their most recent calibration date with submission of final test report.

C. Report format: Provide in soft cover, letter size, 3-ring binder, with index page and tabs, and cover identification. Include reduced scale drawings with air outlets and equipment identified to correspond with data sheets, and indicating thermostat locations.

D. Report Forms: AABC National Standards for Total System Balance forms, forms prepared following ASHRAE 111 or NEBB forms.

PART 2 - PRODUCTS

NOT REQUIRED

PART 3 - EXECUTION

3.1 GENERAL

A. Before commencing work, verify that systems are complete and operable.

B. Report any defects, deficiencies, or abnormal conditions in mechanical systems which prevent system balance.

C. Beginning of work means acceptance of existing conditions.

D. Recorded data shall represent actually measured or observed condition.

E. Permanently mark settings of valves, dampers, and other adjustment devices. Set and lock memory stops.

F. Patch holes in insulation and housing that have been cut or drilled for test purposes, in manner recommended by original installer.

G. Retest, adjust, and balance systems subsequent to significant system modifications, and resubmit test results.

H. Prepare report of test results, including instrumentation calibration reports, in format recommended by applicable standards.

3.2 TEST OBJECTIVE

A. Test, adjust, and balance environmental systems and components, as indicated, in accordance with procedures outlined in applicable standards as described:

1. Air measurements and balancing for air handlers, exhaust fans, air devices, air terminal boxes to obtain design flow.

3.3 TOLERANCES

A. Air Handling Systems: Adjust airflow to within plus or minus 5 percent of design.

B. Air Outlets and Inlets: Adjust to within plus or minus 10 percent of design.

3.4 PROCEDURE

A. Adjust air handling and distribution systems to provide required or design supply, return, outside air and exhaust air quantities.

B. Measure air quantities at air inlets and outlets.

C. Use volume control devices to regulate air quantities only to extent that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers.

D. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.

E. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Allow for 50 percent loading of filters.

F. Adjust automatic outside air, return air, and exhaust air dampers for design conditions.

G. Measure temperature conditions across outside air, return air, and exhaust air dampers to check leakage.

END OF SECTION

SECTION 16050

ELECTRICAL GENERAL PROVISIONS

PART 1 - GENERAL

1.1 SECTION INCLUDES

1. Except as modified in this section, General Conditions, Supplementary Conditions, applicable provisions of Division 1, General Requirements, and other provisions and requirements of the Contract Documents apply to work of Division 16.

2. Each section included in Division 16 is incomplete without the provisions stated herein.

1.2 RELATED SECTIONS

1. Section 16080 - Electrical Testing.

1.3 REFERENCES

1. ASTM D 698 - Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/cu. ft. (600kN-m/cu. m.)).

2. ASTM E 814 - Fire Tests of Through-Penetration Fire Stops.

3. IEEE C2 - National Electrical Safety Code.

4. NFPA 70 - National Electrical Code.

5. UL 1479 - Fire Tests of Through-Penetration Firestops.

1.4 DEFINITIONS

1. Provide: Where the word "provide" is used, the word is understood to mean "the Contractor shall furnish and install" the equipment, tests, inspections, etc. referenced.

2. Related Work: The sections referenced under RELATED SECTIONS shall be understood to include provisions which directly affect the work being specified in the section where RELATED SECTIONS occurs.

3. Concealed: Where the word "concealed" is used in conjunction with raceways, equipment, and the like, the word shall be understood to mean hidden from sight as in chases, furred spaces, or suspended ceilings.

4. Exposed: Where the word "exposed" is used, the word shall be understood to mean open to view.

1.5 REGULATORY REQUIREMENTS

1. Perform work in accordance with the editions, revisions, amendments, or supplements of applicable statutes, ordinances, codes, or regulations of Federal, State, and Local Authorities having jurisdiction in effect on the date bids are received.

2. Where approval standards have been established by OSHA, UL, ASME, AGA, AMCA, ANSI, ARI, NFPA, State Fire Insurance Regulatory Body, and FM, follow these standards whether or not indicated on the Drawings and Specifications. Include cost of work required to comply with requirements of these authorities in the original proposal. Comply with IEEE C2 where applicable.

3. Requirements in reference specifications and standards are minimum for equipment, material, and work. In instances where capacities, size, or other features of equipment, devices, or materials exceed these minimums, meet listed or shown capacities.

4. Resolve code violations discovered in Contract Documents with A/E prior to Contract award. After Contract award, make corrections or additions necessary for compliance with applicable codes.

5. Arrange with local and state authorities and utility companies for permits, fees, and service connections, verifying locations and arrangement, and pay charges including inspections.

1.6 CONTRACT DRAWINGS

1. Drawings are generally diagrammatic and are intended to encompass a system that will not interfere with the structural and architectural design of the building. Coordinate work to avoid interferences between conduit, equipment, architectural, and structural work.

2. Coordinate with architectural features, trim and millwork details, and install equipment in cabinets or other special areas as directed by A/E.

3. Drawings are based on equipment specified. Make adjustments, modifications, or changes required, due to use of other equipment.

1.7 PROJECT/SITE CONDITIONS

1. Site Visitation: Visit the site of the proposed construction to become thoroughly familiar with details of work and working conditions, verify dimensions in the field, and advise A/E of discrepancies before performing work.

2. Space Requirements
    1. Consider space limitations imposed by contiguous work in selection and location of equipment and material. Do not provide equipment or material which is not suitable in this respect.
    2. Make changes in equipment location of up to 5 feet, to allow for field conditions prior to actual installation, and as directed by A/E.
    3. Conceal conduit in finished areas. Conduit may be exposed in mechanical rooms, electrical rooms and where specifically allowed on Drawings. Route conduit and bus duct through the building without interfering with other contractors' equipment or construction.
    4. Provide maximum possible clear height underneath conduit. Install conduit as high as possible.
    5. Install equipment requiring service so that it is easily accessible.
    6. Compare the equipment sizes with the space allotted for installation before installation and make written notice of possible conflict. Disassemble large equipment to permit installation through normal room openings when required. Should written notice not be made in a timely manner, make adjustments and modifications necessary without additional compensation.
    7. Timely place equipment too large to fit through finished openings, and stairways.

3. Site Obstructions:
    1. Drawings indicate certain information pertaining to surface and subsurface obstructions which has been taken from available drawings. Such information is not guaranteed as to accuracy of location or completeness of information.
    2. Verify with A/E, utility companies, municipalities, and other interested parties that available information has been provided before cutting or trenching operations are begun. Verify locations given.
    3. Alter routing of new work should obstruction be encountered, whether or not shown on Drawings. Reroute existing lines, remove

obstruction where permitted, or otherwise perform whatever work is necessary to satisfy the purpose of the new work and leave existing services and structures in a satisfactory and serviceable condition.

4. Assume total responsibility for and repair damage to existing utilities or construction, whether or not such existing facilities are shown. Repair the lines, if damaged.

4. Cutting and Patching:
    1. Submit written request to A/E in advance of cutting or alterations.
    2. Execute cutting and demolition by methods which will prevent damages to other work and will provide proper surfaces to receive installation of repairs.
    3. Restore work which has been cut or removed; install new products complying with specified products, functions, tolerances and finishes as specified.
    4. Escutcheon Plates
        1. Heavy chrome-plated or nickel-plated escutcheon plates for penetrations of finished surface.
        2. Product: B&C No. 10 with concealed hinges.
    5. Fit work airtight to conduit, sleeves, and other penetrations through surfaces. For fire-rated penetrations, provide assemblies in accordance with UL 1479 and ASTM E 814 utilizing products and materials equal to rating of surfaces penetrated.

1.8 QUALITY ASSURANCE

1. Electrical equipment, material, and installation shall be provided by and maintained by Quality Electric, Inc., the El Dorado Water Utility Department control service provider.
2. Alternate providers will be considered based upon a pre-qualified quality assurance package submitted to the Engineer within 10 days prior to the date of the bid opening and will based upon the following requirements and criteria:

    1. Combined total experience of qualified technicians of 50 years (minimum).
    2. Five projects of similar work within the last 10 years.
    3. Three projects within the last 10 years performed for water municipalities in the state of Arkansas involving Supervisory Control and Data Acquisition (SCADA) systems.

3. Written notification will be given to the prospective bidder within 5 days of the bid date.

1.9 MATERIALS AND WORKMANSHIP

1. Provide new materials and equipment of a domestic manufacturer by those regularly engaged in the production and manufacture of specified materials and equipment. Where UL or other agency has established standards for materials, provide materials which are listed and labeled accordingly. The commercially standard items of equipment and the specific names mentioned herein are intended to identify standards of quality and performance necessary for the proper functioning of the work.

2. Work shall be performed by workmen skilled in the trade required for the work. Install materials and equipment to present a neat appearance when completed and in accordance with the approved recommendations of the manufacturer and in accordance with Contract Documents.

3. Provide labor, materials, apparatus, and appliances essential to the complete functioning of the systems described or indicated herein, or which may be reasonably implied as essential whether mentioned in the Contract Documents or not.

4. Make written request for supplementary instructions to A/E in cases of doubt as to Work intended or in event of need for explanation thereof.

5. Performance and material requirements scheduled or specified are minimum standards acceptable. The right to judge the quality of equipment that deviates from the Contract Documents remains solely with A/E.

1.10 DELIVERY, STORAGE AND HANDLING

1. Follow the manufacturer's directions completely in the delivery, storage, and handling of equipment and materials.

2. Store equipment in a clean, dry place, protected from other construction. While stored, maintain factory wrappings or tightly cover and protect equipment against dirt, water, construction debris, chemical, physical or weather damage, traffic and theft.

3. Adequately brace and package equipment to prevent breakage and distortion while in transit.

1.11 EXCAVATION

1. Trenching:

1. Perform excavation of every description and of whatever substance encountered to depths indicated or specified. Pile materials suitable for backfilling a sufficient distance from banks of trenches to prevent slides or cave-ins. Comply with OSHA requirements for excavation, trenching, and shoring. Keep surface drainage of adjoining areas unobstructed. Waste excavated materials not required or satisfactory for backfill. Remove water by pumping or other approved methods, discharge at a safe distance from the excavation.
2. Provide trenches of necessary width for proper laying of conduit and comply with latest publication of OSHA 2226 Excavating and Trenching Operations. Coordinate trench excavation with pipe installation to avoid open trenches for prolonged periods. Accurately grade to bottoms of trenches to provide uniform bearing and support for each section of conduit on undisturbed soil or the required thickness of bedding material at every point along its entire length.
3. Provide minimum 12 inches between outer surfaces and embankment or shoring which may be used, when excavating for manholes, pull boxes, and similar structures. Remove unstable soil that is incapable of supporting the structure in the bottom of the excavation to the depth necessary to obtain design bearing.
4. Material to be excavated is "unclassified." No adjustment in the contract price will be made on account of the presence or absence of rock, shale, masonry, or other materials.
5. Protect existing utility lines that are indicated or the locations of which are made known prior to excavating and trenching and that are to be retained. Protect utility lines constructed during excavating and trenching operations, from damage during excavating, trenching and backfilling; if damaged, repair lines as directed by utilities, Owner, and A/E. Issue notices when utility lines that are to be removed are encountered within the area of operations in ample time for the necessary measures to be taken to prevent interruption of the service.
6. Provide trenches for utilities of a depth that will provide the following minimum depths of cover from existing grade or from indicated finish grades, whichever is lower:
    1. 3-Foot Minimum Cover: Raceways for primary voltage conductors.
    2. 2-Foot Minimum Cover: Raceways for secondary conductors.

2. Backfilling:

1. Backfill trenches after conduit, fittings, and joints have been tested and approved.
2. Backfill trenches with sand to provide 6 inches sand below conduit and 12 inches sand cover. Backfill remainder of trenches with satisfactory materials consisting of earth, loam, sandy clay, sand, and gravel, or soft shale, free from large clods of earth and stones not over 1-1/2 inch in size, and deposit in 9 inch maximum layers, loose depth as indicated or specified. Take care not to damage utility lines. Deposit the remainder of backfill materials in the trench in 1 foot maximum layers, and compact by mechanical means. Re-open trenches and excavation pits improperly backfilled or where settlement occurs to the depth required to obtain the specified compaction, then refill and compact with the surface restored to the required grade and compaction.
3. Where trenches cross streets, driveways, building slabs, or other pavements, backfill trench utility line with sand backfill material in 6 inch layers. Moisten each layer and compact to 95 percent of the maximum soil density as determined by ASTM D 698. Accomplish backfilling in such a manner as to permit the rolling and compaction of the filled trench with the adjoining material to provide the required bearing value so that paving of the area can proceed immediately after backfilling is complete.

1.12 PAINTING

1. Comply with Section 09900 for painting.

2. Properly prepare surfaces to receive paint. Prime prepared surfaces and finish with two coats of exterior oil base paint. Verify primer and paint are rated for application.

3. Repair damage to factory painted finishes.

4. Remove splattered and incidental paint from electrical equipment.

1.13 NOISE AND VIBRATION

1. Provide the entire operating system and its component items of equipment free of objectionable vibration or noises. Statically and dynamically balance rotating equipment, and mount or fasten so that no equipment vibration will be transmitted to the building. If objectionable noise or vibration is produced or transmitted to or through the building structure by equipment, ballasts, or other parts of the work, rectify such condition at no additional compensation.

1.14 OPERATING INSTRUCTIONS

1. Provide services of authorized representatives of manufacturer to ensure that the equipment is installed according to the manufacturer's recommendations, is operating properly, and to instruct Owner's operating personnel during start-up and operating tests of complete electrical system. Notify A/E seven days prior to beginning equipment start-up.

2. Certify in writing that these services have been performed.

3. Perform tests as specified in Section 16080.

1.15 SERVICE

1. Inspect, clean, and service light fixtures; replace incandescent lamps; and replace fluorescent or HID lamps if utilized for construction lighting immediately prior to final acceptance of project.

2. Clean and polish fixtures, equipment, and materials thoroughly, and return to "as new" condition.

3. Remove excess material and debris. Place electrical systems in complete working order before request for final review. Broom clean areas.

1.16 PROJECT RECORD DOCUMENTS

1. Maintain a set of Contract Documents at the job site for the purpose of recording final size, location, and interrelation of work under this Division. Mark this set of drawings as the job progresses to indicate "as-built" location of equipment, including concealed conduit and equipment.

2. Obtain mylar Drawings from A/E, at Contractor's expense, and record as-built conditions.

3. Clearly and accurately delineate the work by dimensions on the mylar record drawings as installed, with equipment locations identified by at least two dimensions to permanent structures.

4. Final mylar record drawings shall be marked "AS-BUILT," and signed and dated by Contractor.

5. Provide certified "AS-BUILT" drawings at the conclusion of project.

1.17 FINAL REVIEW

1. Obtain necessary Certificates of Occupancy from local authorities.

2. Submit final approved operation and maintenance manuals including approved submittals, test reports, and "AS-BUILT" drawings prior to requesting final payment. Delivery of operation and maintenance manuals is a condition of final acceptance.

1.18 GUARANTEE

1. Guarantee materials, parts and labor for Work for one year from the date of issuance of occupancy permit. During that period make good faults or imperfections that may arise due to defects or omissions in materials or workmanship with no additional compensation and as directed by A/E.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION

SECTION 16051

SUBMITTALS

PART 1 - GENERAL

1.1 SECTION INCLUDES

1. This section provides for the preparation and submission of shop drawings and product data.

1.2 MANUFACTURERS

1. Listed manufacturers will be acceptable as long as specified requirements are met.

2. Manufacturers who are not listed as "acceptable manufacturers" bear the burden of proof to A/E that their products comply with the specifications. Furthermore, those manufacturers shall agree in writing to bear the cost of A/E time to review compliance with the specifications whether their products are approved or not.

3. Provide power distribution and control equipment of the same manufacturer (i.e., switchboards, panelboards, transformers, motor control centers).

4. Provide similar equipment of same manufacturer (i.e., wiring devices).

1.3 CONTRACTOR'S CERTIFICATION

1. Submittals will be submitted only by the Contractor. Indicate by signed stamp that the contract documents have been checked, that the work shown in the submittals is in accordance with contract requirements and that dimensions and relationship with work of other trades have been checked. If submittals are submitted for review that have not been checked and signed by the Contractor, they will be returned for checking before being considered by A/E.

