RPM GSA LITTLE ROCK USSS
DAV RENOVATION

5320 SOUTH SHACKLEFORD ROAD
SUITE K
LITTLE ROCK, AR 72204

GSA PROJECT NUMBER: XXXX

PROJECT MANUAL: SPECIFICATIONS

100% Construction Documents

PREPARED FOR:
RPM GROUP

PREPARED BY:
Witsell Evans Rasco

October 05, 2026

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END OF SECTION

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SECTION 00 0105
CERTIFICATIONS PAGE

ARCHITECT

I HEREBY CERTIFY THAT THIS PROJECT MANUAL WAS PREPARED BY ME, OR UNDER MY DIRECT SUPERVISION, AND THAT I AM A DULY LICENSED ARCHITECT UNDER THE LAWS OF THE STATE OF ARKANSAS.

NAME: _____ **DATE: 10/05/2026 REG. NO C-44**

END OF SECTION

WITSELL, EVANS & RASCO P.A.
REGISTERED ARCHITECTS
NO. C-44
ARKANSAS

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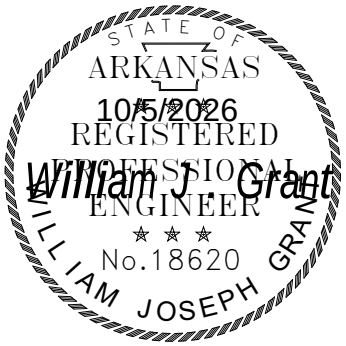
The Engineers of Record for the RPM GSA Little Rock USSS
Mechanical, Electrical, & Plumbing Plans & Specifications
are:



WHGRANT
engineering, LLC

Consulting Engineers
p.o. box 242523, Little Rock, AR 72223

SECTION 01 1000
SUMMARY

PART 1 GENERAL V.22

1.01 PROJECT

A. Project Name: RPM GSA Little Rock USSS DAV Renovation

B. Owner's Name: RPM Group.

C. Architect's Name: WER Architects.

D. The Project consists of the alteration of existing warehouse space for offices and vehicle storage..

1.02 DESCRIPTION OF ALTERATIONS WORK

A. Scope of alterations work is indicated on drawings.

1.03 WORK BY OWNER

A. The Owner, without sacrificing their right to do so, does not plan to undertake significant work with their own forces within the construction site prior to Substantial Completion. Refer to the responsibility maxtrix following this section for components being performed by Owner.

B. Items noted NIC (Not in Contract) will be supplied and installed by Owner before Substantial Completion. Some items include:

C. Owner will supply and install the following:

D. Owner will supply the following for installation by Contractor:

E. Items and equipment noted to be Contactor Furnished and Contractor Installed is to be purchased new by the Contractor and all cost associated with the handling, installation and connection should be included turn-key in the project. All items and equipment noted to be Contractor Installed shall be coordinated with provider and the Contractor shall include all costs for handling, installation and connection in the project.

F. Cooperate fully with the Owner's own forces or separate contractors, if any, so work on those contracts may be carried out smoothly, without interfeering with or delaying work under this contract.

1.04 OWNER OCCUPANCY

A. Owner intends to occupy the Project upon Substantial Completion.

B. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.

C. Schedule the Work to accommodate Owner occupancy.

1.05 CONTRACTOR USE OF SITE AND PREMISES

A. Construction Operations: Limited to areas noted on Drawings.
   1. Locate and conduct construction activities in ways that will limit disturbance to site.

B. Arrange use of site and premises to allow:
   1. Owner occupancy.
   2. Work by Others.
   3. Work by Owner.

C. Do not unreasonably encumber site with materials or equipment. Confine stockpiling of materials to areas authorized by Owner.

D. Provide access to and from site as required by law and by Owner:
   1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.

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2. Do not obstruct roadways, sidewalks, or other public ways without permit.

E. Workers on the jobsite are to be reminded that adjunct areas are occupied and in use on the campus. **Workers will maintain a respectful attitude toward all people for the duration of the construction project. Abusive language or gestures will result in immediate dismissal from the project.**

F. Existing building spaces may not be used for storage.

G. Time Restrictions:
   1. Limit conduct of especially noisy exterior work to the hours of 7:00 am through 4:00 pm.

H. Utility Outages and Shutdown:
   1. Limit disruption of utility services to hours the building is unoccupied.
   2. Do not disrupt or shut down life safety systems, including but not limited to fire sprinklers and fire alarm system, without 7 days notice to Owner and authorities having jurisdiction.
   3. Prevent accidental disruption of utility services to other facilities.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

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RESPONSIBILITY MATRIX	OWNER FURNISHED OWNER INSTALLED	OWNER FURNISHED CONTRACTOR INSTALLED	CONTRACTOR FURNISHED CONTRACTOR INSTALLED	7/7/2026
ITEM	**GSA (OFOI)**	**OFCI**	**CFCI**	**COMMENTS**
Tele/Data (Structured Cabling) - TSD - SECURITY CONTRACTOR				
Conduits, raceways, & backboxes			X	GC/EC
Telephone Outlets (VOIP)			X	GC/EC
System Cabling & Device Termination			X	TSD - SECURITY CONTRACTOR
Racks, Patch Panels			X	TSD - SECURITY CONTRACTOR
Patch Cables			X	TSD - SECURITY CONTRACTOR
Switches			X	TSD - SECURITY CONTRACTOR
Wireless Access Devices			X	TSD - SECURITY CONTRACTOR
UPS			X	TSD - SECURITY CONTRACTOR
Servers			X	TSD - SECURITY CONTRACTOR
CCTV Security - TSD - SECURITY CONTRACTOR				
Conduits, raceways, & backboxes			X	GC/EC
System cabling & Device Termination			X	GC/EC
Cameras			X	TSD - SECURITY CONTRACTOR
CCTV Servers and Head-end equipment			X	TSD - SECURITY CONTRACTOR
Intrusion Detection - TSD - SECURITY CONTRACTOR				N/A
Access Control				
Conduits, raceways, & backboxes			X	GC/EC
System cabling & Device Termination			X	TSD - SECURITY CONTRACTOR
Head-end Equipment / Panels			X	TSD - SECURITY CONTRACTOR
Card Swipe, push buttons, etc..			X	TSD - SECURITY CONTRACTOR
Electric Strikes/Panic			X	TSD - SECURITY CONTRACTOR
Janitorial				
Paper Towel Dispensers			X	GC
Soap Dispensers			X	GC
Toilet Paper Holders			X	GC
Saitary Napkin Trash			X	GC
Grab Bars			X	GC
Trash cans	X			
In wall blocking			X	GC
Robe Hooks			X	GC
Furniture, Fixtures and Equipment				
Office Furniture	X			
White Boards				N/A
Site Furnishings / Benchs / Bike Racks				N/A
AED Devices	X			
Fire Extinguishers			X	
Storage Room Shelving	X			
Lockers				N/A
Appliances & Laundry Eqpt	X			

SECTION 01 3000
ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL V.22

1.01 SECTION INCLUDES

A. Electronic document submittals.
B. Preconstruction meeting.
C. Site mobilization meeting.
D. Progress meetings.
E. Construction progress schedule.
F. Change Order requirements.
G. Contractor Liabiltity requirements.
H. Coordination drawings.
I. Submittals for review, information, and project closeout.
J. Number of copies of submittals.
K. Submittal procedures.

1.02 PROJECT COORDINATION

A. Cooperate with the Project Coordinator in allocation of mobilization areas of site; for field offices and sheds, for construction & delivery access, traffic, and parking facilities.
B. During construction, coordinate use of site and facilities through the Project Coordinator.
C. Comply with Project Coordinator's procedures for intra-project communications; submittals, reports and records, schedules, coordination drawings, and recommendations; and resolution of ambiguities and conflicts.
D. Comply with instructions of the Project Coordinator for use of temporary utilities and construction facilities.
E. Coordinate field engineering and layout work under instructions of the Project Coordinator.
F. Make the following types of submittals to Architect:
    1. Requests for interpretation.
    2. Requests for substitution.
    3. Shop drawings, product data, and samples.
    4. Test and inspection reports.
    5. Manufacturer's instructions and field reports.
    6. Applications for payment and change order requests.
    7. Progress schedules.
    8. Coordination drawings.
    9. Closeout submittals.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 ELECTRONIC DOCUMENT SUBMITTALS

A. Any documents transmitted for purposes of administration of the contract will be in electronic (PDF) format and transmitted via an Internet-based e-mail service.
    1. In addition to submittals for review, information, and closeout, this procedure will apply to requests for information (RFIs), progress documentation, contract modification documents (e.g. supplementary instructions, proposal requests, change orders), applications for

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payment, field reports and meeting minutes, and any other document the Contractor or Architect wish to make part of the project electronic record.

2. Contractor and Architect will use conventional e-mail for this service, subject to the limitations of the service provider (file size).
3. It is the Contractor's responsibility to submit documents in PDF format via file attachment to e-mail directed to WER Architects. Addressee will be determined at the pre-construction conference. Documents shall be reviewed and stamped by the contractor prior to submission. PDF documents without contractors stamp, signature and/or initials, & date will not be reviewed. Each scan or PDF copy, especially large format documents or drawings, shall be individually stamped, if transmitted as individual files. Assembled documents in a single file need only be stamped once.
4. Subcontractors, suppliers, and Architect's consultants are required to use the e-mail transmission of review documents, and provide copies directed to the Architect and Contractor.
5. Users of the electronic document submission process shall provide an email address and Internet access. PDF review software that includes ability to mark up and apply electronic stamps (such as Adobe Acrobat, www.adobe.com, or Bluebeam PDF Revu, www.bluebeam.com), is encouraged, unless scan to PDF file capability is provided by the document generator / provider.
6. Paper documents & transmittals of electronic submissions will not be reviewed; emailed PDF documents without transmittal letters / forms from the contractor will not be reviewed.
7. All other specified submittal and document transmission procedures apply, except that electronic document requirements do not apply to physical samples or color selection charts.

B. Cost: The cost of the electronic document submittal(s) is to be paid by Contractor; include the cost of the submittals in the contract sum.

C. Project Closeout: Architect will determine which project electronic document files shall be archived for the Owner. The contractor shall provide these documents elecronically and physical components as part of the close out document submission.

3.02 PRECONSTRUCTION MEETING

A. Architect will schedule a meeting after Notice of Award.

B. Attendance Required:
   1. Owner.
   2. Architect.
   3. Contractor.

C. Agenda:
   1. Distribution of Contract Documents.
   2. Submission of list of Subcontractors, list of Products, schedule of values, and progress schedule.
   3. Designation of personnel representing the parties to Contract, the Owner and Architect.
   4. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
   5. Scheduling.

D. Record minutes and distribute copies within two days after meeting to participants, with electronic copies to Architect, Owner, participants, and those affected by decisions made.

3.03 SITE MOBILIZATION MEETING

A. Architect will schedule a meeting at the Project site prior to Contractor occupancy.

B. Attendance Required:
   1. Contractor.

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2. Owner.
3. Architect.
4. Contractor's Superintendent.
5. Major Subcontractors.

C. Agenda:
1. Use of premises by Owner and Contractor.
2. Owner's requirements .
3. Construction facilities and controls provided by Owner.
4. Temporary utilities provided by Owner.
5. Security and housekeeping procedures.
6. Schedules.
7. Application for payment procedures.
8. Procedures for testing.
9. Procedures for maintaining record documents.
10. Requirements for start-up of equipment.
11. Inspection and acceptance of equipment put into service during construction period.

D. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

3.04 PROGRESS MEETINGS

A. Schedule and administer meetings throughout progress of the Work at maximum monthly intervals.

B. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.

C. Attendance Required: Job superintendent, major Subcontractors and suppliers, Owner, Architect, as appropriate to agenda topics for each meeting.

D. Agenda:
1. Review minutes of previous meetings.
2. Review of Work progress.
3. Field observations, problems, and decisions.
4. Identification of problems that impede, or will impede, planned progress.
5. Review of submittals schedule and status of submittals.
6. Maintenance of progress schedule.
7. Corrective measures to regain projected schedules.
8. Planned progress during succeeding work period.
9. Maintenance of quality and work standards.
10. Effect of proposed changes on progress schedule and coordination.
11. Other business relating to Work.

E. Record minutes and distribute copies within two days after meeting to participants, with electronic copies to Architect, Owner, participants, and those affected by decisions made.

3.05 CONSTRUCTION PROGRESS SCHEDULE - SEE SECTION 01 3216

A. Within 10 days after date of the Agreement, submit preliminary schedule defining planned operations for the first 60 days of Work, with a general outline for remainder of Work.

B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.

C. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.
1. Include written certification that major contractors have reviewed and accepted proposed schedule.

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D. Within 10 days after joint review, submit complete schedule.

E. Submit updated schedule with each Application for Payment.

3.06 COORDINATION DRAWINGS

A. Provide information required by Project Coordinator for preparation of coordination drawings.

B. Review drawings prior to submission to Architect.

3.07 DIGITAL DOCUMENT FILES AND RELEASES

A. BIM Models: Projects are created by Architect and Engineers using Building Information Modelling software and not all projects wil have these files available for Contractor's use. The final model is a composite of multiple models that will require separate models from consultants. Contact Architect and Engineers for specific availablity and cost.

B. AutoCAD files: Do not exist for architectural plans. Architect has capabilty to generate AutoCAD files that resemble the sheets as seen in the Construction Documents as well as generate entire floor plans of the building. This service can be provided at a cost to the Contractor per sheet/floor plan desired. See end of section for Digital Release form.

C. Portable Digital Format (PDF): PDF of issued drawings can be provided to Contractor at no cost. Contact Architect for availablity.

D. Other documents: Contractor will have to directly contact consultants for trade specific files, such as AutoCAD files for topographical layout, etc.

3.08 REQUESTS FOR CHANGE ORDERS

A. In order to facilitate checking of quotations for extras or credits, all proposals, except for those so minor that their propriety can be seen by inspection, shall be accompanied by a complete itemization of costs including labor, materials and subcontracts. Labor and materilas shall be itemized in manner prescribed above. Where major cost items are subcontracts, they shall be itemied also.

3.09 CONTRACTOR LIABILITY REQUIREMENTS

A. The Contractor shall cause the commerical liability coverage required by the Contract Documents to include (1) the Owner, the Architect Engineer and the Architect Engineer's consulants as additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner as an additional insured for claims caued in whole or in part by the Contractor's negligent acts or omissions during the Contractor's completed operations. The Architect / Engineer, Engineer, and their respective Consultants are responsible for their own Professional Liability coverage.

3.10 SUBMITTALS FOR REVIEW

A. When the following are specified in individual sections, submit them for review:
   1. Product data.
   2. Shop drawings.
   3. Samples for selection.
   4. Samples for verification.
   5. Delgated Design Deferred submittals.

B. Submit to Architect for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.

C. Samples will be reviewed only for aesthetic, color, or finish selection.

D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01 7800 - CLOSEOUT SUBMITTALS.

3.11 SUBMITTALS FOR INFORMATION

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A. When the following are specified in individual sections, submit them for information:
   1. Design data.
   2. Certificates.
   3. Test reports.
   4. Inspection reports.
   5. Manufacturer's instructions.
   6. Manufacturer's field reports.
   7. Other types indicated.

B. Submit for Architect's knowledge as contract administrator or for Owner. No action will be taken.

3.12 SUBMITTALS FOR PROJECT CLOSEOUT

A. When the following are specified in individual sections, submit them at project closeout:
   1. Project record documents.
   2. Operation and maintenance data.
   3. Warranties.
   4. Bonds.
   5. Other types as indicated.

B. Submit for Owner's benefit during and after project completion.

3.13 NUMBER OF COPIES OF SUBMITTALS

A. Documents: Submit one electronic copy in PDF format; an electronically-marked up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected.

B. Documents for Information: Submit one electronic copy.

C. Documents for Project Closeout: Make electronic reproductions of submittal files originally reviewed. Include electronic files of any submittals for information. All hard copies of Operational Manuals included with products and equipment should be collected and retained for close out documentation.

D. Samples: Submit the number specified in individual specification sections; one of which will be retained by Architect.
   1. After review, produce duplicates required for jobsite use & verification.
   2. Retained samples will not be returned to Contractor unless specifically so stated. Digital documentation of approvided samples will be provided.

3.14 SUBMITTAL PROCEDURES

A. Transmit each submittal with approved form and Contractors transmittal form. Transmittal shall be numbered sequentially and revised submittals should include original number and a sequential alphabetic suffix. Transmittal shall include list of each specification section or sections that are included in the submittal contents. Send transmitted submittal as one complete PDF; multiple files will not be reviewed and will need to be reassembled by Contractor.

B. Identify Project, Contractor, Subcontractor or supplier; pertinent drawing and detail number, and specification section number.

C. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of Products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with the requirements of the Work and Contract Documents.

D. Deliver physical submittals to Architect at business address. In some instances, larger physical samples can be coordinated to be delivered to the construction site, typically for use in a mock-up.

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E. Schedule submittals to expedite the Project, and coordinate submission of related items. Transmit higher priority submittals first and provide date for anticipated return of submittal.

F. For each submittal for review, allow 15 days excluding delivery time to and from the Contractor. When large quantities of submittals are transmitted in a short time frame, review time may take longer. Mark high priority submittals on trasmittal to notify / assist in an expidited review.

G. Identify variations from Contract Documents and Product or system limitations that may be detrimental to successful performance of the completed Work. Any proposed change or deviation from Contract Document plans or specifications must be clearly noted and easily identifiable on the submittal. Any change must be identified and specifically requesting approval of proposed deviation by Architect or Engineer of Recod. Failure to follow this requirement results in submitted deviation bearing the complete responsiblity of the contractor.

H. Comments made in submittals by Architect or Engineer that change contract costs need to be submitted to Architect as a Potential Change Order for Claims for review and approval by Owner prior to the change to project scope. Failure to follow this requirement, whether a cost savings or cost increase, results in the submitted cost change bearing the complete responsibilty of the providing contractor.

I. Provide space for Contractor and Architect review stamps. Submittals must be reviewed and stamped by Contractor, unstamped submittals will be not be reviewed and will be returned.

J. Submittals to be as complete, comprehensive and accurate as possible. Include all components requested to be reviewed in Submittal section 1.03 of the specifications. Do not split up a single specification section into multiple submittals (ie product data, samples, shop drawings, etc.). Avoid grouping unrelated specifications sections together in a submittal.

K. Each submittals will only be reviewed two times; once for orginal review and then a second time for a potential revised submittal. Any further additional reviews must include General Contractor's explaination for their inablity to conform with requirements. Additional reviews beyond aforementioned may have costs associated to complete additional reviews.

L. When revised for resubmission, identify all changes made since previous submission. Cloud all changes and revised details / notes. Address all comments and/or questions posed in previous submission; lack of addressing all previous review comments are grounds for rejections of submittal. Only submit new or revised items. For revised items, clearly cloud or identify changed components.

M. Distribute reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with requirements.

N. Submittals not requested will not be recognized or processed.

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3.15 AUTOCAD RELEASE FORM

A. At your request, Witsell Evans Rasco, P.A. (WER) will provide electronic files for your convenience and use in the preparation of a bid or shop drawings related to Project: _____subject to the following terms and conditions.

B. WER's electronic files are compatible with AutoCad as a dwg. file. WER makes no representation as to the compatibility of these files with your hardware or your software beyond the specified release of the referenced specifications.

C. Data contained on these electronic files is part of WER's instruments of service and shall not be used by you or anyone else receiving this data through or from you for any purpose other than as a convenience in the preparation of bids or shop drawings for the referenced project. Any other use or reuse by you or by others, will be at your sole risk and without liability or legal exposure to WER. You agree to make no claim and hereby waive, to the fullest extent permitted by law, any claim or cause of action of any nature against WER, its officers, directors, employees, agents or sub-consultants which may arise out of or in connection with your use of the electronic files.

D. Furthermore, you shall, to the fullest extent permitted by law, indemnify and hold harmless WER from all claims, damages, losses and expenses, including attorney's fees arising out of or resulting from your use of these electronic files.

E. **These electronic files are not contract documents.** Differences may exist between these electronic files and corresponding hard copy contract documents due to addenda, change orders or other revisions. WER makes no presentation regarding the accuracy or completeness of the electronic files you receive. In the event that a conflict arises between the signed contract documents prepared by WER and electronic files, the signed contract documents shall govern. You are responsible for determining if any conflict exists. By your use of these electronic files, you are not relieved of your duty to fully comply with the contract documents, including and without limitations, the need to check, confirm and coordinate all dimensions and details, take field measurements, verify field conditions and coordinate your work with that of other contractors for the project.

F. Because of the potential that the information presented on the electronic files can be modified, unintentionally or otherwise, WER reserves the right to remove all indications of its ownership and/or involvement from each electronic display.

G. WER will furnish you electronic files at a cost of **$150.00** per building floor or sheet, for the following:

1. _____
2. _____
3. _____

A service fee of $ (_____) shall be remitted to WER prior to delivery of the electronic files.

H. Under no circumstances shall delivery of the electronic files for use by you be deemed a sale by WER and WER makes no warranties, either express or implied, of merchantability and fitness for any particular purpose. In no event shall WER be liable for any loss of profit or any consequential damages.

SIGNED: _____ _____

WITSELL EVANS, RASCO PA **CONTRACTOR NAME / TITLE**

_____

_____

DATE: _____ **ADDRESS / PHONE NUMBER**

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END OF SECTION

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SECTION 01 3216
CONSTRUCTION PROGRESS SCHEDULE

PART 1 GENERAL V.22

1.01 SECTION INCLUDES

A. Preliminary schedule.

B. Construction progress schedule, bar chart type.

1.02 SUBMITTALS

A. Within 10 days after date of Agreement, submit preliminary schedule.

B. Within 10 days after joint review, submit complete schedule.

1.03 QUALITY ASSURANCE

A. Scheduler: Contractor's personnel or specialist Consultant specializing in CPM scheduling with one years minimum experience in scheduling construction work of a complexity comparable to this Project, and having use of computer facilities capable of delivering a detailed graphic printout within 48 hours of request.

1.04 SCHEDULE FORMAT

A. Listings: In chronological order according to the start date for each activity. Identify each activity with the applicable specification section number.

B. Diagram Sheet Size: Maximum 22 x 17 inches. Provide electronic file(s) in PDF format.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRELIMINARY SCHEDULE

A. Prepare preliminary schedule in the form of a horizontal bar chart.

3.02 CONTENT

A. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction.

B. Identify each item by specification section number.

C. Provide sub-schedules to define critical portions of the entire schedule.

D. Include conferences and meetings in schedule.

E. Show accumulated percentage of completion of each item, and total percentage of Work completed, as of the first day of each month.

F. Provide separate schedule of submittal dates for shop drawings, product data, and samples, owner-furnished products, products identified under Allowances, and dates reviewed submittals will be required from Architect. Indicate decision dates for selection of finishes.

G. Indicate delivery dates for owner-furnished products.

H. Provide legend for symbols and abbreviations used.

3.03 BAR CHARTS

A. Include a separate bar for each major portion of Work or operation.

B. Identify the first work day of each week.

3.04 REVIEW AND EVALUATION OF SCHEDULE

A. Participate in joint review and evaluation of schedule with Architect at each submittal.

B. Evaluate project status to determine work behind schedule and work ahead of schedule.

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C. After review, revise as necessary as result of review, and resubmit within 10 days.

3.05 UPDATING SCHEDULE

A. Maintain schedules to record actual start and finish dates of completed activities. Revised schedules should show original baseline start and finish dates for activities in comparrison with actual work started and completed.

B. Indicate progress of each activity to date of revision, with projected completion date of each activity.

C. Annotate diagrams to graphically depict current status of Work.

D. Identify activities modified since previous submittal, major changes in Work, and other identifiable changes.

E. Indicate changes required to maintain Date of Substantial Completion.

F. Submit reports required to support recommended changes.

G. Provide narrative report to define problem areas, anticipated delays, and impact on the schedule. Report corrective action taken or proposed and its effect.

3.06 DISTRIBUTION OF SCHEDULE

A. Distribute copies of updated schedules to Contractor's project site file, to subcontractors, suppliers, Architect, Owner, and other concerned parties.

B. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.

END OF SECTION

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SECTION 01 3300
SUBMITTAL PROCEDURES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

1.03 DEFINITIONS

A. Action Submittals: Written and graphic information that requires The Contracting Officer's responsive action.

B. Informational Submittals: Written information that does not require The Contracting Officer's responsive action. Submittals may be rejected for not complying with requirements.

1.04 SUBMITTAL PROCEDURES

A. General: Electronic copies of CAD Drawings of the Contract Drawings will not be provided by The Contracting Officer for Contractor's use in preparing submittals.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
   1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
   2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
      a. The Contracting Officer reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Submittals Schedule: Comply with requirements in Division 1 Section "Construction Progress Schedule" for list of submittals and time requirements for scheduled performance of related construction activities.

D. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on The Contracting Officer's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
   1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. The Contracting Officer will advise Contractor when a submittal being processed must be delayed for coordination.
   2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
   3. Resubmittal Review: Allow 15 days for review of each resubmittal.
   4. Sequential Review: Where sequential review of submittals by The Contracting Officer's consultants, Owner, or other parties is indicated, allow 21 days for initial review of each submittal.
   5. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to The Contracting Officer and to The Contracting Officer's consultants, allow 15 days for review of each submittal. Submittal will be returned to The Contracting Officer before being returned to Contractor.

E. Identification: Place a permanent label or title block on each submittal for identification.

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1. Indicate name of firm or entity that prepared each submittal on label or title block.
2. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by The Contracting Officer.
3. Include the following information on label for processing and recording action taken:
    a. Project name.
    b. Date.
    c. Name and address of The Contracting Officer.
    d. Name and address of Contractor.
    e. Name and address of subcontractor.
    f. Name and address of supplier.
    g. Name of manufacturer.
    h. Submittal number or other unique identifier, including revision identifier.
        1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 06100.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 06100.01.A).
    i. Number and title of appropriate Specification Section.
    j. Drawing number and detail references, as appropriate.
    k. Location(s) where product is to be installed, as appropriate.
    l. Other necessary identification.

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

G. Additional Copies: Unless additional copies are required for final submittal, and unless The Contracting Officer observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
1. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to The Contracting Officer.
2. Additional copies submitted for maintenance manuals will be marked with action taken and will be returned.

H. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. The Contracting Officer will return submittals, without review, received from sources other than Contractor.
1. Transmittal Form: Use AIA Document G810.
2. Transmittal Form: Provide locations on form for the following information:
    a. Project name.
    b. Date.
    c. Destination (To:).
    d. Source (From:).
    e. Names of subcontractor, manufacturer, and supplier.
    f. Category and type of submittal.
    g. Submittal purpose and description.
    h. Specification Section number and title.
    i. Drawing number and detail references, as appropriate.
    j. Transmittal number.
    k. Submittal and transmittal distribution record.
    l. Remarks.
    m. Signature of transmitter.
3. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by The Contracting Officer on previous submittals, and deviations from requirements in the Contract

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Documents, including minor variations and limitations. Include same label information as related submittal.

I. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
   1. Note date and content of previous submittal.
   2. Note date and content of revision in label or title block and clearly indicate extent of revision.
   3. Resubmit submittals until they are marked "Approved by The Contracting Officer."

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

K. Use for Construction: Use only final submittals with mark indicating "Approved by The Contracting Officer" taken by The Contracting Officer.

PART 2 PRODUCTS

2.01 ACTION SUBMITTALS

A. General: Prepare and submit Action Submittals required by individual Specification Sections.
   1. Submit electronic submittals directly to extranet specifically established for Project.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
   1. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
   2. Mark each copy of each submittal to show which products and options are applicable.
   3. Include the following information, as applicable:
      a. Manufacturer's written recommendations.
      b. Manufacturer's product specifications.
      c. Manufacturer's installation instructions.
      d. Standard color charts.
      e. Manufacturer's catalog cuts.
      f. Wiring diagrams showing factory-installed wiring.
      g. Printed performance curves.
      h. Operational range diagrams.
      i. Mill reports.
      j. Standard product operation and maintenance manuals.
      k. Compliance with specified referenced standards.
      l. Testing by recognized testing agency.
      m. Application of testing agency labels and seals.
      n. Notation of coordination requirements.
   4. Submit Product Data before or concurrent with Samples.
   5. Number of Copies: Submit three copies of Product Data, unless otherwise indicated. The Contracting Officer will return one copy. Mark up and retain one returned copy as a Project Record Document.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
   1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
      a. Dimensions.
      b. Identification of products.
      c. Fabrication and installation drawings.
      d. Roughing-in and setting diagrams.

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e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
f. Shopwork manufacturing instructions.
g. Templates and patterns.
h. Schedules.
i. Design calculations.
j. Compliance with specified standards.
k. Notation of coordination requirements.
l. Notation of dimensions established by field measurement.
m. Relationship to adjoining construction clearly indicated.
n. Seal and signature of professional engineer if specified.
o. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.

2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 30 by 40 inches.
3. Number of Copies: Submit two opaque (bond) copies of each submittal. The Contracting Officer will return one copy.
4. Number of Copies: Submit three opaque copies of each submittal, unless copies are required for operation and maintenance manuals. Submit five copies where copies are required for operation and maintenance manuals. The Contracting Officer will retain two copies; remainder will be returned.

D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
2. Identification: Attach label on unexposed side of Samples that includes the following:
a. Generic description of Sample.
b. Product name and name of manufacturer.
c. Sample source.
d. Number and title of appropriate Specification Section.
3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. The Contracting Officer will return submittal with options selected.
5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing

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

a. Number of Samples: Submit three sets of Samples. The Contracting Officer will retain two Sample sets; remainder will be returned.
   1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
   2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.

E. Product Schedule or List: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
   1. Type of product. Include unique identifier for each product.
   2. Number and name of room or space.
   3. Location within room or space.
   4. Number of Copies: Submit three copies of product schedule or list, unless otherwise indicated. The Contracting Officer will return two copies.
      a. Mark up and retain one returned copy as a Project Record Document.

F. Contractor's Construction Schedule: Comply with requirements specified in Division 1 Section "Construction Progress Schedule" for Construction Manager's action.

G. Submittals Schedule: Comply with requirements specified in Division 1 Section "Construction Progress Schedule."

H. Application for Payment: Comply with requirements specified in Division 1 Section "Payment Procedures."

I. Schedule of Values: Comply with requirements specified in Division 1 Section "Payment Procedures."

J. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
   1. Name, address, and telephone number of entity performing subcontract or supplying products.
   2. Number and title of related Specification Section(s) covered by subcontract.
   3. Drawing number and detail references, as appropriate, covered by subcontract.
   4. Number of Copies: Submit three copies of subcontractor list, unless otherwise indicated. The Contracting Officer will return two copies.
      a. Mark up and retain one returned copy as a Project Record Document.

2.02 INFORMATIONAL SUBMITTALS

A. General: Prepare and submit Informational Submittals required by other Specification Sections.
   1. Number of Copies: Submit two copies of each submittal, unless otherwise indicated. The Contracting Officer will not return copies.
   2. Certificates and Certifications: Provide a notarized statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
   3. Test and Inspection Reports: Comply with requirements specified in Division 1 Section "Quality Requirements."

B. Coordination Drawings: Comply with requirements specified in Division 1 Section "Project Management and Coordination."

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C. Contractor's Construction Schedule: Comply with requirements specified in Division 1 Section "Construction Progress Schedule."

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

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

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

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

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

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

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

K. Research/Evaluation Reports: Prepare written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
   1. Name of evaluation organization.
   2. Date of evaluation.
   3. Time period when report is in effect.
   4. Product and manufacturers' names.
   5. Description of product.
   6. Test procedures and results.
   7. Limitations of use.

L. Schedule of Tests and Inspections: Comply with requirements specified in Division 1 Section "Quality Requirements."

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

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

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

P. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements specified in Division 1 Section "Operation and Maintenance Data."

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

R. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer. Include the following, as applicable:
   1. Preparation of substrates.
   2. Required substrate tolerances.
   3. Sequence of installation or erection.
   4. Required installation tolerances.
   5. Required adjustments.
   6. Recommendations for cleaning and protection.

S. Manufacturer's Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:
   1. Name, address, and telephone number of factory-authorized service representative making report.
   2. Statement on condition of substrates and their acceptability for installation of product.
   3. Statement that products at Project site comply with requirements.
   4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
   5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
   6. Statement whether conditions, products, and installation will affect warranty.
   7. Other required items indicated in individual Specification Sections.

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

U. Material Safety Data Sheets (MSDSs): Submit information directly to Owner; do not submit to The Contracting Officer.
   1. The Contracting Officer will not review submittals that include MSDSs and will return them for resubmittal.

PART 3 EXECUTION

3.01 CONTRACTOR'S REVIEW

A. Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to The Contracting Officer.

B. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.02 CONTRACTING OFFICER'S ACTION

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

B. Action Submittals: The Contracting Officer will review each submittal, make marks to indicate corrections or modifications required, and return it. The Contracting Officer will stamp each

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submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:

C. Informational Submittals: The Contracting Officer will review each submittal and will not return it, or will return it if it does not comply with requirements. The Contracting Officer will forward each submittal to appropriate party.

D. Partial submittals are not acceptable, will be considered nonresponsive, and will be returned without review.

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

END OF SECTION

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SECTION 01 4000
QUALITY REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. References and standards.

B. Submittals.

C. Quality assurance.

D. References and standards.

E. Mock-ups.

F. Control of installation.

G. Testing and inspection agencies and services.
   1. Other than Code required special testing and inspections

H. Defect Assessment.

1.02 REFERENCE STANDARDS

A. ASTM C1021 - Standard Practice for Laboratories Engaged in Testing of Building Sealants; 2008 (Reapproved 2014).

B. ASTM C1077 - Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation; 2014.

C. ASTM C1093 - Standard Practice for Accreditation of Testing Agencies for Masonry; 2013.

D. ASTM D3740 - Standard Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction; 2012a.

E. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection and/or Testing; 2014a.

F. ASTM E543 - Standard Specification for Agencies Performing Nondestructive Testing; 2013.

G. ASTM E699 - Standard Specification for Agencies Involved in Testing, Quality Assurance, and Evaluating of Manufactured Building Components; 2016.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Design Data: Submit for Architect's knowledge as contract administrator for the limited purpose of assessing compliance with information given and the design concept expressed in the contract documents, or for Owner's information.

C. Test Reports: After each test/inspection, promptly submit two copies of report to Architect and to Contractor.
   1. Test report submittals are for Architect's knowledge as contract administrator for the limited purpose of assessing compliance with information given and the design concept expressed in the contract documents, or for Owner's information.

D. Certificates: When specified in individual specification sections, submit certification by the manufacturer and Contractor or installation/application subcontractor to Architect, in quantities specified for Product Data.
   1. Indicate material or product complies with or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
   2. Certificates may be recent or previous test results on material or product, but must be acceptable to Architect.

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E. Manufacturer's Instructions: When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, for the Owner's information. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

F. Manufacturer's Field Reports: Submit reports for Architect's benefit as contract administrator or for Owner.
   1. Submit report within 30 days of observation to Architect for information.
   2. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in the contract documents.

1.04 QUALITY ASSURANCE

A. Testing Agency Qualifications:
   1. Prior to start of work, submit agency name, address, and telephone number, and names of full time registered Engineer and responsible officer.
   2. Submit copy of report of laboratory facilities inspection made by NIST Construction Materials Reference Laboratory during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.

1.05 REFERENCES AND STANDARDS

A. For products and workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. Comply with reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.

C. Obtain copies of standards where required by product specification sections.

D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.

E. Should specified reference standards conflict with Contract Documents, request clarification from Architect before proceeding.

F. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of Architect shall be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.06 TESTING AND INSPECTION AGENCIES AND SERVICES

A. Code Required Testing And Inspections: See Section 01 45 33 - Special Inspections.

B. Contractor shall employ and pay for services of an independent testing agency to perform other specified testing, and as required for Contractor's own quality control.

C. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

D. Contractor Employed Agency:
   1. Laboratory: Authorized to operate in the State of Arkansas.
   2. Laboratory Staff: Maintain a full time registered Engineer on staff to review services.
   3. Testing Equipment: Calibrated at reasonable intervals either by NIST or using an NIST established Measurement Assurance Program, under a laboratory measurement quality assurance program.

PART 3 EXECUTION

2.01 CONTROL OF INSTALLATION

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

B. Comply with manufacturers' instructions, including each step in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.

D. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Have work performed by persons qualified to produce required and specified quality.

F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

2.02 MOCK-UPS

A. Before installing portions of the Work where mock-ups are required, construct mock-ups in location and size indicated for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work. The purpose of mock-up is to demonstrate the proposed range of aesthetic effects and workmanship.

B. Accepted mock-ups establish the standard of quality the Architect will use to judge the Work.

C. Tests shall be performed under provisions identified in this section and identified in the respective product specification sections.

D. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.

E. Accepted mock-ups shall be a comparison standard for the remaining Work.

2.03 TESTING AND INSPECTION

A. Code Required Testing And Inspections: See Section 01 45 33 - Special Inspections.

B. See individual specification sections for testing required.

C. Limits on Testing/Inspection Agency Authority:
   1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
   2. Agency may not approve or accept any portion of the Work.
   3. Agency may not assume any duties of Contractor.
   4. Agency has no authority to stop the Work.

D. Contractor Responsibilities:
   1. Provide incidental labor and facilities:
      a. To provide access to Work to be tested/inspected.
      b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
      c. To facilitate tests/inspections.
      d. To provide storage and curing of test samples.
   2. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.

E. Re-testing required because of non-compliance with specified requirements shall be performed by the same agency on instructions by Architect.

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F. Re-testing required because of non-compliance with specified requirements shall be paid for by Contractor.

2.04 DEFECT ASSESSMENT

A. Replace Work or portions of the Work not complying with specified requirements.

END OF SECTION

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SECTION 01 4216
DEFINITIONS

PART 1 GENERAL

1.01 SUMMARY

A. Other definitions are included in individual specification sections.

1.02 DEFINITIONS

A. Furnish: To supply, deliver, unload, and inspect for damage.

B. Install: To unpack, assemble, erect, apply, place, finish, cure, protect, clean, start up, and make ready for use.

C. Product: Material, machinery, components, equipment, fixtures, and systems forming the work result. Not materials or equipment used for preparation, fabrication, conveying, or erection and not incorporated into the work result. Products may be new, never before used, or re-used materials or equipment.

D. Project Manual: The book-sized volume that includes the procurement requirements (if any), the contracting requirements, and the specifications.

E. Provide: To furnish and install.

F. Supply: Same as Furnish.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

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SECTION 01 5000
TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL V.22

1.01 SECTION INCLUDES

A. Temporary utilities.

B. Temporary telecommunications services.

C. Temporary sanitary facilities.

D. Temporary Controls: Barriers, enclosures, and fencing.

E. Security requirements.

F. Vehicular access and parking.

G. Waste removal facilities and services.

H. Project identification sign.

I. Field offices.

1.02 TEMPORARY UTILITIES

A. Owner will provide the following:
   1. Electrical power , consisting of connection to existing facilities.
   2. Water supply, consisting of connection to existing facilities.

B. Provide and pay for all lighting, heating and cooling, and ventilation required for construction purposes.

C. Existing facilities may not be used.

D. Use trigger-operated nozzles for water hoses, to avoid waste of water.

1.03 TELECOMMUNICATIONS SERVICES

A. Provide, maintain, and pay for telecommunications services to field office at time of project mobilization.

B. Provide telephone, cellular phone, and high-speed internet connection to jobsite.

C. Provide on jobsite capacity of viewing and printing out physical copies of electronic versions of construction documents, submittals, RFIs, ASI, etc.

1.04 TEMPORARY SANITARY FACILITIES

A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.

B. Maintain daily in clean and sanitary condition.

1.05 BARRIERS

A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.

B. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for public access to existing building.

C. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.06 FENCING

A. Provide 6 foot high fence around construction site; equip with vehicular and pedestrian gates with locks.

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B. Used material may be used for construction fence. Provide duplicate keys of any gate lock to Owner. Contractor to be responsible for maintainence of fence for duration of project.

1.07 SECURITY

A. Provide security and facilities to protect Work, existing facilities, and Owner's operations from unauthorized entry, vandalism, or theft.

1.08 VEHICULAR ACCESS AND PARKING

A. Coordinate access and haul routes with governing authorities and Owner.

B. Provide and maintain access to fire hydrants, free of obstructions.

C. Provide means of removing mud from vehicle wheels before entering streets.

D. Provide temporary parking areas to accommodate construction personnel. When site space is not adequate, provide additional off-site parking.

1.09 WASTE REMOVAL

A. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.

B. Provide containers with lids. Remove trash from site periodically.

C. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.

D. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

1.10 PROJECT IDENTIFICATION

A. Provide project identification sign of design and construction as detailed by Architect.

B. Erect on site at location established by Architect.

C. Project Identification Signs:
   1. One painted sign, 64 square feet area, bottom 3 feet above ground.
   2. Content:
      a. Project title, logo and name of Owner as indicated on Contract Documents.
      b. Names and titles of authorities.
      c. Names and titles of Architect/Engineer.
      d. Name of Prime Contractor.
   3. Graphic Design, Colors, Style of Lettering: Designated by Architect/Engineer.

D. Sign Materials:
   1. Structure and Framing: New wood, structurally adequate.
   2. Sign Surfaces: Exterior grade plywood with medium density overlay, minimum 3/4-inch thick, standard large sizes to minimize joints.
   3. Paint and Primers: Exterior quality, two coats; sign background of color as selected.
   4. Lettering: Exterior quality paint, contrasting colors as selected.

E. Installation:
   1. Install project identification signs within 15 days after date fixed by Notice to Proceed.
   2. Erect at location directed by the Architect.
   3. Erect supports and framing on secure foundation, rigidly braced and framed to resist wind loadings.
   4. Install signs surface plumb and level, with butt joints. Anchor securely.
   5. Paint exposed surfaces of signs, supports, and framing.

F. Maintenance: Maintain signs and supports clean, repair deterioration and damage.

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G. Removal: Remove signs, framing, supports, and foundations at completion of Project and restore the area.

H. No other signs are allowed without Owner permission except those required by law.

1.11 FIELD OFFICES

A. Office: Weathertight, with lighting, electrical outlets, heating, cooling equipment, and equipped with sturdy furniture, drawing rack, and drawing display table.

B. Provide space for Project meetings, with table and chairs to accommodate 6 persons.

C. Locate offices a minimum distance of 30 feet from existing and new structures.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

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SECTION 01 6000
PRODUCT REQUIREMENTS

PART 1 GENERAL V.22

1.01 SECTION INCLUDES

A. General product requirements.

B. Re-use of existing products.

C. Transportation, handling, storage and protection.

D. Product option requirements.

E. Substitution limitations.

F. Procedures for Owner-supplied products.

G. Maintenance materials, including extra materials, spare parts, tools, and software.

1.02 REFERENCE STANDARDS

A. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.03 SUBMITTALS

A. Proposed Products List: Submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
   1. Submit within 15 days after date of Agreement.
   2. For products specified only by reference standards, list applicable reference standards.

B. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, manufacturer warranties and other data. Supplement manufacturers' standard data to provide information specific to this Project.

C. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

D. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
   1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

PART 2 PRODUCTS

2.01 EXISTING PRODUCTS

A. Do not use materials and equipment removed from existing premises unless specifically required or permitted by Contract Documents.

B. Existing materials and equipment indicated to be removed, but not to be re-used, relocated, reinstalled, delivered to the Owner, or otherwise indicated as to remain the property of the Owner, become the property of the Contractor; remove from site.

C. Reused Products: Reused products include materials and equipment previously used in this or other construction, salvaged and refurbished as specified.

2.02 NEW PRODUCTS

A. Provide new products unless specifically required or permitted by Contract Documents.

B. Use of products having any of the following characteristics is not permitted:
   1. Made of wood from newly cut old growth timber.

C. Where other criteria are met, Contractor shall give preference to products that:

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1. If used on interior, have lower emissions.
2. If wet-applied, have lower VOC content.
3. Are extracted, harvested, and/or manufactured closer to the location of the project.
4. Have longer documented life span under normal use.
5. Result in less construction waste.
6. Are made of recycled materials.
7. Are Cradle-to-Cradle Certified.
8. Have a published GreenScreen Chemical Hazard Analysis.

D. Provide interchangeable components of the same manufacture for components being replaced.

2.03 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.

B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.

C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

2.04 MAINTENANCE MATERIALS

A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.

B. Deliver to Project site; obtain receipt prior to final payment.

2.05 WARRANTY

A. For all products, where no specific extended warranty periord has been identified, provide no less than manufacturer's standard warranty for product line for quality grade specified.

PART 3 EXECUTION

3.01 SUBSTITUTION LIMITATIONS

A. See Section 01 2500 - Substitution Procedures.

3.02 OWNER-SUPPLIED PRODUCTS

A. Owner's Responsibilities:
1. Arrange for and deliver Owner reviewed shop drawings, product data, and samples, to Contractor.
2. Arrange and pay for product delivery to site.
3. On delivery, inspect products jointly with Contractor.
4. Submit claims for transportation damage and replace damaged, defective, or deficient items.
5. Arrange for manufacturers' warranties, inspections, and service.

B. Contractor's Responsibilities:
1. Review Owner reviewed shop drawings, product data, and samples. Notify Owner and Architect immediately if supplied product affects installed final work.
2. Receive and unload products at site; inspect for completeness or damage jointly with Owner.
3. Handle, store, install and finish products.
4. Repair or replace items damaged after receipt.

3.03 TRANSPORTATION AND HANDLING

A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.

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B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.

C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.

D. Transport and handle products in accordance with manufacturer's instructions.

E. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.

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

G. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.

H. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.04 STORAGE AND PROTECTION

A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication. See Section 01 7419.

B. Store and protect products in accordance with manufacturers' instructions.

C. Store with seals and labels intact and legible.

D. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.

E. For exterior storage of fabricated products, place on sloped supports above ground.

F. Provide off-site storage and protection when site does not permit on-site storage or protection.

G. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.

H. Comply with manufacturer's warranty conditions, if any.

I. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.

J. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.

K. Prevent contact with material that may cause corrosion, discoloration, or staining.

L. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

M. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION

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SECTION 01 6200
INFORMATION REGARDING BUY AMERICAN ACT

(GSA FORM 1735)

PART 1 GENERAL

2.01 INFORMATION REGARDING THE BUY AMERICAN ACT

A. The Buy American Act (41 U.S.C. 10a-10d) generally requires that only domestic construction material be used in the performance of this contract. (See the clause entitled “Buy American” in GSA Form 3506, Construction Contract Clauses.) This requirement does not apply to the excepted construction material or components listed in FAR 25.202(a)(3).

B. Furthermore, bids or proposals offering use of additional nondomestic construction material may be acceptable for award if the Government determines that use of comparable domestic construction material is impracticable or would unreasonably increase the cost or that domestic construction material (in sufficient and reasonable available commercial quantities and of a satisfactory quality) is unavailable. Reliable evidence shall be furnished justifying such use of additional nondomestic construction material.

C. Where it is alleged that use of domestic construction material would unreasonably increase the cost:
   1. Data shall be included, based on a reasonable canvass of suppliers, demonstrating that the cost of each such domestic construction material would exceed the cost of comparable nondomestic construction material, inclusive of duty, by:
      a. More than 6 percent, if the domestic offer is from a large business that is not a labor surplus area concern; or
      b. More than 12 percent, if the domestic offer is from a small business concern or
   2. The evaluation in paragraph (i) above shall be applied on an item-by-item basis or to any group of items on which award may be made as specifically provided by the solicitation.
   3. If an award of more than $250,000 would be made to a domestic concern if the 12-percent factor were applied, but not if the 6-percent factor were applied, the agency head shall decide whether award to the domestic concern would involve unreasonable cost.

D. When offering additional nondomestic construction material, bids or proposals may also offer, at stated prices, any available comparable domestic construction material, so as to avoid the possibility that failure of a nondomestic construction material to be acceptable, under (1) above, will cause rejection of the entire bid.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

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SECTION 01 7000
EXECUTION REQUIREMENTS

PART 1 GENERAL V.22

1.01 SECTION INCLUDES

A. Examination, preparation, and general installation procedures.

B. Requirements for alterations work, and selective demolition.

C. Pre-installation meetings.

D. Cutting and patching.

E. Surveying for laying out the work.

F. Cleaning and protection.

G. Closeout procedures, including Contractor's Correction Punch List, except payment procedures.

1.02 REFERENCE STANDARDS

A. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2013.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Survey work: Submit name, address, and telephone number of Surveyor before starting survey work.
   1. On request, submit documentation verifying accuracy of survey work.
   2. Submit a copy of site drawing signed by the Land Surveyor, that the elevations and locations of the work are in compliance with Contract Documents.
   3. Submit surveys and survey logs for the project record.

C. Cutting and Patching: Submit written request in advance of cutting or alteration that affects:
   1. Structural integrity of any element of Project.
   2. Integrity of weather exposed or moisture resistant element.
   3. Efficiency, maintenance, or safety of any operational element.
   4. Visual qualities of sight exposed elements.
   5. Work of Owner or separate Contractor.

1.04 QUALIFICATIONS

A. For surveying work, employ a land surveyor registered in the State of Arkansas and acceptable to Architect. Submit evidence of surveyor's Errors and Omissions insurance coverage in the form of an Insurance Certificate. Employ only individual(s) trained and experienced in collecting and recording accurate data relevant to ongoing construction activities.

1.05 PROJECT CONDITIONS

A. Use of explosives is not permitted.

B. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

1.06 COORDINATION

A. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.

B. Notify affected utility companies and comply with their requirements.

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C. Verify that utility requirements and characteristics of new operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

D. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on drawings. Follow routing indicated for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

E. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.

F. Coordinate completion and clean-up of work of separate sections.

G. After Owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

PART 2 PRODUCTS

2.01 PATCHING MATERIALS

A. New Materials: As specified in product sections; match existing products and work for patching and extending work.

B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.

C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01 6000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.

B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.

C. Examine and verify specific conditions described in individual specification sections.

D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.

E. Verify that utility services are available, of the correct characteristics, and in the correct locations.

F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

3.02 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance.

B. Seal cracks or openings of substrate prior to applying next material or substance.

C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.03 PREINSTALLATION MEETINGS

A. When required in individual specification sections, convene a preinstallation meeting at the site prior to commencing work of the section.

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B. Require attendance of parties directly affecting, or affected by, work of the specific section.

C. Notify Architect four days in advance of meeting date.

D. Prepare agenda and preside at meeting:
   1. Review conditions of examination, preparation and installation procedures.
   2. Review coordination with related work.

E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

3.04 LAYING OUT THE WORK

A. Verify locations of survey control points prior to starting work.

B. Promptly notify Architect of any discrepancies discovered.

C. Protect survey control points prior to starting site work; preserve permanent reference points during construction.

D. Promptly report to Architect the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.

E. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Architect.

F. Utilize recognized engineering survey practices.

G. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:
   1. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations.
   2. Grid or axis for structures.
   3. Building foundation, column locations, and ground floor elevations.

H. Periodically verify layouts by same means.

I. Maintain a complete and accurate log of control and survey work as it progresses.

3.05 GENERAL INSTALLATION REQUIREMENTS

A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.

B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.

C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.

D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.

E. Make neat transitions between different surfaces, maintaining texture and appearance.

3.06 ALTERATIONS

A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
   1. Verify that construction and utility arrangements are as indicated.
   2. Report discrepancies to Architect before disturbing existing installation.
   3. Beginning of alterations work constitutes acceptance of existing conditions.

B. Remove existing work as indicated and as required to accomplish new work.
   1. Remove items indicated on drawings.
   2. Relocate items indicated on drawings.

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3. Where new surface finishes are to be applied to existing work, perform removals, patch, and prepare existing surfaces as required to receive new finish; remove existing finish if necessary for successful application of new finish.
4. Where new surface finishes are not specified or indicated, patch holes and damaged surfaces to match adjacent finished surfaces as closely as possible.

C. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove, relocate, and extend existing systems to accommodate new construction.
1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components; if necessary, modify installation to allow access or provide access panel.
2. Where existing systems or equipment are not active and Contract Documents require reactivation, put back into operational condition; repair supply, distribution, and equipment as required.
3. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
   a. Disable existing systems only to make switchovers and connections; minimize duration of outages.
   b. Provide temporary connections as required to maintain existing systems in service.
4. Verify that abandoned services serve only abandoned facilities.
5. Remove abandoned pipe, ducts, conduits, and equipment , including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification; patch holes left by removal using materials specified for new construction.

D. Protect existing work to remain.
1. Prevent movement of structure; provide shoring and bracing if necessary.
2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
3. Repair adjacent construction and finishes damaged during removal work.

E. Adapt existing work to fit new work: Make as neat and smooth transition as possible.

F. Patching: Where the existing surface is not indicated to be refinished, patch to match the surface finish that existed prior to cutting. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish.

G. Refinish existing surfaces as indicated:
1. Where rooms or spaces are indicated to be refinished, refinish all visible existing surfaces to remain to the specified condition for each material, with a neat transition to adjacent finishes.
2. If mechanical or electrical work is exposed accidentally during the work, re-cover and refinish to match.

H. Clean existing systems and equipment.

I. Remove demolition debris and abandoned items from alterations areas and dispose of off-site; do not burn or bury.

J. Do not begin new construction in alterations areas before demolition is complete.

K. Comply with all other applicable requirements of this section.

3.07 CUTTING AND PATCHING

A. Whenever possible, execute the work by methods that avoid cutting or patching.

B. See Alterations article above for additional requirements.

C. Perform whatever cutting and patching is necessary to:

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1. Complete the work.
2. Fit products together to integrate with other work.
3. Provide openings for penetration of mechanical, electrical, and other services.
4. Match work that has been cut to adjacent work.
5. Repair areas adjacent to cuts to required condition.
6. Repair new work damaged by subsequent work.
7. Remove samples of installed work for testing when requested.
8. Remove and replace defective and non-complying work.

D. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.

E. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.

F. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.

G. Restore work with new products in accordance with requirements of Contract Documents.

H. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

I. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Section 07 8400, to full thickness of the penetrated element.

J. Patching:
1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
2. Match color, texture, and appearance.
3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

3.08 PROGRESS CLEANING

A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.

C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.

D. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.

3.09 PROTECTION OF INSTALLED WORK

A. Protect installed work from damage by construction operations.

B. Provide special protection where specified in individual specification sections.

C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

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F. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

G. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

3.10 ADJUSTING

A. Adjust operating products and equipment to ensure smooth and unhindered operation.

3.11 FINAL CLEANING

A. Use cleaning materials that are nonhazardous.

B. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.

C. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.

D. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.

E. Clean filters of operating equipment.

F. Clean debris from roofs, gutters, downspouts, scuppers, overflow drains, area drains, and drainage systems.

G. Clean site; sweep paved areas, rake clean landscaped surfaces.

H. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

3.12 CLOSEOUT PROCEDURES

A. Make submittals that are required by governing or other authorities.

B. Accompany Project Coordinator on preliminary inspection to determine items to be listed for completion or correction in the Contractor's Correction Punch List for Contractor's Notice of Substantial Completion.

C. Notify Architect when work is considered ready for Architect's Substantial Completion inspection.

D. Submit written certification containing Contractor's Correction Punch List, that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Architect's Substantial Completion inspection.

E. Conduct Substantial Completion inspection and create Final Correction Punch List containing Architect's and Contractor's comprehensive list of items identified to be completed or corrected and submit to Architect.

F. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Owner-occupied areas.

G. Notify Architect when work is considered finally complete and ready for Architect's Substantial Completion final inspection.

H. Complete items of work determined by Architect listed in executed Certificate of Substantial Completion. When each item is completed, have each item initialled by Project Superintendent and dated when completed. Include in project closeout documentation.

END OF SECTION

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SECTION 01 7800
CLOSEOUT SUBMITTALS

PART 1 GENERAL V.22

1.01 SECTION INCLUDES

A. Project Completion Documents.

B. Project Record Documents.

C. Operation and Maintenance Manuals.

D. Warranties and bonds.

1.02 SUBMITTALS

A. Close Out Document Manuals: All information to be scanned to digital format and submitted to Architect. Retain all hard copies for one complete set for the Owner. Submit complete sets of the following:
   1. Project Completion Documents:
   2. Project Record Documents:
   3. Operation and Maintenance Manuals:

B. Final Application for Payment: Submit fully executed

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PROJECT COMPLETION DOCUMENTS

A. Project Directory: Include list of all Contractors, Owner, Architects, Engineers, Subcontractor and prime material suppliers. List to include trade involved, primary contact name, phone number, mailing address and email address.

B. Waiver of Liens: Provide for all trades and prime material suppliers.

C. Warranties: Submit for contractors installation warranty, manufacturer's warranties and warranties for equipment or component parts of equipment. Warranty begins on the date of acceptance
   1. Submit for contractors installation warranty, manufacturer's warranties and warranties for equipment or component parts of equipment.
   2. Warranties begin on the Date of Substantial Completion, unless delayed or specifically excluded.
   3. For items of Work for which acceptance is delayed beyond the Date of Substantial Completion, the listing date of acceptance is the beginning of the warranty period.
   4. Verify that documents are in proper form, contain full information, and are notorized.
   5. Include originals of each in operation and maintenance manuals, indexed separately on Table of Contents.

D. Certificate of Substantial Completion: Provide fully executed form with punch list attached.

E. Contractor's Punch List: Provide completed list of items requiring completion or correction. Include any attachments for revisions provided by Architect and/or Engineer. Punch list should be noted that all items were corrected and completed with trade responsible identified.

F. Certificate of Occupancy: Provide form as issued for authority having jurisdiction.

G. Consent of Surety: Provide fully executed surety letter when project has associated bonds provided by contractor.

3.02 PROJECT RECORD DOCUMENTS

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A. Record Drawings : Legibly mark construction drawings with each item to record actual construction including the following:
   1. Measured depths of foundations in relation to finish first floor datum.
   2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
   3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
   4. Field changes of dimension and detail.
   5. Details not on original Contract drawings.
   6. Changes made by Addenda and Change Orders.
   7. Record information concurrent with construction progress.

B. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
   1. Manufacturer's name and product model and number.
   2. Product substitutions or alternates utilized.
   3. Changes made by Addenda, Change Orders and other modifications.

C. Addenda: Insure all addenda items have been includes and posted to record documents.

D. Change Orders: Include all executed Change Orders, Allowance purchases and other modifications to the contract.

E. Submittals, Shop Drawings, Product Data and Samples:
   1. Shop Drawings: Include records of manufacturer's instruction for assembly, installation and adjusting.
   2. Product Data: Include list of all products and model number provided.
   3. Samples: Include material samples of all selected interior finishes. Samples to include label indicating manufacturer, product model number, color, finish and other identifying elements. Full color photographs are acceptable for larger samples.

F. Test Reports and Special Inspections:

G. Maintain on site a complete set of record documents; record actual revisions to the Work:

H. Ensure entries are complete and accurate, enabling future reference by Owner.

I. Store record documents separate from documents used for construction.

J. Record information concurrent with construction progress.

3.03 OPERATION AND MAINTENANCE MANUAL GENERAL

A. Source Data: For each product or system, list names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.

B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.

C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.

D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

3.04 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES

A. For Each Product, Applied Material, and Finish:
   1. Product data, with catalog number, size, composition, and color and texture designations.
   2. Information for re-ordering custom manufactured products.

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B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.

C. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

3.05 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS

A. Provide schedule of all equipment that require instruction on operation and/or continual maintenance. Coordinate instruction for all equipment with Owner and/or Owner's Representative and record name and contact information of all in attendance. Video recording of instructions provided is recommended.

