Request for Bid
For
The Remodeling of the Ames Department of Transportation Driver's License Station
Issued by:

IOWA DEPARTMENT OF TRANSPORTATION
Purchasing Section
Proposal No. **17847**

Letting Date: 01/11/2017

Must be submitted no later than 1:00 PM Central Time
Bid Responses received after this date will be rejected

For information about this notice, and during this procurement, interested persons shall contact only:

Jody McNaughton
800 Lincoln Way
Ames, Iowa 50010
Phone: 515-239-1298
Fax: 515-239-1538
E-Mail: jody.mcnaughton@iowadot.us

Issued addenda and all other correspondence will be posted to Iowa DOT's website:
http://**www.iowadot.gov/purchasing**

Procurement Timetable

The following dates are set forth for informational and planning purposes. The Iowa DOT reserves the right to revise the dates as needed. All times listed are Central Time.

Event/Dates	Section Reference	Date/Time
Issue RFB	cover	November 28,2016
Number of Copies of Bid Responses Required		1
Bidders Conference (Pre-Bid) ☐ *Box will be checked when attendance is mandatory* **Location: 3708 Lincoln Way Ames IA 50010** **Time: 10:00a.m.**	2.28	December 7, 2016
DOT Response from Bidder's Conference Questions	2.28	December 12, 2016
Bidder Questions, Requests for Clarification, & Changes *(no later than)*	2.2/2.5	December 16,2016
DOT Response to Questions Issued *(no later than)*	2.2/2.5	January 3, 2017
Bid Opening/Proposal Due	2.8/2.9	January 11, 2017
Presentations & Demonstrations "Short list" (*by invitation only*)	2.22/ 5.3	N/A
Announce Successful Bidder Intent to Award* *see note below*	4.1	January 17, 2017
Completion of Contract Negotiations & Execution of the Contract	4.3	January 30, 2017
Contract Begin Date	See schedule of prices	February 1, 2017
Contract End Date	See schedule of prices	April 30, 2017

*Intent to Award - See Section 2.22

It is intended that Bid Responses will be evaluated and a notice of "intent to award" will be issued within thirty (30) days of the bid opening date. Bid Responses prices, terms and conditions must be held firm for a 180-day period from the date of the notice of "intent to award" the contract.

Solicitation Response

	Response Due Date	Time	Location
	January 11,2017	1:00 P.M.	800 Lincoln Way, Ames, IA

Proposal Number	Description
17874	Remodel of the Ames DOT Driver's License Station located at 3708 Lincoln Way, Ames IA

Contract Begin Date	Contract Completion Date	Bid Bond	Performance Bond (Y/N)	Liquidated Damages
02/01/2017	04/30/2017	Yes, 5% of the bid contractors bid response	N/A	N/A

Purchasing Agent assigned	E-mail Address	Phone	Fax
Jody McNaughton	Jody.mcnaughton@iowadot.us	515-239-1298	515-239-1538

RESPONDER INFORMATION

Company Name			Federal Tax ID
Street Address	City	State	Zip Code

Contact Name	E-mail Address	Phone	Fax

Responder agrees to sell goods, services or both at the same prices, terms and conditions to any other Iowa state agency, Regent or Political Subdivision upon request. Please check Yes or No. ☐ Yes ☐ No	Responder is an Iowa Targeted Small Business ☐ Yes ☐ No

GENERAL INFORMATION

This solicitation includes the Solicitation Response cover page, Schedule of Prices, Standard Terms and Conditions, Supplemental terms (if any), Specifications, Plans and Drawings, mailing label and all other information needed to prepare and submit a response to the solicitation. Information in the "Solicitation Response" above must be typed or completed in ink, signed, and returned in a flat style envelope along with any other information required in the solicitation prior to the response due date and time. Please use the furnished mailing label, or label the response as "Iowa Department of Transportation, proposal number and response due date on the outside of the return envelope. Responders may personally deliver, mail, or select a carrier that ensures timely delivery. **Faxed or e-mail responses will not be accepted.**

If required, each response must be accompanied by a bid bond in an accepted form, in the percent amount indicated above. Refer to the Standard Terms and Conditions for the accepted forms in which the bid bond requirement may be fulfilled. **Responses without a required bid bond will not be considered for award.** If the intended awarded responder fails to enter into a formal contract within fifteen (15) days after award is made for any reason on their part, the bid bond may be retained by the State.

The entire contents of this solicitation, Addendums, Schedule of Prices, Specifications, Plans and Drawings, Supplemental Terms and Conditions, Standard Terms and Conditions, shall become part of the contract.

We certify that we have not, either directly or indirectly, entered into any agreement or participated in any collusion or otherwise taken any action in restraint of free competition; that no attempt has been made to induce any other person or firm to submit or not to submit a response; that this response has been independently arrived at without collusion with any other responder, competitor, or potential competitor; and that this response has not been knowingly disclosed prior to the opening of responses to any other responder or competitor.

We certify that all materials, equipment goods and/or services proposed meet or exceed the specifications and will be supplied in accordance with the entire contents of this solicitation including delivery schedules. We promise to complete the contract within the contract period, or pay any liquidated damages, if stipulated, for each calendar day as set forth in the solicitation documents.

Signed _____ Date _____

Iowa Department of Transportation
Standard Terms and Conditions
For

Submission of Quotations, Bids or Proposals

-FORMAL-

Formal is the procurement process required by Iowa law when the estimated, aggregate amount of the purchase equals or exceeds $50,000.

The entire contents of this solicitation shall become a part of a contract or purchase order. In case of a discrepancy between the contents of the solicitation documents, the following items listed by descending order shall prevail:

- Addendums to the solicitation
- Solicitation
  - Schedule of Prices
  - Specifications
  - Plans and Drawings
- Supplemental Terms and Conditions
- Standard Terms and Conditions

(Example - if a statement in the specifications contradicts a statement in the Standard Terms and Conditions, the statement in the specifications shall apply)

Preparation of Solicitation or Bid Response: All responses must clearly address all aspects of the solicitation. Responses must be typed or completed in ink and submitted on the forms supplied by the Iowa DOT.

Responses must be signed and received prior to the opening date and time indicated on the Solicitation Response page or other specified areas throughout the solicitation document. The Responder's signed Response shall become the official Response to be considered for award.

No email, fax or web link bid Responses will be accepted. Responses must be signed, sealed and delivered in person or by a mail courier that ensures timely delivery.

A. Solicitation

1. **Opening:** The openings of responses are made public and conducted at the Iowa DOT, Ames complex unless otherwise specified. Responses received after the time of the opening will be returned unopened and considered non-compliant.
2. **Communications:** Questions concerning this solicitation should be directed to the purchasing agent listed on the Solicitation Response page. Inquiries can be written, phoned, or faxed. In all cases, written communication will take precedence over verbal communication.
3. **Bid Bond:** If required, the Solicitation Response page will indicate the fixed percent of the bid security based on the amount of the Bidder's bid. A Bid Bond can be supplied in one of the following ways: **(1)** Certified check or credit union certified share draft, cashier's check, or bank draft, drawn on a solvent bank or credit union. Certified checks and certified share drafts shall be drawn and endorsed in the amount indicated. Checks or drafts shall be made payable either to the Iowa Department of Transportation (Iowa DOT) or to the bidder. If payable to the bidder, the check or draft shall be endorsed without qualifications to the Iowa DOT by the bidder or an authorized agent. **(2)** An insurance or surety company may be retained to provide a bond in fulfillment of the Bid Bond requirement. A properly completed and signed copy of the Bid Bond *(Form 131084)* must accompany the bid. **The Iowa DOT's Bid Bond form must be used; no other forms or formats will be accepted.**

4. **Pricing and Discount:** Unit prices shown in the response shall be quoted as the price per unit (e.g., gal., case, each, etc.) as requested in the solicitation. If there is a discrepancy between the unit bid prices, extended price, or total amount of response, the unit prices shall prevail. Unless otherwise indicated, prices shall be firm for the duration of the contract or purchase order. Discounts for early payment are allowed, but not considered in award of the contract.
5. **Acceptance/Rejection:** The Iowa DOT reserves the right to accept or reject any or all responses and to waive irregularities or technicalities, provided such waiver does not substantially change the offer or provide a competitive advantage to any supplier(s) or provider. The Iowa DOT also reserves the right to accept that response which is deemed to be in the best interests of the state. Any unauthorized changes, additions, or conditional response including any ties to another response or any reservations about accepting an award or entering into a contract, may result in rejection of the response. Responses must remain available for award for thirty (30) days from opening date and time.
6. **Results & Disclosure:** Tabulation results will be posted on the Iowa DOT website at www.iowadot.gov/purchasing under the *Bid Award* link referencing the proposal number with an award recommendation indicated. At the conclusion of the selection process, the contents of all received responses will be placed in the public domain and be open to inspection by interested parties, according to state law. Trade secrets or proprietary information that are recognized as such and are protected by law may be withheld if clearly identified as such in the response.
7. **Quality of Goods:** All material shall be new and of first quality. Items which are used, demonstrators, refurbished, obsolete, seconds, or which have been discontinued are unacceptable without prior written approval by the Iowa DOT.
8. **Recycled Content:** The Iowa Code encourages purchase of products and materials with recycled content, including but not limited to paper products, oils, plastic products, compost materials, aggregate, solvents, and rubber products. Recycled items or alternatives must be noted in the Solicitation Response, if known.
9. **Shipping Terms:** Deliveries shall be F.O.B. Destination unless otherwise specified. All deliveries shall be accompanied by a packing slip indicating the Supplier, quantities shipped, and the purchase order number(s). All delivery charges shall be included in the response price and paid by the Supplier. No collect C.O.D. deliveries shall be accepted. When entering into a contract, the Supplier shall notify the freight company that all freight and delivery charges are to be prepaid by the Supplier. Goods delivered to the Iowa DOT Distribution Center at 800 Lincoln Way, Ames, IA shall be received between the hours of 7:00 a.m. and 3:00 p.m. on any day except Saturday, Sunday, or a holiday. For deliveries to other Iowa DOT locations, the Supplier may contact the destination location for available times to deliver as not all Iowa DOT locations have the same business hours. The Iowa DOT will not be liable for any freight claims or unpaid freight bills arising from contract or purchase order issues.

B. Award

The binding agreement (award) may be issued in the form a purchase order or contract or both depending on the requirements and complexity of the agreement.

1. **Method of Award:** Award shall be made to the responsible, responsive Responder whose Quotation, Bid or Proposal meets the requirements of the solicitation and is the most advantageous to the Iowa DOT. An Iowa company or individual will be given preference over an out-of-state company or individual when responses are equal in all aspects and are tied in price. By virtue of statutory authority preference will be given to products and provisions grown and coal produced within the State of Iowa.
2. **Award Protests:** Protests of award recommendations are to be addressed to the Director of Purchasing, and shall be made in accordance with paragraph 761--20.4(6)"e" of the Iowa Administrative Code.
3. **Contracts:** Successful Contractor(s) may be sent either a formal Contract, Notification of Award or Purchase Order as confirmation of acceptance and award. Any of these binding agreements shall be for the term stated in the solicitation or on a purchase order and may be renewed for additional period(s) under the same terms and conditions upon mutual agreement as defined. The successful Contractor may not assign a contract to another party without written authorization from the Iowa DOT Purchasing Section. The Iowa DOT may offer a contract extension to the Contractor when a scheduled target date cannot be met.

4. **Consumer Price Index (CPI-U):** A CPI may be allowed as specified in the terms of the solicitation and at the discretion of the Iowa DOT based on currently posted CPI-U, US City Average, All Items – non seasonally adjusted unless otherwise specified. This applies each of any subsequent renewals, extensions, amendments issued under the contract for the duration of the contract.
5. **Payment Terms:** The Iowa DOT typically pays properly submitted invoices within thirty (30) days of receipt, providing goods and/or services have been successfully delivered, installed or inspected (if required), and accepted. Invoices presented for payment must be only for quantities received by the Iowa DOT and must reference the purchase order number or contract number to be submitted for processing.
6. **Default (Supplier):** Failure of the Supplier to adhere to specified delivery schedules or to promptly replace rejected materials shall render the Supplier liable for all costs in excess of the bid price when alternate procurement is necessary. This shall not be the exclusive remedy and the Iowa DOT reserves the right to pursue other remedies available to it by law or under the terms of the binding agreement.
7. **Default (Contractor):** Failure of a Contractor other than a Supplier to meet any specified project completion deadline shall render the Contractor liable for all costs incurred by the Iowa DOT that were: a) necessary to meet said deadline; or b) necessary to complete said project after said deadline. This shall not be the exclusive remedy and the Iowa DOT reserves the right to pursue other remedies available to it by law or under the terms of the agreement.

C. General

1. **Administrative Rules:** For additional details on the rules governing the actions of the Iowa DOT Purchasing Section, refer to 761 IAC, Chapter 20, Iowa Administrative Code, entitled "Procurement of Equipment, Materials, Supplies and Services".
2. **Affirmative Action:** The Contractor (and also subcontractor, vendor, service provider or supplier) is prohibited from engaging in discriminatory employment practices forbidden by federal and state law, executive orders and rules of the Iowa Department of Management, pertaining to equal employment opportunity and affirmative action. Contractor may be required to have on file a copy of their affirmative action program, containing goal and time specifications. Contractors doing business with Iowa in excess of $5,000 annually and employing 50 or more full time employees may be required to file with the Iowa Department of Management a copy of their affirmative action plan. Failure to fulfill these non-discrimination requirements may cause the contract to be canceled and the contractor declared ineligible for future state contracts or subject to other sanctions as provided by law or rule.
3. **Applicable Law:** The contract shall be governed under the laws of the State of Iowa. The contractor shall at all times comply with and observe all federal and state laws, local laws, ordinances, and regulations which are in effect during the period of a contract and which in any manner affect the work or its conduct. Any legal action relating to a contract shall only be commenced in the Story County, Iowa, District Court or the United States District Court for the Southern District of Iowa.
4. **Conflict of Interest:** No state or county official or employee, elective or appointive shall be directly or indirectly interested in any contract issued by the Iowa DOT, see Code of Iowa 314.2.
5. **Debarment and Vendor Suspension:** By submitting a response, the contractor is certifying that it and its principals and/or subcontractors are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by the State of Iowa or any Federal department or agency.
6. **Equal Opportunity:** Responders to the solicitation must be an "Equal Opportunity Employer" as defined in the Civil Rights Act of 1964 and in Iowa Executive Order Number Thirty-four.
7. **Indemnification-Goods:** To the extent the goods are not manufactured in accordance with Iowa DOT's designs, Supplier shall defend, indemnify and hold harmless Iowa DOT, its assignees, and other users of the goods from and against any claim of infringement of any letters patent, trade names, trademarks, copyright or trade secrets by reason of sale or use of any articles purchased. Iowa DOT shall promptly notify Supplier of any such claim.
8. **Infringement:** Goods shall be delivered free of the rightful claim of any third party by way of infringement. Contractor shall indemnify and save harmless the State of Iowa and the Iowa DOT against all claims for infringement of, and/or royalties claimed under, patents or copyrights on materials and equipment furnished under this bid.

9. **Iowa Open Records Law**: All Solicitation Responses are subject to terms and provisions of Iowa Code Chapter 22 Examination of Public Records (Open Records), specifically 22.7- Confidential Records.
10. **Records Audit:** The contractor agrees that the Auditor of the State of Iowa or any authorized representative of the state, and where federal funds are involved, the Comptroller General of the U.S. Government, shall have access to and the right to examine, audit, excerpt, and transcribe any directly pertinent books, documents, papers, and records of the contractor relating to orders, invoices, or payments of a contract or purchase order.
11. **Targeted Small Businesses:** The Iowa DOT seeks to provide opportunities for women and/or minority small business enterprises. To apply for certification as an Iowa Targeted Small Business, contact the Iowa Department of Inspection and Appeals (515-281-5796). Contractors shall take documented steps to encourage participation from Targeted Small Businesses for the purpose of subcontracting and supplying of goods or services or both.
12. **Taxes:** Prices quoted shall not include state or federal taxes from which the state is exempt. Exemption certificates will be furnished upon request.
13. **Termination:**
    - **Termination Due to Lack of Funds or Change in Law**

      The Iowa DOT shall have the right to terminate this Contract without penalty by giving thirty (30) days written notice to the vendor as a result of any of the following:

      • Adequate funds are not appropriated or granted to allow the Iowa DOT to operate as required and to fulfill its obligations under contract.

      • Funds are de-appropriated or not allocated or if funds needed by the Iowa DOT, at the Iowa DOT's sole discretion, are insufficient for any reason.

      • The Iowa DOT's authorization to operate is withdrawn or there is a material alteration in the programs administered by the Iowa DOT.

      • The Iowa DOT's duties are substantially modified.

    Following a 30 day written notice, the Iowa DOT may terminate a binding agreement in whole or in part without the payment of any penalty or incurring any further obligation to the Responder. Following termination upon notice, the Responder shall be entitled to compensation upon submission of invoices and proper proof of claim for goods and services under contract up to and including the date of termination.

Schedule of Prices

Project Description: The project consists of the demolition and construction of restrooms, office spaces and a breakroom for the Driver's license station located at 3708 Lincoln Way Ames IA 50010.

Item No.	Description	Quantity	Unit/Price	Total Bid Amount
1	Contractor to remodel existing area to include demolition and removal off site as per plans and specifications for the remodeling of restrooms, construction of office spaces, and a break room. Located at 3708 Lincoln Way Ames IA	1	Job	$_____

Fabricated or Custom Built Products (Reference section 2.33.1)
List all and the lead times for each

_____

_____

I hereby certify that this Bid Response meets or exceeds the minimum requirements including specifications and addendums.

Authorized Signature: _____

Contact Person:

Company: _____

_____
(Print Name)

Address: _____

_____
(City) (State) (Zip Code)

Contractors Registration No (If applicable).:_____

Phone No: _____

Email:_____

Fax No.: _____

I acknowledge receipt of addendums:_____

TABLE OF CONTENTS

Coverpage
Procurement Timetable
Bid Response
Iowa DOT Standard Terms and Conditions
Schedule of Prices

Section 1 Introduction
- **1.1 Purpose & Overview of the RFB Process**
- **1.2 Definitions**
- **1.3 General**
- **1.4 Bidding Documents**

Section 2 Administrative Information
- **2.1 Issuing Agent**
- **2.2 Restriction on Communication**
- **2.3 Downloading the RFB from the Internet**
- **2.4 Procurement Timetable**
- **2.5 Questions, Requests for Clarification, and Suggested Changes**
- **2.6 Revisions to Contractor Bid Response**
- **2.7 Submission of Bid Responses**
- **2.8 Bid Response Opening**
- **2.9 Costs of Preparing the Bid Response**
- **2.10 Reasonable Accommodations**
- **2.11 Rejection of Bid Responses**
- **2.12 Disqualification**
- **2.13 Nonmaterial and Material Variances**
- **2.14 Reference Checks**
- **2.15 Information From Other Sources**
- **2.16 Verification of Bid Response Contents**
- **2.17 Criminal History and Background Investigation**
- **2.18 Bid Response Clarification Process**
- **2.19 Disposition of Bid Responses**
- **2.20 Public Records and Requests for Confidential Treatment**
- **2.21 Release of Claims**
- **2.22 Award Notice and Acceptance Period**
- **2.23 No Contract Rights until Execution**
- **2.24 Restrictions on Gifts and Activities**
- **2.25 No Minimum Guaranteed**
- **2.26 Conflicts Between Terms**
- **2.27 News Releases**
- **2.28 Pre-Bid Conference**
- **2.29 Contractors Responsibilities**
- **2.30 Consideration of Bids**
- **2.31 Bonds**
- **2.32 Labor Regulations**
- **2.33 Fabricated or Custom Built Product lead times**

Section 3 General Requirements
- **3.1 Scope of Work**
- **3.2 Adoption of General Conditions**
- **3.3 Contractor Response**
- **3.4 Sub-Contractors**
- **3.5 Protection of Persons and Property**
- **3.6 Miscellaneous Provisions**
- **3.7 Contractors Responsibilities**
- **3.8 Bid Proposal Documents**

Section 4 Contract Terms & Conditions
- **4.1 Contract Award**
- **4.2 Contract Period**
- **4.3 Liquidated Damages**
- **4.4 Immunity of Iowa Department of Transportation**
- **4.5 Payments and Completion**
- **4.6 Insurance Requirements**
- **4.7 Public Contract Termination**

Appendix A Bid Bond
Appendix B Brae form
Mailing Label

Section 1 Introduction

1.1 Purpose & Overview of the RFB Process

The purpose of this Request for Bid (RFB) is to solicit Bid Responses from responsible, responsive Bidders to provide the goods and/or services identified on the RFB cover page and described further in Section 3 of this RFB. The Iowa DOT intends to award a contract(s) beginning and ending on the dates listed on the Procurement Timetable. The Iowa DOT may renew the contract(s) for up to the number of annual extensions identified on the Procurement Timetable at the sole discretion of the Iowa DOT. Any contract(s) resulting from the RFB shall not be an exclusive contract.

Bidders will be required to submit Bid Responses according to the Procurement Timetable. The Iowa DOT will evaluate all responsible Bidders that submit timely responsive Bid Responses to be considered for award.

OverView Contractor to provide all labor, equipment and materials for the remodeling of the Ames Driver's License Station as per plans and specification included in this proposal. This includes demolition and construction of restrooms, office spaces and a breakroom Completion date for this project is 04/30/2017. Location of the project is 3708 Lincoln Way Ames IA 50010

1.2 Definitions

The terms used in individual sections of this document are intended to be consistent with those commonly used in the application field in question. When responding, use the terms and acronyms used in this document, and define any terms or conditions that require further clarification.

1.2.1 "Bid Response" means the bid document submitted by the bidder in response to the RFB.

1.2.2 "Contract" or "Resulting Contract" means the contract(s) entered into with the successful Bidder(s) as described in section 4.

1.2.3 "Bidder" means individual, company or entity submitting a response in response to the RFB.

1.2.4 "Iowa DOT" means the Iowa Department of Transportation.

1.2.5 "Participating Agency" or "Participating Agencies" means the all state boards, and commissions, and any political subdivisions as identified on the RFB cover sheet as Participating Agencies and any other agency that decides to utilize the executed contract.

1.2.6 "Procurement Timetable" *(on the page immediately following the RFB cover)* provide timeline, event and date information.

1.2.7 "Purchase Order" means the documentation issued by the State to the Contractor for a purchase of goods and/or services in accordance with the terms and conditions of the Contract. It may include an identification of the items to be purchased, the delivery date and location, the address where the supplier should submit the invoices, and any other requirements deemed necessary by the State. Any preprinted contract terms and conditions included on Bidder's forms or invoices shall be null and void.

1.2.8 "Responsible Bidder" means a bidder that has the capability in all respects to perform the requirements of the Bid Proposal specifications. In determining whether a Bidder is a responsible, responsive Bidder, the Iowa DOT may consider various factors including, but not limited to, the Bidder's competence and qualifications to provide the goods or services requested, the Bidder's integrity and reliability, the past performance of the Bidder relative to the quality of the goods or services offered by the Bidder, the proposed terms of delivery, and the best interest of the Iowa DOT and Participating Agencies.

1.2.9 "RFB" means Request for Bid and any attachments, exhibits, schedules or addenda hereto. A written response by a Bidder shall be considered a bid and referred to as a Bid Response.

1.2.10 "State" means the Iowa DOT, State of Iowa, and Participating Agencies identified on the title page and all state agencies, boards, and commissions, and any political subdivisions making purchases off of the resulting Contract as permitted by this RFB.

1.2.11 "Subcontractor" Includes every person furnishing material, equipment or performing labor as a sublet of any part of contract.

1.3 General

1.3.1 Owner:

The Owner of these projects is the Iowa Department of Transportation, 800 Lincoln Way, Ames, Iowa 50010.

Project Location: 3708 Lincoln Way Ames IA 50010

1.4 Bidding Documents

1.4.1 Addenda

- Addenda, if issued, will be posted to the Iowa DOT"s website. All addendums must be acknowledged by bidders and included in the Bid Response.
- All addenda so issued shall become part of the contract documents.

1.4.2 Withdrawal Period

Prime Contractors, subcontractors and material suppliers on these projects agree to guarantee their proposal costs and work to be performed for a period of thirty (30) days after the date of receipt of bids.

Section 2 Administrative Information

2.1 Issuing Agent

The Issuing Agent, identified on the cover page is the sole point of contact regarding the RFB from the date of issuance until the notice of intent to award is issued (selection of the successful contractor).

2.2 Restriction on Communication

From the issue date of this RFB until the notice of intent to award is issued (announcement of the successful bidder), bidders may contact only the Issuing Agent.

The Issuing Agent will respond only to questions regarding the procurement process. Questions related to the interpretation of this RFB must be submitted in writing to the Issuing Officer by the deadline found in the Procurement Timetable listed immediately after the cover sheet**.** Verbal questions related to the interpretation of this RFB will not be accepted. Questions related to the interpretation of this RFB must be submitted as provided in section 2.5. Contractors may be disqualified if they contact any state employee other than the Issuing Agent. *Exception: Contractors may contact the State Targeted Small Business Office on issues related to the preference for Targeted Small Businesses.*

In NO CASE shall verbal communication override written communications. Only written communications are binding on the State.

The Iowa DOT assumes no responsibility for representations concerning conditions made by its officers or employees prior to the execution of a contract, unless such representations are specifically incorporated into this RFB. Verbal discussions pertaining to modifications or clarifications of this RFB shall not be considered part of the RFB unless confirmed in writing. All such requests for clarification shall be submitted in writing. Any information provided by the Contractor verbally shall not be considered part of that Contractor's proposal. Only written communications from the Contractor and received by the Department shall be accepted.

With the exception of the written Bid Response which must be submitted by Contractors in accordance with Section 2 herein, communications between the Issuing Agent and Contractors may be conducted by regular prepaid US mail, courier service, e-mail or facsimile transmission.

2.3 Downloading the RFB from the Internet

All correspondence for this Bid Proposal will be posted on the Iowa DOT's website at **www.iowadot.gov/purchasing/lettingschedule.** **Bidders are required** to visit the Iowa DOT's home page periodically for any and all addendums or other pertinent information regarding this bid opportunity.

2.4 Procurement Timetable

The dates listed in the Procurement Timetable (on the page immediately following the RFB cover) are set forth for informational and planning purposes; however, the Iowa DOT reserves the right to change the dates. If a change is made to any of the deadlines for Contractor submission, the Iowa DOT will issue an addendum to the RFB. All times listed are Central Times.

2.5 Questions, Requests for Clarification, and Suggested Changes

Contractors are invited to submit written questions and requests for clarifications regarding the RFB during the time indicated in the Procurement Timetable. Contractors may also submit suggestions for changes to the requirements of this RFB. The questions, requests for clarifications or suggestions must be in writing and received by the Issuing Agent on or before the deadline stated in the Procurement Timetable. Oral questions will not be permitted. If the questions, requests for clarifications, or suggestions pertain to a specific section of the RFB must be referenced.

Written responses to questions, requests for clarifications or suggestions will be posted on or before the deadline stated in the Procurement Timetable and posted on the Iowa DOT's website (see Section 2.3) If the Iowa DOT decides to adopt a suggestion, the Iowa DOT will issue an addendum to the RFB.

The Iowa DOT assumes no responsibility for verbal representations made by its officers or employees unless such representations are confirmed in writing and incorporated into the RFB.

Each bidder must inform themselves fully of the conditions relating to the proposal. Failure to do so will not relieve a successful bidder of their obligation to furnish all services required to carry out the provisions of his contract. Insofar, as possible, the Contractor, in carrying out the work, must employ such methods or means as will not cause any interruption of, or interference with the work of any other contractor.

If a bidder discovers any significant ambiguity, error, conflict, discrepancy, omission, or other deficiency in this RFB, the bidder should immediately notify the Issuing Agent in writing of such error and request modification or clarification of the RFB document.

2.6 Revisions to Contractor Bid Response

Contractors who submit Bid Proposals in advance of the bid opening date may withdraw, modify, and resubmit Bid Proposals at any time until the bid opening date and time. Contractors must notify the Issuing Agent in writing if they wish to withdraw their Bid Response. A Contractor shall not withdraw its Bid Response or its prices prior to the end of the one hundred and eighty (180) day period immediately following the notice of intent to award a contract.

2.7 Submission of Bid Responses

The Iowa DOT must receive Bid Responses addressed to the Department of Transportation, Purchasing Section, 800 Lincoln Way, Ames, Iowa 50010 before the deadline stated in the Procurement Timetable. **This is a mandatory requirement and will not be waived by the Iowa DOT**. Any Bid Response received after this deadline will be rejected and returned unopened to the contractor.

Contractors mailing Bid Responses must allow ample mail delivery time to ensure receipt by the Iowa DOT on or before the due date. Postmarking by the due date will not substitute for actual receipt of the Bid Response.

Electronic mail and faxed Bid Responses will not be accepted.

Contractors must furnish all information necessary to evaluate the Bid Response. Bid Responses that fail to meet the mandatory requirements of the RFB will be disqualified. Verbal information provided by the Contractor shall not be considered part of the Contractor's Bid Response.

2.8 Bid Response Opening

The Iowa DOT will open Bid Responses on the date and time stated in the Procurement Timetable. Bid Responses will remain confidential until a bid tabulation has been posted on the Iowa DOT's website for all bidders to view the results in the form of "Intent to Award". (See Iowa Code Section 72.3.)

The names of the Contractors who submit compliant Bid Responses within the time frame permitted will be available for public review after the contract has been awarded.

2.9 Costs of Preparing the Bid Response

The costs of preparation and delivery of a Bid Response are solely the responsibility of the Contractor.

No payments shall be made by the State to cover costs incurred by any Contractor in the preparation of or the submission of this RFB or any other associated costs.

2.10 Reasonable Accommodations

Upon request, the Iowa DOT will provide reasonable accommodations, including the provision of informational material in an alternative format, for individuals with disabilities. If accommodations are required at time of a bid opening, contact the Issuing Agent designated on the cover page.

2.11 Rejection of Bid Responses

The Iowa DOT reserves the right to reject any or all Bid Responses, in whole or in part, received in response to this RFB at any time prior to the execution of a written contract. Issuance of this RFB in no way constitutes a commitment by the Iowa DOT to award a contract. This RFB is designed to provide Contractors with the information necessary to prepare a competitive Bid Response. This RFB process is for the Iowa DOT benefit and is intended to provide the Iowa DOT with competitive information to assist in the selection of a Contractor to provide services.

It is not intended to be comprehensive and each Contractor is responsible for determining all factors necessary for submission of a comprehensive Bid Response.

The Iowa DOT reserves the right to negotiate the terms of the contract, including the award amount, with the awarded Contractor prior to entering into a contract. If contract negotiations cannot be concluded successfully, the Iowa DOT reserves the right to negotiate a contract with the next lowest Bidder.

2.12 Disqualification

The Iowa DOT may reject outright and shall not evaluate proposals for any one of the following reasons:

2.12.1 The Contractor states that a requirement of the RFB cannot be met.

2.12.2 The Contractor's Bid Response materially changes a requirement of the RFB or the Bid Response is not compliant with the requirements of the RFB.

2.12.3 The Contractor's response limits the rights of the Iowa DOT.

2.12.4 The Contractor fails to include a *Bid Bond*, also or bid security, *if required*. See Bid Response cover page and **Section 2.31.**

2.12.5 The Contractor fails to include any signature, certification, authorization, stipulation, disclosure or guarantee (if required).

2.12.6 The Contractor presents the information requested by this RFB in a format inconsistent with the instructions of the RFB or otherwise fails to comply with the requirements of this RFB.

2.12.7 The Contractor initiates unauthorized contact regarding the RFB with state employees.

2.12.8 The Contractor provides misleading or inaccurate responses.

2.12.9 The Contractor fails to attend the mandatory Contractors Conference or Pre-Bid meeting.

2.12.10 The Contractor's Bid Response is materially unbalanced.

2.12.11 There is insufficient evidence (including evidence submitted by the Contractor and evidence obtained by the Iowa DOT from other sources) to satisfy the Iowa DOT that the Contractor is a "Responsible Contractor".

2.12.12 The Contractor alters the Bid Proposal language in any way.

2.13 Nonmaterial and Material Variances

The Iowa DOT reserves the right to waive or permit cure of nonmaterial variances in the Bidder's Bid Response if, in the judgment of the Iowa DOT, it is in the Iowa DOT best interest to do so. Nonmaterial variances include minor informalities that do not affect responsiveness; that are merely a matter of form or format; that do not change the relative standing or otherwise prejudice other Contractors; that do not change the meaning or scope of the RFB; or that do not reflect a material change in the services. In the event the Iowa DOT waives or permits cure of nonmaterial variances, such waiver or cure will not modify the RFB requirements or excuse the Contractor from full compliance with RFB specifications or other contract requirements if the Contractor is awarded the contract. The determination of materiality is in the sole discretion of the Iowa DOT.

2.14 Reference Checks

The Iowa DOT reserves the right to contact any reference to assist in the evaluation of the Bid Response, to verify information contained in the Bid Response and to discuss the Contractor's qualifications and the qualifications of any subcontractor identified in the bidders Bid Response.

2.15 Information From Other Sources

The Iowa DOT reserves the right to obtain and consider information from other sources concerning a Contractor, such as the Contractor's capability and performance under other contracts, the qualifications of any subcontractor identified in the Contractor's Bid Response, specifically, the Contractor's financial stability, past or pending litigation, and publicly available information.

2.16 Verification of Bid Response Contents

The content of a Bid Response submitted by a Contractor is subject to verification. Misleading or inaccurate responses shall result in disqualification and rejection of the Bid Response.

2.17 Criminal History and Background Investigation

The Contractor hereby explicitly authorizes the Iowa DOT to conduct criminal history and/or other background investigation(s) of the Contractor, its officers, directors, shareholders, partners and managerial and supervisory personnel retained by the Contractor for the performance of the contract.

2.18 Bid Response Clarification Process The Iowa DOT reserves the right to contact a Contractor after the submission of Bid Response for the purpose of clarification to ensure mutual understanding.

This contact may include written questions, interviews, site visits, a review of past performance if the Contractor has provided goods or services to the Iowa DOT or any other political subdivision wherever located, or requests for corrective pages in the Contractor's Bid Response. The Iowa DOT will not consider information received if the information materially alters the content of this Bid Proposal or alters the type of goods and services the Contractor is offering to the Iowa DOT. An individual authorized to legally bind the Contractor shall sign responses to any request for clarification. Responses shall be submitted to the Iowa DOT within the time specified in the Iowa DOT request. Failure to comply with requests for additional information may result in rejection of the Bid Response as non-compliant.

2.19 Disposition of Bid Responses

At the conclusion of the selection process, the contents of all Bid Responses will be in the public domain and be open to inspection by interested parties except for information for which Contractor properly requests confidential treatment or is subject to exceptions provided in Iowa Code Chapter 22 or other applicable law.

2.20 Public Records and Requests for Confidential Treatment

The Iowa DOT may treat all information submitted by a Contractor as public information following the conclusion of the Intent to Award. Iowa DOT release of information is governed by Iowa Code chapter 22. Contractors are encouraged to familiarize themselves with chapter 22 before submitting a Bid Response. The Iowa DOT will copy and produce public records as required to comply with the public records laws.

2.21 Release of Claims

By submitting a Bid Response, the Contractor agrees that it will not bring any claim or cause of action against the Iowa DOT based on any misunderstanding concerning the information provided herein or concerning the Iowa DOT failure, negligent or otherwise, to provide the Contractor with pertinent information as intended by this RFB.

2.22 Award Notice and Acceptance Period

Notice of intent to award will be posted on the Iowa DOT's website at www.iowadot.gov/purchasing/bidaward. Final negotiation and execution of the contract(s) shall be completed no later than thirty (30) days from the date of the Notice of Intent to Award or such other time as designated by the Iowa DOT.

If the successful Contractor fails to negotiate and deliver an executed contract by that date, the Iowa DOT in its sole discretion may cancel the award and redirect the contract to the next lowest bidder meeting the specifications.

2.23 No Contract Rights until Execution

The full execution of a written contract shall constitute the making of a contract for services and no Contractor shall acquire any legal or equitable rights relative to the contract services until the contract has been fully executed by the successful Contractor and the Iowa DOT.

2.24 Restrictions on Gifts and Activities

Iowa Code Chapter 68B restricts gifts which may be given or received by state employees and requires certain individuals to disclose information concerning their activities with state government. Contractors are responsible to determine the applicability of this Chapter to their activities and to comply with the requirements. In addition, pursuant to Iowa Code section 722.1, it is a felony offense to bribe or attempt to bribe a public official.

The laws of Iowa provide that it is a felony to offer, promise, or give anything of value or benefit to a state employee with the intent to influence that employee's acts, opinion, judgment or exercise of discretion with respect to that employee's duties. Evidence of violations of this statute will be submitted to the proper prosecuting attorney.

2.25 No Minimum Guaranteed

The Iowa DOT anticipates that the selected Contractor will provide services as requested by the Iowa DOT. The Iowa DOT will not guarantee any minimum compensation will be paid to the Contractor or any minimum usage of the Contractor's services.

2.26 Conflicts Between Terms

The Iowa DOT reserves the right to accept or reject any exception taken by the Contractor to the terms and conditions contained in this RFB. Should the Contractor take exception to the terms and conditions required by the Iowa DOT, the Contractor's exceptions may be rejected and the entire proposal declared nonresponsive. The Iowa DOT may elect to negotiate with the Contractor regarding contract terms that do not materially alter the substantive requirements of the request for proposals or the contents of the Contractor's Bid Response.

2.27 News Releases

No news releases or other materials pertaining to this procurement, or any part of this proposal, will be made available to the media or the public, the Contractor's clients or potential clients without the prior written approval of the Iowa DOT.

2.28 Pre-Bid Conference

If the Procurement Timetable indicates a Contractor's Pre-Bid Conference will be held in conjunction with this RFB, it will be held at the date, time, and location listed on the Procurement Timetable immediately following the cover page. If Attendance at the Contractor's Pre-Bid Conference is a mandatory requirement to submit a Bid Response, it will be indicated on the Procurement Timetable. The purpose of the Pre-Bid conference is to discuss with prospective Contractors the work to be performed and allow prospective Contractors an opportunity to ask questions regarding the RFB. Verbal discussions at the Pre-Bid conference shall not be considered part of the RFB unless confirmed in writing by the Iowa DOT and incorporated into this RFB. The conference may be recorded. Questions asked at the conference that cannot be adequately answered during the conference may be deferred.

A copy of the questions and answers will be posted on the DOT website for viewing.

In an effort to seek competitive bids the DOT reserves the right to schedule a second pre-bid meeting in the event only one or no vendors are in attendance at the scheduled mandatory pre-bid. The Potential bidder in attendance at the scheduled pre-bid will not be required, but is welcome to attend the second pre-bid if they choose.

2.29 Contractors Responsibilities

2.29.1 Codes, Laws and Regulations

The laws of the State of Iowa in relation to and pertaining to public improvements shall apply to these projects. All construction, materials and methods shall comply with the State and Local Building Codes and with Local Ordinances, except where plans and specifications establish a higher standard.

2.29.2 Licenses, Permits and Inspections

The Bidders shall comply with all codes, laws, ordinances, rules and regulations of any public authority having jurisdiction that bears on the performance of its work. Bidders shall pay for all licenses, permits and inspection fees required for its work. Bidders must furnish copies of all approved inspection certificates and approvals from authorities having jurisdiction in a timely fashion upon completion of the work.

2.30 Consideration of Bids

2.30.1 Rejection of Bids

The Iowa DOT reserves the right to reject any bid if the evidence submitted by, or investigation of, such bidder fails to satisfy the Iowa DOT that such bidder is properly qualified to carry out the obligations of the Contract and to complete the work contemplated therein.
Conditional bids will not be accepted.

2.30.2 Qualification of Bidder

The Iowa DOT may make such investigations as they deem necessary to determine the ability of the Bidder to perform the required work, and the bidder shall furnish to the Iowa DOT all such information and data for this purpose as the Iowa DOT may request.

2.31 Bonds (If required)

2.31.1 Bid Bond

Bid Bond's must be submitted on **Iowa DOT Form No. 131084 (Appendix A) or the bid will be rejected.**

The Bid Bond from the qualified responsive Bidder
will be retained until an executed contract is in place and the required bonds and Insurance Certificates are in the possession of the Iowa DOT after which the bid security will promptly be returned.

2.31.2 Performance and Payment Bond (if required)

The Solicitation Response page will indicate the <u>fixed percent of the bid security required based on the amount of the Bidder's bid.</u> *See also Standard Terms and Conditions Section A-3.*

It is the responsibility of the Contractor to notify the surety company of the required amount of the performance bond. The performance bond is based on the percentage of the contractors total bid response.

If the contracted amount is $25,000 or more, the successful Bidder shall furnish a performance bond covering the faithful performance of 100% of the Contract and the payment of all obligations arising thereunder.

One copy of the bond shall be submitted on Iowa Department of Transportation **Form 131070**. All items must be properly filled in, including Bidder's signature.

A Resident Commission Agent or attorney-in-fact must file a copy of the power of attorney.

2.31.3 Power of Attorney

Attorney-in-fact who signs the Bid Bond and/or Performance Bond must file with each bond a certified and effectively dated copy of the Power of Attorney.

2.32 Labor Regulations

All Bidders, before entering into a contract with the Department, must be registered with the Division of Labor in the Iowa Department of Workforce Development (515-281-3606) according to chapter 91C, Code of Iowa 2015. This pertains to contractor's who engage in the business of construction.

2.33 Fabricated or Custom Built Materials Lead time

2.33.1 All Bidders shall provide a lead time on any fabricated or custom built product or products that will impact the project timeline. Lead times are to be listed for each fabricated product, including estimated product delivery on the Schedule of Prices.

If no critical fabricated or custom built products are needed for the project, bidders shall simply indicated "Not applicable or N/A in the Schedule of Prices. This indicated no known additional time for readily available materials and products needed for the project.

Section 3 General Requirements

3.1 Scope of Work

Successful Bidder shall be required to provide all materials, labor, and equipment Necessary for the remodeling of the existing area at the Ames Department of Transportation Driver's License Station to include demolition and removal off site as per plans and specifications for the remodeling of restrooms, construction of office spaces, and a break room as per plans and specifications.

1 year construction warranty

Warranty on all equipment installed.

Additional mandatory specifications are included after section 4.7

Hours of work are 7:30a.m.-3:00p.m.M-F Unless scheduled differently with the project manager.

The City of Ames permit is required fees are to be paid by Owner

3.2 Adoption of General Conditions

3.2.1 The General Requirements of this Contract shall include the "General Conditions", "Plans and Specifications" and any and all requirements of this RFB, as herein stated.

3.2.2 "THE GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION", A.I.A. FORM #A-201, LATEST EDITION AND A.I.A. DOCUMENT, "INSTRUCTIONS TO BIDDERS", FORM #A-701, LATEST EDITION, SHALL BE INCLUDED, AS MODIFIED IN THE "SUPPLEMENTARY INSTRUCTIONS TO BIDDERS" AND "SUPPLEMENTARY GENERAL CONDITIONS", AND BOUND WITH THE STANDARD FORM OF AGREEMENT BETWEEN THE CONTRACTOR AND OWNER", A.I.A. FORM #101, CHANGES IN WORK A.I.A. FORM # G701, PAY APPLICATION A.I.A. FORM # G702 & G703. LATEST EDITION, AS A PART OF THIS CONTRACT SPECIFICATION.

3.2.3 All bidder information and conditions, bid check lists and similar documents included in the specifications issued by the Iowa DOT, Ames, Iowa are hereby made a part of the General Conditions.

3.3 Contractor Response

3.3.1 Guidelines

- Contractors shall comply with Iowa Occupational Safety and Health Standards as found in 29 CFR Parts 1910 and 1926. Of particular importance are those standards referring to the use of personal protective equipment (PPE), fall protection and ventilation.
- Contractor may be required to make available to the Iowa DOT all Safety Data Sheets (SDS) for all products provided at time the apparent low bidder has been determined. SDS shall be sent to the Issuing Agent (when applicable) prior to issuance of the contract.

3.3.2 Guarantee

The Contractor shall guarantee all work executed under this contract, both as the workmanship and materials, for a period of twelve (12) months after the substantial completion date. Neither the final payment nor any provision of the contract documents shall relieve the Contractor of responsibility for faulty materials or workmanship. The Contractor shall remedy any defect thereto and pay for any damage to other work resulting therefrom, which shall appear within a period of one (1) year from the date of the final acceptance. With one month remaining in the guarantee period, the Contractor shall notify the Iowa DOT and set up a complete walk-through inspection.

- All materials, items of equipment, and workmanship furnished under this division of the specifications shall carry the standard warranty against all defects in material and workmanship. Any fault due to defective or improper material, equipment, or workmanship which may develop, shall be made good, forthwith.
- The Guarantee shall include, but not be limited to the following elements and services:
    a. Repair or replace defective materials, equipment, workmanship and installation that develops within the guarantee period, promptly and to Iowa DOT's satisfaction and correct damage caused in making necessary repairs and replacements, including all other damage done to areas, materials, and other systems resulting from the failure or defect, under guarantee by and at the expense of the Contractor.
    b. Replace material or equipment that requires excessive service during guarantee period, as defined and as directed by the Iowa DOT.
    c. Make all service calls, replacements, repairs and adjustments during the guarantee period without cost to the Iowa DOT.

3.3.3 Use of Premises

- All Contractors shall confine all apparatus, storage of materials and construction to areas as directed by the Iowa DOT and shall not encumber the premises with materials.
- Notwithstanding any approvals or instructions which must be obtained by the Contractors from the Iowa DOT in connection with use of premises, the responsibility for the safe working conditions at the site shall remain that of the Contractors.

3.3.4 Verifying Work of Other Contractors

- When a Contractor's work depends on proper execution of work by other contractors, such Contractor shall promptly report to the Iowa DOT project lead any defects in such work and/or discrepancies between executed work plans, drawings or specifications.
- Contractors shall employ such methods and means in carrying out work as will not cause interruption or interference with any other Contractor. General Contractors shall give other Contractors sufficient notice to permit installation of sleeves, piping, conduit, and other items, prior to placing concrete or laying masonry. Any Contractor failing to comply with above shall be responsible for expense caused by such failure.

3.4 Sub-Contractors

- Specific attention shall be given by the Contractor to Article 5 of the A.I.A. Document A-201, "The General Conditions of the Contract for Construction".
- The Successful Bidder for the project shall furnish the Iowa DOT with a complete list of subcontractors, schedule of values, and major material suppliers at the pre-construction meeting.

- The Iowa DOT shall approve and maintain the list of subcontractors and major suppliers and issue a general approval of same after official award of the contract, subject to the specific requirements of the Plans, Specifications and the "General Conditions of the Contract, and of these supplementary Conditions," " Special Provisions," and elsewhere with contract documents, as applicable. Deviations from the list of subcontractors and material suppliers shall be made only with the specific approval of, or at the request of the Iowa DOT.

3.5 Protection of Persons and Property

3.5.1 Safety and Health Regulations

The Contractor, serving in the role of the employer for the project, shall exercise at all times the protection of all persons and property. Contractor shall comply with all requirements of the Occupational Safety and Health Act of 1970, Iowa Bureau of Labor and all applicable state and municipal laws, as well as building and construction codes. It is the Contractor's responsibility to enforce all regulations that apply to these projects.

3.5.2 Protection of Site

The Contractor shall furnish all permanent and temporary guards, signs, fencing, shoring, and underpinning and other protection necessary in the performance of the contract and for the necessary protection of all public and private property and shall be responsible for any damage caused by failure to comply with this requirement.

- After building operations are completed, the Contractor shall replace or satisfactorily repair all damaged walks or pavements which shall have become damaged due to operations of these projects.
- The Contractor shall take care of all underground pipes, conduits, etc., encountered in the excavations, and protect same from damage until such time as they can be permanently disposed of.
- The Contractor shall continuously maintain adequate protection of all work from damage and shall protect the Owner's property and adjacent property from damage arising in connection with this contract.

3.6 Miscellaneous Provisions

3.6.1 Iowa State Building Code

- All construction under this section shall conform to the requirements of the Iowa State Building Code. The provisions of the Iowa State Building Code will be strictly adhered to, and will take precedence over any local Governmental Body Regulations. Work not regulated by the Iowa State Building Code shall be performed in accordance with local Governmental Body Regulations.

3.6.2 Discriminatory Practices

- All Contractors or subcontractors working under the terms of these projects are prohibited from engaging in discriminatory employment practices as forbidden by the Iowa Civil Rights Act of 1965. These provisions shall be fully enforced, as directed through Executive Order Number 34 dated July 22, 1988. Any breach of the provisions contained in the Iowa Civil Rights Acts of 1965 shall be regarded as a material breach of contract.

- Bidder agrees that if awarded a contract to construct and/or remodel any portion of the project described in these Specifications, neither the Contractor nor any subcontractors will engage in any discriminatory employment practices based on race, color, creed, religion of natural origin and that they will in all contracts comply with all statutes of the State of Iowa against discrimination. Failure to do so could be deemed a material breach of contract.

3.7.1 Pre- bid / Site Visit

[X] This is a mandatory meeting for all General Contractors interested in participating in this solicitation opportunity. Attendance is required

Pre-bid Date: 12/7/2016 Time: 10:00a.m. Location: 3708 Lincoln Way Ames IA 50010

- No considerations or revision in the contract price or scope of the project will be considered by the Iowa DOT for any item which could have been revealed by a thorough on-site inspection and examination or pre- bid meeting.

3.7.2 Conditions of Work

Bidders must inform themselves fully of the conditions relating to the construction of the project and the employment of labor thereon. Failure to do so will not relieve successful bidders of their obligation to furnish all material and labor necessary to carry out the provisions of this contract. Insofar as possible, the Contractor, in carrying out the work, must employ such methods or means as will not cause any interruption of, or interference with the work of any other Contractor.

3.7.3 Obligation

At the time of the bid opening, each bidder will be presumed to have read and become thoroughly familiar with the drawings, specifications, and other contract documents, including all addenda.

Bidders are responsible for the proper submission of bids. Omissions by a bidder to examine a form, instrument, or document shall in no way relieve that bidder from any obligations in respect to their bid.

3.8 Bid Proposal Documents

3.8.1 Plans and Specifications

Electronic Plans and specifications are available on the Iowa DOT's website, www.iowadot.gov/purchasing. The Bidder is responsible for all copies of plans and specifications necessary for the execution of the work.

In the event of a conflict between the specifications and the drawings, the specifications shall take precedence.

Alternates or Exceptions

3.8.2 Alternates or exceptions must be evaluated prior to the letting date listed in this proposal.

3.8.2.1 Substitutions will be review until 7 days before bid date..

Section 4 Contract Terms & Conditions

4.1 Contract Award

Award will be based on the total lump sum amount of bid price shown on the Schedule of Prices. The DOT will award to the lowest, most responsive, responsible bidder. The Iowa DOT reserves the right to accept the bid(s) which best serves the interest of the State.

Bid price will include all requirements listed in Section 3 to complete this proposed project. The Prime Contractor shall be responsible for taking all sub-bids and for all coordination between trades.

A "Prime" contract shall be awarded for each project for all work shown on the Drawings and described in the Specifications including Site work, General construction, Demolition, Plumbing, Mechanical, Energy management and control and Electrical work. The Prime Contractor shall be responsible for taking all sub-bids and for all coordination between trades.

Protests of award recommendations shall be made in accordance with Paragraph 761--20.4(6)"e", Iowa Administrative Code.

4.2 Contract Period

See Bid Proposal timeline for dates. The date of completion shall be stated in calendar days on the Bidder's Bid Response, and if necessary, adjusted by mutual agreement between the Iowa DOT and successful bidder prior to executing the contract documents.

The Iowa DOT realizes that deliveries and site conditions have a definite bearing on the completion date. The Iowa DOT will demand diligence in the prosecution of the work, but with good cause and satisfactory past performance by the Contractor, the Iowa DOT may revise the completion date to another mutually-acceptable date, when requested in writing and in good faith by the Contractor.

4.3 Liquidated Damages

Time is an essential component of the contract, and it is important that the work be to completed on the or before the dates listed on the Procurement Timetable.
For each calendar day that any work shall remain uncompleted beyond the substantial completion date and beyond the final completion date or any extension granted under Extension of Contract Period, the amount per calendar day specified in the Bid Response cover page will be assessed, not as a penalty but as predetermined and agreed upon liquidated damages.

If work remains uncompleted on more than one portion for which calendar days and liquidated damages have been specified, the liquidated damages assessed will be the total of the damages per day listed for each uncompleted portion. The Iowa DOT shall prepare and forward to the Contractor an invoice or credit change order for such liquidated damages. The final payment shall be withheld until payment of the invoice has been made or the credit change order has been agreed upon.

Assessment of liquidated damages will be based only on the number of calendar days required to complete the contract beyond the contract completion date, plus authorized extensions.

The provision for the assessment of liquidated damages for failure to complete work within the contract period does not constitute a waiver of the Iowa DOT's right to collect any additional damages other than time delays, which the Iowa DOT may sustain by the failure of the Contractor to carry out the terms of the contract.

4.4 Immunity of Iowa Department of Transportation

The Contractor shall defend, indemnify and hold harmless the Iowa DOT and its officials and employees from liability arising out of or resulting from the Contractor's activities at the designated work site, its performance or attempted performance of the contract, as well as the Contractor's activities with Sub-Contractors and all other third parties.

4.5 Payments and Completion of Contract

4.5.1 Payments on contract will be made monthly by means of state warrants to the extent of ninety-five percent (95%) of the value of work performed, including acceptable material stored at the building site, as determined by the Contractor as governed by the Iowa DOT.

4.5.2 At the Pre-Construction Conference, the contractor shall submit a schedule of values of the various parts of the work, aggregating the total sum of the contract, made out in such form as the Iowa DOT may direct and, if required, supported by evidence as to its correctness. This schedule, when approved by the Iowa DOT, shall be used as a basis for requests for payment.

4.5.3 Final payment shall be authorized not later than thirty (30) days following the completion and final acceptance of the contract, provided that the provisions herein and all other contract requirements have been fulfilled, accepted and approved, where no claims have been filed or following adjudication or release of claims as provided in Chapter 573 of the Code of Iowa.

4.5.4 No notification of payment being processed, no payment made to the Contractor, no partial payment, nor shall the entire use or occupancy of the work by the Iowa DOT be held to constitute an acceptance, in whole or in part, by the Iowa DOT prior to making the final payment and acceptance in full completion of the contract.

4.6 Contractor(s) Insurance Requirements

The resulting Contract will require the successful Contractor to maintain insurance coverage(s) of the type and in the amounts set forth below.