1.4 PREPARATION

1. Include information relevant to particular equipment or materials to be furnished, where product data published by manufacturer is part of submittal.

2. Provide documentation of compliance with manufacturer's published literature or drawings or letter signed by officer of manufacturer in cases where compliance with UL, FM, ARI, IRI, or other similar organization standards are required.

3. Furnish submittals within 45 days after receiving a signed contract and prior to the start of installation.

4. Include identifying symbols and equipment numbers used in the contract documents for all equipment and material submitted.

5. Cross reference sheet numbers on Drawings for shop drawings. Provide shop drawings consisting of plans drawn to scale, with elevations and sections, to show clearly the location of major items of equipment and clearances for maintenance and code requirements.

6. Submit only the requested submittals complete by types of equipment (i.e., lighting fixtures, power distribution, etc.) labelled with applicable specification section(s) included. Each submittal will be handled separately. Should any item not be acceptable, the entire submittal will be returned to the Contractor for correction and resubmittal. Partial submittals are unacceptable. The intent of this requirement is that all approved bound sets of data will be identical and will contain only acceptable information.

7. Submit a compliance sheet for each submittal indicating the submittal is in full compliance with the drawings and specifications. Indicate by drawing number or specification section number and paragraph numbers all exceptions taken and include an explanation.

8. The review of submittals does not relieve or modify the Contractor's responsibility for compliance with the Contract Documents or dimensions or errors contained in the submittal or quantity count. It is clearly understood that, in the review process, noting of some discrepancies but overlooking others does not grant the Contractor permission to proceed in error. Regardless of any information contained in the submittals, the Contract Documents govern the work, and are neither waived nor suspended in any way by the review of the submittals.

9. A minimum review period of two weeks, exclusive of transmittal time, will be required in A/E office for each submittal. Take this time period into consideration when scheduling construction.

10. Include in submittals sufficient plans, elevations, sections, performance data, dimensions, bolt locations, ratings, sound data, weights and schematics to clearly describe the equipment and to show compliance with these specifications. Provide a cover or title sheet for the submittal containing the following:
    1. Name of Contractor originating the submittal.
    2. Name of project for which the submittal is made.
    3. An index of all items submitted including:
        1. Mark of equipment on drawings.
        2. Manufacturer.
        3. Catalog number.
        4. Specification section number.
    4. Date of submittal and date of each revision.
    5. Contractor's certification of review.
    6. Contractor's certification of compliance.
11. Shop drawings and product data which do not comply with the requirements herein will be returned for resubmittal. Submit two paper sepias for shop drawings.

12. A/E will retain one copy and Owner will retain one copy of submittal. Remaining copies will be returned to Contractor marked FURNISH AS SUBMITTED, FURNISH AS CORRECTED, REVISE AND RESUBMIT or SUBMIT SPECIFIED ITEM. If it is marked FURNISH AS SUBMITTED or FURNISH AS CORRECTED, no additional submittal is required. If it is marked REVISE AND RESUBMIT or SUBMIT SPECIFIED ITEM, repeat submittal in accordance with this section. Submit complete and accurate shop drawings and product data at first submittal. If submittals are returned to Contractor marked REVISE AND RESUBMIT or SUBMIT SPECIFIED ITEM, only one additional submission will be permitted.

13. If the reproducible sepia or product data marked FURNISH AS SUBMITTED or FURNISH AS CORRECTED is altered for any reason after it has been stamped, the REVIEWED stamp shall automatically be voided.

14. Provide all work in accordance with the submittals stamped FURNISH AS SUBMITTED or FURNISH AS CORRECTED inasmuch as they are in agreement with the Contract Documents. Where differences occur between the submittals and the Contract Documents, the Contract Documents shall govern the work.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

3.1 REQUIRED SUBMITTALS

1. Furnish product data for devices, equipment, or systems as specified. Other submittals will be returned to Contractor without review. Furnish shop drawings as indicated.

3.2 FINAL SUBMITTAL

1. In addition to the number of copies of shop drawings and product data required to review submittals, maintain separate file of final reviewed copies of such material. Deliver approved submittals in a hard-back binder for the Owner's use. Incorporate changes and revisions made throughout the construction period. Refer to Section 16052.

END OF SECTION

SECTION 16052

OPERATION AND MAINTENANCE MANUALS

PART 1 - GENERAL

1.1 SECTION INCLUDES

1. This section provides for the preparation and submission of operation and maintenance manuals.

2. Each section included in Division 16 - Electrical incorporates this section by reference and is incomplete without the provisions stated herein.

1.2 PREPARATION

1. Furnish four copies of complete operation and maintenance instructions, service manuals and parts list applicable to each manufactured item of equipment furnished. Bind operation and maintenance information in four separate loose-leaf binders and deliver to A/E at least four weeks prior to final review of the project.

2. Organize binders to contain like equipment in separate divisions. Provide a complete double index for each binder to include:
    1. An alphabetized list of the products by name.
    2. An alphabetized list of manufacturers whose products have been incorporated in the work together with their addresses and the name, addresses and telephone numbers of the local sales representative or supplier.

3. For each section of product, equipment or system, organize the data as follows:
    1. Furnish a general description of the equipment or system listing the major components, intended service and other general data.
    2. Furnish technical data including nameplate data, design parameters, ratings, capacity, performance data, operating curves, characteristics, and the like. Clearly distinguish between information which does and does not apply.
    3. List warnings and cautions to be observed during both installation and operations.
    4. Fully detailed installation and operation instructions including special tools required, alignment instructions, start-up, and shut-down sequences.

5. Furnish maintenance, service and repair instructions including maintenance and service schedules, materials, and methods for performing routine and annual service.
6. Furnish a troubleshooting guide and check list indicating common failures, test methods and procedures for determining component fault or failure.
7. Furnish a spare parts list indicating part and order number with name, address, and telephone number of supplier. Include current prices of replacement parts and supplies.
8. Furnish diagrams including controls, wiring, installation or operation of the equipment or system.
9. Furnish copies of all approved submittals. Refer to Section 16051.
10. Furnish copies of all test reports. Refer to Section 16080.
11. Print copies of the "AS-BUILT" drawings. Refer to Section 16050.
12. Furnish all warranties and guarantees.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION

SECTION 16060

GROUNDING AND BONDING SYSTEMS

PART 1 - GENERAL

1.1 SECTION INCLUDES

1. Section includes grounding electrodes and conductors; equipment grounding conductors; bonding methods and materials; , including:
    1. Power system grounding.
    2. Communication system grounding.
    3. Electrical equipment and raceway grounding and bonding.
    4. Structural steel grounding.
    5. Miscellaneous system grounding.

1.2 RELATED SECTIONS

1. Section 16080 - Electrical Testing.

2. Section 16120 - Wire and Cable.

3. Section 16132 - Conduit.

4. Section 16210 - Service Entrance.

1.3 REFERENCES

1. NECA - Standard of Installation.

2. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

3. NFPA 70 - National Electrical Code.

1.4 SYSTEM DESCRIPTION

1. Grounding systems use the following elements as grounding electrodes:
    1. Metal underground water pipe.
    2. Metal frame of the building.
    3. Ground ring.
    4. Rod electrode.

2. Grounding System Resistance: 5 ohms.

1.5 SUBMITTALS

1. Product Data: Submit grounding electrodes and connections; for fastening components; and nameplates, labels, and markers.

2. Test Reports: Indicate overall resistance to ground and resistance of each electrode.

3. Manufacturer's Installation Instructions: Submit for active electrodes.

4. Project Record Documents: Record actual locations of components and grounding electrodes.

1.6 QUALITY ASSURANCE

1. Manufacturer Qualifications: Company specializing in manufacturing products specified in this Section with minimum three years documented experience, and with service facilities within 100 miles of project.

1.7 FIELD MEASUREMENTS

1. Verify field measurements prior to fabrication.

PART 2 - PRODUCTS

2.1 MATERIALS

1. Rod Electrodes: Copper-encased steel, 3/4-inch diameter, minimum length 10 feet.

2. Mechanical Connectors:
    1. Manufacturers:
        1. Burndy.
        2. O.Z. Gedney.
    2. Heavy-duty, bolt-type, copper alloy or bronze for grounding and bonding applications, in configurations required for particular installation.

3. Exothermic Connections:
    1. Type for underground and structural steel; Cadweld.

2. Exothermic materials, accessories, and tools for preparing and making permanent field connections between grounding system components.

4. Wire:
   1. Stranded, copper cable.
   2. Foundation Electrodes: 2/0 AWG.
   3. Grounding Electrode Conductor: Size to meet NFPA 70 requirements.

5. Grounding Well Components:
   1. Well Pipe: 8 inch NPS by 24-inch long concrete pipe with belled end.
   2. Well Cover: Cast iron with legend "GROUND" embossed on cover.

PART 3 - EXECUTION

3.1 GROUNDING AND BONDING INSTALLATION

1. Install rod electrodes at locations indicated. Install additional rod electrodes as required to achieve specified resistance to ground.

2. Provide grounding well pipe with cover at rod locations where indicated. Install well pipe top flush with finished grade.

3. Provide bonding to meet Regulatory Requirements.

4. Bond together metal siding not attached to grounded structure; bond to ground.

5. Obtain permission from A/E before using powder - actuated anchors.

6. Do not drill or cut structural members.

3.2 ELECTRIC SERVICE GROUND

1. Ground the electrical service system neutral at service entrance equipment to grounding electrodes.

2. Bond together system neutrals, service equipment enclosures, and equipment grounding conductor at service entrance.

3. Connect the electric service grounding electrode conductors to the incoming metal water pipe system (when available, using a suitable ground clamp) and ground grid.

4. Provide grounding and bonding at the power company's metering equipment.

5. Provide test wells for access to the ground grid and removable connections for testing the system.

3.3 GROUND LOOP

1. Provide an electrically continuous ground system consisting of minimum of #4/0 copper main ground loop and ground rod stations with the bare copper conductors connected to the ground rod stations. Verify that the resistance to ground between any point on the system does not exceed 5 ohms.

2. Install the ground conductors in contact with the earth below the frost line or a minimum of 30 inches, whichever is deeper.

3.4 BUILDING EQUIPMENT GROUND

1. Provide a complete ground system for the building consisting of copper cable, ground rods and exothermic connections to serve the service entrance, building structural steel, metallic enclosures and conduit systems.

2. Provide a separate, insulated equipment grounding conductor from the main service ground to each main switchboard and in all feeders and branch circuits. Terminate each end on a grounding lug, bus, or bushing. Do not use conduit as grounding conductor.

3. Provide OZ Type "BJ" bonding jumper at all expansion joints, points of electrical discontinuity or connections in conduit where firm mechanical bond is not possible, such as flexible connections, insulating couplings, etc.

4. Ground each lighting and power panelboard by connecting the grounding conductor to the grounding stud.

5. Ground each secondary dry-type transformer to the ground bus of the primary side panelboard. Provide a bonding jumper between the ground

stud and the neutral. Ground transformer ground stud to ground loop if a ground loop is installed or the nearest structural steel member.

6. Bond every item of equipment served by the electrical system to the building equipment ground system. This includes switchboards, panelboards, disconnect switches, receptacles, controls, fans, air handling units, pumps, and flexible duct connections.

3.5 COMMUNICATIONS GROUND

1. Provide communications system grounding conductor at point of service entrance and connect to nearest effectively grounded building structural steel member.

2. Use minimum No. 6 AWG copper conductor for communications service grounding conductor. Leave 10-foot slack conductor at terminal board.

3.6 FIELD QUALITY CONTROL

1. Inspect and test in accordance with NETA ATS, except Section 4.

2. Grounding and Bonding: Perform inspections and tests listed in NETA ATS, Section 7.13.

END OF SECTION

SECTION 16070

SUPPORTING DEVICES

PART 1 - GENERAL

1.1 SECTION INCLUDES

1. Furnish and install supporting devices, including:
    1. Conduit and equipment supports.
    2. Fastening hardware.

1.2 COORDINATION

1. Coordinate size, shape and location of concrete pads with section on cast-in-place concrete.

2. Coordinate size, shape and requirements for utility company equipment with local utility company.

1.3 QUALITY ASSURANCE

1. Provide support systems adequate for weight of equipment and conduit, including wiring which they carry.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

1. B-Line.

2. Kindorf.

3. Unistrut.

2.2 MATERIAL

1. Support Channel: Galvanized or painted steel.

2. Hardware: Galvanized or painted steel.

3. Provide epoxy or PVC coated materials for corrosive environments.

PART 3 - EXECUTION

3.1 INSTALLATION

1. Fasten hanger rods, conduit clamps, and outlet and junction boxes to building structure using expansion anchors, beam clamps or bolts.

2. Use toggle bolts or hollow wall fasteners in hollow masonry, plaster, or gypsum board partitions and walls; expansion anchors or preset inserts in solid masonry walls; sheet metal screws in sheet metal studs and wood screws in wood construction.

3. Do not fasten supports to piping, ductwork, mechanical equipment, or conduit.

4. Do not use powder-actuated anchors on new concrete structure.

5. Do not drill structural steel members.

6. Fabricate supports from structural steel or steel channel, rigidly welded or bolted to present a neat appearance. Use hexagon head bolts with spring lock washers under all nuts.

7. Provide concrete pads and equipment bases for all outdoor equipment on grade, floor mounted equipment, areas with floors below grade, penthouse equipment rooms and where shown on Drawings.

8. Install surface-mounted cabinets and panelboards with minimum of four anchors.

9. Bridge studs top and bottom with channels to support flush-mounted cabinets and panelboards in stud walls.

10. Do not support conduit from ceiling wire supports.

11. Do not use spring steel clips and clamps or support conduits by individual hanger wires.

12. Where multiple runs of conduit can be run grouped together, run conduit in racks supported from the building structure. Provide for future use of rack by properly planning routing of conduits in and through restricted areas such as through walls and around mechanical and electrical equipment.

END OF SECTION

SECTION 16075

ELECTRICAL IDENTIFICATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

1. Furnish and install items for identification of electrical products installed under Division 16.

1.2 SUBMITTALS

1. Submit product data.

PART 2 - PRODUCTS

2.1 MATERIALS

1. Nameplates: Provide engraved three-layer laminated plastic nameplates with white letters on a black background.

2. Wire and Cable Markers: Provide vinyl cloth markers with split sleeve or tubing type, except in manholes provide stainless steel with plastic ties.

3. Underground Warning Tape
    1. Manufactured polyethylene material and unaffected by acids and alkalies.
    2. 3.5 mils thick and 6 inches wide.
    3. Tensile strength of 1,750 psi lengthwise.
    4. Printing on tape shall include an identification note BURIED ELECTRIC LINE, and a caution note CAUTION. Repeat identification and caution notes over full length of tape. Provide with black letters on a red background conforming to APWA recommendations.

4. Panelboard Directories: Provide a circuit directory for each panelboard. Mount circuit directory in a permanent, clear Lexan card holder located on inside of door on panelboard.

PART 3 - EXECUTION

3.1 INSTALLATION

1. Degrease and clean surfaces to receive nameplates.

2. Install nameplates parallel to equipment lines.

3. Secure nameplates to equipment fronts using screws or rivets. Secure nameplate to inside face of recessed panelboard doors in finished locations.

3.2 WIRE AND CABLE LABELING

1. Provide wire markers on each conductor in splice boxes, pull boxes, and at first load connection on homerun. Identify with branch circuit or feeder number for power and lighting circuits, and with control wire number as indicated on equipment manufacturer's shop drawings for control wiring.

3.3 EQUIPMENT LABELING

1. Provide nameplates to identify all electrical distribution and control equipment.

2. Engraved, Laminated Plastic Nameplates: 1/4-inch letters, equipment designation; 1/8-inch letters, source circuit number. Provide for:
    1. Panelboards.
    2. Wire gutters.
    3. Enclosed switches, starters, circuit breakers and contactors. Provide neatly typed label inside each motor starter enclosure door identifying motor served, nameplate horsepower, full load amperes, code letter, service factor, and voltage/phase rating. Provide phenolic nameplate on cover exterior to indicate motor served.
    4. Transformers as identified on Drawings.