B. For Each Item of Equipment and Each System:
   1. Description of unit or system, and component parts.
   2. Identify function, normal operating characteristics, and limiting conditions.
   3. Include performance curves, with engineering data and tests.
   4. Complete nomenclature and model number of replaceable parts.

C. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

D. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed.

E. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.

F. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

G. Provide servicing and lubrication schedule, and list of lubricants required.

H. Include manufacturer's printed operation and maintenance instructions.

I. Include sequence of operation by controls manufacturer.

J. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

K. Additional Requirements: As specified in individual product specification sections.

3.06 CLOSE OUT DOCUMENT MANUALS

A. Provide all Close Out information in digital format, saved in PDF files, and neatly organized for ease of navigation. Arrange by Specification Sections as Table of Contents. Architect can provide file format for use as needed.

B. Where paper documents are provided by manufacturers, scan into records and combine and include into Hard Copy Close Out Documents.

C. Binders: Commercial quality, 8-1/2 by 11 inch three D side ring binders with durable plastic covers; 2 inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.

D. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.

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E. Dividers: Provide tabbed dividers for each separate product and system; identify the contents on the divider tab; immediately following the divider tab include a description of product and major component parts of equipment.

F. Text: Manufacturer's printed data, or typewritten data on 24 pound paper.

G. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

H. Arrange content by systems under specification section numbers and sequence of Table of Contents of this Project Manual.

I. Contents: Prepare a Table of Contents for each volume, with each product or system description identified, in three parts as follows:
   1. Operating instructions.
   2. Maintenance instructions for equipment and systems.
   3. Maintenance instructions for special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
   4. Air and water balance reports.
   5. Certificates.
   6. Photocopies of warranties and bonds.

J. Provide a listing in Table of Contents for design data, with tabbed dividers and space for insertion of data.

K. Table of Contents: Provide title of Project; names, addresses, and telephone numbers of Architect , Consultants, and Contractor with name of responsible parties; schedule of products and systems, indexed to content of the volume.

L. Arrange digital PDF copies of documents in similar fashion using file folders. Name file type with simple explanation of contents using shortest file names type possible. Provide digital files on flash USB drives.

M. Provide owner training videos saved electronically and transmitted in USB drives. Provide sign-in sheets for all attendees for Owner Training sessions and include in closeouts.

END OF SECTION

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SECTION 02 7320
SELECTIVE DEMOLITION

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes the following:
   1. Demolition and removal of selected portions of building or structure.

1.03 DEFINITIONS

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

B. Remove and Salvage: Detach items from existing construction and deliver them to Owner.

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

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

1.04 SUBMITTALS

A. Schedule of Selective Demolition Activities: Indicate the following:
   1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
   2. Interruption of utility services. Indicate how long utility services will be interrupted.
   3. Coordination for shutoff, capping, and continuation of utility services.
   4. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
   5. Means of protection for items to remain and items in path of waste removal from building.

B. Inventory: After selective demolition is complete, submit a list of items that have been removed and salvaged.

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

1.05 QUALITY ASSURANCE

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

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

C. Predemolition Conference: Conduct conference at Project site to comply with requirements. Review methods and procedures related to selective demolition including, but not limited to, the following:
   1. Inspect and discuss condition of construction to be selectively demolished.
   2. Review structural load limitations of existing structure.
   3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
   4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.

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5. Review areas where existing construction is to remain and requires protection.

1.06 PROJECT CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
   1. Comply with requirements specified in Division 1 Section "Summary."

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

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

D. Hazardous Materials: None Known.

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

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

1.07 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that utilities have been disconnected and capped.

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

C. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.

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

E. Engage a professional engineer to survey 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 selective demolition operations.

F. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

3.02 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems: Maintain services/systems indicated to remain and protect them against damage during selective demolition operations.
   1. Comply with requirements for existing services/systems interruptions specified in Division 1 Section "Summary."

B. Service/System Requirements: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.
   1. Building manager will arrange to shut off indicated services/systems when requested by Contractor.
   2. If services/systems are required to be removed, relocated, or abandoned, before proceeding with selective demolition provide temporary services/systems that bypass area

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of selective demolition and that maintain continuity of services/systems to other parts of building.

3. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.
4. Where entire wall is to be removed, existing services/systems may be removed with removal of the wall.

3.03 PREPARATION

A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
   1. Comply with requirements for access and protection specified in Division 1 Section "Temporary Facilities and Controls."

B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
   1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
   2. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
   3. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Division 1 Section "Temporary Facilities and Controls."

3.04 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
   1. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
   2. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
   3. Dispose of demolished items and materials promptly.

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

3.05 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.
   1. Do not allow demolished materials to accumulate on-site.
   2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn demolished materials.

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

3.06 CLEANING

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

END OF SECTION

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SECTION 03 3000
CAST-IN-PLACE CONCRETE

PART 1 - GENERAL V.20

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:
   1. Slabs-on-grade.
   2. Concrete reinforcement.
   3. Concrete curing.

1.03 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans; subject to compliance with requirements.

1.04 SUBMITTALS

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

B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

C. Steel Reinforcement Shop Drawings: Drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement. For mat foundation, provide Shop Drawings for both top and bottom reinforcing mats.
   1. Reproductions of the Contract Drawings for use in preparing shop drawing submittals are not allowed and will be returned to the Contractor rejected.

D. Samples: For waterstops, vapor retarder.

E. Qualification Data: For Installer, Manufacturer, Testing Agency.

F. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements. Aggregates: Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.

G. Material Certificates: For each of the following, signed by manufacturers:
   1. Cementitious materials.
   2. Admixtures.
   3. Form materials and form-release agents.
   4. Steel reinforcement and accessories.
      a. Mill certificates to include mill analysis, tensile and bend tests results for reinforcing steel.
   5. Waterstops.
   6. Curing compounds.
   7. Floor and slab treatments.
   8. Bonding agents.
   9. Adhesives.
   10. Vapor retarders.

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11. Semi-rigid joint filler.
12. Joint-filler strips.
13. Repair materials.

H. Floor surface flatness and levelness measurements to determine compliance with specified tolerances.

I. Field quality-control test and inspection reports.

J. Minutes of pre-installation conference.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94 requirements for production facilities and equipment. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

B. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.

C. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from one source, and obtain admixtures through one source from a single manufacturer.

D. Welding: Welding of reinforcing steel will not be permitted.

E. American Concrete Institute (ACI) Publications: Comply with the following unless modified by requirements in the Contract Documents:
1. ACI 301, "Specification for Structural Concrete".
2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
3. ACI 318, “Building Code Requirements for Structural Concrete and Commentary”.

F. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

G. Conduct pre-installation conference and review Project conditions.
1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
   a. Contractor's superintendent.
   b. Independent testing agency responsible for concrete design mixtures.
   c. Installers
   d. Concrete subcontractors.
   e. Special inspection, testing, and inspecting.
2. Review the following items:
   a. Special inspection, testing, and inspecting agency procedures for field quality control.
   b. Concrete finishes and finishing.
   c. Cold and hot -weather concrete pouring procedures.
   d. Curing procedures.
   e. Construction contraction and isolation joints and joint-filler strips.
   f. Semi-rigid joint fillers.
   g. Forms and form removal limitations.
   h. Vapor-retarder installation.
   i. Anchor rod and anchorage device installation tolerances.

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j. Steel reinforcement installation.
k. Floor and slab flatness and levelness measurement.
l. Concrete repair procedures.
m. Concrete protection.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

B. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

PART 2 - PRODUCTS

2.01 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
1. Plywood, metal, or other approved panel materials.
2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
a. High-density overlay, Class 1 or better.
b. Medium-density overlay, Class 1 or better; mill-release agent treated and edge sealed.
c. Structural 1, B-B or better; mill oiled and edge sealed.
d. B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed.

B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

C. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that will produce surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.

D. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum, unless noted otherwise.

E. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces. Formulate form-release agent with rust inhibitor for steel form-facing materials.

F. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
1. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
2. Furnish ties that, when removed, will leave holes no larger than 1 inch in diameter in concrete surface.
3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

2.02 STEEL REINFORCEMENT

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

B. Low-Alloy-Steel Reinforcing Bars: ASTM A 706, deformed.

C. Plain-Steel Welded Wire Reinforcement: ASTM A 185, plain.

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2.03 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars: ASTM A 615, Grade 60, plain-steel bars, cut bars true to length with ends square and free of burrs.

B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
   1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.
   2. For slabs on grade, use supports with sand plates or horizontal runners where base material will not support chair legs, or where additional support area is required to prevent puncture of vapor retarder.
   3. For footings or other concrete that will be in direct contact with earth, provide supports with either hot-dipped galvanized, stainless steel, plastic protected steel legs, or supports made entirely of plastic or other acceptable, inert polymer. Do not use wood, brick, concrete brick or block, or other unacceptable material.
   4. For footings or other concrete that will be in direct contact with earth reinforcing shall not be supported by stakes or rods, of any material, driven into the ground.

C. Deformed Bar Anchors: Low carbon steel ASTM: A-496.

2.04 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
   1. Portland Cement: ASTM C 150, Type I/IA.
      a. Fly Ash: ASTM C 618, Class C.

B. Normal-Weight Aggregates: ASTM C 33, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.
   1. Coarse-Aggregate:.
      a. Crushed Stone.
      b. 1 1/2 inch nominal, maximum size
      c. Coarse aggregate for all concrete exposed to the weather shall be crushed stone with a #57 gradation.
   2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
      a. Free of materials with deleterious reactivity to alkali in cement.
      b. Siliceous sand with sharp, clean edges.
      c. Meet ASTM C 33 requirements.

C. Water: ASTM C 94, potable.

2.05 ADMIXTURES

A. Air-Entraining Admixture: ASTM C 260.

B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
   1. Water-Reducing Admixture: ASTM C 494, Type A.
   2. Retarding Admixture: ASTM C 494, Type B.
   3. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.
   4. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.

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5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017, Type II.

C. Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete and complying with ASTM C 494, Type C.
   1. Products manufactured by:
      a. Grace Construction Products, W. R. Grace & Co.; DCI.
      b. Master Builders, Inc.; Rheocrete CNI.
      c. Sika Corporation; Sika CNI.
      d. Euclid Chemical Company (The); Eucon CIA.

D. Non-Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, non-set-accelerating, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete.
   1. Products manufactured by:
      a. Grace Construction Products, W. R. Grace & Co.; DCI-S.
      b. Master Builders, Inc.; Rheocrete 222+.
      c. Sika Corporation; FerroGard-901.

2.06 VAPOR RETARDERS

A. Plastic Vapor Retarder (under slab on grade construction): ASTM E 1745, Class A, not less than 15 mils thick. Include manufacturer's recommended adhesive or pressure-sensitive joint tape.
   1. Products manufactured by:
      a. Fortifiber Corporation; Moistop Plus.
      b. Raven Industries Inc.; Dura Skrim.
      c. Reef Industries, Inc.; Griffolyn.
      d. Stego Industries, LLC; Stego Wrap, 15 mils.

B. Granular Fill: As Indicated.

2.07 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
   1. Products manufactured by:
      a. Burke by Edoco; BurkeFilm.
      b. ChemMasters; Spray-Film.
      c. Conspec Marketing & Manufacturing Co., Inc., a Dayton Superior Company; Aquafilm.
      d. Dayton Superior Corporation; Sure Film.
      e. Euclid Chemical Company (The); Eucobar.
      f. L&M Construction Chemicals, Inc.; E-Con.
      g. Meadows, W. R., Inc.; Sealtight Evapre.
      h. Metalcrete Industries; Waterhold.
      i. Sika Corporation, Inc.; SikaFilm.
      j. Symons Corporation, a Dayton Superior Company; Finishing Aid.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.
   1. Use for all surfaces noted in item A.2 above.

C. Moisture-Retaining Cover: ASTM C 171, 6 mil minimum thickness polyethylene film or white burlap-polyethylene sheet.

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D. Water: Potable.

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.
   1. Products manufactured by:
      a. Anti-Hydro International, Inc.; AH Curing Compound #2 DR WB.
      b. Burke by Edoco; Aqua Resin Cure.
      c. ChemMasters; Safe-Cure Clear.
      d. Conspec Marketing & Manufacturing Co., Inc., a Dayton Superior Company; W.B. Resin Cure.
      e. Dayton Superior Corporation; Day Chem Rez Cure (J-11-W).
      f. Euclid Chemical Company (The); Kurez DR VOX.
      g. L&M Construction Chemicals, Inc.; L&M Cure R.
      h. Meadows, W. R., Inc.; 1100 Clear.
      i. Symons Corporation, a Dayton Superior Company; Resi-Chem Clear Cure.

F. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A. (For areas where sealed concrete finish is indicated)
   1. Products manufactured by:
      a. Anti-Hydro International, Inc.; AH Clear Cure WB.
      b. Burke by Edoco; Cureseal 1315 WB.
      c. ChemMasters; Polyseal WB.
      d. Conspec Marketing & Manufacturing Co., Inc., a Dayton Superior Company; Cure and Seal WB.
      e. Dayton Superior Corporation; Safe Cure and Seal (J-18).
      f. Euclid Chemical Company (The); Aqua Cure VOX.
      g. L&M Construction Chemicals, Inc.; Dress & Seal WB.
      h. Symons Corporation, a Dayton Superior Company; Cure & Seal 18 Percent E.

2.08 RELATED MATERIALS

A. Expansion and Isolation Joint Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork.

B. Semi-rigid Joint Filler: Two-component, semi-rigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 per ASTM D 2240.

C. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

D. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and Types I and II, non-load bearing IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

E. Non-shrink Grout: Pre-mixed non-shrinking, high strength grout, COE CRD-621; compressive strength of 5000 psi in 28 days.

F. Expansion Joint Fillers:
   1. Asphalt Impregnated Fiberboard: ASTM D1751, 1/2 inch thick, unless indicated otherwise on Drawings.

2.09 REPAIR MATERIALS

A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.
   1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.

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2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.
4. Compressive Strength: Not less than 4100 psi at 28 days when tested according to ASTM C 109.

B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.
1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
4. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C 109.

2.10 CONCRETE MIXTURES

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.

B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
1. Fly Ash: 20 percent maximum by weight of total cementitious material..

C. Limit water-soluble, chloride-ion content in hardened concrete to 0.06 percent by weight of cement.

D. Admixtures: Use admixtures according to manufacturer's written instructions.
1. Use water-reducing high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.
4. Use corrosion-inhibiting admixture in concrete mixtures where indicated.

2.11 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Slabs-on-Grade, Grade Beams, & Piers: Proportion normal-weight concrete mixture as follows:
1. See Structural Documents for Minimum Compressive Strength.
2. Minimum Compressive Strength: 3000 psi at 28 days.
3. Maximum Water-Cementitious Materials Ratio: 0.55.
4. Air Content: Do not allow air content of troweled finished floors to exceed 3 percent.

2.12 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.13 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94 and ASTM C 1116, and furnish batch ticket information.

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1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.01 FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows (all concrete Class A unless indicated otherwise):
   1. Class A, 1/8 inch for smooth-formed finished surfaces.
   2. Class B, 1/4 inch for rough-formed finished surfaces.

D. Construct forms tight enough to prevent loss of concrete mortar.

E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
   1. Install keyways, reglets, recesses, and the like, for easy removal.
   2. Do not use rust-stained steel form-facing material.

F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

H. Chamfer exterior corners and edges of permanently exposed concrete.

I. Form openings, chases, offsets, sinkages, keyways, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.02 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
   1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."
   2. The maximum diameter for embedded pipes, ducts, or conduits shall be 1/3 of the slab or wall thickness, spaced at a minimum of 3 times the outside diameters, center to center. For pipes or conduits of different diameters, the minimum edge to edge spacing shall be two times the smaller outside diameter of the conduit.

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3. All pipes and conduits providing flowable materials conveyance which penetrate beams, footings, or walls shall be provided with sleeves of an appropriate size and material to provide movement for expected settlements or deflections. For sleeves through walls exposed to earth or retaining liquids, sleeves shall have integral water-stops.

3.03 REMOVING AND REUSING FORMS

A. Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete, if concrete is hard enough to not be damaged by form-removal operations and curing and protection operations are maintained.
   1. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.
   2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.

B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.

C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.04 VAPOR RETARDERS

A. Plastic Vapor Retarders: Place, protect, and repair vapor retarders according to ASTM E 1643 and manufacturer's written instructions, place sheets in position with longest dimension parallel with direction of pour.
   1. Level and compact base material.
   2. Extend vapor barrier to the perimeter of the slab. If practicable, terminate it at the top of the slab, otherwise (a) at a point acceptable to the structural engineer or (b) where obstructed by impediments (such as dowels, waterstops, or any other site condition requiring early termination of the vapor barrier). At the point of termination, seal vapor barrier to the foundation wall with Stego Tack Tape, grade beam or slab itself with Stego Crete Claw.
   3. Lap joints six (6) inches and seal with manufacturer's recommended tape.
   4. Apply seam tape to a clean and dry vapor barrier.
   5. Seal all penetrations (including pipes) per manufacturer’s instructions.
   6. Avoid the use of non-permanent stakes driven through vapor retarder.
   7. If non-permanent stakes are driven through vapor retarder, repair as recommended by vapor retarder manufacturer.
   8. Repair damaged areas with vapor barrier material of similar (or better) permeance, puncture and tensile.

3.05 STEEL REINFORCEMENT

A. Comply with CRSI's "Manual of Standard Practice" for placing reinforcement. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

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E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

F. Provide sufficient numbers of supports and of strength to carry reinforcement. Do not place reinforcing bars more than 2-inches beyond the last leg of any continuous bar support. Dot not use supports as the base(s) for runways for concrete conveying equipment and similar construction loads.

G. Dowels extending into footings shall terminate with a 90-degree standard ACI hook and shall extend to within 4-inches +/- of the bottom of the footing, unless otherwise shown on the Plans.

3.06 JOINTS

A. Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
   1. Place joints perpendicular to typical beam spans. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated on Drawings. Construct contraction joints for a depth equal to at least one-fourth depth of concrete thickness as follows:
   1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
   2. Unless indicated otherwise, control joints in slabs-on-grade shall have a length-to-width ratio of not more than 1.25:1, or as noted on the Drawings.
   3. Control joints shall be completed as soon as possible after pouring the slab, but in no case shall this time exceed 6-hours after concrete placement in any area of the slab.

D. Doweled Joints: Install dowel bars or plates and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint or provide manufacturers standard plastic sleeve..

3.07 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Do not add water to concrete during delivery, at Project site, or during placement unless approved in writing by the architect and his Consulting Structural Engineer of Record.

C. Before test sampling and placing concrete, water may only be added at Project site, when absolute need is required and then must be subject to limitations of ACI 301. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
   1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
   2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
   3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6

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inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
   1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
   2. Maintain reinforcement in position on chairs during concrete placement.
   3. Screed slab surfaces with a straightedge and strike off to correct elevations.
   4. Slope surfaces uniformly to drains where required.
   5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

F. Cold-Weather Placement: Comply with ACI 306.1 and as follows:.
   1. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
   2. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
   3. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
   4. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

G. Hot-Weather Placement: Comply with ACI 301 and as follows:
   1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
   2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.08 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities. Apply to concrete surfaces only exposed to public view.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
   1. Apply to concrete surfaces only where:
      a. Surfaces exposed to public view.
      b. Surfaces that receive a rubbed finish.
      c. Surfaces to be covered with a coating or covering material applied directly to concrete.

C. Rubbed Finish: Apply the following to smooth-formed finished as-cast concrete where indicated on Drawings:
   1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.

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D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.09 FINISHING FLOORS AND SLABS

A. Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.
   1. Apply float finish to surfaces:
      a. As indicated on Drawings.
      b. At areas to receive trowel finish.
      c. At areas to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.

C. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
   1. Apply a trowel finish to surfaces:
      a. As indicated on Drawings.
      b. At areas exposed to view.
      c. At areas to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
   2. Finish surfaces to the following tolerances, according to ASTM E 1155, for a randomly trafficked floor surface:
      a. Specified overall values of flatness, F(F) 35; and of levelness, F(L) 25; with minimum local values of flatness, F(F) 24; and of levelness, F(L) 17; typically at Office and Press Building for slabs-on-grade.
      b. Specified overall values of flatness, F(F) 30; and of levelness, F(L) 20; with minimum local values of flatness, F(F) 24; and of levelness, F(L) 15; for foundation equipment mounting surfaces.
   3. Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-foot long straightedge resting on 2 high spots and placed anywhere on the surface does not exceed 1/8 inch.

D. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces:
   1. As indicated on Drawings.
   2. At areas where ceramic or quarry tile is to be installed by either thickset or thin-set method. While concrete is still plastic, slightly scarify surface with a fine broom.
   3. Comply with flatness and levelness tolerances for trowel finished floor surfaces.

E. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

F. Slip-Resistive Finish: Before final floating, apply slip-resistive aggregate finish where indicated and to concrete stair treads, platforms, and ramps. Apply according to manufacturer's written instructions and as follows:
   1. Uniformly spread 25 lb/100 sq. ft. of dampened slip-resistive aggregate over surface in 1 or 2 applications. Tamp aggregate flush with surface, but do not force below surface.

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2. After broadcasting and tamping, apply float finish.
3. After curing, lightly work surface with a steel wire brush or an abrasive stone and water to expose slip-resistive aggregate.

3.10 MISCELLANEOUS CONCRETE ITEMS

A. Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts and / or anchorage assemblies for machines and equipment at correct elevations, complying with diagrams or templates from manufacturer furnishing machines and equipment.

3.11 CONCRETE PROTECTING AND CURING

A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.

B. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.

C. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

D. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
   1. Moisture Curing: This method is to be used for all surfaces receiving paint or epoxy coating materials. Keep surfaces continuously moist for not less than seven days with the following materials:
      a. Water.
      b. Continuous water-fog spray.
      c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
   2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
      a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
      b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
      c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project.
   3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period. After curing period has elapsed, remove curing compound

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without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound will not interfere with bonding of floor covering used on Project.

4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.12 JOINT FILLING

A. Prepare, clean, and install joint filler according to manufacturer's written instructions. Defer joint filling until concrete has aged at least one month. Do not fill joints until construction traffic has permanently ceased.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.

C. Install semi-rigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.13 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Architect and by the Consulting Structural Engineer. Remove and replace concrete that cannot be repaired and patched as determined by the Architect and the Consulting Engineer.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension in solid concrete, but not less than 1 inch in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
2. After concrete has cured at least 14 days, correct high areas by grinding.

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3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to Architect's and the Owner's installation agent's approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to Architect's and the Consulting Engineer's approval.

3.14 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage a special inspector and a qualified testing and inspecting agency, approved in writing by the Architect and his Consulting Structural Engineer, to perform tests and inspections and to submit reports.

B. Inspections:
1. Steel reinforcement placement.
2. Steel reinforcement welding.
3. Headed bolts and studs.
4. Verification of use of required design mixture.
5. Concrete placement, including conveying and depositing.
6. Curing procedures and maintenance of curing temperature.
7. Verification of concrete strength before removal of shores and forms from beams and slabs.

C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
2. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. or fraction thereof for each concrete mixture placed each day. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

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3. Slump: ASTM C 143; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
4. Air Content: ASTM C 231, pressure method, for normal-weight concrete; ASTM C 173, volumetric method, for structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
5. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
6. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
7. Compression Test Specimens: ASTM C 31.
    a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
    b. Cast and field cure two sets of two standard cylinder specimens for each composite sample.
8. Compressive-Strength Tests: ASTM C 39; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
    a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
    b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
9. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
10. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
11. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7 and 28 day tests.
12. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
13. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42 or by other methods as directed by Architect.
14. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
15. Correct deficiencies in the Work that test reports and inspections indicate does not comply with the Contract Documents.

D. Measure floor and slab flatness and levelness according to ASTM E 1155 within 48 hours of finishing.

END OF SECTION

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SECTION 06 1000
ROUGH CARPENTRY

PART 1 GENERAL V.22

1.01 SECTION INCLUDES

A. Preservative treated wood materials.

B. Miscellaneous framing and sheathing.

C. Communications and electrical room mounting boards.

D. Concealed wood blocking, nailers, and supports.

1.02 REFERENCE STANDARDS

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

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

C. ASTM E2357 - Standard Test Method for Determining Air Leakage of Air Barrier Assemblies; 2011.

D. AWPA U1 - Use Category System: User Specification for Treated Wood; 2012.

E. PS 1 - Structural Plywood; 2009.

F. PS 20 - American Softwood Lumber Standard; 2010.

G. SPIB (GR) - Grading Rules; 2014.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide technical data on structural lumber, sheathing, and wood preservative materials and application instructions.

C. Installation fastener requirements and spacing.

D. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.04 DELIVERY, STORAGE, AND HANDLING

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

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

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

B. Provide sustainably harvested wood; see Section 01 6000 - Product Requirements for requirements.

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C. Lumber salvaged from deconstruction or demolition of existing buildings or structures is permitted in lieu of sustainably harvested lumber provided it is clean, denailed, and free of paint and finish materials, and other contamination; identify source.

2.02 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

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

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

C. Moisture Content: S-dry or MC19.

D. Stud Framing (2 by 2 through 2 by 6):
   1. Species: Douglas Fir-Larch.
   2. Grade: No. 2.

E. Joist, Rafter, and Small Beam Framing (2 by 6 through 4 by 16):
   1. Grade: [CHOICE TEXT].

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

2.03 CONSTRUCTION PANELS

A. Communications and Electrical Room Mounting Boards: PS 1 A-D plywood, or medium density fiberboard; 3/4 inch thick; flame spread index of 25 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E84.

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

2.04 ACCESSORIES

A. Fasteners and Anchors: Use fasteners suitable for proper attachment to substrates and contain weatherized coating approved for use where exposed. Fasteners in treated lumber are required to have high corrosion resistance, compatible with chemical treatment and be approved for use by wood manufacturer.
   1. Metal and Finish: Hot-dipped galvanized steel complying with ASTM A153/A153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.
   2. Drywall Screws: Bugle head, hardened steel, power driven type, length three times thickness of sheathing.

B. Water-Resistive Barrier: For other locations, as specified in Section 07 2500.

C. Fluid Applied Weather Barrier Joint Treatment: Dens Defy Liquid Flashing.

D. Joint Transition Membane: Dens Defy Transition Membrane.

2.05 FACTORY WOOD TREATMENT

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

B. Preservative Treatment:

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

PART 3 EXECUTION

3.01 PREPARATION

A. Coordinate installation of rough carpentry members specified in other sections.

3.02 INSTALLATION - GENERAL

A. Select material sizes to minimize waste.

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

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

3.03 BLOCKING, NAILERS, AND SUPPORTS

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

B. At building construction types I & type II, refer to code review statements on drawings, use fire-retardant treated wood FRTW where drawings indicate the use of wood for blocking, nailers or furring at the following locations:
    1. Exterior walls that are classified with fire resistance rating.
    2. Interior fire resistance rated partitions.

C. At exterior walls, use pressure treated wood PTW for blocking.

D. At interior locations, blocking shall be standard wood unless noted otherwise.

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

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

G. Provide the following specific non-structural framing and blocking:
    1. Cabinets and shelf supports.
    2. Wall brackets.
    3. Handrails.
    4. Grab bars.
    5. Towel and bath accessories.
    6. Wall-mounted door stops.
    7. Chalkboards and marker boards.
    8. Wall paneling and trim.
    9. Joints of rigid wall coverings that occur between studs.
    10. Locations of termination bars for elements such as masonry flashing or roofing, etc.. Continuous plywood strips are permitted at exterior walls, in same thickness of wall sheathing, provided the exterior surface is field treated with fluid weather barrier product.

3.04 ROOF-RELATED CARPENTRY

A. Coordinate installation of roofing carpentry with deck construction, framing of roof openings, and roofing assembly installation.

3.05 INSTALLATION OF CONSTRUCTION PANELS

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A. Wall Sheathing: Secure with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using nails, screws, or staples.
   1. Use fastener type and spacing as recommended by manufacturer to accommodate no less than structural design wind speed per structural plans.

B. Communications and Electrical Room Mounting Boards: Secure with screws to studs with edges over firm bearing; space fasteners at maximum 24 inches on center on all edges and into studs in field of board.
   1. At fire-rated walls, install board over wall board indicated as part of the fire-rated assembly.
   2. Where boards are indicated as full floor-to-ceiling height, install with long edge of board parallel to studs.

C. Wall Sheathing and Roof Sheathing with Laminated Water-Resistive Barrier and Air Barrier: Secure to studs as recommended by manufacturer.
   1. Install with laminated water-resistive and air barrier on exterior side of sheathing.
   2. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.
   3. Use compatible fluid applied weather barrier at transitions to adjacent materials.
   4. Apply manufacturer's standard seam tape to joints between sheathing panels. Use tape gun or hard rubber roller as recommended by manufacturer.
   5. Treatment of openings, penetrations, patches and repairs are per section 07 2500 weather barriers.

3.06 TOLERANCES

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

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

3.07 CLEANING

A. Waste Disposal: Comply with the requirements of Section 01 7419 - Construction Waste Management and Disposal.
   1. Comply with applicable regulations.
   2. Do not burn scrap on project site.
   3. Do not burn scraps that have been pressure treated.
   4. Do not send materials treated with pentachlorophenol, CCA, or ACA to co-generation facilities or “waste-to-energy” facilities.

B. Do not leave any wood, shavings, sawdust, etc. on the ground or buried in fill.

C. Prevent sawdust and wood shavings from entering the storm drainage system.

END OF SECTION

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SECTION 06 1500
WOOD DECKING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Plywood structural wood decking.

1.02 REFERENCE STANDARDS

A. PS 1 - Structural Plywood; 2009.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide technical data on wood preservative materials.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Plywood Decking:
   1. Boise Cascade Company; ____: www.bc.com/#sle.
   2. Georgia-Pacific LLC; ____: www.buildgp.com/#sle.
   3. Weyerhaeuser Company; ____: www.weyerhaeuser.com/#sle.
   4. Substitutions: See Section 01 6000 - Product Requirements.

2.02 WOOD MATERIALS

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

B. Provide sustainably harvested wood; see Section 01 6000 - Product Requirements for requirements.

C. Plywood Decking: PS 1 veneer plywood; APA Rated Sheathing, Span Rating ____; Exterior grade;1 A interior veneer appearance grade; sanded.

2.03 ACCESSORIES

A. Fasteners and Anchors:
   1. Fastener Type and Finish: Hot-dipped galvanized steel for high humidity and preservative-treated wood locations, unfinished steel elsewhere.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that support framing is ready to receive decking.

3.02 PREPARATION

A. Coordinate placement of bearing items.

3.03 INSTALLATION - PLYWOOD DECKING

A. Install decking perpendicular to framing members with ends staggered over firm bearing. On sloped surfaces, lay decking with tongue upward.

B. Engage plywood tongue and groove edges.

C. Allow expansion space at edges and ends.

D. Attach decking with adhesive and screws.

E. Use sheathing clips at unsupported edges of plywood between supporting framing members.

3.04 TOLERANCES

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A. Surface Flatness of Decking Without Load: 1/4 inch in 10 feet maximum, and 1/2 inch in 30 feet maximum.

END OF SECTION

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SECTION 07 2100
THERMAL INSULATION

PART 1 GENERAL V.22

1.01 SECTION INCLUDES

A. Batt insulation in interior wall and ceiling construction.

1.02 REFERENCE STANDARDS

A. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method; 2009a.

B. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2015a.

C. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2012.

D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

E. ASTM E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace At 750 Degrees C; 2012.

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

G. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components; 2012.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

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

C. Installation schedule: Provide description of locations where each proposed product will be installed. Include description of compliance with fire rated, acoustical and NFPA 285 details.

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

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

PART 2 PRODUCTS

2.01 APPLICATION SCHEDULE

A. Insulation inside metal framed partitions: Batt insulation with no vapor retarder.

B. Insulation in Framed Ceiling Structure: Batt insulation with no vapor retarder.

C. Insulation Above Lay-In Acoustical Ceilings: Batt insulation with no vapor retarder.

2.02 BATT INSULATION MATERIALS

A. Where batt insulation is indicated, either glass fiber or SAFB mineral wool insulation may be used, at Contractor's option, unless specifically noted or required otherwise.
   1. Use Sound Attenuation Fire Blanket (SAFB) Mineral Wool at all fire rated assemblies and STC rated wall per drawings and partition schedule and as required by code/UL test.

B. Glass Fiber Batt Insulation: Flexible preformed batt or blanket, complying with ASTM C665; friction fit.
   1. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
   2. Smoke Developed Index: 50 or less, when tested in accordance with ASTM E84.
   3. Combustibility: Non-combustible, when tested in accordance with ASTM E136.

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4. Formaldehyde Content: Zero.
5. Thermal Resistance: R-value of 3.5 per inch minimum.
6. Thickness: Match cavity thickness or as indicated on drawings or insulation schedule.
7. Facing: Unfaced.
8. Manufacturers:
    a. CertainTeed Corporation: www.certainteed.com/#sle.
    b. Johns Manville: www.jm.com/#sle.
    c. Knauf Insulation GmbH: www.knaufinsulation.us.
    d. Owens Corning Corp: www.owenscorning.com.
9. Substitutions: See Section 01 6000 - Product Requirements.

2.03 ACCESSORIES

A. Tape: Bright aluminum self-adhering type, mesh reinforced, 2 inch wide.

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

C. Wire Mesh: Galvanized steel, hexagonal wire mesh.

D. Spray-foam Insulation: See slso Section 07 2119.
1. Polyurethane expanding foam.
2. Products: DuPont Great Stuff; www.greatstuff.dupont.com
3. Dupont Great Stuff

PART 3 EXECUTION

3.01 EXAMINATION

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

B. Verify substrate surfaces are flat.

3.02 BATT INSTALLATION

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

B. Trim insulation neatly to fit spaces. Cut and form insulation as necessary to fully fill all cavities and void spaces. Insulate miscellaneous gaps and voids.

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

D. At attic locations with gyp-bd ceilings, use spray foam around all penetrations through gyp-bd layer. Apply to seal all air leakage around pentrations and to insluate around device. Fill voids around plumbing pipes, conduits, wiring, junction boxes, etc poking though attic ceiling layer.

E. Install insulation in thicknesses required to achieve minimum desired R-values below; unless noted otherwise.
1. Walls: R-19
2. Floors: R-13
3. Floors above unconditioned spaces: R-19
4. Ceilings at unconditioned attic spaces: R-29

F. Fill voids in walls and cavities around perimeter of openings with spray-foam insulation. Fill shim spaces around window perimeters full with batt insulation or low-expanion spray-foam insulation.

3.03 PROTECTION

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

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END OF SECTION

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SECTION 07 9200
JOINT SEALANTS

PART 1 GENERAL V.20

1.01 SECTION INCLUDES

A. Nonsag gunnable joint sealants.

B. Self-leveling pourable joint sealants.

C. Joint backings and accessories.

1.02 REFERENCE STANDARDS

A. ASTM C661 - Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer; 2006 (Reapproved 2011).

B. ASTM C834 - Standard Specification for Latex Sealants; 2014.

C. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.

D. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2013.

E. ASTM C1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants; 2008 (Reapproved 2012).

F. ASTM C1311 - Standard Specification for Solvent Release Sealants; 2014.

G. ASTM C1330 - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants; 2002 (Reapproved 2013).

H. ASTM C1521 - Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints; 2013.

I. ASTM D2240 - Standard Test Method for Rubber Property--Durometer Hardness; 2005 (Reapproved 2010).

J. SCAQMD 1168 - South Coast Air Quality Management District Rule No.1168; current edition.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data for Sealants: Submit manufacturer's technical data sheets for each product to be used, that includes the following.
   1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
   2. List of backing materials approved for use with the specific product.
   3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
   4. Substrates the product should not be used on.
   5. Substrates for which use of primer is required.
   6. Sample product warranty.

C. Product Data for Accessory Products: Submit manufacturer's technical data sheet for each product to be used, including physical characteristics, installation instructions, and recommended tools.

D. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.

E. Field Quality Control Plan: Submit at least two weeks prior to start of installation.

F. Field Quality Control Log: Submit filled out log for each length or instance of sealant installed, within 10 days after completion of inspections/tests; include bagged test samples and photographic records, if any.

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1.04 MOCK UP

A. Provide mock-up of sealant joints in conjunction with wall and air barrier system.

B. Construct mock-up with specified sealant types and with other components noted.

C. Locate where directed. Mockup may remain as part of the Work.

1.05 QUALITY ASSURANCE

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

B. Installer Qualifications: Company specializing in performing the work of this section and with at least three years of documented experience.

C. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

D. Field Quality Control Plan:
   1. Visual inspection of entire length of sealant joints.
   2. Destructive field adhesion testing of sealant joints, except interior acrylic latex sealant.
      a. For each different sealant and substrate combination, allow for one test every 100 feet in the first 1000 linear feet, and one test per 1000 linear feet thereafter, or once per floor on each elevation.
      b. If any failures occur in the first 1000 linear feet, continue testing at frequency of one test per 500 linear feet at no extra cost to Owner.
   3. Field testing agency's qualifications.

E. Field Adhesion Test Procedures:
   1. Allow sealants to fully cure as recommended by manufacturer before testing.
   2. Record the type of failure that occurred, other information required by test method, and the information required on the Field Quality Control Log.
   3. When performing destructive tests, also inspect the opened joint for proper installation characteristics recommended by manufacturer, and report any deficiencies.
   4. Deliver the samples removed during destructive tests in separate sealed plastic bags, identified with project, location, test date, and test results, to Owner.
   5. If any combination of sealant type and substrate does not show evidence of minimum adhesion or shows cohesion failure before minimum adhesion, report results to Architect.

F. Destructive Field Adhesion Test: Test for adhesion in accordance with ASTM C1521, using Destructive Tail Procedure.
   1. Sample: At least 18 inches long.
   2. Minimum Elongation Without Adhesive Failure: Consider the tail at rest, not under any elongation stress; multiply the stated movement capability of the sealant in percent by two; then multiply 1 inch by that percentage; if adhesion failure occurs before the "1 inch mark" is that distance from the substrate, the test has failed.
   3. If either adhesive or cohesive failure occurs prior to minimum elongation, take necessary measures to correct conditions and re-test; record each modification to products or installation procedures.

1.06 WARRANTY

A. See Section 01 7800 - CLOSEOUT SUBMITTALS, for additional warranty requirements.

B. Correct defective work within a five year period after Date of Substantial Completion.

C. Warranty: Include coverage for installed sealants and accessories that fail to achieve watertight seal , exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

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2.01 MANUFACTURERS

A. Non-Sag Sealants: Permits application in joints on vertical surfaces without sagging or slumping.
   1. Dow Corning Corporation: www.dowcorning.com/construction/#sle.
   2. Momentive Performance Materials, Inc (formerly GE Silicones): www.momentive.com.
   3. Pecora Corporation: www.pecora.com.
   4. Sherwin-Williams Company: www.sherwin-williams.com.
   5. Sika Corporation: www.usa-sika.com.
   6. Tremco Commercial Sealants & Waterproofing: www.tremcosealants.com/#sle.

B. Self-Leveling Sealants: Pourable or self-leveling sealant that has sufficient flow to form a smooth, level surface when applied in a horizontal joint.
   1. Dow Corning Corporation: www.dowcorning.com/construction/#sle.
   2. Master Builders Solutions by BASF: www.master-builders-solutions.basf.us/en-us/#sle.
   3. Pecora Corporation: www.pecora.com.
   4. Sherwin-Williams Company: www.sherwin-williams.com.
   5. Sika Corporation: www.usa-sika.com.
   6. Tremco Commercial Sealants & Waterproofing: www.tremcosealants.com/#sle.

2.02 JOINT SEALANT APPLICATIONS

A. Scope:
   1. Exterior Joints: Seal open joints, whether or not the joint is indicated on drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to, the following items.
      a. Wall expansion and control joints.
      b. Joints between door, window, and other frames and adjacent construction.
      c. Joints between different exposed materials.
      d. Openings below ledge angles in masonry.
      e. Other joints indicated below.
   2. Interior Joints: Do not seal interior joints unless specifically indicated to be sealed. Interior joints to be sealed include, but are not limited to, the following items.
      a. Joints between door, window, and other frames and adjacent construction.
      b. Other joints indicated below.
   3. Do not seal the following types of joints.
      a. Intentional weepholes in masonry.
      b. Joints indicated to be treated with manufactured expansion joint cover or some other type of sealing device.
      c. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
      d. Joints where installation of sealant is specified in another section.
      e. Joints between suspended panel ceilings/grid and walls.

B. Exterior Joints: Use non-sag non-staining silicone sealant, unless otherwise indicated.
   1. Lap Joints in Sheet Metal Fabrications: Butyl rubber, non-curing; Type H.
   2. Lap Joints between Manufactured Metal Panels: Butyl rubber, non-curing; Type H.
   3. Butt Joints in Exterior Metal Work and Siding: Acrylic Emulsion; Type G.
   4. Joints between concrete panels and between panels of adjacent work:
   5. Joints between masonry and cast stone: Type U with sand.

C. Interior Joints: Use non-sag polyurethane sealant, unless otherwise indicated.
   1. Wall and Ceiling Joints in Non-Wet Areas: Acrylic emulsion latex sealant.
   2. Floor Joints in Wet Areas: Non-sag polyurethane "non-traffic-grade" sealant suitable for continuous liquid immersion.

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3. Joints between Fixtures in Wet Areas and Floors, Walls, and Ceilings: Mildew-resistant silicone sealant; white.
4. Other Floor Joints: Self-leveling polyurethane "traffic-grade" sealant.

D. Interior Wet Areas: Bathrooms, restrooms, kitchens, food service areas, and food processing areas; fixtures in wet areas include plumbing fixtures, food service equipment, countertops, cabinets, and other similar items.

2.03 NONSAG JOINT SEALANTS

A. Type U-1 - Non-Staining Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.
1. Movement Capability: Plus 100 percent, minus 50 percent, minimum.
2. Non-Staining To Porous Stone: Non-staining to light-colored natural stone when tested in accordance with ASTM C1248.
3. Dirt Pick-Up: Reduced dirt pick-up compared to other silicone sealants.
4. Color: Match adjacent finished surfaces.
5. Cure Type: Single-component, neutral moisture curing.
6. Service Temperature Range: Minus 20 to 180 degrees F.
7. Manufacturers:
   a. Dow Chemical Company; DOWSIL 795 Silicone Building Sealant: consumer.dow.com/en-us/industry/ind-building-construction.html/#sle.
   b. Pecora Corporation: www.pecora.com.
   c. Substitutions: See Section 01 6000 - Product Requirements.

B. Type U-2 - Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.
1. Movement Capability: Plus and minus 25 percent, minimum.
2. Hardness Range: 15 to 35, Shore A, when tested in accordance with ASTM C661.
3. Color: Match adjacent finished surfaces.
4. Cure Type: Single-component, neutral moisture curing
5. Service Temperature Range: Minus 65 to 180 degrees F.
6. Manufacturers:
   a. Dow Chemical Company; DOWSIL 999-A Building and Glazing Sealant: consumer.dow.com/en-us/industry/ind-building-construction.html/#sle.
   b. Pecora Corporation: www.pecora.com.
   c. Substitutions: See Section 01 6000 - Product Requirements.

C. Type E - Mildew-Resistant Silicone Sealant: ASTM C920, Grade NS, Uses M and A; single component, mildew resistant; not expected to withstand continuous water immersion or traffic.
1. Color: White.
2. Manufacturers:
   a. Pecora Corporation: www.pecora.com.

D. Type A - Polyurethane Sealant: ASTM C920, Grade NS, Uses M and A; single or multi-component; not expected to withstand continuous water immersion or traffic.
1. Movement Capability: Plus and minus 25 percent, minimum.
2. Hardness Range: 20 to 35, Shore A, when tested in accordance with ASTM C661.
3. Color: To be selected by Architect from manufacturer's standard range.
4. Service Temperature Range: Minus 40 to 180 degrees F.
5. Manufacturers:
   a. Pecora Corporation: www.pecora.com.
   b. Sherwin-Williams Company; Stampede-1/-TX Polyurethane Sealant: www.sherwin-williams.com/#sle.

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c. BASF Corporation; MasterSeal NP1, One component polyurethane sealant. www.master-builders-solutions.basf.us
d. Substitutions: See Section 01 6000 - Product Requirements.

E. Type J - Polyurethane Sealant for Continuous Water Immersion: ASTM C920, Grade NS, Uses M and A; single or multi-component; explicitly approved by manufacturer for continuous water immersion; suitable for traffic exposure when recessed below traffic surface .
1. Movement Capability: Plus and minus 35 percent, minimum.
2. Hardness Range: 20 to 35, Shore A, when tested in accordance with ASTM C661.
3. Color: To be selected by Architect from manufacturer's standard range.
4. Service Temperature Range: Minus 40 to 180 degrees F.
5. Manufacturers:
a. Sika Corporation; Sikaflex-1a: www.usa-sika.com/#sle.
b. Substitutions: See Section 01 6000 - Product Requirements.

F. Type B - Non-Sag "Traffic-Grade" Polyurethane Sealant: ASTM C920, Grade NS, Uses M and A; single or multi-component; explicitly approved by manufacturer for continuous water immersion and traffic without the necessity to recess sealant below traffic surface.
1. Movement Capability: Plus and minus 25 percent, minimum.
2. Hardness Range: 40 to 50, Shore A, when tested in accordance with ASTM C661.
3. Color: To be selected by Architect from manufacturer's standard range.

G. Type G - Acrylic Emulsion Latex: Water-based; ASTM C834, single component, non-staining, non-bleeding, non-sagging; not intended for exterior use.
1. Color: Standard colors matching finished surfaces, Type OP (opaque).
2. Manufacturers:
a. Pecora Corporation: www.pecora.com.
b. Sherwin-Williams Company; 850A Acrylic Latex Caulk: www.sherwin-williams.com/#sle.
c. Sherwin-Williams Company; 950A Siliconized Acrylic Latex Caulk: www.sherwin-williams.com/#sle.

H. Type C - Butyl Sealant: Solvent-based; ASTM C1311; single component, nonsag; not expected to withstand continuous water immersion or traffic.
1. Hardness Range: 10 to 30, Shore A, when tested in accordance with ASTM C661.
2. Color: To be selected by Architect from manufacturer's standard range.
3. Service Temperature Range: Minus 13 to 180 degrees F.
4. Manufacturers:
a. Sherwin-Williams Company; Storm Blaster All Season Sealant: www.sherwin-williams.com/#sle.
b. Substitutions: See Section 01 6000 - Product Requirements.

I. Type H - Non-Curing Butyl Sealant: Solvent-based; ASTM C1311; single component, non-sag, non-skinning, non-hardening, non-bleeding; vapor-impermeable; intended for fully concealed applications.
1. Manufacturers:
a. Pecora Corporation; Pecora BA-98 Non-Skinning Butyl Sealant: www.pecora.com/#sle.

2.04 SELF-LEVELING SEALANTS

A. Type F - Self-Leveling Polyurethane Sealant: ASTM C920, Grade P, Uses M and A; single or multi-component; explicitly approved by manufacturer for traffic exposure; not expected to withstand continuous water immersion .
1. Movement Capability: Plus and minus 25 percent, minimum.
2. Hardness Range: 35 to 55, Shore A, when tested in accordance with ASTM C661.

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3. Color: Grey.
4. Service Temperature Range: Minus 40 to 180 degrees F.
5. Manufacturers:
    a. Sherwin-Williams Company; Stampede 1SL Polyurethane Sealant: www.sherwin-williams.com/#sle.
    b. Sika Corporation; Sikaflex-1c SL: www.usa-sika.com/#sle.

B. Type P - Semi-Rigid Self-Leveling Polyurea Joint Filler: Two-component, 100 percent solids; intended for filling cracks and control joints not subject to significant movement; rigid enough to support concrete edges under traffic. Joint filler for areas to receive polished concrete finish. Confirm material with system manufacturer / installer.
1. Durometer Hardness, Type A: 75, minimum, after seven days when tested in accordance with ASTM D2240.
2. Color: To be selected by Architect from manufacturer's standard colors.
3. Joint Width, Maximum: 3/4 inch.
4. Manufacturers:
    a. ARDEX Engineered Cements; ARDEX ARDISEAL RAPID PLUS: www.ardexamericas.com/#sle.
    b. Euclid Chemical Company; EUCO QWIKjoint UVR: www.euclidchemical.com/#sle.
    c. Nox-Crete Inc; DynaFlex JF-85: www.nox-crete.com/#sle.

2.05 ACCESSORIES

A. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.
1. Type for Joints Not Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type O - Open Cell Polyurethane.
2. Open Cell: 40 to 50 percent larger in diameter than joint width.

B. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.

C. Masking Tape: Self-adhesive, nonabsorbent, non-staining, removable without adhesive residue, and compatible with surfaces adjacent to joints and sealants.

D. Joint Cleaner: Non-corrosive and non-staining type, type recommended by sealant manufacturer; compatible with joint forming materials.

E. Primers: Type recommended by sealant manufacturer to suit application; non-staining.

F. Sand: White or tan sand, selection based on field mockup.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that joints are ready to receive work.

B. Verify that backing materials are compatible with sealants.

C. Verify that backer rods are of the correct size.

3.02 PREPARATION

A. Remove loose materials and foreign matter that could impair adhesion of sealant.

B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.

C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.

D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

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3.03 INSTALLATION

A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

B. Perform installation in accordance with ASTM C1193.

C. Install bond breaker backing tape where backer rod cannot be used.

D. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.

E. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.

F. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.

G. Concrete Floor Joint Filler: After full cure, shave joint filler flush with top of concrete slab.

3.04 FIELD QUALITY CONTROL

A. Perform field quality control inspection/testing as specified in PART 1 under QUALITY ASSURANCE article.

B. Destructive Adhesion Testing: If there are any failures in first 1000 linear feet, notify Architect immediately.

C. Remove and replace failed portions of sealants using same materials and procedures as indicated for original installation.

D. Repair destructive test location damage immediately after evaluation and recording of results.

END OF SECTION

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SECTION 08 1113
HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL V.20

1.01 SECTION INCLUDES

A. Non-fire-rated hollow metal doors and frames.

1.02 REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

B. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors; 2011.

C. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2014.

D. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2011.

E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.

F. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable; 2015.

G. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2014.

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

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

J. BHMA A156.115 - American National Standard for Hardware Preparation in Steel Doors and Steel Frames; 2014.

K. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2009.

L. ITS (DIR) - Directory of Listed Products; current edition.

M. NAAMM HMMA 830 - Hardware Selection for Hollow Metal Doors and Frames; 2002.

N. NAAMM HMMA 831 - Hardware Locations for Hollow Metal Doors and Frames; 2011.

O. NAAMM HMMA 840 - Guide Specifications for Installation and Storage of Hollow Metal Doors and Frames; 2007.

P. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2016.

Q. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2012.

R. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.

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

1.03 SUBMITTALS 08/28/2026

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced standards/guidelines.

C. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and any indicated finish requirements.

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

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

F. Manufacturer's Qualification Statement.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years documented experience.

B. Maintain at project site copies of reference standards relating to installation of products specified.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.

B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Hollow Metal Doors and Frames:
   1. Ceco Door, an Assa Abloy Group company: www.assaabloydss.com/#sle.
   2. Assa Abloy Ceco, Curries or Flemming; www.assaabloydss.com
   3. Steelcraft, an Allegion brand; ____: www.allegion.com/#sle.
   4. Substitutions: See Section 01 6000 - Product Requirements.

2.02 PERFORMANCE REQUIREMENTS

A. Requirements for Hollow Metal Doors and Frames:
   1. Steel Sheet: Comply with one or more of the following requirements; galvannealed steel complying with ASTM A653/A653M, cold-rolled steel complying with ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel complying with ASTM A1011/A1011M, commercial steel (CS) Type B, for each.
   2. Accessibility: Comply with ICC A117.1 and ADA Standards.
   3. Exterior Door Top Closures: Flush end closure channel, with top and door faces aligned.
   4. Door Edge Profile: Beveled, both sides.
   5. Typical Door Face Sheets: Flush.
   6. Hardware Preparations, Selections and Locations: Comply with NAAMM HMMA 830 and NAAMM HMMA 831 or BHMA A156.115 and ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
   7. Zinc Coating for Typical Interior and/or Exterior Locations: Provide metal components zinc-coated (galvanized) and/or zinc-iron alloy-coated (galvannealed) by the hot-dip process in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness, unless noted otherwise for specific hollow metal doors and frames.
      a. Based on SDI Standards: Provide at least A40/ZF120 (galvannealed) when necessary, coating not required for typical interior door applications, and at least A60/ZF180 (galvannealed) for corrosive locations.

B. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.03 HOLLOW METAL DOORS

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A. Type A , Interior Doors, Non-Fire-Rated:
   1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
      a. Level 2 - Heavy-duty.
      b. Physical Performance Level B 500 000 cycles; in accordance with ANSI/SDI A250.4.
      c. Model 2 - Seamless.
      d. Door Face Metal Thickness: 18 gage, 0.042 inch, minimum, not less than level specified.
   2. Door Core Material: Manufacturers standard core material/construction and in compliance with requirements.
   3. Door Thickness: 1-3/4 inch, nominal.

2.04 HOLLOW METAL FRAMES

A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.

B. Frame Finish: Factory primed and field finished.

C. Interior Door Frames, Non-Fire Rated: Full profile/continuously welded type.
   1. Frame Metal Thickness: 16 gage, 0.053 inch, minimum.

2.05 FINISHES

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

2.06 ACCESSORIES

A. Grout for Frames: Portland cement grout with maximum 4 inch slump for hand troweling; thinner pumpable grout is prohibited.

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

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

C. Verify that finished walls are in plane to ensure proper door alignment.

3.02 INSTALLATION

A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.

B. Install fire rated units in accordance with NFPA 80.

C. Coordinate frame anchor placement with wall construction.

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

E. Install door hardware as specified in Section 08 7100.

F. Comply with glazing installation requirements of Section 08 8000.

G. Coordinate installation of electrical connections to electrical hardware items.

H. Touch up damaged factory finishes.

3.03 TOLERANCES

A. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

3.04 ADJUSTING

A. Adjust for smooth and balanced door movement.

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B. Adjust sound control doors so that seals are fully engaged when door is closed.

3.05 SCHEDULE

A. Refer to Door and Frame Schedule on the drawings.

END OF SECTION

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SECTION 08 7100
DOOR HARDWARE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Hardware for wood, aluminum, hollow metal doors.

B. Hardware for fire-rated doors.

C. Lock cylinders for doors with balance of hardware specified in other sections.

D. Thresholds.

E. Weatherstripping and gasketing.

1.02 RELATED REQUIREMENTS

A. Section 081113 - Hollow Metal Doors and Frames.

B. Section 081213 - Hollow Metal Frames.

C. Section 081416 - Flush Wood Doors.

D. Section 081433 - Stile and Rail Wood Doors.

E. Section 083323 - Overhead Coiling Doors: Door hardware, except cylinders.

F. Section 084313 - Aluminum-Framed Storefronts: Door hardware, except as noted in section.

1.03 REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

B. ASTM E283/E283M - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2019.

C. BHMA A156.1 - American National Standard for Butts and Hinges; 2013.

D. BHMA A156.2 - American National Standard for Bored and Preassembled Locks & Latches; 2011.

E. BHMA A156.3 - American National Standard for Exit Devices; 2014.

F. BHMA A156.4 - American National Standard for Door Controls - Closers; 2013.

G. BHMA A156.5 - American National Standard for Cylinders and Input Devices for Locks; 2014.

H. BHMA A156.6 - American National Standard for Architectural Door Trim; 2010.

I. BHMA A156.7 - American National Standard for Template Hinge Dimensions; 2014.

J. BHMA A156.16 - American National Standard for Auxiliary Hardware; 2013.

K. BHMA A156.19 - American National Standard for Power Assist and Low Energy Power Operated Doors; 2013.

L. BHMA A156.21 - American National Standard for Thresholds; 2014.

M. BHMA A156.22 - American National Standard for Door Gasketing and Edge Seal Systems, Builders Hardware Manufacturers Association; 2012.

N. BHMA A156.26 - American National Standard for Continuous Hinges; 2012.

O. BHMA A156.28 - American National Standard for Recommended Practices for Mechanical Keying Systems; 2013.

P. BHMA A156.36 - American National Standard for Auxiliary Locks; 2014.

Q. BHMA A156.115 - American National Standard for Hardware Preparation in Steel Doors and Steel Frames; 2014.

R. BHMA A156.115W - Hardware Preparation in Wood Doors with Wood or Steel Frames; 2006.

S. DHI (KSN) - Keying Systems and Nomenclature; 1989.

T. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2009.

U. ITS (DIR) - Directory of Listed Products; current edition.

V. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2016.

W. NFPA 101 - Life Safety Code; 2015.

X. NFPA 105 - Standard for Smoke Door Assemblies and Other Opening Protectives; 2016.

Y. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2012.

Z. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.

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

BB. UL 294 - Access Control System Units; Current Edition, Including All Revisions.

CC. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems; Current Edition, Including All Revisions.

DD. UL 1034 - Standard for Burglary-Resistant Electric Locking Mechanisms; 2015.

EE. UL 1784 - Standard for Air Leakage Tests of Door Assemblies; Current Edition, Including All Revisions.

FF. DHI (H&S) - Sequence and Format for the Hardware Schedule 2019.

GG. DHI (LOCS) - Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames 2004.

HH. DHI WDHS.3 - Recommended Locations for Architectural Hardware for Flush Wood Doors 1993; also, in WDHS-1/WDHS-5 Series, 1996.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the manufacture, fabrication, and installation of products that door hardware is installed on.

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

C. Preinstallation Meeting: Convene a preinstallation meeting one week prior to commencing work of this section; require attendance by affected installers and the following:
   1. Architect.
   2. Installer's Architectural Hardware Consultant (AHC).
   3. Hardware Installer.
   4. Owner's Security Consultant.

D. Furnish templates for door and frame preparation to manufacturers and fabricators of products requiring internal reinforcement for door hardware.

E. Keying Requirements Meeting:
   1. Attendance Required:
      a. Architect.
      b. Installer's Architectural Hardware Consultant (AHC).
   2. Agenda:
      a. Establish keying requirements.
      b. Verify locksets and locking hardware are functionally correct for project requirements.
      c. Verify that keying and programming complies with project requirements.
      d. Establish keying submittal schedule and update requirements.
   3. Incorporate "Keying Requirements Meeting" decisions into keying submittal upon review of door hardware keying system including, but not limited to, the following:
   4. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

5. Deliver established keying requirements to manufacturers.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Product Data: Manufacturer's catalog literature for each type of hardware, marked to clearly show products to be furnished for this project, and includes construction details, material descriptions, finishes, and dimensions and profiles of individual components.

C. Shop Drawings - Door Hardware Schedule: A detailed listing that includes each item of hardware to be installed on each door.
   1. Prepared by or under supervision of Architectural Hardware Consultant (AHC).
   2. Comply with DHI (H&S) using door numbering scheme and hardware set numbers as indicated in Contract Documents.
      a. Submit in vertical format.
   3. Include complete description for each door listed.

D. Shop Drawings - Electrified Door Hardware: Include diagrams for power, signal, and control wiring for electrified door hardware that include details of interface with building safety and security systems. Provide elevations and diagrams for each electrified door opening as follows:
   1. Prepared by or under supervision of Architectural Hardware Consultant (AHC) and Electrified Hardware Consultant (EHC).
   2. Elevations: Include front and back elevations of each door opening showing electrified devices with connections installed and an operations narrative describing how opening operates from either side at any given time.
   3. Diagrams: Include point-to-point wiring diagrams that show each device in door opening system with related colored wire connections to each device.

E. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

F. Manufacturer's qualification statement.

G. Installer's qualification statement.

H. Supplier's qualification statement.

I. Maintenance Data: Include data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.

J. Keying Schedule:
   1. Submit three (3) copies of Keying Schedule in compliance with requirements established during Keying Requirements Meeting unless otherwise indicated.

K. Warranty: Submit manufacturer's warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

L. Project Record Documents: Record actual locations of concealed equipment, services, and conduit.

M. Maintenance Materials and Tools: Furnish the following for Owner's use in maintenance of project.
   1. See Section 016000 - Product Requirements, for additional provisions.

1.06 QUALITY ASSURANCE

A. Standards for Fire-Rated Doors: Maintain one copy of each referenced standard on site, for use by Architect and Contractor.

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

C. Installer Qualifications: Company specializing in performing work of the type specified for commercial door hardware with at least three years of documented experience.

D. Supplier Qualifications: Company with certified Architectural Hardware Consultant (AHC) and Electrified Hardware Consultant (EHC) to assist in work of this section.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Package hardware items individually; label and identify each package with door opening code to match door hardware schedule.

1.08 WARRANTY

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

B. Manufacturer Warranty: Provide manufacturer warranty against defects in material and workmanship for period indicated, from Date of Substantial Completion. Complete forms in Owner's name and register with manufacturer.
   1. Closers: 25 years, minimum.
   2. Exit Devices: Three years, minimum.
   3. Locksets and Cylinders: Three years, minimum.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Provide specified door hardware as required to make doors fully functional, compliant with applicable codes, and secure to extent indicated.

B. Provide individual items of single type, of same model, and by same manufacturer.

C. Locks: Provide a lock for each door, unless it's indicated that lock is not required.
   1. Lock Function: Provide lock and latch function numbers and descriptions of manufacturer's Series. As indicated in hardware sets.
   2. Trim: Provide lever handle or pull trim on outside of each lock, unless otherwise indicated.
   3. Strikes:
      a. Finish: To match lock or latch.
      b. Curved-Lip Strikes: Provide as standard, with extended lip to protect frame, unless otherwise indicated.
      c. Center Strike at Pairs of Doors: 7/8 inch lip.

D. Door Pulls and Push Plates:
   1. Provide door pulls and push plates on doors without a lockset, latchset, exit device, or auxiliary lock unless otherwise indicated.

E. Closers:
   1. Provide door closer on each exterior door, unless otherwise indicated.
   2. Provide door closer on each fire-rated and smoke-rated door.
   3. Spring hinges are not an acceptable self-closing device, unless otherwise indicated.

F. Drip Guards: Provide at head of out swinging exterior doors unless protected by roof or canopy directly overhead.

G. Weatherstripping and Gasketing:
   1. Provide weatherstripping on each exterior door at head, jambs, and meeting stiles of door pairs, unless otherwise indicated.
   2. Provide door bottom sweep as indicated in hardware set, unless otherwise indicated.

H. Fasteners:
   1. Provide fasteners of proper type, size, quantity, and finish that comply with commercially recognized standards for proposed applications.
      a. Aluminum fasteners are not permitted.
      b. Provide phillips flat-head screws with heads finished to match door surface hardware unless otherwise indicated.
   2. Provide machine screws for attachment to reinforced hollow metal and aluminum frames.
      a. Self-drilling (Tek) type screws are not permitted.

3. Provide stainless steel machine screws and lead expansion shields for concrete and masonry substrates.
4. Provide wall grip inserts for hollow wall construction.
5. Fire-Resistance-Rated Applications: Comply with NFPA 80.
    a. Provide wood or machine screws for hinges mortised to doors or frames, strike plates to frames, and closers to doors and frames.
    b. Provide steel through bolts for attachment of surface mounted closers, hinges, or exit devices to door panels unless proper door blocking is provided.

2.02 PERFORMANCE REQUIREMENTS

A. Provide door hardware products that comply with the following requirements:
1. Applicable provisions of federal, state, and local codes.
    a. NFPA 101.
2. Accessibility: ADA Standards and ICC A117.1.
3. Fire-Resistance-Rated Doors: NFPA 80, listed and labeled by qualified testing agency for fire protection ratings indicated, based on testing at positive pressure in accordance with NFPA 252 or UL 10C.
4. Hardware on Fire-Resistance-Rated Doors: Listed and classified by UL (DIR), ITS (DIR), testing firm acceptable to authorities having jurisdiction, or as suitable for application indicated.
5. Hardware for Smoke and Draft Control Doors (Indicated as "S" on Drawings): Provide door hardware that complies with local codes, and requirements of assemblies tested in accordance with UL 1784.
6. Hardware Preparation for Steel Doors and Steel Frames: BHMA A156.115.
7. Hardware Preparation for Wood Doors with Wood or Steel Frames: BHMA A156.115W.
8. Products Requiring Electrical Connection: Listed and classified by UL (DIR) as suitable for the purpose specified.

2.03 HINGES

A. Manufacturers: Conventional butt hinges.
1. BEST; dormakaba Group: www.bestaccess.com/#sle.

B. Properties:
1. Butt Hinges: As applicable to each item specified.
    a. Standard Weight Hinges: Minimum of two (2) permanently lubricated non-detachable bearings.
    b. Heavy Weight Hinges: Minimum of four (4) permanently lubricated bearings on heavy weight hinges.
    c. Template screw hole locations.
    d. Bearing assembly installed after plating.
    e. Bearings: Exposed fully hardened bearings.
    f. Bearing Shells: Shapes consistent with barrels.
    g. Pins: Easily seated, non-rising pins.
        1) Fully plate hinge pins.
        2) Non-Removable Pins.
    h. UL 10C listed for fire-resistance-rated doors.
2. Continuous Hinges: As applicable to each item specified.
    a. Geared Continuous Hinges: As applicable to each item specified.
        1) Non-handed.
        2) Anti-spinning through-fastener.
        3) UL 10C listed for fire-resistance-rated doors.
            (a) Metal Door Installation: Rated up to 90 minutes.
            (b) Wood Door Installation: Rated up to 60 minutes.
        4) Sufficient size to permit door to swing 180 degrees

C. Sizes: See Door Hardware Schedule.
   1. Hinge Widths: As required to clear surrounding trim.
   2. Sufficient size to allow 180-degree swing of door.

D. Finishes: See Door Hardware Schedule.
   1. Fully polish hinges, front, back, and barrel.

E. Grades:
   1. Butt Hinges: Comply with BHMA A156.1 and BHMA A156.7 for templated hinges.
   2. Continuous Hinges: Comply with BHMA A156.26, Grade 1.

F. Material: Base metal as indicated for each item by BHMA material and finish designation.

G. Types:
   1. Butt Hinges: Include full mortise hinges.
   2. Continuous Hinges: Include geared hinges.

H. Quantities:
   1. Butt Hinges: Three (3) hinges per leaves up to 90 inches in height. Add one (1) for each additional 30 inches in height or fraction thereof.
      a. Hinge weight and size unless otherwise indicated in hardware sets:
         1) For doors up to 36 inches wide and up to 1-3/4 inches thick provide hinges with a minimum thickness of 0.134 inch and a minimum of 4-1/2 inches in height.
         2) For doors from 36 inches wide up to 42 inches wide and up to 1-3/4 inches thick provide hinges with a minimum thickness of 0.145 inch and a minimum of 4-1/2 inches in height.
         3) For doors from 42 inches wide up to 48 inches wide and up to 1-3/4 inches thick provide hinges with a minimum thickness of 0.180 inch and a minimum of 5 inches in height.
         4) For doors greater than 1-3/4 inches thick provide hinges with a minimum thickness of 0.180 inch and a minimum of 5 inches in height.
   2. Continuous Hinges: One per door leaf.

I. Applications: At swinging doors.
   1. Provide non-removable pins at out-swinging doors with locking hardware and all exterior doors.

J. Products:
   1. Butt Hinges:
      a. Ball Bearing, Five (5) Knuckle.
   2. Continuous Hinges:
      a. Aluminum geared hinges.

2.04 BOLTS

A. Manufacturers:
   1. Trimco: www.trimcohardware.com/#sle.

B. Properties:
   1. Flush Bolts:
      a. Manual Flush Bolts: Manually latching upon closing of door leaf.
         1) Bolt Throw: 3/4 inch, minimum.
      b. Automatic Flush Bolts: Automatically latching upon closing of door leaf.
         1) Bolt Throw: 3/4 inch, minimum.
      c. Self-Latching Flush Bolts: Automatically latching upon closing of door; manually retracted; located on inactive leaf of pair.
         1) Bolt Throw: 3/4 inch, minimum.
   2. Dustproof Strikes: For bolting into floor, provide except at metal thresholds.

C. Options:
   1. Extension Bolts: In leading edge of door, one bolt into floor, one bolt into top of frame.

2. Lever extensions: Provide for top bolt at oversized doors.

D. Products:
1. Manual flush bolts.
2. Automatic flush bolts.

2.05 EXIT DEVICES

A. Manufacturers:
1. BEST, dormakaba Group: www.bestaccess.com/#sle.
2. Von Duprin, Allegion Group.

B. Properties:
1. Touchpads: 'T" style metal touchpads and rail assemblies with matching chassis covers end caps.
2. Latch Bolts: Stainless steel deadlocking with 3/4-inch 0.75 inch projection using latch bolt.
3. Lever Design: Match project standard lockset trims.
4. Cylinder: Include where cylinder dogging or locking trim is indicated.
5. Strike as recommended by manufacturer for application indicated.
6. Sound dampening on touch bar.
7. Dogging:
a. Non-Fire-Resistance-Rated Devices: Hex key 1/4-inch 0.24 inch hex key dogging.
b. Fire-Resistance-Rated Devices: Manual dogging not permitted.
8. Touch bar assembly on wide style exit devices to have a 1/4-inch 0.25 inch clearance to allow for vision frames.
9. All exposed exit device components to be of architectural metals and “true” architectural finishes.
10. Handing: Field-reversible.
11. Fasteners on Back Side of Device Channel: Concealed - exposed fasteners not allowed.
12. Vertical Latch Assemblies' Operation: Gravity, without use of springs.

C. Grades: Complying with BHMA A156.3, Grade 1.
1. Provide exit devices tested and certified by UL or by a recognized independent laboratory for mechanical operational testing to 10 million cycles minimum with inspection confirming Grade 1 Loaded Forces have been maintained.

D. Options:
1. Electrified Devices
2. MLR: Motorized latch retraction.
3. Electrified Device Voltage: 24 VAC.

E. Products:
1. 2000.

2.06 ELECTRIC STRIKES

A. Manufacturers:

B. Properties:
1. Provide UL (DIR) listed burglary-resistant devices.
2. Provide UL 1034 compliant devices.
3. Provide UL 10C compliant devices.
4. Non-handed devices suitable for door frame material and scheduled lock configuration.
5. Include transformer and rectifier as necessary for complete installation.
6. Holding Force: 1,500 lbs (680.4 kg).
7. Accommodating latch projections of 1/2 inch, 5/8 inch, or 3/4 inch.

C. Options: As applicable to each item specified.
1. Voltage: 12 VDC.

D. Installation: Connect electric strikes into fire alarm where non-rated doors are scheduled to release with fire or sprinkler alarm condition.

E. Products:

2.07 LOCK CYLINDERS

A. Manufacturers:
   1. BEST, dormakaba Group: www.bestaccess.com/#sle.
   2. Match existing Best key system.

B. Properties:
   1. Lock Cylinders: Provide key access on outside of each lock, unless otherwise indicated.
      a. Provide cylinders from same manufacturer as locking device.
      b. Provide cams and/or tailpieces as required for locking devices.
      c. Provide cylinders with appropriate format conventional cores where indicated.

C. Grades:
   1. Standard Security Cylinders: Comply with BHMA A156.5.

D. Material:

E. Types: As applicable to each item specified.

F. Applications: At locations indicated in hardware sets, and as follows
   1. As required for items with locking devices provided by other sections, including at elevator controls and cabinets.
      a. When provisions for lock cylinders are referenced elsewhere in the Project Manual to this Section, provide compatible type of lock cylinder, keyed to building keying system, unless otherwise indicated.

G. Products:
   1. Rim/mortise 12E/1E.

2.08 CYLINDRICAL LOCKS

A. Manufacturers:
   1. BEST, dormakaba Group: www.bestaccess.com/#sle.
   2. Substitutions: Not permitted.

B. Properties:
   1. Mechanical Locks:
      a. Fitting modified ANSI A115.2 door preparation.
      b. Door Thickness Fit: 1-3/8 inches to 2-1/4 inches thick doors.
      c. Construction: Hub, side plate, shrouded rose, locking pin to be a one-piece casting with a shrouded locking lug.
         1) Through-bolted anti-rotational studs.
      d. Cast stainless steel latch retractor with roller bearings for exceptionally smooth operation and superior strength and durability.
      e. Bored Hole: 2-1/8 inch diameter.
      f. Backset: 5 inches unless otherwise indicated.
      g. Latch: Single piece tail-piece construction.
         1) Latchbolt Throw: 9/16 inch, minimum.
      h. Cylinders:
         1) Cylinder Core Types: Locks capable of supporting manufacturers' cores, as applicable.
            (a) Small format interchangeable.
      i. Lever Trim:
         1) Style: See Door Hardware Schedule.
         2) Functionality: Allow the lever handle to move up to 45 degrees from horizontal position prior to engaging the latchbolt assembly.

3) Strength: Locksets outside locked lever designed to withstand minimum1,400 inch-lbs (158.2 Nm) of torque. In excess of that, a replaceable part will shear. Key from outside and/or inside lever will still operate lockset.
4) Independent spring mechanism for each lever.
(a) Contain lever springs in the main lock hub.
5) Outside Lever Sleeve: Seamless one-piece construction.
6) Keyed Levers: Removable only after core is removed by authorized control key.

2. Electrified Locks: Same properties as standard locks, and as follows:
a. Voltage: 24 VAC.
b. Function: Electrically locked (Fail Safe) or unlocked (Fail Secure), as indicated for each lock in Door Hardware Schedule.
c. Temperature Control Module (TCM).

C. Finishes: See Door Hardware Schedule.
1. Core Faces: Match finish of lockset.

D. Grades: Comply with BHMA A156.2, Grade 1, Series 4000, Operational Grade 1, Extra Heavy Duty.
1. Durability: Passing 50 million cycle tests verified by third party testing agency.

E. Material: Manufacturer's standard for specified lock.
1. Critical Latch and Chassis Components: Brass or corrosion-resistance treated steel.
2. Outside Lever Sleeve: Hardened steel alloy.

F. Options:

G. Products: Cylindrical locks, including mechanical and electrified types.
1. 9K (Grade 1).
2. 9KW (Grade 1).

2.09 AUXILIARY LOCKS (DEADLOCKS)

A. Manufacturers:
1. dormakaba; dormakaba Group: www.dormakaba.com/us-en/#sle.

B. Properties:
1. Backset: 2-3/4 inch, unless otherwise indicated.
2. Strike: Appropriate for door frame.
3. Cylindrical Deadbolt: Manufacturer's standard, adjustable to accommodate range of door thicknesses indicated.
a. Door Thickness Fit: 1-3/4 inches to 2 inches thick doors.
b. Bolt Throw: 1 inch hardened steel.
c. UL listed for up to 3 hours.

C. Grades:
1. Cylindrical Deadbolts: Tested and approved by BHMA A156.36, Operational Grade 1.

D. Products:
1. D800 (Cylindrical, Grade 1).

2.10 DOOR PULLS AND PUSH PLATES

A. Manufacturers:
1. Trimco: www.trimcohardware.com/#sle.

B. Properties:
1. Pull Type: Straight, unless otherwise indicated.
2. Push Plate Type: Flat, with square corners, unless otherwise indicated.
a. Edges: Beveled, unless otherwise indicated.

C. Grades: Comply with BHMA A156.6.

D. Material: Stainless steel, unless otherwise indicated.

E. Products:
   1. 1001-11.

2.11 DOOR PULLS AND PUSH BARS

A. Manufacturers:
   1. Trimco: www.trimcohardware.com/#sle.
   2. Ives

B. Properties:
   1. Bar Type: Bar set, unless otherwise indicated.
   2. Pulls and Handles:
      a. Tubular Bars:
         1) Bar Diameter: 1 inch.

C. Grades: Comply with BHMA A156.6.

D. Material: Stainless steel, unless otherwise indicated.

2.12 COORDINATORS

A. Manufacturers:
   1. Trimco: www.trimcohardware.com/#sle.

B. Properties:
   1. General: Non-handed devices, with field-selectable active door leaf.
   2. Coordinators: Devices on pairs of doors with closers and self-latching or automatic flush bolts installed.
      a. Coordinator Operation: Only when inactive door is opened.

C. Grades:
   1. Closer and Coordinator Combinations: Comply with BHMA A156.4, Grade 1.

D. Code Compliance: As required by authorities having jurisdiction in the State in which the Project is located.
   1. Meet UL 10C for Positive Pressure.

E. Types:
   1. Coordinators: Bar.

F. Installation:
   1. Mounting: Provide necessary mounting brackets and filler bars to ensure proper installation of coordinator and related hardware.
   2. Coordination: Properly sequence installation of other door hardware affected by placement of coordinators and carry bars.

G. Products:
   1. 3090 Series.

2.13 CLOSERS

A. Manufacturers:
   1. BEST, dormakaba Group www.bestaccess.com/#sle.
   2. Corbin Russwin, Assa Abloy Group.
   3. dormakaba; dormakaba Group: www.dormakaba.com/us-en/#sle.
   4. LCN, Allegion Group.

B. Properties:
   1. Surface Mounted Closers: Manufacturer's standard.
      a. Construction: R14 high silicon aluminum alloy.
      b. Maximum Projection from Face of Door: 2-1/8 inches.
      c. Mechanism: Separate tamper-resistant adjusting valves for closing and latching speeds.
         1) Include advanced backcheck feature.

2) Include delayed action feature.
d. Hydraulic Fluid: All-weather type.
e. Arm Assembly: Standard for product specified.
1) Include hold-open, integral stop, or spring-loaded stop feature, as specified in Door Hardware Schedule.
2) Parallel arm to be a heavy-duty rigid arm.
3) Where “IS” or “S-IS” arms are specified in hardware sets, if manufacturer does not offer this arm provide a regular arm mount closer in conjunction with a heavy-duty overhead stop equal to a dormakaba 900 Series.
f. Covers:
1) Type: Standard for product selected.
(a) Full.
(b) Slim.
2) Material: Plastic.
3) Finish: Painted.

C. Grades:
1. Closers: Comply with BHMA A156.4, Grade 1.
a. Underwriters Laboratories Compliance:
1) Product Listing: UL (DIR) and ULC for use on fire-resistance-rated doors.
(a) UL 228 - Door Closers-Holders, With or Without Integral Smoke Detectors.

D. Code Compliance: As required by authorities having jurisdiction in the State in which the Project is located.
1. Devices listed with California Department of Forestry and Fire Protection, Office of the State Fire Marshal.

E. Types:
1. Rack-and-pinion, surface-mounted. 1-1/2 inches minimum bore.

F. Options:
1. Delayed action, adjustable with an independent valve.

G. Installation:
1. Mounting: Includes surface mounted installations.
2. Mount closers on non-public side of door and stair side of stair doors unless otherwise noted in hardware sets.
3. At out swinging exterior doors, mount closer on interior side of door.
4. Provide adapter plates, shim spacers, and blade stop spacers as required by frame and door conditions.
5. Where an overlapping astragal is included on pairs of swinging doors, provide coordinator to ensure door leaves close in proper order.

H. Products:
1. Surface Mounted:
a. HD7000.
b. 8600.

2.14 SWINGING DOOR OPERATORS

A. Manufacturers:
1. See Section 087113 Auto Operators .

2.15 PROTECTION PLATES

A. Manufacturers:
1. Trimco: www.trimcohardware.com/#sle.

B. Properties:
1. Plates:

a. Armor Plates: Provide on bottom half of push side of doors that require protection from objects moving through openings that may damage door surface.
   1) Size: high by 1-1/2 inch less door width (LDW) on pull side and 2 inch LDW on push side of door.
b. Kick Plates: Provide along bottom edge of push side of every wood door with closer, except aluminum storefront and glass entry doors, unless otherwise indicated.
   1) Size: 10 inches high by 2 inch less door width (LDW) on push side of door.
c. Mop Plates: Provide along bottom edge of push side of doors to provide protection from cleaning liquids and equipment damage to door surface.
   1) Size: high by 1-1/2 inch less door width (LDW) on pull side and 2 inch LDW on push side of door.
d. Edges: Beveled, on four (4) unless otherwise indicated.

C. Grades: Comply with BHMA A156.6.

D. Material: As indicated for each item by BHMA material and finish designation.
   1. Metal Properties: Stainless steel.
      a. Metal, Standard Duty: Thickness 0.050 inch, minimum.
   2. Plastic Properties:
      a. Plastic, Flexible PVC: Thickness 0.060 inch, minimum.

E. Installation:
   1. Fasteners: Countersunk screw fasteners

F. Products: K0050, K6000

2.16 STOPS AND HOLDERS

A. Manufacturers:
   1. Trimco: www.trimcohardware.com/#sle.

B. Properties:
   1. Wall Bumpers: 1270WV.

C. Grades:
   1. Door Holders and Wall Bumpers: Comply with BHMA A156.16 and Resilient Material Retention Test as described in this standard.

D. Material: Base metal as indicated for each item by BHMA material and finish designation.

E. Types:
   1. Wall Bumpers: Bumper, concave, wall stop.

F. Installation:
   1. Non-Masonry Walls: Confirm adequate wall reinforcement has been installed to allow lasting installation of wall bumpers.

G. Products:
   1. Wall Bumpers 1270WV.

2.17 THRESHOLDS

A. Manufacturers:
   1. National Guard Products, Inc: www.ngpinc.com/#sle.

B. Properties:
   1. Threshold Surface: Fluted horizontal grooves across full width.

C. Grades: Thresholds: Comply with BHMA A156.21.

D. Products:
   1. 896

2.18 WEATHERSTRIPPING AND GASKETING

A. Manufacturers:

1. National Guard Products, Inc: www.ngpinc.com/#sle.

B. Properties:
1. Weatherstripping Air Leakage Performance: Not exceeding of door opening at 0.3 inches of water pressure differential for single doors, and of door area at 0.3 inches of water pressure differential for double doors for gasketing other than smoke control, as tested according to ASTM E283/E283M; with resilient or flexible seal strips that are easily replaceable and readily available from stocks maintained by manufacturer.
2. Adhesive-Backed Perimeter Gasketing: Slilicone gasket material applied to frame with self- adhesive.
3. Door Sweeps: Neoprene gasket material held in place by flat aluminum housing or flange; surface mounted to face of door with screws.

C. Grades: Comply with BHMA A156.22.

D. Products:
1. Weatherstripping: See Door Hardware Schedule.
2. Smoke Seals: See Door Hardware Schedule.
3. Meeting Stile Seals: See Door Hardware Schedule.
4. Door Bottom Seals:
a. Door Sweeps: See Door Hardware Schedule.

2.19 MISCELLANEOUS ITEMS

A. Manufacturers:
1. Trimco: www.trimcohardware.com/#sle.

B. Properties:
1. Coat Hooks: Provide on room side of door, screw fastened.
a. Material: Stainless steel.
2. Silencers: Provide at equal locations on door frame to mute sound of door's impact upon closing.
a. Single Door: Provide three on strike jamb of frame.
b. Pair of Doors: Provide two on head of frame, one for each door at latch side.
c. Material: Rubber, gray color.

C. Products:
1. Coat Hooks.
2. Silencers.

2.20 ELECTRIFIED HARDWARE

A. Manufacturers:
1. BEST, dormakaba Group: www.bestaccess.com/#sle.
2. Substitutions: Not permitted.

B. Properties:
1. Power Supply Units: Manufacturer's standard.
a. Regulatory Compliance:
1) United States Compliance:
(a) UL listed for Class II Output.
(b) Comply with UL 294 Standards incorporating enhanced Access Control. communications capabilities.
2) Canada Compliance:
(a) Comply with ULC S-319 Electronic Access Control Systems.
b. Enclosures: Lockable NEMA Type 1, with hinged cover and knockouts.
c. Power: 24 VAC, 10 Amp; field-selectable.
1) Incoming Power Voltage: 120 VAC.
d. Emergency Release Terminals: Designed to release devices upon activation of fire alarm system.

e. Auxiliary contacts for remote signaling.
f. User-selectable time delay from 0 to 4 minutes.
g. Fire Alarm System Interface: Standard.
1) Fire alarm terminal with green LED indicating power is available.
h. Output Distribution Board with indicator LEDs.
i. On/Off LED power indicator.
2. Power Transfers: Manufacturer's standard.
a. Mortised Type:
1) Stainless steel housing and flexible tube.
2) Accommodate 120 degree door swing.
b. Mortised Type with Wires & Connectors:
1) Listed by UL and ULC.
2) Stainless steel housing and spring conduit.
3) Wire Harness: Pre-installed, twelve wire, equipped with ten (10) 24 gauge wires and two 18 gauge wires.
4) Accommodate 180 degree door swing.
5) Quick-Connect Plugs: Pre-installed.
3. Wire Harnesses: Of sufficient length, with quick connectors.
a. Wire Harness End Connection to Power Supply or Junction Box: One end with bare leads.

C. Products:
1. Power Supplies:
a. RPSMLR2.
2. Power Transfers:
a. EPT-12C.
3. Wire Harnesses:
a. BEST wire harnesses.

2.21 KEYS AND CORES

A. Manufacturers:
1. BEST, dormakaba Group: www.bestaccess.com/#sle.
2. Substitutions: Not permitted.

B. Properties: Complying with guidelines of BHMA A156.28.
1. Provide small format interchangeable core.
2. Provide Patented CORMAX keys and cores.
3. Provide keying information in compliance with DHI (KSN) standards.
4. Keying Schedule: Arrange for a keying meeting, with Architect, Owner and hardware supplier, and other involved parties to ensure locksets and locking hardware, are functionally correct and keying complies with project requirements.
5. Keying: Master keyed.
6. Include construction keying and control keying with removable core cylinders.
7. Supply keys in following quantities:
a. Grand Master Keys: 1 each.
b. Master Keys: 4 each.
c. Construction Master Keys: 6 each.
d. Construction Keys: 15 each.
e. Construction Control Keys: 2 each.
f. Control Keys if New System: 2 each.
g. Change Keys: 2 each for each keyed core.
8. Provide key collection envelopes, receipt cards, and index cards in quantity suitable to manage number of keys.
9. Deliver keys with identifying tags to Owner by security shipment direct from manufacturer.

10. Permanent Keys and Cores: Stamped with applicable key marking for identification. Do not include actual key cuts within visual key control marks or codes. Stamp permanent keys "Do Not Duplicate."
11. Include installation of permanent cores and return construction cores to hardware supplier. Construction cores and keys to remain property of hardware supplier.

C. Products:
1. Patented:
a. CORMAX.

2.22 FINISHES

A. Finishes: Identified in Hardware Sets.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that doors and frames are ready to receive this work; labeled, fire-rated doors and frames are properly installed, and dimensions are as indicated on shop drawings.

B. Correct all defects prior to proceeding with installation.

C. Verify that electric power is available to power operated devices and of correct characteristics.

3.02 INSTALLATION

A. Install hardware in accordance with manufacturer's instructions and applicable codes.

B. Install hardware using the manufacturer’s fasteners provided. Drill and tap all screw holes located in metallic materials. Do not use “Riv-Nuts” or similar products.

C. Install hardware on fire-rated doors and frames in accordance with applicable codes and NFPA 80.

D. Install hardware for smoke and draft control doors in accordance with NFPA 105.

E. Use templates provided by hardware item manufacturer.

F. Do not install surface mounted items until application of finishes to substrate are fully completed.

G. Wash down masonry walls and complete painting or staining of doors and frames.

H. Complete finish flooring prior to installation of thresholds.

I. Set exterior door thresholds with full-width bead of elastomeric sealant at each point of contact with floor providing a continuous weather seal; anchor thresholds with stainless steel countersunk screws.

J. Include in installation for existing doors and frames any necessary field modification and field preparation of doors and frames for new hardware. Provide necessary fillers, reinforcements, and fasteners for mounting new hardware and to cover existing door and frame preparations.

3.03 ADJUSTING

A. Adjust work under provisions of Section 017000 - Execution and Closeout Requirements.

B. Adjust hardware for smooth operation.

C. Adjust gasketing for complete, continuous seal; replace if unable to make complete seal.

3.04 CLEANING

A. Clean finished hardware in accordance with manufacturer's written instructions after final adjustments have been made.

3.05 PROTECTION

A. Protect finished Work under provisions of Section 017000 - Execution and Closeout Requirements.

B. Do not permit adjacent work to damage hardware or finish.

3.06 DOOR SCHEDULE

Manufacturer list

BES	BEST
PRE	BEST (Precision)
DK	dormakaba
DKA	dormakaba Architectural
NGP	National Guard Products
RCI	Rutherford Controls Inc
TRI	Trimco

Option list

Code:	Name:
B4E Heavy	Heavy Bevel Edges
C	Pre-Terminated Quick Connect Plug
CSK	Counter Sunk Holes
LAR	Length As Required
MLR	Motorized Latch Retraction
RQE	Request to Exit
S3	ANSI 4 7/8" Strike
TDS	Touchbar Monitoring Double Switch

Finish list

Code:	Name:
26D	Satin Chrome
28	Brushed Anodized Aluminum
626	Satin Chrome
630	Satin Stainless Steel
689	Aluminum
A	Anodized Aluminum
B	Brown

Specification Report

Set #1 *EXISTING DOOR AND FRAME, MAKE MODIFICATIONS AS NECESSARY TO COORDINATE WITH ACCESS CONTROL

1	Existing Hinges			
1	Power Transfer	EPT-12C		PR
1	Elec Exit Device-Storeroom	C MLR TDS 2103 X 4903B 48”	630	PR
1	Rim Cylinder	12E-72 PATD	626	BE
1	Existing Closer			
1	Kick Plate	K0050 10” X 2” LDW B4E CSK	630	TR
1	Existing Gasketing Replace Existing If Damaged			
1	Wiring Harness	WH-6E		ST
1	Wiring Harness	WH-32P		ST
1	Wiring Harness	WH-19P		ST
1	Power Supply-Exit Device	RSMLR2BB		BY
		NOTE: (Optional-Access Control Provider can provided)		
1	Power Supply-Access Cont	By Access Control Provider		BY
1	Door Position Switch	By Access Control Provider		BY
1	Card Reader	By Access Control Provider		BY

Set #2 *EXISTING DOOR AND FRAME, MAKE MODIFICATIONS AS NECESSARY TO COORDINATE WITH ACCESS CONTROL

1	Existing Hinge			
1	Power Transfer	EPT-12C		PR
1	Elec Exit Device-Storeroom	C MLR TDA 2103 X 4903B 48“	630	PR
1	Rim Cylinder	12E-72 PATD	626	BE
1	Existing Closer			
1	Kick Plate	K0050 10" X 2" LDW B4E CSK	630	TR
1	Mop Plate	KM050 6“ X 1“ LDW B4E CSK	630	TR
1	Wall Bumper	1270WV	630	TR
1	Existing Gasketing Replace Existing If Damaged			
1	Wiring Harness	WH-6E		ST
1	Wiring Harness	WH-32E		ST
1	Wiring Harness	WH-192P		ST
1	Power Supply-Exit Device	RSMLR2BB		PR
1	Power Supply-Access Cont	By Access Control Provider		BY
1	Card Reader	By Access Control Provider		BY
1	Door Position Switch	By Access Control Provider		BY

Set #3

1	Cont. Full Mortise Hinge	HD1400A 83” EPT-PREP		NA
1	Power Transfer	EPT-12C		PR
1	Elec Exit Device-Storeroom	C MLR TDS 2103 X 4903B 48”	630	PR
1	Rim Cylinder	12E 72 PATD	626	BE

1	Closer w/ Tri-Pack Arm	HD7016 AO8P	689	BE
1	Kick Plate	K0050 10" X 2" LDW B4E CSK	630	TR
1	Mop Plate	KM050 6" X 1" LDW B4E CSK	630	TR
1	Wall Bumper	1270WV	630	TR
1	Perimeter Gasketing	5075 B X LAR		NA
1	Wiring Harness	WH-6E		ST
1	Wiring Harness	WH-38P		ST
1	Wiring Harness	WH-192P		ST
1	Power Supply-Exit Device	RPSMLR2BB		PR
1	Power Supply-Access Cont	By Access Control Provider		BY
1	Card Reader	By Access Control Provider		BY
1	Door Position Switch	By Access Control Provider		BY

Set #4

3	Full Mortise Hinge	FBB179 4.5“ X 4.5“	26D	ST
1	Lockset-Office	9K3-7AB16D PATD	626	BE
1	Closer w/ Tri-Pack Arm	HD7016 AO8P	689	BE
1	Kick Plate	K0050 10" X 2" LDW B4E CSK	630	TR
1	Mop Plate	KM050 6“ X 1“ LDW B4E CSK	630	TR
1	Wall Bumper	1270WV	630	TR
1	Perimeter Gaskets	5075 B X LAR		NA

Set #5

3	Full Mortise Hinge	FBB179 4.5“ X 4.5“	26D	ST
1	Deadlock w/ Indicator	D871	626	DM
1	Passage Set	9K3-0N16D	626	BE
1	Closer w/ Tri-Pack Arm	HD7016 AO8P	689	BE
1	Mop Plate	KM050 6“ x 1“ LDW B4E CSK	630	TR
1	Kick Plate	K0050 10" X 2" LDW B4E CSK	630	TR
1	Coat Hook	3072	630	TR
1	Perimeter Gaskets	5075 B X LAR		NA

Set #6

3	Full Mortise Hinge	FBB179 4.5” X 4.5”	26D	ST
1	Power Transfer	EPT-12C		PR
1	Elec Lockset-Storeroom	9K3-7DEU16D PATD C RQE	626	BE
1	Closer	HD7016 AO8P	689	BE
1	Kick Plate	K0050 10" X 2" LDW B4E CSK	630	TR
1	Mop Plate	KM050 6” X 1” LDW B4E CSK	630	TR
1	Wall Bumper	1270WV	630	TR
1	Perimeter Gasketing	5075 B X LAR		NA
1	Wiring Harness	WH-6E		ST
1	Wiring Harness	WH-38P		ST
1	Wiring Harness	WH-192P		ST

1	Power Supply-Access Cont	By Access Control Provider		BY
1	Door Position Switch	By Access Control Provider		BY
1	Card Reader	By Access Control Provider		BY

Set #7

3	Full Mortise Hinge	FBB179 4.5” X 4.5”	26D	ST
1	Lockset-Storeroom	9K3-7D16D PATD	626	BE
1	Closer w/ Friction Hold-Open	HD7016 FH	689	BE
1	Kick Plate	K0050 10" X 2" LDW B4E CSK	630	TR
1	Mop Plate	KM050 6" X 1" LDW B4E CSK	630	TR
1	Perimeter Gasketing	5075 B X LAR		NA
1	Wall Bumper	1270WV	630	TR

END OF SECTION

SECTION 08 8723
SAFETY AND SECURITY FILMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Glazing film applied to existing glazing assemblies.

1.02 REFERENCE STANDARDS

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

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

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Record of product certification for safety requirements.
   2. Preparation instructions and recommendations.
   3. Storage and handling requirements and recommendations.
   4. Installation methods.

C. Samples: For each film product to be used, minimum size 4 inches by 6 inches, representing actual product, color, and patterns.

D. Test Reports: Detailed reports of full-scale chamber tests to specified criteria, using assemblies identical to those required for this project.

E. Specimen Warranty.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of authorities having jurisdiction.

1.05 FIELD CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.06 WARRANTY

A. See Section 01 7800 - CLOSEOUT SUBMITTALS, for additional warranty requirements.

B. Provide 10 year manufacturer's replacement warranty to cover film against peeling, cracking, discoloration, and deterioration.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. 3M Window Film: www.solutions.3m.com/#sle.

B. Madico, Inc: www.madico.com/#sle.

C. Substitutions: See Section 01 6000 - Product Requirements.

2.02 SAFETY AND SECURITY GLAZING FILM

A. Safety Glazing: Retrofit existing glazing assemblies to provide impact resistance complying with ANSI Z97.1 and 16 CFR 1201, Category II.
   1. Film Thickness: 8 mil.

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2. Surface applied film.
3. Visible Light Transmitted: 20%.
    a. Reflective Silver to block visually from exterior.
4. Requiring no supplemental anchoring devices.

PART 3 EXECUTION

3.01 EXAMINATION

A. Field -Applied Film: Verify that existing conditions are adequate for proper application and performance of film.

B. Examine glass and frames. Verify that existing conditions are adequate for proper application and performance of film.

C. Verify glass is not cracked, chipped, broken, or damaged.

D. Verify that frames are securely anchored and free of defects.

E. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

A. Clean glass of dust, dirt, paint, oil, grease, mildew, mold, and other contaminants that would inhibit adhesion.

B. Immediately prior to applying film, thoroughly wash glass with neutral cleaning solution.

C. Protect adjacent surfaces.

D. Do not begin installation until substrates have been properly prepared.

3.03 INSTALLATION

A. Do not apply glazing film when surface temperature is less that 40 degrees F or if precipitation is imminent.

B. Install in accordance with manufacturer's instructions, without air bubbles, wrinkles, streaks, bands, thin spots, pinholes, or gaps, as required to achieve specified performance.

C. Accurately cut film with straight edges to required sizes allowing 1/16 inch to 1/8 inch gap at perimeter of glazed panel unless otherwise required by anchorage method.

D. Seams: Seam film only as required to accommodate material sizes; form seams vertically without overlaps and gaps; do not install with horizontal seams.

E. Clean glass and anchoring accessories following installation. Remove excess sealants and other glazing materials from adjacent finished surfaces.

F. Remove labels and protective covers.

3.04 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION

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SECTION 09 0561
COMMON WORK RESULTS FOR FLOORING PREPARATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. This section applies to floors identified in Contract Documents that are receiving the following types of floor coverings:
   1. Resilient tile and sheet.

B. Preparation of existing concrete floor slabs for installation of floor coverings.

C. Testing of concrete floor slabs for moisture and alkalinity (pH).

D. Remediation of concrete floor slabs due to unsatisfactory moisture or alkalinity (pH) conditions.
   1. Contractor shall perform all specified remediation of concrete floor slabs. If such remediation is indicated by testing agency's report and is due to a condition not under Contractor's control or could not have been predicted by examination prior to entering into the contract, a contract modification will be issued.

E. Patching compound.

F. Remedial floor coatings.

G. Remedial floor sheet membrane.

1.02 REFERENCE STANDARDS

A. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or (50-mm) Cube Specimens); 2013.

B. ASTM C472 - Standard Test Methods for Physical Testing of Gypsum, Gypsum Plasters and Gypsum Concrete; 1999 (Reapproved 2014).

C. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2011.

D. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride; 2011.

E. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes; 2011.

F. RFCI (RWP) - Recommended Work Practices for Removal of Resilient Floor Coverings; Resilient Floor Covering Institute; October 2011.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordinate scheduling of cleaning and testing, so that preliminary cleaning has been completed for at least 24 hours prior to testing.

1.04 SUBMITTALS

A. Floor Covering and Adhesive Manufacturers' Product Literature: For each specific combination of substrate, floor covering, and adhesive to be used; showing:
   1. Moisture and alkalinity (pH) limits and test methods.
   2. Manufacturer's required bond/compatibility test procedure.

B. Testing Agency's Report:
   1. Description of areas tested; include floor plans and photographs if helpful.
   2. Summary of conditions encountered.
   3. Moisture and alkalinity (pH) test reports.
   4. Copies of specified test methods.
   5. Recommendations for remediation of unsatisfactory surfaces.

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6. Product data for recommended remedial coating.
7. Submit report to Architect.
8. Submit report not more than two business days after conclusion of testing.

C. Adhesive Bond and Compatibility Test Report.

D. Copy of RFCI (RWP).

1.05 QUALITY ASSURANCE

A. Moisture and alkalinity (pH) testing will be performed by an independent testing agency employed and paid by Owner.

B. Testing Agency Qualifications: Independent testing agency experienced in the types of testing specified.
1. Submit evidence of experience consisting of at least 3 test reports of the type required, with project Owner's project contact information.

C. Contractor's Responsibility Relating to Independent Agency Testing:
1. Provide access for and cooperate with testing agency.
2. Confirm date of start of testing at least 10 days prior to actual start.
3. Allow at least 4 business days on site for testing agency activities.
4. Achieve and maintain specified ambient conditions.
5. Notify Owner when specified ambient conditions have been achieved and when testing will start.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, handle, and protect products in accordance with manufacturer’s instructions and recommendations.

B. Deliver materials in manufacturer’s packaging; include installation instructions.

C. Keep materials from freezing.

1.07 FIELD CONDITIONS

A. Maintain ambient temperature in spaces where concrete testing is being performed, and for at least 48 hours prior to testing, at not less than 65 degrees F or more than 85 degrees F.

B. Maintain relative humidity in spaces where concrete testing is being performed, and for at least 48 hours prior to testing, at not less than 40 percent and not more than 60 percent.

PART 2 PRODUCTS

2.01 MATERIALS

A. Patching Compound: Floor covering manufacturer's recommended product, suitable for conditions, and compatible with adhesive and floor covering. In the absence of any recommendation from flooring manufacturer, provide a product with the following characteristics:
1. Cementitious moisture-, mildew-, and alkali-resistant compound, compatible with floor, floor covering, and floor covering adhesive, and capable of being feathered to nothing at edges.
2. Latex or polyvinyl acetate additions are permitted; gypsum content is prohibited.
3. Compressive Strength: 3000 psi, minimum, after 28 days, when tested in accordance with ASTM C109/C109M or ASTM C472, whichever is appropriate.

B. Remedial Floor Coating: Single- or multi-layer coating or coating/overlay combination intended by its manufacturer to resist water vapor transmission to degree sufficient to meet flooring manufacturer's emission limits, resistant to the level of alkalinity (pH) found, and suitable for adhesion of flooring without further treatment.
1. Thickness: 1/8 inch, maximum.

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2. Products:
    a. ARDEX Engineered Cements; ARDEX MC RAPID: www.ardexamericas.com/#sle.
    b. Floor Seal Technology, Inc; MES 100 with Floor Seal FloorCem SLU: www.floorseal.com/#sle.
    c. Sika Corporation; Sikafloor Moisture Tolerance Epoxy Primer and Sikafloor Self-Leveling Moisture Tolerant Resurfacer: www.sikafloorusa.com/#sle.
    d. Tnemec Company, Inc; Series 208 Epoxoprime MVT: www.tnemec.com/#sle.

C. Remedial Floor Sheet Membrane: Pre-formed multi-ply sheet membrane installed over concrete subfloor and intended by its manufacturer to resist water vapor transmission to degree sufficient to meet flooring manufacturer's emission limits, resistant to the level of alkalinity (pH) found, and suitable for adhesion of flooring without further treatment.
1. Thickness: 28 mil (0.028 inch).
2. Tape: Types recommended by underlayment manufacturer to install membrane and cover seams.
3. Products:
    a. GCP Applied Technologies; Kovara MBX: www.gcpat.com/#sle.
    b. Substitutions: See Section 01 6000 - Product Requirements.

PART 3 EXECUTION

3.01 CONCRETE SLAB PREPARATION

A. Perform following operations in the order indicated:
1. Preliminary cleaning.
2. Moisture vapor emission tests; 3 tests in the first 1000 square feet and one test in each additional 1000 square feet, unless otherwise indicated or required by flooring manufacturer.
3. Internal relative humidity tests; in same locations as moisture vapor emission tests, unless otherwise indicated.
4. Alkalinity (pH) tests; in same locations as moisture vapor emission tests, unless otherwise indicated.
5. Specified remediation, if required.
6. Patching, smoothing, and leveling, as required.
7. Other preparation specified.
8. Adhesive bond and compatibility test.
9. Protection.

B. Remediations:
1. Active Water Leaks or Continuing Moisture Migration to Surface of Slab: Correct this condition before doing any other remediation; re-test after correction.
2. Excessive Moisture Emission or Relative Humidity: If an adhesive that is resistant to the level of moisture present is available and acceptable to flooring manufacturer, use that adhesive for installation of the flooring; if not, apply remedial floor coating or remedial sheet membrane over entire suspect floor area.
3. Excessive Alkalinity (pH): If remedial floor coating is necessary to address excessive moisture, no additional remediation is required; if not, if an adhesive that is resistant to the level present is available and acceptable to the flooring manufacturer, use that adhesive for installation of the flooring; otherwise, apply a skim coat of specified patching compound over entire suspect floor area.

3.02 PRELIMINARY CLEANING

A. Clean floors of dust, solvents, paint, wax, oil, grease, asphalt, residual adhesive, adhesive removers, film-forming curing compounds, sealing compounds, alkaline salts, excessive laitance, mold, mildew, and other materials that might prevent adhesive bond.

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B. Do not use solvents or other chemicals for cleaning.

3.03 MOISTURE VAPOR EMISSION TESTING

A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.

B. Where this specification conflicts with the referenced test method, comply with the requirements of this section.

C. Test in accordance with ASTM F1869 and as follows.

D. Plastic sheet test and mat bond test may not be substituted for the specified ASTM test method, as those methods do not quantify the moisture content sufficiently.

E. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if test values exceed 3 pounds per 1000 square feet per 24 hours.

F. Report: Report the information required by the test method.

3.04 INTERNAL RELATIVE HUMIDITY TESTING

A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.

B. Where this specification conflicts with the referenced test method, comply with the requirements of this section.

C. Test in accordance with ASTM F2170 Procedure A and as follows.

D. Testing with electrical impedance or resistance apparatus may not be substituted for the specified ASTM test method, as the values determined are not comparable to the ASTM test values and do not quantify the moisture content sufficiently.

E. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if any test value exceeds 75 percent relative humidity.

F. Report: Report the information required by the test method.

3.05 ALKALINITY TESTING

A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.

B. The following procedure is the equivalent of that described in ASTM F710, repeated here for the Contractor's convenience.
   1. Use a wide range alkalinity (pH) test paper, its associated chart, and distilled or deionized water.
   2. Place several drops of water on a clean surface of concrete, forming a puddle approximately 1 inch in diameter. Allow the puddle to set for approximately 60 seconds, then dip the alkalinity (pH) test paper into the water, remove it, and compare immediately to chart to determine alkalinity (pH) reading.
   3. Use of a digital pH meter with probe is acceptable; follow meter manufacturer's instructions.

C. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if alkalinity (pH) test value is over 10.

3.06 PREPARATION

A. See individual floor covering section(s) for additional requirements.

B. Comply with requirements and recommendations of floor covering manufacturer.

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C. Fill and smooth surface cracks, grooves, depressions, control joints and other non-moving joints, and other irregularities with patching compound.

D. Do not fill expansion joints, isolation joints, or other moving joints.

3.07 ADHESIVE BOND AND COMPATIBILITY TESTING

A. Comply with requirements and recommendations of floor covering manufacturer.

3.08 APPLICATION OF REMEDIAL FLOOR COATING

A. Comply with requirements and recommendations of coating manufacturer.

3.09 INSTALLATION OF REMEDIAL FLOOR SHEET MEMBRANE

A. Install in accordance with sheet membrane manufacturer's instructions.

END OF SECTION

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SECTION 09 2116
GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL V.20

1.01 SECTION INCLUDES

A. Performance criteria for gypsum board assemblies.

B. Metal partition and soffit framing.

C. Metal channel ceiling framing.

D. Cementitious backing board.

E. Gypsum wallboard.

F. Joint treatment and accessories.

G. Expanded metal penetration barrier (security mesh).

H. Framing Accessories.

1.02 REFERENCE STANDARDS

A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.

B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.

C. ASTM A1003/A1003M - Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members; 2015.

D. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2015.

E. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; 2014.

F. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2012.

G. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2015.

H. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2013.

I. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness; 2015.

J. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2014.

K. ASTM C1047 - Standard Specification for Accessories For Gypsum Wallboard and Gypsum Veneer Base; 2014a.

L. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2014.

M. ASTM C1658/C1658M - Standard Specification for Glass Mat Gypsum Panels; 2013.

N. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2012.

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

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

Q. ASTM F2322 Standard Test Methods for Physical Assault on Vertical Fixed Barriers for Detention and Correctional Facilities; 2019.

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R. GA-216 - Application and Finishing of Gypsum Board; 2013.

S. GA-600 - Fire Resistance Design Manual; 2015.

T. UL (FRD) - Fire Resistance Directory; current edition.

1.03 SUBMITTALS

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

B. Shop Drawings:
   1. Indicate special details associated with fireproofing and acoustical seals.
   2. Indicate component details, stud layout, framed openings, anchorage to structure, acoustic details, type and location of fasteners, accessories, and items of other related work.
   3. Describe method for securing studs to track, splicing, and for blocking and reinforcing of framing connections.
   4. Provide partition legend indicating proposed assembly components at each partition type.

C. Product Data: Provide data on metal framing, gypsum board, accessories, joint finishing system, and security mesh. Include framing load charts and limitations.

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

E. Test Reports: For stud framing products that do not comply with ASTM C645 or ASTM C754, provide independent laboratory reports showing maximum stud heights at required spacings and deflections.

F. Test Reports: Security mesh.

1.04 QUALITY ASSURANCE

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

1.05 MOCK-UP

A. Provide mock-up of stud wall, ceiling, and soffit framing including insulation, sheathing, window frame, and door frame and finish specified in other sections. Coordinate installation of associated work specified in other sections.
   1. Mock-up may remain part of finish work.

PART 2 PRODUCTS

2.01 GYPSUM BOARD ASSEMBLIES

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

B. Interior Partitions, Indicated as Acoustic and/or STC on partition schedule: Provide completed assemblies with the following characteristics:
   1. Acoustic Attenuation: STC of 45-49 calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.
   2. Treat all penetrations and perimeters of wall assembly with acoustical sealant, both sides of wall.

C. Fire Rated Assemblies: Provide completed assemblies as indicated on partition schedule and complying with applicable code.
   1. UL Assembly Numbers: Provide construction equivalent to that listed for the particular assembly in the current UL (FRD).

2.02 METAL FRAMING MATERIALS

A. Manufacturers - Metal Framing, Connectors, and Accessories:

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1. ClarkDietrich: www.clarkdietrich.com/#sle.
2. Marino: www.marinoware.com/#sle.
3. Phillips Manufacturing Co: www.phillipsmfg.com/#sle.
4. Substitutions: See Section 01 6000 - Product Requirements.

B. Non-Loadbearing Framing System Components: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/240 at 5 psf, with steel thickness not less than 20 gauge (30 mils). Adjust steel thickness to comply with deflection with stud heights. Walls with tile or masonry veneer, comply with deflection of wall framing of L/360 at 5psf.
   1. Studs: "C" shaped with knurled or emobossed faces.
   2. Runners: U shaped, sized to match studs.
   3. Ceiling Channels: C-shaped.
   4. Furring Members: Hat-shaped sections, minimum depth of 7/8 inch.

C. Shaft Wall Studs and Accessories: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 and specified performance requirements.

D. Partition Head To Structure Connections: Provide track fastened to structure with legs of sufficient length to accommodate deflection, for friction fit of studs cut short and fastened as indicated on drawings.

E. Tracks and Runners: Same material and thickness as studs, bent leg retainer notched to receive studs.

F. Furring and Bracing Members: Of same material as studs; thickness to suit purpose; complying with applicable requirements of ASTM C754.

G. Metal Framing Fasteners: ASTM C1002 self-piercing tapping screws.

H. Sheet Metal Backing: 0.036 inch thick, galvanized.

I. Partial Height partitions: Use steel wall stiffeners bolted to floor surface and stud framing at 48" o.c., minimum of two per wall. Provide No-Flex Stud Stiffeners, or approved equal. www.noflex.com.

J. Non-structural Framing Accessories:
   1. Ceiling Hangers: Type and size as specified in ASTM C754 for spacing required.
   2. Partial Height Wall Framing Support: Provides stud reinforcement and anchored connection to floor.
      a. Materials: ASTM A36/A36M formed sheet steel support member with factory-welded ASTM A1003/A1003M steel plate base.
   3. Framing Connectors: ASTM A653/A653M G90 galvanized steel clips; secures cold rolled channel to wall studs for lateral bracing.

K. Grid Suspension Systems: Steel grid system of main tees and support bars connected to structure using hanging wire.
   1. Products:
      a. USG Corporation; Drywall Suspension System: www.usg.com/#sle.

2.03 BOARD MATERIALS

A. Manufacturers - Gypsum-Based Board:
   1. American Gypsum Company: www.americangypsum.com/#sle.
   2. Georgia-Pacific Gypsum: www.gpgypsum.com/#sle.
   3. National Gypsum Company: www.nationalgypsum.com/#sle.
   4. Temple-Inland Building Product by Georgia-Pacific, LLC: www.temple.com.
   5. USG Corporation: www.usg.com/#sle.

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B. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
   1. Application: Use for standard vertical surfaces and ceilings, unless otherwise indicated.
   2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
      a. Mold-resistant board is required whenever board is being installed before the building is enclosed and conditioned.
      b. Mold resistant board is required at all toilet rooms, janitor closets, laundry rooms, kitchen and similar wet areaat all wet locations such as: Locker, shower, toilet rooms, kitchens, janitor closets, etc and behind plumbing fixtures locations. Also refer to partition schedule and locations otherwise noted.
   3. At Assemblies Indicated with Fire-Resistance Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
   4. Thickness:
      a. Vertical Surfaces: 5/8 inch.
      b. Ceilings: 5/8 inch., sag resistant.
   5. Paper-Faced Products:
      a. American Gypsum Company; LightRoc Gypsum Wallboard.
      b. Georgia-Pacific Gypsum; ToughRock.
      c. Georgia-Pacific Gypsum; ToughRock Fireguard X.
      d. Georgia-Pacific Gypsum; ToughRock Fireguard C.
      e. Substitutions: See Section 01 6000 - Product Requirements.
   6. Mold Resistant Paper Faced Products:
      a. American Gypsum Company; M-Bloc.
      b. Continental Building Products; Mold Defense Type X.
      c. Georgia-Pacific Gypsum; ToughRock Mold-Guard.
      d. Georgia-Pacific Gypsum; ToughRock Fireguard X Mold-Guard.
      e. National Gypsum Company; Gold Bond XP Gypsum Board.
      f. Lafarge North America Inc; Mold Defense Drywall.
      g. National Gypsum Company; Gold Bond Brand XP Gypsum Board.
      h. Temple-Inland Building Product by Georgia-Pacific, LLC; ComfortGuard Mold Resistant Gypsum Board.
      i. USG Corporation; Sheetrock Brand Mold Tough Gypsum Panels.

2.04 SECURITY MESH PANELS

A. Manufacturers:
   1. Alabama Metal Industries Corporation (AMICO); Interior security mesh; www.amicosecurity.com.
   2. Clark Dietrich; Interior barrier mesh; www.clarkdietrich.com.
   3. Substitutions: See Section 01 6000 - Product Requirements.

B. High Security Mesh:
   1. Mesh size opening: Minimum percentage of open area 60 percent.
   2. Mesh strand thickness: 0.120 inch.
   3. Weight: Minimum 0.77 lbs per square foot.
   4. Fasteners: Manufacturer's standard for fastening to interior metal stud framing and concealing installation behind gypsum wallboard.
   5. Finish: Manufacturer's standard.

2.05 GYPSUM WALLBOARD ACCESSORIES

A. Acoustic Insulation: As specified in Section 07 2100.

B. Acoustic Sealant: Acrylic emulsion latex or water-based elastomeric sealant; do not use solvent-based non-curing butyl sealant.

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

D. Water-Resistive Barrier: As specified in Section 07 2500.

E. Finishing Accessories: ASTM C1047, galvanized steel, pre-approved rigid plastic, rolled zinc, pre-approved rigid plastic, or pre-approved rigid plastic, unless noted otherwise.
   1. Types: As detailed or required for finished appearance.
   2. Special Shapes: In addition to conventional corner bead and control joints, provide U-bead at exposed panel edges.
   3. Products:
      a. Phillips Manufacturing Co: www.phillipsmfg.com/#sle.
      b. Trim-tex, Inc: www.trim-tex.com/#sle.
      c. Fry Reglet Corporation; www.fryreglet.com
      d. Substitutions: See Section 01 6000 - Product Requirements.

F. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
   1. Fiberglass Tape: 2 inch wide, coated glass fiber tape for joints and corners, except as otherwise indicated.
   2. Paper Tape: 2 inch wide, creased paper tape for joints and corners, except as otherwise indicated.
   3. Joint Compound: Drying type, vinyl-based, ready-mixed.
   4. Joint Compound: Setting type, field-mixed.

G. Screws for Fastening of Gypsum Panel Products to Cold-Formed Steel Studs Less than 0.033 inches in Thickness and Wood Members: ASTM C1002; self-piercing tapping screws, corrosion-resistant.

H. Screws for Fastening of Gypsum Panel Products to Steel Members from 0.033 to 0.112 inch in Thickness: ASTM C954; steel drill screws, corrosion-resistant.

2.06 FABRICATION

A. Fabricate assemblies of framed sections to sizes and profiles required.

B. Fit, reinforce, and brace framing members to suit design requirements.

PART 3 EXECUTION

3.01 EXAMINATION

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

B. Verify existing conditions before starting work.

C. Verify that rough-in utilities are in proper location.

3.02 FRAMING INSTALLATION

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

B. Suspended Ceilings and Soffits: Space framing and furring members at 16 inches on center.
   1. Laterally brace entire suspension system.

C. Studs: Space studs at 16 inches on center or as otherwise scheduled.
   1. Extend partition framing to structure in all locations or as otherwise specifically noted on partition schedule.
   2. Partitions Terminating at Structure: Attach extended leg top runner to structure, maintain clearance between top of studs and structure, and brace both flanges of studs with continuous bridging.
   3. Align stud web openings horizontally.
   4. Secure studs to track using fastener method. Do not weld.
   5. Stud splicing is not permissible.

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6. Fabricate corners using a minimum of three studs.

D. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jamb, not more than 2 inches from each side of opening. Refer to framing details on plans.

E. Standard Wall Furring: Install at concrete walls scheduled to receive gypsum board, not more than 4 inches from floor and ceiling lines and abutting walls. Secure in place on alternate channel flanges at maximum 24 inches on center.
   1. Orientation: Horizontal.
   2. Spacing: As indicated.

F. Acoustic Furring: Install resilient channels at maximum 24 inches on center. Locate joints over framing members.

G. Furring for Fire-Resistance Ratings: Install as required for fire-resistance ratings indicated and to GA-600 requirements.

H. Blocking: Coordinate installed bucks, support systems, anchors and blocking with electrical, mechanical and other work to be placed within or behind stud framing. Install wood blocking for support of:
   1. Wall-mounted cabinets.
   2. Plumbing fixtures.
   3. Toilet partitions.
   4. Toilet accessories.
   5. Wall-mounted door hardware.

3.03 CEILING AND SOFFIT FRAMING

A. Install furring after work above ceiling or soffit is complete. Coordinate the location of hangers with other work.

B. Install furring independent of walls, columns, and above-ceiling work.

C. Securely anchor hangers to structural members or embed in structural slab. Space hangers as required to limit deflections to criteria indicated. Use rigid hangers at exterior soffits.

D. Space main carrying channels at maximum 72 inch on center, and not more than 6 inches from wall surfaces. Lap spice securely.

E. Securely fix carrying channels to hangers to prevent turning or twisting and to transmit full load to hangers.

F. Place furring channels perpendicular to carrying channels, not more than 2 inches from perimeter walls and rigid secure. Lap splices securely.