• It shall be the Contractor's responsibility to have liability insurance covering all of the project operations incident to contract completion and the Contractor(s) must have on file with the Contracting Authority a current "Certificate of Insurance" prior to award of contract. The certificate shall identify the insurance company firm name and address, contractor firm name, policy period, type of policy, limits of coverage, and scope of work covered (single contract or statewide). This requirement shall apply with equal force, whether the work is performed by persons employed directly by the

Contractor(s) including a subcontractor, persons employed by a subcontractor(s), or by an independent contractor(s).

• In addition to the above, the Contracting Authority shall be included as an insured party, or a separate owner's protective policy shall be filed showing the Contracting Authority as an insured party.

• The liability insurance shall be written by an insurance company (or companies) qualified to do business in Iowa. For independent contractors engaged solely in the transportation of materials, the minimum coverage provided by such insurance shall be not less than that required by Chapter 325A, Code of Iowa, for such truck operators or contract carriers as defined therein. For all other contractors, subcontractors, independent contractors, and the Contracting Authority, the minimum coverage by such insurance shall be as follows:

• Commercial General Liability including Contractual Liability;
• Contingent Liability;
• Damage; Occurrence Basis Bodily Injury: Broad Form Personal Injury; Broad Form Property Damage.

Bodily Injury

The contractor will purchase and maintain throughout the term of this contract the following minimum limits and coverage:

• Each person	$750,000
• Each accident/occurrence	$750,000
• Workers Compensation	$750,000
• Statutory Limits	$750,000
• Employer's liability	$750,000
• Occupation Disease	$750,000

Operations

• Property Damage	$250,000 each occurrence

The Contractor(s) shall require all subcontractor(s) meet the above insurance requirements.

The Certificate of Insurance must include the following;

- Iowa Department of Transportation must be listed as an additional insured
- Proposal Number
- Proposal Description
- Letting Date and Contract Period

- For independent contractors engaged solely in the transportation of materials, the minimum insurance coverage provided shall be not less than that required by Chapter 325A, Code of Iowa, for such truck operators or contract carriers as defined therein.

Builders Risk Insurance *(if applicable)*

- Each Contractor holding a valid contract with the Iowa DOT shall furnish and pay for builder's risk insurance, providing coverage for at least the following losses: fire, extended coverage, vandalism and malicious damage to materials incorporated in the project, and materials purchased to be incorporated in the project, either stored on or off the permanent job site. If this insurance coverage is not provided, the Contractor shall assume all responsibility for the perils outlined above which may occur prior to project completion and acceptance.

- Failure on the part of the Contractor(s) to comply with the requirements of this Article will be considered sufficient cause to suspend the work, withhold estimates, and to deny the Contractor(s) any further contract awards, as provided in Article 1103.01.
- The Contractor(s) shall require all subcontractor(s) meet the above insurance requirements.

4.7 Public Contract Termination

The provisions of Iowa law as contained in Chapter 573A of the Code of Iowa, an Act to provide for termination of contracts for the construction of public improvements when construction or work thereon is stopped because of national emergency, shall apply to and be a part of this Contract, and shall be binding upon all parties hereto, including sub-contractors and sureties upon any bond given or filed in connection herewith.

SECTION 00 0101
PROJECT TITLE PAGE

PROJECT MANUAL
FOR
AMES DL REMODEL
OWNER'S PROJECT NUMBER: BG-3A35(004)--80-85
IOWA DEPARTMENT OF TRANSPORTATION
3708 LINCOLN WAY
AMES , IOWA 50014
DATE: OCTOBER 2016

END OF SECTION

SECTION 00 0110

TABLE OF CONTENTS

PROCUREMENT AND CONTRACTING REQUIREMENTS

1.01 DIVISION 00 -- PROCUREMENT AND CONTRACTING REQUIREMENTS

A. 00 0101 - Project Title Page

B. 00 0110 - Table of Contents

C. 00 0115 - List of Drawing Sheets

SPECIFICATIONS

2.01 DIVISION 01 -- GENERAL REQUIREMENTS

A. 01 1000 - Summary

B. 01 2000 - Price and Payment Procedures

C. 01 3000 - Administrative Requirements

D. 01 3216 - Construction Progress Schedule

E. 01 4000 - Quality Requirements

F. 01 5000 - Temporary Facilities and Controls

G. 01 6000 - Product Requirements

H. 01 7000 - Execution and Closeout Requirements

I. 01 7800 - Closeout Submittals

2.02 DIVISION 02 -- EXISTING CONDITIONS

A. 02 4100 - Demolition

2.03 DIVISION 03 -- CONCRETE

A. 03 3000 - Cast-in-Place Concrete

2.04 DIVISION 04 -- MASONRY (NOT USED)

2.05 DIVISION 05 -- METALS (NOT USED)

2.06 DIVISION 06 -- WOOD, PLASTICS, AND COMPOSITES

A. 06 1000 - Rough Carpentry

B. 06 4100 - Architectural Wood Casework

2.07 DIVISION 07 -- THERMAL AND MOISTURE PROTECTION

A. 07 2100 - Thermal Insulation

B. 07 2500 - Weather Barriers

C. 07 9005 - Joint Sealers

2.08 DIVISION 08 -- OPENINGS

A. 08 1113 - Hollow Metal Doors and Frames

B. 08 4313 - Aluminum-Framed Storefronts

C. 08 5113 - Aluminum Windows

D. 08 7100 - Door Hardware

E. 08 8000 - Glazing

2.09 DIVISION 09 -- FINISHES

A. 09 2116 - Gypsum Board Assemblies

B. 09 2216 - Non-Structural Metal Framing

C. 09 5100 - Acoustical Ceilings

D. 09 6500 - Resilient Flooring
E. 09 6813 - Tile Carpeting
F. 09 9000 - Painting and Coating

2.10 DIVISION 10 -- SPECIALTIES

A. 10 2113.19 - Plastic Toilet Compartments
B. 10 2800 - Toilet, Bath, and Laundry Accessories

2.11 DIVISION 11 -- EQUIPMENT (NOT USED)

2.12 DIVISION 12 -- FURNISHINGS (NOT USED)

A. 12 2400 - Window Shades

2.13 DIVISION 13 -- SPECIAL CONSTRUCTION (NOT USED)

2.14 DIVISION 14 -- CONVEYING EQUIPMENT (NOT USED)

2.15 DIVISION 21 -- FIRE SUPPRESSION (NOT USED)

2.16 DIVISION 22 -- PLUMBING

2.17 DIVISION 23 -- HEATING, VENTILATING, AND AIR-CONDITIONING (HVAC)

2.18 DIVISION 26 -- ELECTRICAL

2.19 DIVISION 27 -- COMMUNICATIONS (NOT USED)

2.20 DIVISION 28 -- ELECTRONIC SAFETY AND SECURITY (NOT USED)

2.21 DIVISION 31 -- EARTHWORK (NOT USED)

2.22 DIVISION 32 -- EXTERIOR IMPROVEMENTS (NOT USED)

2.23 DIVISION 33 -- UTILITIES (NOT USED)

END OF SECTION

SECTION 00 0115

LIST OF DRAWING SHEETS

ARCHITECTURAL DRAWINGS:

- **A0 - GENERAL NOTES, ABBREVIATIONS, AND LEGENDS**
- **A-1 - DEMOLITION PLANS**
- **A-2 - FLOOR & ENLARGED PLANS**
- **A-3 - CEILING PLAN & ELEVATIONS**
- **FP101 - FIRST FLOOR FIRE PROTECTION PLAN**
- **P101 - PLUMBING PLANS**
- **M101 - MECHANICAL PLANS**
- **M600 - MECHANICAL AND PLUMBING SCHEDULES AND DETAILS**
- **E000 - ELECTRICAL GENERAL INFORMATION**
- **E101 - FIRST FLOOR LIGHTING PLAN**

END OF LIST OF DRAWINGS

SECTION 01 0163
PRE-BID SUBSTITUTIONS

PART 1 GENERAL

1.01 DOCUMENT INCLUDES

A. Pre-Bid Substitutions

B. Sample Form: Request For Substitution
   1. Contractor shall make copies as needed.
   2. Use one form for each Specified Item.

1.02 BIDDER'S OPTIONS

A. For products specified by reference standard only, select product meeting that standard, by any manufacturer.

B. For products specified by naming several products or manufacturers, select one of the products and manufacturers named which complies with the technical Specifications. No substitutions will be allowed.

C. For products specified by naming several products or manufacturers and stating “or equivalent”, or “equal”, or “Architect approved equivalent”, or similar wording, submit a Request For Substitution for any product or manufacturer which is not specifically named. Architect and/or Engineer will review and consider for approval. If not approved prior to bidding, product is not allowed for use in the project.

D. For products specified by naming only one product/manufacturer, there is no option and no substitution will be allowed.

1.03 SUBSTITUTIONS

A. Prepare Base Bid in accordance with requirements of the Bidding Documents.
   1. Substitutions for products may be made during the bidding period by submitting completed Request For Substitution form and providing substantiating product information. Request For Substitution form must be received by the Office of Purchasing a minimum of seven (7) calendar days prior to the Bid Date.
   2. The Iowa DOT will consider substitution requests for approval provided they meet the submittal requirements and product information is complete and accurate.
   3. The Office of Purchasing will notify Bidders of approved product substitutions in an addendum.

B. Submit separate request for each item. Provide the following with each request:
   1. Complete data substantiating compliance of proposed substitution with requirements stated in Bidding Documents:
      a. Product identification, including manufacturers name and address.
      b. Manufacturer's literature, identifying:
         1) Product description and model number.
         2) Reference standards.
         3) Performance and test data.
         4) Samples, as applicable.
      c. Name and address of projects on which product has been used and date of each installation.
   2. Itemized comparison of the proposed substitution with product specified, listing significant variations.
   3. Advise of any change in construction schedule resulting from use of proposed substitution.
   4. All effects of substitution on separate contracts.
   5. List of changes required in other work or products.
   6. Designation of responsibility for cost of required license fees or royalties.
      a. Description of availability of maintenance services and sources of replacement materials and parts.

C. Substitutions will not be considered for acceptance when:
   1. Acceptance will require substantial revision of Contract Documents.
   2. In the judgment of the Iowa DOT, the submittal does not include adequate information for a comprehensive evaluation.

1.04 BIDDER'S REPRESENTATION

A. In making formal request for substitution the bidder represents that:
   1. The bidder has investigated proposed product and has determined that it is equivalent to or superior in all respects to that specified.
   2. The bidder will provide the same warranties or bonds for substitution as for the product specified.
   3. The bidder will coordinate installation of the accepted substitution into the Work, and will make such changes as may be required for the Work to be completed in all respects.
   4. The bidder waives claims for additional costs caused by substitution which may subsequently become apparent.

1.05 ARCHITECT'S ACTION

A. Review requests for substitution. Substitution requests that are either approved or not approved will not be returned to person submitting request.

B. Issue an addendum to identify accepted substitutions.

C. Only those substitutions noted as approved in an addendum may be included in the Bid.

1.06 SUBSTITUTION REQUEST FORM

A. See Request for Substitution form at the end of this RFP.

B. Substitutions will be considered only when the Request for Substitution form is completed and submitted with product information requested.

END OF SECTION

SECTION 01 1000
SUMMARY

PART 1 GENERAL

1.01 PROJECT

A. Project Name: Ames DL Remodel

B. Owner's Name: Iowa Department of Transportation.

C. The Project consists of the demolition and construction of restrooms, office spaces, and a break room.

1.02 CONTRACT DESCRIPTION

A. Contract Type: A single prime contract based on a Stipulated Price.

1.03 DESCRIPTION OF ALTERATIONS WORK

A. Scope of demolition and removal work is shown on drawings and specified in Section 02 4100.

B. Scope of alterations work is shown on drawings.

C. Plumbing: Alter existing and add new construction.

D. HVAC: Alter existing system and add new construction, keeping existing in operation.

E. Electrical Power and Lighting: Alter existing system and add new construction, keeping existing in operation.

F. Fire Alarm: Alter existing system and add new construction, keeping existing in operation.

1.04 OWNER OCCUPANCY

A. Owner intends to continue to occupy adjacent portions of the existing building during the entire construction period.

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

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

C. Time Restrictions:
   1. work in room 101 will be limited to Saturdays after 1:00, Sundays, or Mondays.

D. 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.

1.06 WORK SEQUENCE

A. Construct Work in phases during the construction period:
   1. Phase 1: demolition of conference room and restrooms, construction of offices, break room, and restrooms shown on plans.
   2. Phase 2: demolition of offices and construction of vestibule shown on plans.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 2000
PRICE AND PAYMENT PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Procedures for preparation and submittal of applications for progress payments.

B. Documentation of changes in Contract Price and Contract Time.

C. Change procedures.

D. Correlation of Contractor submittals based on changes.

E. Procedures for preparation and submittal of application for final payment.

1.02 SCHEDULE OF VALUES

A. Form to be used: AIA G703.

B. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit draft to Architect for approval.

C. Forms filled out by hand will not be accepted.

D. Submit Schedule of Values in duplicate within 5 days after date of Owner-Contractor Agreement.

E. Format: Utilize the Table of Contents of this Project Manual. Identify each line item with number and title of the specification Section. Identify site mobilization, bonds and insurance, and General Requirements as separate line items.

F. Include separately from each line item, a direct proportional amount of Contractor's overhead and profit.

G. Revise schedule to list approved Change Orders, with each Application For Payment.

1.03 APPLICATIONS FOR PROGRESS PAYMENTS

A. Payment Period: Submit at intervals stipulated in the Agreement.

B. Form to be used: AIA G702 and G703.

C. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Architect for approval.

D. Forms filled out by hand will not be accepted.

E. For each item, provide a column for listing each of the following:
   1. Item Number.
   2. Description of work.
   3. Scheduled Values.
   4. Previous Applications.
   5. Work in Place and Stored Materials under this Application.
   6. Authorized Change Orders.
   7. Total Completed and Stored to Date of Application.
   8. Percentage of Completion.
   9. Balance to Finish.
   10. Retainage.

F. Execute certification by signature of authorized officer.

G. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed and for stored products.

H. Submit three copies of each Application for Payment.

I. Include the following with the application:
   1. Construction progress schedule, revised and current as specified in Section 01 3000.

J. When Architect requires substantiating information, submit data justifying dollar amounts in question. Provide one copy of data with cover letter for each copy of submittal. Show application number and date, and line item by number and description.

1.04 MODIFICATION PROCEDURES

A. For minor changes not involving an adjustment to the Contract Price or Contract Time, Architect will issue instructions directly to Contractor.

B. For other required changes, Architect will issue a document signed by Owner instructing Contractor to proceed with the change, for subsequent inclusion in a Change Order.
   1. The document will describe the required changes and will designate method of determining any change in Contract Price or Contract Time.
   2. Promptly execute the change.
   3. Contractor will not being work priot to signature and approval of change order by architect, Iowa Department of Transportation, and contractor. If work is done prior to approval by all parties, the contractor will not receive remuneration and may be required to change the project back per original plans at the behest of the architect.

C. For changes for which advance pricing is desired, Architect will issue a document that includes a detailed description of a proposed change with supplementary or revised drawings and specifications, a change in Contract Time for executing the change with a stipulation of any overtime work required and the period of time during which the requested price will be considered valid. Contractor shall prepare and submit a fixed price quotation within 14 days.

D. Contractor may propose a change by submitting a request for change to Architect, describing the proposed change and its full effect on the Work, with a statement describing the reason for the change, and the effect on the Contract Price and Contract Time with full documentation and a statement describing the effect on Work by separate or other contractors. Document any requested substitutions in accordance with Section 01 6000.

E. Computation of Change in Contract Amount: As specified in the Agreement and Conditions of the Contract.
   1. For change requested by Contractor, the amount will be based on the Contractor's request for a Change Order as approved by Architect.
   2. For change ordered by Architect without a quotation from Contractor, the amount will be determined by Architect based on the Contractor's substantiation of costs as specified for Time and Material work.

F. Substantiation of Costs: Provide full information required for evaluation.
   1. On request, provide the following data:
      a. Overhead and profit.
         1) Profit and overhead not to exceed 15 percent total between general contractor and sub contractor.
   2. For Time and Material work, submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract.

G. Execution of Change Orders: Architect will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.

H. After execution of Change Order, promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Price.

I. Promptly revise progress schedules to reflect any change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.

1.05 APPLICATION FOR FINAL PAYMENT

A. Prepare Application for Final Payment as specified for progress payments, identifying total adjusted Contract Price, previous payments, and sum remaining due.

B. Application for Final Payment will not be considered until the following have been accomplished:
   1. All closeout procedures specified in Section 01 7000.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 3000
ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Preconstruction meeting.

B. Progress meetings.

C. Construction progress schedule.

D. Coordination drawings.

E. Submittals for review and for information.

F. Number of copies of submittals.

G. Submittal procedures.

1.02 RELATED REQUIREMENTS

A. Section 01 7000 - Execution and Closeout Requirements: Additional coordination requirements.

B. Section 01 7800 - Closeout Submittals: Project record documents, construction progress schedules, closeout submittals.

1.03 PROJECT COORDINATION

A. Project Coordinator: Project Manager.

B. Cooperate with the Project Coordinator in allocation of mobilization areas of site; for field offices and sheds, for vehicular access, traffic, and parking facilities.

C. During construction, coordinate use of site and facilities through the Project Coordinator.

D. 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.

E. Comply with instructions of the Project Coordinator for use of temporary utilities and construction facilities.

F. Coordinate field engineering and layout work under instructions of the Project Coordinator.

G. Make the following types of submittals to Architect through the Project Coordinator:
   1. Requests for interpretation.
   2. Requests for substitution.
   3. Shop drawings, product data, and samples.
   4. Test and inspection reports.
   5. Design data.
   6. Manufacturer's instructions and field reports.
   7. Applications for payment and change order requests.
   8. Progress schedules.
   9. Coordination drawings.
   10. Correction Punch List and Final Correction Punch List for Substantial Completion.
   11. Closeout submittals.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRECONSTRUCTION MEETING

A. Owner will schedule a meeting after contract is signed by both parties.

B. Attendance Required:
   1. Owner.
   2. Architect/Engineer.
   3. General Contractor.

4. All major Sub-Contractors.

C. Agenda:
1. Review Owner-Contractor Agreement and contract conditions.
2. Submission of executed bonds and insurance certificates.
3. Distribution of Contract Documents.
4. Review list of Subcontractors, list of Products, schedule of values, and progress schedule.
5. Designation of personnel representing the parties to Contract, Owner and Architect.
6. Designation of personnel representing the parties to Contract, Owner and Architect/Engineer.
7. Review procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
8. Coordinate commencement of construction.
9. Use of premises by Owner and Contractor.
10. Construction facilities and controls provided by Owner.
11. Temporary utilities provided by Contractor.
12. Security and housekeeping procedures.
13. Procedures for testing.
14. Procedures for maintaining record documents.
15. Requirements for start-up of equipment.
16. Inspection and acceptance of equipment put into service during construction period.
17. Scheduling.

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.

3.02 PROGRESS MEETINGS

A. General Contractor will make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.

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

C. 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. Review of off-site fabrication and delivery schedules.
7. Maintenance of progress schedule.
8. Corrective measures to regain projected schedules.
9. Planned progress during succeeding work period.
10. Coordination of projected progress.
11. Status of Proposal Requests, Change Orders, Architect's Supplemental Instructions and Requests For Information. Maintenance of quality and work standards.
12. Effect of proposed changes on progress schedule and coordination.
13. Other business relating to Work.

D. General Contractor will record minutes and distribute copies to participants and those affected by decisions made within (5) five days of progress meeting. The distribution will be made electronically unless requested otherwise.

3.03 CONSTRUCTION PROGRESS SCHEDULE

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

B. Within 10 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.

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

D. Submit updated schedule with each Application for Payment.

3.04 COORDINATION DRAWINGS

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

B. Review drawings prior to submission to Architect.

3.05 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.

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.

3.06 SUBMITTALS FOR INFORMATION

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.

3.07 NUMBER OF COPIES OF SUBMITTALS

A. Electronic 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. Samples: Submit the number specified in individual specification sections; one of which will be retained by Architect.
   1. After review, produce duplicates.
   2. Retained samples will not be returned to Contractor unless specifically so stated.

3.08 SUBMITTAL PROCEDURES

A. Shop Drawing Procedures:
   1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting the Contract Documents and coordinating related Work.
   2. Generic, non-project specific information submitted as shop drawings do not meet the requirements for shop drawings.

B. Transmit each submittal with a copy of approved submittal form.

C. Sequentially number the transmittal form. Revise submittals with original number and a sequential alphabetic suffix.

D. Identify Project, Contractor, Subcontractor or supplier; pertinent drawing and detail number, and specification section number, as appropriate on each copy.

E. 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.

F. Deliver submittals to Owner in electronic format only.
   1. Only physical samples to be submitted to Owner's address.

G. Schedule submittals to expedite the Project, and coordinate submission of related items.

H. For each submittal for review, allow 15 days excluding delivery time to and from the Contractor.

I. Identify variations from Contract Documents and Product or system limitations that may be detrimental to successful performance of the completed Work.

J. Provide space for Contractor and Architect review stamps.

K. When revised for resubmission, identify all changes made since previous submission.

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

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

END OF SECTION

SECTION 01 3216
CONSTRUCTION PROGRESS SCHEDULE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Preliminary schedule.

B. Construction progress schedule, with network analysis diagrams and reports.

1.02 RELATED SECTIONS

A. Section 01 1000 - Summary: Work sequence.

1.03 REFERENCE STANDARDS

A. AGC (CPSM) - Construction Planning and Scheduling Manual; 2004.

B. M-H (CPM) - CPM in Construction Management - Project Management with CPM; O'Brien; 2006.

1.04 SUBMITTALS

A. Within 10 days after date established in Notice to Proceed, 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.

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

E. Submit updated schedule with each Application for Payment.

F. Submit progress schedules electronically.

G. Submit under transmittal letter form specified in Section 01 3000 - Administrative Requirements.

1.05 QUALITY ASSURANCE

A. Scheduler: Contractor's personnel or specialist Consultant specializing in CPM scheduling with 1 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.

1.06 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 11x17 inches or width required.

C. Scale and Spacing: To allow for notations and revisions.

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

D. Provide legend for symbols and abbreviations used.

3.03 NETWORK ANALYSIS

A. Prepare network analysis diagrams and supporting mathematical analyses using the Critical Path Method.

B. Illustrate order and interdependence of activities and sequence of work; how start of a given activity depends on completion of preceding activities, and how completion of the activity may restrain start of subsequent activities.

C. Mathematical Analysis: Tabulate each activity of detailed network diagrams, using calendar dates, and identify for each activity:
   1. Preceding and following event numbers.
   2. Activity description.
   3. Estimated duration of activity, in maximum 15 day intervals.
   4. Earliest start date.
   5. Earliest finish date.
   6. Actual start date.
   7. Actual finish date.
   8. Latest start date.
   9. Latest finish date.
   10. Total and free float; float time shall accrue to Owner and to Owner's benefit.
   11. Monetary value of activity, keyed to Schedule of Values.
   12. Percentage of activity completed.
   13. Responsibility.

D. Analysis Program: Capable of compiling monetary value of completed and partially completed activities, accepting revised completion dates, and recomputation of all dates and float.

E. Required Reports: List activities in sorts or groups:
   1. By preceding work item or event number from lowest to highest.
   2. By amount of float, then in order of early start.

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.

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.

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.

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 shown in schedules.

C. Distribute copies of updated schedules to Architect and Owner with every pay application.

END OF SECTION

SECTION 01 4000
QUALITY REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Submittals.

B. References and standards.

C. Control of installation.

D. Defect Assessment.

1.02 RELATED REQUIREMENTS

A. Section 01 3000 - Administrative Requirements: Submittal procedures.

B. Section 01 6000 - Product Requirements: Requirements for material and product quality.

1.03 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.

1.04 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 conformance 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. Include:
      a. Date issued.
      b. Project title and number.
      c. Name of inspector.
      d. Date and time of sampling or inspection.
      e. Identification of product and specifications section.
      f. Location in the Project.
      g. Type of test/inspection.
      h. Date of test/inspection.
      i. Results of test/inspection.
      j. Conformance with Contract Documents.
      k. When requested by Architect, provide interpretation of results.
   2. Test report submittals are for Architect's knowledge as contract administrator for the limited purpose of assessing conformance 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 conforms to 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.

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 in duplicate within 30 days of observation to Architect for information.
2. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.

G. Erection Drawings: Submit drawings for Architect's benefit as contract administrator or for Owner.
1. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.
2. Data indicating inappropriate or unacceptable Work may be subject to action by Architect or Owner.

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. Conform to 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.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 CONTROL OF INSTALLATION

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.

3.02 DEFECT ASSESSMENT

A. Replace Work or portions of the Work not conforming to specified requirements.

END OF SECTION

SECTION 01 5000
TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Temporary utilities.

B. Temporary Controls:
   1. Water control.
   2. Dust control.
   3. Noise control.
   4. Pest control.
   5. Pollution control.
   6. Rodent control.

C. Temporary telecommunications services.

D. Temporary sanitary facilities.

E. Temporary Controls: Barriers and enclosures.

F. Vehicular access and parking.

G. Waste removal facilities and services.

H. Project identification sign.

I. Field offices.

1.02 REFERENCE STANDARDS

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

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

1.03 TELECOMMUNICATIONS SERVICES

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

B. Telecommunications services shall include:
   1. Telephone Land Lines: One line, minimum; one handset per line.
   2. Internet Connections: Minimum of one; DSL modem or faster.
   3. Email: Account/address reserved for project use.
   4. Facsimile Service: Minimum of one dedicated fax machine/printer, with dedicated phone line.

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 .

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

1.06 VEHICULAR ACCESS AND PARKING

A. Comply with regulations relating to use of streets and sidewalks, access to emergency facilities, and access for emergency vehicles.

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

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

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

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

1.07 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.

1.08 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Remove temporary utilities, equipment, facilities, materials, prior to Date of Substantial Completion inspection.

B. Remove underground installations to a minimum depth of 2 feet. Grade site as indicated.

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

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 6000
PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. General product requirements.

B. Product option requirements.

C. Procedures for Owner-supplied products.

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

1.02 RELATED REQUIREMENTS

A. Section 01 4000 - Quality Requirements: Product quality monitoring.

1.03 REFERENCE STANDARDS

A. 16 CFR 260.13 - Guides for the Use of Environmental Marketing Claims; Federal Trade Commission; Recycled Content; Current Edition.

B. CAN/CSA Z809 - National Standard for Sustainable Forest Management; CSA International Inc; 2008.

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

1.04 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, 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 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.

2.02 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.

PART 3 EXECUTION

3.01 SUBSTITUTION PROCEDURES

A. Substitutions may be considered when a product becomes unavailable through no fault of the Contractor.

B. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.

C. A request for substitution constitutes a representation that the submitter:
   1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
   2. Agrees to provide the same warranty for the substitution as for the specified product.
   3. Will coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to Owner.
   4. Waives claims for additional costs or time extension that may subsequently become apparent.
   5. Will reimburse Owner and Architect/Engineer for review or redesign services associated with re-approval by authorities.

D. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.

3.02 TRANSPORTATION AND HANDLING

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

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.

3.03 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.

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

C. Store with seals and labels intact and legible.

D. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.

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

F. Provide bonded 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

SECTION 01 7000
EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Examination, preparation, and general installation procedures.

B. Requirements for alterations work, including selective demolition, except removal, disposal, and/or remediation of hazardous materials and toxic substances.

C. Pre-installation meetings.

D. Cutting and patching.

E. Cleaning and protection.

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

1.02 RELATED REQUIREMENTS

A. Section 01 1000 - Summary: Limitations on working in existing building; continued occupancy; work sequence; identification of salvaged and relocated materials.

B. Section 01 3000 - Administrative Requirements: Submittals procedures.

C. Section 01 4000 - Quality Requirements: Testing and inspection procedures.

D. Section 01 7800 - Closeout Submittals: Project record documents, operation and maintenance data, warranties and bonds.

1.03 REFERENCE STANDARDS

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

1.04 SUBMITTALS

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

B. 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.
   6. Include in request:
      a. Identification of Project.
      b. Location and description of affected work.
      c. Necessity for cutting or alteration.
      d. Description of proposed work and products to be used.
      e. Effect on work of Owner or separate Contractor.
      f. Written permission of affected separate Contractor.
      g. Date and time work will be executed.

C. Project Record Documents: Accurately record actual locations of capped and active utilities.

1.05 QUALIFICATIONS

A. For demolition work, employ a firm specializing in the type of work required.
   1. Minimum of 3 years of documented experience.

1.06 PROJECT CONDITIONS

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

B. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.

1. Provide dust-proof enclosures to prevent entry of dust generated outdoors.
2. Provide dust-proof barriers between construction areas and areas continuing to be occupied by Owner.

C. Pest and Rodent Control: Provide methods, means, and facilities to prevent pests and insects from damaging the work.

1.07 COORDINATION

A. See Section 01 1000 for occupancy-related requirements.

B. 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.

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

D. 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.

E. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on Drawings. Follow routing shown 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.

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

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

H. 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.

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 GENERAL INSTALLATION REQUIREMENTS

A. In addition to compliance with regulatory requirements, conduct construction operations in compliance with NFPA 241, including applicable recommendations in Appendix A.

B. 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.

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

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

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

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

3.05 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 shown.
   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 rotted wood, corroded metals, and deteriorated masonry and concrete; replace with new construction specified.
   2. Remove items indicated on drawings.
   3. Relocate items indicated on drawings.
   4. 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.
   5. 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, and Electrical): 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.
   1. When existing finished surfaces are cut so that a smooth transition with new work is not possible, terminate existing surface along a straight line at a natural line of division and make recommendation to Architect.
   2. Where removal of partitions or walls results in adjacent spaces becoming one, rework floors, walls, and ceilings to a smooth plane without breaks, steps, or bulkheads.
   3. Where a change of plane of 1/4 inch or more occurs in existing work, submit recommendation for providing a smooth transition for Architect review and request instructions.
   4. Trim existing wood doors as necessary to clear new floor finish. Refinish trim as required.

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.

3.06 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:
   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-conforming 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.

3.07 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.

3.08 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.

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 plastic coverings if possible.

3.09 ADJUSTING

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

B. Testing, adjusting, and balancing HVAC systems: See Section 23 0593 - Testing, Adjusting, and Balancing for HVAC.

3.10 FINAL CLEANING

A. Execute final cleaning after Substantial Completion but before making final application for payment.

B. Use cleaning materials that are nonhazardous.

C. 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.

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

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

F. Clean filters of operating equipment.

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.

3.11 CLOSEOUT PROCEDURES

A. Make submittals that are required by governing or other authorities.
   1. Provide copies to Owner.

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. Owner will occupy all of the building as specified in Section 01 1000.

F. 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.

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

H. Accompany Project Coordinator on Contractor's preliminary final inspection.

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

J. Complete items of work determined by Architect listed in executed Certificate of Substantial Completion.

END OF SECTION

SECTION 01 7800
CLOSEOUT SUBMITTALS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Project Record Documents.

B. Operation and Maintenance Data.

C. Warranties and bonds.

1.02 RELATED REQUIREMENTS

A. Section 01 3000 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.

B. Section 01 7000 - Execution and Closeout Requirements: Contract closeout procedures.

1.03 SUBMITTALS

A. Project Record Documents: Submit documents to Architect with claim for final Application for Payment.

B. Operation and Maintenance Data:
   1. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Architect will review draft and return one copy with comments.
   2. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
   3. Submit one copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Architect comments. Revise content of all document sets as required prior to final submission.
   4. Submit two sets of revised final documents in final form within 10 days after final inspection.

C. Warranties and Bonds:
   1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within 10 days after acceptance.
   2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
   3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of the following record documents; record actual revisions to the Work:
   1. Drawings.
   2. Specifications.
   3. Addenda.
   4. Change Orders and other modifications to the Contract.
   5. Reviewed shop drawings, product data, and samples.
   6. Manufacturer's instruction for assembly, installation, and adjusting.

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

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

D. Record information concurrent with construction progress.

E. 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 and modifications.

F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
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.

3.02 OPERATION AND MAINTENANCE DATA

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.

3.03 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.

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. Moisture protection and weather-exposed products: Include product data listing applicable reference standards, chemical composition, and details of installation. Provide recommendations for inspections, maintenance, and repair.

D. Additional information as specified in individual product specification sections.

E. 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.

F. Provide a listing in Table of Contents for design data, with tabbed fly sheet and space for insertion of data.

3.04 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS

A. 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.

B. 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.

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

D. Include color coded wiring diagrams as installed.

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. Provide control diagrams by controls manufacturer as installed.

L. Provide Contractor's coordination drawings, with color coded piping diagrams as installed.

M. Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

N. Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

O. Include test and balancing reports.

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

3.05 ASSEMBLY OF OPERATION AND MAINTENANCE MANUALS

A. Assemble operation and maintenance data into electronic files, either CD or flash drive, for Owner's personnel use, with data arranged in the same sequence as, and identified by, the specification sections.

B. Where systems involve more than one specification section, provide separate tabbed divider for each system.

C. Project Directory: Title and address of Project; names, addresses, and telephone numbers of Architect, Consultants, Contractor and subcontractors, with names of responsible parties.

D. Tables of Contents: List every item separated by a divider, using the same identification as on the divider tab; where multiple volumes are required, include all volumes Tables of Contents in each volume, with the current volume clearly identified.

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.

3.06 WARRANTIES AND BONDS

A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial completion is determined.

B. Verify that documents are in proper form, contain full information, and are notarized.

C. Co-execute submittals when required.

D. Retain warranties and bonds until time specified for submittal.

E. Manual: Bind in commercial quality 8-1/2 by 11 inch three D side ring binders with durable plastic covers.

F. Cover: Identify each binder with typed or printed title WARRANTIES AND BONDS, with title of Project; name, address and telephone number of Contractor and equipment supplier; and name of responsible company principal.

G. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Project Manual, with each item identified with the number and title of the specification section in which specified, and the name of product or work item.

H. Separate each warranty or bond with index tab sheets keyed to the Table of Contents listing. Provide full information, using separate typed sheets as necessary. List Subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

END OF SECTION

SECTION 02 4100
DEMOLITION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Building demolition excluding removal of hazardous materials and toxic substances.

B. Selective demolition of building elements for alteration purposes.

1.02 RELATED REQUIREMENTS

A. Section 01 1000 - Summary: Limitations on Contractor's use of site and premises.

B. Section 01 5000 - Temporary Facilities and Controls: security, protective barriers, and waste removal.

C. Section 01 7000 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products; temporary bracing and shoring.

1.03 REFERENCE STANDARDS

A. 29 CFR 1926 - U.S. Occupational Safety and Health Standards; current edition.

1.04 SUBMITTALS

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

B. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.

1.05 QUALITY ASSURANCE

A. Demolition Firm Qualifications: Company specializing in the type of work required.
   1. Minimum of 3 years of documented experience.

PART 2 PRODUCTS -- NOT USED

PART 3 EXECUTION

3.01 SCOPE

A. Remove concrete sub-floors, walls, doors, ceilings, plumbing fixtures, and cabinets where indicated on drawings.

B. Remove other items indicated, for demolition as indicated on drawings.

3.02 GENERAL PROCEDURES AND PROJECT CONDITIONS

A. Comply with other requirements specified in Section 01 7000.

B. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
   1. Obtain required permits.
   2. Use of explosives is not permitted.
   3. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
   4. Provide, erect, and maintain temporary barriers and security devices.
   5. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
   6. Do not close or obstruct roadways or sidewalks without permit.
   7. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.
   8. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon or limit access to their property.

C. Do not begin removal until receipt of notification to proceed from Owner.

D. Protect existing structures and other elements that are not to be removed.
   1. Provide bracing and shoring.
   2. Prevent movement or settlement of adjacent structures.
   3. Stop work immediately if adjacent structures appear to be in danger.

E. Minimize production of dust due to demolition operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.

F. If hazardous materials are discovered during removal operations, stop work and notify Architect and Owner; hazardous materials include regulated asbestos containing materials, lead, PCB's, and mercury.

G. Perform demolition in a manner that maximizes salvage and recycling of materials.
   1. Dismantle existing construction and separate materials.
   2. Set aside reusable, recyclable, and salvageable materials; store and deliver to collection point or point of reuse.

3.03 EXISTING UTILITIES

A. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits.

B. Protect existing utilities to remain from damage.

C. Do not disrupt public utilities without permit from authority having jurisdiction.

D. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Owner.

E. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to Owner.

F. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.

G. Remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities.

3.04 SELECTIVE DEMOLITION FOR 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 shown.
   2. Report discrepancies to Architect before disturbing existing installation.
   3. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.

B. Separate areas in which demolition is being conducted from other areas that are still occupied.
   1. Provide, erect, and maintain temporary dustproof partitions of construction specified in Section 01 5000 in locations indicated on drawings.

C. Remove existing work as indicated and as required to accomplish new work.
   1. Remove items indicated on drawings.

D. Services (Including but not limited to HVAC, Plumbing, Fire Protection, and Electrical): Remove existing systems and equipment as indicated.
   1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components.
   2. 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.
   3. See Section 01 1000 for other limitations on outages and required notifications.
   4. Verify that abandoned services serve only abandoned facilities before removal.

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.

E. 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.
   4. Patch as specified for patching new work.

3.05 DEBRIS AND WASTE REMOVAL

A. Remove debris, junk, and trash from site.

B. Leave site in clean condition, ready for subsequent work.

C. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION

SECTION 03 3000
CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Concrete formwork.

B. Floors and slabs on grade.

C. Concrete reinforcement.

D. Joint devices associated with concrete work.

E. Concrete curing.

1.02 RELATED REQUIREMENTS

A. Section 07 9005 - Joint Sealants.

1.03 REFERENCE STANDARDS

A. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials; 2010.

B. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; 1991 (Reapproved 2009).

C. ACI 301 - Specifications for Structural Concrete; 2010 (Errata 2012).

D. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; 2000.

E. ACI 305R - Hot Weather Concreting; 2010.

F. ACI 306R - Cold Weather Concreting; 2010.

G. ACI 308R - Guide to Curing Concrete; 2001 (Reapproved 2008).

H. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; 2011.

I. ACI 347R - Guide to Formwork for Concrete; 2014.

J. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement; 2015.

K. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2013.

L. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2015a.

M. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2015.

N. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete; 2012.

O. ASTM C150/C150M - Standard Specification for Portland Cement; 2015.

P. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method; 2014.

Q. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete; 2010a.

R. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete; 2015.

S. ASTM C881/C881M - Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete; 2014.

T. ASTM C1240 - Standard Specification for Silica Fume Used in Cementitious Mixtures; 2014.

U. ASTM D3963/D3963M - Standard Specification for Fabrication and Jobsite Handling of Epoxy-Coated Reinforcing Steel Bars; 2001 (Reapproved 2007).

1.04 SUBMITTALS

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

B. Mix Design: Submit proposed concrete mix design.

1. Indicate proposed mix design complies with requirements of ACI 301, Section 4 - Concrete Mixtures.
2. Indicate proposed mix design complies with requirements of ACI 318, Chapter 5 - Concrete Quality, Mixing and Placing.

1.05 QUALITY ASSURANCE

A. Perform work of this section in accordance with ACI 301 and ACI 318.

B. Follow recommendations of ACI 305R when concreting during hot weather.

C. Follow recommendations of ACI 306R when concreting during cold weather.

PART 2 PRODUCTS

2.01 FORMWORK

A. Formwork Design and Construction: Comply with guidelines of ACI 347R to provide formwork that will produce concrete complying with tolerances of ACI 117.

B. Form Materials: Contractor's choice of standard products with sufficient strength to withstand hydrostatic head without distortion in excess of permitted tolerances.
   1. Form Facing for Exposed Finish Concrete: Contractor's choice of materials that will provide smooth, stain-free final appearance.
   2. Form Coating: Release agent that will not adversely affect concrete or interfere with application of coatings.
   3. Form Ties: Cone snap type that will leave no metal within 1-1/2 inches of concrete surface.

2.02 REINFORCEMENT

A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi).
   1. Type: Deformed billet-steel bars.
   2. Finish: Unfinished, unless otherwise indicated.

B. Reinforcement Accessories:
   1. Tie Wire: Annealed, minimum 16 gage, 0.0508 inch.
   2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.
   3. Provide galvanized components for placement within 1-1/2 inches of weathering surfaces.

2.03 CONCRETE MATERIALS

A. Cement: ASTM C150/C150M, Type I - Normal Portland type.
   1. Acquire all cement for entire project from same source.

B. Fine and Coarse Aggregates: ASTM C 33.

C. Fly Ash: ASTM C618, Class C or F.

D. Calcined Pozzolan: ASTM C618, Class N.

E. Silica Fume: ASTM C1240, proportioned in accordance with ACI 211.1.

F. Water: Clean and not detrimental to concrete.

2.04 ADMIXTURES

A. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.

B. Air Entrainment Admixture: ASTM C260/C260M.

C. Total volume of add mixtures should not exceed 20% of the portland cement volume.

D. Concrete should be 5-8% air entrainment.

2.05 BONDING AND JOINTING PRODUCTS

A. Epoxy Bonding System:
   1. Complying with ASTM C881/C881M and of Type required for specific application.
   2. Manufacturers:

a. Adhesives Technology Corporation; Crackbond SLV302, Crackbond LR321, Crackbond LR321 LPL, Ultrabond 2100 LPL, Ultrabond 2100, Ultrabond 1, Ultrabond 2, Ultrabond 4CC, or Ultrabond HS200: www.atcepoxy.com.
b. Dayton Superior Corporation; Slow Set Bonding Agent: www.daytonsuperior.com.
c. SpecChem, LLC; SpecPoxy 1000, SpecPoxy 2000, SpecPoxy 3000, or SpecPoxy 3000FS: www.specchemllc.com.
d. W.R. Meadows, Inc.; Rezi-Weld Gel Paste, Rezi-Weld Gel Paste State, Rezi-Weld 1000: www.wrmeadows.com.
e. Substitutions: See Section 01 6000 - Product Requirements.

B. Slab Isolation Joint Filler: 1/2 inch thick, height equal to slab thickness, with removable top section that will form 1/2 inch deep sealant pocket after removal.
1. Material: Closed-cell, non-absorbent, compressible polyethylene or polymer foam in sheet form.
2. Manufacturers:
a. W.R. Meadows, Inc; Deck-O-Foam Joint Filler with pre-scored top strip: www.wrmeadows.com.
b. Reflectix; Expansion Joint: relectixinc.com..
c. Substitutions: See Section 01 6000 - Product Requirements.

2.06 CONCRETE MIX DESIGN

A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.

B. Concrete Strength: Establish required average strength for each type of concrete on the basis of field experience or trial mixtures, as specified in ACI 301.

C. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended or required by manufacturer.

D. Normal Weight Concrete:
1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: 3,000 pounds per square inch.
2. Fly Ash Content: Maximum 15 percent of cementitious materials by weight.
3. Calcined Pozzolan Content: Maximum 10 percent of cementitious materials by weight.
4. Silica Fume Content: Maximum 5 percent of cementitious materials by weight.
5. Water-Cement Ratio: Maximum 40 percent by weight.
6. Total Air Content: 4 percent, determined in accordance with ASTM C173/C173M.
7. Maximum Slump: 3 inches.
8. Maximum Aggregate Size: 5/8 inch.

2.07 MIXING

A. Transit Mixers: Comply with ASTM C94/C94M.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify lines, levels, and dimensions before proceeding with work of this section.

3.02 PREPARATION

A. Formwork: Comply with requirements of ACI 301. Design and fabricate forms to support all applied loads until concrete is cured, and for easy removal without damage to concrete.

B. Verify that forms are clean and free of rust before applying release agent.

C. Where new concrete is to be bonded to previously placed concrete, prepare existing surface by cleaning with steel brush and applying bonding agent in accordance with manufacturer's instructions.
1. Use epoxy bonding system for bonding to damp surfaces, for structural load-bearing applications, and where curing under humid conditions is required.

D. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.

3.03 INSTALLING REINFORCEMENT AND OTHER EMBEDDED ITEMS

A. Fabricate and handle epoxy-coated reinforcing in accordance with ASTM D3963/D3963M.

B. Comply with requirements of ACI 301. Clean reinforcement of loose rust and mill scale, and accurately position, support, and secure in place to achieve not less than minimum concrete coverage required for protection.

C. Install welded wire reinforcement in maximum possible lengths, and offset end laps in both directions. Splice laps with tie wire.

D. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with concrete placement.

3.04 PLACING CONCRETE

A. Place concrete in accordance with ACI 304R.

B. Notify Architect not less than 24 hours prior to commencement of placement operations.

C. Ensure reinforcement will not be disturbed during concrete placement.

D. Place concrete continuously without construction (cold) joints wherever possible; where construction joints are necessary, before next placement prepare joint surface by removing laitance and exposing the sand and sound surface mortar, by sandblasting or high-pressure water jetting.

E. Finish floors level and flat, unless otherwise indicated, within the tolerances specified below.

3.05 SLAB JOINTING

A. Locate joints as indicated on the drawings.

B. Anchor joint fillers and devices to prevent movement during concrete placement.

C. Isolation Joints: Use preformed joint filler with removable top section for joint sealant, total height equal to thickness of slab, set flush with top of slab.

1. Install wherever necessary to separate slab from other building members, including columns, walls, equipment foundations, footings, stairs, manholes, sumps, and drains.

D. Load Transfer Construction and Contraction Joints: Install load transfer devices as indicated; saw cut joint at surface as indicated for contraction joints.

E. Saw Cut Contraction Joints: Saw cut joints before concrete begins to cool, within 4 to 12 hours after placing; use 3/16 inch thick blade and cut at least 1 inch deep but not less than one quarter (1/4) the depth of the slab.

F. Construction Joints: Where not otherwise indicated, use metal combination screed and key form, with removable top section for joint sealant.

3.06 FLATNESS AND LEVELNESS TOLERANCES

A. Maximum Variation of Surface Flatness:

1. Exposed Concrete: 1/4 inch in 10 ft or as shown on drawings

B. Correct the slab surface if tolerances are less than specified.

C. Correct defects by grinding or by removal and replacement of the defective work. Areas requiring corrective work will be identified. Re-measure corrected areas by the same process.

3.07 CONCRETE FINISHING

A. Repair surface defects, including tie holes, immediately after removing formwork.

3.08 CURING AND PROTECTION

A. Comply with requirements of ACI 308R. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

1. Normal concrete: Not less than 7 days.

C. Formed Surfaces: Cure by moist curing with forms in place for full curing period.

D. Surfaces Not in Contact with Forms:
   1. Initial Curing: Start as soon as free water has disappeared and before surface is dry. Keep continuously moist for not less than three days by water ponding, water-saturated sand, water-fog spray, or saturated burlap.
      a. Ponding: Maintain 100 percent coverage of water over slab areas, continuously for 4 days.
   2. Final Curing: Begin after initial curing but before surface is dry.

3.09 FIELD QUALITY CONTROL

A. A testing agency hired by the general contractor will perform field quality control tests, as specified in Section 01 4000.

B. Provide free access to concrete operations at project site and cooperate with appointed firm.

C. Submit proposed mix design of each class of concrete to Iowa Department of Transportation for review prior to commencement of concrete operations.

D. Tests of concrete and concrete materials may be performed at any time to ensure conformance with specified requirements.

E. Compressive Strength Tests: ASTM C39/C39M. For each test, mold and cure three concrete test cylinders. Obtain test samples for every 100 cubic yards or less of each class of concrete placed.

F. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.

G. Perform one slump test for each set of test cylinders taken, following procedures of ASTM C143/C143M.

3.10 DEFECTIVE CONCRETE

A. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.

B. Repair or replacement of defective concrete will be determined by the Architect. The cost of additional testing shall be borne by Contractor when defective concrete is identified.

3.11 PROTECTION

A. Do not permit traffic over unprotected concrete surface until fully cured.

END OF SECTION

SECTION 06 1000
ROUGH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Rough opening framing for doors.

B. Communications and electrical room mounting boards.

C. Concealed wood blocking, nailers, and supports.

1.02 RELATED REQUIREMENTS

A. Section 09 2116 - Gypsum Board Assemblies: Gypsum-based sheathing.

1.03 REFERENCE STANDARDS

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

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

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

2.02 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

A. Moisture Content: S-dry or MC19.

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

2.03 ACCESSORIES

A. Fasteners and Anchors:
   1. Metal and Finish: Hot-dipped galvanized steel complying with ASTM A153/A153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

A. Select material sizes to minimize waste.

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

3.02 BLOCKING, NAILERS, AND SUPPORTS

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

B. 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. Joints of rigid wall coverings that occur between studs.

3.03 INSTALLATION OF CONSTRUCTION PANELS

A. Communications and Electrical Room Mounting Boards: Secure with screws to studs with edges over firm bearing; space fasteners at maximum 24 inches on center on all edges and into studs in field of board.
   1. At fire-rated walls, install board over wall board indicated as part of the fire-rated assembly.
   2. Where boards are indicated as full floor-to-ceiling height, install with long edge of board parallel to studs.
   3. Install adjacent boards without gaps.
   4. Size: 48 by 96 inches, installed vertically at 1'-6" AFF.

3.04 TOLERANCES

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

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

3.05 CLEANING

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

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

END OF SECTION

SECTION 06 4100
ARCHITECTURAL WOOD CASEWORK

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Specially fabricated cabinet units.

B. Countertops.

C. Cabinet hardware.

D. Factory finishing.

E. Preparation for installing utilities.

1.02 RELATED REQUIREMENTS

A. Section 06 1000 - Rough Carpentry: Support framing, grounds, and concealed blocking.

1.03 REFERENCE STANDARDS

A. ANSI A208.2 - American National Standard for Medium Density Fiberboard for Interior Use; 2009.

B. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014.

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

1.04 SUBMITTALS

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

B. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
   1. Minimum Scale of Detail Drawings: 1-1/2 inch to 1 foot.

C. Product Data: Provide data for hardware accessories.

1.05 QUALITY ASSURANCE

A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum 5 years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Protect units from moisture damage.

PART 2 PRODUCTS

2.01 CABINETS

A. Quality Grade: Unless otherwise indicated provide products of quality specified by AWI/AWMAC/WI (AWS) for Custom Grade.

B. Plastic Laminate Faced Cabinets: Custom grade.

C. Cabinets:
   1. Finish - Exposed Interior Surfaces: Decorative laminate.

2.02 WOOD-BASED COMPONENTS

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

2.03 LAMINATE MATERIALS

A. Manufacturers:
   1. Formica Corporation: www.formica.com.
   2. Wilsonart: www.wilsonart.com.
   3. Substitutions: See Section 01 6000 - Product Requirements.

B. Provide specific types as scheduled.

1. Horizontal Surfaces: HGS, 0.048 inch nominal thickness, through color, colors as scheduled, finish as scheduled.
2. Vertical Surfaces: VGS, 0.028 inch nominal thickness, through color, colors as scheduled, finish as scheduled.

2.04 COUNTERTOPS

A. Plastic Laminate Countertops: Medium density fiberboard substrate covered with HPDL, conventionally fabricated and self-edge banded.

2.05 ACCESSORIES

A. Adhesive: Type recommended by fabricator to suit application.

2.06 HARDWARE

A. Hardware: BHMA A156.9, types as recommended by fabricator for quality grade specified.

B. Adjustable Shelf Supports: Standard side-mounted system using recessed metal shelf standards or multiple holes for pin supports and coordinated self rests, polished chrome finish, for nominal 1 inch spacing adjustments.

C. Drawer and Door Pulls: "U" shaped wire pull, steel with chrome finish, 4 inch centers.

D. Drawer Slides:
1. Type: Extension types as scheduled.
2. Static Load Capacity: Commercial grade.
3. Mounting: Side mounted.
4. Stops: Integral type.
5. Features: Provide self closing/stay closed type.

E. Hinges: European style concealed self-closing type, steel with polished finish.

2.07 FABRICATION

A. Assembly: Shop assemble cabinets for delivery to site in units easily handled and to permit passage through building openings.

B. Plastic Laminate: Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Slightly bevel arises. Locate counter butt joints minimum 2 feet from sink cut-outs.

C. Mechanically fasten back splash to countertops as recommended by laminate manufacturer at 16 inches on center.

D. Provide cutouts for plumbing fixtures. Verify locations of cutouts from on-site dimensions. Prime paint cut edges.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify adequacy of backing and support framing.

B. Verify location and sizes of utility rough-in associated with work of this section.

3.02 INSTALLATION

A. Set and secure custom cabinets in place, assuring that they are rigid, plumb, and level.

B. Use fixture attachments in concealed locations for wall mounted components.

C. Use concealed joint fasteners to align and secure adjoining cabinet units.

D. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim for this purpose.

E. Secure cabinets to floor using appropriate angles and anchorages.

3.03 CLEANING

A. Clean casework, counters, shelves, hardware, fittings, and fixtures.

END OF SECTION

SECTION 07 2100
THERMAL INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Batt insulation for filling acoustical insulation.

1.02 RELATED REQUIREMENTS

A. Section 09 2116 - Gypsum Board Assemblies: Acoustic insulation inside walls and partitions.

1.03 REFERENCE STANDARDS

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

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

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

1.04 SUBMITTALS

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

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

PART 2 PRODUCTS

2.01 BATT INSULATION MATERIALS

A. Glass Fiber Batt Insulation: Flexible preformed batt or blanket, complying with ASTM C665; friction fit.
   1. Flame Spread Index: 75 or less, when tested in accordance with ASTM E84.
   2. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
   3. Combustibility: Non-combustible, when tested in accordance with ASTM E136, except for facing, if any.
   4. STC Rating: 50 or higher.
   5. Thickness: 2 1/2" to 5 1/2".
   6. Formaldehyde Content: Zero.
   7. Manufacturers:
      a. CertainTeed Corporation: www.certainteed.com.
      b. Johns Manville: www.jm.com.
      c. Owens Corning Corporation; EcoTouch PINK FIBERGLAS Insulation: www.ocbuildingspec.com.
   8. Substitutions: See Section 01 6000 - Product Requirements.

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, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.

3.02 BATT INSTALLATION

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

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

END OF SECTION

SECTION 07 2500
WEATHER BARRIERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Vapor Retarders: Materials to make exterior walls water vapor resistant and air tight.

1.02 RELATED REQUIREMENTS

A. Section 09 2116 - Gypsum Board Assemblies: Water-resistive barrier under exterior cladding.

1.03 DEFINITIONS

A. Vapor Retarder: Air tight barrier made of material that is relatively water vapor impermeable, to the degree specified, with sealed seams and with sealed joints to adjacent surfaces.
   1. Water Vapor Permeance: For purposes of conversion, 57.2 ng/(Pa s sq m) = 1 perm.