END OF SECTION

SECTION 16080

ELECTRICAL TESTING

PART 1 - GENERAL

1.1 SECTION INCLUDES

1. Test electrical systems and equipment.

2. These tests are required to determine that the equipment involved may be safely energized and operated.

3. Perform tests by and under the supervision of fully experienced and qualified personnel. Advise each respective manufacturer's representative of tests on their equipment.

4. Record all test data.

5. Each section of Division 16 that has products or systems listed herein incorporate this section by reference and is incomplete without the required tests stated herein.

1.2 REFERENCES

1. NFPA 70 - National Electrical Code.

1.3 SUBMITTALS

1. Submit test report forms for review a minimum of 90 days prior to requesting a final review by A/E.

2. Furnish six individually bound copies of test data. Neatly type and arrange data. Include with the data the date tested, personnel present, weather conditions, nameplate record of test instrument and list all measurements taken, both prior to and after any corrections are made to the system. Record all failures and corrective action taken to remedy incorrect situation.

3. A/E will retain one copy. Remaining copies will be returned to Contractor for inclusion in the operation and maintenance manuals.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

3.1 PREPARATION

1. Furnish proposed test procedures, recording forms, list of personnel and test equipment for A/E review.

2. Follow recommended procedures for testing as published by test equipment manufacturer.

3.2 WIRE AND CABLE (600 VOLTS AND LESS)

1. Test insulation resistance of each main feeder and service after the installation is complete but before the connection is made to its source and point of termination.

2. Test insulation resistance using Biddle Megger or equivalent test instrument at a voltage not less than 1,000 volts DC. Measure resistance from phase-to-phase and phase-to-ground. In circuits where insulation test value is lower than 1 megohm, remove and replace conductor and retest.

3. Visually inspect connections of every branch circuit for tightness.

4. Insure that grounding conductor is electrically continuous.

5. Test branch circuits against grounds, shorts or other faults.

6. Inspect grounding and bonding system conductors and connections for tightness and proper installation.

7. Measure ground resistance from system neutral connection at service entrance to convenient ground reference point using suitable ground testing equipment.

3.3 MOLDED CASE CIRCUIT BREAKERS (600 VOLTS AND LESS)

1. Check each circuit breaker for proper mounting, conductor size and feeder designation.

2. Operate circuit breaker to insure smooth operation.

3. Open unsealed breakers and check internal components for tightness, when applicable.

4. Measure contact resistance in micro-ohms. Investigate deviations greater than 50%, as compared to adjacent poles and similar breakers.

3.4 PANELBOARDS

1. Test and inspect equipment in accordance to manufacturer's recommendations and these specifications.

2. Test insulation resistance of busses and portions of control wiring that disconnect from solid-state devices through normal disconnecting features. Insulation resistance less than 100 megohms is not acceptable. Measure insulation resistance of the following:

    1. Each bus section phase-to-phase and phase-to-ground.

    2. Each control circuit with respect to ground.

    3. For components with solid-state devices or other sensitive components, perform tests in accordance to manufacturer's instructions.

3. Check anchorage, external clearances, and alignment and fit of components including internal elements and grounding.

4. Check tightness of bolted electrical connections with calibrated torque wrench. Refer to manufacturer's instructions for proper torque.

5. Physically test interlock systems to ensure proper function.

    1. Make closure attempt on locked-open devices. Make opening attempt on locked closed devises.

    2. Make exchange with devices operated in off-normal positions.

6. Verify proper operation of indicating devices and exercise active components. Verify satisfactory performance of each control feature and protective device.

3.5 WIRING DEVICES

1. Operate switches at least twice.

2. Test every convenience outlet with plug-in device for proper phasing and grounding.

3. Demonstrate operation of lighting circuits and lighting control systems.

3.6 SECONDARY GROUNDING

1. Test service entrance ground resistance.

2. Provide additional made-electrodes if resistance is more than 5 ohms.

3. Test grounding system resistance within building at a minimum of two locations.

3.7 PACKAGED ENGINE GENERATOR SYSTEM

1. Demonstrate operation of standby system with voltage check while the entire electrical system is operating at system full load condition to assure proper operation of generator, transfer switches, etc.

2. Simulate standby power conditions by operating main overcurrent devices to simulate a loss of main electrical power to the building.

3. Verify operation of all transfer switches and operation of all equipment on standby power. Check and adjust all delays and timing sequences.

4. Perform a full load test of the generator by applying a load bank to system equal to full load rating of generator for four hours.

5. Where building load is unavailable for testing or is less than full rated load of generator, provide resistive load bank connected into system to bring load up to full rating of generator.

6. During test, record the following at 20 minute intervals:
    1. Kilowatts.
    2. Amperes.
    3. Voltage.
    4. Coolant temperature.
    5. Room temperature.
    6. Frequency.

7. Oil pressure.

7. Test alarm and shutdown circuits by simulating conditions.

8. Test insulation resistance of generator field and exiter windings.

9. Test sound level at 20 linear feet from engine. Verify that sound pressure level is less than 95 dbA.

10. Based on vibration analysis, select vibration isolators and other dampening devices required to provide a smooth running installation.

END OF SECTION

SECTION 16120

WIRE AND CABLE

PART 1 - GENERAL

1.1 SECTION INCLUDES

1. Furnish and install wire and cable, including:
    1. Building wire.
    2. Cable.
    3. Wiring connections and terminations.

1.2 RELATED SECTIONS

1. Section 16060 - Grounding and Bonding Systems.
2. Section 16080 - Electrical Testing.
3. Section 16130 - Boxes.
4. Section 16132 - Conduit.
5. Section 16140 - Wiring Devices.
6. Section 16150 - Wire Connections and Devices.

1.3 REFERENCES

1. NEMA WC 3 - Rubber-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.
2. NEMA WC 5 - Thermoplastic-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

1. Wire and Cable
    1. Carol.
    2. Southwire.

3. Triangle PWC, Inc.
4. Rome.
5. Okonite.

2. Connectors
   1. Burndy.
   2. T & B.
   3. 3M.

3. Power Distribution Blocks
   1. Ilsco.
   2. Square D.

2.2 BUILDING WIRE

1. Thermoplastic-Insulated Building Wire: NEMA WC 5.

2. Rubber-Insulated Building Wire: NEMA WC 3.

3. Feeders and Branch Circuits Larger Than #6 AWG: Copper, stranded conductor, 600 volt insulation, THW, THHN/THWN, XHHW, RHW.

4. Feeders and Branch Circuits #6 AWG and Smaller: Copper conductor, 600 volt insulation, THW, THHN/THWN; smaller than #8 AWG, solid conductor.

5. Control Circuits: Copper, stranded conductor 600 volt insulation, THW, THHN/THWN.

6. Wiring types BX and MC will not be acceptable for use on this project.

2.3 WIRING CONNECTIONS AND SPLICES

1. Connect and splice wire #8 AWG and smaller with self-insulating, wire nut connectors.

2. Terminate and splice all #6 AWG and larger copper conductors, except for load side lugs on Class I and II panelboards, fusible switches, circuit breakers, transformers and individual motor controllers with high conductivity, wrought copper, color-keyed compression connector similar to T & B Series 54100 for terminal connection; Series 54500 for two-way copper-to-copper splices; and Series 54700 for tapping and pigtailing copper conductors.

3. Motor Connections: 3M Series 5300-5304.

4. Set screw type connectors are only acceptable on the load side lugs of Class I and II panelboards, circuit breakers, fusible switches and on individual motor controllers.

5. Where three or more conductors larger than #8 AWG are installed in wiring gutter, utilize a screw-type power distribution block.

PART 3 - EXECUTION

3.1 GENERAL WIRING METHODS

1. Use no wire smaller than No. 12 AWG for power and lighting circuits, and no smaller than No. 14 AWG for control wiring. Provide minimum of No. 12 AWG for all switch legs. Provide neutral conductor of the same size as the phase conductors to which it is associated.

2. Use No. 10 AWG conductor minimum for 20 ampere, 120 volt branch circuits longer than 100 feet, and for 20 ampere, 277 volt branch circuits longer than 200 feet.

3. Provide homerun conductors of continuous length without joint or splice from overcurrent device to first outlet.

4. Provide main service and feeder conductors of continuous length without joint or splice for their entire length.

5. Install wiring in conduit, unless indicated otherwise.

6. Neatly train and lace wiring inside boxes, panelboards, switchgear, motor control centers, wiring gutters, and other equipment using Thomas & Betts "Ty-Wraps."

7. Provide equal conductor lengths for all parallel circuits.

8. A common neutral may only be used for lighting branch circuits scheduled for different phases.

9. Drawings indicate proposed circuiting only, and do not indicate every conductor unless intent is unclear and further clarification is required. Provide the necessary travellers for all three-way and four-way switches.

10. Tag each circuit in an outlet box where two or more circuits run to a single outlet as a guide for the fixture hanger in making connections.

3.2 WIRING INSTALLATION IN RACEWAYS

1. Pull all conductors into a raceway at the same time. Use UL listed wire pulling lubricant. Do not exceed manufacturer's recommended tension.

2. Install wire in raceway after interior of building has been physically protected from the weather and all mechanical work likely to injure conductors has been completed.

3. Completely and thoroughly swab raceway system before installing conductors.

4. Remove and discard conductors cut too short or installed in wrong raceway. Do not install conductors which have been removed from a raceway.

5. Do not install conductors in conduit which contains wires already in place.

3.3 WIRING CONNECTIONS AND TERMINATIONS

1. Make taps and splices in accessible junction or outlet boxes only.

2. Thoroughly clean wires before installing lugs and connectors.

3. Make splices, taps and terminations to carry full ampacity of conductors without perceptible temperature rise.

4. Provide joints in branch circuits only where such circuits divide. Where circuits divide, provide one through circuit to which the branch is spliced from the circuit. Do not leave joints in branch circuits for fixture hanger to make. Make all taps and splices with approved type compression connector.

5. Terminate spare conductors with electrical tape.

6. Identify and label all conductor terminations as specified in electrical identification.

7. Properly terminate indicated conductors in equipment furnished and provide properly sized lugs.

3.4 COLOR CODING

1. Color code all distribution systems as follows:
   1. 120/208V System

Phase	Color
A	Black
B	Red
C	Blue
N	White
G	Green

   2. 277/480V System

Phase	Color
A	Brown
B	Orange
C	Yellow
N	Gray/White
G	Green

   3. For existing facilities with color coding different from that specified, contact A/E for instructions.

2. Provide color coding throughout the full length of all wire No. 6 and smaller. Identification by permanent paint bands or tags at the outlets will be acceptable for wire sizes larger than No. 6. Provide the same color and shade of color throughout the project.

3.5 FIELD QUALITY CONTROL

1. Inspect wire and cable for physical damage and proper connection.

2. Torque test conductor connections and terminations to manufacturer's recommended values.

END OF SECTION

SECTION 16130

BOXES

PART 1 - GENERAL

1.1 SECTION INCLUDES

1. Furnish and install wall and ceiling outlet boxes, floor boxes, and pull and junction boxes.

1.2 RELATED SECTIONS

1. Section 16070 - Supporting Devices.
2. Section 16075 - Electrical Identification.
3. Section 16120 - Wire and Cable.
4. Section 16132 - Conduit.
5. Section 16140 - Wiring Devices.

1.3 REFERENCES

1. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers and Box Supports.
2. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
3. NFPA 70 - National Electrical Code.

PART 2 - PRODUCTS

2.1 OUTLET BOXES

1. Provide galvanized or cadmium-plated pressed steel outlet boxes suitable for the conditions of each outlet. Provide multi-gang outlets of single box design; sectional boxes will not be acceptable.

2. Provide deep type cast metal outlet boxes located in damp locations exposed to weather or exposed areas subject to damage, complete with gasketed cover and threaded hubs.

3. Provide outlet boxes of sufficient volume to accommodate the number of conductors entering the box in accordance with the requirements of NFPA 70, and not less than 1-1/2 inch deep unless shallower boxes are required by structural conditions and are especially approved by A/E.

4. Provide PVC type outlet boxes only in corrosive areas rated as NEMA 13X.

5. Provide 4-inch octagonal ceiling outlet boxes.

2.2 PULL AND JUNCTION BOXES

1. Provide galvanized sheet metal boxes conforming to NEMA OS 1. Provide hinged enclosures for any box larger than 12 inches in any dimension.

2. Provide cast metal boxes for outdoor and wet locations conforming to NEMA 250; Type 4 and Type 6, flat-flanged, surface-mounted junction box, UL listed as raintight with cover and ground flange, neoprene gasket, and stainless steel cover screws.

3. Provide precast concrete or fiberglass handholes for underground installations. Where fiberglass handholes are provided, provide die-molded type with pre-cut 6"x6" cable entrance at center bottom of each side and fiberglass weatherproof cover with non-skid finish.

4. Provide pre-cast reinforced concrete type pull/splice boxes with flush cover as manufactured by Brooks Products, for underground circuits. Size boxes as indicated.

5. Provide separate pull boxes and junction boxes for electric power, control, and communication systems.

6. Duct Bank Pull Boxes
    1. Provide pull boxes constructed of cast-in-place concrete with steel reinforcing bars; precast concrete with steel reinforcing bars; or fiberglass.
    2. Design and test manufactured pull boxes to temperatures of minus 50 degrees F. Provide pull boxes with material compressive strength no less than 11,000 psi.

3. Provide covers with a minimum coefficient of friction of .5 and which are full vehicular traffic H-20 rated. Provide "logo" on cover as indicated on Drawings. Provide lockable covers with two penta-head bolts and pull slot(s) for easy removal.

PART 3 - EXECUTION

3.1 COORDINATION OF BOX LOCATIONS

1. Provide electrical boxes as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections, and code compliance.

2. Electrical box locations shown on Drawings are approximate unless dimensioned. Verify with A/E the location of floor boxes and outlets in offices and work areas prior to rough-in.

3. Locate and install boxes to allow access. Provide access doors where installation is inaccessible.

4. Locate and install to maintain headroom and to present a neat appearance.

3.2 OUTLET BOX INSTALLATION

1. Do not install boxes back-to-back in walls. Provide minimum 6 inch separation, except provide minimum 24-inch separation in acoustic-rated walls.

2. Locate boxes in masonry walls to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat openings for boxes.

3. Provide knockout closures for unused openings. Provide blank plates for all junction boxes.

4. Securely fasten boxes to the building structure, independent of the conduit, except for splice boxes that are connected to two metal conduits, both supported within 12 inches of box.

5. Provide access to all boxes.

6. Use multiple-gang boxes where more than one device are mounted together; do not use sectional boxes. Provide barriers to separate wiring of different voltage systems.

7. Install boxes in walls without damaging wall insulation.

8. Coordinate with A/E for mounting heights and locations of outlets mounted above counters, benches, and backsplashes.

9. Set boxes installed in concealed locations flush with the finish surfaces, and provide with the proper type extension rings and/or covers where required.

10. Position outlets to locate luminaires as shown on reflected ceiling plans.

11. In inaccessible ceiling areas, do not install junction boxes which are accessible only through luminaire ceiling opening.

12. Provide recessed outlet boxes in finished areas; secure boxes to interior wall and partition studs, accurately positioning to allow for surface finish thickness. Use adjustable steel channel fasteners for flush ceiling outlet boxes.

13. Align wall-mounted outlet boxes for switches, thermostats, and similar devices. Install all grouped device locations neat and symmetrical. Coordinate with A/E before rough-in.

3.3 PULL AND JUNCTION BOX INSTALLATION

1. Locate pull boxes and junction boxes above accessible ceilings or in unfinished areas.

2. Support pull and junction boxes independent of conduit.

3. Provide pull boxes in feeder circuits as required but at least every 150 feet in straight runs.

4. Identify all junction boxes by circuit number on cover with legible permanent ink marker.

5. Duct Bank Pull Boxes
    1. Where installed outside, set pull boxes level 4 inches above finish grade.
    2. Rate all pull boxes for H-20 heavy traffic. Concrete encase pull boxes.
    3. Stack pull boxes or provide extensions as required for routing of conduits as indicated on Drawings.