G. Laterally brace suspension system.

3.04 ACOUSTIC ACCESSORIES INSTALLATION

A. Install insulation material type as indicated in 07 2100 into partition cavities.

B. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions. At locations in stud cavities not covered by sheetrock, install strapping or retainer wires to hold insulation in place.

C. Acoustic Sealant: Install in accordance with manufacturer's instructions.
   1. Place one bead continuously on substrate before installation of perimeter framing members.
   2. Seal around all penetrations by conduit, pipe, ducts, and rough-in boxes, except where firestopping is provided.

3.05 SECURITY MESH INSTALLATION

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A. Lay-out and install security mesh panels in accordance with manufacturer's written instructions.
   1. Diamond mesh panels may be installed with diamond running in either direction.

B. Secure mesh to metal framing members with manufacturer's provided clips or fasteners as indicated by manufacturer in written instructions.

C. Stagger joints in mesh panels ocurring on framing members, and overlap as recommended by manufacturer.

D. Panels shall join, bein and terminate on a framing member.
   1. Panels not joining on framing member shall be wire tied with 18 GA steel tie wire. Wire tying shall be no less frequent than installing with approved fasteners.

3.06 BOARD INSTALLATION

A. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.

B. Single-Layer Nonrated: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.

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

D. Fire-Resistance-Rated Construction: Install gypsum board in strict compliance with requirements of assembly listing.

E. Mold Resistant Gypsum Board: Use at all wall and ceiling surfaces in toilet rooms, janitor closets, laundry rooms, kitchens, and similar wet areas not indicated to receive wall tile.
   1. At single plumbing fixtures locations: Install from floor to 24 inches vertically above fixture and 12 inches horizontally past edge of fixture.

F. Tile Backer Board: Install at all locations scheduled to receive tile. Seal all joints penetrations through backer board with sealant. Install in accordance with ANSIO A108.11 and manufacturer's instructions.

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

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

3.07 INSTALLATION OF TRIM AND ACCESSORIES

A. Control Joints: Place control joints consistent with lines of building spaces and as indicated.
   1. Not more than 30 feet apart on walls and ceilings over 50 feet long.
   2. Not more than 30 feet apart on ceiling over 50 feet long and/or where framing changes directions.
   3. At exterior soffits, not more than 30 feet apart in both directions.

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

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

D. Exterior Soffit Vents: Install according to manufacturer's written instructions and in locations indicated on the drawings. Provide vent area specified or no less than 1/150 of area vented.

3.08 JOINT TREATMENT

A. Glass Mat Faced Gypsum Board and Exterior Glass Mat Faced Sheathing: Use fiberglass joint tape, embed and finish with setting type joint compound.

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B. Paper Faced Gypsum Board: Use paper joint tape, embed with drying type joint compound and finish with drying type joint compound.

C. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
   1. Level 5: Walls and ceilings to receive semi-gloss or gloss paint finish, walls behind specialty dry-erase coatings and other areas specifically indicated.
   2. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
   3. Level 2: In utility areas, behind cabinetry, and on backing board to receive tile finish.
   4. Level 1: Wall areas above finished ceilings, whether or not accessible in the completed construction. Installation must conform to UL or STC ratings at Fire Rated and Acoustical Partitions.

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

E. Fill and finish joints and corners of cementitious backing board as recommended by manufacturer.

3.09 QUALITY CONTROL

A. Prior to installation of wall board on stud walls, coordinate review with Architect and AHJ inspections and approvals.

B. Prior to covering up with suspended ceilings, coordinate above ceiling review with Architect. Review to observe installation of acoustical sealant, fire wall installation and labels, mechanical equipment installation and clearances, etc. Coordinate with AHJ inspections and approvals.

3.10 TOLERANCES

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

END OF SECTION

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SECTION 09 5100
ACOUSTICAL CEILINGS

PART 1 GENERAL V.20

1.01 SECTION INCLUDES

A. Suspended metal grid ceiling system.

B. Acoustical units.

1.02 REFERENCE STANDARDS

A. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.

B. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate [Metric]; 2014.

C. ASTM C635/C635M - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 2013a.

D. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels; 2013.

E. ASTM E580/E580M - Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions; 2014.

F. ASTM E1264 - Standard Classification for Acoustical Ceiling Products; 2014.

G. UL (FRD) - Fire Resistance Directory; current edition.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.

B. Do not install acoustical units until after interior wet work is dry.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate grid layout and related dimensioning.

C. Product Data: Provide data on suspension system components and acoustical units.

D. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.
   2. Extra Acoustical Units: Quantity equal to 5 percent of total installed. Provide at a minimum 1 box or carton of ceiling tile.

1.05 QUALITY ASSURANCE

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

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

1.06 FIELD CONDITIONS

A. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

PART 2 PRODUCTS

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2.01 MANUFACTURERS

A. Acoustic Tiles/Panels:
   1. Armstrong World Industries, Inc: www.armstrongceilings.com.
   2. CertainTeed Corporation: www.certainteed.com.
   3. USG Corporation: www.usg.com/ceilings.
   4. Substitutions: See Section 01 6000 - Product Requirements.

B. Suspension Systems:
   1. Same as for acoustical units.

2.02 ACOUSTICAL UNITS

A. Acoustical Units - General: ASTM E1264, Class A.

B. Acoustical Panels, Type ACT-01: Smooth-texture panels that are washable, impact- and scratch-resistant, with a non-directional visual, and containing the following characteristics:
   1. Classification: ASTM E1264 Type A.
   2. Size: 24 by 24 inches.
   3. Thickness: 3/4 inch
   4. Composition: Wet-formed mineral fiber.
   5. Light Reflectance: 88 percent, determined in accordance with ASTM E1264.
   6. NRC Range: 0.7 to 0.75, determined in accordance with ASTM E1264.
   7. Ceiling Attenuation Class (CAC): 35, determined in accordance with ASTM E1264.
   8. Panel Edge: Beveled tegular.
   9. Suspension System Type Prelude XL: Exposed grid.
   10. Products:
      a. Armstrong World Industries, Inc.; Ultima 1911.
      b. Substitutions: See Section 01 6000 - Product Requirements.

2.03 SUSPENSION SYSTEM(S)

A. Metal Suspension Systems - General: Complying with ASTM C635/C635M; die cut and interlocking components, with perimeter moldings, hold down clips, stabilizer bars, clips, and splices as required.

B. Exposed Suspension System: Hot-dipped galvanized steel grid with aluminum cap; factory-applied closed-cell foam gaskets.
   1. Structural Classification: Heavy-duty, when tested in accordance with ASTM C635/C635M.
   2. Profile: Tee; 15/16 inch face width.
   3. Finish: Baked enamel.
   4. Products:
      a. USG Corporation; Donn Brand DXLA/DXCE 15/16 inch Acoustical Suspension System: www.usg.com/ceilings.
      b. Armstrong: Prelude XL 15/16" Exposed Tee.. www.armstrongceilings.com.
      c. Substitutions: See Section 01 6000 - Product Requirements.

2.04 ACCESSORIES

A. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.

B. Hanger Wire: 12-gage 0.08 inch galvanized steel wire.

C. Perimeter Moldings: Same metal and finish as grid.
   1. Angle Molding: L-shaped, for mounting at same elevation as face of grid.

D. Acoustical Insulation: Specified in Section 07 2100.
   1. Thickness: 2 inch.

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2. Size: To fit acoustical suspension system.

E. Gypsum Board: Fire rated type; 5/8 inch thick, ends and edges square, paper faced.

F. Acoustical Sealant For Perimeter Moldings: Specified in Section 07 9005.

G. Touch-up Paint: Type and color to match acoustical ceiling tiles and grid units.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Coordinate and verify that layout of hangers will not interfere with other work.

3.02 INSTALLATION - SUSPENSION SYSTEM

A. Install suspension system in accordance with ASTM C636/C636M, ASTM E580/E580M, ASTM C636/C636M, ASTM E580/E580M, ASTM C636/C636M, and ASTM E580/E580M and as supplemented in this section.

B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.

C. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
1. Use longest practical lengths.

D. Suspension System, Non-Seismic: Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.

E. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.

F. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.

G. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.

H. Do not eccentrically load system or induce rotation of runners.

3.03 INSTALLATION - ACOUSTICAL UNITS

A. Install acoustical units in accordance with manufacturer's instructions.

B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.

C. Fit border trim neatly against abutting surfaces.

D. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.

E. Cutting Acoustical Units:
1. Make field cut edges of same profile as factory edges.
2. Double cut and field paint exposed reveal edges.

F. Where round obstructions occur, provide preformed closures to match perimeter molding.

G. At partitions that extend only to underside of ceiling grid, lay acoustical insulation for a distance of 48 inches either side of acoustical partitions.

H. Install hold-down clips on each panel to retain panels tight to grid system; comply with fire rating requirements.

3.04 TOLERANCES

A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.

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B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

END OF SECTION

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SECTION 09 6500
RESILIENT FLOORING

PART 1 GENERAL V.20

1.01 SECTION INCLUDES

A. Resilient tile and sheet flooring.

B. Resilient base.

C. Installation accessories.

1.02 REFERENCE STANDARDS

A. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2011.

B. ASTM F1066 - Standard Specification for Vinyl Composition Floor Tile; 2004 (Reapproved 2014).

C. ASTM F1861 - Standard Specification for Resilient Wall Base; 2008 (Reapproved 2012).

D. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride; 2011.

E. ASTM F2169 - Standard Specification for Resilient Stair Treads; 2015.

F. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes; 2011.

G. BAAQMD 8-51 - Bay Area Air Quality Management District Regulation 8, Rule 51, Adhesive and Sealant Products; www.baaqmd.gov; 2002.

H. RFCI (RWP) - Recommended Work Practices for Removal of Resilient Floor Coverings; Resilient Floor Covering Institute; October 2011.

I. SCAQMD 1168 - South Coast Air Quality Management District Rule No.1168; current edition; www.aqmd.gov.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.

C. Shop Drawings: Indicate seaming plans and floor patterns.

D. Selection Samples: Submit manufacturer's complete set of color samples for Architect's initial selection.

E. Mockup: may be required from installer to convey installation of componets with accessories.

F. Certification: Prior to installation of flooring, submit written certification by flooring manufacturer and adhesive manufacturer that condition of subfloor is acceptable.

G. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.

H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.
   2. Extra Flooring Material: 10 percent or 45 square feet of each type and color.
   3. Extra Wall Base: 20 linear feet of each type and color.
   4. Extra Stair Materials: Quantity equivalent to 5 percent of each type and color.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Protect roll materials from damage by storing on end.

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1.05 FIELD CONDITIONS

A. Maintain temperature in storage area between 55 degrees F and 90 degrees F.

B. Store materials for not less than 48 hours prior to installation in area of installation at a temperature of 70 degrees F to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F.

PART 2 PRODUCTS

2.01 TILE FLOORING

A. Luxury Vinyl Tile: Type LVT-01; surface decorated, with wear layer.
   1. Manufacturers:
      a. Mannington Commercial; www.manningtoncommercial.com.
      b. Substitutions: See Section 01 6000 - Product Requirements.
   2. Minimum Requirements: Comply with ASTM F1700, Class III.
   3. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E648 or NFPA 253.
   4.
   5. Wear Layer Thickness: 20 mil.
   6. Wear Layer: Quantum Guard Elite.
   7. Pattern: Groove.
   8. ADA Compliant: FTC Slip Resistant Classified Product.
   9. Color: Selected by Architect from manufacturer's standard range.

2.02 RESILIENT BASE

A. Resilient Base - Type RBB-01: ASTM F1861, Type TS rubber, vulcanized thermoset; top set Style B, Cove.
   1. Height: 4 inch.
   2. Thickness: 0.125 inch.
   3. Finish: Satin.
   4. Length: Roll.
   5. Color: To be selected by Architect from manufacturer's full range.
   6. Accessories: Premolded external corners and internal corners.

2.03 ACCESSORIES

A. Subfloor Filler: White premix latex; type recommended by adhesive material manufacturer.

B. Leveling and Patching compound: As recommended by flooring manufacturer.

C. Moisture Membrane: As required or recommended by flooring manufacturer.

D. Primers, Adhesives, and Seam Sealer: Waterproof; types recommended by flooring manufacturer based on application type.
   1. Provide only products having lower volatile organic compound (VOC) content than required by the more stringent of the South Coast Air Quality Management District Rule No.1168 and the Bay Area Air Quality Management District Regulation 8, Rule 51.
   2. Provide product compatible with concrete subfloor relative humidity and ph levels.

E. Moldings, Transition and Edge Strips: Metal, stainless steel or anodized aluminum.
   1. Products: Schluter Systems; Schiene, Deco or Reno style trim.

F. Filler for Coved Base: Plastic.

PART 3 EXECUTION

3.01 EXAMINATION

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A. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.

B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive resilient base.

C. Cementitious Sub-floor Surfaces: Verify that substrates have fully cured and ready for resilient flooring installation by testing for moisture, pH and compression strength.
   1. Test as Follows:
      a. Alkalinity (pH): ASTM F710.
      b. Internal Relative Humidity: ASTM F2170.
      c. Moisture Vapor Emission: ASTM F1869.
   2. Obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.
   3. Verify cementitious sub-floor and any fillers have reached minimum 3000 psi strength.

3.02 PREPARATION

A. Prepare floor substrates as recommended by flooring and adhesive manufacturers. Remove curing compounds, surface hardeners or other chemicals that may interfere with adhesive bonding. Where subfloor moisture levels are higher than acceptable installation range, prepare or condition space as necessary to permit installation. The use of moisture barrier membrane is acceptable.

B. Remove subfloor ridges and bumps. Fill minor low spots, cracks, joints, holes, and other defects with subfloor filler to achieve smooth, flat, hard surface.

C. Prohibit traffic until filler is fully cured.

D. Clean substrate.

3.03 INSTALLATION - GENERAL

A. Starting installation constitutes acceptance of subfloor conditions.

B. Install in accordance with manufacturer's written instructions.

C. Where type of floor finish, pattern, or color are different on opposite sides of door, terminate flooring under centerline of door. Where flooring is similar, continue seamlessly through opening.

D. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated. Provide nosings at corners of floor plane transtions such as at steps..

E. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.

F. Install flooring in recessed floor access covers, maintaining floor pattern.

G. At movable partitions, install flooring under partitions without interrupting floor pattern.

H. Install feature strips where indicated.

3.04 INSTALLATION - TILE FLOORING

A. Mix tile from container to ensure shade variations are consistent when tile is placed, unless otherwise indicated in manufacturer's installation instructions.

B. Lay flooring with joints and seams parallel to building lines to produce symmetrical pattern.

C. Install tile to match patterns as indicated on approved shop drawings. Allow minimum 1/2 full size tile width at room or area perimeter.

3.05 INSTALLATION - RESILIENT BASE

A. Fit joints tightly and make vertical. Use coil stock when available and install in longest runs with minimal joints possible.

B. Miter internal corners. At external corners, use premolded units. .

C. Install base on solid backing. Bond tightly to wall and floor surfaces.

D. Scribe and fit to door frames and other interruptions.

3.06 CLEANING

A. Remove excess adhesive from floor, base, and wall surfaces without damage.

B. Clean in accordance with manufacturer's written instructions.

3.07 PROTECTION

A. Prohibit traffic on resilient flooring for 48 hours after installation.

B. Seal and Wax resilient flooring with two coats and/as recommended by manufacturer. For products that do not require wax, provide temporary protection until project completion.

END OF SECTION

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SECTION 09 6700
FLUID-APPLIED FLOORING

PART 1 GENERAL V.20

1.01 SECTION INCLUDES

A. Fluid-applied flooring and base with integral color patterns.

B. Divider Strips and accessories.

1.02 REFERENCE STANDARDS

A. ASTM D638 - Standard Test Method for Tensile Properties of Plastics; 2014.

B. ASTM D905 - Standard Test Method for Strength Properties of Adhesive Bonds in Shear by Compression Loading; 2008 (Reapproved 2013).

C. ASTM D4060 - Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser; 2014.

D. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes; 2011.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns and colors available.

C. Samples: Submit two samples, 4 by 4 inch in size illustrating color and pattern for each floor material for each color specified.

D. Manufacturer's Installation Instructions: Indicate special procedures.

E. Maintenance Data: Include maintenance procedures, recommended maintenance materials, procedures for stain removal, repairing surface, and suggested schedule for cleaning.

1.04 QUALITY ASSURANCE

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

B. Applicator Qualifications: Company specializing in performing the work of this section.
   1. Minimum five years of documented experience.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Store resin materials in a dry, secure area.

B. Store materials for three days prior to installation in area of installation to achieve temperature stability.

1.06 FIELD CONDITIONS

A. Maintain minimum temperature in storage area of 55 degrees F.

B. Store materials in area of installation for minimum period of 24 hours prior to installation.

C. Maintain ambient temperature required by manufacturer 72 hours prior to, during, and 24 hours after installation of materials.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Fluid-Applied Flooring:
   1. Crossfield Products Corp: www.crossfieldproducts.com.
   2. Desco Coatings, Inc.: www.descocoating.com.

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3. Key Resin Company: www.keyresin.com.
4. Sherwin-Williams Company: General Polymers Brand: www.generalpolymers.com.
5. Sika Corporation: www.sikafloorusa.com.
6. Tnemec Company; www.tnemec.com.

2.02 FLUID-APPLIED FLOORING SYSTEMS

A. Epoxy Flooring Type EPX-01: Epoxy, two component, thermosetting, colored with mineral filler, with aggregate embedded in base coat.
   1. Base Coat: 1/8 inch thick; color as selected.
   2. Aggregate: Small quartz chips, multiple colors as selected.
   3. Top Coat: Epoxy, single component, thermosetting; 1/8 inch thick; clear.
   4. Tensile Strength: 2,500 psi, when tested in accordance with ASTM D638.
   5. Compressive Strength: 12,000 psi, when tested in accordance with ASTM D695.
   6. Adhesion in Shear Strength: 300-400 psi minimum, when tested in accordance with ASTM D905.
   7. Abrasion Resistance: Maximum weight loss of 32 g/1000 cycles, when tested in accordance with ASTM D4060.
   8. Impact Resistance: 16 in/lb; no cracking, chipping or delamination, when tested with Gardner Impact Tester.
   9. Mildew Resistance: No growth.
   10. Color: Selected by Architect.

2.03 ACCESSORIES

A. Base Caps & Flooring Trim: Extruded anodized aluminum with projecting base of 1/8 inch; color as selected.

B. Cant Strips: Molded of flooring resin material.

C. Subfloor Filler: Type recommended by fluid-applied flooring manufacturer.

D. Primer: Type recommended by fluid-applied flooring manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that subfloor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive flooring.

B. Verify that subfloor surfaces are dust-free and free of substances that could impair bonding of materials to subfloor surfaces.

C. Cementitious Subfloor Surfaces: Verify that substrates are ready for fluid-applied flooring installation by testing for moisture and alkalinity (pH).
   1. Test as Follows:
      a. Internal Relative Humidity: ASTM F2170.
   2. Obtain instructions if test results are not within limits recommended by fluid-applied flooring manufacturer.

D. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

A. Remove subfloor ridges and bumps. Fill low spots, cracks, joints, holes, and other defects with subfloor filler.

B. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Grind irregularities above the surface level. Prohibit traffic until filler is cured.

C. Apply primer or concrete slab moisture humitidy sealer to surfaces required by flooring manufacturer.

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3.03 INSTALLATION - ACCESSORIES

A. Install cant strips at base of walls where flooring is to be extended up wall as base.

B. Install terminating cap strip at top of base and at door thresholds; attach securely to substrate.

3.04 INSTALLATION - FLOORING

A. Apply in accordance with manufacturer's instructions.

B. Apply each coat to minimum thickness indicated.

C. Finish to smooth level surface.

D. Install raised water dam bump around perimetes of showers.

E. Cove at vertical surfaces.

F. Seal perimeter of base cap against wall surface.

3.05 PROTECTION

A. Prohibit traffic on floor finish for 48 hours after installation.

B. Barricade area to protect flooring until fully cured.

END OF SECTION

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SECTION 09 9123
INTERIOR PAINTING

PART 1 GENERAL V.20

1.01 SECTION INCLUDES

A. Surface preparation.

B. Field application of paints.

C. Scope: Finish interior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated.
   1. Both sides and edges of plywood backboards for electrical and telecom equipment before installing equipment.
   2. Mechanical and Electrical:
      a. In finished areas, paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, mechanical equipment, and electrical equipment, unless otherwise indicated.
      b. In finished areas, paint shop-primed items.
      c. Paint interior surfaces of air ducts that are visible through grilles and louvers with one coat of flat black paint to visible surfaces.

D. Do Not Paint or Finish the Following Items:
   1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
   2. Items indicated to receive other finishes.
   3. Items indicated to remain unfinished.
   4. Fire rating labels, equipment serial number and capacity labels, bar code labels, and operating parts of equipment.
   5. Stainless steel, anodized aluminum, bronze, terne coated stainless steel, and lead items.
   6. Marble, granite, slate, and other natural stones.
   7. Floors, unless specifically indicated.
   8. Ceramic and other tiles.
   9. Glass.
   10. Concealed pipes, ducts, and conduits.

1.02 DEFINITIONS

A. Comply with ASTM D16 for interpretation of terms used in this section.

1.03 REFERENCE STANDARDS

A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.

B. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2014.

C. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials; 2007.

D. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; Current Edition, www.paintinfo.com.

E. SSPC-SP 1 - Solvent Cleaning; 2015.

F. SSPC-SP 2 - Hand Tool Cleaning; 1982 (Ed. 2004).

G. SSPC-SP 3 - Power Tool Cleaning; 1982 (Ed. 2004).

H. SSPC-SP 6 - Commercial Blast Cleaning; 2007.

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1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide complete list of products to be used, with the following information for each:
   1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
   2. MPI product number (e.g. MPI #47).
   3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
   4. Manufacturer's installation instructions.

C. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches in size, illustrating range of colors available for each finishing product specified.
   1. Where sheen is specified, submit samples in only that sheen.

D. Manufacturer's Instructions: Indicate special surface preparation procedures.

E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.
   2. Extra Paint and Finish Materials: 1 gallon of each color; from the same product run, store where directed.
   3. Label each container with color in addition to the manufacturer's label.

1.05 QUALITY ASSURANCE

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

1.06 MOCK-UP

A. See Section 01 4000 - Quality Requirements, for general requirements for mock-up.

B. Provide panel, 3 feet long by 3 feet wide, illustrating each paint color, texture, and finish.

C. Provide mock-up on-site of each accent paint colors selected by Architect, minimum 3 feet long by 3 feet wide, in location as directed by Architect. Accent colors to be reviewed by Architect for final approval PRIOR to accent painting starting. Proceeding with Accent painting without approval is done so at Contractor's own risk.

D. Provide door and frame assembly illustrating paint color, texture, and finish.

E. Locate where directed by Architect.

F. Mock-up may remain as part of the work.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.08 FIELD CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.

B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

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C. Do not apply materials when relative humidity exceeds 85 percent; at temperatures less than 5 degrees F above the dew point; or to damp or wet surfaces.

D. Minimum Application Temperatures for Paints: 50 degrees F for interiors unless required otherwise by manufacturer's instructions.

E. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Provide paints and finishes used in any individual system from the same manufacturer; no exceptions.

B. Paints:
1. Base Manufacturer: Sherwin Williams Company; www.sherwin-williams.com.
2. Benjamin Moore; www.benjaminmoore.com.
3. Pittsburgh Paints: www.ppgpaints.com.

C. Primer Sealers: Same manufacturer as top coats.

D. Block Fillers: Same manufacturer as top coats.

2.02 PAINTS AND FINISHES - GENERAL

A. Paints and Finishes: Ready mixed, unless intended to be a field-catalyzed paint.
1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
2. Supply each paint material in quantity required to complete entire project's work from a single production run.
3. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.

B. Colors: To be selected from manufacturer's full range of available colors.
1. Selection to be made by Architect after award of contract.
2. Allow for minimum of three colors for each system, unless otherwise indicated, without additional cost to Owner.
3. In finished areas, finish pipes, ducts, conduit, and equipment the same color as the wall/ceiling they are mounted on/under.

2.03 PAINT SYSTEMS - INTERIOR

A. Paint WI-OP-3L - Wood, Opaque, Latex, 3 Coat:
1. One coat of latex primer sealer. PrepRite ProBlock Latex Primer Sealer B51 Series
2. Semi-gloss: Two coats of latex enamel; Pro Industrial Acrylic Semi Gloss B66-650 Series.

B. Paint MI-OP-3L - Ferrous Metals, Unprimed, Latex, 3 Coat:
1. One coat of acrylic primer. ProCryl Universal Primer B66-310 Series
2. Semi-gloss: Two coats of acrylic enamel; Pro Industrial Semi-Gloss B66-650 Series.

C. Paint MI-OP-2A - Ferrous Metals, Primed, Acrylic, 2 Coat:
1. Touch-up with recommended primer.
2. Semi-gloss: Two coats of acrylic enamel; Pro Industrial Semi Gloss B66-650 Series.

D. Paint MI-OP-2L - Ferrous Metals / Roof Deck / Exposed Interior Structure, Primed, Latex, 2 Coat:
1. Touch-up with recommended primer. Pro-Cryl B66-310 Series
2. Semi-gloss: Two coats of water borne acrylic dryfall Pro Industrial Semi Gloss B42-80 Series. .

E. Paint CI-OP-3E - Concrete/Masonry, Epoxy Enamel, 3 Coat:

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1. One coat of catalyzed epoxy primer. Loxon Block Surfacer A24W200
2. Gloss: Two coats of catalyzed epoxy enamel: Full Gloss. Pro Industrial Precatalyzed Gloss Epoxy B73-300 Series .

F. Paint GI-OP-3L - Gypsum Board/Plaster, Latex, 3 Coat:
1. One coat of alkyd primer sealer. ProMar 200 Primer B28W2600 Series
2. Semi-gloss: Two coats of latex enamel.
3. Eggshell: Two coats of latex enamel; ProMar 200 B20-2600 Series.
4. Flat: Two coats of latex enamel; B30-2600 Series (ceilings).

G. Paint GI-OP-3M - Gypsum Board/Plaster, Epoxy Enamel, 3 Coat:
1. One coat of latex primer sealer. ProMar 200 Latex Primer B28W2600 Series
2. Gloss: Two coats of water based catalized epoxy enamel; Pro Industrial Epoxy B73-300 Series.

H. Paint FI-OP-3A - Fabrics/Insulation Jackets, Alkyd, 3 Coat:
1. One coat of alkyd primer sealer.
2. Eggshell: Two coats of alkyd enamel.

2.04 ACCESSORY MATERIALS

A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.

B. Patching Material: Latex filler.

C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin application of paints and finishes until substrates have been properly prepared.

B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.

D. Test shop-applied primer for compatibility with subsequent cover materials.

E. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
1. Gypsum Wallboard: 12 percent.
2. Masonry, Concrete, and Concrete Masonry Units: 12 percent.
3. Interior Wood: 15 percent, measured in accordance with ASTM D4442.

3.02 PREPARATION

A. Clean surfaces thoroughly and correct defects prior to application.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.

D. Seal surfaces that might cause bleed through or staining of topcoat.

E. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.

F. Concrete:
1. Remove release agents, curing compounds, efflorescence, and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.

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G. Masonry:
   1. Remove efflorescence and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces or if alkalinity of mortar joints exceed that permitted in manufacturer's written instructions. Allow to dry.

H. Gypsum Board: Fill minor defects with filler compound. Spot prime defects after repair.

I. Galvanized Surfaces:
   1. Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.

J. Ferrous Metal:
   1. Solvent clean according to SSPC-SP 1.
   2. Shop-Primed Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.
   3. Remove rust, loose mill scale, and other foreign substances using methods recommended in writing by paint manufacturer and blast cleaning according to SSPC-SP 6 "Commercial Blast Cleaning". Protect from corrosion until coated.

K. Wood Surfaces to Receive Opaque Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats. Back prime concealed surfaces before installation.

L. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

3.03 APPLICATION

A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.

B. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".

C. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

D. Apply each coat to uniform appearance in thicknesses specified by manufacturer.

E. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply as many coats as necessary for complete hide.

F. Sand wood and metal surfaces lightly between coats to achieve required finish.

G. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

H. Wood to Receive Transparent Finishes: Tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.

I. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 CLEANING

A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.05 PROTECTION

A. Protect finishes until completion of project.

B. Touch-up damaged finishes after Substantial Completion.

END OF SECTION

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SECTION 10 2600
WALL AND DOOR PROTECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Corner guards.

1.02 RELATED REQUIREMENTS

A. Section 09 2116 - Gypsum Board Assemblies: Placement of supports in stud wall construction.

1.03 SUBMITTALS

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

B. Product Data: Indicate physical dimensions, features, wall mounting brackets with mounted measurements, anchorage details, and rough-in measurements.

C. Samples: Submit samples illustrating component design, configurations, joinery, color and finish.

D. Manufacturer's Instructions: Indicate special procedures, perimeter conditions requiring special attention, and _____.

E. Maintenance Data: Manufacturer's instructions for care and cleaning of each type of product. Include information about both recommended and potentially detrimental cleaning materials and methods.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Deliver wall and door protection items in original, undamaged protective packaging. Label items to designate installation locations.

B. Protect work from moisture damage.

C. Protect work from UV light damage.

D. Store products in either horizontal or vertical position, in compliance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Corner Guards:
   1. Inpro Corporation; Palladium 3D Trim System: www.inprocorp.com/#sle.
   2. Koroseal Interior Products; _____: www.koroseal.com/#sle.
   3. Wallprotex; wX3 Vinyl Corner Guards: www.wallprotex.com/#sle.
   4. Substitutions: See Section 01 6000 - Product Requirements.

2.02 CORNER GUARDS

A. Corner Guards - Surface Mounted:
   1. Material: Type 430 stainless steel, No.4 finish, 16 gauge, 2 inch thick.
   2. Thickness: 0.075 inch.
   3. Width of Wings: 2 inches.
   4. Corner: Square.
   5. Color: As selected from manufacturer's standard colors.
   6. Length: One piece, 48 inches.
   7. Mounting: Countersunk screws through factory-drilled holes.

2.03 FABRICATION

A. Fabricate components with tight joints, corners and seams.

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PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that rough openings, concealed blocking, and anchors are correctly sized and located.

B. Verify that field measurements are as indicated on drawings.

C. Verify that substrate surfaces for adhered items are clean and smooth.

3.02 INSTALLATION

A. Position corner guard 4 inches above finished floor to 48 inches high.

3.03 CLEANING

A. Clean wall and door protection items of excess adhesive, dust, dirt, and other contaminants.

END OF SECTION

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SECTION 10 2800
TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 GENERAL V.20

1.01 SECTION INCLUDES

A. Commercial toilet accessories.

B. Commercial shower and bath accessories.

C. Utility room accessories.

1.02 RELATED REQUIREMENTS

A. Section 22 4000 - Plumbing Fixtures: Under-lavatory pipe and supply covers.

1.03 REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

B. ASTM A666/A666M - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2024.

C. ASTM F2285 - Standard Consumer Safety Performance Specification for Diaper Changing Tables for Commercial Use; 2004 (Reapproved 2010).

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the work with the placement of internal wall reinforcement and concealed ceiling supports to receive anchor attachments.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Submit data on accessories describing size, finish, details of function, and attachment methods.

C. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Commercial Toilet, Shower, and Bath Accessories:
   1. American Specialties, Inc: www.americanspecialties.com.
   2. Bobrick Washroom Equipment, Inc.: www.bobrick.com.
   3. Bradley Corporation: www.bradleycorp.com.
   4. Georgia-Pacific Professional: www.gppro.com.
   5. Kohler Co.; www.kohler.com.
   6. Substitutions: Section 01 6000 - Product Requirements.

2.02 MATERIALS

A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.
   1. Grind welded joints smooth.
   2. Fabricate units made of metal sheet of seamless sheets, with flat surfaces.

B. Stainless Steel Sheet: ASTM A666/A666M, Type 304.

C. Adhesive: Two component epoxy type, waterproof.

D. Fasteners, Screws, and Bolts: Hot dip galvanized; tamper-proof; security type.

E. Expansion Shields: Fiber, lead, or rubber as recommended by accessory manufacturer for component and substrate.

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2.03 FINISHES

A. Stainless Steel: Satin finish, unless otherwise noted.

2.04 COMMERCIAL TOILET ACCESSORIES

A. Toilet Paper Dispenser **(TA-1)**: Single Roll, surface-mounted, stainless steel unit with pivot hinge.
   1. Product: B685 manufactured by Bobrick.
   2. Substitutions: Section 01 6000 - Product Requirements.

B. Paper Towel Dispenser **(TA-2a)**: Folded paper type, stainless steel, surface-mounted, with viewing slots on sides as refill indicator and tumbler lock.
   1. Capacity: 400 multifold minimum.
   2. Products: B262 manufactured by Bobrick.
      a. Substitutions: Section 01 6000 - Product Requirements.

C. Waste Receptacle **(TA-4)**: Stainless Steel, freestanding style.
   1. Liner: Removable rigid molded plastic receptacle.
   2. Minimum Capacity: 33 gallons.
   3. Product: B2400 Manufactured by Bobrick.

D. Soap Dispenser **(TA-6)**: Liquid soap dispenser, wall-mounted, surface, with stainless steel cover and horizontal stainless steel tank and working parts; push type soap valve, check valve, and window gage refill indicator, tumbler lock.
   1. Minimum Capacity: 48 ounces.
   2. Products: B2112 manufactured by Bobrick.
      a. Substitutions: Section 01 6000 - Product Requirements.

E. Seat Cover Dispenser: Stainless steel, surface-mounted, reloading by concealed opening at base, tumbler lock.
   1. Minimum capacity: 250 seat covers.
   2. Products:
      a. Georgia-Pacific Professional; GP Safe-T-Gard Chrome 1/2 Fold Seatcover Dispenser: www.blue-connect.com/#sle.
      b. Substitutions: Section 01 6000 - Product Requirements.

F. Grab Bars **(TA-7)**: Stainless steel, nonslip grasping surface finish.
   1. Standard Duty Grab Bars:
      a. Push/Pull Point Load: 250 pound-force, minimum.
      b. Length and Configuration: As indicated on drawings.
      c. Products: B812-2 x Length required, manufactured by Bobrick.
         1) Substitutions: Section 01 6000 - Product Requirements.

G. Sanitary Napkin Disposal Unit **(TA-8b)**: Stainless steel, surface-mounted, self-closing door, locking bottom panel with full-length stainless steel piano-type hinge, removable receptacle.
   1. Products: B254 manufactured by Bobrick.
      a. Substitutions: Section 01 6000 - Product Requirements.

H. Framed Mirror: **(TA-11)**: Tempered glazing with 3/4 inch x 3/4 inch stainless steel frame.
   1. Product: B290 manufactured by Bobrick.

2.05 COMMERCIAL SHOWER AND BATH ACCESSORIES

A. Shower Curtain Rod: Stainless steel tube, 1 inch outside diameter, 0.04 inch wall thickness, satin-finished, with 3 inch outside diameter, minimum 0.04 inch thick satin-finished stainless steel flanges, for installation with exposed fasteners.

B. Shower Curtain:

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1. Material: Opaque vinyl, 0.008 inch thick, matte finish, with antibacterial treatment, flameproof and stain-resistant.
2. Size: 36 by 72 inches, hemmed edges.
3. Grommets: Stainless steel; pierced through top hem on 6 inch centers.
4. Color: As selected from manufacturer's standard colors.

C. Folding Shower Seat: Wall-mounted surface; welded tubular seat frame, structural support members, swing-down legs, hinges, and mechanical fasteners of Type 304 stainless steel, L-shaped, right hand seat.
1. Products:
a. Seachrome Corporation; Accessibility Seats- L-Shaped Transfer with Swing-down Legs, Reversible: www.seachrome.com/#sle.
b. Substitutions: Section 01 6000 - Product Requirements.

D. Towel Bar **(TA-13)**: Stainless steel Type 304, 3/4 inch square tubular bar; rectangular brackets, concealed attachment, satin finish.
1. Length: 24 inches.
2. Products: B530 manufactured by Bobrick.
a. Substitutions: Section 01 6000 - Product Requirements.

E. Robe Hook **(TA-15)**: Heavy-duty stainless steel, single-prong, rectangular-shaped bracket and backplate for concealed attachment, satin finish.
1. Products:
a. Substitutions: Section 01 6000 - Product Requirements.

2.06 UTILITY ROOM ACCESSORIES

A. Combination Utility Shelf/Mop and Broom Holder **(MBH-1)**: 0.05 inch thick stainless steel, Type 304, with 1/2 inch returned edges, 0.06 inch steel wall brackets.
1. Provide one at each mop sink, typical.
2. Hooks: Two, 0.06 inch stainless steel rag hooks at shelf front.
3. Mop/broom holders: Three spring-loaded rubber cam holders at shelf front.
4. Length: 36 inches.
5. Products: B239 manufactured by Bobrick.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify exact location of accessories for installation.

C. Verify that field measurements are as indicated on drawings.

3.02 PREPARATION

A. Deliver inserts and rough-in frames to site for timely installation.

B. Provide templates and rough-in measurements as required.

3.03 INSTALLATION

A. Install accessories in accordance with manufacturers' instructions in locations indicated on drawings.

B. Install plumb and level, securely and rigidly anchored to substrate.

C. Mounting Heights: As required by accessibility regulations, unless otherwise indicated.

3.04 PROTECTION

A. Protect installed accessories from damage due to subsequent construction operations.

END OF SECTION

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SECTION 10 4400
FIRE PROTECTION SPECIALTIES

PART 1 GENERAL V.22

1.01 SECTION INCLUDES

A. Fire extinguishers.

B. Fire extinguisher cabinets.

C. Accessories.

1.02 RELATED REQUIREMENTS

A. Section 09 9123 - Interior Painting: Field paint finish.

1.03 REFERENCE STANDARDS

A. ASTM E814 - Standard Test Method for Fire Tests of Through-Penetration Fire Stops; 2013a.

B. FM (AG) - FM Approval Guide; current edition.

C. NFPA 10 - Standard for Portable Fire Extinguishers; 2013.

D. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide extinguisher operational features.

C. Shop Drawings: Indicate locations of cabinets and cabinet physical dimensions.

D. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.

E. Maintenance Data: Include test, refill or recharge schedules and re-certification requirements.

1.05 FIELD CONDITIONS

A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Fire Extinguishers:
   1. Amerex; www.amerex-fire.com.
   2. JL Indistries, Inc.; www.jlindustries.com.
   3. Kidde, a unit of United Technologies Corp: www.kidde.com.
   4. Oval Brand Fire Products; Oval Dry Chemical Fire Extinguisher - Multipurpose ABC: www.ovalfireproducts.com/#sle.
   5. Potter-Roemer: www.potterroemer.com.
   6. Strike First Corporation of America; ABC-Seamless Steel Fire Extinguisher; www.strike-first.com.
   7. Substitutions: See Section 01 6000 - Product Requirements.

B. Fire Extinguisher Cabinets and Accessories:
   1. Activar Construction Products Group - JL Industries: www.activarcpg.com.
   2. Larsen's Manufacturing Co: www.larsensmfg.com.
   3. Oval Brand Fire Products; Cabinets for Low Profile Extinguishers: www.ovalfireproducts.com.
   4. Potter-Roemer: www.potterroemer.com.

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5. Strike First Corporation of America; EL-Elite Architectural Series Fire Extinguisher Cambinet; www.strike-first.com.
6. Substitutions: See Section 01 6000 - Product Requirements.

2.02 FIRE EXTINGUISHERS

A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.
   1. Provide extinguishers labeled by UL (DIR) or FM (AG) for purpose specified and as indicated.
   2. Provide Bi-lingual labels.

B. Multipurpose Dry Chemical Type Fire Extinguishers: Carbon steel tank, with pressure gauge.
   1. Stored Pressure Operated: Deep Drawn.
   2. Class: A:B:C type.
   3. Size: 10 pound.
   4. Finish: Baked polyester powder coat, color as selected.
   5. Temperature range: Minus 40 degrees F to 120 degrees F.

2.03 FIRE EXTINGUISHER CABINETS

A. Fire Rating: Listed and labeled in accordance with ASTM E814 requirements for fire resistance rating of walls where being installed.

B. Fire Rated Cabinet Construction: One-hour fire rated.

C. Cabinet Configuration: Semi-recessed type, coordinate with wall cavity depth.
   1. Exterior nominal dimensions of 12 inch wide by 27 inch high by 4 inch deep.
   2. Trim: Flat square edge, with 1-1/2 inch wide face.

D. Door: 0.036 inch metal thickness, reinforced for flatness and rigidity with nylon catch. Hinge doors for 180 degree opening with two butt hinge.

E. Door Glazing: tempered glass , clear, 1/8 inch thick, flat shape and set in resilient channel glazing gasket.

F. Cabinet Mounting Hardware: Appropriate to cabinet, with pre-drilled holes for placement of anchors.

G. Finish of Cabinet Exterior Trim and Door: Baked enamel, color as selected.

H. Finish of Cabinet Interior: Match exterior.

2.04 ACCESSORIES

A. Extinguisher Brackets: Formed steel, galvanized and enamel finished.

B. Lettering: FIRE EXTINGUISHER decal, or vinyl self-adhering, pre-spaced black lettering in accordance with authorities having jurisdiction (AHJ).

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify rough openings for cabinet are correctly sized and located.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions per NFPA and ADA standards.
   1. Handle for Fire Extinguisher Cabinet shall not be installed higher than 52" above finished floor.
   2. The top of the Fire Extinguisher mounted inside of Cabinet shall not be higher than 60" above finished floor.

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B. Install cabinets plumb and level in wall openings, 24 inches from finished floor to inside bottom of cabinet.

C. Secure rigidly in place.

D. Place extinguishers in cabinets.

E. Position cabinet signage at wall directly above cabinet, and lettering on cabinet doors after painting is complete..

END OF SECTION

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SECTION 12 3600
COUNTERTOPS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Wall-hung counters and vanity tops.

1.02 RELATED REQUIREMENTS

A. Section 22 4000 - Plumbing Fixtures: Sinks.

1.03 REFERENCE STANDARDS

A. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Specimen warranty.

C. Shop Drawings: Complete details of materials and installation ; combine with shop drawings of cabinets and casework specified in other sections.

D. Selection Samples: For each finish product specified, color chips representing manufacturer's full range of available colors and patterns.

E. Test Reports: Chemical resistance testing, showing compliance with specified requirements.

F. Installation Instructions: Manufacturer's installation instructions and recommendations.

G. Maintenance Data: Manufacturer's instructions and recommendations for maintenance and repair of countertop surfaces.

1.05 WARRANTY

A. Provide Manufacturer's standard warranty against fabrication and installation defects.
   1. Damage caused by physical or chemical abuse or damage from excessive heat will not be warranted.
   2. Warranty period: 10 years.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.07 FIELD CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 PRODUCTS

2.01 COUNTERTOPS

A. Solid Surfacing Countertops: Solid surfacing sheet or plastic resin casting over continuous substrate.
   1. Flat Sheet Thickness: 1/2 inch, minimum.
   2. Solid Surfacing Sheet and Plastic Resin Castings: Complying with ISFA 2-01 and NEMA LD 3; acrylic or polyester resin, mineral filler, and pigments; homogenous, non-porous and

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capable of being worked and repaired using standard woodworking tools; no surface coating; color and pattern consistent throughout thickness.
a. Finish on Exposed Surfaces: Matte, gloss rating of 5 to 20.

3. Other Components Thickness: 1/2 inch, minimum.
4. Back and End Splashes: Same sheet material, square top; minimum 4 inches high.

2.02 MATERIALS

A. Adhesives: Chemical resistant waterproof adhesive as recommended by manufacturer of materials being joined.

2.03 FABRICATION

A. Fabricate tops and splashes in the largest sections practicable, with top surface of joints flush.
1. Join lengths of tops using best method recommended by manufacturer.
2. Fabricate to overhang fronts and ends of cabinets 1 inch except where top butts against cabinet or wall.
3. Prepare all cutouts accurately to size; replace tops having improperly dimensioned or unnecessary cutouts or fixture holes.

B. Provide back/end splash wherever counter edge abuts vertical surface unless otherwise indicated.
1. Secure to countertop with concealed fasteners and with contact surfaces set in waterproof glue.
2. Height: 4 inches, unless otherwise indicated.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

C. Verify that wall surfaces have been finished and mechanical and electrical services and outlets are installed in proper locations.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

A. Securely attach countertops to cabinets using concealed fasteners. Make flat surfaces level; shim where required.

B. Seal joint between back/end splashes and vertical surfaces.

3.04 TOLERANCES

A. Variation From Horizontal: 1/8 inch in 10 feet, maximum.

B. Offset From Wall, Countertops: 1/8 inch maximum; 1/16 inch minimum.

C. Field Joints: 1/8 inch wide, maximum.

3.05 CLEANING

A. Clean countertops surfaces thoroughly.

3.06 PROTECTION

A. Protect installed products until completion of project.

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B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION

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SECTION 22 00 00
PLUMBING

PART 1 – GENERAL

1. PROJECT INFORMATION

   A. Project: RPM GSA LITTLE ROCK USSS

   B. Owner: RPM

   C. Architect: WER Architects

   D. The Project consists of constructing a vehicle storage facility and office in an existing shell tenant space in Little Rock, AR.

2. GENERAL CONDITIONS

   The General conditions, Supplementary General Conditions, Information to Bidders, Division A and all other pertinent documents issued by the Architect, are a part of these specifications and shall be complied with in every respect.

3. SCOPE AND CONDITIONS OF WORK

   The Plumbing work consists of furnishing all labor and materials, and performing all operations necessary in the installation of the Plumbing systems in accordance with the Drawings and Specifications. In case of conflict between the Plumbing Drawings and Specifications the most stringent shall govern. In case of conflict between this section and other sections of Division 22 (Plumbing) the most stringent shall govern.

4. SPECIAL INSPECTION

   The Architect will inspect the piping systems, duct systems and equipment systems when they are ready for testing. The Plumbing Contractor shall notify the Architect 24 hours prior to this time so that the Architect can make inspection and give approval of or indicate corrective action before systems are concealed.

5. PAINTING

   Unless otherwise specified, job finish painting will be done by the General Contractor, and painted Plumbing equipment shall be baked enamel finish. The Plumbing Contractor shall restore damaged painted surfaces of Plumbing equipment to its original condition.

6. CODES AND STANDARDS

   Materials and workmanship shall comply with the Contract Documents and applicable codes and standards, including the IPC (most current). If applicable codes and standards and the Contract Documents differ, the Contractor shall promptly notify the Architect in writing of such difference. If the Contractor performs any work that does not comply with the requirements of applicable codes and standards, he shall bear all costs in correcting such defect. Applicable codes and standards shall include all state laws, local

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ordinances, utility company regulations and applicable requirements of nationally accepted codes and standards. All pressure vessels, including hot water storage containers, shall be constructed in compliance with the rules and regulations of the Boiler Inspection Division of the State of Arkansas, and installation of such equipment shall be made by firms licensed by the Boiler Inspection Division. Where required, duct, piping, Plumbing systems, equipment, and support systems shall be installed in accordance with Arkansas Act 1100 of l991 for earthquake resistant design.

7. COORDINATION OF WORK

A. The Plumbing Drawings show the general arrangement of piping, equipment and appurtenances, and shall be followed as closely as practicable. The Plumbing work shall conform to the requirements shown on all of the drawings. General and Structural Drawings shall take precedence over Plumbing Drawings. It is not practical to indicate all offsets, fittings, and accessories required. The Contractor shall study the structural and finish conditions affecting the work, and arrange his work accordingly, providing fittings, valves, and accessories required. The Contractor shall study the structural and finish conditions affecting the work, and arrange his work accordingly, providing fittings, valves, and accessories required to meet such conditions.

B. The Contractor shall compare the Plumbing Drawings and Specifications with the Drawings and Specifications for other trades and report any discrepancies between them to the Architect and obtain from him written instructions for changes necessary in the Plumbing work. The Plumbing work shall be installed in cooperation with other trades installing interrelated work. Before installation, the Contractor shall make proper provisions to avoid interferences. Changes required in the work of the contractor caused by his neglect to do so shall be made by him at his own expense.

C. Anchor bolts, sleeves, inserts, and supports for the Plumbing work shall be furnished and installed by the Plumbing Contractor.

D. Slots, chases, openings and recesses through floors, walls, ceilings and roofs in new construction will be provided by the various trades in their respective materials, but the trade requiring them shall see that they are properly located and shall do any cutting and pay for any patching caused by the neglect to do so.

E. Locations of pipes, equipment, fixtures, etc., shall be adjusted to accommodate the work to interferences anticipated and encountered. The contractor shall determine the exact route and location of each pipe prior to fabrication.

F. Lines that pitch shall have the right of way over those which do not pitch. For example, plumbing drains shall normally have right of way. Lines whose elevations cannot be changed shall have the right of way over lines whose elevations can be changed.

G. Transitions and changes in direction in pipe and ducts shall be made as required to maintain proper head room and pitch of sloping lines. The contractor shall furnish and install traps, air vents, sanitary vents, etc., required to affect these offsets and changed in directions.

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H. The contractor shall provide access panels in walls, ceilings, equipment, ducts, etc., as required for inspection of interiors and for proper maintenance.

8. FEES, PERMITS, AND INSPECTION

Fees, permits, and inspections shall be obtained and paid for by the Contractor under the section of the Specifications for which they are required. The Contractor shall furnish a certificate of final inspection to the Architect from the inspection department having jurisdiction.

9. EQUIPMENT AND MATERIALS

A. Materials shall be new and bear the manufacturer's name, trademark, and the UL label in every case where a standard has been established for the particular material. Equipment shall be the standard product of a manufacturer regularly engaged in the production of that type of equipment, and shall be the manufacturer's latest approved design.

B. Products and Manufacturers specified on the plans and in these specifications are for basis of design and equal manufacturers that meet the same criteria shall be deemed acceptable. Products shall meet "Buy American Act," unless such products are proven to be unavailable for the function specified.

C. Equipment shall be protected against moisture, dirt, damage and theft. Fixtures, equipment and materials shall be cleaned and polished and turned over to the owner in a condition satisfactory to the Architect. Rusted surfaces shall be refinished.

D. The contractor shall make field measurements to ascertain space requirements, including those for connections, and shall furnish and install such sizes and shapes of equipment that the final installation shall suit the intent of the Drawings and Specifications.

E. Manufacturer's directions shall be followed in the delivery, storage, protection and installation of equipment and materials. The contractor shall promptly notify the Architect in writing of any conflict between any requirement of the Contract Documents and the manufacturer's directions, and shall obtain the Architect's written instruction before proceeding with the work. Should the Contractor perform any work that does not comply with the manufacturer's directions or such written instructions from the Architect, he shall bear all cost arising in correcting deficiencies.

10. EQUIPMENT ACCESSORIES

A. The Contractor shall furnish and install equipment, accessories, connections, and incidental items necessary to complete the work, ready for use, occupancy and operation by the Owner.

B. Where equipment requiring different arrangement or connections from those shown is approved, it shall be the responsibility of the Contractor to install the

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equipment to operate properly. He shall provide additional motors, controllers, supports, bases, valves, fittings, and other equipment, including required changes in affected trades. The contractor shall be responsible for the proper location of rough-ins and connections by other trades. All changes shall be made at no increase in the Contract amount or additional costs to other trades.

C. The contractor shall support work and equipment plumb, rigid, and true to line. The Contractor shall study the General, Structural, Plumbing and Electrical Drawings, shop drawings, and catalog data to determine how equipment, fixtures, piping, ductwork, etc., are to be installed. The Contractor shall provide bolts, inserts, pipe stands, brackets, and accessories for proper support. When directed, the Contractor shall submit drawings showing supports for approval.

11. CUTTING AND PATCHING

A. The contractor shall be responsible for digging, cutting, etc., incident to his work, and shall make repairs thereafter to the satisfaction of the Architect, but no structural element, beam or column shall be cut without the written approval of the Architect.

B. Pavements, sidewalks, roads, and curbs shall be cut, patched, repaired and/or replaced as required to permit the installation of underground work of the various trades and such cutting, patching, repairing and replacing shall be the responsibility of, and paid for by, the Contractor under the section of the Specifications of the trade requiring the work.

C. Each trade shall bear the expense of cutting, patching, repairing or replacing of the work of other trades required because of his fault, error, or tardiness.

12. EXCAVATION AND BACKFILLING

A. Separate trenches shall be provided for each utility or service to the building unless otherwise noted or approved. All excavations shall be made by open cut. Banks of trenches shall be kept as nearly vertical as practicable, and trenches over 5 feet deep (and where required) shall be properly sheeted and braced.

B. Water shall be removed as necessary to fully protect workmen and adjacent structures, and to permit proper installation of work. Under no circumstances shall pipe be laid or appurtenances installed in water; trenches shall be kept free from water until pipe joint material has hardened. Presence of ground water in soil or necessity of sheeting or bracing trenches shall not constitute a condition for which any increase may be made in contract price. Sheeting left in place shall be cut off not less than two feet below finished grade.

C. Material to be excavated shall be unclassified, and shall include all earth or other material encountered. Contract shall include removal of all such materials to depth and extent as required.

D. Trenches shall be graded evenly on bottom to ensure uniform bearing for full length of pipe. Bell holes shall be cut for joint making. Where bottom of trench is rock, cement, gravel or other similar hard materials, trench shall be excavated to

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an overdepth of at least three inches below trench depth otherwise required. Overdepth in the excavation shall be filled with firmly compacted sand or fine gravel, or with concrete.

E. Trenches shall not be backfilled until all required tests have been performed and section tested meets requirements as specified herein. Trenches shall be carefully backfilled with excavated materials consisting of earth, loam, sandy clay, sand and gravel, soft shale, or other approved materials free from large clods of earth or stone, deposited in thoroughly compacted six-inch layers, loose thickness, until pipe has a cover of not less than one foot. Remainder of pipe shall be backfilled and compacted thoroughly with a runner of suitable weight, or with an approved Plumbing tamper or if backfill material is granular, settling with water will be permissible. Areas which are subsequently to receive pavements, walks, or other surfacing shall be tamped solidly in layers not to exceed six inches loose thickness. Along all portions of trenches, except areas to receive pavements, walks, or other surfacing, ground shall be graded to a reasonable uniformity and mounding over the trenches left in a uniform and neat condition. Trenches under floor slabs shall be backfilled and compacted as directed by the Architect.

13. GENERAL PIPING INSTALLATION

A. The Contractor shall furnish and install a complete system of piping, valved as indicated and necessary to control the entire apparatus and appurtenances. The piping drawings are diagrammatic and indicate the general location and connections.

B. Piping shall be properly supported, and adequate provisions made for expansion, contraction, slope and anchorage. Piping shall be cut accurately for fabrication to the measurements taken at the site, and shall be worked into place without springing or farcing, clearing windows, doors, and other openings and equipment. Pipes shall have burr and cutting slag removed by reaming or other cleaning methods.

C. Piping shall be arranged to permit removal of equipment, access to openings, removal of coils, filters, etc., so that there will be no interference with the installation of equipment, ducts, etc., and to ensure noiseless circulation. Valves and specialties shall be placed to permit easy operation and access, and valves shall be regulated, packed and glands adjusted so as to avoid liquid or air pockets. Eccentric reducers shall be used where changes in pipe sizes occur, and the reducers shall be located approximately 18” beyond the nearest upstream branch. Expansion and contraction of piping shall be provided by expansion loops, bends, and/or expansion joints top prevent injury to connections, piping, equipment or the building.

D. Minimum slope of piping shall be in accordance with the following, unless otherwise required:

1. Waste and vent piping ¼” per foot.
2. Main building sewer and storm sewer, 4” and larger. 1/8” per foot (Minimum).
3. Water piping (where practical). 1” in 40 ft. to drain points.

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E. Unions or flanges shall be installed on bypasses, ahead of traps, and at all equipment connections to permit removal of equipment.

F. Sleeves shall be provided around pipes passing through walls, floors, ceilings, partitions, structural members or other building parts. Sleeves through floors or walls below grade and exterior walls shall be schedule 40 galvanized iron pipes two sizes larger that the pipe or insulation, so that pipe or insulation shall pass through freely with space for movement. Sleeves through floors shall be extended ¼' above floor finish in toilets or in rooms where domestic water is used. In other rooms, sleeves shall be flush with the floor. Sleeves through outside walls and floor shall be sealed with Non-Asbestos fireproof and watertight packing. Sleeves through inside walls and floors above grade may be 18-gauge galvanized steel.

G. Plates: Spring clamp plates (escutcheons) shall be provided where pipes are exposed through walls, floors, or ceilings, except in concealed spaces. Plates shall be chrome-plated spun brass, set tight on the pipe and to the building surface.

H. Flashing: Piping passing through new built-up roof shall be flashed with a square sheet of 4-pound soft lead or 16 oz. Copper extended to the top of pipe and turned over top and into pipe ½" or extended to flashing collar where pipe continues beyond roof.

   Flashings through metal building roofs and existing roofs shall be as directed by the Architect.

I. Protection: Ends of pipes and equipment shall be capped to keep foreign matter out of the system. Plugs of rags, waste, or similar materials shall not be used.

J. Hangers and Supports: Pipe hooks, chains or perforated iron shall not be used for pipe support. Hangers shall be attached to floor inserts or expansion shields.

   1. Hangers, support rods, and other support accessories for bare copper tubing shall be copper plated.

   2. Vertical Piping: Riser clamps shall be placed at each floor and at each coupling or fitting. Clamps shall be supported by structural members which are supported directly from the building structure. Clamps for bare copper tubing shall be copper plated.

K. Cleaning: Remove dirt, grease, and other foreign matter from pipe before making connections.

L. Installation of Underground Pipe: Each pipe shall be laid true to line and grade and in such manner as to form a close concentric joint with adjoining pipe and to prevent sudden offset to flow line.

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M. Pipe Sizes: If pipe sizes are not clearly evident, the Contractor shall request instructions as to proper sizing. Changes resulting from the Contractor's failure to request clarification shall be at his own expense.

N. Pressure Regulators: Where water supply pressure can exceed 75 psi, the Contractor shall install two (2) pressure-reducing valves sized for 1/3 and 2/3 flow to maintain a maximum of 75 psi.

O. Pressure Testing: All pressure pipe (e.g., domestic water pipe, natural or LP gas pipe, compressed air piping, etc.) shall be pressure tested according to the most current applicable standards of the International Plumbing Code (IPC), International Fuel Gas Code (IFGC), Arkansas Plumbing Code, Arkansas Health Department Standards, and the Authority Having Jurisdiction (AHJ).

14. ELECTRICAL WIRING

A. Electrical wiring for Plumbing equipment is separated into two main wiring divisions: "Power Wiring" and "Control Wiring."

1. Power Wiring – Shall be the energy source and includes circuit protective devices, motor starters or controllers, conduit, wiring and safety disconnects beginning at the Power Supply and terminating at the motor or terminals on equipment.

2. Control Wiring – Comprises conduit and wiring not included in power wiring, including automatic temperature control wiring, interlock wiring, pilot light and signal wiring, etc., that is not included as part of prewired equipment, but necessary for the proper operation and safety of the equipment.

B. Unless otherwise noted, Power wiring shall be done by the Electrical Contractor under the supervision of the equipment supplier, and Control Wiring shall be done by the Contractor furnishing the equipment. All wiring shall be done in compliance with the Electrical Division (Division 16) of these Specifications.

15. NOISE CONTROL

It is intended that the Plumbing system as installed under this contract be free from objectionable noise when the system is operating, Isolate equipment, pipelines, etc., as directed so as to insure an acceptable noise level in all of the Plumbing systems.