1.04 SUBMITTALS

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

B. Product Data: Provide data on material characteristics.

1.05 FIELD CONDITIONS

A. Maintain temperature and humidity recommended by the materials manufacturers before, during and after installation.

PART 2 PRODUCTS

2.01 WEATHER BARRIER ASSEMBLIES

A. Interior Vapor Retarder:
   1. On inside face of masonry and concrete walls use vapor retarder sheet, self-adhesive type.

2.02 VAPOR RETARDER MATERIALS (AIR BARRIER AND WATER-RESISTIVE)

A. Vapor Retarder Sheet: ASTM D1970/D1970M.
   1. Type: Rubberized asphalt bonded to thermoplastic sheet, self-adhesive.
   2. Thickness: 40 mil (0.040 inch), nominal.
   3. Sheet Width: 18 inches, and 36 inches.
   4. Water Vapor Permeance: 0.05 perm, maximum, when tested in accordance with ASTM E96/E96M.
   5. Seam and Perimeter Tape: As recommended by sheet manufacturer.

2.03 ACCESSORIES

A. Sealants, Tapes, and Accessories for Sealing Weather Barrier and Sealing Weather Barrier to Adjacent Substrates: As specified or as recommended by weather barrier manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces and conditions are ready to accept the work of this section.

3.02 PREPARATION

A. Remove projections, protruding fasteners, and loose or foreign matter that might interfere with proper installation.

B. Clean and prime substrate surfaces to receive adhesives in accordance with manufacturer's instructions.

3.03 INSTALLATION

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

B. Vapor Retarders: Install continuous air tight barrier over surfaces indicated, with sealed seams and with sealed joints to adjacent surfaces.

C. Self-Adhesive Sheets:
   1. Prepare substrate in manner recommended by sheet manufacturer; fill and tape joints in substrate and between dissimilar materials.
   2. Lap sheets shingle-fashion to shed water and seal laps air tight.
   3. Once sheets are in place, press firmly into substrate with resilient hand roller; ensure that all laps are firmly adhered with no gaps or fishmouths.
   4. Use same material, or other material approved by sheet manufacturer for the purpose, to seal to adjacent construction and as flashing.
   5. At wide joints, provide extra flexible membrane allowing joint movement.

3.04 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

3.05 PROTECTION

A. Do not leave materials exposed to weather longer than recommended by manufacturer.

END OF SECTION

SECTION 07 9005
JOINT SEALERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Sealants and joint backing.

1.02 REFERENCE STANDARDS

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

B. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications; 2012.

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

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

E. ASTM D1667 - Standard Specification for Flexible Cellular Materials--Poly(Vinyl Chloride) Foam (Closed-Cell); 2005 (Reapproved 2011).

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

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the work with other sections referencing this section.

1.04 SUBMITTALS

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

B. Product Data: Provide data indicating sealant chemical characteristics, performance criteria, substrate preparation, limitations, and color availability.

C. Manufacturer's Installation Instructions: Indicate surface preparation and perimeter conditions requiring special attention.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum 3 years documented experience.

B. Applicator Qualifications: Company specializing in performing the work of this section with minimum three years documented experience and approved by manufacturer.

1.06 FIELD CONDITIONS

A. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

1.07 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 which fail to achieve airtight seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.01 SEALANTS

A. Sealants and Primers - General: Provide only products having lower volatile organic compound (VOC) content than required by South Coast Air Quality Management District Rule No.1168.

B. Type 3 - General Purpose Interior Sealant: Acrylic emulsion latex; ASTM C834, Type OP, Grade NF single component, paintable.
   1. Color: Match adjacent finished surfaces.
   2. Products:
      a. Bostik Inc: www.bostik-us.com.
      b. Pecora Corporation; AC-20 + Silicone Acrylic Latex Caulking Compound: www.pecora.com.

c. BASF Construction Chemicals-Building Systems: www.buildingsystems.basf.com.
d. Sherwin-Williams Company; White Lightning 3006 Siliconized Acrylic Latex Caulk: www.sherwin-williams.com.
e. Tremco Global Sealants: www.tremcosealants.com.
f. Substitutions: See Section 01 6000 - Product Requirements.

C. Type 4 - Self-Leveling Polysulfide Sealant: ASTM C920, Grade P, Class 25, Uses T, I, M, A, O; two component, chemical curing, non-staining, non-bleeding, capable of continuous water immersion, self-leveling type.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate surfaces are ready to receive work.

B. Verify that joint backing and release tapes are compatible with sealant.

3.02 PREPARATION

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

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

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

D. Protect elements surrounding the work of this section from damage or disfigurement.

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. Perform acoustical sealant application work in accordance with ASTM C919.

D. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer.

E. Install bond breaker where joint backing is not used.

F. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.

G. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

H. Tool joints concave.

3.04 CLEANING

A. Clean adjacent soiled surfaces.

3.05 PROTECTION

A. Protect sealants until cured.

3.06 SCHEDULE

A. Interior Joints for Which No Other Sealant is Indicated: Type 3; colors as shown on the drawings.

B. Control and Expansion Joints in Interior Concrete Slabs and Floors: Type 4.

C. Joints Between Plumbing Fixtures and Walls and Floors, and Between Countertops and Walls: Type 3.

END OF SECTION

SECTION 08 1113
HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

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

1.02 RELATED REQUIREMENTS

A. Section 08 7100 - DOOR HARDWARE.

1.03 REFERENCE STANDARDS

A. ANSI/SDI A250.3 - Test Procedure and Acceptance Criteria for Factory Applied Finish Coatings for Steel Doors and Frames; 2007 (R2011).

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

1.04 SUBMITTALS

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

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

1.05 QUALITY ASSURANCE

A. Copies of Documents at Project Site: Maintain at the project site a copy of each referenced document that prescribes installation requirements.

1.06 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 DESIGN CRITERIA

A. 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.

2.02 HOLLOW METAL DOORS

A. Interior Doors, Non-Fire Rated:
   1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
      a. Level 1 - Standard-duty.
      b. Physical Performance Level C, 250,000 cycles; in accordance with ANSI/SDI A250.4.
      c. Model 1 - Full Flush.
      d. Door Face Metal Thickness: 20 gage, 0.032 inch, minimum.
   2. Core Material: Manufacturers standard core material/construction and in compliance with requirements.
   3. Door Thickness: 1-3/4 inch, nominal.
   4. Door Finish: Factory finished.

2.03 HOLLOW METAL FRAMES

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

B. Interior Door Frames, Non-Fire Rated: Face welded type.
   1. Frame Metal Thickness: 18 gage, 0.042 inch, minimum.
   2. Frame Finish: Factory finished.

2.04 FINISHES

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

B. Factory Finish: Complying with ANSI/SDI A250.3, manufacturer's standard coating.

C. Bituminous Coating: Asphalt emulsion or other high-build, water-resistant, resilient coating.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

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

3.02 PREPARATION

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

3.03 INSTALLATION

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

B. Coordinate frame anchor placement with wall construction.

C. Coordinate installation of hardware.

D. Touch up damaged factory finishes.

3.04 TOLERANCES

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

3.05 ADJUSTING

A. Adjust for smooth and balanced door movement.

END OF SECTION

SECTION 08 4313
ALUMINUM-FRAMED STOREFRONTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Aluminum-framed storefront, with vision glass.

B. Aluminum doors and frames.

C. Weatherstripping.

1.02 RELATED REQUIREMENTS

A. Section 07 9200 - Joint Sealants: Sealing joints between frames and adjacent construction.

B. Section 08 8000 - Glazing: Glass and glazing accessories.

1.03 REFERENCE STANDARDS

A. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site; 2015.

B. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2012.

C. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.

D. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric]; 2013.

1.04 SUBMITTALS

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

B. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill.

C. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related Work, expansion and contraction joint location and details, and field welding required.

D. Hardware Schedule: Complete itemization of each item of hardware to be provided for each door, cross-referenced to door identification numbers in Contract Documents.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Handle products of this section in accordance with AAMA CW-10.

B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.

1.07 FIELD CONDITIONS

A. Do not install sealants when ambient temperature is less than 40 degrees F. Maintain this minimum temperature during and 48 hours after installation.

1.08 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Correct defective Work within a 1 year period after Date of Substantial Completion.

C. Provide five year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Aluminum-Framed Storefront and Doors:

1. C.R. Laurence Co., Inc; U.S. Aluminum: www.crl-arch.com.
2. EFCO Corporation: www.efcocorp.com.
3. Kawneer North America: www.kawneer.com.
4. Tubelite, Inc.: www.tubeliteinc.com.
5. Substitutions: See Section 01 6000 - Product Requirements.

2.02 STOREFRONT

A. Aluminum-Framed Storefront: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
   1. Glazing Position: Centered (front to back).
   2. Vertical Mullion Dimensions: 2 inches wide by 4-1/2 inches deep.
   3. Finish: Superior performing organic coatings.
      a. Factory finish all surfaces that will be exposed in completed assemblies.
      b. Touch-up surfaces cut during fabrication so that no natural aluminum is visible in completed assemblies, including joint edges.
   4. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors and hardware; fasteners and attachments concealed from view; reinforced as required for imposed loads.
   5. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.
   6. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
   7. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.
   8. Movement: Allow for movement between storefront and adjacent construction, without damage to components or deterioration of seals.
   9. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.

2.03 COMPONENTS

A. Aluminum Framing Members: Tubular aluminum sections, thermally broken with interior section insulated from exterior, drainage holes and internal weep drainage system.
   1. Glazing Stops: Flush.

B. Glazing: As specified in Section 08 8000.

C. Swing Doors: Glazed aluminum.
   1. Thickness: 1-3/4 inches.
   2. Top Rail: 4 inches wide.
   3. Vertical Stiles: 4-1/2 inches wide.
   4. Bottom Rail: 6 inches wide.
   5. Finish: Same as storefront.

2.04 MATERIALS

A. Extruded Aluminum: ASTM B221 (ASTM B221M).

B. Fasteners: Stainless steel.

C. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.

2.05 FINISHES

A. Class I Color Anodized Finish: AAMA 611 AA-M12C22A44 Electrolytically deposited colored anodic coating not less than 0.7 mils thick.

2.06 HARDWARE

A. For each door, include threshold.

B. Other Door Hardware: Storefront manufacturer's standard type to suit application.
   1. Finish on Hand-Contacted Items: Brushed Aluminum.
   2. For each door, include butt hinges, pivots, push handle, pull handle, exit device, narrow stile handle latch, and closer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify dimensions, tolerances, and method of attachment with other work.

B. Verify that wall openings and adjoining air and vapor seal materials are ready to receive work of this section.

3.02 INSTALLATION

A. Install wall system in accordance with manufacturer's instructions.

B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.

C. Provide alignment attachments and shims to permanently fasten system to building structure.

D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.

E. Provide thermal isolation where components penetrate or disrupt building insulation.

F. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.

G. Where fasteners penetrate sill flashings, make watertight by seating and sealing fastener heads to sill flashing.

H. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

I. Set thresholds in bed of sealant and secure.

J. Install hardware using templates provided.

K. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

3.03 TOLERANCES

A. Maximum Variation from Plumb: 0.06 inches every 3 ft non-cumulative or 1/16 inches per 10 ft, whichever is less.

B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.

3.04 ADJUSTING

A. Adjust operating hardware and sash for smooth operation.

3.05 CLEANING

A. Remove protective material from pre-finished aluminum surfaces.

B. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.

3.06 PROTECTION

A. Protect installed products from damage until Date of Substantial Completion.

END OF SECTION

SECTION 08 5113
ALUMINUM WINDOWS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Extruded aluminum windows with fixed sash and infill panels.

B. Factory glazing.

1.02 RELATED REQUIREMENTS

A. Section 07 9200 - Joint Sealants: Sealing joints between window frames and adjacent construction.

1.03 REFERENCE STANDARDS

A. AAMA/WDMA/CSA 101/I.S.2/A440 - North American Fenestration Standard/Specification for windows, doors, and skylights; 2011.

B. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site; 2015.

C. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2012.

1.04 SUBMITTALS

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

B. Product Data: Provide component dimensions, information on glass and glazing, internal drainage details, and descriptions of hardware and accessories.

1.05 QUALITY ASSURANCE

A. Manufacturer and Installer Qualifications: Company specializing in fabrication of commercial aluminum windows of types required, with not fewer than 5 years of experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of AAMA CW-10.

B. Protect finished surfaces with wrapping paper or strippable coating during installation. Do not use adhesive papers or sprayed coatings that bond to substrate when exposed to sunlight or weather.

1.07 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Provide five year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Aluminum Windows:
   1. EFCO, a Pella Company: www.efcocorp.com.
   2. Manko Window Systems, Inc: www.mankowindows.com.
   3. Substitutions: See Section 01 6000 - Product Requirements.

2.02 WINDOWS

A. Aluminum Windows: Extruded aluminum frame and sash, factory fabricated, factory finished, with operating hardware, related flashings, and anchorage and attachment devices.
   1. Frame Depth: 3-1/2 inches.
   2. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors; fasteners and attachments concealed from view; reinforced as required for operating hardware and imposed loads.
   3. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.

4. Movement: Accommodate movement between window and perimeter framing and deflection of lintel, without damage to components or deterioration of seals.
5. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.

B. Performance Requirements: Provide products that comply with the following:
1. Grade: AAMA/WDMA/CSA 101/I.S.2/A440 requirements for specific window type:
a. Performance Class (PC): R.

C. Fixed, Non-Operable Type:
1. Construction: Thermally broken.
2. Glazing: Single; clear; transparent.
3. Exterior Finish: Class I natural anodized.
4. Interior Finish: Class I natural anodized.

2.03 FINISHES

A. Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41 Clear anodic coating not less than 0.7 mils thick.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that wall openings and adjoining air and vapor seal materials are ready to receive aluminum windows.

3.02 INSTALLATION

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

B. Attach window frame and shims to perimeter opening to accommodate construction tolerances and other irregularities.

C. Align window plumb and level, free of warp or twist. Maintain dimensional tolerances and alignment with adjacent work.

D. Install sill and sill end angles.

E. Provide thermal isolation where components penetrate or disrupt building insulation. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

3.03 TOLERANCES

A. Maximum Variation from Level or Plumb: 1/16 inches every 3 ft non-cumulative or 1/8 inches per 10 ft, whichever is less.

3.04 ADJUSTING

A. Adjust hardware for smooth operation and secure weathertight closure.

3.05 CLEANING

A. Remove protective material from factory finished aluminum surfaces.

B. Wash surfaces by method recommended and acceptable to window manufacturer; rinse and wipe surfaces clean.

END OF SECTION

SECTION 08 7100
DOOR HARDWARE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Hardware for wood and hollow metal doors.

B. Thresholds.

C. Weatherstripping, seals and door gaskets.

1.02 RELATED REQUIREMENTS

A. Section 08 1113 - Hollow Metal Doors and Frames.

1.03 REFERENCE STANDARDS

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

B. BHMA A156.2 - American National Standard for Bored and Preassembled Locks & Latches; 2011.

C. BHMA A156.3 - American National Standard for Exit Devices; 2014.

D. BHMA A156.4 - American National Standard for Door Controls - Closers; 2013.

E. BHMA A156.6 - American National Standard for Architectural Door Trim; 2010.

F. BHMA A156.8 - American National Standard for Door Controls - Overhead Stops and Holders; 2010.

G. BHMA A156.18 - American National Standard for Materials and Finishes; 2012.

H. BHMA A156.21 - American National Standard for Thresholds; 2014.

I. BHMA A156.22 - American National Standard for Door Gasketing and Edge Seal Systems, Builders Hardware Manufacturers Association; 2012.

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

K. NFPA 101 - Life Safety Code; 2015.

1.04 SUBMITTALS

A. See Section 01 3000 - 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.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum 5 years ofdocumented experience.

B. Hardware Supplier Qualifications: Company specializing in supplying the type of products specified in this section with at least 5 years documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Package hardware items individually; label and identify each package with door opening code to match hardware schedule.

1.07 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Allegion Brands; Ives, LCN, Schlage, Steelcraft, or Von Duprin: www.allegion.com/us.

B. Assa Abloy Brands; Corbin Russwin, Curries, McKinney, Norton, Sargent, or Yale: www.assaabloydss.com.

C. C. R. Laurence Company, Inc: www.crl-arch.com.

D. Substitutions: See Section 01 6000 - Product Requirements.

2.02 DOOR HARDWARE - GENERAL

A. Provide hardware specified or required to make doors fully functional, compliant with applicable codes, and secure to the extent indicated.

B. Provide items of a single type of the same model by the same manufacturer.

C. Provide products that comply with the following:
   1. Applicable provisions of federal, state, and local codes.
   2. Accessibility: ADA Standards and ICC A117.1.
   3. Applicable provisions of NFPA 101, Life Safety Code.

D. Finishes: Provide door hardware of the same finish unless otherwise indicated.
   1. Primary Finish: Satin chrome plated over nickel on brass or bronze, 626 (approx US26D).
   2. Secondary Finish: Satin chrome plated over nickel on brass or bronze, 626 (approx US26D).
      a. Use secondary finish in kitchens, bathrooms, and other spaces containing chrome or stainless steel finished appliances, fittings, and equipment; provide primary finish on one side of door and secondary finish on other side if necessary.
   3. Finish Definitions: BHMA A156.18.
   4. Exceptions:
      a. Where base metal is specified to be different, provide finish that is an appearance equivalent according to BHMA A156.18.
      b. Door Closer Covers and Arms: Color to be selected by Architect from manufacturer's standard colors.
      c. Aluminum Surface Trim and Gasket Housings: Anodized to match door, not to match other hardware.

2.03 LOCKS AND LATCHES

A. Locks: Provide a lock for every door, unless specifically indicated as not requiring locking.
   1. If no hardware set is indicated for a swinging door provide an office lockset.
   2. Trim: Provide lever handle or pull trim on outside of all locks unless specifically stated to have no outside trim.
   3. Lock Cylinders: Provide key access on outside of all locks unless specifically stated to have no locking or no outside trim.

B. Latches: Provide a latch for every door that is not required to lock, unless specifically indicated "push/pull" or "not required to latch".

2.04 HINGES

A. Hinges: Provide hinges on every swinging door.
   1. Provide five-knuckle full mortise butt hinges unless otherwise indicated.
   2. Provide ball-bearing hinges at all doors having closers.
   3. Provide hinges in the quantities indicated.
   4. Provide non-removable pins on exterior outswinging doors.
   5. Where electrified hardware is mounted in door leaf, provide power transfer hinges.

B. Quantity of Hinges Per Door:
   1. Doors From 60 inches High up to 90 inches High: Three hinges.

2.05 PUSH/PULLS

A. Push/Pulls: Comply with BHMA A156.6.
   1. Provide push and pull on doors not specified to have lockset, latchset, exit device, or auxiliary lock.
   2. On solid doors, provide matching push plate and pull plate on opposite faces.

2.06 CYLINDRICAL LOCKSETS (SMALL FORMAT INTERCHANGEABLE CORE)

A. Locking Functions: As defined in BHMA A156.2, and as follows.
   1. Passage: No locking, always free entry and exit.

2. Privacy: F76, emergency tool unlocks.
3. Classroom: F84, key required to lock.

2.07 EXIT DEVICES

A. Locking Functions: Functions as defined in BHMA A156.3, and as follows:
1. Entry/Exit, Free Swing: Key outside retracts latch, latch holdback (dogging) for free swing during occupied hours, not fire-rated; outside trim must be specified as lever or pull.
2. Entry/Exit, Always-Latched: Key outside locks and unlocks lever, no latch holdback (dogging).
3. Exit Only, Secure: No outside trim, no key entry, no latch holdback, deadlocking latchbolt.

B. Manufacturers - Exit Devices:
1. Von Duprin, an Allegion brand: www.allegion.com/us.

2.08 CLOSERS

A. Closers: Complying with BHMA A156.4.
1. Provide surface-mounted, door-mounted closers unless otherwise indicated.
2. Provide a door closer on every exterior door.
3. Provide a door closer on every fire- and smoke-rated door. Spring hinges are not an acceptable self-closing device unless specifically so indicated.
4. On pairs of swinging doors, if an overlapping astragal is present, provide coordinator to ensure the leaves close in proper order.

2.09 STOPS AND HOLDERS

A. Stops: Complying with BHMA A156.8; provide a stop for every swinging door, unless otherwise indicated.
1. Provide wall stops, unless otherwise indicated.
2. If wall stops are not practical, due to configuration of room or furnishings, provide overhead stop.
3. Stop is not required if positive stop feature is specified for door closer; positive stop feature of door closer is not an acceptable substitute for a stop unless specifically so stated.

2.10 GASKETING AND THRESHOLDS

A. Gaskets: Complying with BHMA A156.22.
1. On each door in smoke partition, provide smoke gaskets; top, sides, and meeting stile of pairs. If fire/smoke partitions are not indicated on drawings, provide smoke gaskets on each door identified as a "smoke door" and 20-minute rated fire doors.
2. On each exterior door, provide weatherstripping gaskets, unless otherwise indicated; top, sides, and meeting stiles of pairs.
   a. Where exterior door is also required to have fire or smoke rating, provide gaskets functioning as both smoke and weather seals.
3. On each exterior door, provide door bottom sweep, unless otherwise indicated.

B. Thresholds: Complying with BHMA A156.21.
1. At each exterior door, provide a threshold unless otherwise indicated.

C. Manufacturers - Gasketing and Thresholds:
1. National Guard Products, Inc; _____: www.ngpinc.com.
2. Pemko Manufacturing Co; _____: www.pemko.com.
3. Substitutions: See Section 01 6000 - Product Requirements.

2.11 PROTECTION PLATES AND ARCHITECTURAL TRIM

A. Protection Plates:
1. Kickplate: Provide on push side of every door with closer, except aluminum storefront and glass entry doors.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install hardware in accordance with manufacturer's instructions and applicable codes.

B. Use templates provided by hardware item manufacturer.

C. Mounting heights for hardware from finished floor to center line of hardware item.

D. Set exterior door thresholds with full-width bead of elastomeric sealant on each point of contact with floor providing a continuous weather seal; anchor thresholds with stainless steel countersunk screws.

3.02 CLEANING

A. Clean adjacent surfaces soiled by hardware installation. Clean finished hardware per manufacturer's instructions after final adjustments has been made. Replace items that cannot be cleaned to manufacturer's level of finish quality at no additional cost.

3.03 PROTECTION

A. Protect finished Work under provisions of Section 01 7000 - Execution and Closeout Requirements.

B. Do not permit adjacent work to damage hardware or finish.

HARDWARE SETS

4.01 HARDWARE SETS - GENERAL

4.02 SWING DOORS -- NOT REQUIRING KEY LOCKING

A. HW-1: Push/Pull, Non-Fire-Rated: (110, 111)
   1. Closer.
   2. Push/Pull.
   3. Hinges.
   4. Kickplate.
   5. Silencers.
   6. Wall mounted door stop.

B. HW-2: Latchset, Non-Fire-Rated. (105)
   1. Latchset, Passage.
   2. Hinges.
   3. Kickplate.
   4. Silencers.
   5. Wall mounted door stop.

C. HW-5: Privacy Lockset, Non-Fire-Rated: (106, 107)
   1. Lockset, Privacy.
   2. Hinges.
   3. Silencers.
   4. Kickplate.
   5. Vacant/Occupied thumb turn.
   6. Wall mounted door stop.

4.03 SWING DOORS -- LOCKABLE, MAY BE LEFT UNLOCKED, KEY NOT REQUIRED TO LOCK

A. HW-13: Public Entrance, Exit Device, Lockable, Non-Fire-Rated: (112B)
   1. Closer.
   2. Exit Device, Rim, Entry/Exit, Free Swing, lever outside trim.
   3. Hinges.

4.04 SWING DOORS -- KEY REQUIRED TO LOCK, MAY BE LEFT UNLOCKED

A. HW-20: Classroom Lock, Non-Fire-Rated: (102A, 103, 104)
   1. Lockset, Classroom.
   2. Hinges.

3. Kickplate.
4. Silencers.
5. Wall mounted door stop.

4.05 SWING DOORS -- EXIT ONLY, MAY NOT BE LEFT UNLOCKED

A. HW-41: Exit Only, Exit Device, Self-Closing, Fire-Rated and Non-Fire-Rated: (109B)
1. Closer.
2. Exit Device, Exit Only Secure.
3. Hinges.
4. Kickplate.
5. Weather stripping.
6. Threshold.

END OF SECTION

SECTION 08 8000
GLAZING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Glazing units.

B. Glazing compounds and accessories.

1.02 RELATED REQUIREMENTS

A. Section 08 4313 - Aluminum-Framed Storefronts: Glazing furnished as part of storefront assembly.

1.03 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.

C. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers; 2005 (Reapproved 2011).

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

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

F. GANA (SM) - GANA Sealant Manual; 2008.

1.04 SUBMITTALS

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

B. Product Data on Glazing Unit Glazing Types: Provide structural, physical and environmental characteristics, size limitations, special handling and installation requirements.

C. Product Data on Glazing Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements. Identify available colors.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years documented experience.

1.06 FIELD CONDITIONS

A. Do not install glazing when ambient temperature is less than 40 degrees F.

B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.07 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.01 GLASS MATERIALS

A. Float Glass: Provide float glass based glazing unless noted otherwise.
   1. Fully Tempered Safety Glass: Complies with ANSI Z97.1 and 16 CFR 1201 criteria.
   2. Thicknesses: As indicated; provide greater thickness as required for exterior glazing wind load design.

2.02 GLAZING UNITS

A. Type G-2 - Monolithic Interior Vision Glazing:
   1. Applications: Interior glazing unless otherwise indicated.
   2. Glass Type: Fully tempered float glass.
   3. Tint: Clear.

4. Thickness: 1/4 inch, nominal.

2.03 GLAZING COMPOUNDS

A. Type GC-5 - Silicone Sealant: Single component; neutral curing; capable of water immersion without loss of properties; non-bleeding, non-staining; ASTM C920, Type S, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 15 to 25; color as selected.

2.04 ACCESSORIES

A. Setting Blocks: Silicone, with 80 to 90 Shore A durometer hardness; ASTM C864 Option II. Length of 0.1 inch for each square foot of glazing or minimum 4 inch x width of glazing rabbet space minus 1/16 inch x height to suit glazing method and pane weight and area.

B. Glazing Tape, Back Bedding Mastic Type: Preformed, butyl-based, 100 percent solids compound with integral resilient spacer rod applicable to application indicated; 5 to 30 cured Shore A durometer hardness; coiled on release paper; black color.

PART 3 EXECUTION

3.01 VERIFICATION OF CONDITIONS

A. Verify that openings for glazing are correctly sized and within tolerances, including those for size, squareness, and offsets at corners.

B. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and support framing is ready to receive glazing system.

3.02 PREPARATION

A. Clean contact surfaces with appropriate solvent and wipe dry within maximum of 24 hours before glazing. Remove coatings that are not tightly bonded to substrates.

B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.

C. Prime surfaces scheduled to receive sealant where required for proper sealant adhesion.

3.03 INSTALLATION, GENERAL

A. Install glazing in compliance with written instructions of glass, gaskets, and other glazing material manufacturers, unless more stringent requirements are indicated, including those in glazing referenced standards.

B. Install glazing sealants in accordance with ASTM C1193, GANA (SM), and manufacturer's instructions.

3.04 INSTALLATION - DRY GLAZING METHOD (TAPE AND TAPE)

A. Application - Interior Glazed: Set glazing infills from the interior of the building.

B. Cut glazing tape to length and set against permanent stops, projecting 1/16 inch above sight line.

C. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.

D. Rest glazing on setting blocks and push against tape for full contact at perimeter of pane or unit.

E. Place glazing tape on free perimeter of glazing in same manner described above.

F. Install removable stop without displacement of tape. Exert pressure on tape for full continuous contact.

G. Carefully trim protruding tape with knife.

3.05 INSTALLATION - WET/DRY GLAZING METHOD (TAPE AND SEALANT)

A. Application - Interior Glazed: Set glazing infills from the interior of the building.

B. Cut glazing tape to length and install against permanent stops, projecting 1/16 inch above sight line.

C. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.

D. Rest glazing on setting blocks and push against tape to ensure full contact at perimeter of pane or unit.

E. Install removable stops, spacer shims inserted between glazing and applied stops at 24 inch intervals, 1/4 inch below sight line.

F. Fill gaps between pane and applied stop with silicone type sealant to depth equal to bite on glazing, to uniform and level line.

G. Carefully trim protruding tape with knife.

3.06 FIELD QUALITY CONTROL

A. Glass and Glazing product manufacturers to provide field surveillance of the installation of their products.

B. Monitor and report installation procedures and unacceptable conditions.

3.07 CLEANING

A. Remove excess glazing materials from finish surfaces immediately after application using solvents or cleaners recommended by manufacturers.

B. Remove non-permanent labels immediately after glazing installation is complete.

C. Clean glass and adjacent surfaces after sealants are fully cured.

D. Clean glass on both exposed surfaces not more than 4 days prior to Date of Substantial Completion in accordance with glass manufacturer's written recommendations.

3.08 PROTECTION

A. After installation, mark pane with an 'X' by using removable plastic tape or paste; do not mark heat absorbing or reflective glass units.

B. Remove and replace glass that is damaged during construction period prior to Date of Substantial Completion.

3.09 SCHEDULES

A. Aluminum Window Glazing: Glass Type G2, install glass using wet/dry method with Type GC-5 glazing compound.

B. Aluminum-Framed Storefront Glazing: Glass Type G2, install glass using dry method, and with glass thickness as required to comply with performance requirements indicated in Section 08 4313.

END OF SECTION

SECTION 09 2116
GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Metal stud wall framing.

B. Metal channel ceiling framing.

C. Gypsum wallboard.

D. Joint treatment and accessories.

E. Textured finish system.

F. Water-resistive barrier over exterior wall sheathing.

1.02 RELATED REQUIREMENTS

A. Section 06 1000 - Rough Carpentry: Wood blocking product and execution requirements.

B. Section 09 2216 - Non-Structural Metal Framing.

1.03 REFERENCE STANDARDS

A. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2015.

B. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; 2014.

C. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2015.

D. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2013.

E. 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.

F. 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.

G. ASTM C1047 - Standard Specification for Accessories For Gypsum Wallboard and Gypsum Veneer Base; 2014a.

H. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2014.

I. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2012.

J. GA-216 - Application and Finishing of Gypsum Board; 2013.

K. GA-600 - Fire Resistance Design Manual; 2015.

1.04 SUBMITTALS

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

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

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

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing gypsum board installation and finishing, with minimum __ years of experience, with minimum 3 years of documented experience.

PART 2 PRODUCTS

2.01 METAL FRAMING MATERIALS

A. 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.
   1. Studs: "C" shaped with flat or formed webs with knurled faces.
   2. Runners: U shaped, sized to match studs.
   3. Ceiling Channels: C-shaped.

2.02 BOARD MATERIALS

A. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
   1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
   2. Thickness:
      a. Vertical Surfaces: 5/8 inch.

B. Backing Board For Wet Areas: One of the following products:
   1. Application: Surfaces behind tile in wet areas including lavatories and water closets.
   2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.

2.03 ACCESSORIES

A. Acoustic Insulation: As specified in Section 07 2100.

B. Beads, Joint Accessories, and Other Trim: ASTM C1047, rigid plastic, unless noted otherwise.
   1. Rigid Corner Beads: Low profile, for 90 degree outside corners and archways.

C. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
   1. Tape: 2 inch wide, creased paper tape for joints and corners, except as otherwise indicated.

D. High Build Drywall Surfacer: Vinyl acrylic latex-based coating for spray application, designed to take the place of skim coating and separate paint primer in achieving Level 5 finish.

E. Textured Finish Materials: Latex-based compound; plain.

F. Screws for Fastening of Gypsum Panel Products to Cold-Formed Steel Studs Less than 0.033 inch in Thickness and Wood Members: ASTM C1002; self-piercing tapping screws, corrosion resistant.

G. 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.

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 FRAMING INSTALLATION

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

B. Studs: Space studs at 16 inches on center.
   1. Extend partition framing to structure where indicated and to ceiling in other locations.
   2. Partitions Terminating at Ceiling: Attach ceiling runner securely to ceiling track in accordance with manufacturer's instructions.
   3. 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.

C. Blocking: Install wood blocking for support of:
   1. Framed openings.
   2. Wall mounted cabinets.

3. Plumbing fixtures.
4. Toilet partitions.
5. Toilet accessories.
6. Wall mounted door hardware.

3.03 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 Non-Rated: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.

3.04 INSTALLATION OF TRIM AND ACCESSORIES

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

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

3.05 JOINT TREATMENT

A. 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 and other areas specifically indicated.
   2. Level 2: In utility areas, behind cabinetry, and on backing board to receive tile finish.
   3. Level 1: Wall areas above finished ceilings, whether or not accessible in the completed construction.

B. 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.

C. Where Level 5 finish is indicated, spray apply high build drywall surfacer over entire surface after joints have been properly treated; achieve a flat and tool mark-free finish.

3.06 TEXTURE FINISH

A. Apply finish texture coating by means of spraying apparatus in accordance with manufacturer's instructions and to match approved sample.

3.07 TOLERANCES

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

END OF SECTION

SECTION 09 2216
NON-STRUCTURAL METAL FRAMING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Metal partition framing.

B. Framing accessories.

1.02 RELATED REQUIREMENTS

A. Section 07 9200 - Joint Sealants: Sealing acoustical gaps in construction other than gypsum board or plaster work.

B. Section 09 2116 - Gypsum Board Assemblies: Metal studs for gypsum board partition framing.

1.03 REFERENCE STANDARDS

A. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; 2014.

B. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2015.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing the work of this section with minimum five years documented experience and approved by manufacturer.

PART 2 PRODUCTS

2.01 FRAMING MATERIALS

A. 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.

1. Studs: C shaped with flat or formed webs with knurled faces.
2. Runners: U shaped, sized to match studs.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

3.02 INSTALLATION OF STUD FRAMING

A. Extend partition framing to structure where indicated and to ceiling in other locations.

B. Partitions Terminating at Ceiling: Attach ceiling runner securely to ceiling track in accordance with manufacturer's instructions.

C. Align and secure top and bottom runners at 24 inches on center.

D. Fit runners under and above openings; secure intermediate studs to same spacing as wall studs.

E. Align stud web openings horizontally.

F. Secure studs to tracks using crimping method. Do not weld.

G. Fabricate corners using a minimum of three studs.

H. Double stud at wall openings, door and window jambs, not more than 2 inches from each side of openings.

I. Coordinate installation of bucks, anchors, and blocking with electrical, mechanical, and other work to be placed within or behind stud framing.

3.03 TOLERANCES

A. Maximum Variation From True Position: 1/8 inch in 10 feet.

B. Maximum Variation From Plumb: 1/8 inch in 10 feet.

END OF SECTION

SECTION 09 5100
SUSPENDED ACOUSTICAL CEILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Suspended metal grid ceiling system.

B. Acoustical units.

1.02 RELATED REQUIREMENTS

A. Section 23 3700 - Air Outlets and Inlets: Air diffusion devices in ceiling.

B. Section 26 5100 - Interior Lighting: Light fixtures in ceiling system.

1.03 REFERENCE STANDARDS

A. ASTM C635/C635M - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 2013a.

B. 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.

C. ASTM E1264 - Standard Classification for Acoustical Ceiling Products; 2014.

D. UL (FRD) - Fire Resistance Directory; current edition.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.

B. Do not install acoustical units until after interior wet work is dry.

1.05 SUBMITTALS

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

B. Product Data: Provide data on suspension system components and acoustical units.

C. Samples: Submit two full size samples illustrating material and finish of acoustical units.

D. Samples: Submit two samples each, of suspension system main runner, cross runner, and connector.

E. Manufacturer's Installation Instructions: Indicate special procedures.

F. 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: 10 sq ft of each type and size.
   3. Extra Acoustical Units: Quantity equal to 5 percent of total installed.

1.06 QUALITY ASSURANCE

A. Fire-Resistive Assemblies: Complete assembly listed and classified by UL (FRD) for the fire resistance indicated.

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

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

1.07 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

2.01 ACOUSTICAL UNITS

A. Acoustical Units - General: ASTM E1264, Class A.

1. Units for Installation in Fire-Rated Suspension System: Listed and classified for the fire-resistive assembly as part of suspension system.

B. Acoustical Tile: Mineral fiber, ASTM E1264 Type III, with to the following characteristics:
   1. Size: 24 x 48 inches.
   2. Thickness: 5/8 inches.
   3. Composition: Mineral fiber.
   4. Edge: Square.
   5. Surface Color: White.
   6. Products:

2.02 SUSPENSION SYSTEM(S)

A. Suspension Systems - General: Complying with ASTM C635/C635M; die cut and interlocking components, with stabilizer bars, clips, splices, perimeter moldings, and hold down clips as required.

B. Exposed Steel Suspension System: Formed steel, commercial quality cold rolled; intermediate-duty; heavy-duty.
   1. Profile: Tee; 15/16 inch wide face.
   2. Finish: White painted.
   3. Products:

2.03 ACCESSORIES

A. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.

B. Perimeter Moldings: Same material and finish as grid.
   1. At Exposed Grid: Provide L-shaped molding for mounting at same elevation as face of grid.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that layout of hangers will not interfere with other work.

3.02 INSTALLATION - SUSPENSION SYSTEM

A. Install suspension system in accordance with ASTM C636/C636M, ASTM E580/E580M, and manufacturer's instructions and as supplemented in this section.

B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of l/360.

C. Lay out system to a balanced grid design with edge units no less than 50 percent of acoustical unit size.

D. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.

E. 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.

F. 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.

G. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.

H. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.

I. Do not eccentrically load system or induce rotation of runners.

J. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.

1. Use longest practical lengths.
2. Overlap and rivet corners.

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 units after above-ceiling work is complete.

E. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.

F. Cutting Acoustical Units:
1. Cut to fit irregular grid and perimeter edge trim.
2. Make field cut edges of same profile as factory edges.

G. Where round obstructions occur, provide preformed closures to match perimeter molding.

H. Install hold-down clips on each panel to retain panels tight to grid system; comply with fire rating requirements.

I. Install hold-down clips on panels within 10 ft of an exterior door.

3.04 TOLERANCES

A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.

B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

END OF SECTION

SECTION 09 6500
RESILIENT FLOORING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Resilient tile flooring.

B. Resilient base.

C. Installation accessories.

1.02 REFERENCE STANDARDS

A. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2014c.

B. ASTM F1700 - Standard Specification for Solid Vinyl Tile; 2013a.

C. ASTM F1861 - Standard Specification for Resilient Wall Base; 2008 (Reapproved 2012).

D. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source; 2015.

E. RFCI (RWP) - Recommended Work Practices for Removal of Resilient Floor Coverings; Resilient Floor Covering Institute; October 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; including sizes, patterns and colors available; and installation instructions.

C. Selection Samples: Submit manufacturer's complete set of color samples for Architect's initial selection.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Protect roll materials from damage by storing on end.

1.05 FIELD CONDITIONS

A. 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. Vinyl Tile: Solid vinyl with color and pattern throughout thickness.
   1. Manufacturers:
      a. Patcraft: www.patcraft.com.
   2. Minimum Requirements: Comply with ASTM F1700, of Class corresponding to type specified.
   3. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E 648 or NFPA 253.
   4. Tile Size: 12 by 35 inch.
   5. Total Thickness: 0.100 inch.
   6. Pattern: striped.

2.02 RESILIENT BASE

A. Resilient Base: ASTM F1861, Type TS rubber, vulcanized thermoset; top set Style B, Cove.
   1. Height: 4 inch.
   2. Thickness: 0.125 inch thick.
   3. Finish: Satin.
   4. Color: As indicated on drawings.
   5. Manufacturers:

a. Burke Flooring: www.burkemercer.com.
b. Johnsonite, a Tarkett Company: www.johnsonite.com.
c. Roppe Corp: www.roppe.com.

2.03 ACCESSORIES

A. Primers, Adhesives, and Seam Sealer: Waterproof; types recommended by flooring manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.

3.02 PREPARATION

A. Remove existing resilient flooring and flooring adhesives; follow the recommendations of RFCI (RWP).

B. Prepare floor substrates as recommended by flooring and adhesive manufacturers.

C. Clean substrate.

3.03 INSTALLATION

A. Starting installation constitutes acceptance of sub-floor conditions.

B. Install in accordance with manufacturer's written instructions.

C. Spread only enough adhesive to permit installation of materials before initial set.

D. Fit joints and butt seams tightly.

E. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.

3.04 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.

3.05 RESILIENT BASE

A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints.

B. Install base on solid backing. Bond tightly to wall and floor surfaces.

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.

END OF SECTION

SECTION 09 6813
TILE CARPETING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Carpet tile, fully adhered.

B. Removal of existing carpet tile.

1.02 RELATED REQUIREMENTS

1.03 REFERENCE STANDARDS

A. ASTM D2859 - Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials; 2006 (Reapproved 2011).

B. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2014c.

C. CRI 104 - Standard for Installation of Commercial Carpet; 2015.

D. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source; 2015.

1.04 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, colors available, and method of installation.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in installing carpet tile with minimum three years documented experience and approved by carpet tile manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Tile Carpeting:
   1. Lees Carpets: www.leescarpets.com.

2.02 MATERIALS

A. Tile Carpeting: Tufted, manufactured in one color dye lot.
   1. Product: Class Act manufactured by Lees.
   2. Tile Size: 24 by_24 inch, nominal.
   3. Color: 418 Distinctive.
   4. Pattern: Get Around.
   5. Critical Radiant Flux: Minimum of 0.22 watts/sq cm, when tested in accordance with ASTM E648 or NFPA 253.

2.03 ACCESSORIES

A. Sub-Floor Filler: White premix latex; type recommended by flooring material manufacturer.

B. Edge Strips: Embossed aluminum, silver color.

C. Carpet Tile Adhesive: Recommended by carpet tile manufacturer; releasable type.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that sub-floor surfaces are smooth and flat within tolerances specified for that type of work and are ready to receive carpet tile.

3.02 PREPARATION

A. Remove existing carpet tile.

B. Prepare floor substrates as recommended by flooring and adhesive manufacturers.

3.03 INSTALLATION

A. Starting installation constitutes acceptance of sub-floor conditions.

B. Install carpet tile in accordance with manufacturer's instructions.

C. Blend carpet from different cartons to ensure minimal variation in color match.

D. Cut carpet tile clean. Fit carpet tight to intersection with vertical surfaces without gaps.

E. Lay carpet tile in square pattern, with pile direction parallel to next unit, set parallel to building lines.

F. Fully adhere carpet tile to substrate.

G. Trim carpet tile neatly at walls and around interruptions.

H. Complete installation of edge strips, concealing exposed edges.

3.04 CLEANING

A. Remove excess adhesive without damage, from floor, base, and wall surfaces.

B. Clean and vacuum carpet surfaces.

END OF SECTION

SECTION 09 9000
PAINTING AND COATING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface preparation.

B. Field application of paints.

C. Scope: Finish all interior and exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:

D. Do Not Paint or Finish the Following Items:
   1. Items fully factory-finished unless specifically so 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, and operating parts of equipment.
   5. Floors, unless specifically so indicated.
   6. Glass.
   7. Concealed pipes, ducts, and conduits.

1.02 REFERENCE STANDARDS

A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.

1.03 SUBMITTALS

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

B. Product Data: Provide complete list of all 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.

C. Samples: Submit 2 paper chip samples, 8 1/2" x 11" inch in size illustrating range of colors and textures available for each surface finishing product scheduled.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum 3 years documented experience.

1.05 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.

1.06 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.

C. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Provide all paint and coating products used in any individual system from the same manufacturer; no exceptions.

B. Paints:
   1. Diamond Vogel Paints: www.diamondvogel.com.
   2. Benjamin Moore & Co: www.benjaminmoore.com.
   3. Sherwin-Williams Company: www.sherwin-williams.com.

C. Substitutions: See Section 01 6000 - Product Requirements.

2.02 PAINTS AND COATINGS - GENERAL

A. Paints and Coatings: Ready mixed, unless intended to be a field-catalyzed coating.
   1. Provide paints and coatings 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 coating material in quantity required to complete entire project's work from a single production run.
   3. Do not reduce, thin, or dilute coatings or add materials to coatings unless such procedure is specifically described in manufacturer's product instructions.

B. Primers: As follows unless other primer is required or recommended by manufacturer of top coats; where the manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by the manufacturer.
   1. Gypsum Board: Interior Institutional Low Odor/VOC Primer Sealer; MPI #149.
   2. Concrete: Interior Institutional Low Odor/VOC Primer Sealer; MPI #149.

C. Volatile Organic Compound (VOC) Content:
   1. Provide coatings that comply with the most stringent requirements specified in the following:
      a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
   2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.

2.03 PAINT SYSTEMS - EXTERIOR

A. Paint ME-OP-2A - Ferrous Metals, Primed, Alkyd, 2 Coat:
   1. Touch-up with rust-inhibitive primer recommended by top coat manufacturer.
   2. Semi-gloss: Two coats of alkyd enamel.

2.04 PAINT SYSTEMS - INTERIOR

A. Paint I-OP - All Interior Surfaces Indicated to be Painted, Unless Otherwise Indicated: Including gypsum board and concrete masonry.
   1. Two top coats and one coat primer.
   2. Primer(s): As recommended by manufacturer of top coats.

B. Paint I-OP-MD-DT - Medium Duty Door/Trim: For surfaces subject to frequent contact by occupants, including metals:
   1. Two top coats and one coat primer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.

C. Test shop-applied primer for compatibility with subsequent cover materials.

D. 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 Unit Masonry: 12 percent.

3.02 PREPARATION

A. Clean surfaces thoroughly and correct defects prior to coating 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 and Unit Masonry Surfaces to be Painted: Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter. Remove oil and grease with a solution of tri-sodium phosphate; rinse well and allow to dry. Remove stains caused by weathering of corroding metals with a solution of sodium metasilicate after thoroughly wetting with water. Allow to dry.

G. Gypsum Board Surfaces to be Painted: Fill minor defects with filler compound. Spot prime defects after repair.

H. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

3.03 APPLICATION

A. Apply products in accordance with manufacturer's instructions.

B. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

C. Apply each coat to uniform appearance.

D. Sand metal surfaces lightly between coats to achieve required finish.

E. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

F. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for general requirements for field inspection.

3.05 CLEANING

A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.06 PROTECTION

A. Protect finished coatings until completion of project.

B. Touch-up damaged coatings after Substantial Completion.

END OF SECTION

SECTION 10 2113.19
PLASTIC TOILET COMPARTMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Solid plastic toilet compartments.

1.02 RELATED REQUIREMENTS

A. Section 06 1000 - Rough Carpentry: Blocking and supports.

B. Section 10 2800 - Toilet, Bath, and Laundry Accessories.

1.03 REFERENCE STANDARDS

A. NFPA 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth; 2015.

1.04 SUBMITTALS

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

B. Product Data: Provide data on panel construction, hardware, and accessories.

C. Samples: Submit one samples of partition panels, 2 by 2 inch in size illustrating panel finish, color, and sheen.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Solid Plastic Toilet Compartments:
   1. Scranton Products (Santana/Comtec/Capital): www.scrantonproducts.com.
   2. Substitutions: Section 01 6000 - Product Requirements.

2.02 SOLID PLASTIC TOILET COMPARTMENTS

A. Toilet Compartments: Factory fabricated doors, pilasters, and divider panels made of solid molded high density polyethylene (HDPE), tested in accordance with NFPA 286, floor-mounted unbraced.

B. Doors:
   1. Thickness: 1 inch.
   2. Width: 24 inch.
   3. Width for Handicapped Use: 36 inch, out-swinging.
   4. Height: 55 inch.

C. Panels:
   1. Thickness: 1 inch.
   2. Height: 55 inch.

D. Pilasters:
   1. Thickness: 1 inch.
   2. Width: As required to fit space; minimum 3 inch.

2.03 ACCESSORIES

A. Pilaster Shoes: Formed chromed steel with satin finish, 3 in high, concealing floor fastenings.

B. Pilaster Brackets: Polished stainless steel.

C. Wall Brackets: Continuous type, polished stainless steel.

D. Attachments, Screws, and Bolts: Stainless steel, tamper proof type.

E. Hardware: Polished stainless steel:
   1. Pivot hinges, gravity type, adjustable for door close positioning; two per door.
   2. Door Latch: Slide type with exterior emergency access feature.
   3. Door strike and keeper with rubber bumper; mounted on pilaster in alignment with door latch.

4. Coat hook with rubber bumper; one per compartment, mounted on door.
5. Provide door pull for outswinging doors.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify correct spacing of and between plumbing fixtures.

C. Verify correct location of built-in framing, anchorage, and bracing.

3.02 INSTALLATION

A. Install partitions secure, rigid, plumb, and level in accordance with manufacturer's instructions.

B. Maintain 3/8 to 1/2 inch space between wall and panels and between wall and end pilasters.

C. Attach panel brackets securely to walls using anchor devices.

D. Attach panels and pilasters to brackets. Locate head rail joints at pilaster center lines.

3.03 TOLERANCES

A. Maximum Variation From True Position: 1/4 inch.

B. Maximum Variation From Plumb: 1/8 inch.

3.04 ADJUSTING

A. Adjust and align hardware to uniform clearance at vertical edge of doors, not exceeding 3/16 inch.

END OF SECTION

SECTION 10 2800

TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Accessories for toilet rooms.

B. Electric hand/hair dryers.

C. Grab bars.

1.02 RELATED REQUIREMENTS

A. Section 06 1000 - Rough Carpentry: Placement of reinforcement for backing plate reinforcement.

1.03 REFERENCE STANDARDS

A. ASTM A269/A269M - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service; 2015.

B. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.

C. ASTM C1036 - Standard Specification for Flat Glass; 2011.

D. ASTM C1503 - Standard Specification for Silvered Flat Glass Mirror; 2008 (Reapproved 2013).

E. 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, concealed ceiling supports, and reinforcement of toilet partitions 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. Samples: Submit two samples of each accessory, illustrating color and finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Toilet Accessories:
   1. ASI - American Specialties, Inc: www.americanspecialties.com.
   2. Bradley Corporation: www.bradleycorp.com.

B. Electric Hand/Hair Dryers:
   1. American Dryer, Inc; ExtremeAir CPC: www.americandryer.com.
   2. World Dryer Corporation: www.worlddryer.com.
   3. Substitutions: Section 01 6000 - Product Requirements.

2.02 MATERIALS

A. 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. Keys: Provide keys for each accessory to Owner .

C. Stainless Steel Sheet: ASTM A666, Type 304.

D. Stainless Steel Tubing: ASTM A269/A269M, Type 304 or 316.

E. Mirror Glass: Annealed float glass, ASTM C1036 Type I, Class 1, Quality Q2, with silvering, protective and physical characteristics complying with ASTM C1503.

F. Fasteners, Screws, and Bolts: Hot dip galvanized; tamper-proof; security type.

G. Expansion Shields: Fiber, lead, or rubber as recommended by accessory manufacturer for component and substrate.

2.03 FINISHES

A. Stainless Steel: No. 4 Brushed finish, unless otherwise noted.

2.04 TOILET ROOM ACCESSORIES

A. Toilet Paper Dispenser: Double roll, surface mounted bracket type, plastic.

B. Waste Receptacle: Stainless steel, freestanding style with swing top.
   1. Liner: Removable, heavy-duty vinyl liner, attached at a minimum of 4 points with stainless steel grommets and hooks.
   2. Minimum capacity: 20 gallons.

C. Soap Dispenser (Owner provided): Liquid soap dispenser, wall-mounted, surface, with plastic cover and tank and working parts; push type soap valve, check valve, and window gage refill indicator, tumbler lock.
   1. Minimum Capacity: 48 ounces.

D. Mirrors: Stainless steel framed, 1/4 inch thick annealed float glass; ASTM C1036.
   1. Size: 24x36 inches.
   2. Frame: 0.05 inch angle shapes, with mitered and welded and ground corners, and tamperproof hanging system; No.4 finish.
   3. Backing: Full-mirror sized, minimum 0.03 inch galvanized steel sheet and nonabsorptive filler material.
   4. Adjustable Tilt Mirrors: Stainless steel piano hinge full width of base and elbow hinges at sides of mirror, for minimum tilt forward from top of 6 inches.
   5. Shelf: Stainless steel; gage and finish to match mirror frame, turned down edges, welded to frame; 5 inches deep, full width of mirror.

E. Grab Bars: Stainless steel, nonslip grasping surface finish.
   1. Standard Duty Grab Bars:
      a. Push/Pull Point Load: 250 pound-force, minimum.
      b. Dimensions: 1-1/4 inch outside diameter, minimum 0.05 inch wall thickness, exposed flange mounting, 1-1/2 inch clearance between wall and inside of grab bar.
      c. Length and Configuration: As indicated on drawings.

F. Diaper Changing Station: Wall-mounted folding diaper changing station for use in commercial toilet facilities, meeting or exceeding ASTM F 2255.
   1. Style: Horizontal.
   2. Material: Polyethylene.
   3. Mounting: Surface.
   4. Color: Gray.
   5. Manufacturers:
      a. Bradley Corporation: www.bradleycorp.com.
      b. Koala Kare Products: www.koalabear.com.
      c. Substitutions: 01 6000 - Product Requirements.

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 INSTALLATION

A. Install accessories in accordance with manufacturers' instructions in locations indicated on the drawings.

B. Install plumb and level, securely and rigidly anchored to substrate.

C. Mounting Heights: As required by accessibility regulations, unless otherwise indicated.
   1. Grab Bars: As indicated on the drawings.
   2. Mirrors: 40 inch, measured to bottom of mirrored surface.
   3. Electric Hand Dryers: Measured to bottom of nozzle:
      a. Men: 42 inch.
      b. Women: 42 inches.
   4. Other Accessories: As indicated on the drawings.

3.03 PROTECTION

A. Protect installed accessories from damage due to subsequent construction operations.

END OF SECTION

SECTION 12 2400
WINDOW SHADES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Window shades and accessories.

1.02 RELATED REQUIREMENTS

A. Section 06 1000 - Rough Carpentry: Concealed wood blocking for attachment of headrail brackets.

B. Section 09 2116 - Gypsum Board Assemblies: Substrate for window shade systems.

1.03 REFERENCE STANDARDS

A. NFPA 701 - Standard Methods of Fire Tests for Flame Propagation of Textiles and Films; 2015.

1.04 SUBMITTALS

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

B. Product Data: Provide manufacturer's standard catalog pages and data sheets including materials, finishes, fabrication details, dimensions, profiles, mounting requirements, and accessories.

C. Verification Samples: Minimum size 6 inches square, representing actual materials, color and pattern.

D. Manufacturer's Instructions: Include instructions for storage, handling, protection, examination, preparation, and installation of product.

E. Warranty: Submit sample of manufacturer's warranty and documentation of final executed warranty completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than 15 years of documented experience.

B. Installer Qualifications: Company specializing in performing work of this type with minimum 5 years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver shades in manufacturer's unopened packaging, labeled to identify each shade for each opening.