6. Provide weatherproof pull boxes or junction boxes where installed outdoors with watertight gasketed covers fastened by means of corrosion resistant screws.

3.4 DRAWINGS

1. Provide as-built plan and profile drawings of all high voltage and medium voltage duct banks and pull boxes. Show all utilities encountered.

2. Utilize sheets for plan and profile drawings of same size as Drawings. Coordinate scale of drawings with A/E.

END OF SECTION

SECTION 16131

EMPTY RACEWAY SYSTEMS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Furnish and install raceway systems including telephone, chlorination system, and pump system.

1.2 RELATED SECTIONS

A. Section 16130 - Boxes.

B. Section 16132 - Conduit.

1.3 SYSTEM DESCRIPTION

A. Provide conduit and terminal boards required to form a system of raceways for pulling of cable at a later date.

PART 2 - PRODUCTS

1.4 EQUIPMENT

A. Backboards: 3/4-inch, fire-retardant, exterior grade plywood.
   1. Provide minimum of one 4-foot by 8-foot sheet of plywood for each telephone location shown unless otherwise noted.

PART 3 - EXECUTION

1.5 INSTALLATION

A. Provide 4-inch PVC underground system service as shown on drawings. Verify exact system requirements for each vendor or utility.

B. Provide pull boxes in conduit runs spaced not greater than 100 feet apart. Install no more than two right angle bends between junction boxes for telephone conduit runs.

C. Place label on pull and junction boxes indicating system type.

D. Conduit:
   1. Provide 3/4-inch conduit from each telephone outlet to telephone backboard.
   2. Provide conduit as indicated on plans from pump system control panel to equipment locations indicated. Verify requirements with system provider.
   3. Provide conduit as indicated on plans for cholorination system to equipment locations indicated. Verify requirements with system provider.
   4. Provide No. 12 AWG insulated conductor or suitable steel pull wire or nylon cord in all conduits which are for future use or do not call for wire or cable to be installed.

E. Provide duplex receptacles at each communications backboard. Confirm location on job site prior to installation.

F. Provide two coats of light gray paint for each backboard.

END OF SECTION

SECTION 16132

CONDUIT

PART 1 - GENERAL

1.1 SECTION INCLUDES

1. Furnish and install raceway systems, including:
    1. Rigid metal conduit and fittings.
    2. Electrical metallic tubing and fittings.
    3. Flexible metal conduit and fittings.
    4. Liquidtight flexible metal conduit and fittings.
    5. Nonmetallic conduit and fittings.

1.2 RELATED SECTIONS

1. Section 16070 - Supporting Devices.

2. Section 16120 - Wire and Cable.

3. Section 16130 - Boxes.

1.3 REFERENCES

1. ANSI C80.1 - Rigid Steel Conduit, Zinc-Coated.

2. ANSI C80.3 - Electrical Metallic Tubing, Zinc-Coated.

3. NEMA FB 1 - Fittings and Supports for Conduit and Cable Assemblies.

4. NEMA RN 1 - PVC Externally-Coated Galvanized Rigid Steel Conduit and Electrical Metallic Tubing.

5. NEMA TC 2 - Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80).

6. NEMA TC 3 - PVC Fittings for Use with Rigid PVC Conduit and Tubing.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

1. Rigid Metal Conduit, Electrical Metallic Tubing and Fittings
    1. Allied Tube and Conduit Corporation.
    2. Triangle PWC, Inc.
    3. Wheatland Tube Co.

2. Flexible Conduit and Fittings
    1. Anamet, Inc.
    2. Electri-Flex Co.
    3. Triangle PWC, Inc.

3. Nonmetallic Conduit and Fittings
    1. Can-Tex Industries.
    2. Carlon.
    3. Certain-Teed.

2.2 MATERIALS

1. Rigid Metal Conduit and Fittings
    1. Rigid Steel Conduit: ANSI C80.1; hot-dip galvanized.
    2. PVC Externally Coated Conduit: NEMA RN 1; rigid steel conduit with external PVC coating and internal galvanized surface.
    3. Fittings and Conduit Bodies: NEMA FB 1; threaded type, material to match conduit.

2. Electrical Metallic Tubing (EMT) and Fittings
    1. EMT: ANSI C80.3; hot-dipped galvanized tubing.
    2. Fittings and Conduit Bodies: NEMA FB 1; steel compression type.

3. Flexible Metal Conduit and Fittings
    1. Conduit: Galvanized steel strips, spirally wound.
    2. Fittings and Conduit Bodies: NEMA FB 1.

4. Liquidtight Flexible Conduit and Fittings
    1. Conduit: Flexible metal conduit with PVC jacket and integral grounding conductor.
    2. Fittings and Conduit Bodies: NEMA FB 1; liquidtight, zinc coated steel.

5. Nonmetallic Conduit and Fittings
    1. Conduit: NEMA TC 2; Schedule 40 PVC.
    2. Fittings and Conduit Bodies: NEMA TC 3.

PART 3 - EXECUTION

3.1 CONDUIT SIZING, ARRANGEMENT AND SUPPORT

1. Minimum size of conduit is 3/4-inch. Minimum size of homerun and feeder conduits is 3/4-inch. Indicated sizes are minimum based on THW copper wire and larger sizes may be used for convenience of wire pulling.

2. Arrange conduit to maintain headroom and present a neat appearance.

3. Conceal conduit in ceiling of all finished areas and in walls of all areas of the building. In unfinished areas without ceilings, conduit may be run exposed overhead. Install all conduit, including conduit above accessible ceiling, parallel or perpendicular to walls and adjacent piping. Neatly route conduit in a common rack where possible.

4. Maintain minimum 6 inch clearance between conduit and piping. Maintain 12 inch clearance between conduit and heat sources such as flues, steam pipes, and heating appliances.

5. Arrange conduit supports to prevent distortion of alignment by wire pulling operations. Fasten conduit securely to building structure using clamps, hangers and threaded rod.

6. Refer to Section 16070 for support of conduit.

3.2 GENERAL CONDUIT INSTALLATION

1. Cut conduit square using a saw or pipecutter; de-burr cut ends before joining.

2. Bring conduit to the shoulder of fittings and couplings and fasten securely.

3. Install no more than the equivalent of three 90-degree bends between boxes.

4. Use conduit bodies to make sharp changes in direction, as around beams.

5. Avoid moisture traps where possible; where unavoidable, provide junction box with drain fitting at conduit low point. Seal conduit which crosses a boundary between areas of extreme temperature difference.

6. Use suitable conduit caps to protect installed conduit against entrance of dirt and moisture.

7. Drawings indicate intended circuiting and are not intended to be scaled for exact conduit location.

8. Install conduit such that it does not interfere with fire-proofing of steel.

9. Do not install conduit in floor slab of ground floor of building.

3.3 NONMETALLIC CONDUIT INSTALLATION

1. Wipe nonmetallic conduit clean and dry before joining. Apply full even coat of cement to entire area that will be inserted into fitting. Let joint cure for 20 minutes minimum.

3.4 METALLIC CONDUIT INSTALLATION

1. Make joints mechanically tight and all conduit electrically continuous.

2. Use conduit hubs for fastening conduit to sheet metal boxes in damp or wet locations. Use sealing locknuts and other approved techniques for moisture proofing raceway in wet areas.

3. Use hydraulic one-shot conduit bender or factory elbows for bends in conduit larger than 2 inch size.

4. Install expansion joints where conduit crosses building expansion joints and at 150 foot intervals in straight runs.

5. Provide fire-stop compound at all penetrations of floor slabs or fire walls such that fire rating integrity of barrier is not lessened.

3.5 UNDERGROUND DUCT BANK INSTALLATION

1. Install top of duct bank minimum 24 inches below finished grade, unless indicated otherwise.

2. Slope duct banks, that extend beyond the building outside walls, downward 4 inches per 100 feet from point of origin inside of building to manholes or junction boxes outside the building.

3. Terminate conduit in end bell at manhole entries.

4. Stagger conduit joints.

5. Use suitable separators and chairs installed 5 feet on centers. Band conduit together with suitable banding devices. Securely anchor conduit to prevent movement during concrete placement.

6. Provide minimum 3 inches red concrete cover at top and bottom and 3 inches concrete at sides of duct bank.

7. Provide two No. 5 steel reinforcing bars at each corner and at 12 inches on center on top and sides of all duct banks and at 6 inches on center on the bottom. Provide No. 3 steel reinforcing stirrups at 5 feet on center.

3.6 CONDUIT INSTALLATION SCHEDULE

1. Exterior
    1. Exposed
        1. Rigid metal conduit.
        2. PVC coated rigid metal conduit at all concrete slab penetrations and at cooling towers.
        3. Liquidtight flexible metal conduit for connection to vibrating equipment including motors, transformers and control devices.
    2. Underground
        1. Rigid non-metallic conduit for all branch circuits.
        2. Rigid non-metallic conduit for all feeders with concrete encasement as specified.
        3. PVC coated rigid metal factory elbows for all bends and for concrete slab penetrations.

2. Interior
    1. Exposed
        1. Rigid metal conduit in areas subject to moisture, corrosive agents, physical abuse or in unconditioned spaces.
        2. Electrical metallic tubing in areas not subject to moisture, corrosive agents or physical abuse.
    2. Concealed
        1. Rigid metal conduit in areas subject to moisture or corrosive agents.
        2. Electrical metallic tubing in areas not subject to moisture or corrosive agents.
    3. Cast in Concrete: Rigid non-metallic conduit..
    4. Connections to Equipment:
        1. Liquidtight flexible metal conduit in areas subject to moisture, high humidity, or corrosive agents.
        2. Flexible metal conduit in dry, noncorrosive areas.

3. Electrical nonmetallic tubing, flexible polyethylene or PVC tubing will not be acceptable for use on this project.

4. BX and MC cable will not be acceptable for use on this project.

END OF SECTION

SECTION 16133

WIREWAYS

PART 1 - GENERAL

1.1 REFERENCES

A. NFPA 70 - National Electrical Code.

PART 2 - PRODUCTS

1.2 MANUFACTURERS

A. B-Line.

B. Hoffman.

C. Keystone.

D. Square D.

E. Superior.

1.3 MATERIALS

A. General Purpose Wireway: Square D Square Duct, Series LD.

B. Oiltight, Dust-Tight Wireway: Square D Type JIC, Series LL.

C. Raintight Wireway: Square D lay-in raintight, Series LDR.

D. Raintight Troughs: Square D, Series RD.

E. Wireway End Closures, Supports and Associated Fittings: Square D, of best forms and dimensions for applications.

PART 3 - EXECUTION

1.4 INSTALLATION

A. Provide systems of wireway of sufficient size where shown, on equipment racks, and at other locations with two or more starters, disconnect switches, and cabinets mounted in close proximity.

B. Size wireway cross-sectional area and length based upon conductor fill and equipment served as required by NFPA 70 and local codes.

C. Install types based on environmental conditions to which exposed.

D. Provide covers for wiring gutters of the same construction as the wiring gutter. Secure cover with captive type screws located in accordance with manufacturer's recommendation. Hinged covers will not be acceptable.

END OF SECTION

SECTION 16140

WIRING DEVICES

PART 1 - GENERAL

1.1 SECTION INCLUDES

1. Furnish and install specification grade wiring devices, including:
    1. Wall switches.
    2. Receptacles.
    3. Device plates and box covers.

1.2 RELATED SECTIONS

1. Section 16130 - Boxes.

1.3 SUBMITTALS

1. Furnish manufacturer’s catalog data.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

1. Switches and Receptacles
    1. Arrow-Hart.
    2. Hubbell.
    3. Leviton.
    4. Pass & Seymour.

2. Cover Plates: Match device manufacturer.

2.2 DEVICE COLOR

1. Provide Ivory colored switches and receptacles.

2.3 SWITCHES

1. 20A, 120-277V Single Pole: "1221", Hubbell.

2. 20A, 120-277V Double Pole: "1222", Hubbell.

3. 20A, 120-277V Three Way: "1223", Hubbell.

2.4 RECEPTACLES

1. 20A, 125V, 2P3W Simplex: NEMA 5-20R; "5361", Hubbell.

2. 20A, 125V, 2P3W Duplex: NEMA 5-20R; "5362", Hubbell.

3. 20A, 125V, 2P3W Duplex Ground Fault Interrupting: NEMA 5-20R; "GF5352", Hubbell.

4. Heat trace or other loads continuously plugged in outdoors. Provide Crouse-Hinds WRLD-1 cover. Install round plug on cord supplied with heat trace or other equipment to match weatherproof bushing on receptacle cover.

2.5 COVER PLATES

1. Provide one piece cover plates for all group mounted devices.

2. Provide nylon thermoplastic of the same manufacturer and color as the device.

PART 3 - EXECUTION

3.1 INSTALLATION

1. Install receptacles and switches only in electrical boxes which are clean and free from excess building materials, debris, etc.

2. Install wall switches with OFF position down.

3. Where switches and other devices are mounted at one location, provide single coverplate to cover all devices.

4. Align the tops of all group mounted devices. Install plumb and aligned in the plane of the wall.

5. Install convenience receptacles in vertical position with grounding pole on bottom unless otherwise noted.

6. Provide ground fault circuit interrupting type devices in all locations requiring weatherproof devices.

7. Do not use feed through feature for ground fault interrupting devices. Install GFI device at each location. GFI circuit breaker will not be acceptable.

8. Install plates on all devices and blank outlets in finished areas. Use jumbo size plates for outlets installed in masonry walls.

9. Install galvanized steel plates on outlets in unfinished areas.

10. Install galvanized steel plates on outlet boxes and junction boxes above accessible ceilings.

11. Mounting Heights:
    1. Refer to drawing cover sheet or contact A/E.
    2. Convenience Receptacles Above Counter or Backsplash: 6 inches above counter or backsplash in horizontal position.
    3. Receptacles for Water Coolers: Mount directly behind water cooler to eliminate visibility of cord and attachment plug. Coordinate elevation with the cooler to be installed prior to installation of box.
    4. Install devices in mill work as shown in details and elevations or as directed by A/E.

12. Drill opening for poke-through fitting installation in accordance with manufacturer's instructions.

END OF SECTION

SECTION 16150

WIRE CONNECTIONS AND DEVICES

PART 1 - GENERAL

1.1 SECTION INCLUDES

1. Furnish and install splicing and terminating devices.

1.2 RELATED SECTIONS

1. Section 16120 - Wire and Cable.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

1. Burndy Corp.
2. Dossert Manufacturing Corp.
3. Ideal Industries, Inc.
4. Ilsco Corp.
5. Minnesota Mining and Manufacturing Co.
6. Thomas & Betts Co., Inc.

2.2 MATERIALS

1. Cable and wire connections for splicing or terminating shall be made with compression deforming type connectors. Connectors for cable sizes 250 kcmil and larger shall be the long barrel type for double indentation. Soldered connections will not be permitted. Twist-on insulated connectors may be used which are resistant to vibration and are used in the proper sizes.

2. Provide terminal connectors with hole sizes and spacing in accordance with NEMA standards. Provide terminal connectors with two holes in tongue for use on conductor sizes 250 kcmil and larger. Terminal

connectors will not be required for connections to the circuit breakers in the lighting and/or receptacle panels.

3. Provide connections made with non-insulated connectors insulated with three layers of plastic tape, each layer being half lapped. Provide No. 35+ plastic tape.

PART 3 - EXECUTION

3.1 INSTALLATION

1. Provide electrical connections to equipment furnished under other contracts and furnish wiring, conduit, outlet boxes, and safety switches, as required. Verify locations, horsepower, and voltages of equipment prior to installation of feeders. If apparent conflict arises in power wiring, advise A/E immediately for clarification.

2. Provide switches as required by national or local codes.

3. If the motor is integral to the equipment, isolate the entire piece of equipment with a short section of flexible metal conduit to prevent vibration and/or noise amplification to be transferred to the building structure.

4. If the motor is adjustable, install an additional length of flexible metal conduit at the motor.

5. Connect a ground wire from the conduit termination to the motor frame on the inside of flexible conduit. Use approved grounding lugs or clamps or the conduit connection.

6. Major equipment furnished under mechanical and other sections of specifications may require different rough-in requirements than those indicated on Drawings. Secure detailed drawings from source furnishing equipment to determine actual rough-in locations, conduit and conductor requirements to assure proper installation.