16. CLEANING AND REPAIR

Do not allow waste material and rubbish to accumulate in or about the premises. After completion of this work, remove rubbish, tools, scaffolding and surplus materials from and about the building and leave all work clean and ready for use. Clean all equipment, pipes, valves and fittings, of grease, metal cuttings and sludge. Repair any stoppage, discoloration or other damage to parts of the building, its finish or furnishings due to failure to properly clean the Plumbing systems, without additional cost to the Owner.

17. CLEAN WATER SYSTEMS

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1. Do not turn water into the domestic water system until the system has been thoroughly cleaned and approved by the Engineer.

18. INSTRUCTIONS OF OWNER'S REPRESENTATIVE:

The Contractor shall instruct the representatives of the Owner in the operation and maintenance of the Plumbing system.

19. SUBMITTALS:

The Contractor shall submit within thirty days after the awarding of the contract brochures of descriptive data of proposed material and equipment. Failure by the Contractor to comply shall make him liable for the expense of delays and changes in construction. If the Contractor fails to comply, the Architect may go directly to the manufacturer and obtain and details necessary. Cost of changes in connection with this procedure shall be borne by the Contractor. Submittals shall designate the exact item offered. Submittals shall not cover detailed installation drawings prepared for the Contractor's own use but shall be limited to necessary departures from the Contract Drawings.

20. SUBSTITUTION OF MATERIALS:

Competition is requested and where a definite material or equipment is specified, it is not the intent to discriminate against any "approved equal" product. However, no substitution shall be made unless authorized in writing by the Architect.

21. UTILITIES LOCATION

Location and elevations of utilities are offered as a guide only, without guarantee as to accuracy. The contractor shall verify location and elevation of utilities and their relation to the work with the Owner before starting any work.

22. GUARANTEE

The Contractor shall guarantee his materials, equipment, and labor to be fee of defects for one year from date of final acceptance, and should any defects appear within this period, the defect will be replaced or repaired without additional expense to the Owner. This guarantee shall include the replacement of drive belts, bearings, seals, and other similar items whose improper installation, or lack of attention could be cause for failure within the one-year period. This guarantee does not include the replacement of air filters, lamps or similar expendable items.

23. RECORD DRAWINGS

The Plumbing Contractor shall prepare record drawings to be delivered to the Architect prior to final acceptance. These drawings shall show systems as installed, including location, medium conveyed, pipe size, pipe material of all underground lines. Also, shown location, size, medium conveyed, pressure, material of all existing underground lines encountered during installation of systems under this contract.

24. BOND REQUIREMENTS

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100% Performance and Payment bonds for each subcontractor.

END OF SECTION

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SECTION 22 05 23
GENERAL-DUTY VALVES FOR PLUMBING

PART 1 - GENERAL

1.01 Scope of Work:

A. Valves specified in this section are for general use. See specifications for specific system for special valves.

B. Submit brochures and other data for approval of all items differing from those specified.

PART 2 - PRODUCTS

2.01 Gate Valves:

A. 1/4" through 2": 125 lb. SWP, 200lb. WOG. Bronze, screw-in bonnet, threaded ends, non-rising stem, solid wedge.

B. 2-1/2" through 12": 125lb. SWP, 200 lb. WOG, iron body, inside screw, bronze mounted, flanged ends, non-rising stem, solid wedged.

2.02 Globe Valves:

A. 1/8" through 2": 125 lb., SWP, 200 lb. WOG, bronze, screw-in bonnet, threaded ends, Buna-N seat disc for water, oil, or gas (W), Teflon seat disc for steam (Y).

B. 2-1/2" through 10": 125 lb. SWP, 200 lb. WOG, iron body, outside screw and yoke, bronze mounted, flanged ends, Buna-N seat disc for water, oil or gas (W), composition seat disc for steam (S).

2.03 Swing Check Valves:

A. 1/4" through 2": 125 lb. SWP, 200 lb. WOG, Bronze, threaded ends, Buna-N seat disc for water, oil or gas (W), Teflon seat disc for steam (S).

B. 2-1/2" through 10": 125 lb. SWP, 200 lb. WOG, iron body, bronze mounted, flanged ends, Buna-N seat disc for water, oil, or gas (W), composition seat disc for steam (S).

2.04 Butterfly Valves:

A. 2-1/2" through 8": 150 lb. WWP, lug type cast iron body, ductile iron disc, 416 stainless steel, shaft, EPDM seat, disc shall not seal in shaft hole, extended neck, infinite position throttling handle with memory stop.

2.05 Ball Valves:

A. 1/4" through 2-1/2":, 150 lb. steam, 400 lb. WOG, bronze, full port, threaded ends, Buna-N

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seat for water, oil, or gas (W), Teflon seat for steam (Y).

2.06 Balancing Valves:

A. 3/4" and Below: 20 psi cold liquid, 175 PSI at 150 degrees F, brass, screwdriver slot adjustment, screwed ends, air vent if required.

B. 1/2" through 2": 125 lb. SWP, 200 lb. WOG, semi-steel lubricated, wrench operated threaded ends.

C. 2-1/2" through 12": 175 lb. WOG, semi-steel lubricated, wrench operated flanged ends.

2.07 Pressure Reducing Valves:

A. For 1/2” to 2-1/2” standard capacity water reducing valve 25 to 75 psi adjustable range.

2.08 GAS COCKS

A. 2 inch and smaller: Bronze body, bronze tapered plug, nonlubricated, teflon

PART 3 - EXECUTION

3.00 General

A. Provide isolation valves before and after all in-line plumbing equipment for service (e.g., water heaters, pumps, tanks, RPZs, pressure regulators, etc.), in main domestic water lines, and at all branch line locations from domestic water lines. Provide stops or valves ahead of all plumbing fixtures in accessible locations for service.

B. Provide valves in main gas lines, at branches from main gas lines, and at all equipment for service.

3.01 Arrangement or Location:

A. Locate valves in an accessible position. Where several valves are related as to function, group in a battery.

B. No valve shall be installed with stem below horizontal position without prior approval.

C. Provide special handles or operators as might be required or as indicated on the drawings.

D. Valves specified under specific systems shall take precedence over those as specified herein.

E. Valves in copper pipe shall have threaded ends (except where size dictates flanged ends), use copper to MPT adapters.

F. The use of threaded ends or flanged ends is the Contractor's option within the size listed.

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3.02 Valve Boxes:

A. All valves located below slabs or grade shall be housed in cast iron boxes. Cover shall be properly identified as to the services controlled by the valve.

B. Furnish Owner with proper key and valve-operator extensions.

END OF SECTION

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SECTION 22 05 29
HANGERS AND SUPPORTS FOR PLUMBING

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Provide adequate pipe, equipment foundation and suspension system in accordance with recognized engineering practices. Where possible, use standard, commercially-accepted hangers and accessories.

1.02 CODES

A. All pipe hangers and supports shall conform to the latest requirements of the code for Pressure Piping, Refrigeration Society of ANSI/ASME B 31.5-74 and Manufacturers' Standardization Society of Valve and fittings industry documents MASS-SP-58-75 and MASS-SP-69-76.

B. All auxiliary steel necessary for the installation of the pipe hangers and supports shall be designed in accordance with the AISC, or as indicated on the drawings.

C. Supporting steel not shown for the piping and equipment shall be designed, supplied and erected by the Contractor. (The supporting steel is that steel which is connected to the structural members shown on the drawings and carries the weight of the mechanical items). This supporting steel design must carry the dead weight and dynamic load imposed by the equipment or piping.

PART 2 PRODUCTS

2.01 PIPE HANGERS

A. All hangers for piping two (2) inch or larger shall be provided with means of vertical adjustment.

B. Where thermal movement causes the hanger rod to deviate more than five (5) degrees from the vertical, or where longitudinal expansion causes a movement of more than 1/2" in the piping supported from below, roller hangers shall be used in conjunction with a protection saddle to suite the insulation thickness. On insulated pipe the hanger must be placed on the outside of the insulation with a shield.

2.02 BRACKETS AND RACKS

A. Multiple pipe racks or trapeze hangers shall be fabricated from B-line, FAMET, or UNISTRUT channel, clamps and accessories.

2.03 VIBRATION ISOLATION FOR EQUIPMENT

A. Provide vibration and acoustic isolation for all Plumbing equipment that includes rotating equipment capable of producing vibration (i.e., pumps, etc.).

B. Vibration isolators for suspended equipment shall be equal to combination rubber and spring isolators by Mason Industries and rated for the load of the equipment connected.

C. For floor mounted equipment, provide neoprene pad isolation equal to Mason Industries waffle pad isolators for acoustic and vibration isolation and rated for the equipment weight supported.

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D. If seismic isolation is required based on structural classification of building (verify with architectural and structural plans and specifications), upgrade isolators and supports to seismic rated equipment for the loads supported equal to Mason Industries.

PART 3 EXECUTION

3.01 ATTACHING TO STRUCTURE

A. Where equipment or piping is supported from building steel, beam-clamps or welded beam attachments shall be used. Holes drilled in building steel for hanger support rods will not be permitted.

B. All vertical runs of piping shall be supported at the floor.

3.02 HANGER ROD 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 hangers shall be installed at each change in direction not more than two feet (2') from end of run. On straight runs, support at each joint and intermediately, so the spacing shall not exceed the following, whichever is closer:

Size	Steel pipe	Copper pipe
To 3/4"	7'	5'
1" to 2"	10'	8'
2-1/2" to 4"	12'	10'
5" to 8"	16'	10'
10" and larger	20'	10'

C. Provide supports at concentrated loads such as equipment, in-line pumps, valves and other piping, to prevent line sag and/or excess stress in the piping systems.

D. For cast iron pipe, provide a hanger at each joint or fitting with a maximum spacing of five (5) feet on center.

E. Where distance between riser clamp and hanger exceed ten (10) feet in height, intermediate clamps shall be installed to provide support or alignment at a maximum of every ten (10) feet.

3.03 AUXILIARY STEEL

A. Furnish all miscellaneous structural members necessary to hang or support pipe or mechanical equipment. Material of members shall be consistent with that of the main structural system.

B. All auxiliary steel shall receive one shop coat of primer paint prior to installation.

C. Notify Engineer of any adjustment in main structural system for support of major equipment or piping.

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3.04 CONCRETE PADS

A. Provide concrete pads under floor-mounted equipment and apparatus as indicated on drawings and coordinate with structural drawings.

3.05 INSULATION INSERTS OR SADDLES

A. Provide insulation inserts or saddles at all points of support on insulated pipe. Insert to be same thickness as adjoining pipe insulation.

END OF SECTION

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SECTION 22 05 53
IDENTIFICATION FOR PLUMBING

PART 1 - GENERAL

1.01 Pipe Identification:

A. All piping shall be identified with pressure-sensitive pipe markers with color bands of the proper size. Markers shall have proper legend and meet OSHA specifications. Where pipes are too small for such application, a 1-1/2" brass tag shall be used.

B. Markers shall be applied to the piping at the following locations:

1. Adjacent to each valve.

2. At each branch and riser take-off.

3. At each pipe passage through wall, floor and ceiling construction.

4. At each pipe passage to underground.

5. At not more than forty (40) feet spacing on straight pipe runs.

C. Markers shall be placed so as to be easily read. Arrows shall be applied to indicate direction of flow.

1.02 Valve Identifications:

A. Provide brass tags for all valves with legend describing function of each valve. Tag shall also indicate normally-open or normally-closed.

PART 2 - PRODUCTS:

2.01 Valve Tags:

A. Brass tags shall be a minimum of two (2) inches diameter of 3-1/2" oval, to accommodate 1" height numbers. Tag shall be equipped with a 3/16" X 6" long brass chain.

2.02 Pipe Markers and Bands:

A. Markers and band sizes shall conform to the following:

Outside Diameter of Pipe or Insulation	Width of Color band	Lettering Height
To 1”	3/4"	3/8”
1” to 3”	1-1/2”	3/4"
3” to 6”	2-1/2”	2”
6” and over	4”	3-1/2”

B. Marker band colors, and marker legends shall conform to OSHA.

C. Arrows shall be of same color as bands, and shall point in director of flow and downstream of

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pipe legend.

PART 3 - EXECUTION

3.01 Work Included:

A. Legends shall be securely fixed to the pipe with full circumference bands on each side of legend. Arrows downstream of legend shall have full circumference band at the arrow end.

B. Valve tags shall be numbered in accordance with a valve chart, to be framed, and mounted in the equipment room. Said chart shall describe valve location and function.

END OF SECTION

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SECTION 22 07 19
PLUMBING PIPING INSULATION

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Piping Insulation

B. Adhesive, tie wires, tapes.

C. Insulated domestic hot, cold, & hot water return water piping above finished floor.

1.02 PROJECT CONDITIONS

A. Deliver material to project site in original non-broken factory packaging, labeled with manufacturer's density and thickness.

B. Perform work at ambient and equipment temperatures as recommended by the adhesive manufacturer.

PART 2 - PRODUCTS

2.01 GENERAL

A. Adhesives and insulation materials: composite fire and smoke hazard ratings of maximum 25 for flame spread and 50 for smoke developed. Adhesives to be waterproof.

2.02 INSULATION MATERIALS

A. Domestic Cold, hot, and hot water return water piping: Fine glass fiber insulation, with factory applied vapor barrier jacket, molded to conform to piping "K" value at 75°F, maximum 0.24 BTU*inch/(hr*ft^2*°F) Insulation shall have vapor barrier jacket, self-sealing lap and butt strips.

B. Roof Drain/Storm Drain Piping within building: Fine glass fiber insulation, with factory applied vapor barrier jacket, molded to conform to piping "K" value at 75°F, maximum 0.24 BTU*inch/(hr*ft^2*°F) Insulation shall have vapor barrier jacket, self-sealing lap and butt strips

PART 3 - EXECUTION

3.01 PREPARATION

A. Do not install covering before piping and equipment has been tested and approved.

B. Ensure surface is clean and dry prior to installation and during application. Finish with systems at operating conditions.

3.02 INSTALLATION

A. Ensure insulation is continuous through inside walls. Pack around pipes with fireproof self-supporting insulation material, fully sealed.

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B. Insulate fittings and valves. Do not insulate unions, flanges, strainer, flexible connections, and expansion joints. Terminate insulation neatly with plastic material troweled on bevel. Provide removable bands of flexible fiberglass insulation with vapor sealed jacket over all insulated surfaces previously described.

C. Finish insulation neatly at hangers, supports and other protrusions.

D. Locate insulation or cover seams in least visible locations and install aluminum bands on 8" centers.

E. Domestic Cold & hot water piping, chilled water piping, and service hot water piping: Cover fittings and valves with equivalent thickness of insulation material. Cover with open mesh glass cloth sealed with vapor barrier sealant. Seal lap joints with 100 percent coverage of vapor barrier sealant and adhesive. Seal butt joints with 4-inch wide strips of vapor barrier sealed with vapor barrier adhesive. For exposed fittings and valves, apply hydraulic setting cement paste over insulation material before applying finish.

F. Insulate bowls of roof drains to prevent condensation.

G. Repair separation of joints or cracking of insulation due to thermal movement or poor workmanship.

H. All interior insulated piping crossing areas without ceilings (exposed) shall be painted per Architect.

I. Install .020 aluminum recovering on all exterior piping.

J. Paint all insulated, jacketed piping per Architect in exposed areas without ceilings.

3.03 INSULATION THICKNESS SCHEDULE:

Piping or Equipment	Pipe Size Inches	Insulation Thickness
Domestic Cold Water Piping	1/4 thru 1/2"	1/2 inch
Domestic Hot Water Piping	All Sizes	1 inch
Domestic Hot & cold Water Piping	3/4" and Larger	1 inch
Cold Condensate Drains	All sizes	1/2 inch
Roof Drain Piping Above Slab	All Sizes	1/2 inch

END OF SECTION

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SECTION 22 10 00
PLUMBING PIPING

PART 1 - GENERAL

1.01 Work Included:

A. Pipe and Pipe Fittings.

B. Valves.

C. Sanitary sewer piping system.

D. Storm Drain & Roof Drain piping system.

E. Domestic water piping system.

F. Cold Condensate drain piping system.

G. Compressed Air Piping

H. Natural Gas Piping

PART 2 - PRODUCTS

2.01 Sanitary Sewer and storm drain piping, Buried beyond 5 feet of building.

A. Cast Iron Pipe: ASTM A74, service weight. Fittings: Cast Iron. Joints; ASTM C564, neoprene gasketing system or lead and oakum.

2.02 Sanitary Sewer Piping, Buried under and within 5 feet of building.

A. Cast Iron Pipe: ASTM A74 service weight. Fittings: Cast Iron. Joints: Hub-and-spigot, CISPI HSN compression type with ASTM C564 neoprene gaskets or lead and oakum.

2.03 Sanitary Sewer and roof drain piping, above grade.

A. Cast Iron Pipe: ASTM A74, service weight. Fittings: Cast Iron Joints: Hub-and-Spigot, CISPI HSN compression type with ASTM C564 neoprene gasket or lead and oakum.

B. Cast Iron Pipe: CISPI 301, hubless, service weight. Fittings: Cast iron, Joints: Neoprene gaskets and stainless steel heavy duty clamp-and shield assemblies.

C. Copper Pipe: ASTM B306, DWV. Fittings: ANSI/ASME B16.3, cast bronze, or ANSI/ASME B16.29, wrought copper. Joints: ANSI/ASTM B32, solder, Grade 50B.

2.04 Water Piping, Buried Beyond 5 feet of building

A. Ductile Iron Pipe: ASNI/AWWA C151, Fittings: Ductile iron standard thickness. Joints: ANSI/AWWA C111, Rubber gasket with 3/4 inch diameter rods.

B. Copper tubing: ASTM B88, Type "K" soft. Fittings: ANSI/ASME B16.29, wrought copper. Silver Braze.

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2.05 Water Piping, Buried Under and Within 5 feet of Building

A. Copper tubing: ASTM B88, Type "K" hard or soft drawn. Fittings: ANSI/ASME B16.29, wrought copper. Silver Braze.

2.06 Water Piping, Above Ground

A. Copper Tubing: ASTM B88, Type "L" hard drawn. Fittings: ANSI/ASME B16.23, cast brass, or ANSI/ASME B16.29, wrought copper. Joints: ASNI/ASTM B32, solder, Grade 95 TA.

2.07 Condensate Drain Piping, Above Ground

A. Copper tubing: ASTM B88, type "M" hard drawn. Fittings: ANSI/ASME B16.23 cast brass of ANSI/ASME B16.29 wrought copper. Joints: ANSI/ASME B32, solder, Grade 95TA.

2.08 Compressed Air Piping, Above Grade Inside Building

A. Less than 4” copper tubing Type “K”, Silver brazed 95/5

2.09 Couplings and Unions

A. Pipe size under 2 inches: 150 psig malleable iron for threaded ferrous piping; bronze unions for copper pipe.

B. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

2.10 Valves (Refer to Section 22 11 19)

2.11 Condensate Drain Piping, Above Ground

A. Copper tubing: ASTM B88, type "M" hard drawn. Fittings: ANSI/ASME B16.23 cast brass or ANSI/ASME B16.29 wrought copper. Joints: ANSI/ASME B32. Solder. Grade 95TA.

2.12 Natural Gas Piping, Above Grade Inside Building

A. Steel Pipe: ASTM A53 or A120. Schedule 40 Black. Fittings ANSI/ASME B16.3 malleable iron, or ASTM A234. forged steel welding type. Joints: Screwed for pipe two inches and under ANSI/AWS D1.1 welded, for all pipe sizes (optional).

2.13 Natural Gas Piping, Above Grade or Exposed Outside

A. Pipe shall be schedule 40 black steel with external coating (yellow).

2.14 Natural Gas Piping Outside Underground

A. Schedule 40 black steel with external coating.

B. Polyethylene Plastic ASTM-D2513 with compatible fitting thermally welded where approved by authorities and Architect.

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PART 3 - EXECUTION

3.01 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.

D. All underground steel piping shall be coated for corrosion protection with a suitable coating/method prior to insulating and burying pipe.

3.02 Installation

A. Provide non-conducting dielectric connections wherever joining dissimilar metals.

B. Route piping in orderly manner and maintain gradient.

C. Install piping to conserve building space and not interfere with use of space or access to equipment.

D. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

E. Provide clearance for installation of insulation and access to valves and fittings.

F. Provide access where valves and fittings are not exposed.

G. Slope water piping and arrange to drain at low points.

H. Establish elevations of buried piping outside the building to ensure adequate cover. (24 inch minimum cover)

I. Establish invert elevations, slopes for drainage of 1/8" inch per foot minimum within building for Pipe 4" larger. Slope smaller sizes 1/4" per foot minimum. Maintain gradient.

J. Install valves with stems upright or horizontal, not inverted.

3.03 Application:

A. Install unions downstream of valves at equipment or apparatus connections.

B. Install brass male adapters each side of valves in copper piped system. Sweat solder adapters to pipe.

C. Install gate or ball valves for shut-off and to isolate equipment.

3.04 Disinfection of Domestic Water Piping System:

A. Prior to starting use, verify system is complete, flushed and clean.

B. Comply with all requirements of the Little Rock Water Dept. and Arkansas State Health

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Department.

3.05 Coordination:

A. Consult and verify with serving utility the exact location, size, depth and requirements of all utility services.

END OF SECTION

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SECTION 22 30 00
PLUMBING EQUIPMENT

PART 1 - GENERAL

1.01 Work Included:

A. Plumbing Fixtures

B. Plumbing Specialties

C. Installation

PART 2 - PRODUCTS

2.01. General

A. Catalog numbers have been taken from current catalogs and used for descriptive purposes, but it is not intended to exclude any recognized equal products approved by the owner.

B. Products and Manufacturers specified herein are for basis of design and equal manufacturers that meet the same criteria are acceptable. Product shall meet “Buy American Act,” unless such products are proven to be unavailable for the function specified. Manufacturers specified herein and alternates include but are not limited to:

- Zurn
- Elkay
- Watts
- Kohler
- American Standard
- Just
- Halsey Taylor
- Stern Williams
- Guy Gray
- IPS Corporation
- Armstrong
- TACO
- Grundfos
- Rheem
- Lochinvar
- State Systems
- Amtrol
- Josam
- Guardian
- Freedom Showers by Accessibility Professionals
- Aquatic Showers by American Bath Group
- Oasis Showers

C. Flush valves shall be equipped with vacuum breakers. All service sinks shall have vacuum breaker and hose threaded attachment.

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D. Plumbing fixtures and equipment shall be furnished and installed complete with trim required to connect to rough-in piping at floor or wall, unless otherwise specified under the item. Fixture shall be Kohler or as scheduled.

E. Fixtures shall be protected during construction and then thoroughly cleaned after all painting, plastering, and cleaning of the building has been done.

F. Floor and Wall escutcheons shall be furnished with all fixtures. All fixtures shall be white. Trim shall be chromium plated brass.

G. Approved stops, installed in accessible locations as directed by Architect shall be provided on each fixture supply pipe.

2.02. Plumbing Fixture - Schedule:

A. P-1AH: Water Closet (ADA): ZURN Z5665-BWL1, 12” rough-in, 1-1/2” top spud, 16 ¾” bowl height, White, Vitreous China, floor mounted, bottom outlet, elongated siphon jet flushing toilet with bolt caps, Centoco 500 STSCCSS solid plastic open front white seat with check hinge and stainless steel hinges. Provide with ZURN Aquaflush Plus Exp FV WC valve No.Z600PL-WS1 and Zurn Z5972-COMB closet bolt and wax ring kit.

B. P-2AH: Lavatory (ADA): ELKAY Lustertone Classic Model ELUH1212 Stainless Steel 14-1/2” x 14-1/2” x 7” Single Bowl Undermount Sink with LK35 3-1/2” Drain Fitting, 304 Stainless Steel Body, Strainer Basket, and Tailpiece. Provide with Zurn Model Z812B4-XL Deck-Mounted 4” Center set faucet, 5-3/8” gooseneck, 4” writs blade handles, 2.2gpm with aerator, Z8700-PC R867 Cast Body P Trap 17 ga 11/4 with cleanout, and Z8800-XL-LR-LK-PC lead free stops, escutcheons, and flexible supplies.

C. P-4C: Wall Mount Wash Sink, ELKAY Model EWMA4820C Stainless Steel, Wall Mount 48” x 20” x 18”, Single Compartment, 14 gauge 304 stainless steel, Buffed Satin Finish, center drain, with two faucets. Provide with two (2) LK940GN05T4H faucets, Elkay LK18B drain, Z8700-PC R867 Cast Body P Trap 17 ga 11/4 with cleanout, and Z8800-XL-LR-LK-PC lead free stops, escutcheons, and flexible supplies. Coordinate mounting and mounting height to meet ADA requirements.

D. P-5: Eye Wash, Guardian G1891 Wall mounted, all stainless-steel construction, corrosion resistant, eyewash with stainless steel bowl, ½” U.S. made stay-open stainless steel ball valve, stainless steel flag handle and wall bracket. Unit shall have (2) polypropylene GS-Plus™ spray heads with integral “flip-top” dust covers, filters and 1.6 GPM flow control orifices mounted on stainless steel head assembly. Unit shall include ANSI compliant sign. Provide with G6020 thermostatic mixing valve, chrome plated P-trap, and chrome plated angle stops with chrome plated escutcheons.

E. P-6H: Electric Drinking Fountain: Elkay LZS8WSSP on-wall mount refrigerated, filtered bottle filling station and single drinking fountain with sensor bottle fill activation and mechanical front activation for anti-microbial flexible safety bubbler, rated 8.0 gph@115V/1phase. SS finish and coordinate mounting @ ADA accessible heights.

F. P-7: Floor Sink: Zurn Floor sink ZN-1902-12"-NH floor sink with 4" trap. AR type acid resistant coating. Provide with full grate with center opening and stainless steel mesh liner for

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bucket. Provide with Zurn Z1072 Z shield barrier trap seal. Or Engineer Approved Equal.

G. P-8: Frost Proof Encased Variable Temp Wall Hydrant: Zurn Z1325 Wall Hydrant, ¾ inch anti siphon, non-freeze, vari-temp, bronze or stainless box (verify). Length to suit location. Or Engineer Approved Equal.

H. P-11: HW Recirculation Pump – Armstrong all bronze circulator pump, Model # E7.2B, 1/6 HP, 3400 RPM, 120 Volt, 1phase, 2.0 FLA. Provide with Thermostatic Control.

I. P-13: Air Gap – Zurn Model AG, 2" outlet. Provide with stainless steel access or paint to match steel access panel as required (verify with architect).

J. P-16: Thermal Expansion tank: Therm-X-Trol model ST-12, 4.4 gallon tank, ¾" NPTM connection.

K. DWH-1: Commercial Gas Water Heater – (1 required). Lochinvar HVC (High Value Condensing) Water Heater Model#LHPCT-40L, 93% thermal efficiency, helical heat exchanger, blue diamond glass lined tank, 150 psi working pressure, direct vent sealed combustion, natural gas, brass drain valve, and leak detection technology. Provide with venting kit and condensate neutralization kit. 3/4" NPT DCW inlet & DHW outlet connections, ½" NPT gas connection, and 2" flue and intake air connections. Dimensions: 22" diameter x 45" tall, 40 gallon capacity. Rated for 62GPH at 90°F rise, 86 gallons first hour. Approximate weight 216# (empty).

L. SHOWER: Provide Speakman Neo Shower Head Combination, Model VS-123010, polished chrome finish, with 2-way diverter, 5 position hand shower, ADA slide bar, & 60 inch metal hose, 2.5GPM flow rate. Provide Zurn Temp-Gard III single handle chrome polished shower valve. Provide Freedom Showers ADA Transfer Shower Model #APC3838BF1PRF-R, right receiver flange with left side valve wall. Provide shower with accessory package Model# APCACCPKG3838SD-R with (1) fold up L-shaped shower seat with legs, (1) L-shaped grab bar – size 18" x 33", (1) straight grab bar – length 18", recessed soap dish, curtain rod, and drain with stainless steel strainer. Provide also with weighted shower curtain (verify with architect).

2.03. Plumbing Accessories:

A. FCO: Floor cleanouts Zurn Z-1400 cast iron adjustable nickel bronze (or finish per Architect – verify) top to suit floor material, round top.

B. WCO: Wall cleanouts (WCO): Zurn Z-1305-1, with cast iron plug, cast iron ferrule, and polished nickel-bronze (or finish per Architect - verify) round flat access cover.

C. Shock absorbers: Josam No. 1485 Hydro-pneumatic Absorbotron sized per manufacturers sizing method for fixture units served.

D. WB: Guy Gray Stainless Steel Washing Machine Outlet Box, model SSWB1TM with 2" center drain slip nut to be used with 2" pipe or male adapter, and ½" quarter turn sweat valves, top mount.

E. PRV: Water Pressure Regulators: Zurn 1-600XL3 water pressure regulator. Coordinate for

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line size on drawings.

F. Thermostatic Mixing Valves for Lavs: ZURN P6900-MV or Equal.

PART 3 - EXECUTION

3.01 Inspection

A. Review millwork shop drawings. Confirm location and size of fixtures and openings before rough-in and installation.

B. Verify when adjacent construction is ready to receive rough-in work of this section.

3.02 Installation

A. Install each fixture with trap, easily removable for servicing and cleaning.

B. Install specialties in accordance with manufacturer's instructions to permit intended performance.

C. Install shock absorbers and water hammer arrestors at points system sufficient to mitigate momentum changes in pipe and sudden water shutoff (field coordinate and verify).

D. Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Ensure clearance at cleanout for rodding of drainage system.

E. Provide chrome plated rigid or flexible supplies to all fixtures (with wheel handle stops, reducers, and escutcheons.)

F. Provide specified mixing valves integral to supply to fixtures for all LAVs and handwashing fixtures.

G. Install components level and plumb.

H. Install and secure fixtures in place with supports, wall carriers and bolts.

3.03 Adjusting and Cleaning:

A. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

B. At completion, clean plumbing fixtures and equipment.

END OF SECTION

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SECTION 23 00 00
HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)

PART 1 – GENERAL

1. PROJECT INFORMATION

   A. Project: RPM GSA LITTLE ROCK USSS

   B. Owner: RPM

   C. Architect: WER Architects

   D. The Project consists of constructing a vehicle storage facility and office in an existing shell tenant space in Little Rock, AR.

2. GENERAL CONDITIONS

   The General conditions, Supplementary General Conditions, Information to Bidders, Division A and all other pertinent documents issued by the Architect, are a part of these specifications and shall be complied with in every respect.

3. SCOPE AND CONDITIONS OF WORK

   The mechanical work consists of furnishing all labor and materials, and performing all operations necessary in the installation of the mechanical systems in accordance with the Drawings and Specifications. In case of conflict between the Mechanical Drawings and Specifications the most stringent shall govern. In case of conflict between this section and other sections of Division 23 (Mechanical) the most stringent shall govern.

4. SPECIAL INSPECTION

   The Architect will inspect the piping systems, duct systems and equipment systems when they are ready for testing. The Mechanical Contractor shall notify the Architect 24 hours prior to this time so that the Architect can make inspection and give approval of or indicate corrective action before systems are concealed.

5. PAINTING

   Unless otherwise specified, job finish painting will be done by the General Contractor, and mechanical equipment shall be baked enamel finish. The Mechanical Contractor shall restore damaged painted surfaces of mechanical equipment to its original condition.

6. CODES AND STANDARDS

   Materials and workmanship shall comply with the Contract Documents and applicable codes and standards. If applicable codes and standards and the Contract Documents differ, the Contractor shall promptly notify the Architect in writing of such difference. If the Contractor performs any work that does not comply with the requirements of applicable codes and standards, he shall bear all costs in correcting such defect. Applicable codes and standards shall include all state laws, local ordinances, utility company regulations and applicable requirements of nationally accepted codes and standards. All pressure

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vessels, including hot water storage containers, shall be constructed in compliance with the rules and regulations of the Boiler Inspection Division of the State of Arkansas, and installation of such equipment shall be made by firms licensed by the Boiler Inspection Division. Where required, duct, piping, mechanical systems, equipment, and support systems shall be installed in accordance with Arkansas Act 1100 of l991 for earthquake resistant design.

7. COORDINATION OF WORK

A. The Mechanical Drawings show the general arrangement of piping, equipment and appurtenances, and shall be followed as closely as practicable. The Mechanical work shall conform to the requirements shown on all of the drawings. General and Structural Drawings shall take precedence over Mechanical Drawings. It is not practical to indicate all offsets, fittings, and accessories required. The Contractor shall study the structural and finish conditions affecting the work, and arrange his work accordingly, providing fittings, valves, and accessories required. The Contractor shall study the structural and finish conditions affecting the work, and arrange his work accordingly, providing fittings, valves, and accessories required to meet such conditions.

B. The Contractor shall compare the Mechanical Drawings and Specifications with the Drawings and Specifications for other trades and report any discrepancies between them to the Architect and obtain from him written instructions for changes necessary in the Mechanical work. The Mechanical work shall be installed in cooperation with other trades installing interrelated work. Before installation, the Contractor shall make proper provisions to avoid interferences. Changes required in the work of the contractor caused by his neglect to do so shall be made by him at his own expense.

C. Anchor bolts, sleeves, inserts, and supports for the Mechanical work shall be furnished and installed by the Mechanical Contractor.

D. Slots, chases, openings and recesses through floors, walls, ceilings and roofs in new construction will be provided by the various trades in their respective materials, but the trade requiring them shall see that they are properly located and shall do any cutting and pay for any patching caused by the neglect to do so.

E. Locations of pipes, ducts, equipment, fixtures, etc., shall be adjusted to accommodate the work to interferences anticipated and encountered. The contractor shall determine the exact route and location of each pipe and duct prior to fabrication.

F. Lines that pitch shall have the right of way over those which do not pitch. For example, plumbing drains shall normally have right of way. Lines whose elevations cannot be changed shall have the right of way over lines whose elevations can be changed.

G. Transitions and changes in direction in pipe and ducts shall be made as required to maintain proper head room and pitch of sloping lines. The contractor shall furnish and install traps, air vents, sanitary vents, etc., required to affect these offsets and changed in directions.

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H. The contractor shall provide access panels in walls, ceilings, equipment, ducts, etc., as required for inspection of interiors and for proper maintenance.

8. FEES, PERMITS, AND INSPECTION

Fees, permits, and inspections shall be obtained and paid for by the Contractor under the section of the Specifications for which they are required. The Contractor shall furnish a certificate of final inspection to the Architect from the inspection department having jurisdiction.

9. EQUIPMENT AND MATERIALS

A. Products and Manufacturers specified on the plans and in these specifications are for basis of design and equal manufacturers that meet the same criteria shall be deemed acceptable. Products shall meet “Buy American Act,” unless such products are proven to be unavailable for the function specified.

B. Materials shall be new and bear the manufacturer’s name, trademark, and the UL label in every case where a standard has been established for the particular material. Equipment shall be the standard product of a manufacturer regularly engaged in the production of that type of equipment and shall be the manufacturer’s latest approved design.

C. Equipment shall be protected against moisture, dirt, damage and theft. Fixtures, equipment and materials shall be cleaned and polished and turned over to the owner in a condition satisfactory to the Architect. Rusted surfaces shall be refinished.

D. The contractor shall make field measurements to ascertain space requirements, including those for connections, and shall furnish and install such sizes and shapes of equipment that the final installation shall suit the intent of the Drawings and Specifications.

E. Manufacturer’s directions shall be followed in the delivery, storage, protection and installation of equipment and materials. The contractor shall promptly notify the Architect in writing of any conflict between any requirement of the Contract Documents and the manufacturer’s directions and shall obtain the Architect’s written instruction before proceeding with the work. Should the Contractor perform any work that does not comply with the manufacturer’s directions or such written instructions from the Architect, he shall bear all cost arising in correcting deficiencies.

10. EQUIPMENT ACCESSORIES

A. The Contractor shall furnish and install equipment, accessories, connections, and incidental items necessary to complete the work, ready for use, occupancy and operation by the Owner.

B. Where equipment requiring different arrangement or connections from those shown is approved, it shall be the responsibility of the Contractor to install the equipment to operate properly. He shall provide additional motors, controllers, supports, bases, valves, fittings, and other equipment, including required changes in affected trades. The contractor shall be responsible for the proper

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location of rough-ins and connections by other trades. All changes shall be made at no increase in the Contract amount or additional costs to other trades.

C. The contractor shall support work and equipment plumb, rigid, and true to line. The Contractor shall study the General, Structural, Mechanical and Electrical Drawings, shop drawings, and catalog data to determine how equipment, fixtures, piping, ductwork, etc., are to be installed. The Contractor shall provide bolts, inserts, pipe stands, brackets, and accessories for proper support. When directed, the Contractor shall submit drawings showing supports for approval.

11. CUTTING AND PATCHING

A. The contractor shall be responsible for digging, cutting, etc., incident to his work, and shall make repairs thereafter to the satisfaction of the Architect, but no structural element, beam or column shall be cut without the written approval of the Architect.

B. Pavements, sidewalks, roads, and curbs shall be cut, patched, repaired and/or replaced as required to permit the installation of underground work of the various trades and such cutting, patching, repairing and replacing shall be the responsibility of, and paid for by, the Contractor under the section of the Specifications of the trade requiring the work.

C. Each trade shall bear the expense of cutting, patching, repairing or replacing of the work of other trades required because of its fault, error, or tardiness.

12. EXCAVATION AND BACKFILLING

A. Separate trenches shall be provided for each utility or service to the building unless otherwise noted or approved. All excavations shall be made by open cut. Banks of trenches shall be kept as nearly vertical as practicable, and trenches over 5 feet deep (and where required) shall be properly sheeted and braced.

B. Water shall be removed as necessary to fully protect workmen and adjacent structures, and to permit proper installation of work. Under no circumstances shall pipe be laid or appurtenances installed in water; trenches shall be kept free from water until pipe joint material has hardened. Presence of ground water in soil or necessity of sheeting or bracing trenches shall not constitute a condition for which any increase may be made in contract price. Sheeting left in place shall be cut off not less than two feet below finished grade.

C. Material to be excavated shall be unclassified, and shall include all earth or other material encountered. Contract shall include removal of all such materials to depth and extent as required.

D. Trenches shall be graded evenly on bottom to ensure uniform bearing for full length of pipe. Bell holes shall be cut for joint making. Where bottom of trench is rock, cement, gravel or other similar hard materials, trench shall be excavated to an overdepth of at least three inches below trench depth otherwise required. Overdepth in the excavation shall be filled with firmly compacted sand or fine gravel, or with concrete.

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E. Trenches shall not be backfilled until all required tests have been performed and section tested meets requirements as specified herein. Trenches shall be carefully backfilled with excavated materials consisting of earth, loam, sandy clay, sand and gravel, soft shale, or other approved materials free from large clods of earth or stone, deposited in thoroughly compacted six-inch layers, loose thickness, until pipe has a cover of not less than one foot. Remainder of pipe shall be backfilled and compacted thoroughly with a runner of suitable weight, or with an approved mechanical tamper or if backfill material is granular, settling with water will be permissible. Areas which are subsequently to receive pavements, walks, or other surfacing shall be tamped solidly in layers not to exceed six inches loose thickness. Along all portions of trenches, except areas to receive pavements, walks, or other surfacing, ground shall be graded to a reasonable uniformity and mounding over the trenches left in a uniform and neat condition. Trenches under floor slabs shall be backfilled and compacted as directed by the Architect.

13. GENERAL PIPING INSTALLATION

A. The Contractor shall furnish and install a complete system of piping, valved as indicated and necessary to control the entire apparatus and appurtenances. The piping drawings are diagrammatic and indicate the general location and connections.

B. Piping shall be properly supported, and adequate provisions made for expansion, contraction, slope and anchorage. Piping shall be cut accurately for fabrication to the measurements taken at the site and shall be worked into place without springing or farcing, clearing windows, doors, and other openings and equipment. Pipes shall have burr and cutting slag removed by reaming or other cleaning methods.

C. Piping shall be arranged to permit removal of equipment, access to openings, removal of coils, filters, etc., so that there will be no interference with the installation of equipment, ducts, etc., and to ensure noiseless circulation. Valves and specialties shall be placed to permit easy operation and access, and valves shall be regulated, packed and glands adjusted so as to avoid liquid or air pockets. Eccentric reducers shall be used where changes in pipe sizes occur, and the reducers shall be located approximately 18” beyond the nearest upstream branch. Expansion and contraction of piping shall be provided by expansion loops, bends, and/or expansion joints to prevent injury to connections, piping, equipment or the building.

D. Minimum slope of piping shall be in accordance with the following, unless otherwise required:

1. Waste and vent piping ¼” per foot.
2. Main building sewer and storm sewer, 4” and larger. 1/8” per foot (Minimum).
3. Water piping (where practical). 1” in 40 ft. to drain points.

E. Unions or flanges shall be installed on bypasses, ahead of traps, and at all equipment connections to permit removal of equipment.

F. Sleeves shall be provided around pipes passing through walls, floors, ceilings, partitions, structural members or other building parts. Sleeves through floors or

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walls below grade and exterior walls shall be schedule 40 galvanized iron pipes two sizes larger than the pipe or insulation, so that pipe or insulation shall pass through freely with space for movement. Sleeves through floors shall be extended ¼' above floor finish in toilets or in rooms where domestic water is used. In other rooms, sleeves shall be flush with the floor. Sleeves through outside walls and floor shall be sealed with Non-Asbestos fireproof and watertight packing. Sleeves through inside walls and floors above grade may be 18-gauge galvanized steel.

G. Plates: Spring clamp plates (escutcheons) shall be provided where pipes are exposed through walls, floors, or ceilings, except in concealed spaces. Plates shall be chrome-plated spun brass, set tight on the pipe and to the building surface.

H. Flashing: Piping passing through new built-up roof shall be flashed with a square sheet of 4-pound soft lead or 16 oz. Copper extended to the top of pipe and turned over top and into pipe ½" or extended to flashing collar where pipe continues beyond roof.

   Flashings through metal building roofs and existing roofs shall be as directed by the Architect.

I. Protection: Ends of pipes and equipment shall be capped to keep foreign matter out of the system. Plugs of rags, waste, or similar materials shall not be used.

J. Hangers and Supports: Pipe hooks, chains or perforated iron shall not be used for pipe support. Hangers shall be attached to floor inserts or expansion shields.

   1. Hangers, support rods, and other support accessories for bare copper tubing shall be copper plated.

   2. Vertical Piping: Riser clamps shall be placed at each floor and at each coupling or fitting. Clamps shall be supported by structural members which are supported directly from the building structure. Clamps for bare copper tubing shall be copper plated.

K. Cleaning: Remove dirt, grease, and other foreign matter from pipe before making connections.

L. Installation of Underground Pipe: Each pipe shall be laid true to line and grade and in such manner as to form a close concentric joint with adjoining pipe and to prevent sudden offset to flow line.

M. Pipe Sizes: If pipe sizes are not clearly evident, the Contractor shall request instructions as to proper sizing. Changes resulting from the Contractor's failure to request clarification shall be at his own expense.

N. Pressure Regulators: Where water supply pressure can exceed 75 psi, the Contractor shall install two (2) pressure-reducing valves sized for 1/3 and 2/3 flow to maintain a maximum of 75 psi.

14. ELECTRICAL WIRING

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A. Electrical wiring for mechanical equipment is separated into two main wiring divisions: “Power Wiring” and “Control Wiring.”

1. Power Wiring – Shall be the energy source and includes circuit protective devices, motor starters or controllers, conduit, wiring and safety disconnects beginning at the Power Supply and terminating at the motor or terminals on equipment.

2. Control Wiring – Comprises conduit and wiring not included in power wiring, including automatic temperature control wiring, interlock wiring, pilot light and signal wiring, etc., that is not included as part of prewired equipment, but necessary for the proper operation and safety of the equipment.

B. Unless otherwise noted, Power wiring shall be done by the Electrical Contractor under the supervision of the equipment supplier, and Control Wiring shall be done by the Contractor furnishing the equipment. All wiring shall be done in compliance with the Electrical Division (Division 16) of these Specifications.

15. MOTOR AND EQUIPMENT CONTROL

A. Each motor, electrical equipment or group of motors and equipment shall be provided with starters and pilot devices that will perform the functions as specified. Starters and pilot devices shall conform to NEMA Standard LCL and UL Standard for Industrial Control Equipment.

B. Manual Starter shall be provided for manually started single phase motors under ½ horsepower or as noted on the Drawings. Starters shall be single or two pole with selector switches, push button, pilot lights and interlocking attachments are required. Contactors may be used in lieu of manual starter if motor has integral overload protections.

C. Magnetic starters shall be provided for motors ½ horsepower and larger, and motors started by pilot devices. Starters shall have necessary control devices in cover, three interlocking contacts, and low-voltage protection.

D. Starters shall have overload relays in all ungrounded conductors. Overload relays shall be sized to protect the motor with consideration given to ambient temperature of the motor and controller.

E. Starters, pushbutton stations, selector switches, pilot lights, relays, automatic temperature controllers, safety devices, solenoids, and similar devices that are not a part of a motor control center or switchgear, shall be furnished and installed by the Contractor furnishing the equipment, except starters and contactors in individual enclosures shall be furnished to the Electrical Contractor for his installation.

F. Starters, pilot lights, contactors, pushbuttons, and similar devices located in finished spaces shall be flush-mounted and surface-painted to match surrounding finish.

G. Inverter Duty Motors operated by Variable Frequency Drives (VFD). Where VFDs are not specified to be provided with the equipment in the contract drawings, schedules, or specifications, it shall be the control contractor’s responsibility to

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provide VFDs where required. If the mechanical contractor also provides controls for the project, then the mechanical contractor shall provide VFDs where required. Coordinate with electrical for required circuits, overcurrent protection, and disconnects for VFDs.

16. ELECTRICAL MOTORS

A. Motors shall be of recognized American manufacturer and shall conform to latest standards of manufacture and performance of NEMA and AIEE. Motors shall be highest efficiency and shall meet the current energy code requirements.

B. Motors shall be rated for continuous duty at 100 percent of rated capacity, and temperature rise shall be 40 degrees C open type: 50 degrees C drip and splash proof: 55 degrees C explosion proof and totally enclosed, above an ambient of 40 degrees C.

C. Unless otherwise required, integral horsepower polyphase motors shall be Class B, general purpose, squirrel cage, open type induction motors.

D. Motors ½ horsepower or less shall have integral overcurrent protection.

E. Motors 10 horsepower and above shall have positive temperature coefficient thermistors embedded in the phase windings of the motor. 120 mechanical degrees part. P.T.C. thermistors, or Westinghouse Guardistor.

F. Motors inside building or suitable housing shall be open type drip-proof. Motors exposed to weather shall be totally enclosed. Fan-cooled. Motors in hazardous locations of duty shall be explosion proof of the type required for the service.

17. AIR AND WATER BALANCE (BY INDEPENDENT CONTRACTOR)

A. All air and water quantities and flow rates shall, after completion of the job, be adjusted to provide quantities and flow rates shown on plans. After complete adjustment, additional re-adjustment shall be performed to satisfy desired temperature, pressure, & flow. All air measurements during setting operations shall be made by means of the "Velometer" or "Anemometer" method. Measurements for water shall be made by differential pressure and temperature measurements and/or flow meter measurements. Instruments used for check of air and water quantities and flow rates shall have recent certification of correctness.

Independent Air Balance Contractor shall submit evidence of qualifications as follows:

a. Submit Air Balance Contractor qualifications for review.
b. Evidence of certification of calibration of equipment.

18. NOISE CONTROL

It is intended that the mechanical system as installed under this contract be free from objectionable noise when the system is operating, Isolate equipment, pipelines, ductwork, etc., as directed so as to insure an acceptable noise level in all of the mechanical systems.

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19. CLEANING AND REPAIR

Do not allow waste material and rubbish to accumulate in or about the premises. After completion of this work, remove rubbish, tools, scaffolding and surplus materials from and about the building and leave all work clean and ready for use. Clean all equipment, pipes, valves and fittings, of grease, metal cuttings and sludge. Repair any stoppage, discoloration or other damage to parts of the building, its finish or furnishings due to failure to properly clean the mechanical systems, without additional cost to the Owner.

20. SYSTEM OPERATING TESTS

For start-up of equipment, the Contractor shall balance circulating or water, air and other fluids to provide proper quantities to spaces or items of equipment. He shall adjust valves, dampers, and similar items to ensure that the Mechanical systems perform as intended. A report shall be provided containing a summary of all tests. After the successful completion of all equipment start-up and test requirements, perform the following tests on the complete mechanical systems:

A. First Operating Test by contractor: Prove the operation of the mechanical systems and of each individual item in the systems. Give at least 10 days' notice to the Engineer of such tests. Should any item of the systems fail to perform in an approved manner, repeat this test until approved by the Engineer.

B. Checking by Owner and Engineer: Following the successful completion of first operating tests by the Contractor, the Owner and the Engineer have the privilege of making such tests as they may desire during a period of three weeks to ascertain in detail if any corrections are to be made to the system. At the end of the testing by the Owner and the Engineer, the Engineer may direct the Contractor in writing to make such corrections to the systems as are within the scope of the contract.

C. Contractor's Corrections to Systems: Make all required corrections to the systems and notify the Engineer in writing that the corrections outlined have been completed. Give at least seven (7) days' notice of a final three-day operating test.

D. Three-Day Operating Test: Perform an operating test to the satisfaction of the Engineer for a period of three (3) days. Should any element of the systems not perform properly, make all required corrections and repeat three-day test until successfully performed.

    a. Submit the Form of record proposed by the Contractor for the recording of all measurements to the Engineer for approval at least two weeks before the approved form will be required by the Contractor.

    b. Measurements: Make the following measurements at two-hour intervals (5 measurements per 8-hour day) during the three-day operating test.

        (1) Electrical: Running amperes and voltage of each motor 3/4 horsepower or larger.

        (2) Water pressures at each pump suction and discharge.

        (3) Air temperatures in each heated or air-conditioned space and outdoor temperatures.

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c. Instruments: Provide all instruments, materials and labor to perform the tests and to obtain and record the measurements specified herein, including the furnishing of all required record forms as approved by the Engineer. Submit for the Engineer's Approval, complete shop drawings or catalog data for all instruments to be used for the three-day operating test and obtain approval at least two weeks before the instruments will be required for test measurements.

d. Report: Submit four (4) copies of a written report of the three-day operating test on the approved form of record to the Engineer for approval and subsequent transmittal to the Owner.

21. ACCESS PANELS

Provide access panels as required and in all walls, ceilings and ductwork to service and have access to all valves, operating parts and duct mounted fire dampers. For all ceiling and wall access doors that are required in gypsum board and plaster, provide 24" X 24" Milcor type appropriate for the construction involved.

22. TEMPORARY HEAT OR COOLING

1. Do not use the permanent heating or cooling systems as a temporary source of heat, cooling, or dehumidification during construction. When the building is substantially complete and only after approval of the Owner may the permanent building heating systems be utilized.

2. Do not turn water into the system until the systems have been thoroughly cleaned and approved by the Engineer.

23. INSTRUCTIONS OF OWNER'S REPRESENTATIVE:

The Contractor shall instruct the representatives of the Owner in the operation and maintenance of the Mechanical system.

24. SUBMITTALS:

The Contractor shall submit within thirty days after the awarding of the contract brochures of descriptive data of proposed material and equipment. Failure by the Contractor to comply shall make him liable for the expense of delays and changes in construction. If the Contractor fails to comply, the Architect may go directly to the manufacturer and obtain and details necessary. Cost of changes in connection with this procedure shall be borne by the Contractor. Submittals shall designate the exact item offered. Submittals shall not cover detailed installation drawings prepared for the Contractor's own use, but shall be limited to necessary departures from the Contract Drawings.

25. SUBSTITUTION OF MATERIALS:

Competition is requested and where a definite material or equipment is specified, it is not the intent to discriminate against any "approved equal" product. However, no substitution shall be made unless authorized in writing by the Architect.

26. UTILITIES LOCATION

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Location and elevations of utilities are offered as a guide only, without guarantee as to accuracy. The contractor shall verify location and elevation of utilities and their relation to the work with the Owner before starting any work.

27. GUARANTEE

    The Contractor shall guarantee his materials, equipment, and labor to be fee of defects for one year from date of final acceptance, and should any defects appear within this period, the defect will be replaced or repaired without additional expense to the Owner. This guarantee shall include the replacement of drive belts, bearings, seals, and other similar items whose improper installation, or lack of attention could be cause for failure within the one-year period. This guarantee does not include the replacement of air filters, lamps or similar expendable items.

28. RECORD DRAWINGS

    The Mechanical Contractor shall prepare record drawings to be delivered to the Architect prior to final acceptance. These drawings shall show systems as installed, including location, medium conveyed, pipe size, pipe material of all underground lines. Also, shown location, size, medium conveyed, pressure, material of all existing underground lines encountered during installation of systems under this contract.

29. BOND REQUIREMENTS

    100% Performance and Payment bonds for each subcontractor.

END OF SECTION

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SECTION 23 05 23
GENERAL-DUTY VALVES FOR HVAC PIPING

PART 1 - GENERAL

1.01 Scope of Work:

A. Valves specified in this section are for general use. See specifications for specific system for special valves.

B. Submit brochures and other data for approval of all items differing from those specified.

PART 2 - PRODUCTS

2.01 Gate Valves:

A. 1/4" through 2": 125 lb. SWP, 200lb. WOG. Bronze, screw-in bonnet, threaded ends, non-rising stem, solid wedge.

B. 2-1/2" through 12": 125lb. SWP, 200 lb. WOG, iron body, inside screw, bronze mounted, flanged ends, non-rising stem, solid wedged.

2.02 Globe Valves:

A. 1/8" through 2": 125 lb., SWP, 200 lb. WOG, bronze, screw-in bonnet, threaded ends, Buna-N seat disc for water, oil, or gas (W), Teflon seat disc for steam (Y).

B. 2-1/2" through 10": 125 lb. SWP, 200 lb. WOG, iron body, outside screw and yoke, bronze mounted, flanged ends, Buna-N seat disc for water, oil or gas (W), composition seat disc for steam (S).

2.03 Swing Check Valves:

A. 1/4" through 2": 125 lb. SWP, 200 lb. WOG, Bronze, threaded ends, Buna-N seat disc for water, oil or gas (W), Teflon seat disc for steam (S).

B. 2-1/2" through 10": 125 lb. SWP, 200 lb. WOG, iron body, bronze mounted, flanged ends, Buna-N seat disc for water, oil, or gas (W), composition seat disc for steam (S).

2.04 Butterfly Valves:

A. 2-1/2" through 8": 150 lb. WWP, lug type cast iron body, ductile iron disc, 416 stainless steel, shaft, EPDM seat, disc shall not seal in shaft hole, extended neck, infinite position throttling handle with memory stop.

2.05 Ball Valves:

A. 1/4" through 2-1/2":, 150 lb. steam, 400 lb. WOG, bronze, full port, threaded ends, Buna-N seat for water, oil, or gas (W), Teflon seat for steam (Y).

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2.06 Balancing Valves:

A. 3/4" and Below: 20 psi cold liquid, 175 PSI at 150 degrees F, brass, screwdriver slot adjustment, screwed ends, air vent if required.

B. 1/2" through 2": 125 lb. SWP, 200 lb. WOG, semi-steel lubricated, wrench operated threaded ends.

C. 2-1/2" through 12": 175 lb. WOG, semi-steel lubricated, wrench operated flanged ends.

2.07 Pressure Reducing Valves:

A. For 1/2” to 2-1/2” standard capacity water reducing valve 25 to 75 psi adjustable range.

2.08 GAS COCKS

A. 2 inch and smaller: Bronze body, bronze tapered plug, nonlubricated, teflon

PART 3 - EXECUTION

3.00 General:

A. Provide isolation valves in hydronic piping before and after mechanical equipment for service (e.g., boilers, hot water pumps, circulator pumps, expansion tanks, chemical shot feeders, VAV hot water coils, etc.).

3.01 Arrangement or Location:

A. Locate valves in an accessible position. Where several valves are related as to function, group in a battery.

B. No valve shall be installed with stem below horizontal position without prior approval.

C. Provide special handles or operators as might be required or as indicated on the drawings.

D. Valves specified under specific systems shall take precedence over those as specified herein.

E. Valves in copper pipe shall have threaded ends (except where size dictates flanged ends), use copper to MPT adapters.

F. The use of threaded ends or flanged ends is the Contractor's option within the size listed.

3.02 Valve Boxes:

A. All valves located below slabs or grade shall be housed in cast iron boxes. Cover shall be properly identified as to the services controlled by the valve.

B. Furnish Owner with proper key and valve-operator extensions.

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END OF SECTION

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SECTION 23 05 29
HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Provide adequate pipe, equipment foundation and suspension system in accordance with recognized engineering practices. Where possible, use standard, commercially-accepted hangers and accessories.

1.02 CODES

A. All pipe hangers and supports shall conform to the latest requirements of the code for Pressure Piping, Refrigeration Society of ANSI/ASME B 31.5-74 and Manufacturers' Standardization Society of Valve and fittings industry documents MASS-SP-58-75 and MASS-SP-69-76.

B. All auxiliary steel necessary for the installation of the pipe hangers and supports shall be designed in accordance with the AISC, or as indicated on the drawings.

C. Supporting steel not shown for the equipment shall be designed, supplied and erected by the Contractor. (The supporting steel is that steel which is connected to the structural members shown on the drawings and carries the weight of the mechanical items). This supporting steel design must carry the dead weight and dynamic load imposed by the equipment or piping.

PART 2 PRODUCTS

2.01 PIPE HANGERS

A. All hangers for piping two (2) inch or larger shall be provided with means of vertical adjustment.

B. Where thermal movement causes the hanger rod to deviate more than five (5) degrees from the vertical, or where longitudinal expansion causes a movement of more than 1/2" in the piping supported from below, roller hangers shall be used in conjunction with a protection saddle to suite the insulation thickness. On insulated pipe the hanger must be placed on the outside of the insulation with a shield.

2.01 BRACKETS AND RACKS

A. Multiple pipe racks or trapeze hangers shall be fabricated from B-line, FAMET, or UNISTRUT channel, clamps and accessories.

2.03 VIBRATION ISOLATION FOR EQUIPMENT

A. Provide vibration and acoustic isolation for all mechanical equipment that includes rotating equipment capable of producing vibration (i.e., fans, pumps, VAVs, air handlers, etc.).

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B. Vibration isolators for suspended equipment shall be equal to combination rubber and spring isolators by Mason Industries and rated for the load of the equipment connected.

C. For floor mounted equipment, provide neoprene pad isolation equal to Mason Industries waffle pad isolators for acoustic and vibration isolation and rated for the equipment weight supported.

D. If seismic isolation is required based on structural classification of building (verify with architectural and structural plans and specifications), upgrade isolators and supports to seismic rated equipment for the loads supported equal to Mason Industries.

PART 3 EXECUTION

3.01 ATTACHING TO STRUCTURE

A. Where equipment or piping is supported from building steel, beam-clamps or welded beam attachments shall be used. Holes drilled in building steel for hanger support rods will not be permitted.

B. All vertical runs of piping shall be supported at the floor.

3.02 HANGER ROD 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 hangers shall be installed at each change in direction not more than two feet (2') from end of run. On straight runs, support at each joint and intermediately, so the spacing shall not exceed the following, whichever is closer:

Size	Steel pipe	Copper pipe
To 3/4"	7'	5'
1" to 2"	10'	8'
2-1/2" to 4"	12'	10'
5" to 8"	16'	10'
10" and larger	20'	10'

C. Provide supports at concentrated loads such as equipment, in-line pumps, valves and other piping, to prevent line sag and/or excess stress in the piping systems.