B. Handle and store shades in accordance with manufacturer's recommendations.

1.07 WARRANTY

A. Provide manufacturer's warranty from Date of Substantial Completion, covering the following:
   1. Shade Hardware: One year.
   2. Fabric: One year.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Manually Operated Roller Shades:
   1. Draper, Inc; Clutch Operated FlexShade: www.draperinc.com.
   2. Lutron Electronics Co., Inc: www.lutron.com.
   3. Hunter Douglas: www.hunterdouglas.com.
   4. Substitutions: See Section 01 6000 - Product Requirements.

B. Shade Fabric:
   1. Phifer, Inc; Style 2390 5% and 2410 3%: www.phifer.com.
   2. SunBlock Series SB9000: www.draperinc.com.
   3. Substitutions: See Section 01 6000 - Product Requirements.

C. Source Limitations: Furnish products produced by a single manufacturer and obtained from a single supplier.

2.02 WINDOW SHADE APPLICATIONS

A. Shades: Sheer shades.
   1. Type: Roller shades.
   2. Fabric: 2410 3% Sheerweave and 2390 5% Sheerweave .
   3. Fabric Performance Requirements:
      a. Openness Factor: 3% and 5%.
   4. Color: As selected by Architect from manufacturer's full range of colors.
   5. Mounting: Inside (between jambs).
   6. Operation: Manual.

2.03 ROLLER SHADES

A. Roller Shades: Fabric roller shades complete with mounting brackets, roller tubes, hembars, hardware and accessories; fully factory-assembled.
   1. Drop: Regular roll.
   2. Size: As indicated on drawings.

B. Fabric: Non-flammable, color-fast, impervious to heat and moisture, and able to retain its shape under normal operation; PVC-free; 100 percent recycled.
   1. Sheer Shades: Reduce glare yet still reveal considerable details to the outside; no privacy; Openness Factor greater than 1 percent.
   2. Flammability: Pass NFPA 701 large and small tests.

C. Roller Tube: As required for type of operation, extruded aluminum with end caps.
   1. Fabric Attachment: Utilize extruded channel in tube to accept vinyl spline welded to fabric edge.

D. Hembars and Hembar Pockets: Wall thickness designed for weight requirements and adaptation to uneven surfaces, to maintain bottom of shade straight and flat.

E. Manual Operation: Clutch operated continuous loop; beaded ball chain.

2.04 ACCESSORIES

A. Fascias: Size as required to conceal shade mounting.
   1. Style: As selected by Architect from shade manufacturer's full selection.

B. Brackets and Mounting Hardware: As recommended by manufacturer for mounting configuration and span indicated.

C. Fasteners: Non-corrosive, and as recommended by shade manufacturer.

2.05 FABRICATION

A. Field measure finished openings prior to ordering or fabrication.

B. Fabricate shades to fit openings within specified tolerances.
   1. Vertical Dimensions: Fill openings from head to sill with 1/2 inch space between bottom bar and window sill.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine finished openings for deficiencies that may preclude satisfactory installation.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

C. Start of installation shall be considered acceptance of substrates.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions and approved shop drawings, using mounting devices as indicated.

B. Installation Tolerances:
   1. Maximum Offset From Level: 1/16 inch.

C. Adjust level, projection and shade centering from mounting bracket. Verify there is no telescoping of shade fabric. Ensure smooth shade operation.

3.03 CLEANING

A. Clean soiled shades and exposed components as recommended by manufacturer.

B. Replace shades that cannot be cleaned to "like new" condition.

3.04 PROTECTION

A. Protect installed products from subsequent construction operations.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 00 0110
TABLE OF CONTENTS

PROCUREMENT AND CONTRACTING REQUIREMENTS

1.1 DIVISION 00 -- PROCUREMENT AND CONTRACTING REQUIREMENTS

A. 00 0105 - Certifications Page

B. 00 0110 - Table of Contents

SPECIFICATIONS

2.1 DIVISION 05 -- METALS

A. 05 5000 - Metal Fabrications

2.2 DIVISION 21 -- FIRE SUPPRESSION

A. 21 1313 - Wet Pipe Fire Suppression Sprinkler Systems

2.3 DIVISION 22 -- PLUMBING

A. 22 0500 - Common Work Results For Plumbing

B. 22 0523 - General-Duty Valves for Plumbing Piping

C. 22 0529 - Hangers And Supports For Plumbing Piping And Equipment

D. 22 0553 - Identification for Plumbing Piping and Equipment

E. 22 0700 - Plumbing Insulations

F. 22 1116 - Domestic Water Piping

G. 22 1316 - Sanitary Waste and Vent Piping

H. 22 1319 - Sanitary Waste Piping Specialties

I. 22 4000 - Plumbing Fixtures

2.4 DIVISION 23 -- HEATING, VENTILATING, AND AIR-CONDITIONING (HVAC)

A. 23 0500 - Common Work Results for HVAC

B. 23 0529 - Hangers and Supports for HVAC Piping and Equipment

C. 23 0553 - Identification for HVAC Piping and Equipment

D. 23 0593 - Testing, Adjusting, and Balancing for HVAC

E. 23 0700 - HVAC Insulation

F. 23 1123 - Facility Natural Gas Piping

G. 23 2300 - Refrigerant Piping

H. 23 3113 - Metal Ducts

I. 23 3300 - Air Duct Accessories

J. 23 3700 - Wall Louvers

K. 23 3713 - Diffusers, Registers, and Grilles

L. 23 5400 - Furnaces

M. 23 7200 - Air-to-Air Energy Recovery Equipment

N. 23 8126 - Split-System Air-Conditioners

2.5 DIVISION 26 -- ELECTRICAL

A. 26 0500 - Common Work Results for Electrical

B. 26 0501 - Minor Electrical Demolition

C. 26 0519 - Low-Voltage Electrical Power Conductors and Cables

D. 26 0526 - Grounding and Bonding for Electrical Systems

E. 26 0529 - Hangers and Supports for Electrical Systems

F. 26 0534 - Conduit

G. 26 0537 - Boxes

H. 26 0553 - Identification for Electrical Systems

I. 26 0923 - Lighting Control Devices

J. 26 2726 - Wiring Devices

K. 26 2818 - Enclosed Switches

L. 26 5100 - Interior Lighting

END OF SECTION

SECTION 00 0105

CERTIFICATIONS PAGE

STATE OF IOWA

	I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly licensed Professional Engineer under the laws of the State of Iowa. _____ _____ **Signature** **Date** Printed or typed name: Karen E Hardisty License Number: 22588 My license renewal date is: 12/31/2016 Pages, Sheets, or Divisions covered by this Seal: Section 05 5000

	I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly licensed Professional Engineer under the laws of the State of Iowa. _____ _____ **Signature** **Date** Printed or typed name: Brian A Steffens License Number: 22014 My license renewal date is: 12/31/2017 Pages, Sheets, or Divisions covered by this Seal: Divisions 21, 22 and 23

	I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly licensed Professional Engineer under the laws of the State of Iowa. _____ _____ **Signature** **Date** Printed or typed name: Edin Smailovic License Number: 21953 My license renewal date is: 12/31/2016 Pages, Sheets, or Divisions covered by this Seal: Division 26

END OF SECTION

SECTION 05 5000

METAL FABRICATIONS

PART 1 GENERAL

1.1 SUMMARY

A. Products furnished, but not installed, under this Section include the following:

1. Loose steel lintels.

1.2 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of metal fabrications that are anchored to or that receive other work. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.3 ACTION SUBMITTALS

A. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide Shop Drawings for the following:

1. Loose steel lintels.

1.4 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1 (D1.1M), "Structural Welding Code - Steel."

2. AWS D1.2 (D1.2M), "Structural Welding Code - Aluminum."

3. AWS D1.3 (D1.3M), "Structural Welding Code--Sheet Steel."

4. AWS D1.6 (D1.6M), "Structural Welding Code - Stainless Steel."

1.5 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

PART 2 PRODUCTS

2.1 METALS

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

B. Steel Plates, Shapes, and Bars: ASTM A36 (A36M).

2.2 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

2.3 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

D. Form exposed work with accurate angles and surfaces and straight edges.

E. Weld corners and seams continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

2. Obtain fusion without undercut or overlap.

3. Remove welding flux immediately.

4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.

G. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

J. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1 1/2 inch (3.2 by 38 mm), with a minimum 6 inch (150 mm) embedment and 2 inch (50 mm) hook, not less than 8 inch (200 mm) from ends and corners of units and 24 inch (600 mm) o.c., unless otherwise indicated.

2.4 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.

B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.

1. Fabricate units from slotted channel framing where indicated.

2. Furnish inserts for units installed after concrete is placed.

C. Galvanize miscellaneous framing and supports where indicated.

2.5 LOOSE STEEL LINTELS

A. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Fabricate in single lengths for each opening unless otherwise indicated. Weld adjoining members together to form a single unit where indicated.

B. Size loose lintels to provide bearing length at each side of openings equal to 1/12 of clear span, but not less than 8 inch (200 mm) unless otherwise indicated.

C. Galvanize loose steel lintels located in exterior walls.

2.6 FINISHES, GENERAL

A. Finish metal fabrications after assembly.

B. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.7 STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A153 (A153M) for steel and iron hardware and with ASTM A123 (A123M) for other steel and iron products.

B. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.

1. Shop prime with universal shop primer unless zinc-rich primer is indicated.

C. Preparation for Shop Priming: Prepare surfaces to comply with SSPC-SP 3, "Power Tool Cleaning."

D. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

PART 3 EXECUTION

3.1 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

C. Field Welding: Comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

2. Obtain fusion without undercut or overlap.

3. Remove welding flux immediately.

4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.

E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

F. Corrosion Protection: Coat concealed surfaces of aluminum that come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:

1. Cast Aluminum: Heavy coat of bituminous paint.

2. Extruded Aluminum: Two coats of clear lacquer.

3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

B. Support steel girders on solid grouted masonry, concrete, or steel pipe columns. Secure girders with anchor bolts embedded in grouted masonry or concrete or with bolts through top plates of pipe columns.

1. Where grout space under bearing plates is indicated for girders supported on concrete or masonry, install as specified in "Installing Bearing and Leveling Plates" Article.

C. Install pipe columns on concrete footings with grouted baseplates. Position and grout column baseplates as specified in "Installing Bearing and Leveling Plates" Article.

1. Grout baseplates of columns supporting steel girders after girders are installed and leveled.

3.3 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

1. Apply by brush or spray to provide a minimum 2.0 mil (0.05 mm) dry film thickness.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780 (A780M).

END OF SECTION

SECTION 21 1313
WET PIPE FIRE SUPPRESSION SPRINKLER SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

A. Provide equipment, material, devices, labor, and supervision necessary to fabricate and erect a hydraulically designed wet pipe fire suppression system as required by the drawings and this section.

1.2 CODES AND REGULATIONS

A. Sprinkler system design, equipment, materials, devices, and installation shall conform to NFPA Codes and Requirements of Governmental Bodies and Bureaus as listed below:

1. NFPA 13, 14, and 101 and other standards as applicable
2. Local Fire Department
3. State Fire Marshal
4. City Building Department
5. International Building Code
6. Factory Mutual (FM)
7. Underwriters Laboratory (UL)

1.3 QUALIFICATIONS

A. All installation work shall be performed by licensed fire protection sprinkler contractors, licensed for such work where the work is to be performed.

1.4 WIRING

A. The Electrical Contractor shall furnish wiring for signal and alarm devices furnished by sprinkler contractor.

1.5 SPRINKLER DESIGN

A. The sprinkler system's hydraulic design criteria shall be indicated on the Drawings.

B. The Contractor shall coordinate with the City of Ames and shall perform a current flow test in the vicinity of this project prior to completion of the shop drawings. The results and date of the current flow test shall be clearly indicated on the first sheet of the shop drawings submitted. The sprinkler system design shall be based on the current flow test.

C. Sprinker sytem shall be an extenion/modification of the existing system. Contractor shall verify existing conditions.

1.6 SUBMITTALS

A. Product Data: Submit manufacturer's technical product data and installation instructions for all fire protection materials and products.

B. Shop Drawings: Submit scaled, dimensioned installation drawings and supporting hydraulic calculations. Provide drawings and calculations that are prepared and stamped by a Registered Engineer or by a technician with NICET level 3 certification and approved by the authority having jurisdiction.

C. Prior to submitting shop drawings or equipment submittals, this contractor shall coordinate with the electrical contractor, sprinkler contractor and general contractor if interface with those trades is applicable. Equipment space needs shall be verified prior to equipment submittal.

D. Contractor's Material & Test Certificate: Submit completed Contractor's Material & Test Certificate for each system.

E. At project closeout, submit record drawings of installed fire protection piping and products.

F. Submit operating and maintenance data and parts lists for fire protection materials and products. Include this data, product data, shop drawings, approved drawings, approved calculations, certificate of installation, and record drawings in maintenance manual.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Sprinklers

   a. ASCOA Fire Systems, Figgie International Co.

   b. Central Sprinkler Corp.

   c. Gem Sprinkler Co. Div., Grinnell Corp.

   d. Globe Fire Sprinkler Corp.

   e. Reliable Automatic Sprinkler Co., Inc.

   f. Star Sprinkler Corp.

   g. Viking Corp.

2. Grooved Couplings for Steel Piping

   a. Grinnell Supply Sales Co., Grinnell Corp.

   b. Gustin-Bacon Div., Tyler Pipe Subsid., Tyler Corp.

   c. Stockham Valves and Fittings, Inc.

   d. Victaulic Company of America

   e. Central Sprinklers Corp.

2.2 PIPES

A. Refer to Part 3 Article "Sprinkler System Piping Applications" for identification of systems where pipe and fitting materials specified below are used.

B. Steel Pipe: ASTM A53, Schedule 40, black, plan and threaded ends, for threaded, cut-groove, and rolled-groove joints.

C. Steel Pipe: ASTM A 135, Schedule 10, black, with plain ends for rolled-groove joints.

2.3 PIPE FITTINGS

A. Grooved-End Fittings for Ductile-Iron Pipe: ASTM A 536 ductile-iron or ASTM A 47 malleable-iron, AWWA pipe-size, designed to accept AWWA C606 grooved couplings. Include cement lining or Food and Drug Administration (FDA)-approved interior coating.

B. Steel Fittings: ASTM A234, seamless or welded; ASME B16.9, buttwelding; or ASME B16.11, socket-welding type for welded joints.

C. Steel Flanges and Flanged Fittings: ASME B16.5.

D. Grooved-End Fittings for Steel Pipe: UL-listed and FM-approved, ASTM A 536, Grade 65-45-12 ductile iron or ASTM A 47 Grade 32510 malleable iron, with grooves or shoulders designed to accept grooved couplings.

2.4 JOINING MATERIALS

A. Refer to Division 23 for joining materials not included in this Section.

2.5 GENERAL-DUTY VALVES

A. Refer to Division 23 for general-duty gate and ball valves.

2.6 FIRE PROTECTION SERVICE VALVES

A. General: UL-listed and FM-approved, with 175-psig non-shock minimum working pressure rating.

1. Option: Valves for use with grooved piping may be grooved type.

2.7 SPECIALTY VALVES

A. Ball Drip Valves: UL 1726 automatic drain valve, ¾-inch size, spring-loaded, ball check device with threaded ends.

1. Option: Grooved-end connections for use with grooved-end piping.

2.8 SPRINKLERS

A. Automatic Sprinklers with quick-response element conforming to:

1. UL 199 and FM-approved, for applications except residential.

B. Sprinkler types and categories are as indicated and as required by application. Furnish automatic sprinklers with nominal ½-inch orifice and ½-inch NPT.

C. Sprinkler heads shall be of the following types:

1. Areas with suspended ceiling: Quick response, recessed type, chrome plated, two piece escutcheon. Reliable Model FIFR Series or approved equivalent.

2. Sidewall: Quick response, recessed type, chrome plated, two piece escutcheon ring. Reliable Model FIFR or approved equivalent.

3. Areas without finished ceilings, in concealed spaces and under ducts: Quick response, upright head for exposed piping, brass finish. Reliable Model FIFR or approved equivalent.

4. Dry pendant for overhang areas or other areas subject to freezing, quick response, recessed type chrome-plated, two piece escutcheon ring, Reliable model F3QR series or approved equivalent.

D. Sprinkler heads shall be of the ordinary temperature range 160 deg F except where subject to high temperatures caused by unit heaters, hot pipes or other heat source, heads shall be of high temperature type, 250 deg F.

E. Sprinkler Guards: Wire-cage type, including fastening device for attaching to sprinkler.

F. Sprinkler Cabinets: Finished steel cabinet and hinged cover, with space for minimum of 6 spare sprinklers plus sprinkler wrench, suitable for wall mounting. Include number of sprinklers required by NFPA 13 and 1 wrench for sprinklers. Include separate cabinet with sprinklers and wrench for each style sprinkler on project.

2.9 SPECIALTY SPRINKLER FITTINGS

A. Mechanical "T" Fittings: UL 213, ductile-iron housing with pressure-responsive gasket, bolts, and threaded or locking-lug outlet.

B. Mechanical Cross Fittings: UL 213, ductile-iron housing with pressure-responsive gaskets, bolts, and threaded or locking-lug outlets.

C. Drop-Nipple Fittings: UL 1474, with threaded inlet, threaded outlet, and seals; adjustable.

D. Sprinkler Alarm Test Fittings: Ductile-iron housing with 1½-inch (DN 40) inlet and outlet, integral test valves, combination orifice and sight glass, and threaded or locking lug ends.

2.10 PRESSURE GAUGES

A. Pressure Gauges: UL 393, 3½" to 4½" diameter dial, with dial range of 0-250 psig.

PART 3 EXECUTION

3.1 SPRINKLER SYSTEM PIPING APPLICATIONS

A. Refer to Part 2 of this Section for detailed specifications on pipe and fittings products listed below. Use pipe, fittings, and joining methods according to the following applications. Piping may be joined with flanges instead of indicated joints. Use grooved-end fittings with grooved couplings that are made by the same manufacturer and that comply with listing when used together for grooved-coupling joints.

1. Option: Mechanical "T" bolted-branch-outlet fittings, instead of fitting types specified may be used for branch connections.

B. Drains and Pipe between Fire Department Connections and Check Valves: Use galvanized steel pipe instead of black steel pipe when steel pipe is specified for applications below. Do not use welded joints.

C. Sizes 10" and Smaller: ASTM A 53 or A 135 Schedule 40 steel pipe with rolled-groove or cut-groove ends, grooved-end steel pipe fittings, and grooved-coupling joints.

D. Sizes 2½" to 6": ASTM A 135 or A 795, Schedule 10 steel pipe with rolled groove ends, grooved-end steel pipe fittings, and grooved-coupling joints.

3.2 VALVE APPLICATIONS

A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:

1. Shut-off Duty: Use gate, ball, or butterfly valves.

2. Throttling Duty: Use globe, ball, or butterfly valves.

3.3 JOINT CONSTRUCTION

A. Refer to Division 23 for basic piping joint construction.

B. Grooved-End Pipe and Grooved-End Fitting Joints: Use groove-end fittings and grooved couplings that are made by the same manufacturer and that are listed for use together. Groove pipe and assemble joints with grooved coupling, gasket, lubricant, and bolts according to coupling and fitting manufacturer's written instructions.

C. Mechanically Formed Outlet Joints: Use UL-listed procedure and follow forming equipment manufacturer's written instructions. Drill pilot hole in tube, form branch for collar, dimple tube to form seating stop, and braze branch tube into formed-collar outlet.

D. Locking-Lug Joints: Follow manufacturer's written instructions.

3.4 PIPING INSTALLATIONS

A. Refer to Division 23 for basic piping installation and fire stopping.

B. Locations and Arrangements: Drawings (plans, schematics, and diagrams) indicate general location and arrangement of piping. Install piping as indicated, as far as practical.

1. Deviations from approved shop drawings for sprinkler piping require written approval from authority having jurisdiction. File written approval with the Architect prior to deviating from approved shop drawings.

C. Use approved fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.

D. Install flanges or flange adapters on valves, apparatus, and equipment have 2½-inch and larger connections.

E. Install combination Inspector's Test Connection and Drain in sprinkler piping, sized on the system riser, if acceptable to the authority having jurisdiction.

F. Install sprinkler piping with drains for complete system drainage.

G. Install ball drip valves to drain piping between fire department connections and check valves, and where indicated. Drain outside building.

H. Install alarm devices in piping systems.

I. Hangers and Supports: Comply with NFPA 13.

1. Install hanger and support spacing and locations for steel piping joined with grooved mechanical couplings according to manufacturer's written instructions for rigid systems.

2. Do not hang from joist bridging. Joist bridging is not considered structural.

J. Install pressure gauges on riser. Include pressure gauges with connection not less than ¼" and with soft metal seated globe valve, arranged for draining pipe between gauge and valve. Install gauges to permit removal, and install where they will not be subject to freezing.

K. Hold riser piping and components as close to wall as allowable. Install riser components vertically, when possible, rather than horizontally to minimize space requirements.

L. All piping layouts shall be coordinated with all other trades prior to installation. Coordinate any special requirements for clearances and/or installation.

3.5 HYDRAULIC CALCULATIONS

A. Size system piping such that total required system pressure at demand flow (including hose streams) is at least 5 psi less than the available pressure at demand flow. Include in calculations, the greater of the following:

1. 8-psi allowance for future reduced pressure principle backflow preventer installed at service entrance.

2. Actual backflow preventer installed.

3.6 VALVE INSTALLATIONS

A. Refer to Division 23 for installation of general-duty valves. Install fire-protection specialty valves, trim, fittings, controls, and specialties according to NFPA 13, manufacturer's written instructions, and the authority having jurisdiction.

B. Gate Valves: Install fire-protection service valves supervised-open, located to control sources of water supply excerpt from fire department connections. Where there is more than 1 control valve, provide permanently marked identification signs indicating portion of system controlled by each valve.

C. Install permanent signs supported by chains identifying all drains, test connections, and water supply valves. Install placards indicating all hydraulic design criteria for each area and permanently attach placards to riser.

3.7 SPRINKLER APPLICATIONS

A. Rooms without Ceilings: Upright sprinklers.

B. Rooms with Ceilings: Concealed sprinklers.

C. Beneath Overhead Doors, Light Monitor Areas and Gallery: Sidewall sprinklers.

D. Sprinkler Temperature Ratings: Use sprinklers with the following temperature ratings in the applications listed unless noted otherwise on drawings:

1. Ordinary Temperature Classification (165° F): Top of elevator hoistways where ambient temperatures can not exceed 100° F, bottom of elevator hoistways for hydraulic elevators, elevator machine rooms, public areas, offices, janitor's closets, mechanical equipment rooms, alteration room.

2. Intermediate Temperature Classification (212° F): Top of elevator hoistways where ambient temperatures can exceed 100° F, stock rooms, kiln room.

3.8 SPRINKLER INSTALLATIONS

A. Install sprinklers in locations indicated. When sprinkler locations are not indicated in an area, locate sprinklers to meet this specification.

B. Install sprinklers in suspended ceiling in center of acoustical panels and in center of half of acoustical panels, as shown on plans. The location of sprinklers may deviate up to 4 inches from the center, provided the deviation is continued for all sprinklers in the rows of both directions.

C. Install sprinkler guards on sprinklers under overhead doors, in the gymnasium, and on non-recessed heads within 84 inches of the floor.

3.9 CONNECTIONS

A. Connect to fire department connections and accessories.

B. Connect water supplies to sprinkler systems. Include backflow preventers.

C. Electrical Connections: Power wiring as specified in Division 26.

D. Follow NFPA 24 testing requirements of below ground piping prior to connecting to the above ground pipes.

3.10 FIELD QUALITY CONTROL

A. Perform field acceptance tests of each fire protection system with Architect/Engineer and authority having jurisdiction present.

1. Flush, test, and inspect sprinkler piping systems according to NFPA 13 Chapter "System Acceptance."

B. Replace piping system components that do not pass test procedures specified, then retest to demonstrate compliance. Repeat procedure until satisfactory results are obtained.

1. Complete the Contractor's Material & Test Certificate and submit form promptly to Owner's representative and authority having jurisdiction.

3.11 CLEANING

A. Clean dirt and debris from sprinklers. Replace sprinklers having paint other than factory finish with new sprinklers. Cleaning and reuse of painted sprinklers is prohibited.

3.12 COMMISSIONING

A. Starting Procedures: Follow manufacturer's written procedures. If manufacturer prescribes no procedures, proceed as follows:

1. Verify that valves, trim, fittings, controls, and accessories have been installed correctly and operate correctly.

2. Verify that specified tests of piping are complete.

3. Check that damaged sprinklers and sprinklers with paint or coating not specified have been replaced with new, correct type of sprinklers.

4. Check that sprinklers are correct type, have correct finish and temperature ratings, and have guards where required for applications.

5. Check that potable water supplies have correct type of backflow preventer.

6. Check that fire department connections have threads compatible with local fire department equipment and have correct pressure rating.

7. Fill wet pipe sprinkler systems with water.

8. Energize circuits to electrical equipment and devices.

9. Adjust operating controls and pressure settings.

B. Coordinate with fire alarm system tests. Operate systems as required.

3.13 DEMONSTRATION

A. Demonstrate equipment, specialties, and accessories. Review operating and maintenance information.

END OF SECTION

SECTION 22 0500
COMMON WORK RESULTS FOR PLUMBING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. The work shall include the furnishings of systems, equipment and materials specified in this Division and as called for on the Plumbing Drawings to include supervision, quality control, operation, methods and labor for the fabrication, installation, start-up and tests for the complete plumbing installation. The work shall also include the furnishing of necessary hoisting facilities to set materials and equipment in place and the furnishing of any scaffolding and transportation associated with this work.

B. Examine the project site and become familiar with existing conditions which will affect the work. Review the drawings and specifications of other trades and take note of conditions to be created which will affect the work. All conditions shall be considered in the preparation of bids; no additional compensation will be made on the behalf of this Contractor.

C. Provide labor necessary to demolish the existing plumbing systems as shown on the drawings, as described in Part 3.1, Existing Conditions, or as required.

D. Where noted on the drawings or where called for in other sections of the specification, the Contractor for this division shall install equipment furnished by others, and shall make required service connections. Verify with the supplier of the equipment the requirements for the installation. This contractor shall be responsible for the removal and installation of railings, piping, ductwork, louvers, etc. as required to install new equipment.

1.2 DAMAGE

A. The Contractor shall be responsible for damage to the work of other trades, or to the building and its contents, caused by equipment installation.

1.3 PERMITS AND INSPECTIONS

A. Obtain and furnish necessary permits and inspection certificates for material and labor furnished. Permits and certificates shall be obtained from the proper inspection authorities. The cost of permits, certificates and fees required in connection with the installation shall be borne by the Contractor, unless otherwise noted in the detailed contractual description preceding these specifications. Where applications are required for the procuring of utility services to the building, see that such application is properly filed with the utility, and that information required for such an application is presented to the extent and in the form required by the utility company.

1.4 CODES AND STANDARDS

A. Standards listed by reference, including revisions by issuing authority, form a part of this specification section to the extent indicated. Standards listed are identified by issuing authority, authority abbreviation, designation number, title or other designation established by issuing authority. Standards subsequently referenced herein are referred to by issuing authority abbreviation and standard designation.

B. Applicable provisions of the following codes and standards are hereby imposed on a general basis for the mechanical work in addition to specific applications specified by individual work sections of these specifications.

1. ANSI/ASHRAE/IES 90.1 - Energy Standard for Buildings Except Low-Rise Residential Buildings
2. IECC - International Energy Conservation Code
3. ANSI Pressure Piping Standards (B31)
4. ASME Boiler and Pressure Vessel Code and State Boiler Code
5. AWS Standards for Welding
6. NFPA/NEC 70 - National Electrical Code
7. Local and/or State Plumbing, Mechanical and Building Codes
8. Occupational Safety and Health Act (OSHA)
9. Uniform Plumbing Code
10. International Mechanical Code
11. NFPA Codes and Standards

C. Any product used for dispensing potable water shall meet NSF 61 and NSF 372 testing standards. Third party testing shall be required.

D. If any work indicated on the drawings or specified herein conflicts in any way with any of the rules and regulations of the above Authorities, the Contractor shall promptly notify the Architect/Engineer in writing and do so no less than 72 hours before bids are opened. In the event the Contractor fails to notify the Architect/Engineer and changes are required by said conflicts, the Contractor shall make such changes as are required without additional cost to this Owner.

E. Installations must be safe in every respect, and must not create a condition which will be harmful to building occupants; to operating, installing or testing personnel; to workmen; or to the public. The contractor for each installation shall be solely responsible for providing installations which will meet these conditions. If the Contractor believes that the installation will not be safe for all parties, report these beliefs in writing to the Architect/Engineer before any equipment is purchased or work is installed, giving recommendations. The Architect/Engineer will work out required changes and adjustments in contract price where adjustments are warranted.

1.5 DRAWINGS

A. A complete set of current up-to-date Project Drawings and Specifications shall be kept on the site at all times. Prior to installing any of the work, check the drawings for dimensions and see that the work does not interfere with clearance required for ceilings, beams, foundations, finished columns, pilasters, partitions and electrical equipment as shown on the drawings and details. After work is installed and it develops that interferences occur which have not been called to the Architect/Engineer's attention before the installation, the Contractor shall, at his own expense, make such changes in his work as directed by the Architect/Engineer.

B. The contract drawings for plumbing work are in part diagrammatic, intended to convey the scope of work and indicate general arrangement and approximate sizes and locations of equipment and materials. Where job conditions require reasonable changes in indicated locations and arrangement, the Contractor shall make such changes as directed by the Architect/Engineer, without additional cost to the Owner.

C. Because of the scale of the drawings, certain basic items such as pipe fittings, access panels, and sleeves may not be shown; but where such items are required by other sections of these specifications or where they are required by the nature of the work, they shall be furnished and installed. Rough-in dimensions and locations shall be verified with the supplier of equipment furnished by other trades, or by the Owner, prior to the time of roughing-in.

D. Equipment specification may not deal individually with minute items required such as components, parts, controls and devices which may be required to produce the equipment performance specified, or as required to meet the equipment warranties. Where such items are required, they shall be included by the supplier of the equipment, whether or not specifically called for.

E. The drawings and the specifications are cooperative and supplementary. It is the intent of both said drawings and specifications to cover all mechanical requirements in their entirety as nearly as possible. The Contractor shall closely check the drawings and specifications for any obvious errors or omissions and bring any such condition to the attention of the Architect/Engineer prior to the receipt of bids, in order to permit clarification by means of a mailed Addendum. If there is no question prior to the bid proposal date, the Architect/Engineer shall assume that the drawings and specifications are complete and correct and will expect the intent of said documents to be complied with, and the installation to be complete in all respects, according to said intent.

F. Locate equipment which must be serviced, operated or maintained in fully accessible positions. Minor deviations from the contract drawings may be made to allow for better accessibility, but changes of magnitude, or which involve extra cost, shall not be made without prior approval. Ample space shall be allowed for removal of parts that may require replacement or service in the future.

G. All valves, pumps, etc. shall be accessible for maintenance purposes. Locate items carefully and coordinate with other trades so that each valve and piece of equipment is accessible and functional. Items located above a non-accessible ceiling, chase, or soffit shall be accessible through an access door. Coordinate location of access doors with the general contractor.

1.6 RESPONSIBILITY

A. The Contractor's responsibility shall not end with the installation and connecting of the various apparatus. It shall include the services of an experienced superintendent, who shall be constantly in charge of the work, together with the qualified journeymen, helpers and laborers required to properly unload, install, connect, adjust, start, operate and test the work involved, including equipment and materials furnished by other trades or by the Owner, until such time as the entire plumbing installation functions properly in every detail.

1.7 COORDINATION

A. Coordinate the work with other trades prior to installation.

B. No piping or equipment, which is foreign to the electrical equipment, or architectural appurtenances shall be run over the top of any electrical panels or electrical equipment, in accordance with NEC 110.26. This does not prohibit sprinkler protection for the installation.

C. The determination of quantities of material and equipment required shall be made from the drawings. Schedules on the drawings and in the specifications are completed as an aid, but where discrepancies arise, it shall be the Contractor's responsibility to provide the required quantity.

D. Where the specifications state that equipment shall be furnished, installed or provided, it shall be understood to mean this Contractor shall furnish and install completely, unless it is specifically stated that the equipment is to be furnished and installed by others.

E. The Architect/Engineer reserves the right to determine space priority of the contractors in the event of interference between the piping and equipment of the various contractors. Conflicts between the drawings and specifications, or between requirements set forth for the various trades, shall be called to the attention of the Architect/Engineer. If clarification is not asked for prior to the taking of bids, it will be assumed that none is required, and that the Contractor has submitted his bid in conformance with plans and specifications as issued and that no interference exists.

F. No piping or equipment foreign to an elevator hoistway and machine room shall be run inside the hoistway or machine room in accordance with NEC 620.37 and ASME A17.1 Safety Code for Elevators and Escalators.

1.8 GUARANTEE AND MAINTENANCE

A. Materials and equipment shall be guaranteed to be free from defects and to be new equipment; no secondhand, used or salvaged equipment will be allowed. The Owner's existing equipment which is to be relocated or reinstalled under this contract shall be refurbished, cleaned and repaired, and made subject to the guarantee and maintenance as herein specified, unless specifically noted otherwise.

B. Keep the entire portion of the work in repair, without additional cost to the Owner, so far as defects in workmanship, apparatus, material or construction are concerned for one (1) year from the date of final acceptance, except as otherwise specified herein.

C. Equipment which fails to meet performance ratings as specified and shown on the drawings shall be removed and replaced by new equipment that meets the specified requirements, without additional cost to the Owner.

D. Materials and workmanship shall be subject to the review of the Architect/Engineer, in whose presence various tests shall be made as required by these specifications.

PART 2 PRODUCTS

2.1 SUBMITTALS

A. Submit shop drawings and catalog data for plumbing equipment as called for in front end documents.

B. Submittal data for plumbing equipment shall consist of shop drawings and/or catalog cuts showing technical data necessary to evaluate the material or equipment to include dimensions, wiring diagrams, performance curves, rating, and other descriptive data necessary to describe fully the item proposed and its operating characteristics. Shop drawings shall be submitted on equipment and materials as required by the specifications.

C. Approval of materials, including alternate or substitute items, shall be obtained in writing from the Architect/Engineer, verbal approval will not be considered binding.

D. Shop drawings shall be submitted and shall have been signed, checked, approved, and initialed by the Contractor prior to submittal to the Architect/Engineer. The Architect/Engineer will review shop drawings to aid in interpreting the plans and specifications, and will in so doing assume that the shop drawings conform to specified requirements set forth in this specification. The approval of the shop drawing by the Architect/Engineer does not relieve the Contractor of the responsibility of complying with elements of the specification. The name of the job, Architect/Engineer, location, and specification section shall appear on all pages of shop drawings. Equipment marks (such as S-1, WH-1) shall be indicated for each item.

E. Near completion of project, before conducting Owner orientation and training sessions and before authorization of final payment, submit to the Owner or their designated Representative for review: three (3) sets of installation and operational information, parts lists, and maintenance instructional manuals. These OMMs shall be organized, formatted and bound in accordance with front end documents..

F. At the completion of the project, prepare and submit to the Owner record drawings showing the location of piping and valves. Drawing shall give accurate dimensions of such equipment for future use by the Owner. This drawing shall be submitted as soon as work is completed and before authorization of final payment.

2.2 SUBCONTRACTORS AND MATERIALS

A. Submit to the Architect/Engineer for review, when requested, a list of subcontractors, materials and equipment proposed to be used. The list must be reviewed by the Architect/Engineer before this Contractor may enter into any subcontractual agreement. Equipment, materials, and devices, etc. shall be subject to the review of the Architect/Engineer, whether or not said items are herein specified.

2.3 STANDARDS OF MATERIALS AND WORKMANSHIP

A. Materials shall be new, complete with manufacturer's guarantee or warranty, and shall be as listed by Underwriters Laboratories (UL), Inc., American Water Works Association (AWWA), American Gas Association (AGA), etc., if a standard has been established by that agency for the type of material.

B. Materials shall also comply with applicable standards of the National Electrical Manufacturer's Association, National Board of Fire Underwriters, National Fire Protection Association, National Safety Council, National Bureau of Standards, the National Electrical Code and the Williams-Steiger Occupational Safety and Health Act of 1970. Such standards are hereby made a part of these specifications.

C. Work shall be performed by workmen skilled in the particular craft, shall be executed in a workmanlike manner, and shall present a neat mechanical appearance when completed. Align, level and adjust equipment for satisfactory operation, and install so that connecting and disconnecting of piping and accessories can be made readily and so that parts are easily accessible for inspection, operation and maintenance. Methods and techniques of installation shall be subject to the review of the Architect/Engineer.

D. Materials shall be the standard product of a reputable manufacturer regularly engaged in the manufacture of the specific product. Materials of the same type of class shall be the products of one manufacturer. For example, faucets shall be from the same manufacturer.

E. Materials shall be protected from damage, and stored indoors or protected from the weather at all times, unless other storage arrangements are approved by the Architect/Engineer.

F. Bearing lubrication fittings shall be as recommended by the manufacturer and shall be extended, where necessary, to an accessible location.

G. Material and equipment shall be installed in strict accordance with the manufacturer's recommendations.

2.4 MATERIAL SUBSTITUTIONS

A. Proposals as submitted shall be based on the products specifically named in the specification or on the drawings. Material or equipment by manufacturers other than those specified may be used only by permission of the Architect/Engineer. Such permission for substitution must be requested, in writing and according to front end documents..

B. The Architect/Engineer reserves the sole right for the approval of proposed material or equipment, and the phrase, "or approved equivalent", used in these specifications, or on the drawings, shall be interpreted to mean an equivalent approved by the Architect/Engineer.

C. Changes required by alternate equipment shall be made at no additional cost to the Owner; and costs incurred by other trades, public utilities or the Owner, as a result of the use of such equipment, shall be the responsibility of the Contractor.

D. Furnish to the Architect/Engineer, when requested, samples of proposed material or equipment substitutions. These samples shall remain with the Architect/Engineer as long as needed.

E. Identify the differences in alternate material or equipment as compared to that specified, and indicate the benefits to the project as a result of selecting the alternative.

F. The Architect/Engineer reserves the right to refuse approval of equipment which does not meet the specification, in their opinion, or of equipment for which no local experience of satisfactory service is available. The Architect/Engineer further reserves the right to reject equipment for which maintenance service and the availability of replacement parts is questionable.

2.5 JOINING MATERIALS

A. Refer to individual Division 22 piping sections for special joining materials not listed below.

B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.

1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch (3.2-mm) maximum thickness unless thickness or specific material is indicated.

a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.

b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.

1) AWWA C110, rubber, flat face, 1/8 inch (3.2 mm) thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.

C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

D. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

E. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

F. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated; and AWS A5.8, BAg1, silver alloy for refrigerant piping, unless otherwise indicated.

G. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

H. Solvent Cements for Joining Plastic Piping:

1. ABS Piping: ASTM D 2235.
2. CPVC Piping: ASTM F 493.
3. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
4. PVC to ABS Piping Transition: ASTM D 3138.
5. Fiberglass Pipe Adhesive: As furnished or recommended by pipe manufacturer.

2.6 TRANSITION FITTINGS

A. AWWA Transition Couplings: Same size as, and with pressure rating at least equal to and with ends compatible with piping to be joined.

1. Available Manufacturers:
   a. Cascade Waterworks Mfg. Co.
   b. Dresser Industries, Inc.; DMD Div.
   c. Ford Meter Box Company, Incorporated (The); Pipe Products Div.
   d. JCM Industries.
   e. Smith-Blair, Inc.
   f. Viking Johnson.
      1) Underground Piping NPS 1-1/2 (DN 40) and Smaller: Manufactured fitting or coupling.
      2) Underground Piping NPS 2 (DN 50) and larger: AWWA C219, metal sleeve-type coupling.
      3) Aboveground Pressure Piping: Pipe fitting.
2. Plastic-to-Metal Transition Fittings: CPVC, PVC, PVC and CPVC, or ____ one-piece fitting with manufacturer's Schedule 80 equivalent dimensions; one end with threaded brass insert, and one solvent-cement-joint end.
   a. Available Manufacturers:
      1) Eslon Thermoplastics.
3. Plastic-to-Metal Transition Adaptors: One-piece fitting with manufacturer's SDR 11 equivalent dimensions; one end with threaded brass insert, and one solvent-cement-joint end.
   a. Available Manufacturers:
      1) Thompson Plastics, Inc.
4. Plastic-to-Metal Transition Unions: MSS SP-107, CPVC, PVC, CPVC AND PVC, or ____ four-part union. Include brass end, solvent-cement-joint end, rubber O-ring, and union nut.
   a. Available Manufacturers:
      1) NIBCO INC.
      2) NIBCO, Inc.; Chemtrol Div.

5. Flexible Transition Couplings for Underground, Aboveground, Underground and Aboveground, or Nonpressure Drainage Piping: ASTM C 1173 with elastomeric sleeve, ends same size as piping to be joined, and corrosion-resistant metal band on each end.

    a. Available Manufacturers:

        1) Cascade Waterworks Mfg. Co.

        2) Fernco, Inc.

        3) Mission Rubber Company.

        4) Plastic Oddities, Inc.

2.7 DIELECTRIC FITTINGS

A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.

B. Insulating Material: Suitable for system fluid, pressure, and temperature.

C. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig (1725-kPa) minimum working pressure at 180 deg F (82 deg C).

1. Available Manufacturers:

    a. Capitol Manufacturing Co.

    b. Central Plastics Company.

    c. Eclipse, Inc.

    d. Epco Sales, Inc.

    e. Hart Industries, International, Inc.

    f. Watts Industries, Inc.; Water Products Div.

    g. Zurn Industries, Inc.; Wilkins Div.

2.8 GROUT

A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.

1. Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.

2. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.

3. Packaging: Premixed and factory packaged.

PART 3 EXECUTION

3.1 EXISTING CONDITIONS

A. Examine the existing buildings and grounds or site and become familiar with the conditions as they exist, or that will in any manner affect the work under this contract. No allowance will be made subsequently, in this connection, on behalf of the Contractor for any error or negligence by the Contractor.

B. Existing equipment, such as duct or pipe, in or on the existing building and grounds which is to be replaced, or which interferes in any way with the remodeling of the existing facilities and/or installation of new equipment, shall be removed from the premises or relocated by this Contractor, as directed by the Architect/Engineer. Do not remove from the premises any equipment that may have maintenance value to the Owner without permission of the Owner. Equipment, duct or pipe not to be reused shall be removed from the premises, unless otherwise noted herein or shown on the drawings.

C. Where existing equipment is removed or changed, all piping no longer in service shall be removed and stubs plugged as directed by the Architect/Engineer. Building surfaces damaged and openings left by removal of equipment shall be repaired by the proper trades and paid for by this Contractor, unless otherwise noted on the drawings. The cutting and fitting shall be done by this Contractor. The cutting of floor, ceiling or wall surfaces shall be done by this Contractor with extreme care, in order to avoid any disrupting or damage of existing utility services which may be encountered. Coordinate with other trades and with the General Contractor or Construction Manager to minimize the damage to the building in order to reduce the amount of patching required.

D. Where new openings are cut and concealed piping is encountered, such items shall be removed or relocated as required. Where systems to be removed stub through floors, walls or ceilings, openings shall be patched so that no evidence of the former installation remains.

E. Existing active services (water, gas, sewer, electric), when encountered, shall be protected against damage. Do not prevent or disturb operation of active services that are to remain. If active services are encountered which require relocation, make request to authorities with jurisdiction for determination of procedures. Where existing services are to be abandoned, they shall be terminated in conformance with requirements of the utility or municipality having jurisdiction.

F. The location, size and elevation of underground utilities shown on the drawings are in accordance with data supplied by the Owner and/or the various utility companies. The Contractor shall verify this data and shall report any discrepancies to the Architect/Engineer, in writing, before submitting his bid.

3.2 INTERRUPTION OF SERVICE

A. Changes in service shall be made so as to provide a minimum of interference with the operation of services in the building. When changes require shutdown of building services, notify the proper building authorities no less than 48 hours in advance and obtain approval from these authorities before making changes. Such notices shall give duration and nature of shutdown. Temporary arrangements shall be approved by the Architect/Engineer and/or Owner.

B. Any and all interruptions to building services shall be in accordance with front end documents.

3.3 PIPING SYSTEMS - COMMON REQUIREMENTS

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

B. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

E. Install piping at indicated slopes.

F. Install fittings for changes in direction and branch connections.

G. Install piping to allow application of insulation.

H. Select system components with pressure rating equal to or greater than system operating pressure.

3.4 OPENINGS, CUTTING, AND PATCHING

A. The General Contractor shall coordinate the placing of openings in the new structure, as required for the installation of the plumbing work.

B. Furnish to the General Contractor the accurate locations and sizes for required openings. This shall not relieve this Contractor of the responsibility of checking to assure that proper size openings are provided. When additional patching is required due to this Contractor's failure to inspect this work, this Contractor shall make arrangements for the patching required to properly close the opening, to include patch painting. This Contractor shall pay any additional cost incurred in this respect.

C. When cutting and patching of the structure is made necessary due to this Contractor's failure to install piping, sleeves or equipment on schedule, or due to this Contractor's failure to furnish, on schedule, the information required for the leaving of openings, it shall be this Contractor's responsibility to make arrangements for this cutting and patching. This Contractor shall pay any additional cost incurred in this respect.

D. Underfloor Plumbing Work:

1. Contractor shall coordinate all related activity with General Contractor at least 24 hours before beginning construction activity.

2. Contractor, before saw-cutting floor, must first field verify all existing piping service, sizes, locations, depths, flow directions as well as coordinate with any other trades who may have utilities such as wires or conduits concealed beneath floor and which may be subject to damage and subsequent service interruptions. The cost to repair any damaged utilities shall be borne by The Contractor.

3. Contractor shall be responsible for erecting and maintaining suitable temporary construction barriers and enclosures for containment of all construction dust and debris. Enclosures and barriers shall be maintained under negative pressure and fans and filters as needed to assist with containment.

3.5 EXCAVATION AND BACKFILL

A. Contractor shall coordinate all related activity with General Contractor at least 24 hours before beginning construction activity.

B. The Contractor shall be responsible for erecting and monitoring of all safety barricades and related protection around excavation and work areas.

C. Trenches and excavations may be backfilled by the Contractor only after required testing has been satisfactorily performed and locations of connections and appurtenances which will be concealed have been recorded by the Contractor in the construction record documents.

D. Bedding:

1. Gravity Storm Sewer or Sanitary Sewer Pipe Bedding Material:

   a. Rigid Pipe:

      1) Rigid gravity storm or sanitary sewer pipe shall be provided with compacted granular bedding having a minimum thickness of 4" (100 mm) or 1/8th of the outside pipe diameter, whichever is greater.

      2) Clean gravel or crushed rock shall meet the following gradation for rigid sewer pipe. (RCP, DIP, VCP):

   b. Non-Rigid Pipe:

      1) Non-rigid gravity storm or sanitary sewer pipe shall be provided with compacted granular bedding having a minimum thickness of 4" (100 mm) or 1/4th of the outside pipe diameter, whichever is greater.

      2) Gravel or crushed rock shall meet the following gradation for non-rigid sewer pipe: 100% passing a ¾" (19 mm) sieve, 50-80% passing a No. 4 (4.75 mm) sieve, and 25-60% passing a No. 8 (2.36 mm) sieve. (IADOT Gradation No. 10).

2. Water mains or sanitary sewer force mains may be installed with undisturbed or compacted soil bedding provided the subgrade is consistent and the Contractor provides hand excavation for bells such that the pipe barrel bears evenly on the subgrade.

3. Contractor shall be responsible for prompt cleanup and disposal of all unsuitable or excess bedding materials.

E. Backfill:

1. Suitable excavated material: Free of cinders, ashes, refuse, rocks, pavement fragments, vegetative or organic matter. Unless noted otherwise on the plans, sand shall not be used.

2. Granular backfill shall be crushed limestone or gravel with 100% passing a ¾" (19 mm) sieve, 50-80% passing a No. 4 (4.75 mm) sieve, and 25-60% passing a No. 8 (2.36 mm) sieve. (IADOT Gradation No. 10)

3. Place backfill simultaneously on both sides of pipe to prevent displacement and place at an angle so that impact on installed pipe is minimized.

4. Backfill in the pipe envelope (top of bedding to a point 12" (300 mm) above the pipe) shall be hand placed. Material shall be of even consistency and free of clumps and boulders, finely divided, and shall be compacted to 90% maximum Standard Proctor Density. Material within the pipe envelope shall be the same as specified for trench backfill, unless noted otherwise on the Plans

5. Contractor shall be responsible for prompt cleanup and disposal of all unsuitable or excess backfill materials.

3.6 CONCRETE AND MASONRY WORK

A. Concrete work included herein or shown on the drawings shall be done only by experienced cement finishers. Brickwork, where included, shall be laid only by experienced brick masons. Brick shall be of uniform size, hard burned, and shall be laid in cement mortar, except for patch work at a location where cement and lime mortar has previously been used. Exposed, finish brickwork shall match existing brickwork as closely as practical and shall be to the satisfaction of the Architect/Engineer and Owner.

B. Concrete bases and pads for mechanical equipment will be furnished by General Contractor. This Contractor shall coordinate size and location.

C. Locate, furnish and install all support, hanger and equipment anchor bolts and related hardware.

D. Underfloor Plumbing Work:

1. Contractor shall coordinate all related activity with General Contractor at least 24 hours before beginning construction activity.

2. Contractor shall saw cut, remove and properly dispose of concrete and related debris as required to accommodate new underfloor piping and fixtures.

3. Patch floor to match adjacent floor textures and reinforce with #3 rebar, 18” O.C. (drill and grout 3” imbed).

4. Unless noted otherwise, concrete shall be commercial grade with a minimum 28-day compressive strength of 3,000 PSI. Do not allow air content of troweled finished floors to exceed 3%

3.7 ROOF OPENINGS

A. Roof openings required by this Contractor that are not shown on the Structural or Architectural Drawings shall be cut and adequately reinforced by an experienced roofing contractor.

B. Roof penetrations for piping shall be through curbed roof openings. Equipment supports shall be by curbed and flashed runners meeting current National Roofing Contractor Association (NRCA) standards and details. Pitch pockets, pitch pans, and wood blocking are not acceptable.

C. All roof work shall be completed such that it does not void any existing roof warranty.

3.8 PAINTING

A. The finish of any item that has been marred, scratched or damaged in any way by this Contractor shall be repainted at the expense of this Contractor, and to the satisfaction of the Architect/Engineer and the Owner.

B. Painting and finishing of exposed mechanical systems including piping and duct shall be as shown on the drawings and per Division 9 - Finishes.

3.9 CLEANING

A. Keep the premises clean of all dirt and debris, caused by the work in accordance with front end documents.

B. Keep the premises clean of all debris caused by the work at all times, and keep materials stored, in areas designated by the Owner, in such a manner as not to interfere with the progress of the work of other Contractors or with the operation of existing facilities.

C. At the conclusion of the construction, the site shall be thoroughly cleaned of all rubble, debris and unused material and shall be left in good order. Closed off spaces shall be cleaned of waste such as material, cartons, and wood frame members used in the construction.

3.10 SUSPENSION FROM WOOD STRUCTURAL MEMBERS

A. In general, concentrated or other loads shall not be suspended directly from the bottom of wood structural members, unless approved by the Architect/Engineer. Loads suspended from open web joists or trusses may be transferred to the bottom chord of the structural member at the panel points. Loads suspended from solid web joists shall be transferred to the joists only through the top flange or web. Suspension systems shall be reviewed by the Architect/Engineer.

3.11 WIRING FOR PLUMBING EQUIPMENT

A. The Division 26 Contractor shall provide power including connection to all electrically powered equipment furnished by the Division 22 Contractor. Where electrical disconnect switches are not explicitly specified to be furnished as part of Division 22 equipment, the Electrical Contractor shall furnish suitable type(s) and properly rated electrical disconnect switches for all said mechanical equipment.

B. Provide integral wiring, alarm wiring, control wiring, temperature control wiring and interlock wiring for equipment furnished, whether or not such wiring is furnished by the equipment vendor.

C. Except as noted otherwise or where other sections call for motor starters to be furnished by manufacturers as part of their equipment, the Division 26 Electrical Contractor shall furnish motor starters as required for motors furnished by this Division 22 Contractor.

D. Furnish shop drawings including but not limited to detailed schedules and wiring diagrams to other interested trades including Division 26 electrical contractor for all electrically powered equipment furnished. Schedules shall include: electrical loads and characteristics, max. overcurrent fuse protection / circuit breaker needs, disconnect requirements, motor starter requirements and motor horsepower(s). Include drawings as needed to depict locations of electrical and control panels, service clearances, disconnects as well as wiring connection points.

E. The Division 22 Contractor shall be responsible to pay for all additional costs incurred due to equipment substitutions by Division 22 Contractor, which require either larger electrical service or service of a different electrical characteristic than scheduled on the Drawings.

F. Prior to bid submission, this Division 22 Contractor shall review the Electrical Drawings and promptly bring to the attention of the Architect/Engineer, any omissions or errors in the electrical services required for equipment proposed to be furnished.

3.12 MOTORS

A. Motors 1/2 HP and smaller shall be 120 volt 1-phase unless noted otherwise.

B. Motors 3/4 HP and larger shall be 460 volt 3-phase unless noted otherwise.

C. 3-phase motors 1 HP and larger shall be NEMA Premium Efficiency type.

D. TEFC and ODP motors for equipment supplied by this contractor shall meet or exceed the listed values when tested in accordance with IEEE Standard 112 Method B as defined by NEMA Standard MG 1-12.6C. Efficiency values listed are based on NEMA Premium Efficiency Motors of NEMA MG 1-2003, Table 12-12 at 1800 RPM:

HP	ODP	TEFC
1	85.5	85.5
1.5	86.5	86.5
2	86.5	86.5
3	89.5	89.5

5	89.5	89.5
7.5	91.0	91.7
10	91.7	91.7
15	93.0	92.4
20	93.0	93.0
25	93.6	93.6
30	94.1	93.6
40	94.1	94.1
50	94.5	94.5
60	95.0	95.0
75	95.0	95.4
100	95.4	95.4
125	95.4	95.4
150	95.8	95.0
200	95.8	95.0

E. All motors that are indicated to be used with Variable Frequency Drives (VFDs) shall be inverter duty rated. Coordinate all motor requirements with the Electrical Contractor.

F. All motors controlled by VFD's shall be equipped with a shaft grounding kit to divert adverse shaft currents away from the motor bearings. This contractor shall ensure (via field observation and measurement) that the shaft is effectively grounded upon startup.