7. Before connecting any piece of equipment, verify the name plate data corresponds with information shown on Drawings. Discrepancies shall be called to attention of A/E.

8. Change any feeders installed incorrectly as a result of not verifying equipment requirements, of equipment provided by others, prior to feeder installation.

END OF SECTION

SECTION 16210

SERVICE ENTRANCE

PART 1 - GENERAL

1.1 SECTION INCLUDES

1. Furnish and install electrical service entrance, including:
    1. Arrangement with power company for permanent electric service.
    2. Primary and Secondary service entrance from power company.

1.2 RELATED SECTIONS

1. Section 16060 - Grounding and Bonding Systems.

2. Section 16132 - Conduit.

1.3 SYSTEM DESCRIPTION

1. System Voltage: 120/208 volts, three-phase, four-wire, 60 hertz.

2. Service Entrance: Underground.

1.4 SUBMITTALS

1. Submit product data.

1.5 QUALITY ASSURANCE

1. Install service entrance in accordance with power company's rules and regulations.

PART 2 - PRODUCTS

2.1 METERING EQUIPMENT

1. Coordinate with the power company and provide equipment, conduits, manholes and equipment pads in accordance with power company directives.

PART 3 - EXECUTION

3.1 INSTALLATION

1. Make arrangements with the power company to obtain permanent electric service to the project.

2. Provide primary service entrance conduits from power company terminations. Power company will connect conductors to transformer and provide primary cables.

3. Provide secondary service entrance conduits and wire from power company transformer to building service entrance equipment.

4. Provide conduit and wiring as directed by power company to remote location for meter.

END OF SECTION

SECTION 16411

DISCONNECT SWITCHES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Furnish and install disconnect switches, including:
   1. Fuses.
   2. Enclosures.

1.2 RELATED SECTIONS

A. Section 16070 - Supporting Devices.

B. Section 16075 - Electrical Identification.

1.3 REFERENCES

A. NFPA 70 - National Electrical Code.

B. UL 198E - Class J Fuses.

1.4 SUBMITTALS

A. Furnish dimensions and ratings for voltage, ampacity, horsepower and short circuit.

B. Indicate enclosure material finish and NEMA classification type.

PART 2 - PRODUCTS

1.5 MANUFACTURERS

A. Disconnect Switches:
   1. Cutler-Hammer.
   2. General Electric.
   3. Siemens.
   4. Square D.

B. Fuses:

1. Bussman.
2. Gould-Shawmut.
3. Littelfuse.

1.6 DISCONNECT SWITCHES

A. Fusible Switch Assemblies: Heavy duty; quick-make, quick-break, load interrupter enclosed switch with externally operable handle interlocked to prevent opening front cover with switch in ON position. Handle lockable in OFF position. Fuse Clips: Designed to accommodate Class J.

B. Nonfusible Switch Assemblies: Heavy duty; quick-make, quick-break, load interrupter enclosed switch with externally operable handle interlocked to prevent opening front cover with switch in ON position. Handle lockable in OFF position.

C. Enclosures: Unless indicated otherwise, provide general purpose, NEMA 1 for indoor locations; and weatherproof, NEMA 3R for outdoor locations; except at cooling tower, provide NEMA 4, stainless steel.

D. General-Use Snap Switch: Motors of one HP or less as allowed by code.

E. Construct all current carrying parts of high conductivity copper with silver-plated switch contacts.

F. Provide solid copper neutral bar where a neutral is present in the circuit.

1.7 FUSES

A. Fuses 600 Amperes and Less: UL 198E, Class J; as indicated on drawings; time delay, dual element, current limiting, 600 volt.

B. Fuses Over 600 Amperes: Class L, bolt-on type with time delay and capability to hold 500 percent rated fuse current for a minimum of four seconds and clear 20 times rated fuse current in .01-second or less. Provide fuses with 'O' ring seals between end bells and glass melamine barrel similar to Bussman time delay KRP-C.

C. Interrupting Rating: 200,000 rms symmetrical amperes.

D. Provide all fuses of the same manufacturer.

E. Install fuses in motor circuits in accordance with motor manufacturer's recommendations.

PART 3 - EXECUTION

1.8 INSTALLATION

A. Provide disconnect switches, where required by NFPA 70, where indicated on drawings, and where required by equipment manufacturer, in a location convenient for maintenance on each switch and adjacent equipment.

B. Provide fused disconnect switches when required to maintain equipment manufacturer's warranty. Coordinate with Division 15 for warranty requirements of equipment approved by submittal.

C. Install fuses in fusible disconnect switches. Provide permanent marking inside switch enclosure for fuse type.

D. Wall mount switches, where possible, or mount on Uni-Strut supports.

E. Provide spare fuse cabinet in main electrical room complete with three spare fuses for each rating installed for fuse sizes over 600 amperes, and ten percent spare fuses (minimum of three) of each type and rating installed for 600 amperes or less.

F. Provide fuse identification label showing type and size inside door of each switch.

END OF SECTION

SECTION 16424

INDIVIDUAL MOTOR STARTERS

PART 1 - GENERAL

1.1 SECTION INCLUDES

1. Furnish and install starters, contactors, and switches for motor control.

2. Provide a controller for each motor and piece of equipment where controller is not furnished as an integral part of the equipment and as indicated or specified to provide the Owner a complete and operating system.

1.2 RELATED SECTIONS

1. Section 16070 - Supporting Devices.

2. Section 16075 - Electrical Identification.

3. Section 16080 - Electrical Testing.

4. Section 16443 - Motor Control Centers.

1.3 REFERENCES

1. NEMA ICS 2 - Industrial Control Devices, Controllers, and Assemblies.

1.4 DESIGN REQUIREMENTS

1. Provide starters of the type suitable for the application and environment.

2. Provide NEMA 1 (general purpose) enclosure for interior use starters unless noted otherwise.

3. Provide NEMA 12 (industrial) enclosure for interior and exterior use in production areas and where shown on Drawings or required by the interior environment.

4. Provide NEMA 3R (water resistant) enclosure for exterior use starters unless noted otherwise.

1.5 SUBMITTALS

1. Include data on relays, pilot devices, switching and overcurrent protection. Include trip ratings, size and UL listing.
2. Indicate enclosure material finish and NEMA classification type.
3. Provide operation and maintenance manuals for motor starters.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

1. Siemens.

2. Cutler-Hammer.

3. General Electric.

4. Square D.

2.2 MANUAL MOTOR STARTERS

1. Fractional Horsepower Manual Starter: AC general-purpose, Class A, manually operated, full-voltage controller for fractional horsepower induction motors, with thermal overload unit, pilot light, and toggle operator.

2. Motor Starting Switch: AC general-purpose Class A manually operated, full-voltage controller for fractional horsepower induction motors, without thermal overload unit, red pilot light, NO auxiliary contact, and toggle operator.

2.3 MAGNETIC MOTOR STARTERS

1. Magnetic Motor Starters: AC general-purpose, Class A, magnetic controller for induction motors rated in horsepower as indicated.

2. Provide accessible terminals for wiring directly from the front of the starter.

3. Contacts: Provide silver, cadmium oxide alloy, double break, non-welding contacts which will not require filing, dressing or cleaning throughout the life of the control equipment.

4. Provide starter types as scheduled:

1. Full Voltage Starting: Non-reversing type.

5. Coils: Pressure molded, 120 volts, 60 hertz. Provide integral control transformer.

6. Overload Relay: Provide bimetal overload relays in all three phases for three-phase full voltage starters, in ungrounded phases for single-phase full voltage starters and in all six legs for two-speed full voltage starters. Provide overload relays of the hand reset, trip-free variety so that blocking the reset mechanism in the reset position will not prevent the motor controller from dropping out if the motor is overloaded. Capability to field convert overload relays from hand to automatic reset is unacceptable.

7. Auxiliary Contacts: Provide each starter with the required auxiliary contacts for the control functions indicated and required, including the holding interlock and pilot light interlocks plus two additional contacts, field convertible to normally closed or normally open NEMA ICS 2 controls. Provide capability to add auxiliary contacts without removing existing wiring or removing the controller from its enclosure.

8. Selector Switches: HAND/OFF/AUTO for single-speed motors in front cover.

9. Indicating Lights: RUN; red for single-speed motors in front cover. Operate pilot lights by separate interlock not placed across the holding coil.

10. Control Power Transformers: Provide integral 120 volt secondary control transformer with both primary and secondary fuses for each controller.

2.4 COMBINATION MOTOR STARTER

1. Combine magnetic motor starter with disconnect in common enclosure as scheduled with adjustable trip, magnetic-only molded case, motor circuit protector.

2. Provide combination starters with an IER of at least 100,000A (RMS) when used with feeder protective device indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

1. Install motor control equipment in accordance with manufacturer's instructions.

2. Select and install heater elements in motor starters to match installed motor characteristics.

3. Mount with operating handle at 5'-6" above finished floor. Align the tops of all grouped starters. Install plumb and aligned in the plane of the wall in which they are installed.

4. Provide supports of galvanized angle or other suitable material where mounting motor starters on wall or other rigid surface is impractical. Do not support starters from conduit alone. Locate motor starters that are mounted on equipment served so that the starter will not inhibit the removal of any service panel or interfere with required access.

5. Mount in accessible location to allow sufficient room for maintenance on itself and adjacent items.

6. Securely mount all starters indicated.

7. Coordinate with other trades as required for control and interconnections with motors provided under other Divisions.

END OF SECTION

SECTION 16441

SWITCHBOARDS

PART 1- GENERAL

1.1 SECTION INCLUDES

A. Furnish and install main and distribution switchboards. Utilize switchboard construction for boards greater than 1,200 amperes.

1.2 RELATED SECTIONS

A. Section 16070 - Supporting Devices.

B. Section 16075 - Electrical Identification.

C. Section 16080 - Electrical Testing.

D. Section 16120 - Wire and Cable.

E. Section 16132 - Conduit.

F. Section 16450 - Bus Duct.

1.3 REFERENCES

A. NEMA PB 2 - Dead Front Distribution Switchboards.

B. NEMA PB 2.1 - Instructions For Safe Handling, Installation, Operation and Maintenance of Deadfront Switchboards Rated 600 Volts or Less.

1.4 SUBMITTALS

A. Indicate detailed dimensions for the front and side views.

B. Indicate conduit entrance locations and requirements.

C. Indicate enclosure material finish and NEMA classification type.

D. Indicate nameplate legends.

E. Indicate size and number of bus bars and ground; switchboard instrument details.

F. Furnish instructions for handling and installation of switchboard.

G. Include electrical characteristics including voltage, frame size and trip ratings, withstand ratings, and time-current curves of all equipment and components.

H. Provide operation and maintenance manual.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to the site with shipping splits and subassemblies sized for passing through openings.

B. Handle in accordance with NEMA PB 2.1 and manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to switchboard internal components, enclosure, and finish.

1.6 SPARE PARTS

A. Keys: Furnish two each to the Owner for each lock.

PART 2- PRODUCTS

2.1 MANUFACTURERS

A. Cutler-Hammer.

B. General Electric.

C. Siemens.

D. Square D.

2.2 SWITCHBOARD CONSTRUCTION AND RATINGS

A. Factory-assembled, dead front, metal-enclosed, and self-supporting switchboard assembly conforming to NEMA PB 2, and complete from incoming line terminals to load-side terminations.

B. Switchboard electrical ratings and configurations as shown on Drawings. Integrated equipment rating as shown, but not less than 50,000 amperes RMS (sym).

C. Line and Load Terminations: Accessible from the front only of the switchboard, suitable for the conductor materials and number of conductors used.

D. Main Section Devices: Individually mounted.

E. Distribution Section Devices: Panel mounted.

F. Bus Material: Copper with tin plating, sized in accordance with NEMA PB 2.

G. Bus Connections: Bolted, accessible from front for maintenance. Provide Belleville washers for and properly torque all connections.

H. Provide fully rated copper neutral bus.

I. Provide properly sized copper ground bus through the length of the switchboard.

J. Enclosure: NEMA PB 2 Type 1 - General Purpose. Align sections at front and rear.

K. Finish: Manufacturer's standard light gray enamel over external surfaces. Coat internal surfaces with minimum one coat corrosion-resisting paint, or plate with cadmium or zinc.

L. Future Provisions: Fully equip spaces for future devices with bussing and bus connections, suitably insulated and braced for short circuit currents. Continuous current rating as indicated on Drawings. Extend and drill main bus for future addition by means of splice plate.

2.3 SWITCHING AND OVERCURRENT PROTECTIVE DEVICES

A. Solid-state Molded Case Circuit Breakers
1. Provide with electronic sensing, timing and tripping circuits for adjustable current settings; ground fault trip; instantaneous trip; and adjustable short time trip.
2. Provide stationary mounting.
3. Provide ground fault sensing integral with circuit breaker.
4. Provide solid-state trip on breakers 200 amperes and greater.

B. Provide ground fault protection on each main device, rated 277/480 volts, 1,000 amps or larger, as follows:
1. UL listed ground sensor relay system, General Electric GSR, with ground break components for each system with coordinated ground sensor (CR) with integral test winding, solid state relay to operate with shunt trip circuit on the switch and monitor panel.
2. Use time delay type relay with the following features:
   a. Continuously adjustable current pick-up settings of 100 to 1,200 amperes.
   b. Continuously adjustable time delay setting from instantaneous (0.03 second) to one second.
   c. Memory function to recognize and initiate tripping on intermittent ground faults.
3. Install panel which indicates relay operation and provides means for testing the system with or without interruption of electrical service and

does not permit the ground fault system to be inadvertently left in an inactive or 'off' state.

4. Use ground sensor for zero sequence arrangement on the main service entrance devices.

2.4 INSTRUMENTATION

A. Provide solid state circuit monitor with digital output display rated for 120 volts, 60 hertz and waveform capture feature, Square D Class 3020 CM250-XI PowerLogic. Provide UL 508 listing.

B. Provide six-digit LED readout which will allow local display of the following electrical parameters:
   1. Voltmeter, phase to phase and phase to neutral.
   2. Current, per phase RMS and 3 phase average.
   3. Demand current, per phase.
   4. Power factor, per phase and 3 phase total.
   5. Real power, 3 phase total.
   6. Reactive power, 3 phase total.
   7. Apparent power, 3 phase total.
   8. Energy (MWH).
   9. Reactive energy (MVARH).
   10. Frequency.
   11. Average demand real power.

C. Provide the circuit monitor with the following characteristics:
   1. Built-in communications capability which will allow multipoint communication at a 9,600 minimum baud rate to a remote computer workstation, programmable controller or other host device.
   2. Adjustable demand interval (5 to 60 minutes).
   3. Nonvolatile memory for storing all historical data.

D. Set-up of the monitor shall be accomplished from the front of the device. It shall not be necessary to open the front of the enclosure to reach rear mounted dip-switches. Include set-up parameters for CT ratio, PT ratio, System type 3 or 4 wire, and demand interval.

E. Provide keyswitch protection for all set-up and reset functions to prevent unauthorized/accidental change of value.

F. Provide the following monitor accuracy in percent of full scale for:
   1. Current Voltage Measurements: Plus or minus 1 percent.
   2. Power and Energy: Plus or minus 2 percent.
   3. Frequency: Plus or minus 0.5 percent.
   4. Power Factor: Plus or minus 4 percent.
   5. Data Update Time: 0.817 S (4 wire).

G. Provide three potential transformers (PT) rated 480/120 volt with metering class accuracy.

H. Provide three current transformers (CT) having a primary to match the size of the bus and a 5 ampere secondary with metering class accuracy.

PART 3- EXECUTION

3.1 INSTALLATION

A. Install switchboard in locations shown on Drawings, in accordance with manufacturer's written instructions and NEMA PB 2.1.

B. Tighten accessible bus connections and mechanical fasteners after placing switchboard.

C. Provide a 4-inch concrete housekeeping pad with anchor bolts. Bolt equipment to pad plumb and square.

3.2 FIELD QUALITY CONTROL

A. Inspect completed installation for physical damage, proper alignment, anchorage, and grounding.

B. Measure insulation resistance of each bus section phase-to-phase and phase-to-ground for one minute each.

C. Check tightness of accessible bolted bus joints using a calibrated torque wrench in accordance with manufacturer's recommended values.