D. For cast iron pipe, provide a hanger at each joint or fitting with a maximum spacing of five (5) feet on center.

E. Where distance between riser clamp and hanger exceed ten (10) feet in height, intermediate clamps shall be installed to provide support or alignment at a maximum of every ten (10) feet.

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3.03 AUXILIARY STEEL

A. Furnish all miscellaneous structural members necessary to hang or support pipe or mechanical equipment. Material of members shall be consistent with that of the main structural system.

B. All auxiliary steel shall receive one shop coat of primer paint prior to installation.

C. Notify Engineer of any adjustment in main structural system for support of major equipment or piping.

3.04 CONCRETE PADS

A. Provide concrete pads under floor-mounted equipment and apparatus as indicated on drawings and coordinate with structural drawings.

3.05 INSULATION INSERTS OR SADDLES

A. Provide insulation inserts or saddles at all points of support on insulated pipe. Insert to be same thickness as adjoining pipe insulation.

END OF SECTION

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SECTION 23 05 53
IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.01 Pipe Identification:

A. All piping shall be identified with pressure-sensitive pipe markers with color bands of the proper size. Markers shall have proper legend and meet OSHA specifications. Where pipes are too small for such application, a 1-1/2" brass tag shall be used.

B. Markers shall be applied to the piping at the following locations:

1. Adjacent to each valve.

2. At each branch and riser take-off.

3. At each pipe passage through wall, floor and ceiling construction.

4. At each pipe passage to underground.

5. At not more than forty (40) feet spacing on straight pipe runs.

C. Markers shall be placed so as to be easily read. Arrows shall be applied to indicate direction of flow.

1.02 Valve Identifications:

A. Provide brass tags for all valves with legend describing function of each valve. Tag shall also indicate normally-open or normally-closed.

PART 2 - PRODUCTS:

2.01 Valve Tags:

A. Brass tags shall be a minimum of two (2) inches diameter of 3-1/2" oval, to accommodate 1" height numbers. Tag shall be equipped with a 3/16" X 6" long brass chain.

2.02 Pipe Markers and Bands:

A. Markers and band sizes shall conform to the following:

Outside Diameter of Pipe or Insulation	Width of Color band	Lettering Height
To 1”	3/4"	3/8”
1” to 3”	1-1/2”	3/4"
3” to 6”	2-1/2”	2”
6” and over	4”	3-1/2”

B. Marker band colors, and marker legends shall conform to OSHA.

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C. Arrows shall be of same color as bands, and shall point in director of flow and downstream of pipe legend.

PART 3 - EXECUTION

3.01 Work Included:

A. Legends shall be securely fixed to the pipe with full circumference bands on each side of legend. Arrows downstream of legend shall have full circumference band at the arrow end.

B. Valve tags shall be numbered in accordance with a valve chart, to be framed, and mounted in the equipment room. Said chart shall describe valve location and function.

END OF SECTION

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SECTION 23 05 93
TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.01 Scope of Work:

A. Air and Water Balance: A complete air and water balance of this project will be required as specified in sections herein.

1.02 Report:

A. The report shall include the following information:

1. Complete testing and balancing data.

2. All equipment start-up logs.

1.03 Start-up:

A. All major equipment shall be started by a factory-trained service mechanic, or certified technician that is experienced in the service and operation of that piece of equipment. The contractor shall start-up and place into operation all auxiliary equipment such as fans, pumps, etc.

B. Include all these start-up logs in his report for submission to the Engineer and Contractor.

1.04 Acceptance:

A. The Owner and Engineer will not accept the building until the system has been properly started up, balanced, and is operating as per the design.

PART 2 - PRODUCTS

2.00 Test & Balance (TAB) Contractor Qualifications

A. The TAB Contractor shall have updated certification by the Associated Air Balance Council (AABC), the National Environmental Balancing Bureau (NEBB), or the Testing, Adjusting, and Balancing Bureau (TABB).

2.01 Preparation:

B. The Contractor shall have complete all duct work and installed all grilles, registers, diffusers, dampers, access doors, turning vanes, air and water specialties, etc., before the testing and balancing begins.

C. The Contractor shall have completed the installation of all piping, specialties, insulation, controls, and shall have thoroughly checked out the piping systems and action of all control devices and placed the entire system into operation.

2.02 TBA Air System:

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A. Perform the following tests, and balance system in accordance with the following requirements:

(1) Test and adjust blower RPM to design requirements. If equipped, adjust VFD settings as required for design performance.

(2) Test and record motor full-load amperes.

(3) Make pitot tube traverse of main supply ducts and obtain design cfm at fans.

(4) Test and record system static pressures, Fan Suction and discharge pressures.

(5) Test and adjust system for design recirculated air, cfm.

(6) Test and adjust system for design cfm outside air.

(7) Test and record entering air temperatures (DB heating and cooling)

(8) Test and record leaving air temperatures (WB cooling).

(9) Test and record leaving air temperatures (DB heating and cooling).

(10) Test and record leaving air temperatures (WB cooling).

(11) Adjust all main supply and return air ducts to proper design cfm.

(12) Adjust all zones to proper design cfm, supply and return, including VAV controls and max and min air flows if applicable.

(13) Test and adjust each diffuser, grille and register to within +/- 5% of design requirements.

(14) Each grille, diffuser and register shall be identified as to location and area.

(15) Size, type and manufacturer of diffusers, grilles, registers and tested equipment shall be identified and listed. Manufacturer's ratings on all equipment shall be used to make required calculations.

(16) Readings and test of diffusers, grilles and registers shall include required fpm velocity. Measure cfm after adjustment. All diffusers, grilles and registers shall be adjusted to minimize drafts.

(17) Set adjustments of dampers to operate as specified, indicate and/or noted. Check all controls for proper calibrations and list all controls requiring adjustment by control installers.

2.03 TBA Water System Preparation:

A. Prepare the water systems for balancing in the following manner:

(1) Open all valves to full open position. Close bypass stop valves.

(2) Check pump rotation.

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(3) Check expansion tanks to determine that they are not air bound and the system is completely full of water. Adjust water in expansion tanks to proper level and set makeup valve to proper pressure.

(4) Check all air vents at high points of water systems and determine that all are installed and operating freely.

(5) Check operation of bypass valve.

(6) Check and set operating temperatures of boilers, chillers, and condenser water loop.

2.04 TBA Water System:

A. Balance pumps to proper gallons per minute delivery.

B. Adjust flow of Chilled water.

C. Adjust flow of Condenser water.

D. Adjust flow of Hot Water.

E. Check and record leaving water temperatures and return water temperatures.

F. Check water temperature at inlet side and leaving side of fan coil units and air handlers. Note rise or drop of temperature from source.

G. Proceed to balance each unit.

H. Upon completion of flow readings and adjustments at units, mark all settings and record data.

I. After adjustments to units are made, recheck settings at the pumps, and re-adjust if required.

J. Check pump operating suction and discharge pressure and final TDH.

J. List rated and actual running amperage of pump motor.

2.05 Submit Report:

A. Submit TAB contractor qualifications at the start of the project.

B. After the above phases are completed the Project Engineer supervising the Testing and Balancing shall analyze the data and forward to the Design Engineer and Contractor a report of all tests performed.

PART 3– EXECUTION

3.01 Wok Included:

A. Water system shall be cleaned and water treatment complete before start-up of any hydronic systems (coordinate).

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B. System shall be started with skilled craftsman familiar with the types of systems and controls.

C. Provide all equipment necessary for testing and starting.

D. Submit complete test and balance report to Engineer for Review upon completion.

END OF SECTION

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SECTION 23 07 13
DUCT INSULATION

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Duct thermal insulation.

B. Insulation jackets.

C. Duct Acoustic Insulation

D. Adhesives, tie wires, tapes.

E. Externally Insulated rectangular ductwork.

F. Dual Wall Insulated Exposed Round and Oval Spiral Duct

G. Externally Insulated round branch ductwork.

1.02 PROJECT CONDITIONS

A. Deliver material to project site in original, non-broken factory packaging, labeled with manufacturer's density and thickness.

B. Perform work at ambient and equivalent temperatures as recommended by the manufacturer.

1.03 REFERENCES

A. ASTM B209 – Aluminum and Aluminum-Alloy Sheet and Plate.

B. ASTM C518 – Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.

C. ASTM C553 – Mineral Fiber Blanket and Felt Insulation.

D. ASTM C612 – Mineral Fiber Block and Board Thermal Insulation.

E. ASATM E84 – Surface Burning Characteristics of Building Materials.

F. ASTM E96 - Water Vapor Transmission of Materials.

G. NFPA 255 – Surface Burning Characteristics of Building Materials.

H. SMACNA – HVAC Duct Construction Standards – Metal and Flexible.

I. UL 723 – Surface Burning Characteristics of Building Materials.

J. Arkansas Mechanical Code - Most Current Edition.

1.04 SUBMITTALS

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A. Submit under provisions of Section 23 00 00.

B. Product Data: Provide product description, list of materials and thickness for each, and manufacturer's installation standards and instructions.

PART 2 - PRODUCTS

2.01 GENERAL

A. Adhesives and insulation materials: Composite fire and smoke hazard ratings maximum 25 for flame spread and 50 for smoke developed. Adhesives to be waterproof.

2.02 INSULATION MATERIALS

A. Round Ducts: Flexible glass fiber insulation, "K" value at 75° maximum 0.26 BTU*inch/(hr*ft^{2}*°F) with factory applied reinforced aluminum foil vapor barrier for systems conveying air at less than room temperature. 2" thick, 3/4lbs./Ft^{3}.density minimum. Insulation shall be fiberglass duct wrap with foil-scrim-kraft facing.

B. Acoustic and Anti-sweat lining: Glass fiber insulation with "1" value at 75X degrees F, maximum 0.24 BTU/inch/sq.ft./degrees/F/hr, absolute roughness of exposed surface not to exceed 0.0013, coated to prevent Fiber erosion at air velocities up to 4,000.00 fpm, 1.5 lbs. cu. ft., minimum density.

2.03 INSULATION THICKNESS SCHEDULE

	Insulation Thickness:	
Ductwork or Equipment	Indoors in conditioned Bldg.	Outside of conditioned Bldg.
Exhaust Ducts	1" Int./Ext.	2" Int.
Outside Air Intake Ducts	2" Ext.	2" External & jacketed
Plenums (Systems with Cooling Coils)	1" Int./Ext.	2" External & jacketed
Rectangular Supply/Return Ducts (Systems with Cooling Coils)	1" Int./Ext.	2" External & jacketed
Round Supply Ducts (Systems with Cooling Coils)	2" Wrap Ext.	
Flexible Round Duct (un-insulated) Integral Insulation - 1" approved	2" Wrap Ext.	
Dual Wall Oval & Round Spiral Duct	1" minimum/Integral with Duct	
Single Wall Spiral Duct	2" External	

All ducts shall be insulated. Insulation to comply with code thickness, density and installed with vapor barrier to suit appplication.

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PART 3 -EXECUTION

3.01 PREPARATION

A. Do not install covering before ductwork and equipment has been tested and approved.

B. Ensure surface is clean and dry prior to installation. Ensure insulation is dry before and during application. Finish with system at operating conditions.

3.02 INSTALLATION

A. Install all insulation in accordance with manufacturer's recommendations with the following as minimum requirements:

1. Round Ducts: Adhere flexible insulation to ductwork with adhesive applied in 6-inch wide strips on 16-inch centers. Provide 16 gage annealed tie wire tied, spiral wound, or half hitched at 16-inch centers for securing duct insulation until adhesive sets. Butt insulation and seal joints and breaks in ducts conveying air at less than room temperature with 2-inch lap of foil adhered over joints (secured with FSK tape).

2. Rectangular Ducts:

    A. For Exterior, insulate with fiberglass duct board with/vapor barrier applied to exterior of rectangular ducts. Secure to ductwork with adhesive using 100% percent coverage and 12 gage impale anchor tabs on 16 inch centers. Cut off excess fastener length and cover with brush coat of mastic. Cover duct and insulation with aluminum jacket.

    B. For Interior, externally insulate in concealed areas. In exposed areas, duct may be insulated as noted for exterior and painted per Architect or may be internally insulated dual duct of equivalent net free area and painted per Architect.

3. Oval or Spiral dual duct supply ducts, internally insulated between duct layers according to schedule. Paint duct in exposed areas (to include taps and air devices) per Architect.

4. Acoustic and Anti-Sweat lining: Apply to interior of rectangular sound trap ducts. Apply to interior of supply duct taps for dual duct that are to be exposed and painted. Secure to ductwork with adhesive using 100% percent coverage and 12 gage impale anchor labs on 16-inch centers. Cut off excess fastener length and cover with brush coated mastic. Provide vapor barrier located on the warm side for outside air intakes. Ducts with internal insulation do not require external thermal insulation.

5. Supply Duct Flexible Connections: Insulate supply duct flexible connections with a band of external 2-inch duct wrap with foil-scrim-kraft vapor barrier. Staple and adhere to adjacent surfaces with adhesive FSK tape to prevent condensation.

END OF SECTION

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SECTION 23 07 19
HVAC PIPING INSULATION

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Piping Insulation

B. Adhesive, tie wires, tapes.

C. Insulated heating and chilled water piping.

D. Insulated condenser water piping.

D. Insulated refrigerant piping.

E. Insulated condensate drain piping.

1.02 PROJECT CONDITIONS

A. Deliver material to project site in original non-broken factory packaging, labeled with manufacturer's density and thickness.

B. Perform work at ambient and equipment temperatures as recommended by the adhesive manufacturer.

PART 2 - PRODUCTS

2.01 GENERAL

A. Adhesives and insulation materials: composite fire and smoke hazard ratings of maximum 25 for flame spread and 50 for smoke developed. Adhesives to be waterproof.

2.02 INSULATION MATERIALS

A. Chilled and heating water supply and return piping: Fine glass fiber insulation, with factory applied vapor barrier jacket, molded to conform to piping "K" value at 75°F, maximum 0.24 BTU*inch/(hr*ft^2*°F) Insulation shall have vapor barrier jacket, self-sealing lap and butt strips.

B. Refrigerant piping: Flexible elastomeric thermal insulation with "K" value at 75°F, maximum 0.25 BTU*inch/(hr*ft^2*°F). Insulation shall be closed-cell insulation.

C. Condensate Drains: Fine glass fiber insulation, with factory applied vapor barrier jacket, molded to conform to piping "K" value at 75°F, maximum 0.24 BTU*inch/(hr*ft^2*°F) Insulation shall have vapor barrier jacket, self-sealing lap and butt strips.

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PART 3 - EXECUTION

3.01 PREPARATION

A. Do not install covering before piping and equipment has been tested and approved.

B. Ensure surface is clean and dry prior to installation and during application. Finish with systems at operating conditions.

3.02 INSTALLATION

A. Ensure insulation is continuous through inside walls. Pack around pipes with fireproof self-supporting insulation material, fully sealed.

B. Insulate fittings and valves. Do not insulate unions, flanges, strainer, flexible connections, and expansion joints. Terminate insulation neatly with plastic material troweled on bevel. Provide removable bands of flexible fiberglass insulation with vapor sealed jacket over all insulated surfaces previously described.

C. Finish insulation neatly at hangers, supports and other protrusions.

D. Locate insulation or cover seams in least visible locations and install aluminum bands on 8" centers.

E. Chilled water and heating water supply and return piping: Cover fittings and valves with equivalent thickness of insulation material. Cover with open mesh glass cloth sealed with vapor barrier sealant. Seal lap joints with 100 percent coverage of vapor barrier sealant and adhesive. Seal butt joints with 4-inch wide strips of vapor barrier sealed with vapor barrier adhesive. For exposed fittings and valves, apply hydraulic setting cement paste over insulation material before applying finish.

G. Repair separation of joints or cracking of insulation due to thermal movement or poor workmanship.

H. Install .020 aluminum recovering on all exterior piping.

I. Paint all insulated, jacketed piping per Architect in exposed areas without ceilings.

3.03 INSULATION THICKNESS SCHEDULE:

Piping or Equipment	Pipe Size Inches	Insulation Thickness
Cold Condensate Drains	All sizes	1/2 inch
Refrigerant Suction	All Sizes	1/2" Armaflex
Chilled Water Piping	All Sizes	2” - (1” min. where space does not allow 2”)
Condenser Water Piping	All Sizes	2” - (1” min. where space does

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		not allow 2”)
Heating Water Piping	All Sizes	2” - (1” min. where space does not allow 2”)

END OF SECTION

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SECTION 23 21 13
HVAC PIPING

PART 1 - GENERAL

1.01 Work Included:

A. Pipe and Pipe Fittings.

B. Valves.

C. Chilled and Condenser Water Piping.

D. Cold Condensate drains piping system.

E. Heating Water Piping System

F. Refrigerant Piping

PART 2 - PRODUCTS

2.01 Water Piping, Buried Beyond 5 feet of building

A. Ductile Iron Pipe: ASNI/AWWA C151, Fittings: Ductile iron standard thickness. Joints: ANSI/AWWA C111, Rubber gasket with 3/4 inch diameter rods.

B. Copper tubing: ASTM B88, Type "K" soft. Fittings: ANSI/ASME B16.29, wrought copper. Silver Braze.

2.02 Water Piping, Buried Under and Within 5 feet of Building

A. Copper tubing: ASTM B88, Type "K" hard or soft drawn. Fittings: ANSI/ASME B16.29, wrought copper. Silver Braze.

2.03 Water Piping, Above Ground

A. Copper Tubing: ASTM B88, Type "L" hard drawn. Fittings: ANSI/ASME B16.23, cast brass, or ANSI/ASME B16.29, wrought copper. Joints: ASNI/ASTM B32, solder, Grade 95 TA.

2.04 Condensate Drain Piping, Above Ground

A. Copper tubing: ASTM B88, type "M" hard drawn. Fittings: ANSI/ASME B16.23 cast brass of ANSI/ASME B16.29 wrought copper. Joints: ANSI/ASME B32, solder, Grade 95TA.

2.05 Chilled, Condenser, and Heating Water Piping, above grade inside building

A. Less than 4” copper tubing, ASTM B88, Type “K” hard fittings ANSI B16.29 Wrought copper silver brazed.

B. 4” and larger Steel Pipe: ASTM A53 or A120. Schedule 40 Black. Fittings ANSI/ASME B16.3, malleable iron, or ASTM A234, forged steel welding type. Joints: Screwed for pipe two inches and under ANSI/AWS D1.1 welded, for all pipe sizes (optional)

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C. Provide chemical treatment for chilled, condenser, and space heating hot water piping systems to include rust inhibitors, propylene glycol solution (where applicable), etc.

2.06 Couplings and Unions

A. Pipe size under 2 inches: 150 psig malleable iron for threaded ferrous piping; bronze unions for copper pipe.

B. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

2.07 Valves (Refer to Section 23 05 23)

2.08 Condensate Drain Piping, Above Ground

A. Copper tubing: ASTM B88, type "M" hard drawn. Fittings: ANSI/ASME B16.23 cast brass or ANSI/ASME B16.29 wrought copper. Joints: ANSI/ASME B32. Solder. Grade 95TA.

2.09 Refrigerant Piping - See Section 23 23 00.

PART 3 - EXECUTION

3.01 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.

D. All underground steel piping shall be coated for corrosion protection with a suitable coating/method prior to insulating and burying pipe.

3.02 Installation

A. Provide non-conducting dielectric connections wherever joining dissimilar metals.

B. Route piping in orderly manner and maintain gradient.

C. Install piping to conserve building space and not interfere with use of space or access to equipment.

D. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

E. Provide clearance for installation of insulation and access to valves and fittings.

F. Provide access where valves and fittings are not exposed.

G. Slope water piping and arrange to drain at low points.

H. Establish elevations of buried piping outside the building to ensure adequate cover. (24 inch

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minimum cover)

I. Establish invert elevations, slopes for drainage of 1/8" inch per foot minimum within building for Pipe 4" larger. Slope smaller sizes 1/4" per foot minimum. Maintain gradient.

J. Install valves with stems upright or horizontal, not inverted.

3.03 Application:

A. Install unions downstream of valves at equipment or apparatus connections.

B. Install brass male adapters each side of valves in copper piped system. Sweat solder adapters to pipe.

C. Install ball valves to shut-off and isolate equipment for service.

3.04 Coordination:

A. Consult and verify with the serving utility the exact location, size, depth and requirements of all utility services.

END OF SECTION

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SECTION 23 21 15
EXPANSION COMPENSATION

PART 1 - GENERAL

1.01 Work Included

A. Flexible pipe connections.

B. Pipe loops, offsets, and swing joints.

1.02 Related Work

A. Hydronic Piping: Section 23 21 13

B. Hangers and Supports for HVAC Piping: Section 23 05 29

PART 2 - PRODUCTS

2.01 Flexible Pipe Connections

A. For steel piping, construct with stainless steel inner hose and braided exterior sleeve.

B. For copper piping, construct with bronze inner hose and braided exterior sleeve.

C. Use connectors suitable for minimum 125 psi WSP and 450 X degrees F.

2.02 Connections:

A. Provide flexible pipe connections suitable to adjoining piping as specified for pipe joints. Use pipe sized units.

PART 3 - EXECUTION

3.01 Installation:

A. Install flexible pipe connectors on pipes connected to equipment supported by vibration isolation.

B. Accomplish structural work and provide equipment required to control expansion and contraction of piping, loops, pipe offsets, and swing joints, and provide corrugated bellows type expansion joints where required.

C. Install flexible connectors at right angles to displacement. Install one end immediately adjacent to isolated equipment and anchor other end.

D. Rigidly anchor pipe to end structure where necessary. Provide pipe guides so that movement takes place along axis of pipe only.

E. Brace piping in accordance with Arkansas Act 1100 of l991 for earthquake resistant design.

END OF SECTION

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SECTION 23 23 00
REFRIGERANT PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes refrigerant piping used for air-conditioning applications.

1.2 PERFORMANCE REQUIREMENTS

A. Line Test Pressure for A2L Refrigerants (and other Group A1 Refrigerants):
1. Suction Lines for Air-Conditioning Applications: 300 psig.
2. Suction Lines for Heat-Pump Applications: 535 psig.
3. Hot-Gas and Liquid Lines: 535 psig.

1.3 SUBMITTALS

A. Product Data: For each type of valve and refrigerant piping specialty indicated. Include pressure drop based on manufacturer's test data. Provide data in submittals for the following components as a minimum:
(1) Piping and Fittings
(2) Valves
(3) Piping Accessories
(4) Pipe Hangers, Inserts, and Supports

B. Shop Drawings: Show layout of refrigerant piping[1] and specialties, including pipe, tube, and fitting sizes, flow capacities, valve arrangements and locations, slopes of horizontal runs, oil traps, double risers, wall and floor penetrations, and equipment connection details. Show interface and spatial relationships between piping and equipment.

[1] Refrigerant piping indicated on Drawings is schematic only. Size piping and design actual piping layout, including oil traps, double risers, specialties, and pipe and tube sizes to accommodate, as a minimum, equipment provided, elevation difference between compressor and evaporator, and length of piping to ensure proper operation and compliance with warranties of connected equipment.

1.4 QUALITY ASSURANCE

A. Comply with ASHRAE 15, "Safety Code for Refrigeration Systems."
B. Comply with ASME B31.5, "Refrigeration Piping and Heat Transfer Components."

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Protect stored items from the weather, humidity and temperature variations, dirt and dust, or other contaminants. Proper protection and care of all material both before and during installation is the Contractor's responsibility. Replace any materials found to be damaged at the Contractor's expense. During installation, cap piping and similar openings to keep out dirt and other foreign matter.

PART 2- PRODUCTS

2.1 STANDARD COMMERCIAL PRODUCTS

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A. Provide materials and equipment which are standard products of a manufacturer regularly engaged in the manufacturing of such products, that are of a similar material, design and workmanship and that have been in satisfactory commercial or industrial use for 2 years.

2.2 REFRIGERANT PIPING SYSTEM

A. Refrigerant piping, valves, fittings, and accessories shall be in accordance with ANSI/ASHRAE 15 & 34 and ASME B31.5, except as specified herein. Refrigerant piping, valves, fittings, and accessories shall be compatible with the fluids used and capable of withstanding the pressures and temperatures of the service. Refrigerant piping, valves, and accessories used for refrigerant service shall be cleaned, dehydrated, and sealed (capped or plugged) prior to shipment from the manufacturer's plant.

2.3 PIPE, FITTINGS AND END CONNECTIONS (JOINTS)

2.3.1 Steel Pipe

A. Steel pipe for refrigerant service shall conform to ASTM A53/A53M, Schedule 40, Type E or S, Grades A or B. Type F pipe shall not be used.

2.3.1.1 Welded Fittings and Connections

A. Butt-welded fittings shall conform to ASME B16.9. Socket-welded fittings shall conform to ASME B16.11. Welded fittings shall be identified with the appropriate grade and marking symbol. Welded valves and pipe connections (both butt-welds and socket-welds types) shall conform to ASME B31.9.

2.3.1.2 Threaded Fittings and Connections

A. Threaded fitting shall conform to ASME B16.3. Threaded valves and pipe connections shall conform to ASME B1.20.2MASME B1.20.1.

2.3.1.3 Flanged Fittings and Connections

A. Flanges shall conform to ASME B16.5, Class 150. Gaskets shall be Non-asbestos compressed material in accordance with ASME B16.21, 1.59 mm 1/16 inch thickness, full face or self-centering flat ring type. This gaskets shall contain aramid fibers bonded with styrene butadeine rubber (SBR) or nitrile butadeine rubber (NBR). Bolts, nuts, and bolt patterns shall conform to ASME B16.5. Bolts shall be high or intermediate strength material conforming to ASTM A193/A193M.

2.3.2 Steel Tubing

A. Tubing shall be cold-rolled, electric-forged, welded-steel in accordance with ASTM A334/A334M, Grade 1. Joints and fittings shall be socket type provided by the steel tubing manufacturer.

2.3.3 Copper Tubing

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A. Copper tubing shall conform to ASTM B280 annealed or hard drawn as required. Copper tubing shall be soft annealed where bending is required and hard drawn where no bending is required. Soft annealed copper tubing shall not be used in sizes larger than 35 mm 1-3/8 inches. Joints shall be brazed except that joints on lines 22 mm 7/8 inch and smaller may be flared. Cast copper alloy fittings for flared copper tube shall conform to ASME B16.26 and ASTM B62. Wrought copper and bronze solder-joint pressure fittings shall conform to ASME B16.22 and ASTM B75/B75M. Joints and fittings for brazed joint shall be wrought-copper or forged-brass sweat fittings. Cast sweat-type joints and fittings shall not be allowed for brazed joints. Brass or bronze adapters for brazed tubing may be used for connecting tubing to flanges and to threaded ends of valves and equipment.

2.3.4 Solder

A. Solder shall conform to ASTM B32, grade Sb5, tin-antimony alloy for service pressures up to 1034 kPa 150 psig. Solder flux shall be liquid or paste form, non-corrosive and conform to ASTM B813.

2.3.5 Brazing Filler Metal

A. Filler metal shall conform to AWS A5.8/A5.8M, Type BAg-5 with AWS Type 3 flux, except Type BCuP-5 or BCuP-6 may be used for brazing copper-to-copper joints.

2.4 VALVES

A. Valves shall be designed, manufactured, and tested specifically for refrigerant service. Valve bodies shall be of brass, bronze, steel, or ductile iron construction. Valves 25 mm 1 inch and smaller shall have brazed or socket welded connections. Valves larger than 25 mm 1 inch shall have [tongue-and-groove flanged] or [butt welded] end connections. Threaded end connections shall not be used, except in pilot pressure or gauge lines where maintenance disassembly is required and welded flanges cannot be used. Internal parts shall be removable for inspection or replacement without applying heat or breaking pipe connections. Valve stems exposed to the atmosphere shall be stainless steel or corrosion resistant metal plated carbon steel. Direction of flow shall be legibly and permanently indicated on the valve body. Control valve inlets shall be fitted with integral or adapted strainer or filter where recommended or required by the manufacturer. Purge, charge and receiver valves shall be of manufacturer's standard configuration.

2.4.1 Refrigerant Stop Valves

A. Valve shall be the globe or full-port ball type with a back-seating stem especially packed for refrigerant service. Valve packing shall be replaceable under line pressure. Valve shall be provided with a [handwheel] [or] [wrench] operator and a seal cap. Valve shall be the straight or angle pattern design as indicated.

2.4.2 Check Valves

A. Valve shall be the swing or lift type as required to provide positive shutoff at the differential pressure indicated. Valve shall be provide with resilient seat.

2.4.3 Liquid Solenoid Valves

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A. Valves shall comply with ANSI/AHRI 760 and be suitable for continuous duty with applied voltages 15 percent under and 5 percent over nominal rated voltage at maximum and minimum encountered pressure and temperature service conditions. Valves shall be direct-acting or pilot-operating type, packless, except that packed stem, seal capped, manual lifting provisions shall be furnished. Solenoid coils shall be moisture-proof, UL approved, totally encapsulated or encapsulated and metal jacketed as required.
B. Valves shall have safe working pressure of 2760 kPa 400 psi and a maximum operating pressure differential of at least 1375 kPa 200 psi at 85 percent rated voltage. Valves shall have an operating pressure differential suitable for the refrigerant used.

2.4.4 Expansion Valves

A. Valve shall conform to ANSI/AHRI 750 and ASHRAE 17. Valve shall be the diaphragm and spring-loaded type with internal or external equalizers, and bulb and capillary tubing. Valve shall be provided with an external superheat adjustment along with a seal cap. internal equalizers may be utilized where flowing refrigerant pressure drop between outlet of the valve and inlet to the evaporator coil is negligible and pressure drop across the evaporator is less than the pressure difference corresponding to 1 degree C 2 degrees F of saturated suction temperature at evaporator conditions. Bulb charge shall be determined by the manufacturer for the application and such that liquid will remain in the bulb at all operating conditions. Gas limited liquid charged valves and other valve devices for limiting evaporator pressure shall not be used without a distributor or discharge tube or effective means to prevent loss of control when bulb becomes warmer than valve body. Pilot-operated valves shall have a characterized plug to provide required modulating control. A de-energized solenoid valve may be used in the pilot line to close the main valve in lieu of a solenoid valve in the main liquid line. An isolatable pressure gauge shall be provided in the pilot line, at the main valve. Automatic pressure reducing or constant pressure regulating expansion valves may be used only where indicted or for constant evaporator loads.

2.4.5 Safety Relief Valves

A. Valve shall be the two-way type, unless indicated otherwise. Valve shall bear the ASME code symbol. Valve capacity shall be certified by the National Board of Boiler and Pressure Vessel Inspectors. Valve shall be of an automatically reseating design after activation.

2.4.6 Evaporator Pressure Regulators, Direct-Acting

A. Valve shall include a diaphragm/spring assembly, external pressure adjustment with seal cap, and pressure gauge port. Valve shall maintain a constant inlet pressure by balancing inlet pressure on diaphragm against an adjustable spring load. Pressure drop at system design load shall not exceed the pressure difference corresponding to a 1 degree C 2 degrees F change in saturated refrigerant temperature at evaporator operating suction temperature. Spring shall be selected for indicated maximum allowable suction pressure range.

2.4.7 Refrigerant Access Valves

A. Refrigerant access valves and hose connections shall be in accordance with AHRI 720.

2.5 PIPING ACCESSORIES

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2.5.1 Filter Driers

A. Driers shall conform to AHRI 711AHRI 710 I-P. Sizes 15 mm 5/8 inch and larger shall be the full flow, replaceable core type. Sizes 13 mm 1/2 inch and smaller shall be the sealed type. Cores shall be of suitable desiccant that will not plug, cake, dust, channel, or break down, and shall remove water, acid, and foreign material from the refrigerant. Filter driers shall be constructed so that none of the desiccant will pass into the refrigerant lines. Minimum bursting pressure shall be 10.3 MPa 1,500 psi.

2.5.2 Sight Glass and Liquid Level Indicator

2.5.2.1 Assembly and Components

A. Assembly shall be pressure- and temperature-rated and constructed of materials suitable for the service. Glass shall be borosilicate type. Ferrous components subject to condensation shall be electro-galvanized.

2.5.2.2 Gauge Glass

A. Gauge glass shall include top and bottom isolation valves fitted with automatic checks, and packing followers; red-line or green-line gauge glass; elastomer or polymer packing to suit the service; and gauge glass guard.

2.5.2.3 Bull's-Eye and Inline Sight Glass Reflex Lens

A. Bull's-eye and inline sight glass reflex lens shall be provided for dead-end liquid service. For pipe line mounting, two plain lenses in one body suitable for backlighted viewing shall be provided.

2.5.2.4 Moisture Indicator

A. Indicator shall be a self-reversible action, moisture reactive, color changing media. Indicator shall be furnished with full-color-printing tag containing color, moisture and temperature criteria. Unless otherwise indicated, the moisture indicator shall be an integral part of each corresponding sight glass.

2.5.3 Vibration Dampeners

A. Dampeners shall be of the all-metallic bellows and woven-wire type.

2.5.4 Flexible Pipe Connectors

A. Connector shall be a composite of interior corrugated phosphor bronze or Type 300 Series stainless steel, as required for fluid service, with exterior reinforcement of bronze, stainless steel or monel wire braid. Assembly shall be constructed with a safety factor of not less than 4 at 150 degrees C300 degrees F. Unless otherwise indicated, the length of a flexible connector shall be as recommended by the manufacturer for the service intended.

2.5.5 Strainers

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A. Strainers used in refrigerant service shall have brass or cast iron body, Y-or angle-pattern, cleanable, not less than 60-mesh non-corroding screen of an area to provide net free area not less than ten times the pipe diameter with pressure rating compatible with the refrigerant service. Screens shall be stainless steel or monel and reinforced spring-loaded where necessary for bypass-proof construction.

2.5.6 Pressure and Vacuum Gauges

A. Gauges shall conform to ASME B40.100 and shall be provided with throttling type needle valve or a pulsation dampener and shut-off valve. Gauge shall be a minimum of 85 mm 3-1/2 inches in diameter with a range from 0 kPa 0 psig to approximately 1.5 times the maximum system working pressure. Each gauge range shall be selected so that at normal operating pressure, the needle is within the middle-third of the range.

2.5.7 Temperature Gauges

A. Temperature gauges shall be the industrial duty type and be provided for the required temperature range. Gauges shall have Celsius scale in 1 degree Fahrenheit scale in 2 degrees graduations scale (black numbers) on a white face. The pointer shall be adjustable. Rigid stem type temperature gauges shall be provided in thermal wells located within 1.5 m 5 feet of the finished floor. Universal adjustable angle type or remote element type temperature gauges shall be provided in thermal wells located 1.5 to 2.1 m 5 to 7 feet above the finished floor. Remote element type temperature gauges shall be provided in thermal wells located 2.1 m 7 feet above the finished floor.

2.5.7.1 Stem Cased-Glass

A. Stem cased-glass case shall be polished stainless steel or cast aluminum, 229 mm 9 inches long, with clear acrylic lens, and non-mercury filled glass tube with indicating-fluid column.

2.5.7.2 Bimetallic Dial

A. Bimetallic dial type case shall be not less than 89 mm 3-1/2 inches, stainless steel, and shall be hermetically sealed with clear acrylic lens. Bimetallic element shall be silicone dampened and unit fitted with external calibrator adjustment. Accuracy shall be one percent of dial range.

2.5.7.3 Liquid-, Solid-, and Vapor-Filled Dial

A. Liquid-, solid-, and vapor-filled dial type cases shall be not less than 89 mm 3-1/2 inches, stainless steel or cast aluminum with clear acrylic lens. Fill shall be nonmercury, suitable for encountered cross-ambients, and connecting capillary tubing shall be double-braided bronze.

2.5.7.4 Thermal Well

A. Thermal well shall be identical size, 13 or 19 mm 1/2 or 3/4 inch NPT connection, brass or stainless steel. Where test wells are indicated, provide captive plug-fitted type 13 mm 1/2 inch NPT connection suitable for use with either engraved stem or standard separable socket thermometer or thermostat. Mercury shall not be used in thermometers. Extended neck thermal wells shall be of sufficient length to clear insulation thickness by 25 mm 1 inch.

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2.5.8 Pipe Hangers, Inserts, and Supports

A. Pipe hangers, inserts, guides, and supports shall conform to MSS SP-58 and MSS SP-69.

2.5.9 Escutcheons

A. Escutcheons shall be chromium-plated iron or chromium-plated brass, either one piece or split pattern, held in place by internal spring tension or set screws.

2.6 FABRICATION

2.6.1 Factory Coating

A. Unless otherwise specified, equipment and component items, when fabricated from ferrous metal, shall be factory finished with the manufacturer's standard finish, except that items located outside of buildings shall have weather resistant finishes that will withstand 125 [500 for corrosive environments] hours exposure to the salt spray test specified in ASTM B117 using a 5 percent sodium chloride solution. Immediately after completion of the test, the specimen shall show no signs of blistering, wrinkling, cracking, or loss of adhesion and no sign of rust creepage beyond 3 mm 1/8 inch on either side of the scratch mark. Cut edges of galvanized surfaces where hot-dip galvanized sheet steel is used shall be coated with a zinc-rich coating conforming to ASTM D520, Type I.

2.6.2 Factory Applied Insulation

A. [Refrigerant suction lines between the cooler and each compressor [and cold gas inlet connections to gas cooled motors]] [Refrigerant pumps and exposed chilled water lines on absorption chillers] shall be insulated with not less than 19 mm 3/4 inch thick unicellular plastic foam. Factory insulated items installed outdoors are not required to be fire-rated. As a minimum, factory insulated items installed indoors shall have a flame spread index no higher than 75 and a smoke developed index no higher than 150. Factory insulated items (no jacket) installed indoors and which are located in air plenums, in ceiling spaces, and in attic spaces shall have a flame spread index no higher than 25 and a smoke developed index no higher than 50. Flame spread and smoke developed indexes shall be determined by ASTM E84. Insulation shall be tested in the same density and installed thickness as the material to be used in the actual construction. Material supplied by a manufacturer with a jacket shall be tested as a composite material. Jackets, facings, and adhesives shall have a flame spread index no higher than 25 and a smoke developed index no higher than 50 when tested in accordance with ASTM E84.

PART 3 EXECUTION

3.1 INSTALLATION

A. Belowground refrigerant piping should be avoided if at all possible. Direct buried refrigerant piping will not be installed under any circumstances. In the event that belowground pipe routing is the only alternative, the piping will be routed through an accessible trench system (i.e. concrete, fiberglass, PVC, etc). The designer will specifically detail the trench design as well as fully detail

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the piping techniques necessary to accommodate oil circulation at both full and part load conditions. Oil circulation is extremely critical to the successful operation of any refrigerant system. Designers will avoid creating any oil traps within a refrigerant piping system.

B. Pipe and fitting installation shall conform to the requirements of ASME B31.1. Cut pipe accurately to measurements established at the jobsite, and work into place without springing or forcing, completely clearing all windows, doors, and other openings. Cutting or other weakening of the building structure to facilitate piping installation are not permitted without written approval. Cut pipe or tubing square, remove by reaming, and permit free expansion and contraction without causing damage to the building structure, pipe, joints, or hangers.

3.2.1 Directional Changes

A. Make changes in direction with fittings, except that bending of pipe 100 mm 4 inches and smaller is permitted, provided a pipe bender is used and wide weep bends are formed. Mitering or notching pipe or other similar construction to form elbows or tees is not permitted. The centerline radius of bends shall not be less than 6 diameters of the pipe. Bent pipe showing kinks, wrinkles, flattening, or other malformations will not be accepted.

3.2.2 Functional Requirements

A. Piping shall be installed 4 mm/m 1/2 inch/10 feet of pipe in the direction of flow to ensure adequate oil drainage. Open ends of refrigerant lines or equipment shall be properly capped or plugged during installation to keep moisture, dirt, or other foreign material out of the system. Piping shall remain capped until installation. Equipment piping shall be in accordance with the equipment manufacturer's recommendations and the contract drawings. Equipment and piping arrangements shall fit into space allotted and allow adequate acceptable clearances for installation, replacement, entry, servicing, and maintenance.

3.2.3 Fittings and End Connections

3.2.3.1 Threaded Connections

A. Make threaded connections with tapered threads and make tight with PTFE tape complying with ASTM D3308 or equivalent thread-joint compound applied to the male threads only. Show not more than three threads after the joint is made.

3.2.3.2 Brazed Connections

A. Perform brazing in accordance with AWS BRH, except as modified herein. During brazing, fill the pipe and fittings with a pressure regulated inert gas, such as nitrogen, to prevent the formation of scale. Before brazing copper joints, clean both the outside of the tube and the inside of the fitting with a wire fitting brush until the entire joint surface is bright and clean. Do not use brazing flux. Remove surplus brazing material at all joints. Make steel tubing joints in accordance with the manufacturer's recommendations. Paint joints in steel tubing with the same material as the baked-on coating within 8 hours after joints are made. Protect tubing against oxidation during brazing by continuous purging of the inside of the piping using nitrogen. Support piping prior to brazing and do not spring or force.

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3.2.3.3 Welded Connections

A. Welded joints in steel refrigerant piping shall be fusion-welded. Branch connections shall be made with welding tees or forged welding branch outlets. Pipe shall be thoroughly cleaned of all scale and foreign matter before the piping is assembled. During welding the pipe and fittings shall be filled with an inert gas, such as nitrogen, to prevent the formation of scale. Beveling, alignment, heat treatment, and inspection of weld shall conform to ASME B31.1. Weld defects shall be removed and rewelded at no additional cost to the Government. Electrodes shall be stored and dried in accordance with AWS D1.1/D1.1M or as recommended by the manufacturer. Electrodes that have been wetted or that have lost any of their coating shall not be used.

3.2.3.4 Flared Connections

A. When flared connections are used, a suitable lubricant shall be used between the back of the flare and the nut in order to avoid tearing the flare while tightening the nut. RTV 100% silicone shall be applied to the threads of flare connections prior to tightening to the required torque to prevent moisture in the threads.

3.2.3.5 Flanged Connections

A. When steel refrigerant piping is used, union or flange joints shall be provided in each line immediately preceding the connection to each piece of equipment requiring maintenance, such as compressors, coils, chillers, control valves, and other similar items. Flanged joints shall be assembled square end tight with matched flanges, gaskets, and bolts. Gaskets shall be suitable for use with the refrigerants to be handled.

3.2.4 Valves

3.2.4.1 General

A. Refrigerant stop valves shall be installed on each side of each piece of equipment such as compressors condensers, evaporators, receivers, and other similar items in multiple-unit installation, to provide partial system isolation as required for maintenance or repair. Stop valves shall be installed with stems horizontal unless otherwise indicated. Ball valves shall be installed with stems positioned to facilitate operation and maintenance. Isolating valves for pressure gauges and switches shall be external to thermal insulation. Safety switches shall not be fitted with isolation valves. Filter dryers having access ports may be considered a point of isolation. Purge valves shall be provided at all points of systems where accumulated non-condensable gases would prevent proper system operation. Valves shall be furnished to match line size, unless otherwise indicated or approved.

3.2.4.2 Expansion Valves

A. Expansion valves shall be installed with the thermostatic expansion valve bulb located on top of the suction line when the suction line is less than 54 mm 2-1/8 inches in diameter and at the 4 o'clock or 8 o'clock position on lines larger than 54 mm 2-1/8 inches. The bulb shall be securely fastened with two clamps. The bulb shall be insulated. The bulb shall installed in a horizontal portion of the suction line, if possible, with the pigtail on the bottom. If the bulb must be installed in a vertical line, the bulb tubing shall be facing up.

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3.2.4.3 Valve Identification

A. Each system valve, including those which are part of a factory assembly, shall be tagged. Tags shall be in alphanumeric sequence, progressing in direction of fluid flow. Tags shall be embossed, engraved, or stamped plastic or nonferrous metal of various shapes, sized approximately 34 mm 1-3/8 inch diameter, or equivalent dimension, substantially attached to a component or immediately adjacent thereto. Tags shall be attached with nonferrous, heavy duty, bead or link chain, 14 gauge 14 gauge annealed wire, nylon cable bands or as approved. Tag numbers shall be referenced in Operation and Maintenance Manuals and system diagrams.

3.2.5 Vibration Dampers

A. Vibration damper shall be provided in the suction and discharge lines on spring mounted compressors. Vibration dampers shall be installed parallel with the shaft of the compressor and shall be anchored firmly at the upstream end on the suction line and the downstream end in the discharge line.

3.2.6 Strainers

A. Strainers shall be provided immediately ahead of solenoid valves and expansion devices. Strainers may be an integral part of an expansion valve.

3.2.7 Filter Dryer

A. A liquid line filter dryer shall be provided on each refrigerant circuit located such that all liquid refrigerant passes through a filter dryer. Dryers shall be sized in accordance with the manufacturer's recommendations for the system in which it is installed. Dryers shall be installed such that it can be isolated from the system, the isolated portion of the system evacuated, and the filter dryer replaced. Dryers shall be installed in the horizontal position except replaceable core filter dryers may be installed in the vertical position with the access flange on the bottom.

3.2.8 Sight Glass

A. A moisture indicating sight glass shall be installed in all refrigerant circuits down stream of all filter dryers and where indicated. Site glasses shall be full line size.

3.2.9 Discharge Line Oil Separator

A. Discharge line oil separator shall be provided in the discharge line from each compressor. Oil return line shall be connected to the compressor as recommended by the compressor manufacturer.

3.2.10 Accumulator

A. Accumulators shall be provided in the suction line to each compressor.

3.2.11 Flexible Pipe Connectors

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A. Connectors shall be installed perpendicular to line of motion being isolated. Piping for equipment with bidirectional motion shall be fitted with two flexible connectors, in perpendicular planes. Reinforced elastomer flexible connectors shall be installed in accordance with manufacturer's instructions. Piping guides and restraints related to flexible connectors shall be provided as required.

3.2.12 Temperature Gauges

A. Temperature gauges shall be located specifically on, but not limited to the following: [the sensing element of each automatic temperature control device where a thermometer is not an integral part thereof] [the liquid line leaving a receiver] [and] [the suction line at each evaporator or liquid cooler]. Thermal wells for insertion thermometers and thermostats shall extend beyond thermal insulation surface not less than 25 mm 1 inch.

3.2.13 Pipe Hangers, Inserts, and Supports

A. Pipe hangers, inserts, and supports shall conform to MSS SP-58 and MSS SP-69, except as modified herein. Pipe hanger types 5, 12, and 26 shall not be used. Hangers used to support piping 50 mm 2 inches and larger shall be fabricated to permit adequate adjustment after erection while still supporting the load. Piping subjected to vertical movement, when operating temperatures exceed ambient temperatures, shall be supported by variable spring hangers and supports or by constant support hangers.

3.2.13.1 Hangers

A. Do not use Type 3 on insulated piping. Type 24 may be used only on trapeze hanger systems or on fabricated frames.

3.2.13.2 Inserts

A. Secure Type 18 inserts to concrete forms before concrete is placed. Continuous inserts which allow more adjustments may be used if they otherwise meet the requirements for Type 18 inserts.

3.2.13.3 C-Clamps

A. Torque Type 19 and 23 C-clamps in accordance with MSS SP-69 and have both locknuts and retaining devices, furnished by the manufacturer. Field-fabricated C-clamp bodies or retaining devices are not acceptable.

3.2.13.4 Angle Attachments

A. Type 20 attachments used on angles and channels shall be furnished with an added malleable-iron heel plate or adapter.

3.2.13.5 Saddles and Shields

A. Where Type 39 saddle or Type 40 shield are permitted for a particular pipe attachment application, the Type 39 saddle, connected to the pipe, shall be used on all pipe 100 mm 4 inches and larger when the temperature of the medium is 16 degrees C 60 degrees F or higher. Type 40

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shields shall be used on all piping less than 100 mm 4 inches and all piping 100 mm 4 inches and larger carrying medium less than 16 degrees C 60 degrees F. A high density insulation insert of cellular glass shall be used under the Type 40 shield for piping 50 mm 2 inches and larger.

3.2.13.6 Horizontal Pipe Supports

A. Horizontal pipe supports shall be spaced as specified in MSS SP-69 and a support shall be installed not over 300 mm 1 foot from the pipe fitting joint at each change in direction of the piping. Pipe supports shall be spaced not over 1.5 m 5 feet apart at valves. [Pipe hanger loads suspended from steel joist with hanger loads between panel points in excess of 23 kg 50 pounds shall have the excess hanger loads suspended from panel points.]

3.2.13.7 Vertical Pipe Supports

A. Vertical pipe shall be supported at each floor, except at slab-on-grade, and at intervals of not more than 4.5 m 15 feet not more than 2.4 m 8 feet from end of risers, and at vent terminations.

3.2.13.8 Pipe Guides

A. Type 35 guides using, steel, reinforced polytetrafluoroethylene (PTFE) or graphite slides shall be provided where required to allow longitudinal pipe movement. Lateral restraints shall be provided as required. Slide materials shall be suitable for the system operating temperatures, atmospheric conditions, and bearing loads encountered.

3.2.13.9 Steel Slides

A. Where steel slides do not require provisions for restraint of lateral movement, an alternate guide method may be used. On piping 100 mm 4 inches and larger, a Type 39 saddle shall be used. On piping under 100 mm 4 inches, a Type 40 protection shield may be attached to the pipe or insulation and freely rest on a steel slide plate.

3.2.13.10 High Temperature Guides with Cradles

A. Where there are high system temperatures and welding to piping is not desirable, then the Type 35 guide shall include a pipe cradle, welded to the guide structure and strapped securely to the pipe. The pipe shall be separated from the slide material by at least 100 mm 4 inches, or by an amount adequate for the insulation, whichever is greater.

3.2.13.11 Multiple Pipe Runs

A. In the support of multiple pipe runs on a common base member, a clip or clamp shall be used where each pipe crosses the base support member. Spacing of the base support members shall not exceed the hanger and support spacing required for an individual pipe in the multiple pipe run.

3.2.13.12 Seismic Requirements

A. All refrigerant piping supporting systems shall be provided and installed to comply with Arkansas Act 1100 of l991 for earthquake resistant design in the New Madrid Seismic Zone.

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3.2.13.13 Structural Attachments

A. Attachment to building structure concrete and masonry shall be by cast-in concrete inserts, built-in anchors, or masonry anchor devices. Inserts and anchors shall be applied with a safety factor not less than 5. Supports shall not be attached to metal decking. Masonry anchors for overhead applications shall be constructed of ferrous materials only. Structural steel brackets required to support piping, headers, and equipment, but not shown, shall be provided under this section. Material used for support shall be as specified under Section governing STRUCTURAL STEEL.

3.2.14 Pipe Alignment Guides

A. Pipe alignment guides shall be provided where indicated for expansion loops, offsets, and bends and as recommended by the manufacturer for expansion joints, not to exceed 1.5 m 5 feet on each side of each expansion joint, and in lines 100 mm 4 inches or smaller not more than 600 mm 2 feet on each side of the joint.

3.2.15 Pipe Anchors

A. Anchors shall be provided wherever necessary or indicated to localize expansion or to prevent undue strain on piping. Anchors shall consist of heavy steel collars with lugs and bolts for clamping and attaching anchor braces, unless otherwise indicated. Anchor braces shall be installed in the most effective manner to secure the desired results using turnbuckles where required. Supports, anchors, or stays shall not be attached where they will injure the structure or adjacent construction during installation or by the weight of expansion of the pipeline. Where pipe and conduit penetrations of vapor barrier sealed surfaces occur, these items shall be anchored immediately adjacent to each penetrated surface, to provide essentially zero movement within penetration seal. Detailed drawings of pipe anchors shall be submitted for approval before installation.

3.2.16 Building Surface Penetrations

A. Sleeves shall not be installed in structural members except where indicated or approved. Sleeves in non-load bearing surfaces shall be galvanized sheet metal, conforming to ASTM A653/A653M, Coating Class G-90, 1.0 mm (20 gauge) 20 gauge. Sleeves in load bearing surfaces shall be uncoated carbon steel pipe, conforming to ASTM A53/A53M, [Schedule 30] [Schedule 20] [Standard weight]. Sealants shall be applied to moisture and oil-free surfaces and elastomers to not less than 13 mm 1/2 inch depth. Sleeves shall not be installed in structural members.

3.2.16.1 Refrigerated Space

A. Refrigerated space building surface penetrations shall be fitted with sleeves fabricated from hand-lay-up or helically wound, fibrous glass reinforced polyester or epoxy resin with a minimum thickness equal to equivalent size Schedule 40 steel pipe. Sleeves shall be constructed with integral collar or cold side shall be fitted with a bonded slip-on flange or extended collar. In the case of masonry penetrations where sleeve is not cast-in, voids shall be filled with latex mixed mortar cast to shape of sleeve and flange/external collar type sleeve shall be assembled with butyl elastomer vapor barrier sealant through penetration to cold side surface vapor barrier overlap and fastened to surface with masonry anchors. Integral cast-in collar type sleeve shall be

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flashed with not less than 4 inches of cold side vapor barrier overlap of sleeve surface. Normally non-insulated penetrating round surfaces shall be sealed to sleeve bore with mechanically expandable seals in vapor tight manner and remaining warm and cold side sleeve depth shall be insulated with not less than 4 inches of foamed-in-place rigid polyurethane or foamed-in-place silicone elastomer. Vapor barrier sealant shall be applied to finish warm side insulation surface. Warm side of penetrating surface shall be insulated beyond vapor barrier sealed sleeve insulation for a distance which prevents condensation. Wires in refrigerated space surface penetrating conduit shall be sealed with vapor barrier plugs or compound to prevent moisture migration through conduit and condensation therein.

3.2.16.2 General Service Areas

A. Each sleeve shall extend through its respective wall, floor, or roof, and shall be cut flush with each surface. Pipes passing through concrete or masonry wall or concrete floors or roofs shall be provided with pipe sleeves fitted into place at the time of construction. Sleeves shall be of such size as to provide a minimum of 6 mm 1/4 inch all-around clearance between bare pipe and sleeves or between jacketed-insulation and sleeves.

Except in pipe chases or interior walls, the annular space between pipe and sleeve or between jacket over-insulation and sleeve shall be sealed.

3.2.16.3 Waterproof Penetrations

A. Pipes passing through roof or floor waterproofing membrane shall be installed through a 5.17 kg/sq. m 17 ounce copper sleeve, or a 0.81 mm 0.032 inch thick aluminum sleeve, each within an integral skirt or flange. Flashing sleeve shall be suitably formed, and skirt or flange shall extend not less than 200 mm 8 inches from the pipe and be set over the roof or floor membrane in a troweled coating of bituminous cement. The flashing sleeve shall extend up the pipe a minimum of 50 mm 2 inches above the roof or floor penetration. The annular space between the flashing sleeve and the bare pipe or between the flashing sleeve and the metal-jacket-covered insulation shall be sealed as indicated. Penetrations shall be sealed by either one of the following methods.

3.2.16.3.1 Waterproofing Clamping Flange

A. Pipes up to and including 250 mm 10 inches in diameter passing through roof or floor waterproofing membrane may be installed through a cast iron sleeve with caulking recess, anchor lugs, flashing clamp device, and pressure ring with brass bolts. Waterproofing membrane shall be clamped into place and sealant shall be placed in the caulking recess.

3.2.16.3.2 Modular Mechanical Type Sealing Assembly

A. In lieu of a waterproofing clamping flange and caulking and sealing of annular space between pipe and sleeve or conduit and sleeve, a modular mechanical type sealing assembly may be installed. Seals shall consist of interlocking synthetic rubber links shaped to continuously fill the annular space between the pipe/conduit and sleeve with corrosion protected carbon steel bolts, nuts, and pressure plates. Links shall be loosely assembled with bolts to form a continuous rubber belt around the pipe with a pressure plate under each bolt head and each nut. After the seal assembly is properly positioned in the sleeve, tightening of the bolt shall cause the rubber sealing elements to expand and provide a watertight seal rubber sealing elements to expand and provide a watertight seal between the pipe/conduit seal between the pipe/conduit and the sleeve. Each seal assembly shall be sized as recommended by the manufacturer to fit the pipe/conduit

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and sleeve involved. The Contractor electing to use the modular mechanical type seals shall provide sleeves of the proper diameters.

3.2.16.4 Fire-Rated Penetrations

A. Penetration of fire-rated walls, partitions, and floors shall be sealed as required by the most current Arkansas Fire and NFPA Fire Codes.

3.2.16.5 Escutcheons

A. Finished surfaces where exposed piping, bare or insulated, pass through floors, walls, or ceilings, except in boiler, utility, or equipment rooms, shall be provided with escutcheons. Where sleeves project slightly from floors, special deep-type escutcheons shall be used. Escutcheon shall be secured to pipe or pipe covering.

3.2.17 Access Panels

A. Access panels shall be provided for all concealed valves, vents, controls, and items requiring inspection or maintenance. Access panels shall be of sufficient size and located so that the concealed items may be serviced and maintained or completely removed and replaced.

3.2.18 Field Applied Insulation

A. Field installed insulation shall be as specified in Section governing INSULATION FOR MECHANICAL SYSTEMS, except as defined differently herein.

3.2.20 Identification Tags

A. Provide identification tags made of brass, engraved laminated plastic or engraved anodized aluminum indicating service and item number on all valves and dampers. Tags shall be 35 mm 1-3/8 inch minimum diameter and marking shall be stamped or engraved. Indentations shall be black for reading clarity. Tags shall be attached to valves with No. 12 AWG copper wire, chrome-plated beaded chain or plastic straps designed for that purpose.

3.3 CLEANING AND ADJUSTING

A. Clean uncontaminated system(s) by evacuation and purging procedures currently recommended by refrigerant and refrigerant equipment manufacturers, and as specified herein, to remove small amounts of air and moisture. Systems containing moderate amounts of air, moisture, contaminated refrigerant, or any foreign matter shall be considered contaminated systems. Restoring contaminated systems to clean condition including disassembly, component replacement, evacuation, flushing, purging, and re-charging, shall be performed using currently approved refrigerant and refrigeration manufacturer's procedures. Restoring contaminated systems shall be at no additional cost to the Owner as determined by the Engineer and Architect. Water shall not be used in any procedure or test.

3.4 REFRIGERANT PIPING TESTS

A. The following refrigerant system tests are for field fabricated refrigerant piping systems.

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The tests do not apply to packaged, unitary equipment which is charged at the factory. Where applicable condensing temperature is over 54 degrees C (130 degrees F), equipment and piping will be capable of withstanding leak pressure tests at not less than the design pressure corresponding to the condensing pressure during the higher ambient conditions (refer to ANSI/ASHRAE 15 & 34).

B. After all components of the refrigerant system have been installed and connected, subject the entire refrigeration system to pneumatic, evacuation, and startup tests as described herein. Provide all material, equipment, instruments, and personnel required for the test. Provide the services of a qualified technician, as required, to perform all tests and procedures indicated herein. Field tests shall be coordinated with Section governing TESTING, ADJUSTING, AND BALANCING OF HVAC SYSTEMS. Submit 6 copies of the tests report in bound booklets documenting all phases of the tests performed. The report shall include initial test summaries, all repairs/adjustments made, and the final test results.

3.5.1 Preliminary Procedures

A. Prior to pneumatic testing, equipment which has been factory tested and refrigerant charged as well as equipment which could be damaged or cause personnel injury by imposed test pressure, positive or negative, shall be isolated from the test pressure or removed from the system. Safety relief valves and rupture discs, where not part of factory sealed systems, shall be removed and openings capped or plugged.