3.13 PROTECTION

A. Special steps shall be taken as necessary for the protection of equipment and materials furnished under Division 22. Equipment and materials shall be protected by Contractor from any physical damage due to weather elements, dirt, dents, sheet rock installation, and painting until the project is completed. Damage, if incurred, shall be promptly repaired at no additional cost to Owner, as-needed to restore equipment and materials to original as-new condition.

B. Protection of equipment during the finishing (sheet rock, plastering and painting) of the building interior shall be the responsibility of the contractor or contractors performing that work. This shall not relieve this Division 22 Contractor of the ultimate responsibility of checking and ensuring that adequate protection is provided and maintained at all times.

C. Where the installation or connection of equipment requires Division 22 Contractor to work in areas previously finished by other Contractors, the Division 22 Contractor shall be responsible to ensure that such finished areas are adequately protected and are not marred, soiled or otherwise damaged during the course of their said work. If damage occurs this Division 22 Contractor shall be responsible to arrange for the other Contractors to repair and refinish any damaged areas and shall pay for all repair, rework and refinishing required.

D. When heavy materials must be placed upon or transported over the roof deck, sheeting shall be placed to distribute the weight and support such materials. Any damage shall be immediately corrected at no cost to the Owner.

3.14 ASBESTOS IDENTIFICATION AND CONTROL

A. In the event that suspected asbestos containing material (ACM) is encountered during the course of the work, cease operations in the immediate area and promptly notify both the Owner and Architect/Engineer. Suspected materials will then be sampled and analyzed by the Owner's Representative.

B. Should ACM be confirmed, the Owner's Representative shall direct the abatement procedures. This work shall be awarded either by subcontract to the Contractor or under a separate contract.

C. During abatement operations, cease operations in the immediate area of the abatement. Operations in other areas of the project may be performed, but care must be taken to control dust to avoid contamination of air monitoring samples. The Contractors shall coordinate activities with the asbestos abatement contractor as well as the Owner's Representative.

D. Should no ACM be identified, operations in the restricted areas may be resumed. At the discretion of the Owner or Owner's representative, any schedule delays caused by identification, analysis or abatement may be added in the form of an extension of time to the contract via a Change Order.

3.15 NOISE AND VIBRATION

A. Contractor shall install all equipment in a such a manner so as to control the transmission of noise and vibration from any installed equipment, components or systems, so the sound level in any occupied area does not exceed NC-35 levels. Contractor shall correct all objectionable noise levels in any occupied areas and at no additional cost to Owner, which are due to improperly installed or isolated equipment, components or systems.

3.16 TESTS AND DEMONSTRATIONS

A. Systems shall be tested and placed in proper working order prior to demonstrating systems to the Owner.

B. Prior to acceptance of the plumbing installation, demonstrate to the Owner or his designated representatives essential features and functions of all systems installed, and instruct the Owner in the proper operation and maintenance of such systems.

C. Furnish the necessary trained personnel to perform the demonstrations and instructions, and arrange to have the manufacturer's representatives for the system present to assist with the demonstrations. The Owner and Contractor shall each sign a certification stating that the training has been performed and the Owner accepts same.

3.17 UTILITY REBATE APPLICATIONS

A. This contractor shall be responsible for gathering information necessary for completing local utility rebate applications, and submitting to the proper utility companies for gas and electric rebates. Potential rebates include high efficiency gas boilers, thermostats, timeclocks, motors, and other items furnished by this plumbing contractor.

END OF SECTION

SECTION 22 0523

GENERAL DUTY VALVES FOR PLUMBING PIPING

PART 1 GENERAL

1.1 SECTION INCLUDES:

A. Provide equipment, materials, labor, and supervision necessary to install valves as indicated on drawings and in schedules, and herein specified.

B. As nearly as possible, all valves shall be of a single manufacturer.

C. Valves shall conform to ANSI standard dimensions.

D. ASME Compliance:

1. ASME B16.10 for ferrous valve dimensions.

2. ASME B31.9 for building services piping valves.

E. NSF Compliance: NSF/ANSI 61 and/or NSF/ANSI 372 for valve materials for potable-water service. Valves for domestic water must be 3rd Party Certified.

1.2 SUBMITTALS

A. Submit detailed Product Data clearly indicating manufacturer, model, size, dimensions and pressure rating.

1.3 PACKAGING

A. Valves shall be furnished or provided with protective packaging to prevent damage during shipping or on the job site.

B. Prepare valves for shipping as follows:

1. Protect internal parts against rust and corrosion.

2. Protect threads, flange faces, grooves, and weld ends.

3. Set angle, and globe valves closed to prevent rattling.

4. Set ball and plug valves open to minimize exposure of functional surfaces.

5. Set butterfly valves closed or slightly open.

6. Block check valves in either closed or open position.

C. Use the following precautions during storage:

1. Maintain valve end protection.

2. Store valves indoors and maintain at higher than ambient dew point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

D. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.

1.4 DEFINITIONS

CWP: Cold working pressure.

EPDM: Ethylene propylene copolymer rubber.

NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.

PTFE: Polytetrafluoroethylene plastic.

SSP - Saturated Steam Pressure

WP - Working Pressure

SWP - Steam Working Pressure

W.O.G. - Water, Oil, Gas Pressure

BR - Bronze

I.B.B.M. - Iron Body, Bronze-Mounted

O.S.&Y. - Outside Screw and Yoke

N.R.S. - Non-Rising Stem

R.S. - Rising Stem

M.S.S. - Manufacturer's Standardization Society of the Valve and Fitting Industry, Inc.

Lead Free: Refers to the wetted surface of pipe, fittings and fixtures in potable water systems that have a weighted average lead content =0.25% per Safe Drinking Water Act as amended January 4, 2011, Section 1417. .

PART 2 PRODUCTS

2.1 GENERAL

A. Materials: Discs, gaskets, packings, seats, diaphragms and lubricants shall conform to recommendations of the valve manufacturer for the intended use.

B. Body materials, unless otherwise stated:

1. Bronze: 125-150 lbs., ASTM B62
2. High Grade Steam-Metal or Valve-Bronze Alloy: 200-300 lbs., ASTM B61
3. Cast Iron: ASTM A126, Class B
4. Ductile Iron: ASTM A395, A536
5. Cast Steel: ASTM A216

C. Lead Free silicon bronze (ASTM listed) valves shall be made with corrosion-resistant materials. Manufacturer shall provide third party certification tested in accordance with EN ISO 6509 regarding dezincification corrosion resistance and stress corrosion cracking.

D. Bronze Valves: NPS 2 (DN 50) and smaller with threaded or solder ends, unless otherwise indicated.

E. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

F. Valve Sizes: Same as upstream piping unless otherwise indicated.

G. Valve-End Connections:

1. Flanged: With flanges according to ASME B16.1 for iron valves.
2. Grooved: With grooves according to AWAA C606.
3. Solder Joint: With sockets according to ASME B16.18.
4. Threaded: With threads according to ASME B1.20.1.
5. Copper Press: With sockets according to ASME B16.22/ASTM B75.

H. Valves in Insulated Piping: With 2-inch stem extensions and the following features:

1. Ball Valves: With extended operating handle of non-thermal-conductive material that meets UL 2043 approved for inside air plenum, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation and memory stops that are fully adjustable after insulation is applied.

2.2 MANUFACTURERS

A. Subject to compliance with requirements, provide products manufactured by one of the following, as listed for each valve type, or Engineer-approved equivalent.

Valve Type	Approved Manufacturer
Ball Valves	Jamesbury, Apollo, Jenkins, Milwaukee, Watts, Worchester, Powell, or NIBCO

2.3 BALL VALVES

A. Provide ball valves complying with MSS SP-72 or MSS SP-110. Ball valves shall be as follows unless otherwise indicated on the drawings.

1. 2 in. and smaller: ASTM B584 bronze body, 2-piece, full port stainless steel brass ball, screwed or soldered ends with teflon seats and seals, blow out proof stem, tee or lever handle rated to 150 SWP/600WOG.

2.4 DRAIN VALVES (HOSE BIBBS)

A. Soldered or Threaded Ends: Bronze body, screwed bonnet, rising stem, composition disc, 3/4 in. threaded hose outlet connection; 125 psi maximum pressure rating.

PART 3 EXECUTION

3.1 VALVE LOCATIONS – GENERAL

A. Unless otherwise noted, shutoff valves shall be provided at all equipment connections (supply and return where applicable) for the following piping: pump suction and discharge, water, air, fuel and gas and drain lines (except on gravity drains from pans). Equipment connections include such items as tanks, pumps, heat exchangers, and similar items.

B. Install isolation valves at each branch off of horizontal mains and vertical risers.

3.2 EXAMINATION

A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent this movement during shipping and handling.

B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.

C. Examine threads on valve and mating pipe for form and cleanliness.

D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.

E. Do not attempt to repair defective valves; replace with new valves.

3.3 VALVE INSTALLATION

A. Follow the manufacturer's recommended installation instructions concerning soldering, silver brazing, welding, threading, and installation of flanged valves in order to prevent damage to the valve and assure its maximum efficiency. Additional specific installation requirements are as follows:

1. Thread pipe for threaded valves to standard length only, using new block dies.

2. Put pipe compound on the pipe end, not into the valve threads. Securely screw pipe and valve together.

3. Blow out or otherwise thoroughly clean pipe sections before they are installed.

4. Close valve before installation.

5. Secure and adjust valves for no leaks and for easy operation.

6. Install valves with stems horizontal or vertical above the pipe and square with building construction. Install valves in position to allow full stem movement.

7. Install valves so piping does not place a stress or strain on the valve body. Locate valves for easy access and provide separate support where necessary.

8. Install extended-stem valves where insulation is indicated. Stems shall be extended such that the handle moves freely without contact with the insulation.

9. Install drain valves at low points of piping, at each mechanical equipment item, and elsewhere, where indicated.

10. Locate valves, cock, and hose bibbs to allow easy accessibility for operation, maintenance and repair.

B. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

C. When soldering use paste fluxes that are approved by the manufacturer for use with Lead Free Alloys.

3.4 ADJUSTING

A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.5 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

A. Drawings indicate valve types to be used. If valve applications are not indicated, use the following:

1. Shutoff Service: Ball valves.
   a. Piping NPS 2 (DN 50) and smaller: Furnish bronze ball or gate valves.
2. Drain Duty: Hose-end drain valves.

B. Install shutoff valve close to water main on each branch and riser serving plumbing fixtures or equipment, on each water supply to equipment, and on each water supply to plumbing fixtures that do not have supply stops. Use ball valves for piping NPS 2 (DN 50) and smaller.

C. Install drain valves for equipment at base of each water riser, at low points in horizontal piping, and where required to drain water piping.
   1. Install hose-end drain valves at low points in water mains, risers, and branches.
   2. Install stop-and-waste drain valves where indicated.

D. If valves with specified CWP ratings are not available, the same types of valves with CWP ratings may be substituted.

E. Select valves, except wafer types, with the following end connections:
   1. For Copper Tubing, NPS 2 (DN 50) and Smaller: Threaded, Sweat solder, or Press-to-fit ends.

3.6 VALVE SCHEDULE

VALVE TYPE	SERVICE
BALL - ALL SIZES	DOMESTIC COLD WATER, HOT, AND RECIRCULATING SYSTEMS; FOR OPERATION UP TO 200 PSI AT 500° F.
DRAIN	DOMESTIC WATER SYSTEMS

END OF SECTION

SECTION 22 0529

HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Provide equipment, materials, labor and supervision necessary to install pipe hangers and supports.

B. Pipe support systems shall secure pipes in place, prevent pipe vibration, provide vertical adjustment for maintaining required grades, and provide for expansion and contraction.

C. Where supports are attached to concrete or other structural members, care shall be taken to prevent damage or weakening of the structural members.

D. Where concrete inserts are to be used, it shall be this Contractor's responsibility to accurately locate and attach inserts to concrete forms.

1.2 REFERENCE STANDARDS

A. American National Standards Institute, ANSI:

1. ANSI B31.1 Power Piping

2. ANSI B31.9 Building Services Piping

B. Manufacturers Standardization Society of the Valve and Fittings Industry, MSS, 1815 North Fort Myer Drive, Arlington, VA 22209.

1. MSS SP-58: Pipe Hangers and Supports - Materials, Design and Manufacturer.

2. MSS SP-69: Pipe Hangers and Supports - Selection and Application.

C. Anvil International, 2 Holland Way, Exeter, NH 03833, www.anvilintl.com, (603) 418-2800.

1. Pipe Hangers and Supports Catalog (Jan. 2015)

1.3 DEFINITIONS

A. Pipe Hanger: A device normally suspended from structure and is used to carry the piping weight in tension.

B. Pipe Support: A device by which piping is normally carried from beneath and is used to carry the piping weight in compression.

PART 2 PRODUCTS

2.1 HANGERS AND SUPPORTS

A. Hangers and support devices shall be Anvil International Inc., Tolco, Fee and Mason, Michigan, B-Line or Engineer approved equivalent. Figure numbers within are based on Anvil International, Inc..

PART 3 EXECUTION

3.1 INSTALLATION - HORIZONTAL PIPE SUPPORTS

A. Hanger rods for steel, wrought iron and brass pipe shall be installed in accordance with MSS SP-69 Tables 3 and 4 and the following schedule:

Pipe Size	Rod Diameter	Maximum Spacing
Up to 1 1/4"	3/8"	7'-0"
1 1/2" and 2"	3/8"	9'-0"
2"	3/8"	10'-0"
2 1/2", 3", and 3 1/2"	1/2"	10'-0"
4" and 5"	5/8"	12'-0"
6"	3/4"	12'-0"
8"	7/8"	14'-0"
10" and 12"	7/8"	16'-0"
14" and 16"	1"	16'-0"
18"	1 1/8"	18'-0"
20" and 24"	1 1/4"	20'-0"

B. Hanger rods for copper pipe and tube shall be installed in accordance with MSS-SP-69 Tables 3 and 4 and the following schedule:

Pipe Size	Rod Diameter	Maximum Spacing
1/2" and 3/4"	3/8"	5'-0"
1"	3/8"	6'-0"
1 1/4"	3/8"	7'-0"
1 1/2"	3/8"	8'-0"
2"	3/8"	8'-0"
2 1/2"	1/2"	9'-0"
3", 3 1/2", and 4"	1/2"	10'-0"
5"	1/2"	13'-0"
6"	5/8"	14'-0"
8"	3/4"	16'-0"

C. Support horizontal cast iron soil pipe with two hangers for each pipe length. Locate hangers close to couplings.

D. In addition to the above specified spacings, install additional hangers at change in pipe direction and at concentrated loads, large valves and strainers.

E. Where more than one pipe is to be run parallel together, they may be supported on trapeze type hangers. Trapeze bar angles and hanger rods shall be of sufficient size to support the particular group of pipes. Trapeze hanger spacing shall be based on the smallest pipe on the rack. When hanging from light gauge metal trusses, coordinate pipe hanger spacing and hanger rod connection points with the truss manufacturer.

F. For suspending hanger rods from brackets attached to walls, use welded steel brackets: Fig. 194 for loads up to 750 lbs; Fig. 195 for loads up to 1500 lbs; Fig. 199 for loads up to 3000 lbs.

G. Where pipes are to be racked along walls, use “Unistrut” pipe racks or 12 gauge steel strut channel, 1-5/8" x 1-5/8" minimum.

   1. Mount pipes to strut channel with two-piece pipe straps to match outside diameter of pipe including insulation.

H. Attach all pipe hangers from support rods using double locknuts tightened to prevent loosening.

3.2 INSTALLATION - VERTICAL PIPE SUPPORTS

A. Support vertical steel, wrought iron, copper and brass pipe at every other floor line.

B. Support vertical cast iron soil pipe at every floor line.

C. In addition to the above, support vertical pipes at base of riser with base fitting set on concrete or brick pier, or by hanger located on horizontal connection close to riser.

D. Where pipe sleeves extend above floor, place pipe clamps at ceiling below and support clamp extensions from inserts or other approved attachment.

3.3 PIPE ATTACHMENTS

A. For horizontal steel and wrought iron pipe, use carbon steel adjustable clevis hanger, Fig. 260. For floor support or support directly above steel beams, use adjustable pipe roll stand, Fig. 177.

B. For horizontal copper pipe and tube, use copper-plated, carbon steel adjustable swivel ring, Fig. CT-69.

C. When thermal expansion for horizontal pipe is in excess of ½" axially, use adjustable steel yoke pipe roll, Fig. 181, or adjustable pipe roll stand, Fig. 177.

D. For horizontal cast iron soil pipe, use carbon steel adjustable clevis hanger, Fig. 260.

E. For vertical steel, wrought iron and cast iron pipe, use extension pipe or riser clamps, Fig. 261.

F. For vertical copper pipe and tube, use copper-plated, copper plated copper tubing riser pipe clamp, Fig. CT-121.

3.4 INTERMEDIATE ATTACHMENTS

A. Hanger rods: Carbon steel single or double end threaded, Figs. 140, 253 as required. Continuous threaded rod, Fig. 146 may be used wherever possible.

B. Chain wire or perforated strap hangers will not be permitted. One pipe shall not be suspended from another pipe.

3.5 STRUCTURAL ATTACHMENTS

A. For attaching steel or copper plated hanger rods to reinforced concrete, use galvanized malleable iron universal concrete inserts; Fig. 282 for loads up to 1140 lbs.

B. For attaching steel hanger rods to structural steel beams, use malleable iron C-clamps; Fig. 92, Fig. 93 or Fig. 94 with retaining clip Fig. 89 or Fig. 89X for loads up to 500 lbs; Fig. 218 with extension piece for loads up to 1,365 lbs. For copper plated hanger rods, use copper plated malleable iron C-clamps; Fig. CT-138R for loads up to 180 lbs.

C. For attaching steel hanger rods to wood structural members, use malleable iron ceiling flange; Fig. 153 for loads up to 1,270 lbs. For copper plated hanger rods, use copper plated malleable iron ceiling flange: Fig. CT-128R for loads up to 180 lbs.

D. Vertical expansion shields or toggles shall not be used for suspending hanger rods, except with permission in cases where inserts have been omitted or cannot be used. If permitted, use expansion shields; for rod sizes up to ½", 320 lbs. max. load. For hanger rods larger than ½" use attachment plate, Fig. 52, with wedge anchors.

E. Powder actuated anchoring methods shall not be used.

3.6 PIPE COVERING PROTECTION

A. Hangers and supports for insulated piping shall not injure or pierce insulation. Provide insulation protection shields in conjunction with hanger or roll device. Use Fig. 160 and 165, Protection Saddles.

3.7 SUPPLEMENTAL STEEL

A. Provide supplemental steel as required to hang or support plumbing equipment or piping.

END OF SECTION

SECTION 22 0553

IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Provide materials, equipment labor and supervision necessary to install piping identification products.

B. Comply with ANSI A13.1 for lettering size, length or color field, colors, and installed viewing angles of identification devices.

1.2 REFERENCE STANDARDS

A. ASME A13.1 - Scheme for the Identification of Piping Systems; The American Society of Mechanical Engineers; 2007.

B. ASTM D709 - Standard Specification for Laminated Thermosetting Materials; 2013.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Brady Corp., Industrial Safety Supply, Emedco, Seton or Brimar.

B. Engineer approved alternative

2.2 PIPE MARKERS

A. Provide manufacturer's standard preprinted, semi-rigid snap-on or self-sticking, color-coded pipe markers, complying with ANSI A13.1.

B. Provide full-band pipe markers, extending 360° around pipe at each location or self-sticking pipe markers, fastened in the following method:

1. Snap-on application of pre-tensioned semi-rigid plastic pipe marker.

2. Secure to piping and install banding tape on both ends of each pipe label.

C. Lettering shall be manufacturer's pre-printed nomenclature which best describes piping system in each instance, as selected by Architect/Engineer in cases of variance.

D. Print each pipe marker with arrows indicating direction of flow, integrally with piping system service lettering (to accommodate both directions), or as separate unit of plastic or on banding tape.

2.3 BRASS VALVE TAGS

A. Provide manufacturer's standard brass valve tags with stamped black filled lettering, with piping system abbreviation in 1/4" high letters and sequenced valve numbers 1/2" high, and with 3/16" hole for fastener.

B. Provide 1-1/2" round brass tags with black lettering. Seton 250 BL or equal.

2.4 VALVE TAG FASTENERS

A. Manufacturer's standard solid brass chain or solid brass S-hooks of sizes required for proper attachment of tags to valves and manufactured specifically for that purpose.

2.5 PIPING AND EQUIPMENT IDENTIFICATION

A. Piping systems that shall be identified by their controls (including directional arrows) on this project shall include, but are not necessarily limited to the following:

1. Domestic cold water and hot water.

2. Sanitary and sanitary vent.

PART 3 EXECUTION

3.1 INSTALLATION OF MECHANICAL IDENTIFICATION

A. Where identification is to be applied to surfaces that require insulation, painting or other covering or finish, including valve tags in finished mechanical spaces, install identification after completion of covering and painting. Install identification prior to installation of acoustical ceilings and similar removable concealment.

B. Install pipe markers on each system, and include arrows to show normal direction of flow.

C. Locate pipe markers as follows: wherever piping is exposed to view in occupied spaces, machine rooms, accessible maintenance spaces (shafts, tunnels, plenums) above lay-in type ceilings and exterior non-concealed locations.

1. Near each valve and control device.

2. Near each branch, excluding short take-offs for fixtures, mark each pipe at branch where there could be question of flow pattern.

3. Near locations where pipes pass through walls or floors/ceilings, (both sides) or center non-accessible enclosures.

4. At access doors, manholes, and similar access points that permit view of concealed piping.

5. Near major equipment items and other points of origination and termination.

6. At each pipe passage to underground.

7. Spaced intermediately at maximum spacing of 50 feet along each piping run, except reduce spacing to 25 feet in congested areas of piping and equipment.

8. On piping above removable acoustical ceilings, maximum spacing of 10 feet along each piping run.

9. Where self-sticking labels are used, the pipe or its covering surface shall be properly prepared. This consists of removal of loose dirt, oil and grease, loose paint or peeling insulation covering. This can be done with a brush and cloth; washing is not required. Use solvent for removal of oil or grease.

10. Banding tape must be used on both ends of all self-sticking labels. The tape shall encircle the pipe completely and overlap itself so the banding tape can adhere to itself.

D. Provide valve tags for all major valves 1/2" size or larger. Included are all main, zone and branch valves, valves in all equipment rooms, etc. All types of valves, ball, globe, butterfly, cocks, control, regulating, relief, reducing, solenoid, etc. are to be identified except check valves. Do not identify end use point valves for plumbing fixtures, and similar rough-in connections.

3.2 ADJUSTING AND CLEANING

A. Relocate any mechanical identification device which has become visually blocked by work of this division or by other divisions.

END OF SECTION

SECTION 22 0700
PLUMBING INSULATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Provide equipment, materials, labor and supervision necessary to install insulation to hot and cold surfaces of piping, tanks, ductwork, fittings and other surfaces.

B. Insulation shall include insulating materials, jackets, adhesive, mastic coatings, tie wire and other materials as required to complete the insulating work.

1.2 CODES AND STANDARDS

A. Insulating materials, jackets and mastics shall meet flame spread, fuel contribution and smoke developed ratings in accordance with NFPA-90A. Flame spread rating in accordance with NFPA 255, ASTM E-84, or UL 723 of not more than 25; smoke developed rating of not more than 50, unless otherwise noted in this section.

B. Insulation that has been treated with a flame-retardant additive to meet the flame spread and smoke developed ratings shown above is not permitted.

C. Insulation materials shall be non-corrosive to the materials they are applied to, including stress corrosion cracking of stainless steel and shall not breed or promote mold, fungus or bacteria.

D. Insulation shall meet or exceed all requirements of IECC - International Energy Conservation Code .

1.3 QUALIFICATION

A. Insulating materials by Owens-Corning, Armacell, Pittsburgh-Corning, Knauf, Johns Manville, or Engineer approved equivalent.

B. Mastics and adhesives as recommended by insulation manufacturer.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's technical product data and installation instructions for each type of mechanical insulation and jacket. Submit schedule showing manufacturer's product number, flame spread and smoke development rating, k-value, density, temperature limitations, sound absorption coefficients, thickness, and furnished accessories for each mechanical system requiring insulation.

PART 2 PRODUCTS

2.1 INSULATION

A. Description:

1. Type A: Preformed, sectional, heavy density fiberglass insulation, suitable for operating temperatures form –20° F to +850° F. Equipped with factory-applied, all-service vapor barrier jacket constructed of white Kraft paper bonded to aluminum foil reinforced with fiberglass yarn, with pressure-sensitive, self-sealing longitudinal laps and butt strips. Thermal conductivity of 0.23 BTU-in/hr-ft2-°F @ 75° F mean temperature. Water vapor permeance of 0.02 perms. Johns Manville "Micro-Lok HP or Engineer approved equivalent.

2. Type B: Flexible, elastomeric pipe and sheet insulation with closed-cell structure. Shall comply with ASTM C534, Type I, Grade 1 for tubular materials and ASTM C534 Type II, Grade 1 for sheet materials. Suitable for operating temperatures from –40° F to 220° F. Outdoor applications, and where otherwise noted, shall receive a weather-resistant, protective, latex enamel finish. Thermal conductivity of 0.28 BTU-in/hr-ft2-°F @ 75° F mean temperature. Water vapor permeance of 0.08 perms. Insulation shall be equivalent to Armacell AP Armaflex; adhesive equivalent to Armacell Armaflex 520 or Armaflex 520 BLV Low-VOC Contact Adhesive; finish equivalent to Armacell Armaflex WB finish.

3. Type C: Flexible, elastomeric thermal insulation with an expanded, closed-cell structure. Pre-slit tubular form with a pressure-sensitive adhesive strip for closure and vapor sealing of the longitudinal joint. Butt joints, sealed with 3M-471 tape. White color. Suitable for operating temperature of 40° F to 200° F. Thermal conductivity of 0.28 BTU-in/hr-ft2-°F mean temperature. Water vapor permeance of 0.20 perms. Insulation shall be Armacell Self-Seal Armaflex 2000 or Engineer approved equivalent.

2.2 PIPE INSULATION SCHEDULE (IECC - INTERNATIONAL ENERGY CONSERVATION CODE)

SERVICE	TYPE	THICKNESS	PIPE SIZES
DOMESTIC COLD WATER	A,B,C	1/2" 1"	LESS THAN 1-1/2" 1-1/2" AND LARGER
DOMESTIC HOT WATER (UP TO 140 DEG F)	A,B,C	1" 1-1/2"	LESS THAN 1-1/2" 1-1/2" AND LARGER
ABOVE GRADE STORM DRAINAGE	A,B,C	1"	ALL SIZES

2.3 INSULATION JACKETS

A. 20-mil high impact PVC secured with spray contact adhesive. All PVC jacketing shall meet the 25/50 SDR. Manville "Zeston 2000" or equivalent.

B. 6-oz/sq yd UL listed cotton canvas fabric secured with Childers CP50 lagging adhesive.

C. Fitting and valve jackets shall be premolded PVC with joints and seams sealed with a spray contact adhesive or vapor barrier mastic. Premolded jackets shall be Manville "Zeston 2000" or approved equivalent.

D. At wall penetrations and on exterior pipe, provide an additional jacket of 0.020 inch thick smooth finish aluminum secured with 0.015 inch thick, 3/8-inch wide aluminum bands. Metal jacket shall have factory applied moisture barrier. Fitting and valve covers to be preformed of same material as adjacent metal jacket.

E. Where PVC or metal jackets are used, delete the factory applied ASJ on pipe and equipment operating above 75° F.

F. PVC jackets shall be used in the following areas and systems:

1. Whenever piping is routed exposed through occupied spaces.

2. Premolded PVC at all fittings and valve jackets.

PART 3 EXECUTION

3.1 GENERAL

A. Use only experienced applicators regularly engaged in the trade. Rough work will be rejected. Application details shall be in accordance with the insulation materials supplier's recommendations, except where a higher standard is specified.

B. Install materials after systems have been tested and approved. Material such as rust, scale, dirt and moisture shall be removed from surfaces to be insulated.

C. Insulation shall be kept clean and dry at all times.

D. Where pipes and ducts pass through fire rated walls, floors and partitions, a fire seal shall be provided.

E. When flexible cellular insulation is used, it shall be installed with seams and joints sealed with contact adhesive.

1. Wherever possible, the insulation shall be placed over the pipe before it is installed. Seal the butt joints with Armacell Armaflex 520, or Armaflex 520 BLV Low-VOC Contact Adhesive or equal.

2. Where the insulation cannot be slipped on, cut the insulation longitudinally and apply it to the piping. Seal longitudinal seam and butt joints with Armacell Armaflex 520 adhesive, or Armaflex 520 BLV Low-VOC Contact Adhesive or equal. In all cases, the insulation, equal to Armacell AP, protected with half-round PVC sleeves the length of three times the nominal pipe size, minimum length to be 8 inches.

3.2 PIPE INSULATION INSTALLATION

A. Insulate fittings, valves, unions, flanges, strainers, flexible connections and expansion joints with premolded or mitered segments of same insulating material as for adjacent pipe covering.

B. Pipe insulation shall continue through sleeves and hangers with vapor barrier and/or jacket.

C. Insert to be between support shield and piping but under the finish jacket. Provide an insert at hangars not less than 6 inches long, of same thickness and contour as adjoining insulation, to prevent insulation from sagging at support points. Inserts shall be heavy density insulating material suitable for the planned temperature range. Factory fabricated inserts may be used.

D. Neatly finish insulation at supports, protrusions and interruptions.

1. On hot systems where fittings are to be left exposed, insulation ends shall be beveled away from bolts for easy access.

2. On cold systems, valve stems shall be sealed with caulking which allows free movement of the stem, but provides a seal against moisture incursion.

E. For outdoor pipe insulation, increase pipe insulation thickness by ½" from thickness listed in schedule.

F. Wherever piping penetrates a floor or is exposed in a finished area such as kitchens, furnish a floor pipe escutcheon and/or PVC (white) jacket to protect insulation and allow for a smooth finish for cleaning.

END OF SECTION

SECTION 22 1116
DOMESTIC WATER PIPING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Provide equipment, materials, tools, labor, and supervision necessary to furnish, fabricate, and install complete piping system.

1.2 CODES AND STANDARDS

A. Pipe materials specified in this Section shall apply to technical sections of Division 22 of the Project Manual where applicable. Special requirements as may be called for in the technical sections, or shown on the Drawings, shall take precedence over General Requirements herein. Piping located in plenums shall be plenum rated for fire and smoke.

B. Lead Free: Refers to the wetted surface of pipe, fittings and fixtures in potable water systems that have a weighted average lead content =0.25% per Safe Drinking Water Act as amended January 4, 2011, Section 1417 .

C. NSF Compliance: NSF/ANSI 61 and/or NSF/ANSI 372 for valve materials for potable-water service. Valves for domestic water must be 3rd Party Certified.

1.3 PRODUCT HANDLING

A. Provide factory-applied plastic end-caps on each length of pipe and tube. Maintain end-caps through shipping, storage, and handling as required to prevent pipe-end damage and eliminate dirt and moisture from inside of pipe and tube.

B. Where possible, store pipe and tube inside and protected from weather. Where necessary to store outside, elevate well above grade and enclose with durable, waterproof wrapping.

C. Protect flanges and fittings from moisture and dirt by inside storage and enclosure, or by packaging with durable, waterproof wrapping.

1.4 SUBMITTALS

A. For each system served: Submit piping schedule listing, by range of sizes, piping material used.

B. Submit manufacturer's specifications and/or catalog data including material and pressure test certifications for pipe, fittings, valves, and other related items including but not limited to pipe hangers and supports.

C. Locations of connections to existing water lines, service lines, valves, and water main appurtenances shall be submitted as a dimensioned drawing Owner's Representative or Architect/Engineer for construction record purposes.

PART 2 PRODUCTS

2.1 MATERIAL

A. Piping:

MATERIAL	SERVICE
Copper water tube, hard temper ASTM B88:	
Type K	Domestic water piping lines under building, concealed in solid concrete or masonry walls or construction; underground water service up to 3" dia.
Type L	Aboveground domestic water piping lines.
Brass pipe, Schedule 40, chromium plated, ASTM B43	Exposed piping connections for plumbing fixtures, showers and chrome plated tanks.

B. Fittings:

1. Cast iron water pipe - Class 250, ANSI A21.20, AWWA C110, standard mechanical joint fitting with lugs for connecting to pipe.
2. Threaded pipe - ASME B16.3 malleable iron fittings, 125-pound, standard flat band water pattern.
3. Copper water tube, cast bronze or wrought copper, solder joint type. ANSI B16.18 and B16.22.
4. Brass pipe - cast bronze screwed, 125 pound, flat band water pattern, chromium plated, for chromium-plated pipe.

2.2 JOINTS

A. Threaded pipe - make joints using approved pipe joint compound, applied to male threads only. Cut pipe square, cut threads clean, remove burrs, and ream ends to full size of bore. Threads shall not be exposed on chromium-plated pipe.

B. Welded pipe - welding shall conform to welding sections of ASME B31.1 "Code for Power Piping". CPipe up to 2" diameter shall be threaded and coupled.

C. Copper water and drainage tube - use 95-5 tin antimony or silver solder, cut pipe square, clean and polish tube ends and inner surface of fittings, apply flux and solder joint as recommended by manufacturer of solder type fittings. Use same methods for copper refrigerant pipe, except use silver solder with 15% silver content, equivalent to Sil-Flos 15.

D. Copper water and drainage tube press joints - Compression sealing via integral internal EPDM gaskets via use of specialized tools. Assured leakage path feature to assist installer in determining un-pressed joint assembly condition.

E. Threadless brass pipe - use brazing alloy which will flow freely at 1300 degree F. Use flux and brazing method as recommended by manufacturer of brazing alloy.

F. When soldering use paste fluxes that are approved by the manufacturer for use with Lead Free Alloys.

2.3 GENERAL VALVE APPLICATIONS

A. Drawings indicate valve types to be used. If valve applications are not indicated, use the following:

1. Shutoff Service: Ball valves.

a. Piping NPS 2 (DN 50) and smaller: Furnish bronze ball or gate valves.

2. Drain Duty: Hose-end drain valves.

B. Select valves, except wafer types, with the following end connections:

1. For Copper Tubing, NPS 2 (DN 50) and Smaller: Threaded, Sweat solder, or Press-to-fit ends.

C. If valves with specified CWP ratings are not available, the same types of valves with CWP ratings may be substituted.

2.4 NIPPLES AND UNIONS

A. Nipples shall conform to size, weight, and strength of adjoining pipe. When length of unthreaded portion of nipple is less than 1-1/2", use extra strong nipple; do not use close nipples.

B. For pipe 3" and smaller, use screwed unions; over 3", use flanged unions. For steel and wrought iron pipe, use malleable iron ground joint unions, black or galvanized, to conform to pipe. Cast iron flanged unions are to be gasket type. For threaded brass pipe, use bronze ground joint unions with octagon ends. Install unions on equipment intended to be disassembled.

C. Dielectric unions shall be installed between connections of copper pipe and ferrous piping.

2.5 SLEEVES

A. Floor sleeves shall be provided by the contractor. Coordinate with existing structure and notify engineer if structure interferes with design.

B. Sleeves passing through non-load bearing walls and partitions shall be galvanized sheet steel with lock seam joints of minimum gauges as follows: For pipes 2-1/2" in size and smaller - 24-gauge; 3 in. to 6 in. - 22-gauge; over 6 in. - 20-gauge.

C. Sleeves passing through load bearing walls, concrete beams, fireproof walls, foundations, footings, and waterproof floors shall be Schedule 40 galvanized steel pipe or cast iron pipe.

D. Sleeves for insulated piping shall be of sufficient internal diameter to take pipe and insulation and to allow for free movement of pipe. Waterproof sleeves shall be of sufficient internal diameter to take pipe and waterproofing material.

E. In finished areas where pipes are exposed, sleeves shall be terminated flush with wall, partitions and ceilings, and shall extend 1/2 in. above finished floors. Extend sleeves 1 in. above finished floors in areas likely to entrap water and fill space between sleeves and pipe with graphite packing and caulking compound.

F. Sleeves passing through membrane waterproofing or roofing shall be flashed and sealed.

2.6 PIPE ESCUTCHEONS

A. Provide pipe escutcheons with inside diameter closely fitting pipe outside diameter, or outside of pipe insulation where pipe is insulated. Select outside diameter of escutcheon to completely cover pipe penetration hole in floors, walls, or ceilings; and pipe sleeve extensions, if any. Furnish pipe escutcheons with chrome finish for occupied areas, prime paint finish for unoccupied areas.

B. Pipe Escutcheons for Moist Areas: For waterproof floors, and areas where water and condensation can be expected to accumulate, provide cast brass or sheet brass escutcheons, solid or split hinged.

C. Pipe Escutcheons for Dry Areas: Provide sheet steel escutcheons, solid or split hinged.

D. Manufacturer: Chicago Specialty; Producers Specialty; or Sanitary-Dash.

2.7 FIRE SAFING

A. Metal piping and sleeves passing through floors, roof, partitions and fire walls, shall be provided with firestop by packing space between pipe and sleeve with UL listed non-sag and self-leveling fire safing insulation per manufacturer's instructions.

B. Plastic piping passing through fire rated floors and fire rated walls shall be provided with firestop by providing intumescent wrap strip around the pipe, enclosed in steel collar attached to structure.

C. Cracks, Voids, or Holes Up to 4" Diameter: Use non-sag or self-leveling putty or caulking, one-piece intumescent elastomer, non-corrosive to metal, compatible with synthetic cable jackets, and capable of expanding 10 times when exposed to flame or heat, UL listed.

D. Openings 4" or Greater: Use sealing system capable of passing 3-hour fire test in accordance with ASTM E814, consisting of wall wrap or liner, partitions, and end caps capable of expanding when exposed to temperatures of 250 to 350 degree F (121 to 177 degree C), UL listed.

E. Seal all holes or voids made by penetrations to ensure an effective barrier against smoke, fire, toxic and combustible gases.

F. Unless protected, from possible loading or traffic, install firestopping materials in floors having void openings or four (4) inches or more to support the same floor load requirements.

G. Manufacturer: Subject to compliance with requirements, provide non-sag and self-leveling fire barrier caulk, wrap/strip, moldable putty and sheet forms of one of the following:

1. 3M Brand.
2. Flame Stop.
3. Dow Corning.
4. Metacaulk.

H. Horizontal penetrations through fire rated walls where plenum rated cables or tubing bundles are being installed shall be made with EZ-Path Fire-rated Pathway by Specified Technologies, Inc.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install pipe for plumbing and mechanical systems as shown on the Drawings, as called for in other Sections, and as specified herein

B. Arrange and install piping approximately as indicated, straight, plumb, and as direct as possible, form right angles on parallel lines with building walls. Keep pipes close to walls, partitions, and ceilings, offsetting only where necessary to follow walls and avoid interference with other mechanical items. Locate groups of pipes parallel to each other; space at a distance to permit applying full insulation and to permit access for servicing valves. Piping to be run in concealed locations unless indicated exposed, or in equipment rooms.

C. Install horizontal piping as high as possible without sags or humps so that proper grades can be maintained for drainage. Branch piping shall come off the tops of mains unless shown otherwise.

D. Locate valves within reachable distance from equipment being served for easy access and operation. Do not locate valves with stems below horizontal.

E. Check piping for interference with other trades; avoid placing water pipes over electrical equipment.

F. Verify final equipment locations before roughing in.

G. Where rough-ins are required for equipment furnished by others, verify exact rough-in dimensions with Owner or equipment supplier before roughing-in.

H. Press fit piping connections shall be made in accordance with manufacturer's installation instructions, using the manufacturer's approved tools and methods. Installation must meet or exceed IAPMO PS 117 functional performance criteria.

I. Install shutoff valve close to water main on each branch and riser serving plumbing fixtures or equipment, on each water supply to equipment, and on each water supply to plumbing fixtures that do not have supply stops. Use ball or gate valves for piping NPS 2 (DN 50) and smaller.

J. Install drain valves for equipment at base of each water riser, at low points in horizontal piping, and where required to drain water piping.

   1. Install hose-end drain valves at low points in water mains, risers, and branches.

   2. Install stop-and-waste drain valves where indicated.

3.2 SLEEVES

A. Install sleeves for piping passing through floors, roof, walls and foundations.

B. Install fire-proofing per manufacturer's written instructions.

3.3 ESCUTCHEONS

A. Install escutcheons for pipes entering finished spaces.

3.4 PIPE PENETRATIONS

A. Penetrations shall be free of debris and dirt. Dam the penetration (when required) with an acceptable material. Apply firestop material to the penetration per manufacturer's installation

instructions. Use a caulking gun, putty knife or other normal trade tools. Remove damming materials where necessary after cure. Clean up with Xylene.

3.5 FIRE SAFING

A. Install fire safing at all penetrations through walls, floors, etc. per manufacturer's installation instructions as required to meet UL listing.

3.6 FIELD QUALITY CONTROL

A. Inspect domestic water piping as follows:

1. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.

2. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:

a. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.

b. Final Inspection: Arrange final inspection for authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

3. Re-inspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for re-inspection.

4. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

B. Test domestic water piping as follows:

1. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.

2. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.

3. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.

4. Cap and subject piping to static water pressure of 50 psig (345 kPa) above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.

5. Repair leaks and defects with new materials and retest piping or portion thereof until satisfactory results are obtained.

6. Prepare reports for tests and required corrective action.

C. Inspect press joint systems for proper installation and leak free integrity per the manufacturer's installation requirements. Prepare and submit certified inspection reports and include approved copies in the OMM record documentation.

3.7 ADJUSTING

A. Perform the following adjustments before operation:

1. Close drain valves, hydrants, and hose bibbs.

2. Open shutoff valves to fully open position.

3. Remove plugs used during testing of piping and plugs used for temporary sealing of piping during installation.

4. Remove and clean strainer screens. Close drain valves and replace drain plugs.

5. Remove filter cartridges from housings and verify that cartridges are as specified for application where used and are clean and ready for use.

6. Check plumbing specialties and verify proper settings, adjustments, and operation.

3.8 CLEANING

A. Domestic water piping shall be cleaned and disinfected prior to substantial completion. Immediately prior to occupancy, the system(s) shall be flushed and a water sample submitted to the local Water Works for testing.

B. Clean and disinfect potable domestic water piping as follows:

1. Purge new piping and parts of existing domestic water piping that have been altered, extended, or repaired before using.

2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction or, if methods are not prescribed, procedures described in either AWWA C651 or AWWA C652 or as described below:

a. Flush piping system with clean, potable water until dirty water does not appear at outlets.

b. Fill and isolate system according to either of the following:

1) Fill system or part thereof with water/chlorine solution with at least 50 ppm (50 mg/L) of chlorine. Isolate with valves and allow to stand for 24 hours.

2) Fill system or part thereof with water/chlorine solution with at least 200 ppm (200 mg/L) of chlorine. Isolate and allow to stand for three hours.

(a) Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.

(b) Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.

C. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

D. Prepare and submit reports of purging and disinfecting activities.

END OF SECTION

SECTION 22 1316

SANITARY WASTE AND VENT PIPING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Provide equipment, materials, tools, labor, and supervision necessary to furnish, fabricate, and install a complete soil, waste and vent system.

1.2 CODES AND STANDARDS

A. Pipe materials specified in this Section shall apply to other technical sections of Division 22 of the Project Manual where applicable. Special requirements as may be called for in the technical sections, or shown on the Drawings, shall take precedence over General Requirements herein. Piping located in plenums shall be plenum rated for fire and smoke.

B. Local and/or State Plumbing, Mechanical and Building Codes

C. Uniform Plumbing Code

D. International Mechanical Code

E. NFPA Codes and Standards

1.3 PRODUCT HANDLING

A. Provide factory-applied plastic end-caps on each length of pipe and tube. Maintain end-caps through shipping, storage, and handling as required to prevent pipe-end damage and eliminate dirt and moisture from inside of pipe and tube.

B. Where possible, store pipe and tube inside and protected from weather. Where necessary to store outside, elevate well above grade and enclose with durable, waterproof wrapping.

C. Where possible, store pipe and tube inside and protected from weather. Where necessary to store outside, elevate well above grade and enclose with durable, waterproof wrapping.

1.4 SUBMITTALS

A. For each system served: Submit piping schedule listing, by range of sizes, piping material used.

B. Submit product and performance data for equipment specified herein

C. Locations of connections to existing sanitary sewer lines, storm water lines, and related invert elevations shall be submitted as a dimensioned drawing to the Owner's Representative or Architect/Engineer for construction record purposes.

PART 2 PRODUCTS

2.1 SANITARY SEWERS, SOIL, WASTE AND VENT MATERIALS

A. Piping:

MATERIAL	SERVICE
Cast iron soil pipe, service weight, bell and spigot, ASTM A74.	
Asphalt coated	Sanitary and storm sewers.
Uncoated	Above ground soil, waste, vent and downspouts 3" dia. and larger.
Cast iron soil pipe, service weight, no hub CISPI 301, ASTM A888.	Above ground sanitary and storm sewers. Soil, waste, vent and downspouts as permitted by Code.
Copper water tube, hard temper, ASTM B88.	
Type M	Above ground soil, waste, vent and downspouts up to and including 3" dia.
Copper drainage tube, hard temper, Type DWV, ASTM B306.	Above ground soil, waste, vent and downspouts up to and including 2-1/2" dia. as permitted by Code.
Solid wall Schedule 40 PVC pipe, ASTM D2665, (DWV) drain, waste and vent.	Below ground soil, waste and vent piping.

B. Fittings

1. Material and strength of fittings for cast sewer pipes, clay sewer pipes, and concrete sewer pipe shall conform to pipe as per ASTM Standards.
2. Ductile iron and grey Iron fittings - Class 250, ANSI/AWWA C110 A21.10, standard mechanical joint fitting with lugs for connecting to pipe.
3. Copper drainage tube (M) - Cast bronze fittings, solder joint fittings. ANSI B.16, 23-69.
4. Solid wall Schedule 40 PVC DWV – solvent cemented joints per ASTM D2665.

C. Joints

1. Cast iron bell and spigot soil pipe - pipe manufacturer's standard preformed, preset plastic or rubber joint, installed in accordance with manufacturer's instructions.
2. Cast iron no-hub pipe - coupling assembly tightened by torque wrench.
   a. ASTM C1277, CISPI 310, and NSF certified, type 300 series stainless steel shield secured by two or more stainless steel worm drive clamps, ASTM C564 , one piece neoprene compression gasket.
   b. Manufacturers:
      1) Clamp All: Hi-Torq 80

2) MG Coupling

3) Ideal Tridon

4) Engineer approved equivalent

3. Copper water and drainage tube - use 95-5 tin antimony or silver solder, cut pipe square, clean and polish tube ends and inner surface of fittings, apply flux and solder joint as recommended by manufacturer of solder type fittings. Use same methods for copper refrigerant pipe, except use silver solder with 15% silver content, equivalent to Sil-Flos 15.

4. Solid wall Schedule 40 PVC DWV – solvent cemented joints per ASTM D2665.

2.2 VENTS

A. Vents through the roof shall be cast iron and shall extend at least above the highest possible water level on the roof but in no case less than 12 inches.

B. Provide a flashing of 4 pound sheet lead for each vent through the roof. The flashing shall extend up around the pipe and turn down into it at least 2 in. and shall extend over the roof deck at least 1 ft. in each direction from the base.

C. Coordinate flashing of vents through the roof with General Contractor or Roofing Contractor.

D. Where vents through the roof are subject to frost or snow closure the vent termination shall be increased beginning at least 12 in. under the roof with a cast iron long increaser. Size increasers as follows:

Vent Size	Increase To
1-1/4 in. and 1-1/2 in.	3 in. minimum
2 in. and 2-1/2 in.	4 in. minimum
3 in.	5 in.
4 in.	6 in.

2.3 SLEEVES

A. Sleeves passing through non-load bearing walls and partitions shall be galvanized sheet steel with lock seam joints of minimum gauges as follows: For pipes 2-1/2" in size and smaller - 24-gauge; 3 in. to 6 in. - 22-gauge; over 6 in. - 20-gauge.

B. Sleeves passing through load bearing walls, concrete beams, fireproof walls, foundations, footings, and waterproof floors shall be Schedule 40 galvanized steel pipe or cast iron pipe.

C. Sleeves for insulated piping shall be of sufficient internal diameter to take pipe and insulation and to allow for free movement of pipe. Waterproof sleeves shall be of sufficient internal diameter to take pipe and waterproofing material.

D. In finished areas where pipes are exposed, sleeves shall be terminated flush with wall, partitions and ceilings, and shall extend 1/2 in. above finished floors. Extend sleeves 1 in. above finished floors in areas likely to entrap water and fill space between sleeves and pipe with graphite packing and caulking compound.

E. Sleeves passing through membrane waterproofing or roofing shall be flashed and sealed.

2.4 PIPE ESCUTCHEONS

A. Provide pipe escutcheons with inside diameter closely fitting pipe outside diameter, or outside of pipe insulation where pipe is insulated. Select outside diameter of escutcheon to completely cover pipe penetration hole in floors, walls, or ceilings; and pipe sleeve extensions, if any. Furnish pipe escutcheons with chrome finish for occupied areas, prime paint finish for unoccupied areas.

B. Pipe Escutcheons for Moist Areas: For waterproof floors, and areas where water and condensation can be expected to accumulate, provide cast brass or sheet brass escutcheons, solid or split hinged.

C. Pipe Escutcheons for Dry Areas: Provide sheet steel escutcheons, solid or split hinged.

D. Manufacturer: Chicago Specialty; Producers Specialty; or Sanitary-Dash.

2.5 FIRE SAFING

A. Metal piping and sleeves passing through floors, roof, partitions and fire walls, shall be provided with firestop by packing space between pipe and sleeve with UL listed non-sag and self-leveling fire safing insulation per manufacturer's instructions.

B. Plastic piping passing through fire rated floors and fire rated walls shall be provided with firestop by providing intumescent wrap strip around the pipe, enclosed in steel collar attached to structure.

C. Cracks, Voids, or Holes Up to 4" Diameter: Use non-sag or self-leveling putty or caulking, one-piece intumescent elastomer, non-corrosive to metal, compatible with synthetic cable jackets, and capable of expanding 10 times when exposed to flame or heat, UL listed.

D. Openings 4" or Greater: Use sealing system capable of passing 3-hour fire test in accordance with ASTM E814, consisting of wall wrap or liner, partitions, and end caps capable of expanding when exposed to temperatures of 250 to 350oF (121 to 177oC), UL listed.

E. Seal all holes or voids made by penetrations to ensure an effective barrier against smoke, fire, toxic and combustible gases.

F. Unless protected, from possible loading or traffic, install firestopping materials in floors having void openings or four (4) inches or more to support the same floor load requirements.

G. Manufacturer: Subject to compliance with requirements, provide non-sag and self-leveling fire barrier caulk, wrap/strip, moldable putty and sheet forms of one of the following:

1. 3M Brand.
2. Flame Stop.
3. Dow Corning.
4. Metacaulk.

2.6 MECHANICAL SLEEVE SEALS

A. Modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between pipe and sleeve, connected with bolts and pressure plates which cause rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.

B. Manufacturer: Thunderline.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install underground building drains as shown and in accordance with the Uniform Plumbing Code. Lay underground building drains beginning at low point of systems, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install required gaskets in accordance with manufacturer's recommendations for use of lubricants, cements, and other special installation requirements. Clean interior of piping of dirt and other superfluous material as work progresses. Maintain swab or drag in line and pull past each joint as it is completed. Place plugs in ends of uncompleted piping at end of day or whenever work stops.

B. Follow indicated lines generally, but make exact layout on the job to work actual fitting dimensions, align piping, and avoid interference. Provide proper support to maintain uniform fall of 1/4 in. per ft. for lines 3 in. and smaller and 1/8 in. per ft. for lines larger than 3 inches. Protect openings against the entrance of dirt.

C. No soil or waste pipe shall be covered by earth or concealed by construction without first being proven free of leaks by means of a hydrostatic water test of no less than 10-feet of head or pneumatic air test of no less than 5 PSI. Pressure shall be held constant for a period of not less than 15 minutes before begining inspection or 15 minutes without the addition of air. Plastic pipe shall not be tested by air.

D. Install vents in practical alignment and supported with constant pitch back to the drainage system, concealed from finished spaces, unless shown or directed otherwise.

E. Soil, waste and vent connections to fixtures shall be accurately located and concealed from finished spaces, unless shown otherwise.

F. Refer to Division 31 - Earthwork for excavating, trenching, and backfilling requirements.

G. Contractor shall verify existing tie-in invert elevations of sanitary sewer piping prior to installation of new piping. Coordinate the site sewer tie-in invert elevation with the site utility contractor. Existing tie-in inverts that are discovered to be different from the information on the bid documents shall be reported to the General Contractor or Construction Manager and the Engineer immediately.

H. Install no-hub couplings and uniformly tighten clamps to manufacture's recommended torque specifications. No-hub coupling joints shall be properly supported so as to not be exposed to bending.

3.2 SLEEVES

A. Install sleeves for piping passing through floors, roof, walls, concrete beams, and foundations.

B. Install fire-proofing per manufacturer's written instructions.

3.3 ESCUTCHEONS

A. Install escutcheons for pipes entering finished spaces.

3.4 MECHANICAL SLEEVE SEAL INSTALLATION

A. Install mechanical sleeve seals at all pipe penetrations through foundations below grade.

B. Loosely assemble rubber links around pipe and bolts and pressure plates located under each bolt head and nut. Push into sleeve and center. Tighten bolts until links have expanded to form watertight seal.

3.5 PIPE PENETRATIONS

A. Penetrations shall be free of debris and dirt. Dam the penetration (when required) with an acceptable material. Apply fire stop material to the penetration per manufacturer's installation instructions. Use a caulking gun, putty knife or other normal trade tools. Remove damming materials where necessary after cure. Clean up with Xylene.

3.6 FIRE SAFING

A. Install fire safing at all penetrations through walls, floors, etc. per manufacturer's installation instructions as required to meet UL listing.

3.7 TESTING AND CLEANING

A. Provide labor, materials, facilities, and administration required to conduct the tests required under this section. Tests which fail to meet the specified performance shall be retested at no expense to the Owner. Repair all defective installations.

B. Flush out piping system with clean water before proceeding with required tests. Inspect each run of each system for completion of joints, supports and accessory items.

C. Testing shall be done in compliance with the Uniform Plumbing Code and to the satisfaction of the Authorities Having Jurisdiction.

D. Perform final testing after all fixtures have been set and all traps have been filled with water.

E. Hydraulic Water Testing:

1. Hydraulically pressure test each section or segment of the soil, waste and vent system prior to backfilling, encasing, enclosing or otherwise preventing visual observation of the section or segment being tested or access to repair if needed.