3.3 ADJUSTING AND CLEANING

A. Adjust all operating mechanisms for free mechanical movement.

B. Touch-up scratched or marred surfaces to return to "as new" condition.

C. Adjust trip and time delay settings to values shown on Drawings or as required.

END OF SECTION

SECTION 16442

PANELBOARDS

PART 1 - GENERAL

1.1 SECTION INCLUDES

1. Furnish and install distribution, lighting and appliance branch circuit panelboards.

1.2 RELATED SECTIONS

1. Section 16070 Supporting Devices.

2. Section 16075 - Electrical identification.

3. Section 16443- Motor Control Centers.

1.3 REFERENCES

1. NEMA PB 1.1 - Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less.

1.4 SUBMITTALS

1. Include outline and support point dimensions, NEMA enclosure type, voltage, main bus ampacity and material, integrated short circuit ampere rating, circuit breaker and fusible switch arrangement and sizes.

1.5 SPARE PARTS

1. Keys: Furnish two keys to Owner for each panelboard, all keyed alike.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

1. Cutler-Hammer.

2. General Electric.

3. Siemens.

4. Square D.

2.2 GENERAL

1. Conform to UL standards and bear UL label. Form cabinets from code gauge galvanized steel. Form fronts of code gauge cold rolled steel bonderized after fabrication.

2. Provide cabinet fronts with concealed hinges, concealed adjustment means and master keyed flush lock. Finish front in manufacturer's standard gray enamel.

3. Provide with main lugs and breakers or fuses as scheduled on the drawings. Provide main lug connection to accommodate T & B compression connector on end of cable. Attach connector to panel bus with two bolts per lug. Provide captive type bolts or studs to facilitate reinstallation of the lugs with the wire attached.

4. Provide all panelboards with copper bus of the ratings scheduled and designed for all indicated devices and spaces, complete with taps and trim.

5. Minimum 100% rated short circuit rating 10,000 amps RMS symmetrical for 240 volt panelboards; 14,000 amperes RMS symmetrical for 480 volt panelboards or as shown on the drawings. Series rated panelboards are not acceptable.

6. Size bus bars to limit the temperature rise within the panelboard to 50 degrees C over a 40 degrees C ambient temperature.

7. Provide adequate space and provisions for wire No. 6 AWG and larger conductors to terminate with compression type connector to main lugs.

8. Connect all two-section panelboards with copper cable of an ampacity greater than the main bus ampacity.

2.3 MAIN AND DISTRIBUTION PANELBOARDS (1200 AMPS AND SMALLER)

1. Enclosure: Type 1, unless scheduled otherwise.

2. Molded Case Circuit Breakers: Bolt-on type thermal magnetic trip circuit breakers, with common trip handle for all poles. Provide circuit breakers

UL listed as Type SWD for lighting circuits. Provide UL Class A ground fault interrupter circuit breakers where scheduled.

3. Provide plated copper grounding bus.

4. Provide ground fault protection on each main device, rated 277/480 volts, 1,000 amps or larger, as follows:
    1. UL listed ground sensor relay system, General Electric GSR or equal, with ground break components for each system with coordinated ground sensor (CR) with integral test winding, solid state relay to operate with shunt trip circuit on the switch and monitor panel.
    2. Use time delay type relay with the following features:
        1. Continuously adjustable current pick-up settings of 100 to 1,200 amperes.
        2. Continuously adjustable time delay setting from instantaneous (.03 second) to one second.
        3. Memory function to recognize and initiate tripping on intermittent ground faults.
    3. Install panel which indicates relay operation and provides means for testing the system with or without interruption of electrical service and does not permit the ground fault system to be inadvertently left in an inactive or 'off' state.
    4. Use ground sensor for zero sequence arrangement on the main service entrance devices.

2.4 BRANCH CIRCUIT PANELBOARDS

1. Lighting and Appliance Branch Circuit Panelboards: Circuit breaker type.

2. Enclosure: Type 1; unless indicated otherwise.

3. Provide insulated neutral bus and separate copper grounding bus bonded to enclosure.

4. Molded Case Circuit Breakers: Bolt-on type thermal magnetic trip circuit breakers, with common trip handle for all poles. Provide circuit breakers UL listed as Type SWD for lighting circuits. Provide UL Class A ground fault interrupter circuit breakers where scheduled.

5. Sequence phase all adjacent breakers. All circuit breaker connection straps shall be rated at 100 amperes minimum.

PART 3 - EXECUTION

3.1 INSTALLATION

1. Install panelboards plumb and flush with wall finishes, in conformance with NEMA PB 1.1. Mount securely to walls or structural spaces. Mount floor mounted panelboards on 4 inch housekeeping pads.

2. Height: Install wall mounted panelboards at 6 feet to the top of the enclosure.

3. Provide filler plates for unused spaces in panelboards.

4. Provide typewritten circuit directory for each branch circuit panelboard mounted in permanent, clear Lexan card holder located on inside of door. Prepare directories only after permanent room numbers have been assigned. Do not use room numbers shown on construction drawings.

5. Stub three empty 1 inch conduits to accessible location above ceiling out of each recessed panelboard.

6. Arrange branch circuit connections in three phase lighting and appliance panelboards such that when two or three circuits are run with a common neutral, each circuit is connected to a different phase.

7. Distribute loading on circuits in panelboards to balance the load as evenly as possible in each phase.

8. Terminate only one conductor under each lug of branch circuit breakers.

9. Do not make splices or taps in panelboard gutters.

3.2 FIELD QUALITY CONTROL

1. Inspect for physical damage, proper alignment, anchorage, and grounding. Check proper installation and tightness of connections for circuit breakers.

END OF SECTION

SECTION 16510

LIGHTING FIXTURES - BUILDING

PART 1 - GENERAL

1.1 SECTION INCLUDES

1. Furnish and install light fixtures associated with building, including:
    1. Interior luminaires and accessories.
    2. Lamps.
    3. Ballasts.

1.2 RELATED SECTIONS

1. Section 16132 - Conduit.

2. Section 16120 - Wire and Cable.

1.3 SUBMITTALS

1. Include product data for fixtures, including photometric data, reflectance, lens, lamps, ballasts, poles and lighting control.

2. Furnish samples upon request.

3. Provide operation and maintenance manual.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

1. Lighting Fixtures
    1. Manufacturers of individual lighting fixtures shall be as scheduled on Drawings, and indicate quality and design features required.
    2. Products of other manufacturers will be considered upon submittal of proper data.

2. Lamps
    1. Philips.
    2. General Electric.
    3. Osram Sylvania.

3. Ballasts
    1. Advance.
    2. Universal.
    3. Valmont.

2.2 GENERAL

1. Provide lighting fixtures of the size, type and rating indicated, complete with lamps, lampholders, reflectors, ballasts, starters, wiring and accessories.

2. Where fixtures are recessed mounted in ceiling system, provide trim and accessories required for installation in the ceiling system installed.

3. It is the intent of the drawings and specifications to indicate the type of fixture for each intended use. It is generally intended that rooms of similar usage and configuration will have similar fixture types. Where fixture type is not indicated, it is the duty of the Contractor to request clarification prior to proceeding with the work.

2.3 INTERIOR LUMINAIRES AND ACCESSORIES

1. Fluorescent Luminaires
    1. Provide fixtures of code gauge steel, painted after fabrication. Fixtures using pre-painted steel will not be acceptable.
    2. Provide lensed fixtures with 0.125-inch minimum thick, 9 ounces per square foot, virgin acrylic, KSH-12 lens unless otherwise indicated. Brightness not to exceed 600 foot lamberts at 75 degrees and 85 degrees.
    3. Provide corrosion resistant fixtures as scheduled.
    4. Provide end caps, corner, tee and sections with trim for suspended fixture arrangement.
    5. Provide fixtures in architectural furring to fit space. Leave no more than 4 inches blank space at each end.

2.4 LAMPS

1. F32T8 Fluorescent Lamps, 4100K.
2. F96T8HO Fluorescent Lamps, 4100K.
3. F96T8 Fluorescent Lamps, 4100K.

2.5 FLUORESCENT BALLASTS

1. Fluorescent Ballasts: 265ma lamp ballast, rapid start, premium type, electronic, 0.95 ballast factor.

PART 3 - EXECUTION

3.1 INSTALLATION

1. Support surface-mounted luminaires to ceiling using bolts, screws, or approved clips.

2. Install recessed luminaires with proper frames in accordance with manufacturer's recommendations.

3. Locate recessed luminaires as indicated on reflected ceiling plan.

4. Do not install remote low voltage incandescent transformers more than 20 feet from lamp.

5. Support pendant or bracket fixtures as indicated and as recommended by manufacturer for job conditions encountered.

6. Wall mount exit fixtures where shown above doors. Coordinate fixture location with actual door arrangement as indicated. Connect exit fixtures to unswitched power source as indicated.

7. Connect fixtures designated as night lights to unswitched circuit and burn continuously.

8. Install lamps in luminaires and lampholders.

3.2 FIELD QUALITY CONTROL

1. Coordinate receipt and installation of all fixtures with regard to the overall schedule of the project.

2. Align luminaires and clean lenses and diffusers at completion of work. Clean paint splatters, dirt and debris from installed luminaires.

3. Demonstrate proper operation of all luminaires and controls.

4. Refer to Section 16050 regarding lamp replacement prior to final acceptance.

END OF SECTION

Grubbs, Hoskyn, Barton & Wyatt, INC.
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March 25, 2020
Project No. 20-039

Hillcrest School District
c/o Andrew Hicks Architect
146 South Main Street
Strawberry, Arkansas 72469

Attn: Mr. Andrew Hicks, AIA, NCARB

RE: RESULTS of GEOTECHNICAL INVESTIGATION
HILLCREST HIGH SCHOOL ADDITION
STRAWBERRY, ARKANSAS

Dear Mr. Hicks,

Submitted herein are the final results of the geotechnical investigation performed for the new addition planned at the Hillcrest High School in Strawberry, Arkansas. This study was authorized on behalf of Hillcrest School District on March 4, 2020. The geotechnical investigation has been performed in general accordance with our proposal of February 19, 2020 (GHBW Proposal No. 20-032). Preliminary recommendations were provided in the submittal of March 19, 2020.

We understand the project consists of a new cafeteria building which will be located on the Hillcrest High School campus, south of the existing cafeteria building. We also understand that the new cafeteria will be a single-story metal building with approximately 11-ft high masonry block/brick veneer exterior. The new cafeteria building will also include a saferoom built with concrete block corridors and exterior walls designed to resist 175 mph winds. The project also includes a paved delivery drive. Maximum gravity column loads are anticipated to be less than 40 kips. The plan finish floor is El 315.41. Site grading is expected to include up to about 5 ft of fill. The structure will include deep foundation walls to transition grades from finish floor level to the lower surrounding grades.

The purposes of this study were to explore subsurface conditions at the new addition site and to develop recommendations to guide design and construction of foundations and pavements. The results of the field and laboratory studies are discussed in the following report sections. Subsequent report sections provide recommendations for design and construction.

SUBSURFACE EXPLORATION

Subsurface conditions at the Hillcrest High School site have been explored by drilling five (5) sample borings to 14- to 20-ft depth. The site vicinity is shown on Plate 1. The approximate boring locations are shown on the Plan of Borings, Plate 2. Boring logs, presenting descriptions of the subsurface strata encountered and results of field tests, are included as Plates 3 through 7. The approximate ground surface elevation, as inferred from the topographic information provided by the Architect, is also shown on the logs. It must be recognized that the elevations shown are approximate and actual elevations may vary. A key to the terms and symbols used on the logs is presented as Plate 8.

The borings were drilled with a truck-mounted SIMCO 2400 rotary-drilling rig using dry-auger drilling procedures. Samples were recovered using a 2-in.-diameter split-barrel sampler driven into the strata by blows of a 140-lb safety hammer with 30-in. drop in accordance with Standard Penetration Test (SPT) procedures. The number of blows required to drive the standard split-barrel sampler the final 12 in. of an 18-in. total drive, or a portion thereof, is defined as the Standard Penetration Number (N). Recorded N-values are shown on the boring logs in the "Blows Per Ft" column. Where rock hardness precluded recovery with the split-spoon, cuttings were recovered for use in visual classification.

All samples were removed from sampling tools in the field, examined and visually classified. Samples were then placed in appropriate containers to prevent moisture loss and/or change in condition during transfer to our laboratory for further examination and testing.

The borings were advanced using dry-auger drilling procedures to facilitate groundwater observations. Observations regarding groundwater are noted in the lower-right portion of each log and are discussed in subsequent sections of this report. All boreholes were backfilled after obtaining final groundwater readings.

LABORATORY TESTING

To evaluate pertinent physical and engineering characteristics of the foundation and subgrade soils, laboratory tests consisting of natural water content determinations and classification tests were performed on selected representative soil and rock samples. A total of 28 natural water content determinations were performed to develop a water content profile for each boring. The results of these tests are plotted on the logs as solid circles, in accordance with the scale and symbols shown in the legend located in the upper-right corner.

To verify field classification and to evaluate soil plasticity, nine (9) liquid and plastic (Atterberg) limit determinations and nine (9) sieve analyses were performed on selected representative samples. The Atterberg limits are plotted on the logs as pluses inter-connected with a dashed line using the water content scale. The percent of soil passing the No. 200 Sieve is noted in the "Minus No. 200" column on the log forms. Classification test results, as well as soil classification by the Unified Soil Classification System and AASHTO Classification System, are summarized in Appendix A.

GENERAL SITE and SUBSURFACE CONDITIONS

Site Conditions

The project site is located south of the existing cafeteria building at the Hillcrest High School Campus in Strawberry, Arkansas. The site is presently an open grass-covered area with some pavements and trees in the vicinity. Drainage ditches extend along the north and west edges of the site. The terrain is mostly flat with a slight fall to the west. Surface drainage is considered fair.

Seismic Conditions

The Lawrence County, Arkansas site is located in Seismic Zone 3, defined by the Arkansas Building Authority (2005) as the zone of greatest seismic potential. Based on the results of the borings and the local geology, a Seismic Site Class C (very dense soil and soft rock profile) is considered suitable for the site in accordance with the criteria of IBC 2012. The liquefaction potential of the predominantly cohesive overburden soils encountered within the exploration depths of the borings is considered negligible.

Subsurface Conditions

Geologically, the project locale is in the mapped outcrop of the Ordovician Period Saint Peter Sandstone Formation. The Saint Peter Sandstone is comprised of massive bedded, medium- to fine-grained, well-rounded, friable, white sandstone. A small number of beds of shale, limestone, and/or dolostone have been reported in some areas. The sandstone is typically cemented by calcite, often with single crystals incorporating hundreds to thousands of sand grains. The sandstone frequently forms bluffs where exposed. The base of the Saint Peter Sandstone is unconformable to the underlying Everton Limestone and Powell Dolomite, often with several feet of relief at the disconformity. The formation thickness ranges from a feather edge to as much as 175 ft thick.

The surface soils are on-site fill extending to 2 to 4 feet. The fill is comprised of soft to stiff dark brown, yellowish brown, maroon, and gray fine sandy clay. The surficial fill contains minor amounts of roots, organic matter, and fine gravel. The fine sandy clay fill has low to medium plasticity and exhibits poor to fair compaction with high to moderate compressibility. The depth, content, and compaction of the on-site fill is likely to vary across the site.

The natural near-surface soils below 2 to 4 ft and extending to 14 to 20 ft are firm to very stiff yellowish brown, yellowish red, maroon, and gray fine sandy clay/clay and medium dense to dense yellowish red, yellowish brown, and gray clayey fine sand. The fine sandy clay and clay exhibit moderate shear strength and low to high plasticity. The potential for shrink-swell activity is considered low given the depth of the clay units and the *in-situ* water contents. The clayey fine sand has medium relative density and low compressibility.

Shallow groundwater was not encountered within the exploration depths of the borings drilled in March 2020. Though not encountered in the borings, shallow perched groundwater could be present in the silty near-surface soils, particularly during wet seasons of the year. Groundwater levels will vary with seasonal precipitation and surface runoff and infiltration.