3.5.2 Pneumatic Test

A. Pressure control and excess pressure protection shall be provided at the source of test pressure. Valves shall be wide open, except those leading to the atmosphere. Test gas shall be dry nitrogen, with minus 55 degrees C minus 70 degree F dewpoint and less than 5 ppm oil. Test pressure shall be applied no to exceed the values previously specified in this section. The initial test pressure shall be recorded along with the ambient temperature to which the system is exposed. Final test pressures of the second stage shall be maintained on the system for a minimum of 24 hours. At the end of the 24 hour period, the system pressure will be recorded along with the ambient temperature to which the system is exposed. A correction factor of 2 kPa 0.3 psi will be allowed for each degree C F change between test space initial and final ambient temperature, plus for increase and minus for a decrease. If the corrected system pressure is not exactly equal to the initial system test pressure, then the system shall be investigated for leaking joints. To repair leaks, the joint shall be taken apart, thoroughly cleaned, and reconstructed as a new joint. Joints repaired by caulking, remelting, or back-welding/brazing shall not be acceptable. Following repair, the entire system shall be retested using the pneumatic tests described above. The entire system shall be reassembled once the pneumatic tests are satisfactorily completed.

3.5.2 Evacuation Test

A. Following satisfactory completion of the pneumatic tests, the pressure shall be relieved and the entire system shall be evacuated to an absolute pressure of 300 micrometers. During evacuation of the system, the ambient temperature shall be higher than 2 degrees C 35 degrees F. No more than one system shall be evacuated at one time by one vacuum pump. Once the desired vacuum has been reached, the vacuum line shall be closed and the system shall stand for 1 hour. If the pressure rises over 500 micrometers after the 1 hour period, then the system shall be evacuated

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again down to300 micrometers and let set for another 1 hour period. The system shall not be charged until a vacuum of at least 500 micrometers is maintained fora period of 1 hour without the assistance of a vacuum line. If during the testing the pressure continues to rise, check the system for leaks, repair as required, and repeat the evacuation procedure. During evacuation, pressures shall be recorded by a thermocouple-type, electronic-type, or a calibrated-micrometer type gauge.

3.5.3 System Charging and Startup Test

A. Following satisfactory completion of the evacuation tests, the system shall be charged with the required amount of refrigerant by raising pressure to normal operating pressure and in accordance with manufacturer's procedures. Following charging, the system shall operate with high-side and low-side pressures and corresponding refrigerant temperatures, at design or improved values. The entire system shall be tested for leaks. Fluorocarbon systems shall be tested with halide torch or electronic leak detectors.

3.5.4 Refrigerant Leakage

A. If a refrigerant leak is discovered after the system has been charged, the leaking portion of the system shall immediately be isolated from the remainder of the system and the refrigerant pumped into the system receiver or other suitable container. Under no circumstances shall the refrigerant be discharged into the atmosphere.

3.5.6 Contractor's Responsibility

A. At all times during the installation and testing of the refrigeration system, take steps to prevent the release of refrigerants into the atmosphere. The steps shall include, but not be limited to, procedures which will minimize the release of refrigerants to the atmosphere and the use of refrigerant recovery devices to remove refrigerant from the system and store the refrigerant for reuse or reclaim. At no time shall more than 85 g, 3 ounces of refrigerant be released to the atmosphere in any one occurrence. Any system leaks within the first year shall be repaired in accordance with the requirements herein at no cost to the Owner, including material, labor, and refrigerant if the leak is the result of defective equipment, material, or installation.

END OF SECTION

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SECTION 23 31 00
HVAC DUCTS AND CASINGS

PART 1 - GENERAL

1.01 Work Included

A. Ducts for Supply, Return, & Exhaust Systems.

B. Ductwork (Low pressure <2” ESP), (Medium pressure =>2” to 10” ESP)

C. Fasteners

D. Sealants

E. Duct Cleaning

F. Dual wall internally insulated oval

G. Dual wall internally insulated round

1.02 Definitions

A. Duct Sizes: Inside clear dimensions for all ducts, unless otherwise noted.

B. Low Pressure: Static pressure in duct downstream from VAV boxes less than 2" w.g. and velocities less than 2000 fpm (10 meters/second).

C. High pressure: Static pressure in duct up stream of VAV boxes less than 10" W.G.

1.03 References

A. Fabricate in accordance with SMACNA Duct Construction Standards, Latest Edition, duct manual and ASHRAE handbooks.

B. Construct ductwork to comply with NFPA 90A, Air conditioning and Ventilating Systems.

1.05 Submittals

A. Confirm ductwork has been fabricated and installed in accordance with recommendations and SMACNA standards.

PART 2 - PRODUCTS

2.01 Materials

A. Ducts: Galvanized steel lock forming quality, having zinc coating of 1.25 ounces per square foot for each side for cooling and heating air transport. Welded 18 gauge stainless steel or 16 gauge steel for grease laden vapor.

B. Fasteners: Sheet metal screws accepted on low pressure ducts.

C. Sealant: Water resistant, fire resistive, compatible with mating materials, Hardcast tape and

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adhesive or approved equal.

D. Flexible Duct: With solid polyester film inner liner, 2", 3/4# density insulation and fiberglass reinforced aluminized polyester film vapor barrier outer liner. Flexible duct shall not have vinyl outer liner. Insulation exposed to the air stream is not acceptable. Flexible duct shall be listed and labeled by U.L. as Class 1 Air Duct Material, Standard 181. It must comply with latest NFPA Bulletin 90A and meet GSA, FHA and other government standards. Flame spread shall not exceed 25, and smoke developed shall not exceed 50. Flexible duct shall be securely attached to both ductwork and air devices with stainless steel band that is screwdriver driven. A maximum of three (3) feet of flexible duct is to be installed on each ceiling device and terminals (EXCEPT WHERE specifically noted to be longer).

2.02 Fabrication of Low Pressure Ductwork

A. Size round ducts installed in place of rectangular ducts from ASHRAE table of equivalent rectangular and round ducts. No variation of duct configuration or sizes permitted except by written permission.

B. Complete metal ducts within themselves with no single partition between ducts. Open corners are not acceptable.

C. Lap metal ducts in direction of air flow. Hammer down edges and slips to leave smooth duct interior.

D. Construct tees, bends and elbows with radius of not less than 1 1/2 times width of duct on center line. Where not possible and where rectangular elbows used, provide air foil type turning vanes.

E. Increase duct sizes gradually, not exceeding 15 deg. divergence wherever possible. Maximum divergence upstream of equipment to be 30 deg. and 45 deg. convergence downstream.

F. Rigidly construct metal ducts with joints mechanically tight, substantially airtight, braced and stiffened so as not to breathe, rattle, vibrate or sag. Caulk duct joints and connections with sealant as ducts are being assembled.

G. Provide easements where low pressure ductwork conflicts with piping and structure where easements exceed 10% duct area, split into two ducts maintaining original duct area.

2.03 Low Pressure Duct Gauges

A. Construct return air from A/C units ductwork in accordance with 2" table of SMACNA handbook and supply duct downstream of the terminal boxes and exhaust duct in accordance with 1" table of SMACNA handbook.

2.04 Flexible Connections

A. Fabricate of neoprene coated flameproof fabric Equal Vent tab approximately 2" inch wide tightly crimped into edging strip and attach to ducting and equipment by screws or bolts at 6" inch intervals.

2.05 Fabrication for 10" W.G. High Pressure Ductwork

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A. All primary supply and return air ductwork form and to main air handling units shall be considered 10.0” W.G. pressure ductwork. All 10" W.G. pressure duct shall be fabricated and erected in accordance with the recommendations of SMACNA HVAC duct Construction Standards, current Edition. Minimum gauges, Joints, seams and bracing shall be in strict accordance with the above for the listed size, unless metal gauges hereinafter specified are more stringent. The duct construction must be strong enough to handle a minimum of 10" of water internal pressure and shall be tested for leaks to the satisfaction of the Architect and Owner before acceptance. All leaks and discrepancies in the ductwork shall be repaired and the system retested.

B. The arrangements of fittings and pipe as drawn on the plans are to be adhered to as closely as practical, since selection of fan noise levels and pressure drops have been based upon this arrangement. However, some field adaption is to be expected which may change, omit or require additional fittings. The Contractor is cautioned to study the space requirements and elevations and to estimate any additional fittings necessary for cross-overs, etc. A complete air distribution system must be furnished.

C. Contractor shall furnish and completely install Semco dual wall oval and dual wall round additional primary, 10" W.G. pressure ductwork shown on the drawings and covered in these specifications as necessary to provide completely quiet operating 10" W. G. pressure duct systems as outlined on the drawings. This system must be constructed in a workmanlike manner by skilled mechanics in such a way as to effect a completely air tight distribution system from discharge of the primary supply fan to the various air terminals.

D. All round ductwork 64" and smaller shall be spiral lock seam pipe as manufactured by Semco Manufacturing, Inc. The spiral pipe shall have been laboratory tested for leakage rate, friction loss, bursting and collapsing strength. Sizes 3" to 14" shall be 26 gauge galvanized steel. Sizes 15" to 26" shall be 26 gauge galvanized steel. Sizes 27" to 36" shall be 22 gauge galvanized steel. Sizes 37" to 50" shall be 20 gauge galvanized and 52" to 64" shall be 18 gauge galvanized steel. Spiral duct shall be supplied in 12' lengths. All dual wall round and oval duct shall be internally lined.

The sealing procedures shall be as follows:

1. First Step: Apply duct sealer to fitting. Surface should be relatively free from dirt, oil and grease.

2. Second Step: Install sheet metal screws as close to fitting head as possible.

3. Third Step: Apply layer to sealer to outside of joint, approximately three (3) inches wide. Make sure that sheet metal screw heads are completely covered, as well as joint and coupling head.

4. Fourth Step: Apply a single pass of Hardcast FS-150 tape over the wet sealer. Pull tight and smooth to make complete contact and cover tape with final layer of sealer.

5. Alternately, seal with a listed code sealant by an approved method - verify with the authority having jurisdiction.

2.06 Dust Collection Ductwork

A. Duct shall be minimum 16 gauge for negative 20” W.G.

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B. Seal and construct duct per SMANCA industrial duct standards with clean outs on 10' centers.

PART 3 - EXECUTION

3.01 Installation

A. Contractor shall verify in the field duct spaces that are available. Contractor shall offset and make changes to ductwork as required for a complete job at no expense to anyone, but himself.

B. Install ductwork in accordance with details on drawings, SMACNA manuals and manufacturer's installation instructions and standards.

C. Install flexible connections between all air moving equipment and return & supply air supply ducts to & from such equipment unless otherwise noted. Seal and Insulate flexible connections externally.

D. Install turning vanes in all square/rectangular duct elbows.

E. Install deflectors in rectangular ducts at rectangular takeoffs.

F. Install spin-in or gasketed, flanged, take-off fittings with volume dampers where round ducts connect rectangular ducts.

G. Install volume control dampers on each branch supply duct to balance air device outputs.

H. Install volume control dampers in supply, return, or exhaust ducts having more than one system outlet. Such dampers shall be located in-line in branch ducts ahead of inlets or outlets as applicable.

I. Flexible insulated air ducts may be installed to ceiling outlets in lay-in ceilings. Maximum length of flex ducts shall be 3 feet. No exceptions.

J. Reinforce industrial round duct as required by SMACNA standards.

K. Clean duct system and force air at high velocity through duct to remove accumulated dust. To obtain sufficient air, clean half the system at a time. Protect equipment which may be harmed by excessive dirt with filters, or bypass during cleaning.

END OF SECTION

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SECTION 23 33 00
AIR DUCT ACCESSORIES

PART 1 - GENERAL

1.01 Work Included

A. Access Doors.

B. Fire Dampers

C. Smoke Dampers

D. Combination Fire & Smoke Dampers.

E. Ceiling Radiation Fire Dampers

F. Flexible Connections.

G. Balancing & Volume Dampers

1.02 Related Work

A. Section 23 31 00.

1.03 Quality Assurance

A. Combination Fire & Smoke dampers, fire dampers, and ceiling radiation dampers shall be UL listed and constructed in accordance with all applicable UL/ETL standards.

B. Combination fire and smoke dampers, fire dampers, and ceiling radiation dampers shall meet the approval of the authorities having jurisdiction.

C. Access doors shall be UL listed/labelled.

1.04 References

A. Accessories shall meet the requirements of NFPA 90 A, Air Conditioning and Ventilating Systems.

B. Fabricate in accordance with ASHRAE handbooks and SMACNA HVAC Duct Construction Standards, latest First Edition.

1.05 Submittals

A. Submit shop drawings of factory fabricated assemblies.

B. Submit samples of shop fabricated assemblies as requested.

C. Submit manufacturer's printed installation instructions.

PART 2 - PRODUCTS

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2.01 Access Doors

A. Fabricate rigid and close fitting doors of galvanized steel with sealing gaskets and quick fastening locking devices. For insulated ductwork, install minimum 1" thick insulation with sheet metal cover.

B. Provide two hinges and two sash locks for sizes up to 18" square, two hinges and tow compression latches with outside and inside handles for sizes up to 24" X 48".

2.02 Fire Dampers

A. Fabricate of galvanized steel or prime coated black steel weighted to close and lock in closed position when released by fusible link.

B. Fire dampers in low pressure ductwork shall be curtain type. Fire dampers in ductwork over 2" in pressure will be Type "C".

C. Curtain type fire dampers shall have blades retained in a recess so free area of connecting ductwork is not reduced.

D. Set or select fusible links for 160 deg. F. release.

2.03 Smoke Dampers

A. The dampers shall be the very low leakage non-degradable design with friction free metal to metal seals incorporated into the blade and frame shapes. Other types of gasketing to achieve very low leakage performance such as: petrochemical (vinyl, plastic, etc.), spring stainless steel etc. are not acceptable. The damper frame shall be 16 gauge galvanized steel with double wrapped center and edge forming for maximum structural strength. The dampers shall leak no more than 11 CFM per sq. ft. @ 1" static pressure and meet NFPA 90A smoke damper requirements. Actuators shall be (120 volt or electric) and furnished by the smoke damper manufacturer unless otherwise specified in control specifications.

2.04 Balancing and Volume Dampers

A. Fabricate from galvanized steel, minimum 16 gauge and provide with quadrants or adjustment rod and lock screw.

B. Fabricate splitter dampers of double thickness sheet metal to streamline shape, properly stiffened to avoid vibration. Size on basis of straight air volume proportioning.

C. Fabricate single blade dampers for duct sizes to 9 1/2" X 30".

D. Fabricate multi-blade damper of opposed blade pattern with maximum blade sizes 12" X 72". Assemble center and edge crimped blade in prime coated or galvanized channel frame with suitable hardware.

E. Construct damper blades for medium and high pressure systems to block a maximum of 70% of the air passage. Supply locking type handles.

F. Fabricate multi-blade, parallel action gravity balanced backdraft dampers with blades a maximum of 10" width having felt or flexible vinyl sealing edges, linked together in rattle-free

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manner and with adjustment device to permit setting for varying differential static pressure.

G. Balancing and volume dampers for round ducts sized 10” and less shall be equal to Young Regulator Iris style dampers.

2.05 Flexible Connections

A. Fabricate of neoprene coated flameproof fabric approximately 2" wide tightly crimped into metal edging strip and attach to ducting and equipment by screws or bolts at 6" intervals.

2.06

PART 3 - EXECUTION

3.01 Installation

A. Install items in accordance with manufacturer's printed instructions and the plans and specifications.

3.02 Application

A. Provide access doors for inspection and cleaning before and after filters, coils, fans, automatic dampers, at fire and smoke dampers and elsewhere as indicated. Review locations prior to fabrication.

B. Provide 4" X 4" quick opening access doors for inspection at balancing dampers.

C. Provide combination fire & smoke dampers or fire dampers, as noted, at locations shown, where ducts and outlets pass through fire rated components and where required by authorities having jurisdiction. Fire dampers shall be complete with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushings and hinges.

D. Provide balancing dampers at points on pressure supply, return, and exhaust systems where branches are taken from larger ducts as required for air balancing.

E. Provide balancing dampers on duct systems where indicated. Use splitter dampers only where indicated on drawings.

F. Provide flexible connections immediately adjacent to equipment in ducts associated with fans and equipment subject to forced vibration.

END OF SECTION

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SECTION 23 34 00
HVAC FANS

PART 1 GENERAL

1.01 WORK INCLUDED

A. Exhaust fans.

1.02 REFERENCES

A. ASHRAE Standard 90.1 – Energy Standard for Buildings Except Low-Rise Residential Buildings (most current addition referenced by Arkansas Energy Code)

B. ARI 210 - Standard for Unitary Air-Conditioning Equipment.

C. ASHRAE Standard 62.1 – Ventilation for Acceptable Indoor Air Quality (most current edition referenced by Arkansas Mechanical Code and Arkansas Energy Code)

D. Arkansas Mechanical Code (most current edition).

1.03 SUBMITTALS

A. Submit shop drawings and product data showing, dimensions, connections, arrangements, accessories, and controls for all equipment specified and scheduled on the drawings in accordance with Section 23 00 00.

B. Submit manufacturer's installation instructions.

1.04 OPERATION AND MAINTENANCE DATA

A. Submit manufacturer's descriptive literature, operating instruction, and maintenance and repair data.

1.05 WARRANTY

A. Provide minimum five (5) year parts warranty on equipment.

1.06 QUALITY ASSURANCE

A. Conform to requirements of applicable codes.

B. Unit shall be certified in accordance with UL Standard 1995/CSA C22.2 No. 236, Safety Standard for Heating and Cooling Equipment.

C. Unit shall be safety UL/ETL listed or both.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

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A. Exhaust Fans: Greenheck (Basis of Design), Loren Cook, ACME, or Engineer Approved Equal.

B. HVLS FANS: Greenheck (Basis of Design), Hunter Industrial Fans, Propel Air Fans, or Engineer Approved Equal.

2.02 EXHAUST FANS (SCHEDULED ON DRAWINGS)

A. Direct Drive exhaust fans.

B. Provide Fans with in-line shutter gravity dampers and all required mounting equipment.

C. Fans shall be provided a Speed control or 0-10VDC input for adjustment of operating fan speed, as noted on the plans.

2.03 HIGH VOLUME LOW SPEED (HVLS) FANS (SCHEDULED ON DRAWINGS)

A. Direct Drive integral VFD fans.

B. Wall mounted single controller for multiple fans required.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install Units where shown on the plans. Coordinate exact mounting locations and elevations with all equipment, Architectural plans and reflected ceiling plans, and structure.

B. Coordinate sequence of installation and start-up of new systems with other trades.

C. Install all HVAC equipment in accordance with the manufacturer's installation instructions and recommendations.

D. Provide start-up of systems as required in Specifications – Coordinate with Controls Contractor.

E. Support all fans from the structure.

F. Install exhaust systems and supply air systems as indicated on plans and per manufacturer's guidelines and all applicable codes and standards.

G. Installation, Operation and Maintenance manual shall be supplied with the all units.

H. Controls for all systems by control contractor shall be in compliance with all of the manufacturer's required equipment and installation procedures. Installation of controls, including field-installed components, shall be in accordance with Installation, Operation, and Maintenance manual instructions.

END OF SECTION

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SECTION 23 37 00
AIR OUTLETS AND INLETS

PART 1 - GENERAL

1.01 Work Included

A. Diffusers.

B. Grilles.

C. Registers.

D. Wall Louvers.

E. Dryer Vents.

1.02 Quality Assurance

A. Make air flow tests, pressure tests, and sound level measurements in accordance with applicable ADC equipment test codes and ASHRAE Standards.

B. Manufacturer shall certify cataloged performances and ensure correct application of air outlet types.

PART 2 - PRODUCTS

2.02 Air Devices on the Drawings

A. Provide air devices equal to the materials, finish, quality, and performance indicated on the drawings.

B. Products subject to Section 23 00 00.

PART 3 - EXECUTION

3.01 Installation

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

B. Paint ductwork visible behind air outlets matte black where visible from occupied spaces.

C. Install filters in ALL air distribution systems supplying air to conditioned spaces.

END OF SECTION

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SECTION 23 42 00
VEHICLE EXHAUST GAS DETECTION SYSTEM

PART 1 GENERAL

1.01 WORK INCLUDED

A. Multi-point digital gas detection and control system.

B. emergency exhaust fan activation.

1.02 REFERENCES

A. ANSI/UL 61010-1

B. Arkansas Mechanical Code (Most current edition).

1.03 SUBMITTALS

A. Submit shop drawings and product data showing, dimensions, connections, arrangements, accessories, and controls for all equipment specified and scheduled on the drawings in accordance with general provisions.

B. Submit manufacturer's installation instructions.

1.04 OPERATION AND MAINTENANCE DATA

A. Submit manufacturer's descriptive literature, operating instruction, and maintenance and repair data.

1.05 WARRANTY

A. Manufacturers standard warranty.

1.06 QUALITY ASSURANCE

A. Conform to requirements of applicable codes.

B. Unit shall be certified in accordance with ul/csa standards

C. Unit shall be safety ul/etl listed or both.

PART 2 PRODUCTS

2.00 MANUFACTURERS

A. INTEC CONTROLS POLYGARD 2 or engineer approved equal.

2.01 MULTI-POINT DIGITAL GAS DETECTION AND CONTROL SYSTEMS

A. Provide units as noted on the drawings.

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B. Provide sensors for coverage based on manufacturer's recommended system configuration.

C. Provide interlock to activate emergency exhaust fan (SEE NOTES ON DRAWINGS).

D. Provide a complete system.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install equipment and sensors where shown on the plans or in locations to meet manufacturer's coverage requirements.

B. Coordinate exact mounting locations and elevations.

C. Coordinate interlock and activation of the provided emergency exhaust fan system with alarm and notification (SEE NOTES ON PLANS).

D. Installation, operation, and maintenance manual shall be supplied with system.

END OF SECTION

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SECTION 23 50 00
GAS FIRED MODULATING INFRARED TUBE HEATERS

PART 1 GENERAL

1.01 WORK INCLUDED

A. Gas Fired Modulating Infrared Tube Heaters and wall mounted thermostat controls.

1.02 REFERENCES

A. ASHRAE Standard 90.1 – Energy Standard for Buildings Except Low-Rise Residential Buildings (most current addition referenced by Arkansas Energy Code)

B. Arkansas Mechanical Code (most current edition).

C. National Fuel Gas Code (most current edition).

1.03 SUBMITTALS

A. Submit shop drawings and product data showing, dimensions, connections, arrangements, accessories, and controls for all equipment specified and scheduled on the drawings in accordance with Section 23 00 00.

B. Submit manufacturer's installation instructions.

1.04 OPERATION AND MAINTENANCE DATA

A. Submit manufacturer's descriptive literature, operating instruction, and maintenance and repair data.

1.05 WARRANTY

A. Provide minimum five (5) year parts warranty on equipment.

1.06 QUALITY ASSURANCE

A. Conform to requirements of applicable codes.

B. Unit shall be certified in accordance with UL Standard 1995/CSA C22.2 No. 236, Safety Standard for Heating and Cooling Equipment.

C. Unit shall be safety UL/CSA-US listed or both.

D. Manufacturer Qualifications: Minimum 5 years' experience manufacturing similar equipment.

E. Installer Qualifications: Minimum 2 years' experience installing similar equipment.

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PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Advanced Radiant Systems (Basis of Design), Detroit Radiant Products, Schwank, or Engineer Approved Equal.

2.02 GAS FIRED MODULATING INFRARED TUBE HEATERS

A. Scheduled on drawings.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install Units where shown on the plans. Coordinate exact mounting locations and elevations with all equipment, Architectural and structural plans, and verify finish floor heights and conditions prior to installation.

B. Coordinate sequence of installation and start-up of new systems with other trades.

C. Provide start-up of systems as required in Specifications.

D. Install equipment as indicated on plans and per manufacturer's guidelines and all applicable codes and standards.

E. Installation, Operation and Maintenance manual shall be supplied with all units.

F. Protect installed products until completion of project.

G. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

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SECTION 23 81 26
MULTI-ZONE DUCTLESS INVERTER HEAT PUMPS & AIR HANDLERS

PART 1 GENERAL

1.01 WORK INCLUDED

A. MULTI-ZONE DUCTLESS INVERTER HEAT PUMPS AND CASSETTE AIR HANDLERS

1.02 REFERENCES

A. ASHRAE Standard 90.1 – Energy Standard for Buildings Except Low-Rise Residential Buildings (most current addition referenced by Arkansas Energy Code)

B. ARI 210 - Standard for Unitary Air-Conditioning Equipment.

C. ASHRAE Standard 62.1 – Ventilation for Acceptable Indoor Air Quality (most current edition referenced by Arkansas Mechanical Code and Arkansas Energy Code)

D. Arkansas Mechanical Code (most current edition).

1.03 SUBMITTALS

A. Submit shop drawings and product data showing, dimensions, connections, arrangements, accessories, and controls for all equipment specified and scheduled on the drawings in accordance with Section 23 00 00.

B. Submit manufacturer's installation instructions.

1.04 OPERATION AND MAINTENANCE DATA

A. Submit manufacturer's descriptive literature, operating instruction, and maintenance and repair data.

1.05 WARRANTY

A. Provide minimum five (5) year parts warranty on equipment.

1.06 QUALITY ASSURANCE

A. Conform to requirements of applicable codes.

B. Unit shall be certified in accordance with UL Standard 1995/CSA C22.2 No. 236, Safety Standard for Heating and Cooling Equipment.

C. Unit shall be safety UL/ETL listed or both.

PART 2 PRODUCTS

2.00 MANUFACTURERS

A. LG (basis of design), DAIKIN, MITSUBISHI, or Engineer Approved Equal.

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2.01 MULTI-ZONE DUCTLESS HEAT PUMPS AND AIR HANDLERS (SCHEDULED ON DRAWINGS)

A. Provide multi-zone zone inverter compressor heat pump units as scheduled on the drawings.

B. Provide ceiling cassette-type air handlers for multi-zone units as scheduled on the drawings.

C. Provide units with wired remote controls as scheduled on the drawings.

D. Provide units with manufacturers' required refrigeration accessories and controls to install as shown on the drawings.

E. Provide units with ventilation air inlet connections as shown on the drawings.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install Units where shown on the plans. Coordinate exact mounting locations and elevations with Architectural and Structural Plans.

B. Coordinate sequence of installation and start-up of new systems with other trades.

C. Install all HVAC equipment in accordance with the manufacturer's installation instructions and recommendations.

D. Provide start-up of systems as required in Specifications – Coordinate with Test & Balance Contractor.

E. Installation, Operation, and Maintenance manual shall be supplied with the all units.

F. Controls for all systems shall be in compliance with all of the manufacturer's required equipment and installation procedures. Installation of controls, including field-installed components, shall be in accordance with Installation, Operation, and Maintenance manual instructions.

END OF SECTION

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SECTION 26 00 00
ELECTRICAL

PART 1 - GENERAL

1. PROJECT INFORMATION

   A. Project: RPM GSA LITTLE ROCK USSS

   B. Owner: RPM

   C. Architect: WER Architects

   D. The Project consists of constructing a vehicle storage facility and office in an existing shell tenant space in Little Rock, AR.

2. Work Included:

   A. Furnish and install all electrical wiring, systems, equipment and accessories in accordance with the specifications and drawings. Specifications and drawings are complimentary except that, in case of conflict, the most stringent requirement will govern. Capacities, power ratings of motors, cable, panel board, motor controls and arrangement for specified items in general are shown on drawings.

   B. All ampacities herein specified or indicated on the drawings are based on copper conductors with the conduit and raceways accordingly sized. Aluminum conductors are not permitted.

   C. The General Conditions, Supplementary Conditions, and the General Requirements (Division 1) of these Specifications are an integral part of this Division and of the Contract for this project. Carefully note the contents and provisions in performance of the work.

   D. Examine all of the Contract drawings and specifications or otherwise determine the extent of related work in other divisions before submitting a quotation for the work in this division. Coordinate the work in this Division with work in other divisions through the General Contractor. No extra payment will be made for additional work required by failure to coordinate the work.

   E. Examine the premises in accordance with Division 1 (General Requirements) of the Specifications.

   F. Obtain all permits and pay all fees required by the work in this Division in accordance with the General Conditions of the Contract.

   G. Should the particular equipment which any bidder proposes to install, require other space conditions than those indicated on the drawings, arrange for such space with the Engineer before submitting a bid or purchasing any equipment. Should changes become necessary because of failure to comply with this clause, install changes without any additional expense.

   H. Where electrical equipment is installed that causes electrical noise interference with other electrical systems installed under this contract, equip the offending equipment with isolating transformers, filters, shielding or any other means as required for the satisfactory

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suppression of the interference as determined by the Engineer.

I. Where required, conduit, electrical equipment, and support systems shall be installed in accordance with Arkansas Act 1100 of l991 for earthquake resistant design.

3. Applicable Publications:

The following publications of the issues as listed, but referred thereafter by basic designation only, form a part of this specification to the extent indicated by the reference thereto:

A. Federal Specifications (Fed. Spec.)

B. American Society for testing and Materials (ASTM)

C. National Fire Protection Association (NFPA)

D. National Electrical Code (NEC)

E. Miscellaneous Standards:

American National Standards Institute, Inc. (ANSI)

Illuminating Engineering Society (IES)

Institute of Electrical and Electronic Engineers (IEEE)

Insulated Power Cable Engineers Association (IPCEA)

Joint Industrial Council (JIC)

National Electrical Manufacturers Association (NEMA)

National Electrical Safety Code (NESC)

4. Related work in other Divisions:

A. Related work in other divisions requiring cooperation and coordination with this Division includes, but is not limited to, the following:

a. Perform or coordinate all cutting and patching as required for this project and in conformance with Division 1 (General Requirements).

b. Perform all earth work required by the work in this division. Ensure that excavating, back-filling and other earthwork conforms to Division 2 (Site Construction) except where described in other sections of this Division or on the drawings.

c. Furnish all sleeves inserts anchors and supports required by this work to be installed in concrete or masonry and coordinate with the respective trades under Division 3 (Concrete) and 4 (Masonry) for proper locations and installation.

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d. Flash and seal roof penetrations in accordance with Division 7 (Thermal and Moisture Protection). Furnish locations and sizes and coordinate the installation with the respective trades.

e. Perform painting of electrical equipment and materials in finished areas as required under Division 9 (Finishes). Touch up or prime any surfaces required in this Division in accordance with Division 9. Provide factory finishes as specified in other sections of this Division.

f. Install branch circuits and make final connections to any equipment requiring electric power that is furnished and installed by the Contractor or by the Owner. Perform the electrical work according to approved shop drawings.

g. Install empty raceways and outlet boxes or branch circuits for equipment to be furnished by others, or to be installed after completion of the Contract.

h. Install and connect motor starters or variable frequency drives (VFD) furnished under Division 23 where starters are not integral parts of the equipment. Ensure that starters and VFDs generally conform to the requirements of this Division. Coordinate with mechanical and controls contractors.

i. Mechanical equipment controls and control wiring are furnished and installed under Division 23 in accordance with the requirements of this Division.

j. Motors are furnished and installed generally as an integral part of equipment specified under Division 23 and must conform to the requirements of this Division.

5. Standards:

A. Ensure that all materials and equipment are listed, labeled or certified by Underwriters laboratories, Inc. where such standards have been established. Equipment and materials which are not covered by UL Standards will be accepted provided equipment and material is listed, labeled, certified or otherwise determined to meet safety requirements by a nationally recognized testing laboratory. If inspected or tested in accordance with national industrial standards, such as NEMA, IPECA or ANSI. Evidence of compliance must include certified test reports and definite shop drawings.

PART 2 - PRODUCTS

A. Approvals:

Approvals are required of products or services of the proposed manufacturers, suppliers, and installers for this project. Approvals will be based upon review of submissions by Contractorss.

1. Manufacturer's Qualifications: Manufacturer regularly and presently manufactures as one of the manufacturer's principal products the following items and has manufactured these items for at least five (5) years.

Wire and Cable - all types
Light Fixtures

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Emergency Ballasts
Lighting Switches and Receptacles
Dimmers
Molded Case Circuit Breakers
Conduit
Surge Protection Devices
Plug-in Strip Receptacle Units
Low Voltage Fusible and Non-fusible Switches
Outlet Boxes
Duct Sealing Compound
Conduit Supports
Panelboards
Conduit Couplings
Bushing and Fittings
Wiring Devices
Relay Panels
Fire Alarm Devices and Equipment

2. Installer must have the technical qualifications, experience, trained personnel and facilities to install specified items including at least three years of successful installation of electrical work similar to that required for this project. Approval will not be given where the experience record is one of unsatisfactory performance.

B. Manufactured Products:

1. Ensure that materials and equipment furnished are of current production by manufacturers regularly engaged in the manufacture of such items for which replacement parts should be available. Items not meeting these requirements but which otherwise meet technical specifications and merits of which can be established through reliable test reports or physical examination of representative samples will be considered.

2. Provide products of a single manufacturer when more than one unit of the same class of equipment or material is required.

3. Equipment assemblies and components:

a. All components of an assembled unit need not be products of the same manufacturer.

b. Manufacturers of equipment assemblies which include components made by others must assume complete responsibility for the final assembled unit.

c. Components must be compatible with each other and with the total assembly for the intended service.

d. Constituent parts which are similar must be the product of a single manufacturer.

e. Moving parts of any element of equipment of the unit normally requiring lubrication must have means provided for such lubrication and must be adequately lubricated at factory prior to delivery.

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4. Identify all factory wiring on the equipment being furnished and on all wiring diagrams.

C. Equipment ratings and approval of "Equal" Equipment:

1. Equipment voltage ratings must be in accordance with the requirements indicated on the drawings and as specified.

2. Obtain written approval for any equipment which differs from the requirements of the drawings and specifications.

a. Furnish drawings showing all installation details, shop drawings, technical data, and other pertinent information as required.

b. Approval by the Engineer of the equal equipment does not relieve the Contractor of the responsibility of furnishing and installing the equipment at no additional cost.

c. Furnish and install any other items required for the satisfactory installation of the equal equipment at no additional cost. This includes, but is not limited to, changes to branch circuits, circuit protective devices, conduits, wire, feeders, controls, panels, and correlation with other work, subject to the jurisdiction and approval of the Engineer.

3. Where specifically called for, provide equipment of the named manufacturer with an alternate price for the acceptable "equal" equipment.

4. Products and Manufacturers specified on the plans and in these specifications are for basis of design and equal manufacturers that meet the same criteria shall be deemed acceptable. Products shall meet “Buy American Act,” unless such products are proven to be unavailable for the function specified.

D. Equipment Protection:

1. Store all materials and equipment to be installed in the work so as to ensure the preservation of their quality, workability and fitness for the work intended. Provide storage provisions for protection from the elements, rust, and physical damage. Place stored materials on clean, hard surfaces above ground and keep covered at all times to ensure protection from paint, plaster, dust, water and other construction debris or operations. Install heaters under the protective cover where the equipment may be damaged due to moisture and weather conditions. Keep conduit ends plugged or capped and all covers closed on boxes, panels, switches, fixtures, etc. until installation of each item. Store all plastic conduit or duct out of direct sunlight in shaded areas. Locate stored materials and equipment to facilitate prompt inspection.

2. Protect during installation, all equipment, controls, controllers, circuit protective devices, etc., against entry of foreign matter on the inside and be vacuum clean both inside and outside before testing, operating and painting.

3. Place damaged equipment, as determined by the Engineer, in first class operating condition or return to source of supply for repair of replacement.

4. Protect painted surfaces with removable heavy kraft paper, sheet vinyl or equal, installed at the

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factory.

PART 3 - EXECUTION

1. Field coordinate with other trades in ample time to build all chases and openings, set all sleeves, inserts and concealed materials, and provide clearances that may be required to accommodate materials and equipment. Lay out electrical work so that in case of interference with other items the layout may be altered to suit conditions encountered.

2. Cutting of Holes:

   a. Cut holes through concrete and masonry in structures with a diamond core drill or concrete saw. Pneumatic hammer, impact electric, hand, or manual hammer type drills are not allowed except where permitted by the Engineer as required by limited working space.

   b. Locate holes so as not to affect structural sections such as ribs or beams.

   c. Layout holes in advance. Advise the Engineer prior to drilling through structural sections for determination of proper layout.

3. Floor, exterior wall and roof seals must be watertight. Sleeve walls and floors which are cored for installation of conduit with steel tubing, grouted, and the space between the conduit and sleeve filled as specified herein. Where conduits pierce the roof, refer to architectural specifications and drawing for details.

4. Do not use electrical hangers and other supports for other than electrical equipment and materials. Provide not less than a safety factor of 5 and conform with any specific requirements as shown on the drawings or in the specifications.

5. Do not deviate from the plans and Specifications without the full knowledge and consent of the Engineer. Should, at any time during the progress of the work, a new or existing condition be found which makes desirable a modification of the requirements of any particular item, report such item promptly to the Engineer for his decision and instruction.

6. Notify all other Contractors of any deviation or special conditions. Resolve interferences between the work of the various Contractors prior to installation. Remove, if necessary, work installed, which is not in compliance with the plans and specifications as specified above, and properly reinstall without additional cost to Owner. Architect/Engineer or his representative is the mediating authority in all deviation and confliction disputes arising on this project.

A. Equipment Installation and Requirements:

1. Installation:

   a. "Provide" and "Install" as used on the drawings and in the specifications means furnish, install, connect, adjust and test except where otherwise specified.

   b. Install coordinate electrical systems, equipment and materials complete with auxiliaries and accessories.

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2. Equipment Location: As close as practicable to locations shown on drawings.

3. Working Spaces: not less than specified in the National Electrical Code for all voltages specified.

4. Inaccessible Equipment:

a. Where the Engineer determines that the Contractor has installed equipment not conveniently accessible for operation and maintenance, remove and reinstall equipment as directed at no additional cost.

b. "Readily Accessible" is defined as being capable of being reached without the use of ladders or without climbing or crawling under or over obstacles such as motors, pumps, belt guards, transformers, piping and ductwork.

5. Equipment and Materials:

a. Install new equipment and materials unless otherwise specified.

b. Ensure that equipment and materials are designed to provide satisfactory operating life for environmental conditions where being installed. NEC and other code requirements apply to the installation in areas requiring special protection such as explosion-proof, Vapor-proof, watertight and weatherproof construction.

B. Equipment Identification:

1. In addition to the requirements of the National Electrical Code, install an identification sign which will clearly indicate information required for use and maintenance of items such as panelboards, cabinets, motor controllers (starters), safety switches, separately enclosed circuit breakers, individual breakers, and controllers in switchgear and motor control assemblies, control devices and other significant equipment.

C. Drawings and Specifications:

1. The drawings and specifications indicate the requirements for the systems, equipment, materials, operation and quality. They are not to be construed to mean limitation of competition to the products of specific manufacturers.

D. System Voltages: Voltage ranges are defined as follows:

1. High Voltage: Above 600 Volts.

2. Low Voltage: 600 Volts and lower.

E. Submittals:

1. Obtain the Engineer's approval for all equipment and material before delivery to the job site. Delivery, storage or installation of equipment or material which has not had prior approval is not permitted at the job site.

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2. Include in all submittals adequate descriptive literature, catalog cuts, shop drawings and other data necessary for the Engineer to ascertain that the proposed equipment and material comply with specification requirements. Catalog cuts submitted for approval must be legible and clearly identify equipment being submitted.

3. Make submittals for individual systems and equipment assemblies which consist of more than one item or component for the system or assembly as a whole. Partial submittals will not be considered for approval.

4. Submit within fifteen (15) days after the awarding of the Contract complete brochures of shop drawings and descriptive data of all materials and equipment.

5. The submittals must include the following:

   a. Information which confirms compliance with contract requirements. Include the manufacturer's name, model or catalog numbers, catalog information, technical data sheets, shop drawings, pictures, nameplate data and test reports as required.

   b. Elementary and interconnection wiring diagrams for communication and signal systems, control system and equipment assemblies. All terminal points and wiring must be identified on wiring diagram.

   c. Parts list which must include those replacement parts recommended by the equipment manufacturer.

   d. Approval will be based on complete submission only.

6. Furnish shop drawing for the work involved in sufficient time so that no delay or changes will be caused.

7. Verify that shop drawings comply in all respect with the item originally specified. It is the Contractor's responsibility to procure the proper sizes, quantities, rearrangement, structural modifications or other modifications in order for the substituted item to comply with the established requirements.

8. Any shop drawings prepared to illustrate how equipment, conduit, fixtures, etc., can be fitted into available spaces will be examined under the assumption that the Contractor has verified all the conditions. Obtaining approval therein does not relieve the Contractor of responsibility in the event the material cannot be installed as shown on those drawings.

9. Shop drawings need not cover detailed installation drawings prepared for the Contractor's own use, but be limited, as in the case of raceways, to necessary departures from the plans as prepared by the Engineer.

10. Submit working scale drawings of apparatus and equipment which in any way varies from these specifications and plans, to be reviewed by the Engineer before the work is started. Correct interferences with the structural conditions before the work proceeds.

11. Submit all shop drawings at the same time in a loose-leaf binder with double index as follows:

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a. List the products alphabetically by name.

b. List the name and manufacturers whose products have been incorporated in the work alphabetically together with their addresses and the name and addresses of the local sales representative.

F. Test and Demonstration:

1. As equipment and materials are being installed and connected, test the installation for the following:

a. Short circuits and ground faults.

b. Insulation resistance at 500 volts DC.

c. Grounding continuity.

2. After tests are completed and necessary corrections are made, put each system into operation and demonstrate its performance to the satisfaction of the Owner's authorized representative.

3. Provide written documentation of test and performance as requested by the Owner's authorized representative.

4. Furnish all, electricity, instruments, test equipment and personnel that are required for the particular test. Certify that equipment and instruments are in good working order. Remove equipment subject to damage during test from line before test is applied.

G. Completion and Acceptance:

1. Upon completion of the work and before final acceptance, perform the duties and provide the documents as follows in accordance with the General conditions, Supplementary Conditions as Division 1 of the Contract.

2. Remove all rubbish, tools and surplus materials accumulated during the execution of the work in this Division.

3. Touch up any equipment or finishes damaged during delivery or installation of the work in this Division.

4. Provide a written one-year guarantee of materials and work except for items that are specified to have a longer warranty. Items that have a published or normal life expectancy of less than one year, such as incandescent lamps are to be governed by the manufacturer's guarantee.

5. Provide systems and equipment installation, operating and maintenance instructions and catalog data for transmittal to the Owner. Place the data in a loose-leaf binder which contains an index of the products listed alphabetically by name and a separate index listing the manufacturer's address of their local representative.

6. Instruct the Owner's representative in the proper operation and maintenance of the systems and their elements as required or directed to familiarize the Owner in the operation and maintenance

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of the systems.

H. Record Drawings:

1. Maintain one extra set of Blue or Black-line white print drawings for use a record drawings. Keep daily records using colored pencil. When the work is completed transfer relevant information to a reproducible set, to be given to the Engineer.

2. Show as-built information to scale, using standard symbols listed in the legend. As a minimum, show the following:

   a. Location of stub-outs, dimensioned from permanent building lines.

   b. Location and depth of under-slap and in slab raceways.

   c. All routing of raceways.

   d. Corrected panelboard and equipment schedules.

   e. Corrected circuit numbers as they appear on panelboard directories.

   f. Corrected motor horsepower and full load amperages.

   g. Number, size, type or insulation, number of wires in each conduit or multi-conductor cable whether in conduit or exposed.

   h. Location of junction boxes and splices.

J. Bond Requirements

1. 100% performance and payment bonds for each subcontractor

END OF SECTION

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SECTION 26 05 19
LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLE

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Building Wire.

B. Cable.

C. Wiring connections and termination.

1.02 REFERENCES

A. NEMA WC 3 - Rubber insulated wire and cable for the transmission and distribution of electrical energy.

B. NEMA WC 5 - Thermoplastic insulated wire and cable for the transmission and distribution of electrical energy.

C. NEC 725 – Remote Control, Signaling and Power Limited Circuits

PART 2 - PRODUCTS

2.01 BUILDING WIRE

A. Feeders and Branch Circuits larger than 8 AWG; copper stranded conductor, 600 volt insulation, THHN/THWN or THW.

B. Feeders and Branch Circuits smaller than 8 AWG; solid copper conductor, 600 volt insulation, THHN/THWN.

C. Control Circuits: Copper, stranded conductor 600 volt insulation, THW or THHN/THWN.

D. Lighting Control Cabling: solid copper conductors with 600 volt for Class 1 install and/or 2 conductor wire 300V plenum rated insulation for Class 2 install.

E. Communications System Wire see Section 27 00 00.

F. Multi-conductor Cable type MC and AC are not permitted under any circumstances unless specifically approved in writing by the engineer.

H. Nonmetallic sheathed (NM) cable is not permitted under any circumstances.

I. Flat or Under-carpet type cable is not permitted under any circumstances.

PART 3 - EXECUTION

3.01 GENERAL

A. Use no wire smaller than 12 AWG for power and lighting circuits, and no smaller than 14 AWG for control wiring unless noted.

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B. Use 10 AWG conductor for 20 ampere, 120 volt branch circuit home runs longer than 75 feet.
C. Use 10 AWG conductor for 20 ampere, 277 volt branch circuit home runs over 150 feet.

D. Splice only in junction or outlet boxes.

E. Neatly train and lace wiring inside boxes, equipment, and panelboards.

F. Make conductor lengths for parallel circuits equal

G. Recessed or Semi-recessed Lighting Fixture Whips (accessible ceilings): Type THHN-THWN , single conductors in FMC in lengths not to exceed six (6) feet.

3.02 WIRING INSTALLATION IN RACEWAYS

A. Pull all conductors into a raceway at the same time. Use UL listed wire pulling lubricate for pulling 4 AWG and larger wires if required.

B. 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.

C. Seal service entrances into building per codes and Utility Co. requirements.

3.03 WIRING CONNECTIONS AND TERMINATIONS

A. Use solderless pressure connectors with insulating covers for copper wire splices and taps, 8 AWG and smaller. For 10 AWG and smaller, use insulated spring wire connectors with plastic caps or copper sleeve stacon connectors.

B. Use pressure connectors for copper wire splices and taps, 6 AWG and larger. Tape uninsulated conductors and connectors with electrical tape to 150 percent of the insulation value of conductor.

C. Thoroughly clean wires before installing lugs and connectors.

D. Make splices, taps and terminations to carry full ampacity of conductors without perceptible temperature rise.

E. Terminate spare conductors with wire nuts and electrical tape.

H. The electrical contractor shall provide all wiring necessary to complete the electrical installation per plans and specifications.

3.04 WIRING INSTALLATION AND TERMINATIONS FOR LIGHTING CONTROL WIRING (0-10V)

A. NEC Class 1 Install 0-10v conductors in raceway with switchleg 120 or 277, use insulation rate for 300V

B. NEC Class 2 (Preferred method to reduce the risk of interference in dimming performance) Install 0-10v plenum rated conductors outside of switchleg raceway, neatly train and lace wire near raceway.

   a. Make splices, taps and termination, if necessary, in a separate J-box from 120 or 277 switchleg.

C. Terminate spare conductors with wire nuts.

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3.05 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Section 26 00 00.

B. Inspect wire and cable for physical damage and proper connection.

C. Torque test conductor connections and terminations to manufacturers recommended values.

D. Perform continuity and insulation tests on all power and equipment branch circuit conductors. Verify proper phase connections.

END OF SECTION

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SECTION 26 05 26
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Electrical system grounding.

1.02 REGULATORY REQUIREMENTS

A. Install a complete grounding system in accordance with National Electrical Code Article 250 (most current edition).

PART 2 - PRODUCTS

2.01 GROUND RODS

A. Ground rods shall be copper-clad steel 5/8 inch diameter X 10 feet minimum length.

2.02 CONDUCTORS

A. Ground Conductors shall be copper type THHN/THWN.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Exothermically weld or clamp cable connection to ground rod in permanently visible location. Install service entrance ground conductor in PVC conduit from main service ground to ground rod.

B. Bonding Jumpers: Provide bonding jumper. Connect ground bar neutral only at service entrance panel neutral bar.

C. Bonding Wires: Install a Green Ground bonding wire in all conduit systems with bond wire conduit connected at each end to a grounding bar solderless lug, clamp or cup washer and screw. Ground all enclosures, boxes, receptacles, light fixtures, enclosures, etc.

D. All existing panels to be reused shall have grounds & neutral bars separated. Insulate the neutral bars, & install neutrals on the neutral bars and green grounds on the green ground bars only.

3.02 Communication Grounding (Telephone/IT/Comm Rooms)

A. Telephone/Data/Communications:

1. Provide one #6 THHN to Phone Board, unless otherwise noted (verify).

2. Provide one #6 THHN to telephone service conduit, unless otherwise noted (verify).

3. Provide one #6 THHN to IT/Comm Racks, unless otherwise noted (verify).

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END OF SECTION

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SECTION 26 05 29
HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Conduit and equipment supports.

B. Fastening hardware.

1.02 COORDINATION

A. Coordinate size, shape and location of support systems with other contractors.

PART 2 - PRODUCTS

2.01 MATERIAL

A. Support channel: Galvanized or painted steel.

B. Hardware: Corrosion resistant.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Fasten hanger rods, conduit clamps, and outlet and junction boxes to building structure or additional steel supports.

B. 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; self-drilling anchors or expansion anchor on concrete surfaces; sheet metal screws in sheet metal studs.

C. Do not fasten supports to piping, ductwork, mechanical equipment, or conduit unless specifically indicated.

D. Do not use powder-actuated anchors.

E. Do not drill structural steel members.

F. 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.

G. In wet locations, install electrical equipment watertight.

H. Install surface-mounted cabinets and panelboards with a minimum of four anchors.

END SECTION

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SECTION 26 05 33
RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

SUBSECTIONS:

A. SECTION 26 05 33.13 - CONDUIT FOR ELECTRICAL SYSTEMS.

B. SECTION 26 05 33.16 - BOXES FOR ELECTRICAL SYSTEMS.

END OF SECTION

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SECTION 26 05 33.13
CONDUIT FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 WORK INCLUDED

A. Rigid metal conduit and fittings.

B. Electrical Intermediate metal conduit and fittings.

C. Electrical metallic tubing and Fittings.

D. Liquid tight flexible metal conduit and fittings.

E. Non-metallic conduit and fittings.

1.02 INCLUDED SPECIFICATIONS

A. Section 26 00 00

1.03 REFERENCES

A. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated.

B. ANSI C80.6 - Electrical Intermediate Metal Conduit, Zinc Coated.

C. ANSI C80.3 - Electrical Metallic Tubing, Zinc Coated.

D. ANSI/NEMA FB 1 - Fittings and Supports for Conduit and Cable Assemblies.

E. FS WW-C-566 Specification for Flexible Metal Conduit.

F. FS WW-C-581 Specification for Galvanized Rigid Conduit.

PART 2 PRODUCTS

2.01 RIGID METAL CONDUIT AND FITTINGS

A. Rigid Steel Conduit: ANSI C80.1

B. Fittings and Conduit Bodies: ANSI/NEMA FB 1; threaded type, material to match conduit.

2.02 ELECTRICAL INTERMEDIATE METAL CONDUIT (EIMC) AMF FITTINGS

A. Conduit: Galvanized Steel.

B. Fittings and Conduit Bodies: ANSI/NEMA FB 1; use fittings and conduit bodies specified above for rigid steel conduit.

2.03 ELECTRICAL METALLIC TUBING (EMT) AND FITTINGS

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A. CMT: ANSI C80.3. Galvanized tubing

B. Fittings and Conduit Bodies: ANSI/NEMA FB 1; Steel or malleable iron, compression type.

C. Electrical Metallic Tubing shall be used only for circuits 24V and less (e.g., data, communications, fire alarm, BAS/BMS, etc.)

2.04 LIQUIDTIGHT FLEXIBLE CONDUIT AND FITTINGS

A. Conduit: Flexible metal conduit with PVC jacket.

B. Fittings and Conduit Bodies: ANSI/NEMA FB 1.

2.05 PLASTIC CONDUIT AND FITTINGS

A. Conduit: NEMA TC 2 Schedule 40 PVC.

B. Fittings and Conduit Bodies: NEMA TC 3

2.06 SURFACE METALLIC RACEWAY

A. Surface Metallic Raceways: One-piece system of galvanized steel, base and cover preassembled.

1. Acceptable Product: One Piece Metal Raceway.
   a. Construction: 3/4 inch (19 mm) wide by 17/32 (13.5mm) or 21/32 inch (17 mm) deep.
   b. Include all matching fittings, devices, and fixture boxes.
   c. Finish: Manufacturer's standard Ivory, White or custom color as selected.

2.07 CONDUIT SUPPORTS

A. Conduit Clamps, Straps, and Supports corrosion resistant: Steel or malleable iron.

PART 3 - EXECUTION

3.01 CONDUIT INSTALLATION SCHEDULE

A. Underground installation buried more than 18" deep, Schedule 40 plastic conduit.

B. Installation in or under concrete slab, or underground buried less than 18" deep, Rigid Steel Conduit.

C. Exposed outdoor locations: Rigid Steel, Electrical Intermediate metal conduit, Liquid tight flexible steel (only where allowed to connect electrical equipment).

D. Wet Interior Locations: Rigid Steel, Electrical Intermediate metal conduit, Electrical Metallic Tubing (24V & less only), Liquid tight flexible steel (only where allowed to connect electrical equipment).

E. Concealed Dry interior locations: Rigid Steel, Electrical Intermediate metal conduit, Electrical Metallic Tubing (24V & less only), and liquid tight flexible steel (only where allowed to connect electrical equipment).

F. Exposed dry interior locations: Rigid Steel, Electrical Intermediate Metal Conduit, Electrical metallic

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tubing (24V & less only), Liquid tight flexible steel (only where allowed to connect electrical equipment).

G. Liquid Tight Flexible Steel shall be allowed up to 6’-0” in length where a connection to electrical equipment or a motor connection is made.

H. Communication Circuit Conduits shall be blue colored (e.g., data, communications, BAS/BMS, etc.)

I. Fire Alarm Conduits shall be red colored.

J. Emergency Circuit Conduits shall be purple colored.

K. Provide pull strings in any empty conduit installations.

3.02 CONDUIT SIZING, ARRANGEMENT, AND SUPPORT

A. Size conduit for conductor type installed or for type THW conductors, whichever is larger: 3/4 inch minimum size underground and above grade. Conform to conduit

B. Arrange conduit to maintain headroom and present a neat appearance.

C. Route exposed conduit and conduit above accessible ceilings parallel and perpendicular to walls.

D. Maintain minimum 6 inch clearance between conduit and piping. Maintain 12 inch clearance between conduit and heat sources such as flues, pipes, and heating appliances.

E. Arrange conduit supports to prevent distortion of alignment by wire pulling operations. Fasten conduit using galvanized straps, lav-in adjustable hangers, clevis hangers, or bolted split stamped galvanized hangers.

F. Group conduit in parallel runs where practical and use conduit rack constructed of steel channel with conduit straps or clamps. Provide space of 25% percent additional conduit.

G. Do not fasten conduit with wire or perforated pipe straps. Remove all wire used for temporary conduit support during construction, before conductors are pulled.

3.03 CONDUIT AND TUBING INSTALLATION

A. Cut conduit and tubing square using a saw; de-burr cut ends.

B. Bring tubing to the shoulder of fittings and couplings and fasten securely.

C. Use conduit hubs or sealing locknuts for fastening conduit to cast boxes, and for fastening conduit to sheet metal boxes in damp or wet locations.

D. Install no more than the equivalent of three 90-degree bends between boxes.

E. Use hydraulic one-shot conduit bender or factory elbows for bends in conduit larger than 1 inch size.

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F. Avoid moisture traps.

G. Install raceway system in all exposed locations below ceiling line (verify elevation) from finished floor level.

END OF SECTION

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SECTION 26 05 33.16
BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Wall and ceiling outlet boxes.

B. Floor boxes.

C. Pull and junction boxes.

1.02 REFERENCES

A. ANSI/NEMA OS 1 - Sheet Steel outlet boxes, device boxes, covers and box supports.

B NEMA 250 - Enclosure for Electrical Equipment (1000 volts maximum)

PART 2 - PRODUCTS

2.01 OUTLET BOXES

A. Sheet Metal Outlet boxes: ANIS/NEMA OS 1: Galvanized steel, with 1/2" inch male fixture studs where required.

B. Cast Boxes: Aluminum, cast feralloy, deep type, gasketed cover, threaded hubs.

2.02 PULL AND JUNCTION BOXES

A. Sheet Metal Boxes: ANSI/NEMA OS 1; Galvanized steel.

B. Cast Metal Boxes For outdoor and Wet location installation: NEMA 250: junction box, UL listed as raintight, Galvanized cast iron or cast aluminum box and cover with ground flange, neoprene gasket, and stainless steel cover screws.

C. Wiremold boxes for V500 raceway systems in exposed areas below 8 feet from the finished floor.

PART 3 - EXECUTION

3.01 COORDINATION

A. Provide electrical boxes as shown on drawings, and as required for splices, taps, wire pulling, equipment connections, and code compliance.

B. Electrical box locations shown on Contract drawings are approximate unless dimensioned. Verify location of floor boxes and outlets when shown or required prior to rough-in.

C. Locate and install boxes to allow access.

D. Locate and install to maintain headroom and to present a neat appearance.

3.02 OUTLET, PULL, SPLICE OR JUNCTION BOX INSTALLATION

A. Do not install boxes back-to-back in walls. Provide minimum 6 inch separation.

B. Locate boxes in masonry walls to required cutting of masonry unit in corner only. Coordinate masonry cutting to achieve neat openings for boxes.

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C. Provide knockout closures for unused openings.

D. Support boxes independently of conduit, except for cast boxes that are connected to two rigid metal conduit, both supported within 12 inches of box.

E. Use multiple-gang boxes where more than one device is mounted together: do not use sectional boxes. Provide barriers to separate wiring of different voltage systems.

F. Install boxes in walls without damaging wall insulation.

G. Coordinate mounting heights and locations of outlets mounted above counters, equipment and backsplashes.

H. Position outlets to locate luminaries as shown on lighting and reflected ceiling plans.

I. In inaccessible ceiling areas, position outlets and junction boxes, when required, within 6 inches of recessed luminaire, to be accessible through luminaire ceiling opening.

J. Provide recessed corrosion resistant outlet boxes in finished areas; secure boxes to interior wall and partition studs, accurately positioning to allow surface finish thickness. Use stamped steel stud bridges for flush outlets in hollow stud wall, and adjustable steel channel fasteners for flush ceiling outlet boxes.

K. Align wall-mounted outlet boxes for switches, thermostats, and similar devices.

L. Provide corrosion resistant cast outlet boxes in exterior locations exposed to the weather and in other wet locations.

END OF SECTION

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SECTION 26 05 53
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 Work Included

A. Provide and install identification makers.

1.02 Related Work

A. Section 26 03 00: Conduit

B. Section 26 05 00: Outlet and Pull Boxes

C. Section 26 04 00: Wires and Cables

D. Section 26 09 00: Panelboards

E. Section 26 10 00: Motor and Circuit Disconnects

PART 2 - PRODUCTS

2.01 Materials

A. Provide nameplates of laminated phenolic plastic with engraved letters 3/16" high at pushbutton stations, thermal overload switches, receptacles, wall switches and similar devices where the nameplate is attached to the device plate. At all other locations make lettering 1/4" high, unless otherwise detailed on the drawings. Securely fasten nameplates to the equipment with No. 4 Phillips, roundhead, cadmium plated, steel self-tapping screws or nickel plated brass bolts. Motor nameplates may be die stamped non-ferrous metal not less than 0.03" thick.

B. Pre-marked, self-adhesive, wrap around type markers.

C. Underground type plastic line marker: Manufacturer's standard permanent, bright colored, continuous printed plastic type, not less than 6" wide X 4 mils thick. Provide tape with printing which most accurately indicates type of service of buried cable.