2. The system and all joints shall be tested with no less than 10 feet head of water pressure. Top of test standpipe to be filled with water shall be a minimum of 10 feet above the highest point of section being tested.

3. The water shall be kept in the tested system or sub-section for not less than 15 minutes before inspection for leakage begins.

4. All leaks shall be promptly repaired by replacing damaged or defective components with new parts and system shall be re-tested, repeating repair and re-testing steps as-needed, without additional cost to the Owner, until system is certified tight and leak free.

F. Pneumatic Air Pressure Testing:

1. Plastic piping shall not be tested with air. Do not overpressurize the system beyond maximum rating.

2. Pneumatically pressure test with air each section or segment of the soil, waste and vent system prior to backfilling, encasing, enclosing or otherwise preventing visual observation of the section or segment being tested or access to repair if needed.

3. The system and all joints shall be tested using an air compressor and pressure gauge or manometer testing apparatus.

4. Fill tested system with air to a uniform, stabilized gauge pressure of 5 PSI. The system shall be held at the test pressure without the addition of air for a period of not less than 15 minutes.

5. All leaks shall be promptly repaired by replacing damaged or defective components with new parts and system shall be re-tested, repeating repair and re-testing steps as-needed, without additional cost to the Owner, until system is certified tight and leak free.

END OF SECTION

SECTION 22 1319
SANITARY WASTE PIPING SPECIALTIES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Provide equipment, materials, labor and supervision necessary to install soil, waste and vent system.

1.2 CODES AND STANDARDS

A. Local and/or State Plumbing, Mechanical and Building Codes

B. Uniform Plumbing Code

C. International Mechanical Code

D. NFPA Codes and Standards

1.3 SUMMARY

A. This Section includes the following sanitary drainage piping specialties:

1. Floor drains.

2. Cleanouts.

3. Miscellaneous sanitary drainage piping specialties.

1.4 DEFINITIONS

A. ABS: Acrylonitrile-butadiene-styrene plastic.

B. FRP: Fiberglass-reinforced plastic.

C. HDPE: High-density polyethylene plastic.

D. PE: Polyethylene plastic.

E. PP: Polypropylene plastic.

F. PVC: Polyvinyl chloride plastic.

1.5 SUBMITTALS

A. Product Data: For each type of product indicated, include rated capacities, operating characteristics, and accessories.

B. Installation, Operations and Maintenance data. Include signed copies of certified testing results reports.

1.6 QUALITY ASSURANCE

A. Drainage piping specialties shall bear label, stamp, or other markings of specified testing agency.

B. Comply with NSF 14, "Plastics Piping Components and Related Materials," for plastic sanitary piping specialty components.

PART 2 PRODUCTS

2.1 CLEANOUTS

A. General:

1. Floor:

a. In floors of finished areas – epoxy coated, cast iron caulking ferrule for soil pipe hub with brass countersunk plug and cast brass round flush access cover with polished top. Furnish carpet flange and cover and cleanout ID marker for all carpeted areas.

b. In floors of unfinished areas – epoxy coated, cast iron with tapered body for caulking into soil pipe hub, with brass countersunk plug.

2. Wall:

a. In walls of finished areas – Gas and water tight bronze tapered seat, raised head plug, iron pipe size (IPS) male threads and round polished stainless steel cover plate with countersunk stainless steel cover screw. Provide with caulking ferrule where installed in cast iron soil pipe.

b. In walls of unfinished areas – Gas and water tight bronze tapered seat, raised head, iron pipe size (IPS) male threads. Provide with caulking ferrule where installed in cast iron soil pipe.

B. Manufacturers: Subject to compliance with requirements, provide clean outs by one of the following:

1. Zurn Plumbing Products Group

2. J.R. Smith

3. Wade

4. Watts Drainage Products Inc.

5. Engineer approved equivalent

2.2 FLOOR DRAINS

A. General:

1. Body: Floor and shower drains shall be epoxy coated cast iron with bottom outlet, convertible membrane clamp, adjustable collar with seepage slots.

2. Strainer: Polished heavy duty vandal-proof secured polished nickel bronze strainer and removable sediment bucket.

3. End Connections: hub and spigot, hubless, or threaded.

B. Sizes: Refer to Project Drawings and Schedules.

C. Traps and Seals:

1. Drains without integral traps shall have service weight cast iron P traps.

D. Seepage Pans:

1. Provide seepage pans of four pound sheet lead or Chloraloy 240 plastic at least 3’-0” square for all floor drains over open space. Lead, if used, shall be thoroughly coated with asphaltum before it is placed in contact with concrete or concrete fill is poured over it.

2. Provide seepage pans of four-pound sheet lead or Chloraloy 240 plastic to cover total area of showers over open spaces. Pan shall turn up at ends at least 9 inches and corners shall be folded and properly sealed. Lead, if used, shall be thoroughly coated with asphaltum before it is placed in contact with concrete or concrete fill is poured over it

3. Flashing clamps and auxiliary drainage rims shall be provided for all drains that are to receive seepage pans.

E. Manufacturers: Subject to compliance with requirements, provide clean outs by one of the following:

1. Zurn Plumbing Products Group

2. J.R. Smith

3. Wade

4. Watts Drainage Products Inc.

5. Engineer approved equivalent

2.3 MISCELLANEOUS SANITARY DRAINAGE PIPING SPECIALTIES

A. Deep-Seal Traps

1. Description: Epoxy coated cast iron, with inlet and outlet matching connected piping and cleanout trap-seal primer valve connection.

2. Size: Same as connected waste piping.

a. NPS 2 (DN 50): 4-inch- (100-mm-) minimum water seal.

b. NPS 2-1/2 (DN 65) and Larger: 5-inch- (125-mm-) minimum water seal.

B. Expansion Joints

1. Description: ASME A112.21.2M compliant. Cast iron body with bronze sleeve, packing and gland.

2. End Connections: hub and spigot, hubless, or threaded. Match piping connections.

3. Size: Same as connected soil, waste, or vent piping.

PART 3 EXECUTION

3.1 INSTALLATION

A. Refer to Division 22 Section "Common Work Results for Plumbing" for piping joining materials, joint construction, and basic installation requirements.

B. Install wood-blocking reinforcement for wall-mounting-type specialties.

C. Install cleanouts in aboveground piping and building drain piping according to the following, unless otherwise indicated:

1. Size same as drainage piping up to NPS 4 (DN 100). Use NPS 4 (DN 100) for larger drainage piping unless larger cleanout is indicated.

2. Locate at each change in direction of piping greater than 45 degrees.

3. Locate at minimum intervals of 50 feet (15 m) for piping NPS 4 (DN 100) and smaller and 100 feet (30 m) for larger piping.

4. Locate at base of each vertical soil and waste stack.

D. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor.

E. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.

F. Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor, unless otherwise indicated.

1. Position floor drains for easy access and maintenance.

2. Set floor drains below elevation of surrounding finished floor to allow floor drainage. Set with grates depressed according to the following drainage area radii:

a. Radius, 30 Inches (750 mm) or Less: Equivalent to 1 percent slope, but not less than 1/4-inch (6.35-mm) total depression.

b. Radius, 30 to 60 Inches (750 to 1500 mm): Equivalent to 1 percent slope.

c. Radius, 60 Inches (1500 mm) or Larger: Equivalent to 1 percent slope, but not greater than 1-inch (25-mm) total depression.

3. Install floor-drain flashing collar or flange so no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes where penetrated.

4. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.

5. Install traps on plumbing specialty drain outlets. Omit traps on indirect wastes unless trap is indicated.

6. Install deep-seal traps on floor drains, and other waste outlets unless otherwise indicated.

G. Install expansion joints on vertical stacks and conductors. Position expansion joints for easy access and maintenance.

H. Install escutcheons at wall, floor, and ceiling penetrations in exposed finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding pipe fittings.

3.2 COORDINATION

A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.

B. Coordinate size and location of roof penetrations.

3.3 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.

2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.4 PROTECTION

A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.

B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION

SECTION 22 4000
PLUMBING FIXTURES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Provide fixtures, trim, accessories, labor, tools and supervision necessary to furnish and install plumbing fixtures as required by the drawings and this Section.

1.2 FIXTURE SCHEDULE

A. Fixtures, trim, and accessories shall be of type and model numbers as scheduled on the drawings.

1.3 CODES AND STANDARDS

A. IBC - International Building Code

B. UPC - Uniform Plumbing Code

C. PDI Compliance: Comply with standards established by PDI pertaining to plumbing fixture supports.

D. ADA Compliance: Construct and install barrier-free plumbing fixtures in accordance with ADA and ANSI A117.1 requirements.

E. Local and/or State Plumbing, Mechanical and Building Codes

F. NFPA Codes and Standards

G. IAPMO, NSF and U.L.

H. Any product used for dispensing potable water shall meet NSF 61 and NSF 372 testing standards. Third party testing shall be required.

1.4 SUBMITTALS

A. Submit Product Data which shall include product description, manufacturer, model, dimensions, size, rough-in requirements, connections to other equipment, construction materials and finishes, trim, accessory schedule, and performance data for each type of fixture.

B. Submit manufacturers Installation Operation and Maintenance instructions. Include signed copies of certified testing reports.

PART 2 PRODUCTS AND QUALIFICATIONS

2.1 MANUFACTURERS

A. Subject to compliance with requirements, provide products manufactured by one of the following, as listed for each type of fixture, or an Engineer-approved equivalent:

1. Vitreous China: American Standard, Crane, Kohler, Eljer, and Zurn.

2. Water Closet and Urinal Flush Valves: Sloan or Zurn

3. Stainless Steel Sinks: Elkay or Just Mfg.

4. Trim: Chicago Faucets, Delta Commercial, T&S Brass Works, or Sloan

5. Water Coolers: Elkay, Halsey Taylor, or Oasis
6. Fixture Carriers: Zurn, Wade, Josam, or J.R Smith
7. Toilet Seats: Bemis, Church, or Olsonite

2.2 VITREOUS FIXTURES

A. Vitreousware shall be non-absorbent, even color, un-warped, two-fired vitreous china, grade A as rated by the Bureau of Standards.

B. Enameled cast iron fixtures shall have the enamel fused with the iron to provide a hard acid-resisting enameled finish.

C. Vitreous fixtures shall be white, except where other colors are called for in schedule.

D. Bathtubs shall have slip-resistant surface.

2.3 FLUSH VALVES

A. Flush valves for handicapped fixtures shall be installed in compliance with ADA requirements and shall be installed with flush valve control mounted on wide side of toilet.

B. Flush valves shall be installed with angle stop and vacuum breaker.

2.4 STAINLESS STEEL SINKS

A. Stainless steel sinks shall be fabricated from 18-gauge nickel-bearing type 302 stainless steel, with satin finish, and sound deadening treatment.

B. Where non-self rimming sinks are specified, furnish sinks with Hudee mounting rim.

C. Provide sinks with compression style clip and bolt mounting hardware.

2.5 TRIM

A. Trim shall include: Supply pipes, stop valves, faucets, tail pieces, strainers, wastes, traps, and floor and wall escutcheon plates which shall be brass. Exposed trim shall be chrome-plated.

B. Stop valves shall be compression type with loose key handle control.

C. P-traps shall be chrome-plated, adjustable cast brass with cleanout plug.

D. Faucets shall contain standardized interchangeable operating units for both hand-closing and self-closing types, closing with the pressure of the water and containing a stamped Monel metal seat.

2.6 ELECTRIC WATER COOLERS

A. Refer to Drawings and Schedules.

B. Furnish one-piece silver impregnated charcoal, NSF approved, inline water filter for all electric water coolers. Furnish an additional filter element for each Electric Water Cooler installed.

2.7 FIXTURE CARRIERS

A. Provide cast-iron supports for fixtures of graphitic gray iron, ductile iron, or malleable iron as indicated. Provide floor mounted carriers for wall mounted fixtures.

2.8 FIXTURE BOLT CAPS

A. Provide manufacturer's standard exposed fixture bolt caps finished to match fixture finish.

2.9 ESCUTCHEONS

A. Where fixture supplies and drains penetrate walls in exposed locations and within cabinetry, provide chrome plated sheet steel escutcheons with friction clips.

PART 3 EXECUTION

3.1 INSPECTION

A. Examine roughing-in work of potable water and waste piping systems to verify actual locations of piping connections prior to installing fixtures. Also examine floors and substrates, and conditions under which fixture work is to be accomplished. Correct any incorrect locations of piping, and other unsatisfactory conditions for installation of plumbing fixtures. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 INSTALLATION

A. General: Install plumbing fixtures of types indicated where shown and at indicated heights; in accordance with fixture manufacturer's written instructions, roughing-in drawings, and with recognized industry practices. Ensure that plumbing fixtures comply with requirements of the Uniform Plumbing Code and Americans with Disability Act (ADA) Standards for Accessible Design pertaining to installation of plumbing fixtures.

B. Fasten plumbing fixtures securely to indicated supports or building structure and ensure that fixtures are level and plumb. Secure plumbing supplies behind or within wall construction so as to be rigid, and not subject to pull or push movement.

C. Install fixtures and make water supply, waste, and vent connections as indicated on drawings.

D. Set fixtures in center of stalls, between partitions where required. Dimensions for spacing shall be verified.

E. Setting shall be absolutely tight and rigid on proper ground. All fixtures shall be sealed to structures (walls, floors, etc.) with non-mildew silicone caulk.

F. Fixtures shall be covered with paper glued in place after they are set to prevent damage during the balance of construction, at the conclusion of work the paper shall be removed and the fixtures properly cleaned.

G. The Contractor shall be responsible for the protection of the fixtures until acceptance by the Owner. Damaged fixtures shall be replaced at no additional cost to the Owner.

H. All fixtures and accessories for handicapped use shall be installed in compliance with ADA requirements.

I. Countertop mounted stainless steel sinks shall be installed using a compression style clip and bolt mount. Snap ring installations shall NOT be permitted.

3.3 FIELD QUALITY CONTROL

A. Upon completion of installation of plumbing fixtures and after units are water pressurized, test fixtures to demonstrate capability and compliance with requirements. When possible, correct malfunctioning units at the site, then retest to demonstrate compliance; otherwise, remove and replace with new units and proceed with retesting.

B. Inspect each installed unit for damage to finish. If feasible, restore and match finish to original at site; otherwise, remove fixture and replace with new unit. Feasibility and match to be judged by Architect/Engineer. Remove cracked or dented units and replace with new units.

3.4 ADJUSTING AND CLEANING

A. Clean plumbing fixtures, trim, and strainers of dirt and debris upon completion of installation.

B. Adjust water pressure at drinking fountains, faucets, shower valves, and flush valves to provide proper flow stream and specified gpm.

C. Adjust or replace washers to prevent leaks at faucets and stops.

END OF SECTION

SECTION 23 0500

COMMON WORK RESULTS FOR HVAC

PART 1 GENERAL

1.1 SECTION INCLUDES

A. The work shall include the furnishings of systems, equipment and materials specified in this Division and as called for on the Mechanical Drawings to include supervision, quality control, operation, methods and labor for the fabrication, installation, start-up and tests for the complete mechanical installation. The work shall also include the furnishing of necessary hoisting facilities to set materials and equipment in place and the furnishing of any scaffolding and transportation associated with this work.

B. Examine the project site and become familiar with existing conditions which will affect the work. Review the drawings and specifications of other trades and take note of conditions to be created which will affect the work. All conditions shall be considered in the preparation of bids; no additional compensation will be made on the behalf of this Contractor.

C. Provide labor necessary to demolish the existing mechanical system as shown on the drawings, as described in Part 3, Existing Conditions, or as required.

D. Where noted on the drawings or where called for in other sections of the specification, the Contractor for this division shall install equipment furnished by others, and shall make required service connections. Verify with the supplier of the equipment the requirements for the installation. This contractor shall be responsible for the removal and installation of railings, piping, ductwork, louvers, etc. as required to install new equipment. Coordinate shipping splits for all equipment provided by this contractor.

1.2 DAMAGE

A. The Contractor shall be responsible for damage to the work of other trades or to the building and its contents, caused by equipment installation.

1.3 PERMITS AND INSPECTIONS

A. Obtain and furnish necessary permits and inspection certificates for material and labor furnished. Permits and certificates shall be obtained from the proper inspection authorities. The cost of permits, certificates and fees required in connection with the installation shall be borne by the Contractor, unless otherwise noted in the detailed contractual description preceding these specifications. Where applications are required for the procuring of utility services to the building, see that such application is properly filed with the utility, and that information required for such an application is presented to the extent and in the form required by the utility company.

1.4 CODES AND STANDARDS

A. Applicable provisions of the following codes and standards are hereby imposed on a general basis for the mechanical work (in addition to specific applications specified by individual work sections of these specifications):

1. ASHRAE/IES 90.1 - 2010 Code for Energy Efficiency

2. ANSI Pressure Piping Standards (B31)

3. ASHRAE Safety Code for Mechanical Refrigeration (ANSI B9.1)

4. AWWA Standards

5. ASME Boiler and Pressure Vessel Code and State Boiler Code
6. American Gas Association
7. AWS Standards for Welding
8. National Electrical Code
9. Local and/or State Plumbing, Mechanical and Building Codes
10. Occupational Safety and Health Act (OSHA)
11. International Energy Conservation Code 2012
12. Uniform Plumbing Code
13. International Mechanical Code
14. NFPA Standards and Pamphlets

B. If any work indicated on the drawings or specified herein conflicts in any way with any of the rules and regulations of the above authorities, the Contractor shall notify the Architect/Engineer in writing 72 hours before bids are opened. In the event the Contractor fails to notify the Architect/Engineer and changes are required by said conflicts, the Contractor shall make such changes as are required without additional cost to this Owner.

C. Installations must be safe in every respect, and must not create a condition which will be harmful to building occupants; to operating, installing or testing personnel; to workmen; or to the public. The contractor for each installation shall be solely responsible for providing installations which will meet these conditions. If the Contractor believes that the installation will not be safe for all parties, report these beliefs in writing to the Architect/Engineer before any equipment is purchased or work is installed, giving recommendations. The Architect/Engineer will work out required changes and adjustments in contract price where adjustments are warranted.

1.5 DRAWINGS

A. A complete set of drawings and specifications shall be on the site at all times. Prior to installing any of the work, check the drawings for dimensions and see that the work does not interfere with clearance required for ceilings, beams, foundations, finished columns, pilasters, partitions and electrical equipment as shown on the drawings and details. After work is installed and it develops that interferences occur which have not been called to the Architect/Engineer's attention before the installation, the Contractor shall, at his own expense, make such changes in his work as directed by the Architect/Engineer.

B. The contract drawings for mechanical work are in part diagrammatic, intended to convey the scope of work and indicate general arrangement and approximate sizes and locations of equipment and materials. Where job conditions require reasonable changes in indicated locations and arrangement, the Contractor shall make such changes as directed by the Architect/Engineer, without additional cost to the Owner.

C. Because of the scale of the drawings, certain basic items such as pipe fittings, access panels, and sleeves may not be shown; but where such items are required by other sections of these specifications or where they are required by the nature of the work, they shall be furnished and installed. Rough-in dimensions and locations shall be verified with the supplier of equipment furnished by other trades, or by the Owner, prior to the time of roughing-in.

D. Equipment specification may not deal individually with minute items required such as components, parts, controls and devices which may be required to produce the equipment performance specified, or as required to meet the equipment warranties. Where such items are required, they shall be included by the supplier of the equipment, whether or not specifically called for.

E. The drawings and the specifications are cooperative and supplementary. It is the intent of both said drawings and specifications to cover all mechanical requirements in their entirety as nearly as possible. The Contractor shall closely check the drawings and specifications for any obvious errors or omissions and bring any such condition to the attention of the Architect/Engineer prior to the receipt of bids, in order to permit clarification by means of a mailed Addendum. If there is no question prior to the bid proposal date, the Architect/Engineer shall assume that the drawings and specifications are complete and correct and will expect the intent of said documents to be complied with, and the installation to be complete in all respects, according to said intent.

F. Locate equipment which must be serviced, operated or maintained in fully accessible positions. Minor deviations from the contract drawings may be made to allow for better accessibility, but changes of magnitude, or which involve extra cost, shall not be made without prior approval. Ample space shall be allowed for removal of parts that may require replacement or service in the future.

1.6 RESPONSIBILITY

A. The Contractor's responsibility shall not end with the installation and connecting of the various apparatus. It shall include the services of an experienced superintendent, who shall be constantly in charge of the work, together with the qualified journeymen, helpers and laborers required to properly unload, install, connect, adjust, start, operate and test the work involved, including equipment and materials furnished by other trades or by the Owner, until such time as the entire mechanical installation functions properly in every detail.

1.7 COORDINATION

A. Coordinate the work with other trades prior to installation.

B. No piping, ducts or equipment foreign to the electrical equipment or architectural appurtenances shall be run over the top of any electrical panels or electrical equipment, in accordance with NEC 110-16 and 384-4. This does not prohibit sprinkler protection for the installation.

C. The determination of quantities of material and equipment required shall be made from the drawings. Schedules on the drawings and in the specifications are completed as an aid, but where discrepancies arise, it shall be the Contractor's responsibility to provide the required quantity.

D. Where the specifications state that equipment shall be furnished, installed or provided, it shall be understood to mean this Contractor shall furnish and install completely, unless it is specifically stated that the equipment is to be furnished and installed by others.

E. The Architect/Engineer reserves the right to determine space priority of the contractors in the event of interference between the piping and equipment of the various contractors. Conflicts between the drawings and specifications, or between requirements set forth for the various trades, shall be called to the attention of the Architect/Engineer. If clarification is not asked for prior to the taking of bids, it will be assumed that none is required, and that the Contractor has submitted his bid in conformance with plans and specifications as issued and that no interference exists.

F. No piping, ducts or equipment foreign to an elevator hoistway and machine room shall be run inside the hoistway and machine room in accordance with NEC 620-37 and ASME A17.1, 102.2.

1.8 GUARANTEE AND MAINTENANCE

A. Materials and equipment shall be guaranteed to be free from defects and to be new equipment; no secondhand, used or salvaged equipment will be allowed.

B. Keep the entire portion of the work in repair, without additional cost to the Owner, so far as defects in workmanship, apparatus, material or construction are concerned for one (1) year from the date of final acceptance, except as otherwise specified herein.

C. Equipment, which fails to meet performance ratings as specified and shown on the drawings, shall be removed and replaced by new equipment that meets the specified requirements, without additional cost to the Owner.

D. Materials and workmanship shall be subject to the review of the Architect/Engineer, in whose presence various tests shall be made as required by these specifications.

PART 2 PRODUCTS

2.1 SUBMITTAL PROCESS

A. Submit shop drawings and catalog data for mechanical equipment specified in Division 23 in accordance with front end documents.

B. Submittal data for mechanical equipment shall consist of shop drawings and/or catalog cuts showing technical data necessary to evaluate the material or equipment to include dimensions, wiring diagrams, performance curves, rating, control sequence, and other descriptive data necessary to describe fully the item proposed and its operating characteristics. Shop drawings shall be submitted on equipment and materials as required by the specifications.

C. Approval of materials, including alternate or substitute items, shall be obtained in writing from the Architect/Engineer, verbal approval will not be considered binding.

D. Shop drawings shall be submitted and shall have been signed, checked, approved, and initialed by the Contractor prior to submittal to the Architect/Engineer. The Architect/Engineer will review shop drawings to aid in interpreting the plans and specifications, and will in so doing assume that the shop drawings conform to specified requirements set forth in this specification. The approval of the shop drawing by the Architect/Engineer does not relieve the Contractor of the responsibility of complying with elements of the specification. The name of the job, Architect/Engineer, location, and specification section shall appear on all pages of shop drawings. Equipment marks (such as EF-1, RTU-1) shall be indicated for each item.

E. At the completion of the job, furnish three (3) copies of parts lists, operating and maintenance instructions, and manuals organized and bound, in three books.

F. At the completion of the project, prepare and submit to the Owner record drawings showing the location of piping and ductwork. Drawing shall give accurate dimensions of such equipment for future use by the Owner. This drawing shall be submitted as soon as work is completed and before authorization of final payment.

2.2 SUBCONTRACTORS AND MATERIALS

A. Submit to the Architect/Engineer for review, when requested, a list of subcontractors, materials and equipment proposed to be used. The list must be reviewed by the Architect/Engineer before this Contractor may enter into any subcontractual agreement. Equipment, materials, and devices, etc. shall be subject to the review of the Architect/Engineer, whether or not said items are herein specified.

2.3 STANDARDS OF MATERIALS AND WORKMANSHIP

A. Materials shall be new, complete with manufacturer's guarantee or warranty, and shall be as listed by Underwriters Laboratories (UL), Inc., Air Movement and Control Association (AMCA), American Gas Association (AGA), Air Conditioning and Refrigeration Institute (ARI), etc., if a standard has been established by that agency for the type of material.

B. Materials shall also comply with applicable standards of the National Electrical Manufacturer's Association, National Board of Fire Underwriters, National Fire Protection Association, National Safety Council, National Bureau of Standards, the National Electrical Code and the Williams-Steiger Occupational Safety and Health Act of 1970. Such standards are hereby made a part of these specifications.

C. Work shall be performed by workmen skilled in the particular craft, shall be executed in a workmanlike manner, and shall present a neat mechanical appearance when completed. Align, level and adjust equipment for satisfactory operation, and install so that connecting and disconnecting of piping and accessories can be made readily and so that parts are easily accessible for inspection, operation and maintenance. Methods and techniques of installation shall be subject to the review of the Architect/Engineer.

D. Materials shall be the standard product of a reputable manufacturer regularly engaged in the manufacture of the specific product. Materials of the same type of class shall be the products of one manufacturer. For example, fans shall be from the same manufacturer and pumps from the same manufacturer.

E. Materials shall be protected from damage, and stored indoors or protected from the weather at all times, unless other storage arrangements are approved by the Architect/Engineer.

F. Bearing lubrication fittings shall be as recommended by the manufacturer and shall be extended, where necessary, to an accessible location.

G. Material and equipment shall be installed in strict accordance with the manufacturer's recommendations.

2.4 MATERIAL SUBSTITUTIONS

A. Proposals as submitted shall be based on the products specifically named in the specification or on the drawings. Material or equipment by manufacturers other than those specified may be used only by permission of the Architect/Engineer. Such permission for substitution must be requested, in writing in accordance with front end documents.

B. The Architect/Engineer reserves the sole right for the approval of proposed material or equipment, and the phrase, "or approved equivalent", used in these specifications, or on the drawings, shall be interpreted to mean an equivalent approved by the Architect/Engineer.

C. Changes required by alternate equipment shall be made at no additional cost to the Owner; and costs incurred by other trades, public utilities or the Owner, as a result of the use of such equipment, shall be the responsibility of the Contractor.

D. Furnish to the Architect/Engineer, when requested, samples of proposed material or equipment substitutions. These samples shall remain with the Architect/Engineer as long as needed.

E. Identify the differences in alternate material or equipment as compared to that specified, and indicate the benefits to the project as a result of selecting the alternative.

F. The Architect/Engineer reserves the right to refuse approval of equipment which does not meet the specification, in their opinion, or of equipment for which no local experience of satisfactory service is available. The Architect/Engineer further reserves the right to reject equipment for which maintenance service and the availability of replacement parts is questionable.

PART 3 EXECUTION

3.1 EXISTING CONDITIONS

A. Examine the existing buildings and grounds and become familiar with the conditions as they exist, or that will in any manner affect the work under this contract. No allowance will be made subsequently, in this connection, on behalf of the Contractor for any error or negligence by the Contractor.

B. Existing equipment, such as duct or pipe, in or on the existing building and grounds which is to be replaced, or which interferes in any way with the remodeling of the existing facilities and/or installation of new equipment, shall be removed from the premises or relocated by this Contractor, as directed by the Architect/Engineer. Do not remove from the premises, any equipment that may have maintenance value to the Owner without permission of the Owner. Equipment, duct or pipe not to be reused shall be removed from the premises, unless otherwise noted herein or shown on the drawings.

C. Where existing equipment is removed or changed, all duct and pipe no longer in service shall be removed and stubs plugged as directed by the Architect/Engineer. Building surfaces damaged and openings left by removal of equipment shall be repaired by the proper trades and paid for by this Contractor, unless otherwise noted on the drawings. The cutting and fitting shall be done by this Contractor. The cutting of floor, ceiling or wall surfaces shall be done by this Contractor with extreme care, in order to avoid any disrupting or damage of existing utility services which may be encountered. Coordinate with other trades and with the General Contractor to minimize the damage to the building in order to reduce the amount of patching required.

D. Where new openings are cut and concealed piping is encountered, such items shall be removed or relocated as required. Where systems to be removed stub through floors, walls or ceilings, openings shall be patched so that no evidence of the former installation remains.

E. Existing active services (water, gas, sewer, electric), when encountered, shall be protected against damage. Do not prevent or disturb operation of active services that are to remain. If active services are encountered which require relocation, make request to authorities with jurisdiction for determination of procedures. Where existing services are to be abandoned, they shall be terminated in conformance with requirements of the utility or municipality having jurisdiction.

F. The location, size and elevation of underground utilities shown on the drawings are in accordance with data supplied by the Owner and/or the various utility companies. The Contractor shall verify this data and shall report any discrepancies to the Architect/Engineer before submitting his bid.

3.2 INTERRUPTION OF SERVICE

A. Changes in service shall be made so as to provide a minimum of interference with the operation of services in the building. When changes require shutdown of building services, notify the proper building authorities no less than 24 hours in advance and obtain approval from these authorities before making changes. Such notices shall give duration and nature of shutdown. Temporary arrangements shall be approved by the Architect/Engineer and/or Owner.

B. Any and all interruptions to building services shall be in accordance with front end documents.

3.3 OPENINGS, CUTTING, AND PATCHING

A. The General Contractor shall coordinate the placing of openings in the new structure, as required for the installation of the mechanical work.

B. Furnish to the General Contractor the accurate locations and sizes for required openings. This shall not relieve this Contractor of the responsibility of checking to assure that proper size openings are provided. When additional patching is required due to this Contractor's failure to inspect this work, this Contractor shall make arrangements for the patching required to properly close the opening, to include patch painting. This Contractor shall pay any additional cost incurred in this respect.

C. When cutting and patching of the structure is made necessary due to this Contractor's failure to install piping, ducts, sleeves or equipment on schedule, or due to this Contractor's failure to furnish, on schedule, the information required for the leaving of openings, it shall be this Contractor's responsibility to make arrangements for this cutting and patching. This Contractor shall pay any additional cost incurred in this respect.

D. Provide cutting and patching and patch painting in the existing structure, as required for the installation of the work. Furnish lintels and supports as required for openings. Cutting of structural support members will not be permitted without prior approval of the Architect/Engineer. Extent of cutting shall be minimized. Use core drills, power saws or other machines which will provide neat, minimum openings. Patching shall match adjacent materials and surfaces and shall be performed by craftsmen skilled in the respective craft required.

3.4 PAINTING

A. The finish of any item that has been marred, scratched or damaged in any way by this Contractor shall be repainted at the expense of this Contractor, and to the satisfaction of the Architect/Engineer and the Owner.

3.5 CLEANING

A. Keep the premises clean of all debris, caused by the work as described in front end documents.

B. At the conclusion of the construction, the site shall be thoroughly cleaned of all rubble, debris and unused material and shall be left in good order. Closed off spaces shall be cleaned of waste such as material, cartons, and wood frame members used in the construction.

3.6 SUSPENSION FROM WOOD STRUCTURAL MEMBERS

A. In general, concentrated or other loads shall not be suspended directly from the bottom of wood structural members, unless approved by the Architect/Engineer. Loads suspended from open web joists or trusses may be transferred to the bottom chord of the structural member at the panel points. Loads suspended from solid web joists shall be transferred to the joists only through the top flange or web. Suspension systems shall be reviewed by the Architect/Engineer.

3.7 WIRING FOR MECHANICAL EQUIPMENT

A. The electrical contractor will provide power to and connection of motors and equipment furnished by this Contractor. Where disconnect switches are not specified to be furnished with the equipment, the electrical Contractor will furnish disconnect switches for equipment furnished by this Contractor.

B. Provide integral wiring, alarm wiring, control wiring, temperature control wiring and interlock wiring for equipment furnished, whether or not such wiring is furnished by the equipment vendor.

C. Except where other Sections call for starters to be furnished by manufacturers as part of their equipment, the electrical contractor will furnish motor starters for motors furnished by this Contractor.

D. Furnish to the electrical contractor, shop drawings and a schedule for motors and other mechanical equipment furnished, which require electrical services. The schedule shall include the locations for rough-ins, electrical loads, size, and electrical characteristics for services required.

E. Additional costs incurred, where motors or equipment furnished by this Contractor require larger services or services of different electrical characteristics than those called for on the Electrical Drawings, due to the Contractor furnishing substitute equipment, shall be paid for by this Contractor.

F. Review the Electrical Drawings and call to the attention of the Architect/Engineer, prior to bidding, omissions of electrical services required for equipment.

G. Mechanical equipment which requires fuse protection, to maintain UL listing, shall be coordinated with the electrical contractor to provide such protection.

3.8 MOTORS

A. TEFC and ODP motors for equipment supplied by this contractor shall meet or exceed the listed values when tested in accordance with IEEE Standard 112 Method B as defined by NEMA Standard MG 1-12.6C. Efficiency values listed are based on NEMA Premium Efficiency Motors of NEMA MG 1-2003, Table 12-12 at 1800 RPM:

HP	ODP	TEFC
1	85.5	85.5
1.5	86.5	86.5
2	86.5	86.5
3	89.5	89.5
5	89.5	89.5
7.5	91.0	91.7
10	91.7	91.7
15	93.0	92.4
20	93.0	93.0
25	93.6	93.6
30	94.1	93.6
40	94.1	94.1
50	94.5	94.5
60	95.0	95.0
75	95.0	95.4
100	95.4	95.4
125	95.4	95.4
150	95.8	95.0
200	95.8	95.0

B. All motors that are indicated to be used with Variable Frequency Drives (VFDs) shall be inverter duty rated. Coordinate all motor requirements with the electrical contractor.

3.9 PROTECTION

A. Special care shall be taken for the protection of equipment furnished by this Contractor. Equipment and material shall be protected from elements such as weather, painting and plastering until the project is completed. Damage from rust, paint or scratches shall be repaired as required to restore equipment to original condition.

B. Protection of equipment during the plastering and painting of the building shall be the responsibility of the contractor performing that work, but this shall not relieve this Contractor of the responsibility of checking to assure that adequate protection is being provided.

C. Where the installation or connection of equipment requires this Contractor to work in areas previously finished by other contractors, this Contractor shall be responsible that such areas are protected and are not marred, soiled or otherwise damaged during the course of such work. This Contractor shall arrange with the other contractors for repairing and refinishing of such areas which may be damaged.

D. When heavy materials must be placed upon or transported over the roof deck, sheeting shall be placed to distribute the weight and support such materials. Any damage shall be immediately corrected at no cost to the Owner.

3.10 ASBESTOS IDENTIFICATION AND CONTROL

A. In the event that suspected asbestos containing material (ACM) is encountered during the course of the work, cease operations in the immediate area and promptly notify the Architect/Engineer. Suspected materials will then be sampled and analyzed by the Owner. Should ACM be identified, the Owner's Representative will direct the procedures for abatement, either by subcontract to the Contractor or separate contractor. During abatement operations, cease operations in the immediate area of the abatement. Operations in other areas of the project may be performed, but care must be taken to control dust to avoid contamination of the abatement containment or air monitoring samples. The Contractor shall coordinate activities with the asbestos abatement contractor.

B. Should no ACM be identified, operations may be resumed. Delays caused by identification, analysis or abatement may be added to the time of the contract, at the discretion of the Architect/Engineer by Change Order.

3.11 NOISE AND VIBRATION

A. Be responsible for the installation of all equipment in such a manner as to control the transmission of noise and vibration from any installed equipment or system, so that the sound level does not exceed NC35 in any occupied space. Be responsible for the correction of any objectionable noise in any occupied area due to improperly installed equipment.

3.12 TESTS AND DEMONSTRATIONS

A. Systems shall be tested and placed in proper working order prior to demonstrating systems to the Owner.

B. Prior to acceptance of the mechanical installation, demonstrate to the Owner or his designated representatives essential features and functions of all systems installed, and instruct the Owner in the proper operation and maintenance of such systems.

C. Furnish the necessary trained personnel to perform the demonstrations and instructions, and arrange to have the manufacturer's representatives for the system present to assist with the demonstrations. The Owner and Contractor shall each sign a certification stating that the training has been performed and the Owner accepts same.

3.13 UTILITY REBATE APPLICATIONS

A. This contractor shall be responsible for gathering information necessary for completing local utility rebate applications, and submitting to the proper utility companies for gas and electric rebates. Potential rebates include high efficiency gas boilers, thermostats, timeclocks, motors, and other items furnished by this mechanical contractor.

END OF SECTION

SECTION 23 0529

HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Provide equipment, materials, labor and supervision necessary to install pipe hangers and supports.

B. Pipe support systems shall secure pipes in place, prevent pipe vibration, provide vertical adjustment for maintaining required grades, and provide for expansion and contraction.

C. Where supports are attached to concrete or other structural members, care shall be taken to prevent damage or weakening of the structural members.

D. Where concrete inserts are to be used, it shall be this Contractor's responsibility to accurately locate and attach inserts to concrete forms.

1.2 REFERENCES

A. American National Standards Institute, ANSI:

B. ANSI B31.1: Power Piping

C. Manufacturers Standardization Society of the Valve and Fittings Industry, MSS, 1815 North Fort Myer Drive, Arlington, VA 22209.

1. MSS SP-58: Materials Standardization Society: Pipe Hangers and Supports-Materials, Design, and Manufacturer.

2. MSS SP-69: Materials and Standardization Society: Pipe Hangers and Supports - Selection and Application.

3. NFPA 13-Standard for the Installation of Sprinkler Systems.

4. ASTM A123-Specification for Zinc Hot-Galvanized Coatings by the Hot Dip Process.

5. ASTM A653 G90-Specification for Steel Sheet, Zinc on Iron and Steel.

PART 2 PRODUCTS

2.1 HANGERS AND SUPPORTS

A. Hangers and support devices shall be Anvil International Inc., Tolco, Fee and Mason, Michigan, B-Line or approved equivalent. Figure numbers based on Anvil.

PART 3 EXECUTION

3.1 INSTALLATION - HORIZONTAL PIPE SUPPORTS

A. Hanger rods for steel, wrought iron and brass pipe shall be installed in accordance with MSS SP-69 Tables 3 and 4 and the following schedule:

Pipe Size	Rod Diameter	Maximum Spacing
Up to 1-1/4"	3/8"	7'-0"
1-1/2" and 2"	3/8"	9'-0"
2"	3/8"	10'-0"
2-1/2", 3" and 3-1/2"	1/2"	10'-0"

4" and 5"	5/8"	12'-0"
6"	3/4"	12'-0"
8"	7/8"	14'-0"
10" and 12"	7/8"	16'-0"
14" and 16"	1"	16'-0"
18"	1-1/8"	18'-0"
20" and 24"	1-1/4"	20'-0"

Pipe Size	Rod Diameter	Maximum Spacing
1/2" and 3/4"	3/8"	5'-0"
1"	3/8"	6'-0"
1-1/4"	3/8"	7'-0"
1-1/2"	3/8"	8'-0"
2"	3/8"	8'-0"
2-1/2"	1/2"	9'-0"
3", 3-1/2" and 4"	1/2"	10'-0"
5"	1/2"	13'-0"
6"	5/8"	14'-0"
8"	3/4"	16'-0"

B. Support horizontal cast iron soil pipe with two hangers for each pipe length. Locate hangers close to couplings.

C. In addition to the above specified spacings, install additional hangers at change in pipe direction and at concentrated loads, large valves and strainers.

D. Where more than one pipe is to be run parallel together, they may be supported on trapeze type hangers. Trapeze bar angles and hanger rods shall be of sufficient size to support the particular group of pipes. Trapeze hanger spacing shall be based on the smallest pipe on the rack. When hanging from light gauge metal trusses, coordinate pipe hanger spacing and hanger rod connection points with the truss manufacturer.

E. For suspending hanger rods from brackets attached to walls, use welded steel brackets; Fig. 194 for loads up to 750 lbs; Fig. 195 for loads up to 1500 lbs; Fig 199 for loads up to 3000 lbs.

F. Where pipes are to be racked along walls, use “Unistrut” pipe racks or 12 gauge steel strut channel, 1-5/8” x 1-5/8” minimum.

1. Mount pipes to strut channel with two-piece pipe straps to match outside diameter of pipe including insulation.

G. Attach all pipe hangers from support rods using double locknuts tightened to prevent loosening.

3.2 INSTALLATION - VERTICAL PIPE SUPPORTS

A. Support vertical steel, wrought iron, copper and brass pipe at every other floor line.

B. Support vertical cast iron soil pipe at every floor line.

C. In addition to the above, support vertical pipes at base of riser with base fitting set on concrete or brick pier, or by hanger located on horizontal connection close to riser.

D. Where pipe sleeves extend above floor, place pipe clamps at ceiling below and support clamp extensions from inserts or other approved attachment.

3.3 PIPE ATTACHMENTS

A. For horizontal steel and wrought iron pipe, use carbon steel adjustable clevis hanger, Fig. 260. For floor support or support directly above steel beams, use pipe roll stand, Fig. 177.

B. For horizontal copper pipe and tube, use copper-plated adjustable swivel ring, Fig. CT-69.

C. When thermal expansion for horizontal pipe is in excess of ½" axially, use adjustable swivel pipe roll, Fig. 181, or pipe roll stand, Fig. 177.

D. For horizontal cast iron soil pipe, use clevis hanger, Fig. 260.

E. For vertical, steel, wrought iron and cast iron pipe, use extension pipe clamps, Fig. 261.

F. For vertical copper pipe and tube, use copper-plated extension pipe clamp, Fig. CT-121.

3.4 INTERMEDIATE ATTACHMENTS

A. Hanger rods: use carbon steel single or double end threaded, Figs. 140, 253 as required. Continuous threaded rod: Fig. 146 may be used wherever possible.

B. Chain wire or perforated strap hangers will not be permitted. One pipe shall not be suspended from another pipe.

3.5 STRUCTURAL ATTACHMENTS

A. For attaching steel or copper plated hanger rods to reinforced concrete, use galvanized malleable iron concrete inserts; Fig. 282 for loads up to 1140 lbs.

B. For attaching steel hanger rods to structural steel beams, use malleable iron C-clamps; Fig. 92, Fig. 93 or Fig. 94 with retaining clip Fig. 89 or Fig. 89X for loads up to 500 lbs; Fig. 218 with extension piece for loads up to 1,365 lbs. For copper plated hanger rods, use copper plated malleable iron C-clamps; Fig. CT-138R for loads up to 180 lbs.

C. For attaching steel hanger rods to wood structural members, use malleable iron ceiling flange; Fig. 153 for loads up to 1,270 lbs. For copper plated hanger rods, use copper plated malleable iron ceiling flange: Fig. CT-128R for loads up to 180 lbs.

D. Vertical expansion shields or toggles shall not be used for suspending hanger rods, except with permission in cases where inserts have been omitted or cannot be used. If permitted, use expansion shields; for rod sizes up to ½", 320 lbs. max. load. For hanger rods larger than ½" use attachment plate, Fig. 52, with wedge anchors.

E. Powder actuated anchoring methods shall not be used.

3.6 PIPE COVERING PROTECTION

A. Hangers and supports for insulated piping shall not injure or pierce insulation. Provide insulation protection shields in conjunction with hanger or roll device. Use Fig. 160 and 165, Protection Saddles.

3.7 SUPPLEMENTAL STEEL

A. Provide supplemental steel required to hang or support mechanical equipment or piping.

END OF SECTION

SECTION 23 0553
IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Provide materials, equipment labor and supervision necessary to install piping identification products.

B. Comply with ANSI A13.1 for lettering size, length or color field, colors, and installed viewing angles of identification devices.

1.2 QUALIFICATIONS

A. Brady Corp., Industrial Safety Supply, Emedco, Seton or Brimar.

PART 2 PRODUCTS

2.1 PIPE MARKERS

A. Provide manufacturer's standard preprinted, semi-rigid snap-on or self-sticking, color-coded pipe markers, complying with ANSI A13.1.

B. Provide full-band pipe markers, extending 360° around pipe at each location or self-sticking pipe markers, fastened in the following method:

1. Snap-on application of pre-tensioned semi-rigid plastic pipe marker.

2. Secure to piping and install banding tape on both ends of each pipe label.

C. Lettering shall be manufacturer's pre-printed nomenclature which best describes piping system in each instance, as selected by Architect/Engineer in cases of variance.

D. Print each pipe marker with arrows indicating direction of flow, integrally with piping system service lettering (to accommodate both directions), or as separate unit of plastic or on banding tape.

2.2 EQUIPMENT MARKERS

A. Provide engraved signage nameplates and tags constructed of multi-layered acrylic that has been treated for outdoor use and can withstand temperatures up to 160° F. Nameplates shall have beveled edges with contrasting color core, letters, and border. Minimum size of nameplate shall be 3" high by 6" long. The minimum letter height shall be 3/4". Attachment shall be by double faced 2 mil permanent acrylic adhesive. For equipment that doesn't allow for direct attachment, furnish sheet metal backing to integrate with equipment such that signage can be read from 5 feet above the finished floor. Unless noted otherwise, signage shall be provided with black lettering, black border, and yellow core. All signage shall include up to 14 characters per line, minimum of 3 lines per tag. Furnish signage for equipment shown in Section 3:

1. All pumps shall include the full name description for system served such as *"Primary Chilled Water Pump – 1."*

2. All air handling unit filter sections shall be labeled with the exact quantity of filters, size, and type of filter such as *"14 – 24"x24"x2", 30% Pleated Filters."*

B. All equipment shall be named consistent with the plans and specifications as indicated on the schedules or as directed by the Owner.

PART 3 EXECUTION

3.1 INSTALLATION OF MECHANICAL IDENTIFICATION

A. Where identification is to be applied to surfaces that require insulation, painting or other covering or finish, including valve tags in finished mechanical spaces, install identification after completion of covering and painting. Install identification prior to installation of acoustical ceilings and similar removable concealment.

B. Install pipe markers on each system, and include arrows to show normal direction of flow.

C. Locate pipe markers as follows: wherever piping is exposed to view in occupied spaces, machine rooms, accessible maintenance spaces (shafts, tunnels, plenums) above lay-in type ceilings and exterior non-concealed locations.

1. Near each valve and control device.
2. Near each branch, excluding short take-offs for fixtures, mark each pipe at branch where there could be question of flow pattern.
3. Near locations where pipes pass through walls or floors/ceilings, (both sides) or center non-accessible enclosures.
4. At access doors, manholes, and similar access points that permit view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. At each pipe passage to underground.
7. Spaced intermediately at maximum spacing of 50' along each piping run, except reduce spacing to 25' in congested areas of piping and equipment.
8. On piping above removable acoustical ceilings, maximum spacing of 20' along each piping run.
9. Where self-sticking labels are used, the pipe or its covering surface shall be properly prepared. This consists of removal of loose dirt, oil and grease, loose paint or peeling insulation covering. This can be done with a brush and cloth; washing is not required. Use solvent for removal of oil or grease.
10. Banding tape must be used on both ends of all self-sticking labels. The tape shall encircle the pipe completely and overlap itself so the banding tape can adhere to itself.

3.2 ADJUSTING AND CLEANING

A. Relocate any mechanical identification device which has become visually blocked by work of this division or other divisions.

3.3 PIPING DUCTWORK, AND EQUIPMENT IDENTIFICATION

A. Piping systems that shall be identified by their controls (including directional arrows) on this project shall include, but are not necessarily limited to, the following:

1. Refrigerant Piping
2. Natural Gas Piping

B. Equipment/Ductwork

1. Furnace/Condensing Units
2. ERV
3. Mini-Split System
4. Provide name plates for all equipment scheduled on the drawings. Coordinate nameplate tag with Owner's sequencing system. If the Owner has no preference, the nameplates shall correspond with the equipment schedule.

END OF SECTION

SECTION 23 0593
TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 GENERAL

1.1 SUMMARY

A. Testing, adjustment, and balancing of air systems.

B. Measurement of final operating condition of HVAC systems.

1.2 QUALIFICATIONS

A. Testing and balancing shall be performed by an independent certified testing and balancing contractor. The Contractor shall be certified by the AABC (American Association of Balancing Contractors), NEBB (National Environmental Balancing Bureau), or SMARTA (Sheet Metal and Air Conditioning and Roofing Trade Association). The Balancing Contractor shall provide labor, services, and test equipment required to test, adjust, and balance the specified systems. Personnel involved in the execution of the work under the Balancing Contract shall be experienced and trained in the total balancing of mechanical systems, as well as being regular employees of the Balancing Contractor.

1.3 SUBMITTALS

A. Submit under provisions of front end specifications.

B. Submit name of adjusting and balancing agency for approval within 30 days after award of Contract.

C. Field Reports: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.

D. Prior to commencing work, submit report forms or outline indicating adjusting, balancing, and equipment data required.

E. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Architect/Engineer and for inclusion in operating and maintenance manuals.

F. Provide reports in letter size binder manuals, complete with index page and indexing tabs, with cover identification at front and side. Include set of reduced drawings with air outlets and equipment identified to correspond with data sheets, and indicating thermostat locations.

G. Include detailed procedures, agenda, sample report forms and copy of AABC National Project Performance Guaranty prior to commencing system balance.

H. Test Reports: Indicate data on forms containing information indicated in Schedules.

1.4 SEQUENCING

A. Sequence work to commence after completion of systems installation and schedule completion of balancing work before Substantial Completion of Project.

B. Do not proceed with balancing work until systems scheduled for testing, adjusting, and balancing are clean and free from debris, dirt, and discarded building materials.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 OTHER CONTRACTOR RESPONSIBILITIES

A. The Mechanical and Plumbing Contractors shall cooperate with the balancing agency by:

1. Including balancing dampers as required by the Drawings and Specifications.
2. Putting complete system into operation during duration of balancing period.
3. Providing up-to-date set of Drawings and advising immediately of changes made to the system during construction.
4. Providing labor and equipment and cost of performing corrections such as dampers, belts, and pulley changes, etc. as required without undue delay.
5. Providing complete submittal information for mechanical equipment complete with pertinent engineering information.

3.2 EXAMINATION

A. Verify that systems are complete and operable before commencing work. Ensure the following conditi

1. Systems are started and operating in a safe and normal condition.
2. Temperature control systems are installed complete and operable.
3. Proper thermal overload protection is in place for electrical equipment.
4. Final filters are clean and in place. If required, install temporary media in addition to final filters.
5. Duct systems are clean of debris.
6. Fans are rotating correctly.
7. Air coil fins are cleaned and combed.
8. Access doors are closed and duct end caps are in place.
9. Air outlets are installed and connected.
10. Duct system leakage is minimized.

B. Submit field reports. Report defects and deficiencies noted during performance of services which prevent system balance.

C. Beginning of work means acceptance of existing conditions.

3.3 PREPARATION

A. Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to Architect/Engineer to facilitate spot checks during testing.

B. Provide additional balancing devices as required.

3.4 INSTALLATION TOLERANCES

A. Air Handling Systems: Adjust to within plus or minus 5 percent of design for supply systems and plus or minus 10 of design for return and exhaust systems.

B. Diffusers, Registers and Grilles: Adjust total to within plus 10 percent and minus 5 percent of design to space. Adjust diffusers, registers and grilles in space to within plus or minus 10 percent of design.

3.5 ADJUSTING

A. Ensure recorded data represents actual measured or observed conditions.

B. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.

C. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.

D. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostat to specified settings.

E. At final inspection, recheck random selections of data recorded in report. Recheck points or areas as selected and witnessed by the Owner.

F. Check and adjust systems approximately six months after final acceptance and submit report.

3.6 AIR SYSTEM PROCEDURE

A. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities at site altitude.

B. Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct.

C. Measure air quantities at air inlets and outlets.

D. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.

E. Use volume control devices to regulate air quantities only to the extent that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers and splitters.

F. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.

G. Provide system schematic with required and actual air quantities recorded at each outlet or inlet.

H. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Make allowance for 50 percent loading of filters.

I. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.

J. Measure temperature conditions across outside air, return air, and exhaust dampers to check leakage.

3.7 SCHEDULES

A. Equipment Requiring Testing, Adjusting, and Balancing

1. Forced Air Furnaces

2. Diffusers, Registers and Grilles

3. Energy Recovery Ventilator

B. REPORT FORMS

1. Title Page:

a. Name of Testing, Adjusting, and Balancing Agency

b. Address of Testing, Adjusting, and Balancing Agency

c. Telephone number of Testing, Adjusting, and Balancing Agency
d. Project name
e. Project location
f. Project Architect
g. Project Engineer
h. Project Contractor
i. Project altitude
j. Report date

2. Summary Comments:
   a. Design versus final performance
   b. Notable characteristics of system
   c. Description of systems operation sequence
   d. Summary of outdoor and exhaust flows to indicate amount of building pressurization
   e. Nomenclature used throughout report
   f. Test conditions
3. Instrument List:
   a. Instrument
   b. Manufacturer
   c. Model number
   d. Serial number
   e. Range
   f. Calibration date
4. Electric Motors:
   a. Manufacturer
   b. Model/Frame
   c. HP/BHP.
   d. Phase, voltage, amperage; nameplate, actual, no load
   e. RPM
   f. Service factor
   g. Starter size, rating, heater elements
   h. Sheave Make/Size/Bore
5. V-Belt Drive:
   a. Identification/location
   b. Required driven RPM
   c. Driven sheave, diameter and RPM
   d. Belt, size and quantity
   e. Motor sheave diameter and RPM
   f. Center to center distance, maximum, minimum, and actual

6. Cooling Coil Data:
    a. Identification/number
    b. Location
    c. Service
    d. Manufacturer
    e. Air flow, design and actual
    f. Entering air DB temperature, design and actual
    g. Entering air WB temperature, design and actual
    h. Leaving air DB temperature, design and actual
    i. Leaving air WB temperature, design and actual
    j. Saturated suction temperature, design and actual
    k. Air pressure drop, design and actual
    l. Type of refrigerant for DX coils
7. Air Moving Equipment
    a. Location
    b. Manufacturer
    c. Model number
    d. Serial number
    e. Arrangement/Class/Discharge
    f. Supply air flow, specified and actual
    g. Return air flow, specified and actual
    h. Outside air flow, specified and actual
    i. Total static pressure (total external), specified and actual
    j. Inlet pressure
    k. Discharge pressure
    l. Sheave Make/Size/Bore
    m. Number of Belts/Make/Size
    n. Fan RPM
    o. Fan BHP
8. Return Air/Outside Air Data:
    a. Identification/location
    b. Design air flow
    c. Actual air flow
    d. Design return air flow
    e. Actual return air flow
    f. Design outside air flow
    g. Actual outside air flow
    h. Return air temperature

i. Outside air temperature
j. Required mixed air temperature
k. Actual mixed air temperature
l. Design outside/return air ratio
m. Actual outside/return air ratio

9. Energy Recovery Ventilator Data:
   a. Location
   b. Manufacturer
   c. Model Number
   d. Serial Number
   e. Design air flow
   f. Actual air flow
   g. External Static Pressure, specified and actual
   h. Fan RPM
   i. Entering and leaving Air DB Temperatures on all sides of the ventilator
   j. Entering and leaving Air WB Temperatures on all sides of the ventilator
10. Duct Traverse:
   a. System zone/branch
   b. Duct size
   c. Area
   d. Design velocity
   e. Design air flow
   f. Test velocity
   g. Test air flow
   h. Duct static pressure
   i. Air temperature
   j. Air correction factor
11. Air Distribution Test Sheet (Diffusers, Registers and Grilles):
   a. Air terminal number
   b. Room number/location
   c. Terminal type
   d. Terminal size
   e. Area factor
   f. Design velocity
   g. Design air flow
   h. Test (final) velocity
   i. Test (final) air flow
   j. Percent of design air flow

END OF SECTION

SECTION 23 0700
HVAC INSULATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Provide equipment, materials, labor and supervision necessary to install insulation to hot and cold surfaces of piping, tanks, ductwork, fittings and other surfaces.