ANALYES and RECOMMENDATIONS

Foundation Design

Foundations for the new cafeteria building must satisfy two (2) basic and independent design criteria. First, the maximum bearing pressure must not exceed the allowable bearing pressure based on an adequate factor of safety with respect to soil shear strength. Secondly, foundation movements resulting from consolidation, shrinking, or swelling of the supporting soils must be within tolerable limits for the structure. Construction factors such as foundation construction, excavation procedures, and surface and groundwater conditions must also be considered.

We recommend that the anticipated light foundation loads of the new building be supported on a shallow foundation system utilizing continuous and/or individual footings. The predominance of weak surface and near-surface soils to approximately 2- to 4-ft depth will warrant some undercut for foundation and floor slab construction. Foundation and floor slab recommendations are discussed in the following report sections.

Footings

Foundation loads of the new cafeteria building may be supported on continuous or individual footings founded in the natural stiff yellowish brown, maroon, and gray fine sandy clay or medium dense clayey fine sand or compacted select fill at a minimum depth of 2 ft below lowest adjacent grade. Footings founded as recommended may be sized based on maximum net allowable soil bearing pressures of 2000 and 2500 lbs per sq ft for continuous and individual footings, respectively.

The recommended bearing values include a minimum factor of safety of 2.5 with respect to measured shear strength of the stiff fine sandy clay and relative density of the medium dense clayey fine sand and anticipated shear strength of properly compacted select fill. Total and differential settlement of foundations proportioned based on the recommended allowable bearing pressures and underlain by less than about 6 ft of compacted fill should be less than 1.0 inch. Differential settlement may be estimated as about one-half of the total settlement.

Footings must not be founded in or just above zones of weak soils. Footing excavations or undercuts must extend through soft to firm soils to bear in the stiff fine sandy clay or medium dense clayey fine sand. In lieu of relatively deep footings, footing excavations may be undercut to suitable bearing strata and backfilled with select fill, flowable fill (minimum compressive strength 300 psi), or lean concrete. Footings supported on undercut backfill as recommended may be sized for the previously recommended bearing pressures.

Footing undercuts backfilled with select fill should have a minimum width determined by a 1-horizontal to 2-vertical (1H:2V) projection from the edge of footings to the undercut bottom. Undercuts may be excavated neat to plan footing dimensions where backfilled with flowable fill or concrete. Where site conditions warrant mass undercut, footings may be founded in the compacted undercut backfill. Mass undercuts should extend at least 5 ft outside the building limits to the extent possible.

There are localized areas of highly-plastic clay at relatively shallow depth (see Boring 2) with some potential for shrink-swell activity. In the event that highly-plastic clay (i.e., with a plasticity index (PI) of 25 or more) is encountered at the footing bottom elevation, the clay should be undercut at least 2 ft below the plan footing bottom depth. Undercuts of highly-plastic clay backfilled with select fill should be at least 2 ft wider than the plan footing width and backfilled with low-plasticity select fill with a plasticity index (PI) in the range of 5 to 18.

Uplift resistance of footings will be provided by the weight of the structure and the foundation units. Resistance to lateral forces will be developed by the passive resistance of the foundation soils and sliding resistance at the footing bottom. The passive resistance of the soil within the upper 1.5 ft should be neglected. Below 1.5-ft depth, an ultimate passive resistance value of 500 lbs per sq ft may be assumed for the stable on-site soils and compacted fill. Resistance to sliding may also be evaluated using an ultimate friction value (tan δ) of 0.35 for concrete on the recommended bearing strata. An appropriate factor of safety must be included in analysis of sliding.

Continuous and individual footings should have minimum dimensions of 18 and 24 in., respectively. Any footing undercuts should have a minimum width determined by a 1-horizontal to 2-vertical (1H:2V) projection from the edge of footings to the undercut bottom. Undercuts may be excavated neat to plan footing dimensions where backfilled with flowable fill or concrete. Mass undercuts should extend at least 5 ft outside building limits to the extent possible. All footing excavations and foundation undercuts should be observed by the Geotechnical Engineer to verify suitable bearing.

Floor Slab

Slab-on-fill construction will be suitable for the building floor slab. It is expected that much of the floor slab, with finish floor at El 315.41, will be above the surrounding grades with grades transitioned by deep foundation walls. Subgrade preparation must include thorough proof-rolling to identify areas of unstable or unsuitable soils. Undercuts on the order of 2 to 4 ft, more or less, could be warranted for subgrade preparation in floor slab areas. Use of granular backfill may be considered

to reduce the settlement below floor slabs. Clean crushed stone (AASHTO M43 No. 57), a clean sand (SW, SP, or SP-SM as per ASTM D2487), clean gravel (GW, GP, or GP-GM as per ASTM D2487), or approved equal are recommended.

We also recommend that the at-grade floor slab be supported on a 4- to 6-in.-thick clean crushed stone layer placed on a properly prepared subgrade. Where a clean granular soil is used for slab backfill/fill the crushed stone layer may be omitted if approved by the Geotechnical Engineer. The granular layer should be densified with vibrating equipment prior to floor slab construction. Impervious sheeting should be placed between the slab and granular course to act as a vapor barrier.

Deep Foundation Walls

Some building foundation walls are expected to be relatively deep, retaining fill from the finish floor at El 315.41. The foundation walls will be fixed at the top by inside corners and the concrete floor slab. Consequently, the deep foundation walls will be acted upon by at-rest lateral earth pressures. Where walls are free to rotate about the base, such as during construction, active earth pressures will be mobilized. The foundation walls are expected to be supported on footings as previously recommended.

It is expected that the foundation walls will be backfilled with clean crushed stone or clean granular select fill (i.e., sand or gravel). For clean crushed stone a gradation complying with AASHTO M43 No. 57 stone or locally-available "C"-ballast is considered suitable. As a minimum, clean crushed stone wall backfill should extend in a zone extending from the back of the wall footing to daylight on a 1-horizontal to 1-vertical (1H:1V) configuration.

A summary of recommended equivalent fluid pressures is tabulated below for walls backfilled with either clean, crushed stone or granular select fill.

Lateral Earth Pressure of Wall Backfill

Earth Pressure Condition	Free-draining crushed stone backfill, Equivalent Fluid Pressure, lbs per sq ft per ft depth	Granular select fill (clean sand or gravel), lbs per sq ft per ft depth
At rest (restrained), drained	50	65
At rest (restrained), undrained	85	95
Active (unrestrained and rotating about wall base), drained	30	45
Active (unrestrained and rotating about wall base), undrained	75	85

Surcharge loads may be evaluated using earth pressure coefficients of 0.33 for the active condition and 0.50 for the at-rest condition for wall backfill. Undrained conditions assume that the walls will be subject to full hydrostatic pressure. Drained conditions assume positive and continuous drainage of infiltrated water from the backfill. Where drainage cannot be assured, then undrained conditions should be assumed.

Crushed stone backfill and clean granular select fill should be placed in nominal 10- to 12-in.-thick lifts and densified by vibrating equipment or other suitable means. Crushed stone and clean

gravel backfill must be separated from the on-site soils by a suitable filter fabric. A fabric such as Mirafi 140N or an approved equivalent is recommended.

To reduce lateral earth pressures and maintain proper drainage, a drainage system is recommended for backfill behind walls. To allow drainage of perched or infiltrated water from wall backfill, a system of regularly-spaced, functioning weep holes or a perimeter drain consisting of a continuous, perforated PVC pipe wrapped in geotextile fabric should be provided within the granular course behind foundation walls.

It must be recognized that there will be some settlement of foundation wall backfill. The magnitude of post-construction settlement can be reduced by utilizing clean crushed stone or select granular backfill under slabs.

Pavements

The project includes a paved drive for delivery trucks. It is assumed that the drive will be subject mostly to delivery trucks, including tractor-trailer units.

Based on the results of the borings performed for this study indicating the potential for undercut in the pavement area, the pavement subgrade is expected to consist of recompacted on-site soils or imported select fill. For the purposes of pavement design, a soil classifying as A-6 per AASHTO M 145 with a minimum California Bearing Ratio (CBR) of 8 has been assumed. Fair to good subgrade support is anticipated for such subgrade in conjunction with good site preparation and positive surface drainage.

The recommended drive pavement section is summarized below. Alternative sections can be evaluated if desired.

7.5 in. Portland Cement Concrete (minimum 4000 psi compressive strength)
6 in. Crushed Stone Base (ARDOT Standard Specifications for Highway Construction, 2014 Edition, Section 303, Class 7)

We recommend that all subgrade be proof-rolled immediately prior to placing base course. Aggregate base should be compacted to a minimum of 98 percent of the AASHTO T 180 maximum dry density as per ARDOT criteria.

Periodic maintenance of pavements should include periodic sealing of all joints and cracks to prevent surface water infiltration. Recommended maximum joint spacing for concrete pavements is expected to be on the order of 10 to 12 ft, but joint spacing should be determined for the specific concrete configuration. The importance of positive site drainage for satisfactory pavement performance cannot be overstated.

Site Grading

Subgrade preparation in the building and pavement areas should begin with required clearing and grubbing and stripping all soft or organic-containing soils. Based on the observed depth of the organic zone, a stripping depth on the order of 6 to 9 in. is expected, though it could be deeper in heavily landscaped or wooded areas.

Following stripping and cutting, and prior to any fill placement, the subgrade should be proof-rolled with a loaded tandem-wheel dump truck or similar equipment. All soft or loose soils encountered in the building or pavement areas should be excavated, reprocessed and recompacted or replaced with select fill, whichever is appropriate. As noted, the surface and near-surface soils to about 2- to 4-ft depth are predominantly weak and moderately to highly compressible. Depending

on seasonal site conditions and final grading plans, undercuts on the order of 2 to 4 ft below existing grade, more or less, are anticipated. Undercuts in building areas should extend at least 5 ft outside building limits. In pavement areas, mass undercuts should extend at least 2 ft beyond pavement limits.

The on-site fine sandy clay and clayey fine sand, free of organics and debris and with a maximum plasticity index (PI) of 18, is suitable for use as select fill and backfill in building and pavement areas. Where the clayey sand has less than 25 percent passing the No., 200 sieve, the PI limit of 18 may be waived. Imported borrow for fill or backfill should consist of an approved clayey sand (SC), sandy clay (CL), or clayey gravel (GC) having a liquid limit less than 40 and a maximum PI of 18, or an approved alternate. Locally-available clayey sand or clayey gravel borrow with a PI in excess of 18 but having a maximum of 25 percent passing the No. 200 sieve is also acceptable for use as select fill in building and pavement areas. All fill and backfill should be free of organic materials and durable rock fragments in excess of about 3-in. dimension. Fill and backfill should be approved by the Geotechnical Engineer.

With the exception of wall backfill, Fill, backfill, and recompacted soils should be compacted to a minimum of 95 percent of the Modified Proctor (ASTM D1557) maximum dry density within a water content range of 2 percent below to 3 percent above the optimum value. With the exception of clean granular fill, all fill and backfill should be placed in horizontal, nominal 6- to 8-in.-thick loose lifts. Each lift of backfill and fill should be tested and approved prior to placing subsequent lifts.

CONSTRUCTION CONSIDERATIONS

Positive surface drainage should be established at the start of work, be maintained during construction and following completion of the project to prevent surface water ponding and subsequent saturation of subgrade and foundation soils. Density and water content of all earthwork should be maintained until the building, slab, and pavements are completed. Foundation or subgrade soils that become saturated by ponding water or runoff should be excavated to undisturbed soils. All abandoned foundations and underground utilities should be completely excavated and replaced with select fill unless specifically accepted by the Architect.

Groundwater was not encountered within the exploration depths of the borings drilled in March 2020. Shallow perched water could be encountered during the work. Where perched water is encountered during site grading, and steady seepage occurs, we recommend that seepage be directed via French drains or blanket drains to positive discharge at daylight or to storm drainage lines.

All footing excavations and undercuts should be observed by the Geotechnical Engineer to verify suitable bearing and adequate undercut. Concrete should be placed in footing excavations expeditiously following final clean up and approval to limit changes in foundation conditions. Footing excavations should be clean and dry at the time of concrete placement. Where footing excavations will be left open for extended periods, the bearing stratum should be protected with a thin layer of seal concrete.

CLOSURE

The Architect or a designated representative should monitor site grading, subgrade preparation, and all foundation and pavement construction. Subsurface conditions significantly at variance with those encountered in the borings should be brought to the attention of the Geotechnical Engineer and work delayed pending evaluation and/or preparation of additional recommendations, if warranted.

The following illustrations are attached and complete this report.

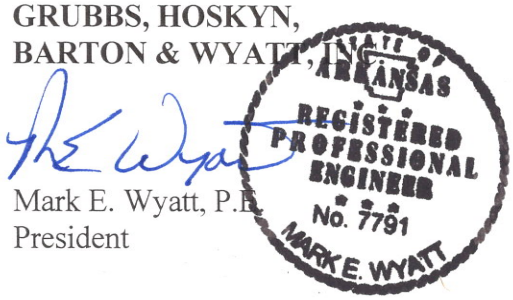
Plate 1	Site Vicinity
Plate 2	Plan of Borings
Plates 3 through 7	Boring Logs
Plate 8	Key to Terms and Symbols
Appendix A	Classification Test Results

* * * * *

We appreciate the opportunity to be of service to you during this phase of the project. Should you have any questions regarding this report, or if we may be of additional assistance during final design or construction, please call on us.

Sincerely,

GRUBBS, HOSKYN,
BARTON & WYATT, INC.

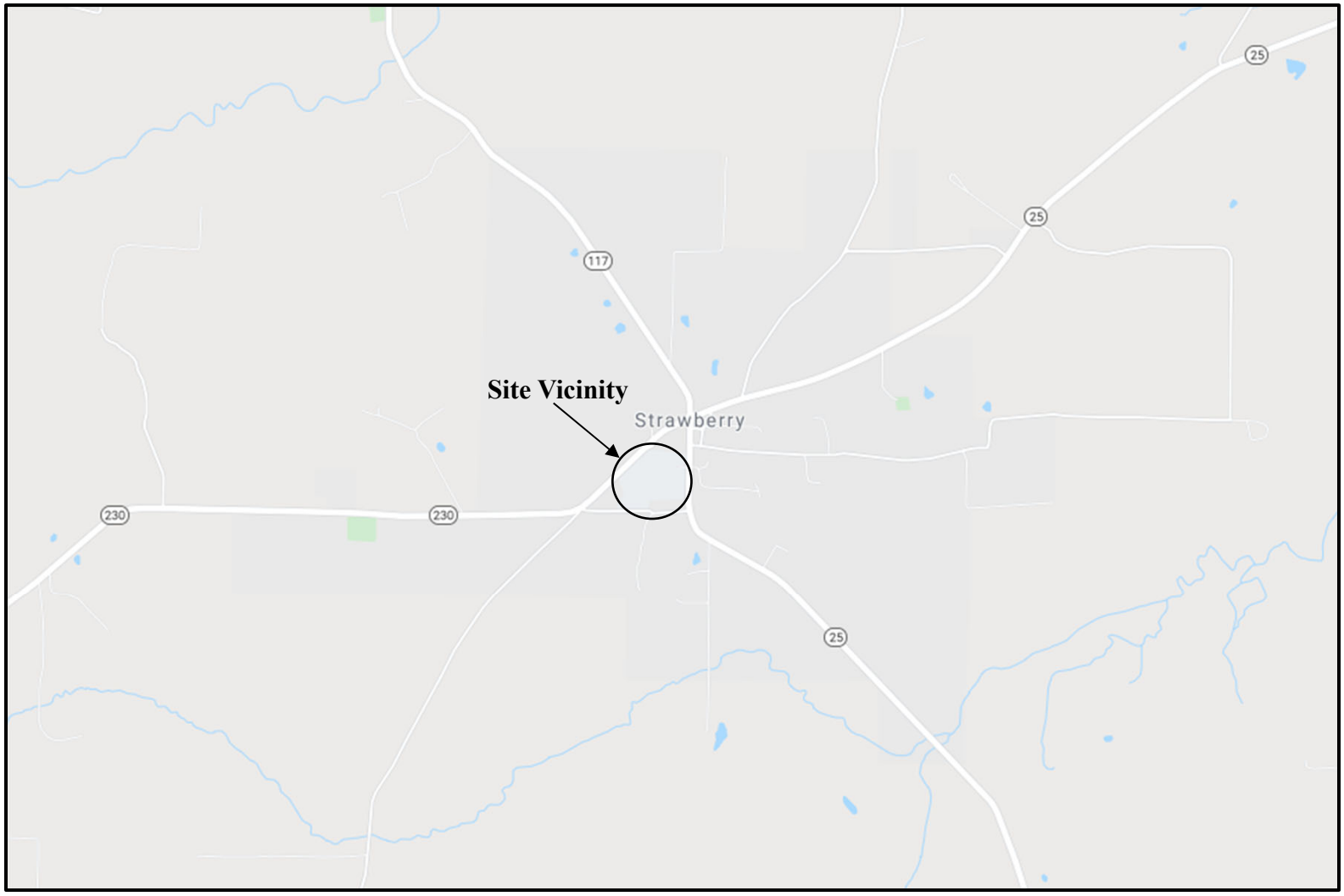


Mark E. Wyatt, P.E.
President

JKB/MEW:jw

Copies submitted: Hillcrest School District
c/o Andrew Hicks Architect
Attn: Mr. Andrew Hicks, AIA, NCARB (1+email)