PART 3 - EXECUTION

1.01 Installation

A. General: Equip the following items with nameplates:

1. All motors, motor starters, VFDs, motor control center, pushbutton stations, control panels, and time switches.

2. Disconnect switches, fused or non-fused, switchboards and panelboards, circuit breakers, contactors, or relays in separate enclosures.

3. Power receptacles where the nominal voltage between any pair of contacts is greater than 150 volts.

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4. Wall switches controlling outlets for lighting fixtures or equipment where the outlets are not located within sight of the controlling switch.

5. Special electrical systems at junction and pull boxes terminal cabinets and equipment racks.

B. Adequately describe the function of or use of the particular equipment involved. Where nameplates are detailed on the drawings, use inscription and size of letters as shown. Include on nameplates for panelboards and switchboards the panel designation, voltage and phase of the supply. The name of the machine or the motor nameplates for a particular machine must be the same as the one used on all motor starter, disconnect and pushbutton station nameplates for that machine.

C. Underground Cable Identification: During back filling/top soiling of each exterior underground electrical, signal or communication cable, install continuous underground type plastic line marker, located directly over buried line at 6" to 8" below finished grade. Where multiple small lines are buried in a common trench and do not exceed an overall width of 16", install a single line marker. Install line marker for every buried cable, regardless of whether it is direct buried, protected in conduit or encased in concrete.

D. Operational Identification and Warnings: Wherever reasonably required to ensure safe and efficient operation and maintenance of electrical system, electrically connected mechanical systems, general systems and equipment and including the prevention of misuse of electrical facilities by unauthorized personnel, install self-adhesive plastic signs or similar equivalent identification, instruction or warnings on switches, outlets and other controls, devices and covers of electrical enclosures. Where detailed instructions or explanations are needed, provide plasticized tags with clearly written messages adequate for intended purposes.

E. Danger Signs:

1. In addition to installation of danger signs required by governing regulations and authorities, install appropriate danger signs at locations indicated and at locations subsequently identified by the Installer of electrical work as constituting similar dangers for persons in or about the project.

2. High Voltage: Install danger signs wherever it is possible, under any circumstances, for persons to come into contact with electrical power of voltages higher than 110-120 volts.

3. Critical Switches/Controls: Install danger signs on switches and similar controls, regardless of whether concealed or locked up, where untimely or inadvertent operation (by anyone) could result in significant danger to persons, or damage to or loss of property.

4. Panel boards or switchboards electrical shock hazard (Available Arc Fault)

F. Furnish and install a framed, full-size (24" X 36" min.) print of the electrical riser and distribution systems (emergency and normal). Include the main service entrance equipment, distribution panels, branch circuit panels, transformers, motor control centers, transfer switches, emergency generator, emergency distribution panels, emergency branch circuit panels, etc.

1. Show each piece of electrical equipment on the print and identify with identical terminology as shown on the engraved plate on each piece of equipment installed throughout the building.

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2. Submit "Record Drawing" to the Electrical Design Engineer for approval prior to installation.

3. Frame print in a suitable wooden frame under glass and install in the main service entrance equipment room at a location designated by the Owner.

END OF SECTION

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SECTION 26 05 73
SHORT-CIRCUIT/COORDINATION/ARC-FLASH ANALYSIS

PART 1 - GENERAL

1.01 SUMMARY

A. The electrical equipment manufacturer shall provide electrical power system studies for the project as required by code, the authority having jurisdiction, and any additional studies required or requested by the Architect or Owner. The type and content of studies are specified in the following articles.

B. At minimum, the studies required in this project are: Short-Circuit Analysis, Protective Device Time-Current Coordination Analysis, and Arc-Flash Hazard Analysis

C. Some studies detailed in this section may be waived at the discretion of the Architect, Engineer, & Owner. Studies may only be waived with approval from all parties. The contractor shall be responsible for verifying the studies required.

1.02 SUBMITTALS

A. Completed electrical power system studies shall be bound and submitted to the engineer.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. The specified electrical power system studies shall be performed by Square D Company or approved equal.

2.02 ELECTRICAL POWER SYSTEM STUDIES

A. Short-Circuit Analysis

1. Calculation of the maximum rms symmetrical three-phase short-circuit current at each significant location in the electrical system shall be made using a digital computer.

2. Appropriate motor short-circuit contribution shall be included at the appropriate locations in the system so that the computer calculated values represent the highest short-circuit current the equipment will be subjected to under fault conditions.

3. A tabular computer printout shall be included which lists the calculated short-circuit currents, X/R ratios, equipment short-circuit interrupting or withstand current ratings, and notes regarding the adequacy or inadequacy of the equipment.

4. The study shall include a computer printout of input circuit data including conductor lengths, number of conductors per phase, conductor impedance values, insulation types, transformer impedances and X/R ratios, motor contributions, and other circuit information as related to the short-circuit calculations.

5. Include a computer printout identifying the maximum available short-circuit current in rms symmetrical amperes and the X/R ratio of the fault current for each bus/branch calculation.

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6. The system one-line diagram shall be computer generated and will clearly identify individual equipment buses, bus numbers used in the short-circuit analysis, cable and bus connections between the equipment, calculated maximum short-circuit current at each bus location and other information pertinent to the computer analysis.

7. A comprehensive discussion section evaluating the adequacy or inadequacy of the equipment must be provided and include recommendations as appropriate for improvements to the system.

8. The contractor shall be responsible for supplying pertinent electrical system conductor, circuit breaker, generator, and other component and system information in a timely manner to allow the short-circuit analysis to be completed prior to final installation.

9. Any inadequacies shall be called to the attention of the engineer and recommendations made for improvements as soon as they are identified.

B. Protective Device Time-Current Coordination Analysis

1. The time-current coordination analysis shall be performed with the aid of computer software intended for this purpose, and will include the determination of settings, ratings, or types for the overcurrent protective devices supplied.

2. Where necessary, an appropriate compromise shall be made between system protection and service continuity with [service continuity considered more important than system protection] [system protection considered more important than service continuity] [system protection and service continuity considered to be of equal importance]. This shall be coordinated with the Owner, Architect, and Engineer.

3. A sufficient number of computer generated log-log plots shall be provided to indicate the degree of system protection and coordination by displaying the time-current characteristics of series connected overcurrent devices and other pertinent system parameters.

4. Computer printouts shall accompany the log-log plots and will contain descriptions for each of the devices shown, settings of the adjustable devices, the short-circuit current availability at the device location when known, and device identification numbers to aid in locating the devices on the log-log plots and the system one-line diagram.

5. The study shall include a separate, tabular computer printout containing the suggested device settings of all adjustable overcurrent protective devices, the equipment where the device is located, and the device number corresponding to the device on the system one-line diagram.

6. A computer generated system one-line diagram shall be provided which clearly identifies individual equipment buses, bus numbers, device identification numbers and the maximum available short-circuit current at each bus when known.

7. A discussion section which evaluates the degree of system protection and service continuity with overcurrent devices, along with recommendations as required for addressing system protection or device coordination deficiencies.

8. Significant deficiencies in protection and/or coordination shall be called to the attention of the engineer and recommendations made for improvements as soon as they are identified.

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9. The contractor shall be responsible for supplying pertinent electrical system conductor, circuit breaker, generator, and other component and system information in a timely manner to allow the time-current analysis to be completed prior to final installation.

C. Arc-Flash Hazard Analysis
   1. The Arc-Flash Hazard Analysis shall be performed with the aid of computer software intended for this purpose in order to calculate Arc-Flash Incident Energy (AFIE) levels and flash protection boundary distances.

   2. The Arc-Flash Hazard Analysis shall be performed in conjunction with a short-circuit analysis and a time-current coordination analysis.

   3. Results of the Analysis shall be submitted in tabular form, and shall include device or bus name, bolted fault and arcing fault current levels, flash protection boundary distances, personal-protective equipment classes and AFIE levels.

   4. The analysis shall be performed under worst-case Arc-Flash conditions, and the final report shall describe, when applicable, how these conditions differ from worst-case bolted fault conditions.

   5. The Arc-Flash Hazard Analysis shall be performed by a registered professional engineer.

   6. The Arc-Flash Hazard Analysis shall be performed in compliance with IEEE Standard 1584-2002, the IEEE *Guide for Performing Arc-Flash Calculations*.

   7. The Arc-Flash Hazard Analysis shall include recommendations for reducing AFIE levels and enhancing worker safety.

   8. The proposed vendor shall demonstrate experience with Arc-Flash Hazard Analysis by submitting names of at least ten actual Arc-Flash Hazard Analyses it has performed in the past year.

   9. The proposed vendor shall demonstrate capabilities in providing equipment, services, and training to reduce Arc-Flash exposure and train workers in accordance with NFPA 70E and other applicable standards.

   10. The proposed vendor shall demonstrate experience in providing equipment labels in compliance with NEC-2002 section 110 and ANSI Z535.4 to identify AFIE and appropriate Personal Protective Equipment classes.

   11. Arc-Flash Warning Labels:

       a. The Contractor of the Arc-Flash Hazard analysis shall provide Arc-Flash Warning labels for all electrical equipment that may be opened or accessed while energized. Labels shall be minimum 3.5 inch x 5 inch thermal transfer type of high adhesion polyester. Labels shall be machine printed, with no field markings.

       b. All labels shall be based on recommended overcurrent device settings and shall be provided after the results of the analysis have been presented to the Owner and after any system changes, upgrades or modifications have been incorporated in the system. The labels shall identify the flash protection boundary, the arc-flash incident energy (AFIE) level, working distances, required personal protective equipment (PPE) hazard risk category, nominal voltage, and engineering report number, revision number and issue date.

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D. Load Flow and Voltage Drop Analysis

1. The Load Flow and Voltage Drop Analysis shall be made using a digital computer and include calculations of power flow in all three-phase branch and feeder circuits, calculated voltages at each bus and voltage drops of each feeder.

2. The analysis shall provide the calculated maximum values of kVA, kW, kVAr, power factor, and amperes for each power circuit.

3. The calculated power losses in each branch and total system losses shall be provided.

4. A computer printout listing all cables, transformers, loads, and other circuit data shall be included.

5. Provide tabular bus-to-bus computer printouts listing the calculated values.

6. The analysis shall include a computer generated system one-line diagram clearly identifying individual equipment buses, bus numbers, cable and bus connections, power flow throughout the system, and other information related to the analysis.

7. A discussion section evaluating the loading and voltage levels for the system shall be provided and recommendations included as appropriate to improve system operation.
8. This analysis will be conducted under two modes of operation. The loading under the first mode of operation will be based on the instantaneous load values collected during the field effort. The loading under the second mode of operation will be based on an 80% design criteria of the load centers. From the results of the load-flow/voltage drop calculations, analysis will be prepared as described above and based on the NEC to indicate areas of overloaded conductors/loadcenters and areas of excessive voltage drop in the conductors.

9. Significant deficiencies in loading or voltage levels shall be called to attention of the engineer and recommendations made for improvements at soon as they are identified.

E. Power Factor Correction Study

1. A Power Factor Correction Study shall be performed to determine the appropriate level of compensation needed to achieve the desired power factor.

2. Impacts on harmonic and transient concerns shall be evaluated in order to determine the optimum size and configuration of the equipment.

3. The study shall make appropriate recommendations in order to provide proper operation of the electrical system.

4. The study shall be based on load data collected from on-site measurements in order to characterize the power factor of the system over a period of time and under varying load conditions. The source of study data shall be coordinated with the Contractor, Architect, Engineer, and Owner prior to conduction of the study.

5. System loading tables shall be provided which include power factor data and estimated levels of power factor compensation provided.

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6. Evaluation of system operation using the estimated levels of compensation will be provided with consideration to harmonic and transient concerns.

7. Final levels of compensation will be determined and used as the base case condition for the harmonic and transient studies.

8. All conclusions, recommendations, and equipment specifications as a result of the Power Factor Correction Study will be summarized in the final report.

F. Harmonic Analysis Study

1. A Harmonic Analysis Study shall be made to determine the levels of harmonic voltages and currents in the system.

2. The type and level of compensation needed to achieve the desired power factor and acceptable levels of harmonics shall be considered.

3. Transient concerns shall be evaluated in order to determine the optimum equipment size, location in the system, and configuration.

4. The study shall make appropriate recommendations in order to provide proper protection and operation of the electrical system.

5. The study will shall be based on load data collected from on-site measurements in order to characterize the power factor of the system over a period of time and under varying load conditions. The source of study data shall be coordinated with the Contractor, Architect, Engineer, and Owner prior to conduction of the study.

6. Harmonic measurements will be performed in order to provide nonlinear load (e.g. DC drive) characteristics, voltage distortion levels, and model verification. The measurements will be conducted over a 1-5 day period.

7. Harmonic source models will be developed for each nonlinear load (drive, etc.) type. The load characteristics will be determined by measurement and used as harmonic sources for the computer simulations. This shall be coordinated with the Engineer.

8. Frequency scan cases (impedance vs. frequency) will be completed in order to determine the system frequency response characteristic for various system conditions.

9. If required, the application of harmonic filters will be evaluated to determine the optimum filter size and configurations.

10. Computer simulations shall be performed to determine the system harmonic voltage and current levels and voltage distortion levels (and compared with measured values to determine the effect of various system conditions).

11. If required, harmonic filter specifications shall be developed with consideration to cost, filtering options, and effectiveness of harmonic filters.

G. Switching Transient Analysis Study

1. A Switching Transient Analysis Study shall be made to determine the transient overvoltages for various switching conditions and their effect on the operation of the electrical system.

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2. Various system conditions (consistent with previously gathered data from the Power Factor Correction Study and Harmonic Analysis Study) shall be evaluated so that the proper overvoltage protection specifications may be developed.

3. Transient simulations shall be performed using a digital computer in order to determine transient voltage levels at the low voltage buses within the electrical system.

4. The electrical system parameters shall be varied to in order to determine their effect on the transient voltages.

5. Various solutions to excessive transient voltage levels shall be considered and additional computer simulations made to determine their validity.

6. The evaluation must consider solutions to power factor and harmonic concerns with respect to transient overvoltage levels.

7. Nuisance tripping of electronic power equipment (e.g., adjustable speed drives) shall be evaluated and corrective or preventive techniques suggested.

H. A motor starting study will be prepared in order to analyze the transient effect of the system's voltage profile during motor starting. Significant motor starting voltage profiles must be calculated in order to analyze the effects of the motor starting on a system basis. The voltage profile as a result of motor starting will be analyzed based on ANSI/IEEE requirements. The system loading for the motor starting study will be in accordance with the Load-Flow/Voltage Drop Analysis as detailed above. The motor starting study calculations must be performed using a digital computer utilizing commercially available software.

PART 3 – EXECUTION

3.01 SUMMARY

A. The contractor shall complete studies as outlined in the articles above.
B. The results of the system studies shall be summarized in a final report. One "as-built" copy shall be posted in each main electric room.

3.02 FIELD SETTINGS/ADJUSTMENTS

A. This Contractor shall engage the equipment manufacturer's service group (Schneider) or alternately a qualified independent testing firm to perform field adjustments of the protective devices as required for placing the equipment in final operating condition. The settings shall be in accordance with the approved short-circuit study and protective device evaluation/coordination study.

B. Necessary field settings of devices and adjustments and minor modifications to equipment to accomplish conformance with the approved short-circuit and protective device coordination study, shall be carried out by the equipment manufacturer's service group or qualified independent testing firm

C. Notify Owner in writing of any required major equipment modifications.

D. Additions, deletions, upgrades or major modifications to any part of the electrical distribution system will require re-calculation of the studies and analysis' for the portions of the system

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that has been changed from the original studies. These re-calculations shall be completed by the same engineer or firm that did the original studies, at no additional cost to the Owner.

3.03 ARC-FLASH WARNING LABELS

A. Apply arc-flash warning labels to equipment. The labels shall be located so as to be clearly visible to qualified persons before examination, adjustment, servicing, or maintenance of the equipment.

3.04 ARC-FLASH TRAINING

A. The Contractor of the Arc-Flash Hazard Analysis shall train the Owner's qualified electrical personnel of the potential arc-flash hazards associated with working on energized equipment (minimum of 4 hours). The training shall be certified for continuing education units (CEUs) by the International Association for Continuing Education Training (IACET) or equivalent.

END OF SECTION

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SECTION 26 24 16
PANELBOARDS

PART 1 - GENERAL

1.01 Work Included:

A. Panelboards as scheduled on the drawings.

1.02 Regulatory Requirements:

A. Construct panelboards to UL standards and provide UL labels.

PART 2 - PRODUCTS

2.01 Acceptable Manufacturers (BASIS OF DESIGN):

A. Square D, Siemens, and Eaton
B. Substitutions: Under provisions of Section 16010.

2.02 Enclosures

A. Panels: Surface or flush mounted complete with panel trim having concealed hinges and trim mounting screws. Provide locking door with flush catch. NEMA 1 or NEMA 3R as required by location.

B. Tub: Galvanized, painted to match trim.

C. Keys: Provide two keys for each panel. Make keys interchangeable for panels of same voltage.

2.03 Panelboards:

A. Panelboards: 1 or 3 phase, 3 or 4 wire, design with sequence phase bussing and full capacity neutral, composed of an assembly of molded case automatic air circuit breakers with electronic adjustable trip or thermal and magnetic trip and trip free position separate from either ON or OFF positions, as designated on the drawings. Provide common simultaneous trip for 2 and 3 pole breakers. Provide interrupting ratings of 22,000 AIC for 277 volts. Provide 200% neutral bars and 25% ground bar in each panelboard, as noted on the drawings. Provide TVSS with panelboards, as noted on the drawings.

2.04 Switchboards:

A. Switchboards are shown and scheduled on the drawings.

PART 3 - EXECUTION

3.01 Installation:

A. Provide mounting brackets and busbar drillings. Fill with breakers.

B. Prepare and affix typewritten directory to inside cover of panelboard indicating loads controlled by each circuit.

END OF SECTION

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SECTION 26 27 26
WIRING DEVICES

PART 1 - GENERAL

1.01 WORK INCLUDED

A. General Purpose Wall Switches.

B. Receptacles.

C. Device plates and box covers.

D. Wall & Ceiling, Wired & Wireless Occupancy Sensors & Power Packs.

E. Astronomical Timeclock Switches.

1.02 REFERENCES

A. FS W-C-596 Electrical Power connector, plug, receptacle, and cable outlet.

B. FS W-S-896 Switch, Toggle.

C. NEMA WD 1 - General Purpose Wiring Devices.

D. NEMA WD 5 - Specific Purpose Wiring Devices.

1.03 SUBMITTALS

A. Submit product data under provisions of Section 26 00 00.

B. Provide product data showing configurations, finishes, dimensions, and manufacturer's instructions.

PART 2 - PRODUCTS

2.01 WALL SWITCHES

A. Wall Switches for lighting circuits and motor loads under 1/2 HP: General use quiet snap switch with toggle handle rated 20 ampere and 120 volts AC. Plastic plates and devices shall have color selected by the Architect.

B. Wall switches with pilot light rated 20A, 120 Volt

C. Wall switches double pole 20A

D. Wall Switches three-way 20A

E. Wall Switches four-way 20A

2.02 RECEPTACLES

A. Convenience and Straight-Blade duplex receptacles: NEMA 5-20R grounding type.

B. Straight-Blade single receptacle: NEMA 5-20R grounding type.

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C. Twist-lock receptacles: NEMA L5-30R grounding type.

D. Ground Fault interrupter receptacles: ANSI C73.12, NEMA 5-20R, 20A 125 Volt

E. Other receptacles as noted and required.

2.05 WALL PLATES

A. Decorative cover plate: Smooth color as selected by the Architect Phenolic Plastic.

B. Weatherproof cover plate: Gasketed cast metal with hinged gasketed device covers.

2.06 WIRED & WIRELESS OCCUPNACY SENSORS & POWER PACKS

A. Occupancy sensors and associated equipment equal to the performance of that scheduled on the drawings.

B. Wall & Ceiling Occupancy Sensors, associated switches and power packs, dimmers, etc. equal to the performance of that scheduled on the drawings.

2.07 ASTRONOMICAL TIME CLOCK SWITCHES

A. Astronomical Time Clock Switches equal to the performance of that scheduled on the drawings.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install wall switches 48 inches above floor, unless otherwise noted, off position down.

B. Install convenience receptacles 18 inches above finished floor and 8 inches above counter tops unless otherwise directed or noted (verify).

C. Install specific-use receptacles at heights shown or noted on Contract drawings or to meet Owner's specific requirements (verify).

D. Install devices and wall plates flush and level.

E. Contractor shall provide permanent labeling of circuits to each device on the front of the wall plates (i.e) (Pnl L-3 etc.)

END OF SECTION

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SECTION 26 29 13
ENCLOSED CONTROLLERS

PART 1 - GENERAL

1.01 WORK INCLUDED
A. Provide and install enclosed motor disconnects.

B. Provide and install enclosed circuit disconnects.

1.02 REGULATORY REQUIREMENTS
A. Conform to National Electrical Code and to applicable inspection Authority Having Jurisdiction.

PART 2 - PRODUCTS

2.01 COMPONENTS
A. Motor and circuit disconnects shall have an underwriter's laboratory label.

B. Single phase disconnect switches: Single or two pole toggle switch. A suitably rated twist lock receptacle and plug with power cord connection may be used for single phase fractional horsepower motors when approved by the Engineer and Inspector.

C. Disconnect Switches: 2 or 3 pole heavy duty fusible or non-fusible 600 volt as required in NEMA type 1 or 3R enclosure to suit location.

D. Fuses shall be as recommended by Equipment Manufacturer.

PART 3 - EXECUTION

3.01 INSTALLATION
A. Install motor and circuit disconnect as recommended by manufacturer and as required by Code.

END OF SECTION

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SECTION 26 50 00
LIGHTING

PART 1 - GENERAL

1.01 Work Included:

A. This Section includes supply and installation of luminaries, supports, and accessories; fixture frames, trim rings, and back boxes for lay-in or other ceilings to suit finish.

1.02 Interface:

A. Confirm compatibility and interface of other materials with luminaire and ceiling system. Report discrepancies to the Engineer/Architect, and defer ordering until clarified.

B. Supply frames, trim rings and back boxes to other trades.

C. Coordinate with Division 23 (Mechanical) to avoid conflicts between luminaries, supports, piping, ductwork, and mechanical equipment.

PART 2 - PRODUCTS

2.01 LED Luminaries:

A. LED Luminaries: Pre-wired type with junction box forming an integral part of the assembly.

B. Supply luminaire complete with trim type required for ceiling system installed. Before ordering, confirm ceiling construction details and architectural finish for each area.

C. Select reflector and lamp positions to provide high efficiency, and even brightness.

2.02 Recessed Luminaries:

A. Recessed LED Luminaries: Pre-wired type with junction box forming an integral part of the assembly.

B. Supply luminaire complete with trim type required for ceiling system installed. Before ordering, confirm ceiling construction details and architectural finish for each area.

C. Select reflector and lamp positions to provide high efficiency, and even brightness.

PART 3 - EXECUTION:

3.01 Supports:

A. Refer to Section 26 05 29

B. Support luminaries directly from building structure.

3.02 Adjusting and Cleaning:

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A. Align luminaries and clean diffusers prior to final acceptance.

3.03 Luminaire Schedule:

A. Lighting Fixture Schedule is shown on drawings.

END OF SECTION

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SECTION 26 50 12
LIGHTING ACCESSORIES

PART 1 - GENERAL

1.01 Work Included:

A. This Section includes Lighting Control Systems and Accessories.

PART 2 - PRODUCTS

2.01 Controls by Lutron (Basis of Design – See 26 00 00), Steinel, or PLC Multipoint:

A. Provide Lutron Wireless Lighting Control System and devices as scheduled on the drawings.

B. Provide Lutron Viv hub.

C. Provide with accessory equipment as scheduled on the drawings (e.g., power packs, sensors, radio modules, radio sensor modules, radio daylight modules, etc. – verify).

PART 3 - EXECUTION:

3.01 Supports:

A. Refer to Section 26 05 29

B. Support accessory equipment (controls) for luminaries directly from building structure.

3.02 Installation:

A. Coordinate installation of all required devices and exact mounting locations with Architectural, Structural, & Lighting Plans.

B. Verify and provide all equipment required for a complete Lighting Controls System by specified or approved alternate manufacturer as shown on the drawings.

END OF SECTION

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SECTION 27 00 00
COMMUNICATIONS

PART 1- GENERAL

1.01 PROJECT INFORMATION

A. Project: RPM GSA LITTLE ROCK USSS

B. Owner: RPM

C. Architect: WER Architects

D. The Project consists of constructing a vehicle storage facility and office in an existing shell tenant space in Little Rock, AR.

1.02 SECTION INCLUDES

A. Conduit and boxes for telecommunications, data, & other systems (BAS/BMS, A/V, Fire, Security, Elevator, owner defined, etc.).

1.03 SYSTEM DESCRIPTION

A. Provide conduit, cable tray, data outlet boxes, and outlet boxes for complete data systems to be provided by Owner. Provide conduit and boxes for BMS, A/V, Fire, Security, and other systems (verify).

1.04 RELATED WORK

A. Section 26 00 00 - Electrical.
B. Section 26 05 33 - Raceway and Boxes for Electrical Systems.
C. Section 28 00 00 - Electronic Safety and Security.
D. Section 28 10 00 - Electronic Access Control and Intrusion Detection.
E. Section 28 23 00 - Video Surveillance.
F. Section 28 46 00 - Fire Detection and Alarm.

1.05 LITTLE ROCK DAV SCOPE OF WORK (SOW) AS FOLLOWS:

PERFORMANCE WORK STATEMENT (PWS)
Access Control Systems (ACS), Intrusion Detection System (IDS), and Video Management System (VMS) Electronic Security System (ESS) Upgrade-Little Rock DAV
GENERAL INFORMATION

1. Introduction: The United States Secret Service Technical Security Division (TSD) provides full life-cycle support for and decommissioning of physical security systems at USSS controlled sites, including **Little Rock DAV.** This is a non-personal services

requirement for the upgrade of an existing **ACS, IDS and VMS** at the **Little Rock DAV**. The Government will not exercise any supervision or control over the contract service providers performing the services herein. Such contract service providers shall be accountable solely to the contractor who, in turn is responsible to the Government.

2. Scope: The contractor shall provide all personnel, facilities, transportation, tools, materials, supervision, and other items and non-personal services necessary, except for those items specified as Government Furnished Equipment (GFE) and services, to perform the **ACS, IDS and VMS** upgrade as defined in the Performance Work Statement (PWS) and in accordance with (IAW) the Base Indefinite Delivery, Indefinite Quantity (IDIQ) contract. If a conflict exists, the Task Order (TO) takes precedence. The contractor shall accomplish the following specific tasks.

1.2 Specific Tasks:

1.2.1 Site Evaluation: The contractor shall perform any site evaluation activities in IAW with IDIQ PWS Section 2.1. The contractor shall develop an Installation Design Plan (IDP) at a 90% level to be approved by the Technical Security Representative (TSR).

1.2.2. Infrastructure Support: The contractor shall perform any infrastructure support activities IAW with IDIQ PWS Section 1.2.2.

1.2.3 Installation: The contractor shall perform all installation activities IAW with IDIQ PWS Section 1.2.4.

The contractor shall install a **ACS, IDS and VMS** upgrade at the **Little Rock DAV**. The **ACS, IDS and VMS** will include the networked head-end and all end devices, all equipment provided is GFE. The contractor shall install the following with proper mounting hardware and associated hardware and software (This includes cabling, workstation peripherals, and software licensing).

EQUIPMENT TO BE INSTALLED:

- 3 Axis cameras, mounts and accessories
- 1 Axis server and licenses
- 2 Decoders and Crash monitor kits
- 1 Uninterruptible power supply, rack mounted
- 1 NTP server
- 1 KVM, rack mounted, 8 port
- 2 Cisco 12 port POE+ switch, managed
- 2 Cisco integrated services router, managed
- 1 Open frame server rack w/PDU’s
- 1 DMP XR550 panel

- 1 Altronix 12V Power supply
- 3 DMP keypads
- 1 DMP Cell Dialer
- 4 Four Wired door contacts, recessed
- 1 Roll up Door contact, high security
- 5 360 Degree Tri-Tech Motion sensors
- 1 Hirsch MX-4 Door Controller
- 4 Hirsch keypad readers w/ mount and adapter plates
- 1 Altronix 12/24V Power supply with 8 fused outputs

CABLING/CONDUIT TO BE INSTALLED:

- CAT6 cable
- 18/4 unshielded
- 18/2 unshielded
- 18/4 shielded

1.25 Installation Practice and Aesthetics: The contractor shall perform all installation practices and aesthetics IAW with IDIQ PWS Section 1.2.7.

1.2.6 Acceptance Testing: The contractor shall perform all acceptance testing activities IAW with IDIQ PWS Section 1.2.8. The contractor shall develop an Acceptance Test Plan to be approved by the TSR.

1.2.7 Engineering and Documentation Support: The contractor shall perform all engineering and documentation support activities IAW with IDIQ PWS Section 1.2.9.
The contractor shall provide the following deliverables:

- Device Layout Drawing-one draft and one final to approved by the TSR
- Acceptance Test Plan-one draft and one final to be approved by TSR
- As-built IDP-One draft and one final to be approved by the TSR
- Configuration Documentation with IP addresses, usernames, and passwords for all devices-one draft and one final to be approved by the TSR
- Warranty Documentation-to be provided to the TSR upon installation acceptance
- User Guide/Training-as required by the task order and location

1.2.8 Warranties: The contractor shall provide all warranties IAW with IDIQ PWS Section 1.2.10.

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1.2.9 Pricing: Pricing will be requested from the contractor for the below line items.

CLINS	Description	Quantity	Unit Price	Total (unit price x Quantity)
001	Installation Services	1/LOT	$TBD	$TBD
002	Travel	1/LOT	$TBD	$TBD
003	Other Direct Costs	1/LOT	$TBD	$TBD
Total Contract Value				

1.3 Period of Performance: The period of performance will be for one (1) Base Year of 12 months. The Period of Performance reads as follows:

PART 2- PRODUCTS

2.01 MATERIALS

A. Provide 19” x 84” data racks for each IT Room and patch panels for both LAN and Telephone needs with vertical and horizontal wire management to be determined by GSA/USSS Security.
B. Cable trays for primary pathways shall be equal to Cooper B-Line Series 1 steel tray 18”wide (166P12-18-144) or Cooper B-Line Flextray 18” wide (FT4x18x10).

a. Tray shall allow for 200% of initial calculated cable requirements. Calculations to include network, security, and known building feeders.

b. All efforts to reduce bends and offsets to primary pathways shall be made. Coordination with all major utilities should be completed.

c. Provide appropriate hardware for splices and elevation changes per manufacturer’s installation guidelines.

d. Cable tray should be installed within 6-8” above ceiling grid and include 10-12” clearance above tray for accessibility.

C. Cable tray within Tele/Data rooms shall be CPI Runway 15” wide minimum (CPI 10250-215).

a. Install cable runway above all racks at a minimum height of 90” above finished floor. Include all required splices, joints, and supports per room designed.
b. Cable runway size to account for all network, nurse call, security, and known building feeders.

D. Provide 4’-0” minimum clearance on three sides of every rack.

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E. General Contractor shall ground and bond cable tray and Owner-installed data racks.

F. Maximum of 4 feet between j-hooks, minimum width of j-hooks to be 1” wide for flat portion of hook, sizing and quantity of hooks to accommodate 200% of initial calculated cable requirements with a maximum of 100 Cat 6 or 75 Cat 6A per row of 4” j-hooks.

G. All main wall penetrations should include STI EZ-Path, or equal, that allows for 200% of initial cable requirements.

H. Backboards: 3/4" fire rated plywood, finished in white with fire rated paint. Install at 20” AFF (just above power outlet heights) to 116” AFF on all walls around the entire perimeter of the room.

I. Provide normal power quad outlets on every wall and 8” AFF at each rack location.

J. Provide appropriately sized UPS power strips in racks where LAN and internet services are required to remain on-line at all times – verify with GSA/USSS.

K. Outlet and Pull Boxes: Minimum 1” conduit for Data cabling with pull strings.

L. All low voltage cabling shall be plenum rated.

M. Cables:

a. All new network infrastructure shall be Category 6A F/UTP. Verify color of each system prior to installation.

i. Network – White
ii. Security – Purple
iii. Nurse Call - Orange
iv. Automation – Yellow
v. For building automation system (BAS) cabling of VAV controls, the link from the IT rack to the first VAV shall be white. Links between downstream VAVs shall be yellow.

b. Additions to all existing network infrastructure should be minimum Category 6.

c. Use appropriate cable for outside plant (OSP) (wet) and indoor/outdoor locations. Follow grounding requirements.

i. Cat 6A F/UTP Shielded OSP Cable - Siemon 9A6O4-A5-01-R1B or equal.

ii. Cat 6A UTP Indoor/Outdoor Cable - Siemon 9U6W4-AF-12-R1A or equal.

d. Backbone cable shall be verified with GSA IT.

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i. Fiber optic cable shall be minimum 24-strand armored jacketed single-mode with LC connectors.

ii. Copper shall be maximum 25-pair type CMP (plenum-rated) terminated on patch panels within IT rack.

e. For installation in existing buildings, network cable shall match existing cabling but be at least CAT 6.For example, if existing cabling is CAT 6A, all new cabling shall be CAT 6A, including security upgrades and other upgrades

N. Conduit:

1. Provide minimum 1" diameter conduit with pull string

2. Conduit, connectors and whips shall be sized to accommodate the number of wires the area could receive with 60% free space; confirm sizing with GSA Technology Support Services

3. Provide protective bushings at conduit ends with open end within 2 feet of cable tray or hooks

O. Data Outlets: All Data Outlets are to be Siemens products or equal. Provide data connections and face plates in standard outlet wall box with number of connections indicated on drawings. Verify and coordinate finish with architect.

PART 3- EXECUTION

3.01 INSTALLATION

A. Installers shall be BICSI Certified.

B. Contractor provide and install rough-in for a standard phone/data outlet (consists of a 4" square junction box with a single gang mud ring), conduit with protective bushing on ends, pull string, cable tray, etc. Wire pulls, jack faceplates, patch panels, racks and terminations are by Owner

C. Install systems as described on the drawings and as required by Owner (GSAUSSS). These include but are not limited to:

1. Access Control Locations
2. Security Camera Locations
3. Office Data Connections
4. Lighting Control System Location(s)
5. BAS/BMS Integration
6. Other GSA required locations – verify.

D. Install conduit where shown or noted on plans and elevations down in wall to wall boxes or as designated by owner. Install Conduit to every box. Contractor to provide and install all conduit for all tele-data cabling in mechanical rooms.

E. Contractor shall ground and bond Owner installed data racks and bus bar.

F. Install wall boxes for data outlets where shown on plans.

G. Install data outlets for internet, network connections, phone, BAS/BMS, or other required functions where indicated and in quantities indicated on drawings.

H. Install pull strings for data cabling home runs from data outlets to IT Room locations indicated on plans.

I. Coordinate with owner for cabling to connect to specific owner required systems (i.e., intra-office private networks, inter-office private networks, A/V controls, BAS/BMS, etc.)

J. Verify and coordinate with other trades to provide empty conduit for fire, A/V, BMS, etc. as required.

END OF SECTION

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SECTION 28 00 00
ELECTRONIC SAFETY AND SECURITY

PART 1 - GENERAL

1.0 PROJECT INFORMATION

A. Project: RPM GSA LITTLE ROCK USSS

B. Owner: PRM

C. Architect: WER Architects

D. The Project consists of constructing a vehicle storage facility and office in an existing shell tenant space in Little Rock, AR.

E. Authority Having Jurisdiction (AHJ): Little Rock Fire Marshal

1.1. DESCRIPTION:

A. This section includes the Scope of Work of the following Sections:

- Section 28 10 00 Electronic Access Control and Intrusion Detection
- Section 28 23 00 Video Surveillance
- Section 28 46 00 Fire Detection and Alarm

1.2. SCOPE:

A. Provide and install complete systems as specified in the referenced sections above, in accordance with the drawings, the referenced codes and standards, the LR DAV Scope of Work, and the Authority Having Jurisdiction (AHJ).
B. For the safety and security of personnel and property, all building shall have security equipment installed.

C. Areas shall have access control and video surveillance as designated by Owner (GSA/USSS).

D. High-risk areas shall have access control, video surveillance, and panic alarms.

E. Systems shall have battery backup.

1.3 LITTLE ROCK DAV SCOPE OF WORK (SOW) AS FOLLOWS:

PERFORMANCE WORK STATEMENT (PWS)
Access Control Systems (ACS), Intrusion Detection System (IDS), and Video Management System (VMS) Electronic Security System (ESS) Upgrade-Little Rock DAV
GENERAL INFORMATION

1. Introduction: The United States Secret Service Technical Security Division (TSD) provides full life-cycle support for and decommissioning of physical security systems at USSS controlled sites, including **Little Rock DAV.** This is a non-personal services requirement for the upgrade of an

existing **ACS, IDS and VMS** at the **Little Rock DAV**. The Government will not exercise any supervision or control over the contract service providers performing the services herein. Such contract service providers shall be accountable solely to the contractor who, in turn is responsible to the Government.

2. Scope: The contractor shall provide all personnel, facilities, transportation, tools, materials, supervision, and other items and non-personal services necessary, except for those items specified as Government Furnished Equipment (GFE) and services, to perform the **ACS, IDS and VMS** upgrade as defined in the Performance Work Statement (PWS) and in accordance with (IAW) the Base Indefinite Delivery, Indefinite Quantity (IDIQ) contract. If a conflict exists, the Task Order (TO) takes precedence. The contractor shall accomplish the following specific tasks.

1.2 Specific Tasks:

1.2.1 Site Evaluation: The contractor shall perform any site evaluation activities in IAW with IDIQ PWS Section 2.1. The contractor shall develop an Installation Design Plan (IDP) at a 90% level to be approved by the Technical Security Representative (TSR).

1.2.2. Infrastructure Support: The contractor shall perform any infrastructure support activities IAW with IDIQ PWS Section 1.2.2.

1.2.3 Installation: The contractor shall perform all installation activities IAW with IDIQ PWS Section 1.2.4.

The contractor shall install a **ACS, IDS and VMS** upgrade at the **Little Rock DAV**. The **ACS, IDS and VMS** will include the networked head-end and all end devices, all equipment provided is GFE. The contractor shall install the following with proper mounting hardware and associated hardware and software (This includes cabling, workstation peripherals, and software licensing).

EQUIPMENT TO BE INSTALLED:

- 3 Axis cameras, mounts and accessories
- 1 Axis server and licenses
- 2 Decoders and Crash monitor kits
- 1 Uninterruptible power supply, rack mounted
- 1 NTP server
- 1 KVM, rack mounted, 8 port
- 2 Cisco 12 port POE+ switch, managed
- 2 Cisco integrated services router, managed
- 1 Open frame server rack w/PDU’s
- 1 DMP XR550 panel
- 1 Altronix 12V Power supply
- 3 DMP keypads
- 1 DMP Cell Dialer
- 4 Four Wired door contacts, recessed
- 1 Roll up Door contact, high security
- 5 360 Degree Tri-Tech Motion sensors

- 1 Hirsch MX-4 Door Controller
- 4 Hirsch keypad readers w/ mount and adapter plates
- 1 Altronix 12/24V Power supply with 8 fused outputs

CABLING/CONDUIT TO BE INSTALLED:

- CAT6 cable
- 18/4 unshielded
- 18/2 unshielded
- 18/4 shielded

1.25 Installation Practice and Aesthetics: The contractor shall perform all installation practices and aesthetics IAW with IDIQ PWS Section 1.2.7.

1.2.6 Acceptance Testing: The contractor shall perform all acceptance testing activities IAW with IDIQ PWS Section 1.2.8. The contractor shall develop an Acceptance Test Plan to be approved by the TSR.

1.2.7 Engineering and Documentation Support: The contractor shall perform all engineering and documentation support activities IAW with IDIQ PWS Section 1.2.9.
The contractor shall provide the following deliverables:

- Device Layout Drawing-one draft and one final to approved by the TSR
- Acceptance Test Plan-one draft and one final to be approved by TSR
- As-built IDP-One draft and one final to be approved by the TSR
- Configuration Documentation with IP addresses, usernames, and passwords for all devices-one draft and one final to be approved by the TSR
- Warranty Documentation-to be provided to the TSR upon installation acceptance
- User Guide/Training-as required by the task order and location

1.2.8 Warranties: The contractor shall provide all warranties IAW with IDIQ PWS Section 1.2.10.

1.2.9 Pricing: Pricing will be requested from the contractor for the below line items.

CLINS	Description	Quantity	Unit Price	Total (unit price x Quantity)
001	Installation Services	1/LOT	$TBD	$TBD
002	Travel	1/LOT	$TBD	$TBD
003	Other Direct Costs	1/LOT	$TBD	$TBD
Total Contract Value				

1.3 Period of Performance: The period of performance will be for one (1) Base Year of 12 months. The Period of Performance reads as follows:

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1.4. SUBMITTALS:

Submittals:

1. Obtain the Engineer's approval for all equipment and material before delivery to the job site. Delivery, storage or installation of equipment or material which has not had prior approval is not permitted at the job site.

2. Include in all submittals adequate descriptive literature, catalog cuts, shop drawings and other data necessary for the Engineer to ascertain that the proposed equipment and material comply with specification requirements. Catalog cuts submitted for approval must be legible and clearly identify equipment being submitted.

3. Make submittals for individual systems and equipment assemblies which consist of more than one item or component for the system or assembly as a whole. Partial submittals will not be considered for approval.

4. Submit within fifteen (15) days after the awarding of the Contract complete brochures of shop drawings and descriptive data of all materials and equipment.

5. The submittals must include the following:

   a. Information which confirms compliance with contract requirements. Include the manufacturer's name, model or catalog numbers, catalog information, technical data sheets, shop drawings, pictures, nameplate data and test reports as required.

   b. Elementary and interconnection wiring diagrams for communication and signal systems, control system and equipment assemblies. All terminal points and wiring must be identified on wiring diagram.

   c. Parts list which must include those replacement parts recommended by the equipment manufacturer.

   d. Approval will be based on complete submission only.

6. Furnish shop drawing for the work involved in sufficient time so that no delay or changes will be caused.

7. Verify that shop drawings comply in all respect with the item originally specified. It is the Contractor's responsibility to procure the proper sizes, quantities, rearrangement, structural modifications or other modifications in order for the substituted item to comply with the established requirements.

8. Any shop drawings prepared to illustrate how equipment, conduit, fixtures, etc., can be fitted into available spaces will be examined under the assumption that the Contractor has verified all the conditions. Obtaining approval therein does not relieve the Contractor of responsibility in the event the material cannot be installed as shown on those drawings.

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9. Shop drawings need not cover detailed installation drawings prepared for the Contractor's own use, but be limited, as in the case of raceways, to necessary departures from the plans as prepared by the Engineer.

10. Submit working scale drawings of apparatus and equipment which in any way varies from these specifications and plans, to be reviewed by the Engineer before the work is started. Correct interferences with the structural conditions before the work proceeds.

11. Submit all shop drawings at the same time in a loose-leaf binder with double index as follows:

    a. List the products alphabetically by name.

    b. List the name and manufacturers whose products have been incorporated in the work alphabetically together with their addresses and the name and addresses of the local sales representative.

PART 2 - PRODUCTS

2.1. GENERAL:

A. Provide Products as specified in the referenced sections above, scheduled and detailed on the drawings, and as required by the AHJ.

B. All equipment and components shall be installed in strict compliance with manufacturers' recommendations. Consult the manufacturer's installation manuals for all wiring diagrams, schematics, physical equipment sizes, etc., before beginning system installation.

C. All equipment shall be attached to walls and ceiling/floor assemblies and shall be held firmly in place (e.g., detectors shall not be supported solely by suspended ceilings). Fasteners and supports shall be adequate to support the required load.

D. Products and Manufacturers specified on the plans and in these specifications are for basis of design and equal manufacturers that meet the same criteria shall be deemed acceptable. Products shall meet “Buy American Act,” unless such products are proven to be unavailable for the function specified.

2.2. CONDUIT:

A. Conduit shall be in accordance with The National Electrical Code (most current NEC), local and state requirements, and Divisions 26 and 27 of these specifications.

2.3. CONDUCTORS AND CABLES FOR ELECTRONIC SAFETY AND SECURITY:

A. All cable for security systems shall be plenum rated.

B. Unless authorized, all network cable and connections between security equipment shall be provided and installed by Owner (GSA/USSS).

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PART 3 - EXECUTION

3.1. INSTALLATION:

A. Installation shall be in accordance with the NEC, NFPA 72, local and state codes, as shown on the drawings, as recommended by the major equipment manufacturer, and subject to the approval of the AHJ.

B. Installation of all systems, equipment, conduit, wire, cable, and accessories shall also be in accordance with this section, the referenced sections above, and Divisions 26 and 27 of the project specifications. In the case of any discrepancies, the most stringent shall govern.

END OF SECTION

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SECTION 28 10 00
ELECTRONIC ACCESS CONTROL AND INTRUSION DETECTION

PART 1 - GENERAL

1.1. DESCRIPTION:

A. This section includes the furnishing, installation, and connection of conduit and boxes for Access Control and Intrusion Detection Systems to meet OWNER requirements as defined in this section. All necessary equipment and devices shall be included.

1.2. OWNER GENERAL REQUIREMENTS AND SCOPE:

A. See section 28 00 00 and Project Plans for Owner Scope of Work and general requirements.

1.3. Submittals:

A. General:
1. Submittals shall be in accordance with Section 28 00 00.

1.4. GUARANTY:

A. All work performed and all material and equipment furnished under this contract shall be free from defects and shall remain so for a period of at least one (1) year from the date of acceptance.

PART 2 - PRODUCTS

2.1. GENERAL:

A. OWNER Security, Support Services, Access Control, and Intrusion Detection products shall be supplied by Owner’s contractor.

PART 3 - EXECUTION

3.1. INSTALLATION:

A. Installation shall be in accordance with OWNER requirements, the NEC, NFPA 72, local and state codes, as shown on the drawings, as recommended by the major

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equipment manufacturer, and subject to the approval of the AHJ.

B. Installation of all systems, equipment, conduits, wire, cable, and accessories shall also be in accordance with this section, the referenced sections above, and Divisions 26 and 27 of the project specifications. In the case of any discrepancies, the most stringent shall govern. Field coordinate with Owner during construction.

END OF SECTION

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SECTION 28 23 00
VIDEO SURVEILLANCE

PART 1 - GENERAL

1.1. DESCRIPTION:

A. This section includes the furnishing and installation of conduits and boxes Video Surveillance Cameras Systems to be installed by Owner.

1.2. OWNER GENERAL REQUIREMENTS AND SCOPE:

A. See Section 28 00 00 and Project Plans for Owner Requirements.

1.3. SUBMITTALS:

A. General:
1. Submittals shall be in accordance with Section 28 00 00.

1.4. GUARANTY:

A. All work performed and all material and equipment furnished under this contract shall be free from defects and shall remain so for a period of at least one (1) year from the date of acceptance.

PART 2 - PRODUCTS

2.1. GENERAL:

A. Conduits and boxes in accordance with Section 28 00 00 and Div 26 and Div 27.

PART 3 - EXECUTION

3.1. INSTALLATION:

A. Installation shall be in accordance with OWNER requirements, the NEC, NFPA 72, local and state codes, as shown on the drawings, as recommended by the major equipment manufacturer, and subject to the approval of the AHJ.

B. Installation of all systems, equipment, conduits, wire, cable, and accessories shall also

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be in accordance with this section, the referenced sections above, and Divisions 26 and 27 of the project specifications. In the case of any discrepancies, the most stringent shall govern.

C. Coordinate conduit & boxes for Video Surveillance Systems with the locations and equipment shown on the plans. Field Verify with Owner.

END OF SECTION

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SECTION 28 46 00
FIRE DETECTION AND ALARM

PART 1 - GENERAL

1.1. DESCRIPTION:

A. This section includes the furnishing, installation, and connection of the fire alarm equipment required to form a complete coordinated conventional control system that is ready for operation. It shall include, but not be limited to, alarm initiating devices, alarm notification appliances, control panel, auxiliary control devices, annunciators, power supplies, Ethernet and/or digital alarm communications to central stations and wiring as shown on the drawings and specified herein.

B. The fire alarm system shall comply with requirements of NFPA Standard No. 72 for protected premises signaling systems except as modified and supplemented by this specification. The system field wiring shall be supervised either electrically or by software-directed polling of field devices.

C. The fire alarm system shall be manufactured by an ISO 9001 certified company and meet the requirements of BS EN9001: ANSI/ASQC Q9001-1994.

D. The Fire Alarm Control Panel (FACP) and peripheral devices shall be manufactured 100% by a single U.S. manufacturer (or division thereof).

E. The system and its components shall be Underwriters Laboratories, Inc. listed under the appropriate UL testing standard as listed herein for fire alarm applications and shall be installed in compliance with the UL listing.

F. The installing company shall employ NICET (minimum Level II Fire Alarm Technology) technicians on site to guide the final check-out and to ensure the systems integrity.

1.2. SCOPE:

A. A new conventional control system shall be installed in accordance with the specifications and drawings.

B. Basic Performance:

1. The FACP shall meet requirements of UL ANSI 864 Ninth Edition
2. Initiation Device Circuits (IDC) shall be wired Style B (Class B) Per NFPA 72.
3. Notification Appliance Circuits (NAC) shall be wired Style Y (Class B) Per NFPA 72.
4. All circuits shall be power-limited, per UL864 requirements.
5. A single ground or open on any initiating device circuit or notification appliance circuit shall not cause system malfunction, loss of operating power or the ability to report an alarm.

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C. Basic System Functional Operation:

When a fire alarm condition is detected and reported by one of the system initiating devices, the following functions shall immediately occur:

1. The system Alarm LED on the FACP shall flash.
2. A local sounder with the control panel shall sound.
3. A backlit 80-character LCD display on the FACP shall indicate all information associated with the fire alarm condition, including the type of alarm point and its location within the protected premises.
4. In response to a fire alarm condition, the system will process all control programming and activate all system outputs (alarm notification appliances and/or relays) associated with the point(s) in alarm. Additionally, the system shall send events to a central alarm supervising station via either dial-up over PSTN or Internet or Intranet via PSDN or virtual private network.

1.3. Submittals:

A. General:
1. Submittals shall be in accordance with Section 28 00 00.

1.4. GUARANTY:

A. All work performed and all material and equipment furnished under this contract shall be free from defects and shall remain so for a period of at least one (1) year from the date of acceptance.

1.5. POST CONTRACT MAINTENANCE:

A. Complete maintenance and repair service for the fire alarm system shall be available from a factory trained authorized representative of the manufacturer of the major equipment for a period of five (5) years after expiration of the guaranty.

1.6. APPLICABLE PUBLICATIONS:

The publications listed below form a part of this specification.

A. National Fire Protection Association (NFPA) - USA:

No. 70 National Electrical Code
No. 72 National Fire Alarm Code
No. 101 Life Safety Code

B. Underwriters Laboratories Inc. (UL) - USA:

No. 38 Manually Actuated Signaling Boxes

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No. 217 Smoke Detectors, Single and Multiple Station
No. 228 Door Closers–Holders for Fire Protective Signaling Systems
No. 268 Smoke Detectors for Fire Protective Signaling Systems
No. 268A Smoke Detectors for Duct Applications
No. 346 Waterflow Indicators for Fire Protective Signaling Systems
No. 464 Audible Signaling Appliances
No. 521 Heat Detectors for Fire Protective Signaling Systems
No. 864 Control Units for Fire Protective Signaling Systems
No. 1481 Power Supplies for Fire Protective Signaling Systems
No. 1638 Visual Signaling Appliances
No. 1971 Visual Signaling Appliances
No. 2017 General-Purpose Signaling Devices and Systems
CAN/ULC S524-01 Standard for Installation of Fire Alarm Systems

1. The FACP shall be ANSI 864, 9th Edition Listed. Systems listed to ANSI 864, 8th edition (or previous revisions) shall not be accepted.

C. Local and State Building Codes.

D. All requirements of the Authority Having Jurisdiction (AHJ).

1.7. APPROVALS:

Each system must have proper listing and/or approval from the following nationally recognized agencies:
UL Underwriters Laboratories Inc

FM Factory Mutual

PART 2 - PRODUCTS

2.1. EQUIPMENT AND MATERIAL, GENERAL:

A. All fire detection alarm system shall be equal Edwards or Computrols

B. A sequence of operation shall be provided with every system.

C. The system shall include, but not limited to:
   a. LCD annunciators,
   b. one-way multi-channel voice communication system,
   c. color graphic workstation and printer (unless compatible with existing system),
   d. Discreet system control switch provided for reset, alarm silence, panel silence, drill switch, previous message switch, next message switch, and

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details switch.

e. Discreet system disable switch for speakers, strobes, elevator recall and shunt trip, doors, smoke dampers, atrium purge fans, AHU shutdown, stairwell pressurization fans, security, and a separate switch for all the above at one time.

D. The control panel(s) shall:
   a. Be a multi-processor based networked system designed especially for fire and smoke control
   b. Provide one-way and two-way emergency audio communications
   c. Allow interactions between any applications to be configured and modified using software provided by a single supplier
   d. Be addressable points
   e. Support multiple digital dialers and modems, support multiple communication ports and protocols
   f. Panels network capable through TCIP addressing

E. The network control panels shall include all software and ability to download the following features:
   a. All network applications and firmware from the configuration computer from a single location on the computer.
   b. Electronic addressing of analog/addressable devices.
   c. Operator interface control/display that shall annunciate, command and control system functions.
   d. Internal audio signal with different programmable patterns to distinguish between alarms, supervisory, trouble, and monitor conditions.

F. Systems reports that provide detailed description of the status of the system parameters for corrective action or for preventative maintenance programs. Reports shall be displayed by the operator interface or capable of being printed on a printer. Reports shall be capable to generate smoke sensitivity percentage.

G. Authorized operator shall be able to operate to modify system functions like system time, date, passwords, holiday dates, restart the system and clear control panel event history file and perform test functions.

H. For high rises, a Firefighter Smoke Control Station (FSCS) shall provide a graphic representation of the facility HVAC system and Stairwell Pressurization system. Fan override and control switches and fan/damper status LEDs shall be provided. The following minimum system controls and indicators shall be provided on the FSCS: Power ON, Trouble, and Signal Silenced LEDs; System Reset, Silence, Trouble Silence, and Drill push buttons. It shall be possible to annunciate text messages via LCD display mounted in the FSCS enclosure

I. Preferred fire alarm system manufacturers shall be Computrols or Edwards with capacity to coordinate with existing systems.

J. All equipment and components shall be installed in strict compliance with

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manufacturers' recommendations. Consult the manufacturer's installation manuals for all wiring diagrams, schematics, physical equipment sizes, etc., before beginning system installation.

K. All equipment shall be attached to walls and ceiling/floor assemblies and shall be held firmly in place (e.g., detectors shall not be supported solely by suspended ceilings). Fasteners and supports shall be adequate to support the required load.

2.2. CONDUIT AND WIRE:

A. Conduit:

1. Conduit shall be in accordance with The National Electrical Code (NEC), local and state requirements.

2. Where required, all wiring shall be installed in conduit or raceway. conduit fill shall not exceed 40 percent of interior cross sectional area where three or more cables are contained within a single conduit.

3. Cable must be separated from any open conductors of power, or Class 1 circuits, and shall not be placed in any conduit, junction box or raceway containing these conductors, per NEC Article 760-29.

4. With the exception of telephone connections, wiring for 24 volt DC control, alarm notification, emergency communication and similar power-limited auxiliary functions may be run in the same conduit as initiating and signaling line circuits. All circuits shall be provided with transient suppression devices and the system shall be designed to permit simultaneous operation of all circuits without interference or loss of signals.

5. Conduit shall not enter the fire alarm control panel, or any other remotely mounted control panel equipment or backboxes, except where conduit entry is specified by the FACP manufacturer.

6. Conduit shall be 3/4 inch (19.1 mm) minimum.

B. Wire:

1. All fire alarm system wiring shall be new.

2. Wiring shall be in accordance with local, state and national codes (e.g., NEC Article 760) and as recommended by the manufacturer of The fire alarm system. Number and size of conductors shall be as recommended by the fire alarm system manufacturer, but not less than 18 AWG (1.02 mm) for Initiating Device Circuits and 14 AWG (1.63 mm) for Notification Appliance Circuits.

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3. All wire and cable shall be listed and/or approved by a recognized testing agency for use with a protective signaling system.

4. Wire and cable not installed in conduit shall have a fire resistance rating suitable for the installation as indicated in NEC 760 (e.g., FPLR).

5. All field wiring(with exception of external communications Ethernet) shall be electrically supervised for open circuit and ground fault.

C. Terminal Boxes, Junction Boxes and Cabinets:

1. All boxes and cabinets shall be UL listed for their use and purpose.

D. The fire alarm control panel shall be connected to a separate dedicated branch circuit, maximum 20 amperes. This circuit shall be labeled at the main power distribution panel as FIRE ALARM. Fire alarm control panel primary power wiring shall be 12 AWG. The control panel cabinet shall be grounded securely to either a cold water pipe or grounding rod. The control panel enclosure shall feature a quick removal chassis to facilitate rapid replacement of the FACP electronics.

PART 3 - EXECUTION

3.1. INSTALLATION:

A. Installation shall be a complete system in accordance with the NEC, NFPA 72, local and state codes, as shown on the drawings, as recommended by the major equipment manufacturer, and subject to the approval of the AHJ.

B. All conduit, junction boxes, conduit supports and hangers shall be concealed in finished areas and may be exposed in unfinished areas. Smoke detectors shall not be installed prior to the system programming and test period. If construction is ongoing during this period, measures shall be taken to protect smoke detectors from contamination and physical damage.

C. All fire detection and alarm system devices, control panels and remote annunciators shall be flush mounted when located in finished areas and may be surface mounted when located in unfinished areas.

D. Coordinate with the Fire Sprinkler Contractor to provide monitoring of the fire sprinkler systems in the facility.

E. Coordinate with the HVAC contractor to install and wire duct smoke detectors for monitoring by the system as shown on the drawings.

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F. At the final inspection a factory trained representative of the manufacturer of the major equipment shall perform the tests in Section 3.2 TEST.

G. Training and required competencies shall be determined at the beginning of project and shall be observed by observed by the commissioning agent'

a. Specific training shall be on-site and be videotaped.

H. Provide a minimum of 2% extra replacement devices for each type of fire alarm devices.

I. Include a minimum of 3 keys to access the system.

3.2. TEST:

Provide the service of a competent, factory-trained engineer or technician authorized by the manufacturer of the fire alarm equipment to technically supervise and participate during all of the adjustments and tests for the system.

1. Before energizing the cables and wires, check for correct connections and test for short circuits, ground faults, continuity, and insulation.

2. Close each sprinkler system flow valve and verify proper supervisory alarm at the FACP.

3. Verify activation of all flow switches.

4. Open initiating device circuits and verify that the trouble signal actuates.

5. Open and short notification appliance circuits and verify that trouble signal actuates.

6. Ground device circuits and verify response of trouble signals.

7. Check presence and audibility of tone at all alarm notification devices.

8. Check installation and supervision of heat detectors to ascertain that they will function as specified.

9. Conduct tests to verify trouble indications for common mode failures, such as alternating current power failure.

3.3. FINAL INSPECTION:

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At the final inspection a factory trained representative of the manufacturer of the major equipment shall demonstrate that the systems function properly in every respect.

3.4. INSTRUCTION:

Provide instruction as required to the building personnel. "Hands-on" demonstrations of the operation of all system components and the entire system shall be provided.

END OF SECTION

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