B. Insulation shall include insulating materials, jackets, adhesive, mastic coatings, tie wire and other materials as required to complete the insulating work.

1.2 CODES AND STANDARDS

A. Insulating materials, jackets and mastics shall meet flame spread, fuel contribution and smoke developed ratings in accordance with NFPA-90A. Flame spread rating in accordance with NFPA 255, ASTM E-84 or UL 723 of not more than 25; smoke developed rating of not more than 50, unless otherwise noted in this section.

B. Insulation that has been treated with a flame-retardant additive to meet the flame spread and smoke developed ratings shown above is not permitted.

C. Insulation materials shall be noncorrosive to the materials they are applied to, including stress corrosion cracking of stainless steel, and shall not breed or promote fungus and bacteria.

D. Insulation shall meet or exceed all requirements of the 2012 International Energy Conservation Code.

1.3 QUALIFICATION

A. Insulating materials by Owens-Corning, Aracell, Pittsburgh-Corning, Knauf, Johns Manville, or approved equivalent.

B. Mastics and adhesives as recommended by insulation manufacturer.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's technical product data and installation instructions for each type of mechanical insulation. Submit schedule showing manufacturer's product number, flame spread and smoke development rating, k-value, density, temperature limitations, sound absorption coefficients, thickness, and furnished accessories for each mechanical system requiring insulation.

PART 2 PRODUCTS

2.1 PRODUCTS

A. Description:

1. Type B: Flexible, elastomeric pipe and sheet insulation with closed-cell structure. Shall comply with ASTM C534, Type I, Grade 1 for tubular materials and ASTM C534 Type II, Grade 1 for sheet materials. Suitable for operating temperatures from –40° F to 220° F. Outdoor applications, and where otherwise noted, shall receive a weather-resistant, protective, latex enamel finish. Thermal conductivity of 0.28 BTU-in/hr-ft2-°F @ 75° F mean temperature. Water vapor permeance of 0.08 perms. Insulation shall be equivalent to Armacell AP Armaflex; adhesive equivalent to Armacell Armaflex 520 or Armaflex 520 BLV Low-VOC Contact Adhesive; finish equivalent to Armacell Armaflex WB finish.

2. Type I: Fiberglass duct wrap, 1.5 PCF density, fabricated of inorganic glass fibers bonded with thermosetting resin with factory applied foil Skrim-Kraft facing, suitable for operating temperature up to +250° F. Thermal conductivity of 0.24 BTU-in/hr-ft2-°F @ 75° F mean temperature. Water vapor permeance of 0.02 perms. Knauf "Duct Wrap" or engineer approved equivalent.

3. Type IA: Fiberglass duct wrap, 0.75 PCF density, fabricated of inorganic glass fibers bonded with thermosetting resin with factory applied foil Skrim-Kraft facing, suitable for operating temperature up to +250° F. Thermal conductivity of 0.29 BTU-in/hr-ft2-°F @ 75° F mean temperature. Water vapor permeance of 0.02 perms. Knauf "Duct Wrap" or engineer approved equivalent.

2.2 INSULATION JACKETS

A. 20-mil high impact PVC secured with spray contact adhesive. All PVC jacketing shall meet the 25/50 SDR. Manville "Zeston 2000" or equivalent.

B. 6-oz/sq yd UL listed cotton canvas fabric secured with Childers CP50 lagging adhesive.

C. Fitting and valve jackets shall be premolded PVC with joints and seams sealed with a spray contact adhesive or vapor barrier mastic. Premolded jackets shall be Manville "Zeston 2000" or approved equivalent.

D. At wall penetrations and on exterior pipe, provide an additional jacket of 0.020 inch thick smooth finish aluminum. Metal jacket shall have factory applied moisture barrier. Fitting and valve covers to be preformed of same material as adjacent metal jacket.

E. Where PVC or metal jackets are used, delete the factory applied ASJ on pipe and equipment operating above 75° F.

F. PVC jackets shall be used in the following areas and systems:

1. Whenever piping is routed exposed through occupied spaces.

2. Premolded PVC at all fittings and valve jackets.

PART 3 EXECUTION

3.1 INSTALLATION, GENERAL

A. Use only experienced applicators regularly engaged in the trade. Rough work will be rejected. Application details shall be in accordance with the insulation materials supplier's recommendations, except where a higher standard is specified.

B. Install materials after systems have been tested and approved. Material such as rust, scale, dirt and moisture shall be removed form surfaces to be insulated.

C. Insulation shall be kept clean and dry at all times.

D. Where pipes and ducts pass through fire rated walls, floors and partitions, a fire seal shall be provided.

E. When flexible cellular insulation is used, it shall be installed with seams and joints sealed with contact adhesive.

1. Wherever possible, the insulation shall be placed over the pipe before it is installed. Seal the butt joints with Armacell Armaflex 520, or Armaflex 520 BLV Low-VOC Contact Adhesive or equal.

2. Where the insulation cannot be slipped on, cut the insulation longitudinally and apply it to the piping. Seal longitudinal seam and butt joints with Armacell Armaflex 520 adhesive, or Armaflex 520 BLV Low-VOC Contact Adhesive or equal. In all cases, the insulation, equal to Armacell AP, protected with half-round PVC sleeves the length of three times the nominal pipe size, minimum length to be 8 inches.

3.2 PIPE INSULATION INSTALLATION

A. Insulate fittings, valves, unions, flanges, strainers, flexible connections and expansion joints with premolded or mitered segments of same insulating material as for adjacent pipe covering.

B. Pipe insulation shall continue through sleeves and hangers with vapor barrier and/or jacket.

C. Insert to be between support shield and piping but under the finish jacket. Provide an insert at hangars not less than 6 inches long, of same thickness and contour as adjoining insulation, to prevent insulation from sagging at support points. Inserts shall be heavy density insulating material suitable for the planned temperature range. Factory fabricated inserts may be used.

D. Neatly finish insulation at supports, protrusions and interruptions.

1. On hot systems where fittings are to be left exposed, insulation ends shall be beveled away from bolts for easy access.

2. On cold systems, valve stems shall be sealed with caulking which allows free movement of the stem, but provides a seal against moisture incursion.

E. For outdoor pipe insulation, increase pipe insulation thickness by ½" from thickness listed in schedule.

F. Wherever piping penetrates a floor or is exposed in a finished area such as kitchens, furnish a floor pipe escutcheon and/or PVC (white) jacket to protect insulation and allow for a smooth finish for cleaning.

3.3 DUCT COVERING APPLICATION

A. Covering shall be cut slightly longer than circumference of duct to ensure full thickness at corners. Insulation shall be applied with edges tightly banded, and shall be adhered to duct with fire-resistant adhesive. Adhesive shall be applied so that insulation conforms to duct surfaces uniformly and firmly.

B. In addition to the adhesive, the insulation shall be additionally secured to the bottom of ducts 18" or wider by means of adhesive pins and speed clips. The protruding ends of the pins shall be cut off flush after the speed clips have been applied. The vapor barrier facing shall be thoroughly sealed with a vapor barrier mastic and tape where the pins have pierced through. The vapor barrier shall be continuous to prevent condensation. Insulation shall not be compressed at any location so as to reduce insulating characteristics.

C. Joints shall be sealed with 2" wide pressure-sensitive tape or vapor barrier tape or strips, using a fire-resistive adhesive. Cuts or tears shall be sealed with strips of vapor barrier jacket applied with adhesive or pressure-sensitive tape.

3.4 PIPE INSULATION SCHEDULE (BASED ON 2012 IECC)

SERVICE	TEMP (°F)	TYPE	NOMINAL PIPE SIZE (INCHES)				
			<1	1 TO <1-1/2	1-1/2 TO <4	4 TO <8	8+
All Refrigerant Piping	All	B	1"	1"	1"	1"	1-1/2"

3.5 MINIMUM DUCT INSULATION SCHEDULE (BASED ON 2012 IECC)

SERVICE	TYPE	THICKNESS
Exhaust Duct and Outdoor Air Ducts from Energy Recovery Unit to Louvers in Exterior Walls	IA	3" first layer
All Supply Air Ducts & Outdoor air to Furnace/RTU	I	2"
Diffusers (top/backside)	I	2"
Return Air on RTU Unit	I	2"

END OF SECTION

SECTION 23 1123
FACILITY NATURAL GAS PIPING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Provide equipment, materials, tools, labor, and supervision necessary to furnish, fabricate, and install a complete Natural Gas piping system.

1.2 STANDARDS AND CODES

A. Pipe materials specified in this Section shall apply to technical sections of Division 23 of the Project Manual where applicable. Special requirements as may be called for in the technical sections, or shown on the Drawings, shall take precedence over General Requirements herein. Piping located in plenums shall be plenum rated for fire and smoke.

B. Gas piping and connections to equipment shall be in accordance with NFPA-54 and the City of Ames Gas Code and the local utility company.

1.3 PRODUCT HANDLING

A. Provide factory-applied plastic end-caps on each length of pipe and tube. Maintain end-caps through shipping, storage, and handling as required to prevent pipe-end damage and eliminate dirt and moisture from inside of pipe and tube.

B. Where possible, store pipe and tube inside and protected from weather. Where necessary to store outside, elevate well above grade and enclose with durable, waterproof wrapping.

C. Protect flanges and fittings from moisture and dirt by inside storage and enclosure, or by packaging with durable, waterproof wrapping.

1.4 SUBMITTALS

A. Submit piping schedule listing each pipe material used and systems served.

PART 2 PRODUCTS

2.1 MATERIAL

A. Material and Service

B. Aboveground natural gas.

1. Black steel pipe seamless, Schedule 40, ASTM A53.

C. Fittings

1. Threaded pipe - malleable iron fittings, 125-pound standard flat band water pattern.

2. Welded pipe - welded neck fittings and welded neck flanges, same material and strength as pipe.

3. Carbon steel pipe - material and strength shall correspond to pipe specifications. ANSI B31.5.

D. Joints

1. Threaded pipe - make joints using approved pipe joint compound, applied to male threads only. Cut pipe square, cut threads clean, remove burrs, and ream ends to full size of bore. Threads shall not be exposed on chromium-plated pipe.

2. Welded pipe - welding shall conform to welding section of ANSI B31.1 "Code for Power Piping". Pipe up to 2" diameter shall be screwed. Pipe 2 ½" diameter and over shall be welded.

E. Nipples and Unions

1. Nipples shall conform to size, weight, and strength of adjoining pipe. When length of unthreaded portion of nipple is less than 1-1/2", use extra strong nipple; do not use close nipples.

2. For pipe 3" and smaller, use screwed unions; over 3", use flanged unions. For steel and wrought iron pipe, use malleable iron ground joint unions, black or galvanized, to conform to pipe. Cast iron flanged unions are to be gasket type. For threaded brass pipe, use bronze ground joint unions with octagon ends. Install unions on equipment intended to be disassembled.

3. Dielectric unions shall be installed between connections of copper pipe and ferrous piping.

2.2 PLUG VALVES

A. Plug valves shall not be furnished unless specifically shown on the Drawings. When so indicated, this type of valve shall meet the following specifications:

1. Smaller than 2 in.: Tapered plug valves, semi-steel, screwed, wrench operated with wrench.

2. 2 in. and larger: Tapered plug valves, carbon steel, flanged, lubricated plug wrench operated with a wrench.

2.3 PRESSURE REGULATING VALVE (NATURAL GAS)

A. Gas regulators shall be furnished and installed to maintain the gas pressure to the pilot supply and main burner supply line within +10% of the operating pressure from maximum to minimum firing rates at inlet operating pressures of 1-1/2 to 2 psig.

B. Regulators shall be of the spring-loaded or pressure balanced type. Under no circumstances shall a dead weight or a weight and level type of regulator be used.

C. Gas regulators shall be suitable for operation with electronic ignition “dead end” conditions.

D. Gas pressure regulators shall be AGA and CGA certified for scheduled operating conditions.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install piping and make service connection as shown on the Drawings.

B. Pipe size 2 in. and larger or 2 psig and greater shall have welded joints; pipe less than 2 in. and less than 2 psig shall have threaded joints made up with gas resistant joint compound.

C. Install gas shutoff plug valve in main, in each branch line and at each appliance.

D. Install service plug valve at each outlet.

E. General: Comply with requirements of basic piping material sections for installation of piping materials. Install piping products in accordance with manufacturer's written instructions, with applicable installation requirements of ANSI Z 223.I, and in accordance with recognized industry practices to insure that products serve intended functions.

F. Use sealants on metal gas piping threads that are chemically resistant to LP and natural gas. Use sealants sparingly and apply to only male threads of metal joints.

G. Remove cutting and threading burrs before assembling piping.

H. Do not install defective piping or fittings. Do not use pipe with threads that are chipped, stripped or damaged.

I. Plug each gas outlet, including valves, with a threaded plug or cap immediately after installation, and retain until continuing piping or equipment connections are completed.

J. Install dirt-legs in gas piping at connections to equipment and elsewhere as indicated, and where required by code or regulation.

K. Install tee fittings with bottom outlet plugged, or capped, at bottom of pipe risers.

L. Do not install gas piping through foundations or under buildings. Where unavoidable, install in welded conduit, ventilated to outdoors on both ends, and tested to same requirements as gas piping.

M. Gas piping shall be electrically grounded and continuously grounded within the project, and bonded tightly to the grounding connection.

N. Use dielectric unions where dissimilar metals are joined together.

O. Install piping with 1/64" per foot (1/8%) downward slope in direction flow.

P. Install piping parallel to other piping, but maintain minimum of 12" clearance between gas piping and steam or hydronic piping above 200° F (93° C).

Q. Installation of Valves:

1. Gas Cocks: Provide at connection to gas train for each gas-fired equipment item; and on risers and braces where indicated.

2. Locate gas cocks where easily accessible, and where they will be protected from possible injury.

3. Control Valves: Install as indicated. Refer to Division 16 for wiring, not work of this section.

4. Pressure Regulating Valves: Install where shown and where required; comply with Utility requirements. Pipe atmospheric vent to outdoors, full size of outlet. Install gas shutoff valve upstream of each pressure regulating valve.

3.2 EQUIPMENT CONNECTIONS

A. Fuel Gas Piping Tightness Test: Prior to initial operation, test and purge fuel gas piping in accordance with ANSI Z 223.I, National Fuel Gas Code.

B. General: Connect gas piping to each gas-fired equipment item, with dirt leg and shutoff gas cock and pressure regulator where required. Comply with equipment manufacturer's instructions.

C. Piping Tests:

1. Using dry nitrogen, purge each segment to be tested. Cap or otherwise seal the segment to be tested. Fill system with dry nitrogen and test in accordance with NFPA 54.

2. Repair or replace fuel gas piping as required to eliminate leaks, and retest as specified to demonstrate compliance.

3. All welded pipe shall be pressure tested to 90 psig for a minimum period of one hour. Submit test results.

D. Purge System:

1. After all segments have been tested and entire system completed, purge the system free of air in accordance with NFPA 54. Do not leave purge discharge points unattended.

E. Spare Parts:

1. Furnish to Owner, with receipt, 2 valve wrenches for each type of gas valve installed, requiring same.

END OF SECTION

SECTION 23 2300
REFRIGERANT PIPING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Provide equipment, materials, tools, labor, and supervision necessary to furnish, fabricate, and install complete piping system.

1.2 STANDARDS AND CODES

A. Pipe materials specified in this Section shall apply to technical sections of Division 23 of the Project Manual where applicable. Special requirements as may be called for in the technical sections, or shown on the Drawings, shall take precedence over General Requirements herein. Piping located in plenums shall be plenum rated for fire and smoke.

1.3 PRODUCT HANDLING

A. Provide factory-applied plastic end-caps on each length of pipe and tube. Maintain end-caps through shipping, storage, and handling as required to prevent pipe-end damage and eliminate dirt and moisture from inside of pipe and tube.

B. Where possible, store pipe and tube inside and protected from weather. Where necessary to store outside, elevate well above grade and enclose with durable, waterproof wrapping.

C. Protect flanges and fittings from moisture and dirt by inside storage and enclosure, or by packaging with durable, waterproof wrapping.

1.4 QUALITY ASSURANCE

A. Brazing: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code, Section IX, "Welding and Brazing Qualifications"; or AWS B2.2, "Standard for Brazing Procedure and Performance Qualification."

1.5 SUBMITTALS

A. Submit piping schedule listing each pipe material used and systems served.

PART 2 PRODUCTS

2.1 MATERIAL

A. Material and Service

1. Copper refrigeration tube, hard temper, Type L-ACR, ASTM B88: Refrigerant lines.

2. Linesets shall be permitted. All piping shall be installed in a straight and neat manor. All linesets refrigeration piping shall be insulated as specified in 23 0700 HVAC INSULATION.

B. Fittings

1. Copper water tube, cast bronze or wrought copper, solder joint type. ANSI B16.18 and B16.22.

C. Joints

1. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys.

2. Verify with equipment manufacture type of brazing and brazing procedures prior to installation.

2.2 REFRIGERATION ACCESSORIES

A. Refrigerant Liquid Line Filter Driers: Provide refrigerant liquid line drier as recommended by equipment manufacturer for use in service indicated. Provide manual by-pass around each filter dryer.

B. Solenoid Valves: Provide solenoid valves of type, size, and rating as recommended by equipment manufacturer for use in service indicated.

C. Moisture-Liquid Indicators: Provide moisture-liquid indicators as recommended by equipment manufacturer for use indicated, double port, color-coded, U.L. listed.

D. Thermal Expansion Valves: Provide thermal expansion valves of type, size, and rating as recommended by equipment manufacturer for use in service indicated.

E. Strainers: 500 psig maximum working pressure; forged brass body with Monel 80-mesh screen, and screwed cleanout plug; Y-pattern, with solder end connections.

F. Provide UL listed valves (globe, check, hot gas by-pass, etc.) where required or recommended by manufacturer.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install pipe for plumbing and mechanical systems as shown on the Drawings, as called for in other Sections, and as specified herein.

B. Arrange and install piping approximately as indicated, straight, plumb, and as direct as possible, form right angles on parallel lines with building walls. Keep pipes close to walls, partitions, and ceilings, offsetting only where necessary to follow walls and avoid interference with other mechanical items. Locate groups of pipes parallel to each other; space at a distance to permit applying full insulation and to permit access for servicing valves. Piping to be run in concealed locations unless indicated exposed, or in equipment rooms.

C. Install horizontal piping as high as possible without sags or humps so that proper grades can be maintained for drainage. Branch piping shall come off the tops of mains unless shown otherwise.

D. Locate valves within reachable distance from equipment being served for easy access and operation. Do not locate valves with stems below horizontal.

E. Check piping for interference with other trades.

F. Where rough-ins are required for equipment furnished by others, verify exact rough-in dimensions with Owner or equipment supplier before roughing-in.

G. Install automatic temperature control valves, separable wells, pressure taps, and other items as called for and furnished by the temperature controls section.

H. Slope refrigerant piping as follows:

1. Install horizontal hot-gas discharge piping with a uniform slope downward away from compressor.

2. Install horizontal suction lines with a uniform slope downward to compressor.

3. Install traps and double risers to entrain oil in vertical runs.

4. Liquid lines may be installed level.

I. When brazing, remove solenoid-valve coils and sight glasses; also remove valve stems, seats, and packing, and accessible internal parts of refrigerant specialties. DO not apply heat near expansion-valve bulb.

J. Before installation of steel refrigerant piping, clean pipe and fittings using the following procedures:

1. Shot blast the interior of piping.

2. Remove coarse particles of dirt and dust by drawing a clean, lintless cloth through tubing by means of a wire or electrician's tape.

3. Draw a clean, lintless cloth saturated with trichloroethylene through the tube or pipe. Continue this procedure until cloth is not discolored by dirt.

4. Draw a clean, lintless cloth, saturated with compressor oil, squeezed dry, through the tube or pipe to remove remaining lint. Inspect tube or pipe visually for remaining dirt and lint.

5. Finally, draw a clean, dry, lintless cloth through the tube or pipe.

6. Safety-relief-valve discharge piping is not required to be cleaned but is required to be open to allow unrestricted flow.

3.2 INSTALLATION OF REFRIGERATION ACCESSORIES

A. Refrigerant Liquid Line Filter Driers: install in refrigerant liquid lines as indicated, and in accessible location for service. Provide with valve bypass.

B. Solenoid Valves: Install in refrigerant piping as indicated with stem pointing upwards.

C. Moisture-Liquid Indicators: Install as indicated on refrigerant liquid lines, in accessible locations.

D. Thermal Expansion Valves: Install in refrigerant piping as indicated.

E. Install strainers immediately ahead of each expansion valve, solenoid valve, hot gas bypass valve, compressor suction valve, and as required to protect refrigerant piping system components.

3.3 JOINT CONSTRUCTION

A. Remove scale, slag, dirt, and debris from outside of cleaned tubing and fittings before assembly.

B. Brazed Joints: Join copper tube and fittings according to CDA's "Copper Tube Handbook," "Brazed Joints" chapter. Continuously purge joint with oil-free, dry nitrogen during brazing.

END OF SECTION

SECTION 23 3113

METAL DUCTS

PART 1 GENERAL

1.1 SUMMARY

A. Provide material, devices, labor, and supervision necessary to fabricate and erect ductwork as required by the Drawings and this Section.

1.2 SUBMITTALS

A. Product Data: Submit manufacturer's technical product data and installation instructions for metal ductwork materials and products.

B. Shop Drawings: Submit ductwork shop drawings for entire facility, to scale, double line, indicating duct sizes, locations, fittings, equipment, accessories, structural clearances, etc. Do not install ductwork prior to approval of shop drawings by Engineer.

1.3 QUALITY ASSURANCE

A. Codes and Standards:

1. Ducts, plenums, apparatus casings, metal gauges, reinforcing, methods of supporting and hanging, and other sheet metal work as called for shall meet all functional criteria defined in Section VII, of the SMACNA "HVAC Duct Construction Standards Metal and Flexible" 1985 Edition. This shall be subsequently referred to as the SMACNA Manual. All ductwork must comply with all local, state and federal code requirements.

2. Comply with applicable requirements of NFPA 91.

1.4 DESCRIPTION

A. Air ducts shall be constructed as follows:

1. All Ductwork ±2” w-g.

PART 2 PRODUCTS

2.1 GENERAL

A. Shop fabricated sheet metal work shall be constructed of prime quality resquared tight coat galvanized steel, except where other type material is specified. Manufacturer's name and U.S. gauge number shall appear on each sheet.

B. Duct sealant shall be installed per SMACNA Class A-all transverse joints, longitudinal seams and duct wall penetrations.

C. Duct Sealant for Low Pressure Duct: UL labeled non-hardening, non-migrating mastic or liquid elastic sealant, type applicable for fabrication/installation detail, as compounded and recommended by manufacturer specifically for sealing joints and seams in ductwork. Sealant to be Mastic No. IG601 as manufactured by Hardcast or Engineer approved equivalent product manufactured by Ductmate or United McGill.

D. Round and/or oval ducts and fittings shall be as manufactured by Semco or United McGill.

2.2 DUCT

A. Rectangular Duct:

1. Sheet Metal: Except as otherwise indicated, fabricate ductwork from minimum 24 gage galvanized sheet steel complying with ASTM A527, lockforming quality; with G90 zinc coating in accordance with ASTM A525; and mill phosphatized for exposed locations.
2. Rectangular duct shall be fabricated to the SMACNA functional criteria for the pressure class indicated on the Drawings.
3. Pittsburgh lock shall be used on all longitudinal seams. All longitudinal seams will be sealed with mastic sealant. Snaplock is not acceptable.

B. Rectangular Duct Fittings:

1. Elbows shall be constructed with centerline radius of not less than 1.5 times duct width; where space conditions will not permit this radius or where indicated on the Drawings, square elbows with single thickness streamline turning vanes shall be used. Provide trailing edge extension for elbows in series.
2. Slopes for transitions or other changes in dimension shall be minimum 1 to 3.
3. All duct seams and joints shall be sealed to SMACNA Class A requirements.
4. Rectangular branch taps from mains shall be 45° entry fittings.

C. Round Duct:

1. Round Duct shall be spiral lock seam type, fabricated of galvanized steel strip with airtight four-ply lock seams Minimum 24 gage.
2. Metal gauges shall be as listed in the SMACNA Standard for the pressure class indicated on the Drawings.
3. Round duct shall be externally insulated.

D. Round Fittings:

1. Elbows for round ducts shall have a center line radius of 1.5 times the duct diameter.
2. 45o and 90o elbows for ducts up to 8" diameter shall be die stamped two-piece with welded longitudinal seams.
3. Elbows for round ducts over 8" diameter shall be formed of segments with welded seams and following numbers of segments:
   a. 90 degree elbow: 5 segments
   b. 60 degree elbow: 3 segments
   c. 45 degree elbow: 3 segments
   d. 30 degree elbow: 2 segments
   e. 22½ degree elbow: 2 segments
4. Tees, crosses and lateral cross fittings for round duct shall be of the conical type.
5. Reducers, increasers, offsets, wyes, crosses, divided flow fittings and similar fittings for round duct shall be one-piece construction with welded seams.
6. Metal gauges for fittings for round duct shall be as listed in SMACNA Standard for the pressure class indicated on the Drawings.

7. Duct and fitting welds shall be painted after fabrication to prevent corrosion where zinc has been burned by welding.

8. No bull headed tees shall be used.

9. Pipe-to-pipe joints for round ducts up to 50" diameter shall be made with male sleeve couplings reinforced by rolled bead.

10. Pipe-to-fitting joints for round ducts up to 50" shall be made by slip-fit of projecting collar of fitting into the duct.

11. Slip-fit joints shall be fastened with sheet metal screws, place ½" from fitting or coupling head.

12. Joints shall be sealed with duct sealant installed as recommended by the manufacturer.

13. Duct reinforcing, size of reinforcing angles and spacing shall be as recommended by SMACNA.

2.3 PLENUMS

A. Plenums shall be fabricated of same material as duct connecting to plenum and shall be two metal gauges heavier than gauge of largest duct connecting to plenum. Plenums used for connecting to exterior louvers shall have all seams welded watertight at the floor and 6 inches up the wall. In addition, plenums used for connection to exterior intake louvers shall have the floors sloped to a drain pipe connection and the drain piped to the nearest floor drain.

2.4 DUCTWORK SUPPORT MATERIALS

A. Except as otherwise indicated, provide hot-dipped galvanized steel fasteners, anchors, rods, straps, trim and angles for support of ductwork.

2.5 DUCT ACCESSORIES

A. Transverse Duct Joints: May be made with the Ductmate Systems or an Engineer approved equivalent. The Ductmate Systems are to be used in accordance with the Ductmate factory installation and assembly instructions, (1-800-245-3188).

1. Ductmate 440 or a Butyl Rubber Gasket which meets Mil-C 18969B, Type II Class B, T-C-1796 A, Type II Class B, and TTS-S-001657 must also pass UL-723. This material, in addition to the above, shall not contain vegetable oils, fish oils, or any other type vehicle that will support fungal and/or bacterial growth associated with dark, damp areas of ductwork. The recommended test procedure for bacterial and fungal growth is found in 21CFR 177, 1210 closures with sealing gaskets for food containers.

2. Ductmate or W.D.C.I. proprietary duct connection systems are acceptable. Duct constructed using these systems shall refer to the manufacturer's guidelines for sheet gauge, intermediate reinforcement size and spacing, and joint reinforcements.

3. Formed on flanges (T.D.C./T.D.F./T-25A/T-25B) are acceptable. Formed on flanges shall be constructed as SMACNA T-25 flanges, whose limits are defined on Page 1.36 1985 SMACNA Manual, First Edition. No other construction pertaining to formed on flanges will be accepted. Formed on flanges shall be accepted for use on ductwork 42" wide or less, 2" static positive pressure or less, and shall include the use of corners, bolts and cleat. (Over 42", the reinforcement/joint deflection criteria no longer conform to the UMC).

B. Insulated Roof Cap: Provide insulated roof caps with 3 inches of R-5 insulation fastened to the underside of the cap to maintain the thermal integrity of the roof/structure. Roof cap shall be constructed with structural steel reinforcements to prevent damage and shall be continuous across the cap. The cap flanges shall be welded at the seams for a watertight installation. Cap shall be fastened down to curb with a minimum of 4 screws every 24" around the cap perimeter.

C. Gooseneck: Provide gooseneck air intake/exhaust where noted on drawings. Duct passing through roof / roof membrane shall maintain the net area through the roof and shall terminate with a 180 degree gooseneck in accordance with SMACNA. Construction shall have waterproof seems and joints. Gooseneck shall include miscellaneous support steel and ½ inch bird screen. Coordinate exact size and roof curb requirements with the Contractor.

PART 3 EXECUTION

3.1 INSTALLATION

A. General: Assemble and install ductwork in accordance with recognized industry practices which will achieve airtight (5% leakage for systems rated 3" and under; 1% for systems rated over 3") and noiseless (no objectionable noise) systems, capable of performing each indicated service. Install each run with minimum number of joints. Align ductwork accurately at connections, within 1/8" misalignment tolerance and with internal surfaces smooth. Support ducts rigidly with suitable ties, braces, hangers and anchors of type which will hold ducts true-to-shape and to prevent buckling. Support vertical ducts at every floor.

B. Inserts: Install concrete inserts for support of ductwork in coordination with form work, as required to avoid delays in work.

C. Field Fabrication: Complete fabrication of work at project as necessary to match shop-fabricated work and accommodate installation requirements.

D. Locate ductwork runs, except as otherwise indicated, vertically and horizontally and avoid diagonal runs wherever possible. Locate runs as indicated by diagrams, details and notations or, if not otherwise indicated, run ductwork in shortest route which does not obstruct usable space or block access for servicing building and its equipment. Install offsets, angles, and transitions as may be required to avoid interferences with other work, install streamlined easements around obstructions where necessary to pass obstructions through ducts. Maintain full capacity of ducts at offsets, angles, transitions and easements, except where Drawings indicated use of reducing or increasing transitions. Hold ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.

E. Limit clearance to ½" where furring is shown for enclosure or concealment of ducts, but allow for insulation thickness, if any. Where possible, locate insulated ductwork for 1" clearance outside of insulation. Wherever possible in finished and occupied spaces, conceal ductwork from view, by locating in mechanical shafts, hollow wall construction or above suspended ceilings. Do not encase horizontal runs in solid partitions, except as specifically shown. Coordinate layout with suspended ceiling and lighting layouts and similar finished work.

F. Where ducts pass through interior partitions and exterior walls, conceal the space between the construction opening and the duct or duct-plus-insulation with sheet metal flanges of the same gauge as the duct. Overlap the opening on all sides by at least 1½".

G. Coordinate duct installations with installation of accessories, equipment, controls and other associated work of the ductwork system.

H. Each duct section shall be rigidly supported from structure. Attach hangers to structure with expansion plugs, concrete inserts, beam clamps or other approved means. Rubber-in-shear

isolators shall be installed in hangers for ducts in equipment rooms, to prevent vibration transmission to the structure.

I. Install as indicated on the Drawings duct mounted equipment as specified in other Sections.

J. Duct sizes shown on Drawings are net inside dimensions. Increase duct sizes as required to allow for installation of duct liner, where specified.

K. Application of Duct Sealant: All ducts to be properly sealed. Specified duct sealant to be pumped or painted into all joints and seams on all ductwork systems. Sealant shall be allowed to set 48 hours before any air pressure is applied to system.

L. Electrical Equipment Spaces: Do not route ductwork through electrical equipment spaces and enclosures. Do not run ductwork above electrical panels.

3.2 EQUIPMENT CONNECTIONS

A. General: Connect metal ductwork to equipment as indicated; provide flexible connection for each ductwork connection to equipment mounted on vibration isolators, and/or equipment containing rotating machinery.

3.3 ADJUSTING AND CLEANING

A. Clean ductwork internally, unit by unit as it is installed, of dust and debris. Clean external surfaces of foreign substances which might cause corrosive deterioration of metal or, where ductwork is to be painted, might interfere with painting or cause paint deterioration.

B. Temporary Closure: At ends of ducts which are not connected to equipment or air distribution devices at time of ductwork installation, provide temporary closure of polyethylene film or other covering which will prevent entrance of dust and debris until time connections are to be completed.

C. Balancing: Refer to Section 23 0593, "Testing, Adjusting and Balancing for HVAC" for air distribution balancing of metal ductwork; not work of this section. Seal any leaks in ductwork that become apparent during the balancing process.

END OF SECTION

SECTION 23 3300

AIR DUCT ACCESSORIES

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Volume dampers.
2. Motorized control dampers.
3. Turning vanes.
4. Duct-mounting access doors.
5. Flexible connectors.
6. Flexible ducts.

1.2 SUBMITTALS

A. Product Data: For the following:

1. Volume dampers.
2. Motorized control dampers.
3. Turning vanes.
4. Duct-mounting access doors.
5. Flexible connectors.
6. Flexible ducts.

B. Shop Drawings:

1. Product Data: Submit manufacturer's technical product data and installation instructions for metal ductwork materials and products.

1.3 QUALITY ASSURANCE

A. Codes and Standards

1. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."
2. Ducts, plenums, apparatus casings, metal gauges, reinforcing, methods of supporting and hanging, and other sheet metal work as called for shall meet all functional criteria defined in the SMACNA "HVAC Duct Construction Standards Metal and Flexible" 2005, 3rd Edition. This shall be subsequently referred to as the SMACNA Manual. All ductwork must comply with all local, state and federal code requirements.
3. Comply with applicable requirements of NFPA 91.

PART 2 PRODUCTS

2.1 VOLUME DAMPERS

A. Manual Volume Dampers: Fabricated of same material as ducts, two metal gauges heavier than duct and hemmed 1" all around, mounted on 3/8" square rod with saw slot position indicated. Pivot bearings, elocking position regulator, Young Regulator Co., Series 443.

1. Where positioning regulator is not accessible, provide coupling and extension rod with regulator for ceiling wall or floor installation, as required. Young Series 301 and 315 for ceiling, Series 270-302 for walls.

2.2 MOTORIZED CONTROL DAMPERS (INSULATED AND LOW LEAKAGE)

A. Dampers shall include the frame, blades, and linkage assembly. Coordinate damper sizes and quantities with louver and duct sizes. Dampers shall be as follows:

1. Opposed blade configuration and suitable for operating temperatures between –40° F and 200° F.
2. Blade shall be aluminum and shall be insulated. Blades and frame shall be thermally broken.
3. The assembly shall include airfoil type blades with the linkage out of the airstream and concealed in the frame.
4. The blade seals and jamb seals shall be silicone.
5. Damper shall have a maximum leakage performance rating of 3 cfm per square foot at 1 inch water gauge static pressure differential (based on a 36 "wide x 36" high damper).
6. Dampers shall bear the AMCA certification for air leakage.
7. Dampers shall be by Greenheck, Ruskin, Tamco, or approved equal.

B. Electronic damper actuators

1. The actuator shall have electronic overload or digital rotation sensing circuitry to prevent damage to the actuator throughout the rotation of the actuator. Furnish a separate damper actuator for each damper greater than 48" in any dimension.
2. Where shown, for power failure/safety applications, an internal mechanical, spring return mechanism shall be built into the actuator housing.
3. All rotary spring return actuators shall be capable of both clockwise and counter clockwise spring return operation. Linear actuators shall spring return to the retracted position.
4. All 24V AC/DC actuators shall not require more than 10 VA for AC or more than 8 W for DC applications. Actuators operating on 120V AC or 230V AC shall not require more than 11 VA.
5. All non-spring return actuators shall have an external manual gear release to allow manual positioning of the damper when the actuator is not powered. Spring return actuators with more than 60 in-lb. torque capacity shall have a manual crank for this purpose.
6. All modulating actuators shall have an external, built-in switch to allow the reversing of direction of rotation.
7. Actuators shall be provided with a conduit fitting and a minimum 1m electrical cable and shall be pre-wired to eliminate the necessity of opening the actuator housing to make electrical connections.
8. Actuators shall be Underwriters Laboratories Standard 873 listed.
9. Actuators shall be designed for a minimum of 60,000 full stroke cycles at the actuator's rated torque. Actuators shall include a stroke limiting device.
10. Contractor shall coordinate all actuator quantity and voltage requirements. Actuators shall be externally mounted.

2.3 TURNING VANES

A. Manufacturers:

1. Aero Dyne; Ductmate; Anemostat; Barber Coleman; Duro Dyne; or Hart & Cooley.

B. Provide single thickness streamline type, except provide turning vanes with trailing edge at elbows which change dimensions or at consecutive elbows.

C. Provide manufactured turning vanes and vane runners, fabricated from the same material as the duct, and constructed in accordance with SMACNA "HVAC Duct Construction Standards". Tab spacing shall be SMACNA standard. Rail systems with non-standard tab spacings shall not be accepted. All tabs shall be used, do not skip tabs. Mounting rails shall have friction insert tabs which align the vanes automatically. Vanes shall be subjected to tensile loading and be capable of supporting 250 lbs. when fastened per the manufacturer's instructions.

2.4 DUCT-MOUNTING ACCESS DOORS

A. General:

1. Shall be of same material as ducts in which they are installed, fabricated of two thicknesses of not less than 22 gauge, with 1" thick rigid glass fiber filler. Provide sheet metal frame, airtight gasket and two cam latches. Access doors and panels shall be 2 inches smaller than duct width and square for ducts 18” wide and larger, maximum size shall be 24" x 24" unless noted otherwise. For ducts less than 18” wide, access doors and panels shall be 2” smaller than duct width and 18” long. Pre-manufactured doors shall be hinged and shall be of adequate size to allow easy access to hardware which needs to be maintained.

2.5 FLEXIBLE DUCT CONNECTIONS

A. Manufacturers:

1. Ventfabric, Inc., Ventglass, Duro Dyne, Ductmate or American/Elgin.

B. General:

1. 30 ounce woven glass fiber, double neoprene coated, fire retardant, waterproof and airtight, suitable for temperatures to 200o F, UL approved.

2.6 FLEXIBLE DUCTS

A. Manufacturers:

1. Flexible duct shall be by Thermaflex, Semco, Wiremold, or Engineer approved equal.

B. General:

1. Acceptable in supply ductwork only where shown (not allowed in exposed occupied areas). Flexible duct shall include wire, core, insulation, and vapor barrier and the composite assembly shall meet requirements of NFPA-90A and UL181 and shall be UL listed for flame spread rating of not more than 25 and smoke developed rated of not more than 50.

C. Minimum length of flexible duct shall be 3 feet.

D. Maximum length of flexible duct shall be 8 feet.

E. Flexible duct shall have a minimum R-value of 6.

F. Flexible duct shall have a maximum vapor transmission rating of .1 perms.

G. Flexible duct shall be rated for operating temperatures between -20 and 250 degrees.

H. All flexible duct shall be connected to metal fittings with stainless steel bands equal to snaplock. The use of duct tape to secure the core is not acceptable.

I. Flexible duct shall have an operating positive pressure rating of 10" wg for nominal sizes 4 thru 12 inch and 6" wg for nominal sizes 14 thru 16 inch, and a negative pressure rating of 1" wg for sizes 4 thru 12 inches. Duct shall be rated for a velocity of 5,000 feet per minute. Duct shall be equal to Thermaflex M-KE.

2.7 QUADRANT LOCKS

A. Provide for each damper, quadrant lock device on one end of shaft; and end bearing plate on other end for damper lengths over 12".

B. Provide extended quadrant locks and end extended bearing plates for externally insulated ductwork.

PART 2 EXECUTION

3.1 APPLICATION AND INSTALLATION

A. Install manual volume dampers in all supply, return and exhaust duct systems as required for controlling air volumes to trunk ducts, branch ducts, outlets and inlets. Contractor shall install a complete system of dampers as required for balancing air systems.

B. Coordinate duct installations with installation of accessories, equipment, controls and other associated work of the ductwork system.

C. Install access panels for inspection and servicing of duct mounted equipment; reheat coils, sound attenuators, and smoke and fire dampers.

D. Install flexible connections in ducts at connections to plenums, apparatus casings, fan housings, roof top units, air handling units, exhaust fans and other equipment which could transmit vibrations to the duct systems. Crimp into duct flanges for attachment to duct and equipment. Make airtight joint. Provide adequate joint flexibility to allow for thermal axial, transverse, and torsional movement, and also capable of absorbing vibration of connected equipment.

E. Install turning vanes in all square or rectangular 90° elbows in supply, return, and exhaust air systems.

F. Installation of Flexible Ducts: Flexible Ducts are to be installed only where indicated on Drawings.

1. Maximum length of flexible duct is 8'-0" OAL.
2. Minimum length of flexible duct is 3'-0" OAL.
3. Square to round transition gages to comply with SMACNA rectangular duct (minimum 24 ga.).
4. Flexible duct must meet UL 181 and be installed per SMACNA using a clamp for securing duct to collar and a supplemental clamp for securing the insulation and vapor barrier.
5. Support flexible ductwork with minimum 2" wide sheet metal bands, secured to structure with ductwork support materials. Maximum spacing shall be 4 feet on center.
6. The flexible duct shall be installed with a minimum centerline radius equal to 1.5 times the diameter of the duct.
7. When connecting flexible duct to diffusers, the duct shall be installed with a minimum of 6" straight flex at the diffuser.

END OF SECTION

SECTION 23 3700
WALL LOUVERS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Provide labor, materials, equipment and supervision necessary to furnish and install:

1. Shop fabricated louver and frame
2. Head and sill flashing to adjacent work
3. Bird screening
4. Attachment hardware

1.2 SUBMITTALS

A. Shop Drawings

1. Clearly indicate, in large scale, profile of frame and installation details, relation to adjacent construction, flashing blade configuration, bird and insect screens, and insulated damper and frame.

B. Product Data

1. Provide louver schedule indicating each louver location, size, free area, water penetration, airflow, and associated pressure drop.
2. Accessory information.
3. Color/finish information and physical color selection materials.

C. See Volume 1 - Division 01 for additional submittal requirements.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Approved basis of design is Ruskin model #ELF6375DX. An equivalent model approved in advance from the following manufacturers:

1. Greenheck.
2. Airolite.
3. Louvers and Dampers
4. Pottorff.
5. NCA
6. United Enertech

2.2 MATERIALS

A. Horizontal Line (Continuous Blade) HVAC Louver

1. Frame and blades: 0.081-inch thick. Extruded aluminum, six inches deep, Type 6063-T5 aluminum.

2. Bird Screen: 1/2-inch mesh, 16-gauge aluminum, secured in removable aluminum frame.
3. Provide extended sill flashing.
4. Drainable blade.
5. Finish to be 3 coat Kynar 500 fluoropolymer coating (70% PVDF) in standard color as selected by architect. 20 year warranty on standard finish colors.
6. Design shall incorporate structural supports to withstand 20 psf wind loads.
7. Blades shall be spaced 5-29/32” nominal on center at 37-1/2º angle, drainable type.
8. Intermediate support mullions shall not interrupt exterior appearance.
9. Size shall be as shown on drawings.

B. Performance

1. The louver shall be licensed to bear the AMCA seal for water penetration and air performance.
2. The louver shall not allow water penetration greater than 0.01 oz/square foot at velocities less than 1000 feet per minute when tested for 15 minutes.
3. The pressure drop through the louver shall not exceed .15 inches water gauge at 800 fpm (intake). Pressure drops do not include bird screen or insect screen.
4. Reference drawings for cfm and louver sizes. Louvers shall have a minimum of 50% free area (based on a 48” x 48” size).

PART 3 EXECUTION

3.1 PREPARATION

A. Ensure openings affecting this work are properly prepared and that flashings are correctly located to divert moisture to exterior.

3.2 INSTALLATION

A. Install louvers in openings properly aligned and level.

B. Install louvers in accordance with manufacturer’s instructions, architectural details, and mechanical details.

C. Secure louver rigid with concealed fasteners of non-corrosive metals to suit materials as being encountered.

D. Coordinate installation method with application of exterior materials and mechanical work.

E. Set and tie into flashings to ensure diversion of moisture to exterior.

F. Install removable bird screens.

G. Caulk around louvers to form seal with surrounding building materials. Verify proper drainage through weep holes following caulking.

END OF SECTION

SECTION 23 3713

DIFFUSERS, REGISTERS, AND GRILLES

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes ceiling- and wall-mounted diffusers, registers, and grilles.

1. Provide materials, devices, labor and supervision necessary for the installation of diffusers, registers and grilles

2. Provide diffusers, registers and grilles as per schedule on Drawings.

1.2 SUBMITTALS

A. Product Data: Submit manufacturer's technical product data for diffusers, registers and grilles including the following:

1. Schedule of diffusers, registers and grilles indicating drawing designation, room location, number furnished, model number, size and accessories furnished.

2. Data sheet for each type of grille, register and diffuser and accessory furnished; indicating construction, finish and mounting details.

3. Performance data for each type of grille, register and diffuser furnished, including aspiration ability, temperature and velocity traverses, throw and drop, and noise criteria ratings. Indicate selections on data.

B. Shop Drawings: Submit manufacturer’s assembly-type shop drawing for each type of grille, register and diffuser, indicating materials and methods of assembly of components.

1.3 QUALITY ASSURANCE

A. Codes and Standards:

1. ARI Compliance: Test and rate diffusers, registers and grilles in accordance with ARI 650 “Standard for Air Outlets and Inlets”.

2. ASHRAE Compliance: Test and rate diffusers, registers and grilles in accordance with ASHRAE 70 “Method of Testing for Rating the Air Flow Performance of Outlets and Inlets”.

3. NFPA Compliance: Install diffusers, registers and grilles in accordance with NFPA 90A “Standard for the Installation of Air Conditioning and Ventilating Systems”.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Products by Titus, Krueger, Carnes, Metal-aire, Nailor, Price, or Engineer approved equivalent.

2.2 CEILING AIR DIFFUSERS

A. General: Except as otherwise indicated, provide manufacturer's standard ceiling air diffusers where shown; of size, shape, capacity and type indicated; constructed of materials and components as indicated, and as required for complete installation.

B. Performance: Provide ceiling air diffusers that have, as minimum, temperature and velocity traverses, throw and drop, and noise criteria ratings for each size device as listed in manufacturer's current data.

C. Ceiling Compatibility: Provide diffusers with border styles that are compatible with adjacent ceiling systems, and that are specifically manufactured to fit into ceiling module with accurate fit and adequate support. Refer to general construction drawings and specifications for types of ceiling systems which will contain each type of ceiling air diffuser.

D. Types: Provide ceiling diffusers of type, capacity and with accessories and finishes as listed on diffuser schedule.

2.3 GRILLES AND REGISTERS

A. General: Except as otherwise indicated, provide manufacturer's standard ceiling and wall registers and grilles where shown; of size, shape, capacity and type indicated; constructed of materials and components as indicated, and as required for complete installation.

B. Performance: Provide registers and grilles that have, as minimum, temperature and velocity traverses, throw and drop, and noise criteria ratings for each size device as listed in manufacturer's current data.

C. Wall and Ceiling Compatibility: Provide registers and grilles with border styles that are compatible with adjacent wall and ceiling systems, and that are specifically manufactured to fit into wall and ceiling construction with accurate fit and adequate support. Refer to general construction drawings and specifications for types of wall and ceiling construction which will contain each type of register and grille.

D. Types: Provide registers and grilles of type, capacity and with accessories and finishes as listed on register and grille schedule.

2.4 FLUORESCENT LIGHT – AIR TROFFER DIFFUSERS

A. Air troffer diffusers shall be factory insulated saddle type with outlet at both sides of diffuser, equipped with air pattern and volume control.

B. Inlet collars shall be oval or round for round flexible duct connections. Collars may be located on top or side of diffuser, at Contractor's option.

2.5 CEILING DIFFUSERS – SQUARE PANEL

A. Architectural square panel ceiling diffusers shall be of the sizes and mounting types shown on the plans and outlet schedule. The diffuser shall have a heavy gauge aluminum face panel that captures a secondary heavy gauge aluminum panel. The face panel is removable by means of four hanger brackets. The exposed surface of the face panel shall be smooth, flat, and free of visible fasteners.

B. The face panel shall project ¼ inch below the outside border of the diffuser backpan. The back of the face panel shall have an aerodynamically shaped, rolled edge to ensure a tight horizontal discharge pattern. Ceiling diffusers with a 24 x 24-inch full face shall have no less than an 18 x 18-inch face panel size. Ceiling diffusers with a 12 x 12-inch full face shall have no less than a 9 x 9-inch face panel size.

C. The backpan shall be one piece precision die-stamped and shall include an integrally drawn inlet. The diffuser backpan shall be constructed of 22-gauge aluminum. The diffuser neck shall have a minimum of 1 1/4 –inch depth available for duct connection.

D. The finish shall be #26 white. The finish shall be an anodic acrylic paint, baked at 315 degrees F for 30 minutes. The pencil hardness must be HB to H.

E. The paint must pass a 100-hour ASTM B117 Corrosive Environments Salt Spray Test without creepage, blistering or deterioration of film. The paint shall pass a 250-hour ASTM D870 Water Immersion Test and pass the ASTM D2794 Reverse Impact Cracking Test with a 50-inch pound force applied.

F. The manufacturer shall provide published performance data for the square panel diffuser. The diffuser shall be tested in accordance with ANSI/ASHRAE Standard 70-1991.

2.6 EGG CRATE GRILLE

A. Furnish Eggcrate Grille with Aluminum Grid and Aluminum Border.Return grilles shall be the sizes and mounting types as shown on the plans and outlet schedule. Return grilles shall provide a free area of at least 90%. Outer borders shall be constructed of heavy extruded aluminum with a thickness of 0.040-0.050 inch and shall have countersunk screw holes for a neat appearance. Border width shall be 1¼ inches on all sides and shall be interlocked at the four corners and mechanically staked to form a rigid frame.

B. The finish shall be an anodic acrylic paint, baked at 315°F for 30 minutes. The pencil hardness shall be HB to H. The paint shall pass a 100-hour ASTM B117 Corrosive Environments Salt Spray Test without creepage, blistering or deterioration of film. The paint must pass a 250-hour ASTM D870 Water Immersion Test. The paint must also pass the ASTM D2794 Reverse Impact Cracking Test with a 50-inch pound force applied.

2.7 MODULAR SLOT DIFFUSERS

A. Modulinear diffusers shall be available in standard one piece lengths up to 6 feet and 1 to 8 discharge slots.

B. Diffuser lengths greater than 6 feet shall be furnished in multiple sections and shall be joined together end-to-end with alignment pins to form a continuous slot appearance. All alignment components shall be furnished with the diffuser. The return models shall be constructed the same as supply diffusers without the pattern controllers.

C. The frame and support bars shall be constructed of heavy gauge extruded aluminum. The pattern controller shall be an aerodynamically curved steel deflector capable of 180° pattern adjustment from the face of the diffuser and shall allow dampering if required. Maximum pattern controller length shall be 3 feet, for diffusers longer than 3 feet pattern controllers shall be furnished in multiple sections.

D. The finish shall be an anodic acrylic paint, baked at 315°F for 30 minutes. The pencil hardness must be HB to H. The paint must pass a 100-hour ASTM B117 Corrosive Environments Salt Spray Test without creepage, blistering or deterioration of film. The paint must pass a 250-hour ASTM D870 Water Immersion Test.

E. The paint shall also pass the ASTM D2794 Reverse Impact Cracking Test with a 50-inch pound force applied.

F. Heavy gauge extruded aluminum end borders, end caps and mitered corners shall be available to close off the ends of the diffusers. Plenums shall be manufactured by the same manufacturer of the linear slot diffusers. Optional diffuser curving to a 6-foot minimum radius with fixed deflection shall be available as required.

PART 3 EXECUTION

3.1 INSTALLATION

A. General: Install diffusers, registers and grilles in accordance with manufacturer's written instructions and in accordance with recognized industry practices to insure that products serve intended functions.

B. Coordinate with other work, including ductwork and duct accessories, as necessary to interface installation of air outlets and inlets with other work.

C. Install wall mounted grilles and registers plumb and level and flush to surface. Locations may be altered slightly, as acceptable to the Architect/Engineer so as to fit portions of the structure.

D. In grid panel type ceilings, lay-in metal pan, acoustical, etc., diffusers, registers and grilles shall be located as shown on the reflected ceiling plan or as directed by the Architect/Engineer typically to minimize cutting of ceiling panels.

E. Coordinate location of ceiling diffusers and registers with Architect's reflected ceiling plan.

F. Provide transitions as required for connections to ductwork, including square to round.

G. Install diffusers, registers, and grilles level and plumb.

H. Install diffusers, registers, and grilles with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

3.2 ADJUSTING

A. After installation, adjust diffusers, registers, and grilles to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION

SECTION 23 5400
FURNACES

PART 1 GENERAL

1.1 SUMMARY

A. Provide material, equipment, labor, and supervision as necessary for complete installation of furnaces, devices, controls, filters, air conditioning, and flues.

1.2 SUBMITTALS

A. Submit manufacturer's product, performance and installation data.

1.3 QUALITY ASSURANCE

A. Standards and Codes

1. Gas furnaces shall be in accordance with American Gas Association and NFPA standards and have been tested and certified by the Department of Energy.

2. Electric furnaces shall be in accordance with N.E.C. and N.E.M.A. and be U.L. listed.

B. All units shall be furnished by the same manufacturer.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Furnaces by Lennox, Trane, Amana, or Carrier.

2.2 GAS FURNACE

A. Units shall be high efficiency natural gas fired downflow or upflow as scheduled on plans.

B. Casing to be one piece Uniweld and heat exchanger compartment shall be fully insulated for maximum heat retaining efficiency. Provide heavy duty motor for air conditioning service with adjustable V belt drive. All moving parts to be rubber isolated for quiet operation.