Engineering Consultants, Inc.
Attn: Mr. Frank Allison, P.E. (1-email)
Attn: Mr. Chris Hill, P.E. (1-email)

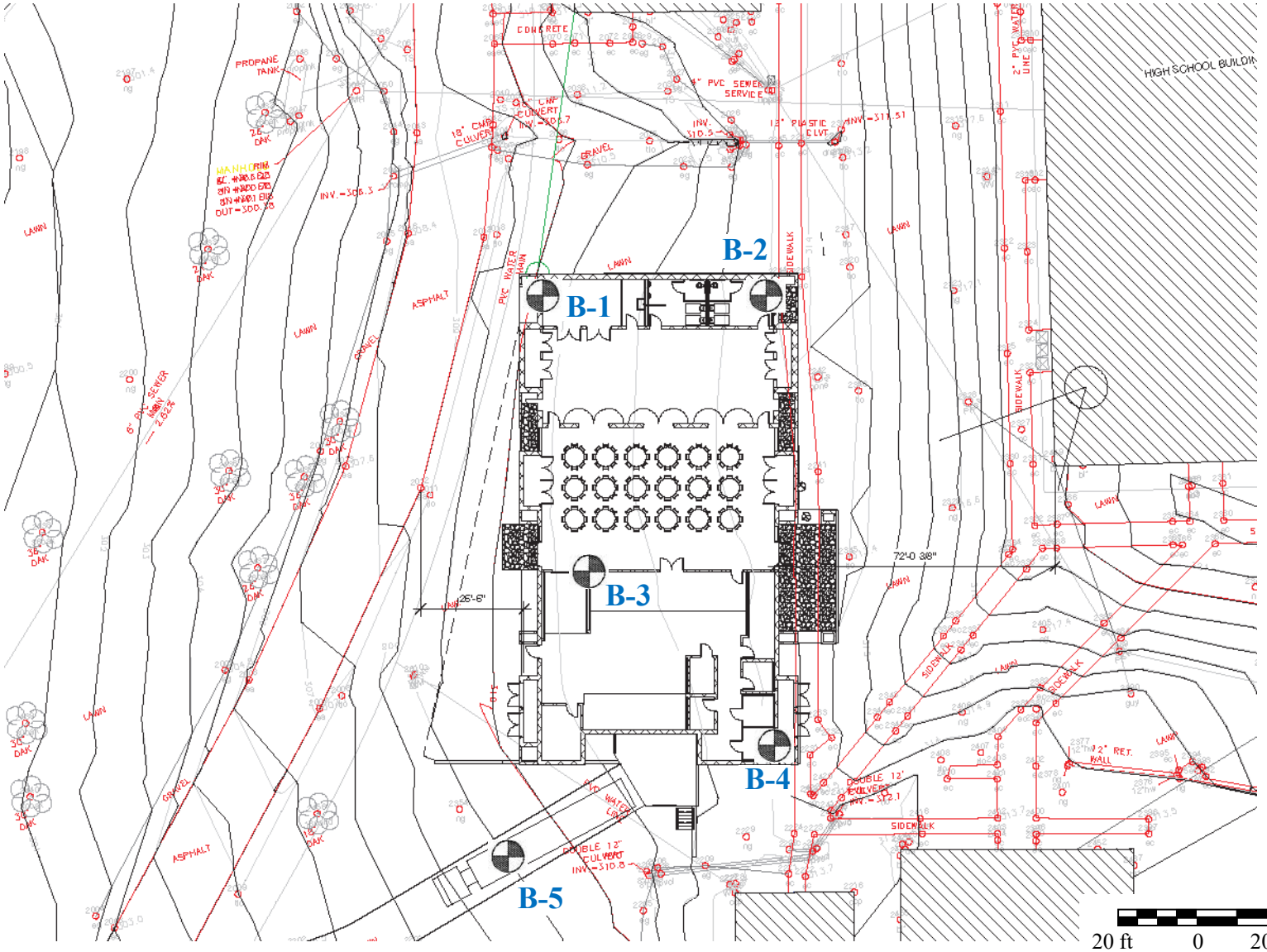


Grubbs, Hoskyn, Barton & Wyatt, INC.
CONSULTING ENGINEERS

SITE VICINITY MAP
Hillcrest High School Addition
Strawberry, Arkansas

Job No. 20-039

Plate 1



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CONSULTING ENGINEERS

PLAN OF BORINGS
Hillcrest High School Addition
Strawberry, Arkansas

Scale: As Shown
Job No. 20-039
Plate 2

20-039

Grubbs, Hoskyn, Barton & Wyatt, Inc.
Consulting Engineers

LOG OF BORING NO. 1

Hillcrest High School Addition
Strawberry, Arkansas

TYPE: Auger

LOCATION: See Plate 2 - Building

SURF. EL: 310±

DEPTH, FT	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	- No. 200 %
	Soft dark brown fine sandy clay w/occasional rootlets and trace fine gravel (fill)	5		
	Soft yellowish brown fine sandy clay (fill) - firm to stiff with maroon and gray below 2 ft	10		57
5	Stiff yellowish brown, maroon and gray fine sandy clay w/occasional organics	14		
	Very stiff yellowish brown and maroon fine sandy clay w/trace sandstone fragments	40		61
10	Medium dense to dense yellowish red clayey fine sand w/clay partings and seams	30		
	- medium dense with ferrous stains below 13 ft	29		
15	NOTE: Auger refusal at 15 ft			
20				
25				

COHESION, TON/SQ FT
0.2 0.4 0.6 0.8 1.0 1.2 1.4

PLASTIC LIMIT — WATER CONTENT — LIQUID LIMIT
10 20 30 40 50 60 70

COMPLETION DEPTH: 15.0 ft
DATE: 3-12-20

DEPTH TO WATER IN BORING: Dry

DATE: 3/12/2020

LGBNEW 20-039.GPJ 3-20-20

PLATE 3

Grubbs, Hoskyn, Barton & Wyatt, Inc.
Consulting Engineers

LOG OF BORING NO. 2

Hillcrest High School Addition
Strawberry, Arkansas

TYPE: Auger LOCATION: See Plate 2 - Building

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (0.2 0.4 0.6 0.8 1.0 1.2 1.4) / PLASTIC LIMIT — WATER CONTENT — LIQUID LIMIT (10 20 30 40 50 60 70)	- No. 200 %
			SURF. EL: 314±				
			Firm dark brown fine sandy clay w/occasional rootlets and trace fine gravel (fill)	8			
			Stiff yellowish brown and brownish gray fine sandy clay w/sandstone fragments and ferrous stains (fill)	15			
5			Medium dense yellowish brown, maroon and gray clayey fine sandy	20			41
			Very stiff yellowish brown and maroon clay, slightly sandy w/ferrous stains	27		85	89
10			- stiff to very stiff with silty fine sand pockets below 8.5 ft	24			
15			NOTE: Auger refusal at 14 ft.				
20							
25							

COMPLETION DEPTH: 14.0 ft
DATE: 3-12-20

DEPTH TO WATER IN BORING: Dry
DATE: 3/12/2020

LGBNEW 20-039.GPJ 3-20-20

Grubbs, Hoskyn, Barton & Wyatt, Inc.
Consulting Engineers

LOG OF BORING NO. 3

Hillcrest High School Addition
Strawberry, Arkansas

TYPE: Auger

LOCATION: See Plate 2 - Building

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (0.2 0.4 0.6 0.8 1.0 1.2 1.4) / PLASTIC LIMIT / WATER CONTENT / LIQUID LIMIT (10 20 30 40 50 60 70)	- No. 200 %
			SURF. EL: 311±				
			Firm dark brown fine sandy clay w/occasional rootlets and a little fine to coarse gravel (fill)	9			
			- yellowish red with trace fine gravel below 2 ft	8			
5			Stiff yellowish red, maroon and gray fine sandy clay w/trace fine gravel	17			
			Medium dense yellowish brown and yellowish red clayey fine sand w/clay laminations and seams	19			30
			- with ferrous stains below 8.5 ft	20			
10							
			Firm to stiff yellowish red and gray clay, sandy w/ferrous stains	10			
15							
			- stiff below 18 ft	21			
20							
25							

COMPLETION DEPTH: 20.0 ft
DATE: 3-12-20

DEPTH TO WATER IN BORING: Dry

DATE: 3/12/2020

LGBNEW 20-039.GPJ 3-20-20

Grubbs, Hoskyn, Barton & Wyatt, Inc.
Consulting Engineers

LOG OF BORING NO. 4

Hillcrest High School Addition
Strawberry, Arkansas

TYPE: Auger

LOCATION: See Plate 2 - Building

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (0.2 0.4 0.6 0.8 1.0 1.2 1.4) / PLASTIC LIMIT — WATER CONTENT — LIQUID LIMIT (10 20 30 40 50 60 70)	- No. 200 %
			SURF. EL: 313±				
			Soft dark brown fine sandy clay w/occasional rootlets and chert fragments (fill)	6			
			- firm to stiff, yellowish brown below 2 ft	10			63
5			Stiff yellowish brown, maroon and gray fine sandy clay	11			68
			Medium dense yellowish red and tan clayey fine sand w/ferrous concretions	22			
10			Stiff yellowish brown and maroon fine sandy clay w/clay pockets	15			
15			- light gray and yellowish red below 13 ft	12			
			Dense yellowish brown, light gray and reddish brown clayey fine sand	34			
20							
25							

COMPLETION DEPTH: 20.0 ft
DATE: 3-12-20

DEPTH TO WATER IN BORING: Dry

DATE: 3/12/2020

LGBNEW 20-039.GPJ 3-20-20

20-039

Grubbs, Hoskyn, Barton & Wyatt, Inc.
Consulting Engineers

LOG OF BORING NO. 5

Hillcrest High School Addition
Strawberry, Arkansas

TYPE: Auger LOCATION: See Plate 2 - Drive

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (0.2 0.4 0.6 0.8 1.0 1.2 1.4) / PLASTIC LIMIT — WATER CONTENT — LIQUID LIMIT (10 20 30 40 50 60 70)	- No. 200 %
			SURF. EL: 309±				
			Firm dark brown fine sandy clay, silty w/occasional rootlets and chert fragments (fill)	9			50
			Stiff tan, gray and reddish brown fine sandy clay	19			
5			Medium dense to dense yellowish red and gray clayey fine sand, silty	30			41
			Very stiff yellowish red and yellowish brown fine sandy clay w/trace fine to coarse gravel	32			
				30			
10							
15							

COMPLETION DEPTH: 10.0 ft
DATE: 3-12-20

DEPTH TO WATER IN BORING: Dry

DATE: 3/12/2020

LGBNEW 20-039.GPJ 3-20-20

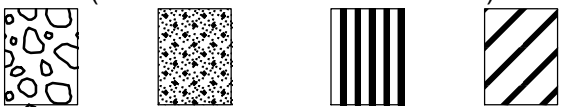
PLATE 7

Grubbs, Hoskyn, Barton & Wyatt, Inc.
Consulting Engineers

SYMBOLS AND TERMS USED ON BORING LOGS

SOIL TYPES

(SHOWN IN SYMBOLS COLUMN)

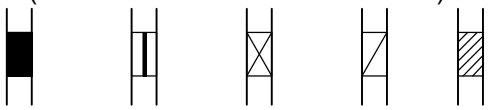


Gravel Sand Silt Clay

Predominant type shown heavy

SAMPLER TYPES

(SHOWN ON SAMPLES COLUMN)



Shelby Tube | Rock Core | Split Spoon | No Recovery | Cutting

TERMS DESCRIBING CONSISTENCY OR CONDITION

COARSE GRAINED SOILS (major portion retained on No. 200 sieve): Includes (I) Clean gravels and sands, and (2) silty or clayey gravels and sands. Condition is rated according to relative density, as determined by laboratory tests.

DESCRIPTIVE TERM	N-VALUE	RELATIVE DENSITY
VERY LOOSE	0-4	0-15%
LOOSE	4-10	15-35%
MEDIUM DENSE	10-30	35-65%
DENSE	30-50	65-85%
VERY DENSE	50 and above	85-100%

FINE GRAINED SOILS (major portion passing No. 200 sieve): Includes (1) Inorganic and organic silts and clays, (2) gravelly, sandy, or silty clays, and (3) clayey silts. Consistency is rated according to shearing strength, as indicated by penetrometer readings or by unconfined compression tests.

DESCRIPTIVE TERM	UNCONFINED COMPRESSIVE STRENGTH TON/SQ. FT.
VERY SOFT	Less than 0.25
SOFT	0.25-0.50
FIRM	0.50-1.00
STIFF	1.00-2.00
VERY STIFF	2.00-4.00
HARD	4.00 and higher

NOTE: Slickensided and fissured clays may have lower unconfined compressive strengths than shown above, because of planes of weakness or cracks in the soil. The consistency ratings of such soils are based on penetrometer readings.

TERMS CHARACTERIZING SOIL STRUCTURE

SLICKENSIDED - having inclined planes of weakness that are slick and glossy in appearance.
FISSURED - containing shrinkage cracks, frequently filled with fine sand or silt; usually more or less vertical.
LAMINATED - composed of thin layers of varying color and texture.
INTERBEDDED - composed of alternate layers of different soil types.
CALCAREOUS - containing appreciable quantities of calcium carbonate.
WELL GRADED - having a wide range in grain sizes and substantial amounts of all intermediate particle sizes.
POORLY GRADED - predominantly of one grain size, or having a range of sizes with some intermediate sizes missing.

Terms used on this report for describing soils according to their texture or grain size distribution are in accordance with the UNIFIED SOIL CLASSIFICATION SYSTEM, as described in Technical Memorandum No.3-357, Waterways Experiment Station, March 1953

KEY 3-14-12

APPENDIX A

SUMMARY of CLASSIFICATION TEST RESULTS

PROJECT: Hillcrest High School Addition
LOCATION: Strawberry, Arkansas
GHBW JOB NUMBER: 20-039

BORING No.	SAMPLE DEPTH (ft)	WATER CONTENT (%)	ATTERBERG LIMITS			PERCENT RETAINED #4	PERCENT PASSING #200	USCS CLASS.	AASHTO CLASS.
			LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX				
1	2.5-3.5	17	36	17	19	0	57	CL	A-6
1	6.5-7.5	23	59	26	33	5	61	CH	A-7-6
2	4.5-5.5	15	38	18	20	5	41	SC	A-6
2	6.5-7.5	32	85	33	52	5	89	CH	A-7-5
3	6.5-7.5	15	29	14	15	8	30	SC	A-2-6
4	2.5-3.5	16	29	14	15	3	63	CL	A-6
4	4.5-5.5	22	41	17	24	0	68	CL	A-7-6
5	0.5-1.5	14	20	14	6	5	50	ML-CL	A-4
5	4.5-5.5	14	20	13	7	2	41	SM-SC	A-4