C. Provide hot surface ignition system, wiring, and integrated system control center, dual solenoid combination gas valve and regulator, low energy power ventilator, slotted port burners, manual gas valve, fan control relay, adjustable fan control, filter rack, and filters. A.G.A. approved.

D. Provide additional controls required to meet local, city and utility requirements.

2.3 AIR COOLED CONDENSING UNIT AND EVAPORATOR COIL

A. Condensting units shall have capacity as scheduled on plans. Unit shall have rigid welded weatherproof casing construction with removable panels for complete access. Minimum 20 gauge cabinet with attractive finish coat of paint. Provide coil protection guards.

B. Condensing units shall be quiet operating with slow speed condenser fan. Shall be suitable for cooling operation down to 30 degrees F. with automatic thermal cutout, automatic reset high and low refrigerant pressure switches. Provide unit with timer off control, low ambient controls and hard start kit.

C. Compressors shall be single stage with suction and liquid line service valves, full refrigerant charge, internal overload protection, copper tube aluminum fin condenser coil. Provide crankcase heater. Compressor shall be served by a five (5) year replacement warranty.

D. Cooling coils shall be cased A type configuration copper tube aluminum fin leak tested at factory. Drip pans shall be galvanized steel coated with waterproof enamel paint or mastic.

E. Refrigerant lines shall be sized and installed per manufacturer's recommendations. See Spec Section 23 2300 Refrigerant Piping.

2.4 CONTROLS

A. Furnish, install, and wire combination heating and cooling 7-day programmable thermostats. Thermostat sub-base shall have fan on off automatic and system heating cooling switches.

2.5 FLUE

A. Provide flue and combustion air vent ducts per manufacturer's written recommendations. Design based on PVC. Size per manufacturer's written recommendations.

B. Provide roof support assembly.

C. Accessories required are:

1. Insulated roof penetration fitting.

2. Rain cap.

3. Condensate Neutralizer kit

D. Joints shall be sleaded per manufacturer's recommendations.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install furnace and condenser equipment as indicated on Drawings in accordance with manufacturer's recommendations. Run condensate line to floor drain with minimum 4" deep trap.

B. Install flue and combustion air vents per manufacturer's instructions.

C. Install clean filters at end of construction.

D. Install furnaces and condensing units on 4" concrete pads.

END OF SECTION

SECTION 23 7200

AIR-TO-AIR ENERGY RECOVERY EQUIPMENT

PART 1 GENERAL

1.1 SUMMARY

A. Provide materials, equipment, tools, labor and supervision necessary to install Air-to-Air Energy Recovery Equipment as required by the Drawings and this Section.

B. This Section includes the following:

1. Packaged energy recovery ventilators (fixed plate).

1.2 CODES AND STANDARDS

A. ASHRAE/ANSI/IES 90.1 - Energy Efficiency for Buildings Except Low-Rise Residential Buildings

B. IEEC - International Energy Conservation Code

C. IRC - International Residential Code

D. NFPA/NEC 70 - National Electrical Code

E. IMC - International Mechanical Code

F. Local and/or State Plumbing, Mechanical and Building Codes

G. NFPA Codes and Standards

H. AHRI 1060

1.3 SUBMITTALS

A. Product Data: Submit manufacturer's product, performance and installation data.

B. Shop Drawings: Submit manufacturer's assembly-type shop drawings indicating dimensions, weight loadings, required clearances, and methods of installation.

PART 2 PRODUCTS

2.1 PACKAGED ENERGY RECOVERY VENTILATORS (FIXED PLATE)

A. Manufacturer:

1. RenewAire
2. Greenheck
3. Engineer approved equivalent

B. Performance

1. Energy transfer shall be capable of transferring both sensible and latent energy between air streams. Latent energy transfer shall be accomplished by direct water vapor transfer from one air stream to the other, without exposing transfer media in succeeding cycles directly to the exhaust air and then to the fresh air.

2. Passive Frost Control: Energy-transfer element shall perform without condensing or frosting under normal operating conditions (defined as outside temperatures above – 10º F and inside relative humidity below 40%). Occasional extreme conditions shall not affect the usual function or performance of the element. No condensate drains will be allowed.

3. Continuous ventilation unit shall have the capacity to operate continuously without the need for bypass, recirculation, pre-heaters or defrost cycles under normal operating conditions.

4. Positive Airstream Separation: Water vapor transfer shall be through molecular transport by hydroscopic resin and shall not be accomplished by "porous plate" mechanisms. Exhaust and fresh airstreams shall at all times travel in separate passages and airstreams shall not mix.

5. Laminar Flow: Airflow through the energy exchange element shall be laminar, avoiding deposition of particulates on the interior of the energy exchange plate material.

C. Product

1. Construction

a. Heat Exchanger:

1) Fixed-plate total energy-exchange element. Total separation of airstreams.

2) Energy-exchange module shall be of fixed-plate cross-flow construction, with no moving parts.

3) Hydroscopic resin type, layered bonded to cross-flow corrugated structure.

4) Energy exchanger core shall be mounted to slide out of cabinet for ease of inspection, removal and cleaning.

5) The ERV core shall be protected by a MERV-8 rated, 2" disposable filters in both airstreams.

b. Drain Pans:

1) No condensate drain pans or drains shall be allowed and unit shall be capable of operating in winter and summer conditions without generating condensate.

c. Unit Cabinet or Casing:

1) Case shall be constructed of galvanized, 20-gauge steel, with lapped corners, and gasketed, zinc plated screw fasteners.

2) Case walls and doors shall be fully insulated with 1 inch, expanded polystyrene foam insulation faced with a cleanable foil face on all exposed surfaces.

3) Access doors or panels shall provide easy access to blowers, energy transfer elements and filters. Access doors or panels shall be gasketed to provide airtight seal.

4) Flange components shall provide suitable for connection of ductwork.

5) Internal filter racks.

d. Fans:

1) Forward curved, direct drive, with ec motors.

2) Statically and dynamically balanced.

e. Power:

1) Manufacturer shall provide disconnect.

2) Unit shall have single-point plug power connection.

3) Unit shall be U.L listed, approved or classified.

4) Unit shall have 24 VAC contactor control connection.

D. Warranty

1. Unit, including motors, shall be warranted to be free from defects in materials or workmanship for a period of Two(2) years.

2. Energy core shall be warranted to be free from defects in materials or workmanship for a period of five (10) years.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install equipment where shown in accordance with equipment manufacturer's written instructions, and recognized industry practices, to ensure that units comply with requirements and serve intended purposes.

B. Coordinate with other work, including ductwork, roof decking, vibration isolation, piping and electrical work, as necessary to interface installation of packaged rooftop air-conditioning units with other work.

C. Temporary Closure: Upon completion of installation, provide protective covering on equipment ductwork connection openings to prevent entrance of dust and debris into equipment.

D. Provide temporary filters for equipment for use during construction period. Install new filters at completion of duct system work, prior to testing, adjusting, and balancing work.

E. Duct Connections: Provide ductwork, accessories, and flexible connections as required.

F. Install air-to-air heat exchangers so supply and exhaust airstreams flow in opposite directions.

G. Install units with manufacturer's reccommended clearances for service and maintenance.

3.2 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain units.

3.3 TESTING

A. Upon completion of packaged energy recovery ventilators and connection to completed air distribution system, start-up and test equipment in accordance with ARI Standards; operate unit to demonstrate capability and compliance with requirements. Where possible, field-correct malfunctioning units, then retest to demonstrate compliance.

3.4 CONTROL

A. Except for maintenance, energy recovery ventilator units shall operate continuously whenever building is occupied. Control shall be through digital programmable timeclock provided by manuacturer. OA/EA dampers shall be wired through same timeclock so whenever ERV is off, dampers shall close tight.

END OF SECTION

SECTION 23 8126

SPLIT-SYSTEM AIR-CONDITIONERS

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes split-system air-conditioning units consisting of separate evaporator-fan and compressor-condenser components. Units are designed for exposed or concealed mounting, and may be connected to ducts.

1.2 SUBMITTALS

A. Product Data: Include rated capacities, furnished specialties, and accessories for each type of product indicated. Include performance data in terms of capacities, outlet velocities, static pressures, sound power characteristics, motor requirements, and electrical characteristics.

B. Shop Drawings: Diagram power, signal, and control wiring.

C. Operation and Maintenance Data: For split-system air-conditioning units to include in emergency, operation, and maintenance manuals.

D. Warranty: Special warranty specified in this Section.

1.3 QUALITY ASSURANCE

A. Product Options: Drawings indicate size, profiles, and dimensional requirements of split-system units and are based on the specific system indicated.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Energy-Efficiency Ratio: Equal to or greater than prescribed by ASHRAE 90.1, "Energy Efficient Design of New Buildings except Low-Rise Residential Buildings" and as scheduled on drawings.

D. Units shall be designed to operate with HCFC-free refrigerants.

1.4 COORDINATION

A. Coordinate size, location, and connection details with roof curbs, equipment supports, and roof penetrations.

1.5 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of split-system air-conditioning units that fails in materials or workmanship within specified warranty period.

1. Warranty Period: Five years parts and labor from date of Substantial Completion. Compressor shall have a seven year warranty.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Lennox
2. Mitsubishi
3. Sanyo

2.2 WALL MOUNTED, EVAPORATOR-FAN COMPONENTS

A. Cabinet: The cabinet shall be formed from high strength molded plastic with smooth finish, flat front panel design with access for filter. The unit shall be wall mounted by means of a factory supplied, pre-drilled, mounting plate.

1. The unit shall also include a built-in, automatic condensate lift mechanism that will be able to raise drain water 23 inches above the condensate pan.
2. The lift mechanism shall be equipped with a positive acting liquid level sensor to shut down the indoor unit if liquid level in the drain pan reached maximum level.

B. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins, complying with ARI 210/240, and with thermal-expansion valve.

C. Fan: Direct drive, forward curve fan. The indoor fan shall consist of three (3) speeds: Low, Mid, and Hi and Auto. The fan shall have a selectable Auto fan setting that will adjust the fan speed based on the difference between controller set-point and space temperature.

D. Filters: Permanent, cleanable.

2.3 AIR-COOLED, COMPRESSOR-CONDENSER COMPONENTS

A. Casing: The casing shall be constructed from galvanized steel plate, finished with an electrostatically applied, thermally fused acrylic or polyester powder coating for corrosion protection. Mounting feet shall be provided and shall be welded to the base of the cabinet and be of sufficient size to afford reliable equipment mount and stability.

B. Compressor: DC twin-rotor rotary compressor with Variable Speed Inverter Drive Technology.

1. The compressor shall be driven by inverter circuit to control compressor speed. The compressor speed shall dynamically vary to match the room load for significantly increasing the efficiency of the system which shall result in significant energy savings.
2. To prevent liquid from accumulating in the compressor during the off cycle, a minimal amount of current shall be automatically, intermittently applied to the compressor motor windings to maintain sufficient heat to vaporize any refrigerant. No crankcase heater is to be used.
3. The outdoor unit shall have an accumulator and high pressure safety switch. The compressor shall be mounted to avoid the transmission of vibration.

C. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins, complying with ARI 210/240.

D. Fan: The fan blade(s) shall be of aerodynamic design for quiet operation, and the fan motor bearings shall be permanently lubricated. The outdoor unit shall have horizontal discharge airflow. The fan shall be mounted in front of the coil, pulling air across it from the rear and dispelling it through the front. The fan shall be provided with a raised guard to prevent external contact with moving parts.

E. Motor: Permanently lubricated, with integral thermal-overload protection.

F. Low Ambient Kit: Provide and install as required for operation down to -20ºF,

2.4 ACCESSORIES

A. Thermostat: Wireless infrared functioning to remotely control compressor and evaporator fan, with the following features:

1. Compressor time delay.

2. 24-hour time control of system stop and start.

3. Liquid-crystal display indicating temperature, set-point temperature, time setting, operating mode, and fan speed.

4. Fan-speed selection, including auto setting.

B. Automatic-reset timer to prevent rapid cycling of compressor.

C. Refrigerant Line Kits: Refrigerant lines shall be sized and installed per manufacturer's recommendations. See Spec Section 23 2300 Refrigerant Piping.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install units level and plumb.

B. Install evaporator-fan components using manufacturer's standard mounting devices securely fastened to building structure.

C. Install roof-mounting compressor-condenser components on equipment supports. Anchor units to supports with removable, cadmium-plated fasteners.

3.2 CONNECTIONS

A. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to unit to allow service and maintenance.

C. Ground equipment according to Division 26 Spec sections.

D. Electrical Connections: Comply with requirements in Division 26 Sections for power wiring, switches, and motor controls.

3.3 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections, and to assist in field testing. Report results in writing.

B. Perform the following field tests and inspections and prepare test reports:

1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.

2. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.

3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

C. Remove and replace malfunctioning units and retest as specified above.

3.4 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

1. Complete installation and startup checks according to manufacturer's written instructions.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain units. Refer to front end specifications.

END OF SECTION

SECTION 26 0500
COMMON WORK RESULTS FOR ELECTRICAL

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Electrical equipment coordination and installation.
2. Sleeves for raceways and cables.
3. Sleeve seals.
4. Grout.

1.3 DEFINITIONS

A. EPDM: Ethylene-propylene-diene terpolymer rubber.

B. NBR: Acrylonitrile-butadiene rubber.

1.4 COORDINATION

A. Coordinate arrangement, mounting, and support of electrical equipment:

1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
2. So connecting raceways, cables, wireways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment.

B. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

PART 2 PRODUCTS

2.1 SLEEVES FOR RACEWAYS AND CABLES

A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.

B. Sleeves for Rectangular Openings: Galvanized sheet steel.

1. Minimum Metal Thickness:

2.2 SLEEVE SEALS

A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.

1. Sealing Elements: EPDM or NBR interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
2. Pressure Plates: Carbon steel. Include two for each sealing element.

3. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.3 GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

PART 3 EXECUTION

3.1 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

A. Comply with NECA 1.

B. Comply with applicable provisions of Occupational Safety and Health Act (OSHA), NFPA Standards and Pamphlets, NEIS Standards, and common work place practice.

C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.

D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.

3.2 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Electrical penetrations occur when raceways, cables, wireways, cable trays, or busways penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.

B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.

C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.

D. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.

E. Cut sleeves to length for mounting flush with both surfaces of walls.

F. Extend sleeves installed in floors 2 inches (50 mm)above finished floor level.

G. Size pipe sleeves to provide 1/4-inch (6.4-mm) annular clear space between sleeve and raceway or cable, unless indicated otherwise.

H. Seal space outside of sleeves with grout for penetrations of concrete and masonry

1. Promptly pack grout solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect grout while curing.

I. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section "Joint Sealants.".

J. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway and cable penetrations. Install sleeves and seal raceway and cable penetration sleeves with firestop materials. Comply with requirements in Division 07 Section "Penetration Firestopping."

3.3 SLEEVE-SEAL INSTALLATION

A. Install to seal exterior wall penetrations.

B. Use type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.4 FIRESTOPPING

A. Apply firestopping to penetrations of fire-rated floor and wall assemblies for electrical installations to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Penetration Firestopping."

END OF SECTION

SECTION 26 0501
MINOR ELECTRICAL DEMOLITION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Electrical demolition.

1.2 RELATED REQUIREMENTS

A. Section 01 7000 - Execution and Closeout Requirements: Additional requirements for alterations work.

1.3 SUBMITTALS

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

B. Sustainable Design Documentation: Submit certification of removal and appropriate disposal of abandoned cables containing lead stabilizers.

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. Materials and equipment for patching and extending work: As specified in individual sections.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that abandoned wiring and equipment serve only abandoned facilities.

B. Demolition drawings are based on casual field observation and existing record documents.

C. Beginning of demolition means installer accepts existing conditions.

3.2 PREPARATION

A. Disconnect electrical systems in walls, floors, and ceilings to be removed.

B. Coordinate utility service outages with utility company.

C. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations.

D. Existing Electrical Service: Maintain existing system in service until new system is complete and ready for service. Disable system only to make switchovers and connections. Minimize outage duration.

3.3 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

A. Perform work for removal and disposal of equipment and materials containing toxic substances regulated under the Federal Toxic Substances Control Act (TSCA) in accordance with applicable federal, state, and local regulations. Applicable equipment and materials include, but are not limited to:

1. PCB-containing electrical equipment, including transformers, capacitors, and switches.

2. PCB- and DEHP-containing lighting ballasts.

3. Mercury-containing lamps and tubes, including fluorescent lamps, high intensity discharge (HID), arc lamps, ultra-violet, high pressure sodium, mercury vapor, ignitron tubes, neon, and incandescent.

B. Remove, relocate, and extend existing installations to accommodate new construction.

C. Remove abandoned wiring to source of supply.

D. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.

E. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets that are not removed.

F. Repair adjacent construction and finishes damaged during demolition and extension work.

G. Maintain access to existing electrical installations that remain active. Modify installation or provide access panel as appropriate.

3.4 CLEANING AND REPAIR

A. See Section 01 7419 - Construction Waste Management and Disposal for additional requirements.

B. Clean and repair existing materials and equipment that remain or that are to be reused.

C. Panelboards: Clean exposed surfaces and check tightness of electrical connections. Replace damaged circuit breakers and provide closure plates for vacant positions. Provide typed circuit directory showing revised circuiting arrangement.

END OF SECTION

SECTION 26 0519

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Single conductor building wire.

B. Wiring connectors.

C. Electrical tape.

D. Wire pulling lubricant.

E. Cable ties.

1.2 RELATED REQUIREMENTS

A. Section 26 0526 - Grounding and Bonding for Electrical Systems: Additional requirements for grounding conductors and grounding connectors.

1.3 REFERENCE STANDARDS

A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire; 2013.

B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft; 2011.

C. ASTM B33 - Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes; 2010 (Reapproved 2014).

D. ASTM B787/B787M - Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation; 2004 (Reapproved 2014).

E. ASTM D3005 - Standard Specification for Low-Temperature Resistant Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape; 2010.

F. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.

G. NEMA WC 70 - Nonshielded Power Cable 2000 V or Less for the Distribution of Electrical Energy; 2009.

H. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2013.

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

J. UL 44 - Thermoset-Insulated Wires and Cables; Current Edition, Including All Revisions.

K. UL 83 - Thermoplastic-Insulated Wires and Cables; Current Edition, Including All Revisions.

L. UL 486A-486B - Wire Connectors; Current Edition, Including All Revisions.

M. UL 486C - Splicing Wire Connectors; Current Edition, Including All Revisions.

N. UL 486D - Sealed Wire Connector Systems; Current Edition, Including All Revisions.

O. UL 510 - Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate sizes of raceways, boxes, and equipment enclosures installed under other sections with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.

2. Coordinate with electrical equipment installed under other sections to provide terminations suitable for use with the conductors to be installed.

3. Notify Architect/Engineer of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

1.5 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

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

C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store conductors and cables in accordance with manufacturer's instructions.

1.7 FIELD CONDITIONS

A. Do not install or otherwise handle thermoplastic-insulated conductors at temperatures lower than 14 degrees F (-10 degrees C), unless otherwise permitted by manufacturer's instructions. When installation below this temperature is unavoidable, notify Architect/Engineer and obtain direction before proceeding with work.

PART 2 PRODUCTS

2.1 CONDUCTOR AND CABLE GENERAL REQUIREMENTS

A. Provide products that comply with requirements of NFPA 70.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.

D. Comply with NEMA WC 70.

E. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.

F. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.

G. Conductors for Grounding and Bonding: Also comply with Section 26 0526.

H. Conductor Material:

1. Provide copper conductors only. Aluminum conductors are not acceptable for this project. Conductor sizes indicated are based on copper.

2. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B 787M unless otherwise indicated.

3. Tinned Copper Conductors: Comply with ASTM B33.

I. Minimum Conductor Size: 12 AWG.

J. Conductor Color Coding:

1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.

2. Color Coding Method: Integrally colored insulation.

a. Conductors size 4 AWG and larger may have black insulation color coded using vinyl color coding electrical tape.

3. Color Code:

a. 208Y/120 V, 3 Phase, 4 Wire System:

1) Phase A: Black.

2) Phase B: Red.

3) Phase C: Blue.

4) Neutral/Grounded: White.

b. Equipment Ground, All Systems: Green.

2.2 SINGLE CONDUCTOR BUILDING WIRE

A. Description: Single conductor insulated wire.

B. Conductor Stranding:

1. Feeders and Branch Circuits:

a. Size 10 AWG and Smaller: Solid.

b. Size 8 AWG and Larger: Stranded.

C. Insulation Voltage Rating: 600 V.

D. Insulation:

1. Copper Building Wire: Type THHN/THWN-2, except as indicated below.

2.3 WIRING CONNECTORS

A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.

B. Connectors for Grounding and Bonding: Comply with Section 26 0526.

C. Wiring Connectors for Splices and Taps:

1. Copper Conductors Size 8 AWG and Smaller: Use twist-on insulated spring connectors.

2. Copper Conductors Size 6 AWG and Larger: Use mechanical connectors or compression connectors.

D. Wiring Connectors for Terminations:

1. Provide terminal lugs for connecting conductors to equipment furnished with terminations designed for terminal lugs.

2. Provide compression adapters for connecting conductors to equipment furnished with mechanical lugs when only compression connectors are specified.

3. Where over-sized conductors are larger than the equipment terminations can accommodate, provide connectors suitable for reducing to appropriate size, but not less than required for the rating of the overcurrent protective device.

E. Do not use push-in wire connectors as a substitute for twist-on insulated spring connectors.

F. Twist-on Insulated Spring Connectors: Rated 600 V, 221 degrees F (105 degrees C) for standard applications and 302 degrees F (150 degrees C) for high temperature applications; pre-filled with sealant and listed as complying with UL 486D for damp and wet locations.

G. Mechanical Connectors: Provide bolted type or set-screw type.

H. Compression Connectors: Provide circumferential type or hex type crimp configuration.

I. Crimped Terminals: Nylon-insulated, with insulation grip and terminal configuration suitable for connection to be made.

2.4 WIRING ACCESSORIES

A. Electrical Tape:

1. Vinyl Color Coding Electrical Tape: Integrally colored to match color code indicated; listed as complying with UL 510; minimum thickness of 7 mil (0.18 mm); resistant to abrasion, corrosion, and sunlight; suitable for continuous temperature environment up to 221 degrees F (105 degrees C).

2. Vinyl Insulating Electrical Tape: Complying with ASTM D3005 and listed as complying with UL 510; minimum thickness of 7 mil (0.18 mm); resistant to abrasion, corrosion, and sunlight; conformable for application down to 0 degrees F (-18 degrees C) and suitable for continuous temperature environment up to 221 degrees F (105 degrees C).

B. Wire Pulling Lubricant: Listed; suitable for use with the conductors or cables to be installed and suitable for use at the installation temperature.

C. Cable Ties: Material and tensile strength rating suitable for application.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that interior of building has been protected from weather.

B. Verify that work likely to damage wire and cable has been completed.

C. Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70.

D. Verify that field measurements are as shown on the drawings.

E. Verify that conditions are satisfactory for installation prior to starting work.

3.2 PREPARATION

A. Clean raceways thoroughly to remove foreign materials before installing conductors and cables.

3.3 INSTALLATION

A. Circuiting Requirements:

1. Unless dimensioned, circuit routing indicated is diagrammatic.

2. When circuit destination is indicated and routing is not shown, determine exact routing required.

3. Include circuit lengths required to install connected devices within 10 ft (3.0 m) of location shown.

4. Maintain separation of Class 1, Class 2, and Class 3 remote-control, signaling, and power-limited circuits in accordance with NFPA 70.

5. Maintain separation of wiring for emergency systems in accordance with NFPA 70.

6. Circuiting Adjustments: Unless otherwise indicated, when branch circuits are shown as separate, combining them together in a single raceway is permitted, under the following conditions:

a. Provide no more than six current-carrying conductors in a single raceway. Dedicated neutral conductors are considered current-carrying conductors.

b. Increase size of conductors as required to account for ampacity derating.

c. Size raceways, boxes, etc. to accommodate conductors.

7. Common Neutrals: Unless otherwise indicated, sharing of neutral/grounded conductors among up to three single phase branch circuits of different phases installed in the same raceway is not permitted. Provide dedicated neutral/grounded conductor for each individual branch circuit.

B. Install products in accordance with manufacturer's instructions.

C. Install conductors and cable in a neat and workmanlike manner in accordance with NECA 1.

D. Installation in Raceway:

1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.

2. Pull all conductors and cables together into raceway at same time.

3. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.

4. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.

E. Paralleled Conductors: Install conductors of the same length and terminate in the same manner.

F. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure. Do not provide support from raceways, piping, ductwork, or other systems.

1. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conductors and cables to lay on ceiling tiles.

G. Terminate cables using suitable fittings.

H. Install conductors with a minimum of 12 inches (300 mm) of slack at each outlet.

I. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.

J. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.

K. Make wiring connections using specified wiring connectors.

1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies or wiring gutters.

2. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.

3. Do not remove conductor strands to facilitate insertion into connector.

4. Clean contact surfaces on conductors and connectors to suitable remove corrosion, oxides, and other contaminates. Do not use wire brush on plated connector surfaces.

5. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.

6. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.

L. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.

M. Insulate ends of spare conductors using vinyl insulating electrical tape.

N. Field-Applied Color Coding: Where vinyl color coding electrical tape is used in lieu of integrally colored insulation as permitted in Part 2 under "Color Coding", apply half overlapping turns of tape at each termination and at each location conductors are accessible.

O. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 8400.

P. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

3.4 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Inspect and test in accordance with NETA ATS, except Section 4.

C. Perform inspections and tests listed in NETA ATS, Section 7.3.2. The insulation resistance test is required for all conductors. The resistance test for parallel conductors listed as optional is not required.

D. Correct deficiencies and replace damaged or defective conductors and cables.

END OF SECTION

SECTION 26 0526
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Grounding and bonding requirements.

B. Conductors for grounding and bonding.

C. Connectors for grounding and bonding.

D. Ground bars.

1.2 RELATED REQUIREMENTS

A. Section 26 0519 - Low-Voltage Electrical Power Conductors and Cables: Additional requirements for conductors for grounding and bonding, including conductor color coding.

B. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

1.3 REFERENCE STANDARDS

A. IEEE 81 - IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System; 2012.

B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.

C. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2013.

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

E. UL 467 - Grounding and Bonding Equipment; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Verify exact locations of underground metal water service pipe entrances to building.

2. Coordinate the work with other trades to provide steel reinforcement complying with specified requirements for concrete-encased electrode.

3. Notify Architect/Engineer of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

B. Sequencing:

1. Do not install ground rod electrodes until final backfill and compaction is complete.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittals procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for grounding and bonding system components.

C. Shop Drawings:

1. Indicate proposed arrangement for signal reference grids. Include locations of items to be bonded and methods of connection.

1.6 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

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

C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.1 GROUNDING AND BONDING REQUIREMENTS

A. Do not use products for applications other than as permitted by NFPA 70 and product listing.

B. Unless specifically indicated to be excluded, provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.

C. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

D. Grounding System Resistance:

1. Achieve specified grounding system resistance under normally dry conditions unless otherwise approved by Architect/Engineer. Precipitation within the previous 48 hours does not constitute normally dry conditions.

2. Grounding Electrode System: Not greater than 5 ohms to ground, when tested according to IEEE 81 using "fall-of-potential" method.

E. Grounding Electrode System:

1. Provide connection to required and supplemental grounding electrodes indicated to form grounding electrode system.

a. Provide continuous grounding electrode conductors without splice or joint.

b. Install grounding electrode conductors in raceway where exposed to physical damage. Bond grounding electrode conductor to metallic raceways at each end with bonding jumper.

2. Provide additional ground electrode(s) as required to achieve specified grounding electrode system resistance.

F. Service-Supplied System Grounding:

1. For each service disconnect, provide grounding electrode conductor to connect neutral (grounded) service conductor to grounding electrode system. Unless otherwise indicated, make connection at neutral (grounded) bus in service disconnect enclosure.

2. For each service disconnect, provide main bonding jumper to connect neutral (grounded) bus to equipment ground bus where not factory-installed. Do not make any other connections between neutral (grounded) conductors and ground on load side of service disconnect.

G. Bonding and Equipment Grounding:

1. Provide bonding for equipment grounding conductors, equipment ground busses, metallic equipment enclosures, metallic raceways and boxes, device grounding terminals, and other normally non-current-carrying conductive materials enclosing electrical conductors/equipment or likely to become energized as indicated and in accordance with NFPA 70.

2. Provide insulated equipment grounding conductor in each feeder and branch circuit raceway. Do not use raceways as sole equipment grounding conductor.

3. Where circuit conductor sizes are increased for voltage drop, increase size of equipment grounding conductor proportionally in accordance with NFPA 70.

4. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.

5. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on neutral (grounded) or isolated/insulated ground bus.

6. Provide bonding jumper across expansion or expansion/deflection fittings provided to accommodate conduit movement.

7. Provide bonding for interior metal piping systems in accordance with NFPA 70. This includes, but is not limited to:

a. Metal water piping where not already effectively bonded to metal underground water pipe used as grounding electrode.

8. Provide bonding for interior metal air ducts.

9. Provide bonding for metal building frame where not used as a grounding electrode.

2.2 GROUNDING AND BONDING COMPONENTS

A. General Requirements:

1. Provide products listed, classified, and labeled as suitable for the purpose intended.

2. Provide products listed and labeled as complying with UL 467 where applicable.

B. Conductors for Grounding and Bonding, in Addition to Requirements of Section 26 0526:

1. Use insulated copper conductors unless otherwise indicated.

a. Exceptions:

1) Use bare copper conductors where installed underground in direct contact with earth.

2) Use bare copper conductors where directly encased in concrete (not in raceway).

C. Connectors for Grounding and Bonding:

1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.

2. Unless otherwise indicated, use exothermic welded connections or compression connectors for underground, concealed and other inaccessible connections.

a. Exceptions:

1) Use mechanical connectors for connections to electrodes at ground access wells.

3. Unless otherwise indicated, use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.

a. Exceptions:

1) Use exothermic welded connections for connections to metal building frame.

D. Ground Bars:

1. Description: Copper rectangular ground bars with mounting brackets and insulators.

2. Size: unless otherwise indicated or required.

3. Holes for Connections: As indicated or as required for connections to be made.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that work likely to damage grounding and bonding system components has been completed.

B. Verify that field measurements are as shown on the drawings.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

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

B. Install grounding and bonding system components in a neat and workmanlike manner in accordance with NECA 1.

C. Make grounding and bonding connections using specified connectors.

1. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connector.

2. Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.

3. Exothermic Welds: Make connections using molds and weld material suitable for the items to be connected in accordance with manufacturer's recommendations.

4. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.

5. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.

D. Identify grounding and bonding system components in accordance with Section 26 0553.

3.3 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Inspect and test in accordance with NETA ATS except Section 4.

C. Perform inspections and tests listed in NETA ATS, Section 7.13.

D. Perform ground electrode resistance tests under normally dry conditions. Precipitation within the previous 48 hours does not constitute normally dry conditions.

E. Investigate and correct deficiencies where measured ground resistances do not comply with specified requirements.

F. Submit detailed reports indicating inspection and testing results and corrective actions taken.

END OF SECTION

SECTION 26 0529
HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Support and attachment components for equipment, conduit, cable, boxes, and other electrical work.

1.2 RELATED REQUIREMENTS

A. Section 26 0534 - Conduit: Additional support and attachment requirements for conduits.

B. Section 26 0537 - Boxes: Additional support and attachment requirements for boxes.

C. Section 26 5100 - Interior Lighting: Additional support and attachment requirements for interior luminaires.

1.3 REFERENCE STANDARDS

A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.

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

C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2013.

D. MFMA-4 - Metal Framing Standards Publication; 2004.

E. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.

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

G. UL 5B - Strut-Type Channel Raceways and Fittings; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components to be installed.

2. Coordinate the work with other trades to provide additional framing and materials required for installation.

3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.

4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.

5. Notify Architect/Engineer of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

B. Sequencing:

1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured in accordance with Section 03 3000.

1.5 QUALITY ASSURANCE

A. Comply with NFPA 70.

B. Comply with applicable building code.

C. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

D. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed for this Project, with a minimum structural safety factor of four times the applied force.

E. Installer Qualifications for Field-Welding: As specified in Section 05 5000.

F. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

G. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.1 SUPPORT AND ATTACHMENT COMPONENTS

A. General Requirements:

1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of electrical work.

2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.

3. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported with a minimum safety factor of 2.5. Include consideration for vibration, equipment operation, and shock loads where applicable.

4. Do not use products for applications other than as permitted by NFPA 70 and product listing.

5. Steel Components: Use corrosion resistant materials suitable for the environment where installed.

a. Indoor Dry Locations: Use zinc-plated steel or approved equivalent unless otherwise indicated.

b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel, stainless steel, or approved equivalent unless otherwise indicated.

c. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.

d. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.

B. Conduit and Cable Supports: Straps, clamps, etc. suitable for the conduit or cable to be supported.

1. Conduit Straps: One-hole or two-hole type; steel or malleable iron.

2. Conduit Clamps: Bolted type unless otherwise indicated.

C. Raceway and Cable Supports: As described in NECA 1 and NECA 101.

D. Outlet Box Supports: Hangers, brackets, etc. suitable for the boxes to be supported.

E. Metal Channel (Strut) Framing Systems: Factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.

1. Comply with MFMA-4.

2. Channel (Strut) Used as Raceway (only where specifically indicated): Listed and labeled as complying with UL 5B.

3. Minimum Channel Thickness: Steel sheet, 12 gage, 0.1046 inch (2.66 mm).

4. Minimum Channel Dimensions: 1-5/8 inch (41 mm) width by 13/16 inch (21 mm) height.

F. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.

1. Minimum Size, Unless Otherwise Indicated or Required:

a. Equipment Supports: 1/2 inch (13 mm) diameter.

b. Busway Supports: 1/2 inch (13 mm) diameter.

c. Single Conduit up to 1 inch (27mm) trade size: 1/4 inch (6 mm) diameter.

d. Single Conduit larger than 1 inch (27mm) trade size: 3/8 inch (10 mm) diameter.

e. Trapeze Support for Multiple Conduits: 3/8 inch (10 mm) diameter.

f. Outlet Boxes: 1/4 inch (6 mm) diameter.

g. Luminaires: 1/4 inch (6 mm) diameter.

G. Non-Penetrating Rooftop Supports for Low-Slope Roofs: Steel pedestals with thermoplastic or rubber bases that rest on top of roofing membrane, not requiring any attachment to the roof structure and not penetrating the roofing assembly, with support fixtures as specified.

1. Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.

2. Attachment/Support Fixtures: As recommended by manufacturer, same type as indicated for equivalent indoor hangers and supports.

3. Mounting Height: Provide minimum clearance of 6 inches (150 mm) under supported component to top of roofing.

H. Anchors and Fasteners:

1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.

2. Concrete: Use preset concrete inserts, expansion anchors, or screw anchors.

3. Solid or Grout-Filled Masonry: Use expansion anchors or screw anchors.
4. Hollow Masonry: Use toggle bolts.
5. Hollow Stud Walls: Use toggle bolts.
6. Steel: Use beam clamps, machine bolts, or welded threaded studs.
7. Sheet Metal: Use sheet metal screws.
8. Wood: Use wood screws.
9. Plastic and lead anchors are not permitted.
10. Powder-actuated fasteners are not permitted.
11. Preset Concrete Inserts: Continuous metal channel (strut) and spot inserts specifically designed to be cast in concrete ceilings, walls, and floors.
    a. Comply with MFMA-4.
    b. Channel Material: Use galvanized steel.
    c. Manufacturer: Same as manufacturer of metal channel (strut) framing system.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field measurements are as shown on the drawings.

B. Verify that mounting surfaces are ready to receive support and attachment components.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

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

B. Install support and attachment components in a neat and workmanlike manner in accordance with NECA 1.

C. Install anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.

D. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.

E. Install support and attachment components for steel conduits in accordance with NECA 101

F. Unless specifically indicated or approved by Architect/Engineer, do not provide support from suspended ceiling support system or ceiling grid.

G. Unless specifically indicated or approved by Architect/Engineer, do not provide support from roof deck.

H. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.

I. Equipment Support and Attachment:

1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.

2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.

3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.

4. Unless otherwise indicated, mount floor-mounted equipment on properly sized 3 inch (80 mm) high concrete pad constructed in accordance with Section 03 3000.

5. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.

J. Conduit Support and Attachment: Also comply with Section 26 0534.

K. Box Support and Attachment: Also comply with Section 26 0537.

L. Interior Luminaire Support and Attachment: Also comply with Section 26 5100.

M. Preset Concrete Inserts: Use manufacturer provided closure strips to inhibit concrete seepage during concrete pour.

N. Secure fasteners according to manufacturer's recommended torque settings.

O. Remove temporary supports.

P. Identify independent electrical component support wires above accessible ceilings (only where specifically indicated or permitted) with color distinguishable from ceiling support wires in accordance with NFPA 70.

Q. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:

1. To Wood: Fasten with lag screws or through bolts.

2. To New Concrete: Bolt to concrete inserts.

3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.

4. To Existing Concrete: Expansion anchor fasteners.

5. To Steel: Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69.

6. To Light Steel: Sheet metal screws.

7. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate by means that meet anchorage requirements.

3.3 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Inspect support and attachment components for damage and defects.

C. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.

D. Correct deficiencies and replace damaged or defective support and attachment components.

END OF SECTION

SECTION 26 0534
CONDUIT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Galvanized steel rigid metal conduit (RMC).

B. Intermediate metal conduit (IMC).

C. Flexible metal conduit (FMC).

D. Liquidtight flexible metal conduit (LFMC).

E. Electrical metallic tubing (EMT).

F. Rigid polyvinyl chloride (PVC) conduit.

G. Conduit fittings.

H. Accessories.

1.2 RELATED REQUIREMENTS

A. Section 07 8400 - Firestopping.

B. Section 26 0526 - Grounding and Bonding for Electrical Systems.

1. Includes additional requirements for fittings for grounding and bonding.

C. Section 26 0529 - Hangers and Supports for Electrical Systems.

D. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

E. Section 31 2316 - Excavation.

F. Section 31 2323 - Fill: Bedding and backfilling.

1.3 REFERENCE STANDARDS

A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC); 2005.

B. ANSI C80.3 - American National Standard for Steel Electrical Metallic Tubing (EMT); 2005.

C. ANSI C80.6 - American National Standard for Electrical Intermediate Metal Conduit (EIMC); 2005.

D. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.

E. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT); 2013.

F. NECA 111 - Standard for Installing Nonmetallic Raceways (RNC, ENT, LFNC); 2003.

G. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2012.

H. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit; 2013.

I. NEMA TC 3 - Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing; 2015.

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

K. UL 1 - Flexible Metal Conduit; Current Edition, Including All Revisions.

L. UL 6 - Electrical Rigid Metal Conduit-Steel; Current Edition, Including All Revisions.

M. UL 360 - Liquid-Tight Flexible Steel Conduit; Current Edition, Including All Revisions.

N. UL 514B - Conduit, Tubing, and Cable Fittings; Current Edition, Including All Revisions.

O. UL 651 - Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings; Current Edition, Including All Revisions.

P. UL 797 - Electrical Metallic Tubing-Steel; Current Edition, Including All Revisions.

Q. UL 1242 - Electrical Intermediate Metal Conduit-Steel; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate minimum sizes of conduits with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.

2. Coordinate the arrangement of conduits with structural members, ductwork, piping, equipment and other potential conflicts installed under other sections or by others.

3. Verify exact conduit termination locations required for boxes, enclosures, and equipment installed under other sections or by others.

4. Coordinate the work with other trades to provide roof penetrations that preserve the integrity of the roofing system and do not void the roof warranty.

5. Notify Architect/Engineer of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

B. Sequencing:

1. Do not begin installation of conductors and cables until installation of conduit is complete between outlet, junction and splicing points.

1.5 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store conduit and fittings in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.1 CONDUIT APPLICATIONS

A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70 and product listing.

B. Unless otherwise indicated and where not otherwise restricted, use the conduit types indicated for the specified applications. Where more than one listed application applies, comply with the most restrictive requirements. Where conduit type for a particular application is not specified, use galvanized steel rigid metal conduit.

C. Underground:

1. Under Slab on Grade: Use rigid PVC conduit.

2. Exterior, Direct-Buried: Use rigid PVC conduit.

3. Exterior, Embedded Within Concrete: Use rigid PVC conduit.

4. Where rigid polyvinyl (PVC) conduit is provided, transition to galvanized steel rigid metal conduit where emerging from underground.

D. Concealed Within Masonry Walls: Use electrical metallic tubing (EMT).

E. Concealed Within Hollow Stud Walls: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), or electrical metallic tubing (EMT).

F. Concealed Above Accessible Ceilings: Use electrical metallic tubing (EMT).

G. Interior, Damp or Wet Locations: Use galvanized steel rigid metal conduit.

H. Exposed, Interior, Not Subject to Physical Damage: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), or electrical metallic tubing (EMT).

I. Exposed, Interior, Subject to Physical Damage: Use galvanized steel rigid metal conduit or intermediate metal conduit (IMC).

1. Locations subject to physical damage include, but are not limited to:

a. Where exposed below 8 feet (2.4 m), except within electrical and communication rooms or closets.

J. Connections to Luminaires Above Accessible Ceilings: Use flexible metal conduit.

1. Maximum Length: 6 feet (1.8 m).

K. Connections to Vibrating Equipment:

1. Dry Locations: Use flexible metal conduit.

2. Damp, Wet, or Corrosive Locations: Use liquidtight flexible metal conduit.

3. Maximum Length: 6 feet (1.8 m) unless otherwise indicated.

4. Vibrating equipment includes, but is not limited to:

a. Transformers.

b. Motors.

2.2 CONDUIT REQUIREMENTS

A. Existing Work: Where existing conduits are indicated to be reused, they may be reused only where they comply with specified requirements, are free from corrosion, and integrity is verified by pulling a mandrel through them.

B. Fittings for Grounding and Bonding: Also comply with Section 26 0526.

C. Provide all conduit, fittings, supports, and accessories required for a complete raceway system.

D. Provide products listed, classified, and labeled as suitable for the purpose intended.

E. Minimum Conduit Size, Unless Otherwise Indicated:

1. Branch Circuits: 3/4 inch (21 mm) trade size.

2. Branch Circuit Homeruns: 3/4 inch (21 mm) trade size.

F. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

2.3 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

A. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.

B. Fittings:

1. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.

2. Material: Use steel or malleable iron.

3. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.4 INTERMEDIATE METAL CONDUIT (IMC)

A. Description: NFPA 70, Type IMC galvanized steel intermediate metal conduit complying with ANSI C80.6 and listed and labeled as complying with UL 1242.

B. Fittings:

1. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.

2. Material: Use steel or malleable iron.

3. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.5 FLEXIBLE METAL CONDUIT (FMC)

A. Manufacturers:

1. AFC Cable Systems, Inc; www.afcweb.com.

2. Electri-Flex Company; www.electriflex.com.

3. International Metal Hose; www.metalhose.com.

B. Description: NFPA 70, Type FMC standard wall steel flexible metal conduit listed and labeled as complying with UL 1, and listed for use in classified firestop systems to be used.

C. Fittings:

1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.

2. Material: Use steel or malleable iron.

2.6 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)

A. Manufacturers:

1. AFC Cable Systems, Inc; www.afcweb.com.
2. Electri-Flex Company; www.electriflex.com.
3. International Metal Hose; www.metalhose.com.

B. Description: NFPA 70, Type LFMC polyvinyl chloride (PVC) jacketed steel flexible metal conduit listed and labeled as complying with UL 360.

C. Fittings:

1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
2. Material: Use steel or malleable iron.

2.7 ELECTRICAL METALLIC TUBING (EMT)

A. Manufacturers:

1. Allied Tube & Conduit; www.alliedeg.com.
2. Republic Conduit: www.republic-conduit.com.
3. Wheatland Tube Company; www.wheatland.com.

B. Description: NFPA 70, Type EMT steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.

C. Fittings:

1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
2. Material: Use steel or malleable iron.
3. Connectors and Couplings: Use compression (gland) type.
   a. Do not use indenter type connectors and couplings.
   b. Do not use set-screw type connectors and couplings.
4. Damp or Wet Locations (where permitted): Use fittings listed for use in wet locations.
5. Embedded Within Concrete (where permitted): Use fittings listed as concrete-tight. Fittings that require taping to be concrete-tight are not acceptable.

2.8 RIGID POLYVINYL CHLORIDE (PVC) CONDUIT

A. Manufacturers:

1. Cantex Inc: www.cantexinc.com.
2. Carlon, a brand of Thomas & Betts Corporation: www.carlon.com.
3. JM Eagle: www.jmeagle.com.

B. Description: NFPA 70, Type PVC rigid polyvinyl chloride conduit complying with NEMA TC 2 and listed and labeled as complying with UL 651; Schedule 40 unless otherwise indicated, Schedule 80 where subject to physical damage; rated for use with conductors rated 90 degrees C.

C. Fittings:

1. Manufacturer: Same as manufacturer of conduit to be connected.

2. Description: Fittings complying with NEMA TC 3 and listed and labeled as complying with UL 651; material to match conduit.

2.9 ACCESSORIES

A. Conduit Joint Compound: Corrosion-resistant, electrically conductive; suitable for use with the conduit to be installed.

B. Solvent Cement for PVC Conduit and Fittings: As recommended by manufacturer of conduit and fittings to be installed.

C. Pull Strings: Use nylon cord with average breaking strength of not less than 200 pound-force (890 N).

D. Sealing Compound for Sealing Fittings: Listed for use with the particular fittings to be installed.

E. Modular Seals for Conduit Penetrations: Rated for minimum of 40 psig; Suitable for the conduits to be installed.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field measurements are as shown on drawings.

B. Verify that mounting surfaces are ready to receive conduits.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

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

B. Install conduit in a neat and workmanlike manner in accordance with NECA 1.

C. Install galvanized steel rigid metal conduit (RMC) in accordance with NECA 101.

D. Install intermediate metal conduit (IMC) in accordance with NECA 101.

E. Install rigid polyvinyl chloride (PVC) conduit in accordance with NECA 111.

F. Conduit Routing:

1. Unless dimensioned, conduit routing indicated is diagrammatic.

2. When conduit destination is indicated and routing is not shown, determine exact routing required.

3. Conceal all conduits unless specifically indicated to be exposed.

4. Conduits in the following areas may be exposed, unless otherwise indicated:

a. Electrical rooms.

b. Mechanical equipment rooms.

c. Within joists in areas with no ceiling.

5. Unless otherwise approved, do not route conduits exposed:

a. Across floors.

b. Across roofs.

c. Across top of parapet walls.

d. Across building exterior surfaces.

6. Conduits installed underground or embedded in concrete may be routed in the shortest possible manner unless otherwise indicated. Route all other conduits parallel or perpendicular to building structure and surfaces, following surface contours where practical.

7. Arrange conduit to maintain adequate headroom, clearances, and access.

8. Arrange conduit to provide no more than the equivalent of four 90 degree bends between pull points.

9. Arrange conduit to provide no more than 150 feet (46 m) between pull points.

10. Route conduits above water and drain piping where possible.

11. Arrange conduit to prevent moisture traps. Provide drain fittings at low points and at sealing fittings where moisture may collect.

12. Maintain minimum clearance of 6 inches (150 mm) between conduits and piping for other systems.

13. Maintain minimum clearance of 12 inches (300 mm) between conduits and hot surfaces. This includes, but is not limited to:

a. Heaters.

b. Hot water piping.

c. Flues.

14. Group parallel conduits in the same area together on a common rack.

G. Conduit Support:

1. Secure and support conduits in accordance with NFPA 70 and Section 26 0529 using suitable supports and methods approved by the authority having jurisdiction.

2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.

3. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conduits to lay on ceiling tiles.

4. Use metal channel (strut) with accessory conduit clamps to support multiple parallel surface-mounted conduits.

5. Use conduit clamp to support single conduit from beam clamp or threaded rod.

6. Use trapeze hangers assembled from threaded rods and metal channel (strut) with accessory conduit clamps to support multiple parallel suspended conduits.
7. Use of wire for support of conduits is not permitted.
8. Where conduit support intervals specified in NFPA 70 and NECA standards differ, comply with the most stringent requirements.

H. Connections and Terminations:

1. Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.
2. Where two threaded conduits must be joined and neither can be rotated, use three-piece couplings or split couplings. Do not use running threads.
3. Use suitable adapters where required to transition from one type of conduit to another.
4. Provide drip loops for liquidtight flexible conduit connections to prevent drainage of liquid into connectors.
5. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.
6. Where spare conduits stub up through concrete floors and are not terminated in a box or enclosure, provide threaded couplings equipped with threaded plugs set flush with finished floor.
7. Provide insulating bushings or insulated throats at all conduit terminations to protect conductors.
8. Secure joints and connections to provide maximum mechanical strength and electrical continuity.

I. Penetrations:

1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.
2. Make penetrations perpendicular to surfaces unless otherwise indicated.
3. Provide sleeves for penetrations as indicated or as required to facilitate installation. Set sleeves flush with exposed surfaces unless otherwise indicated or required.
4. Conceal bends for conduit risers emerging above ground.
5. Seal interior of conduits entering the building from underground at first accessible point to prevent entry of moisture and gases.
6. Provide suitable modular seal where conduits penetrate exterior wall below grade.
7. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.
8. Make penetrations for roof-mounted equipment within associated equipment openings and curbs where possible to minimize roofing system penetrations. Where penetrations are necessary, seal as indicated or as required to preserve integrity of roofing system and maintain roof warranty. Include proposed locations of penetrations and methods for sealing with submittals.
9. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 8400.

J. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. This includes, but is not limited to:

1. Where conduits cross structural joints intended for expansion, contraction, or deflection.

2. Where conduits are subject to earth movement by settlement or frost.

K. Condensation Prevention: Where conduits cross barriers between areas of potential substantial temperature differential, provide sealing fitting or approved sealing compound at an accessible point near the penetration to prevent condensation. This includes, but is not limited to:

1. Where conduits pass from outdoors into conditioned interior spaces.

2. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.

L. Provide pull string in all empty conduits and in conduits where conductors and cables are to be installed by others. Leave minimum slack of 12 inches (300 mm) at each end.

M. Provide grounding and bonding in accordance with Section 26 0526.

N. Identify conduits in accordance with Section 26 0553.

3.3 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.

C. Correct deficiencies and replace damaged or defective conduits.

3.4 CLEANING

A. Clean interior of conduits to remove moisture and foreign matter.

3.5 PROTECTION

A. Immediately after installation of conduit, use suitable manufactured plugs to provide protection from entry of moisture and foreign material and do not remove until ready for installation of conductors.

END OF SECTION

SECTION 26 0537
BOXES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Outlet and device boxes up to 100 cubic inches (1,650 cu cm), including those used as junction and pull boxes.

B. Cabinets and enclosures, including junction and pull boxes larger than 100 cubic inches (1,650 cu cm).

1.2 RELATED REQUIREMENTS

A. Section 26 0529 - Hangers and Supports for Electrical Systems.

B. Section 26 0534 - Conduit:

1. Conduit bodies and other fittings.

C. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

D. Section 26 2726 - Wiring Devices:

1. Wall plates.

2. Additional requirements for locating boxes for wiring devices.

1.3 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.

B. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2010.

C. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2012.

D. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports; 2013.

E. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.

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

G. SCTE 77 - Specification for Underground Enclosure Integrity; 2013.

H. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.

I. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.

J. UL 508A - Industrial Control Panels; Current Edition, Including All Revisions.

K. UL 514A - Metallic Outlet Boxes; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.

2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.

3. Coordinate minimum sizes of boxes with the actual installed arrangement of conductors, clamps, support fittings, and devices, calculated according to NFPA 70.

4. Coordinate minimum sizes of pull boxes with the actual installed arrangement of connected conduits, calculated according to NFPA 70.

5. Coordinate the placement of boxes with millwork, furniture, devices, equipment, etc. installed under other sections or by others.

6. Coordinate the work with other trades to preserve insulation integrity.

7. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted boxes where indicated.

8. Notify Architect/Engineer of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

1.5 SUBMITTALS

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

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for cabinets and enclosures, boxes for hazardous (classified) locations, floor boxes, and underground boxes/enclosures.

1.6 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

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

C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.1 BOXES

A. General Requirements:

1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.

2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.

3. Provide products listed, classified, and labeled as suitable for the purpose intended.

4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

5. Provide grounding terminals within boxes where equipment grounding conductors terminate.

B. Outlet and device boxes up to 100 cubic inches (1,650 cu cm), including those used as junction and pull boxes:

1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.

2. Use cast iron boxes or cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.

3. Use cast iron boxes or cast aluminum boxes where exposed galvanized steel rigid metal conduit or exposed intermediate metal conduit (IMC) is used.

4. Use cast aluminum boxes where aluminum rigid metal conduit is used.

5. Use suitable concrete type boxes where flush-mounted in concrete.

6. Use suitable masonry type boxes where flush-mounted in masonry walls.

7. Use raised covers suitable for the type of wall construction and device configuration where required.

8. Use shallow boxes where required by the type of wall construction.

9. Do not use "through-wall" boxes designed for access from both sides of wall.

10. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.

11. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.

12. Boxes for Supporting Luminaires and Ceiling Fans: Listed as suitable for the type and weight of load to be supported; furnished with fixture stud to accommodate mounting of luminaire where required.

13. Boxes for Ganged Devices: Use multigang boxes of single-piece construction. Do not use field-connected gangable boxes.

14. Minimum Box Size, Unless Otherwise Indicated:
    a. Wiring Devices (Other Than Communications Systems Outlets): 4 inch square by 1-1/2 inch deep (100 by 38 mm) trade size.
    b. Ceiling Outlets: 4 inch octagonal or square by 1-1/2 inch deep (100 by 38 mm) trade size.
15. Wall Plates: Comply with Section 26 2726.

C. Cabinets and Enclosures, including junction and pull boxes larger than 100 cubic inches (1,650 cu cm):
1. Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E, or UL 508A.
2. NEMA 250 Environment Type, unless otherwise indicated:
    a. Indoor Clean, Dry Locations: Type 12, painted steel.
    b. Outdoor Locations: Type 3R, painted steel.
3. Junction and Pull Boxes Larger Than 100 cubic inches (1,650 cu cm):
    a. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field measurements are as shown on drawings.

B. Verify that mounting surfaces are ready to receive boxes.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

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

B. Perform work in a neat and workmanlike manner in accordance with NECA 1 and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.

C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

D. Provide separate boxes for emergency power and normal power systems.

E. Unless otherwise indicated, provide separate boxes for line voltage and low voltage systems.

F. Flush-mount boxes in finished areas unless specifically indicated to be surface-mounted.

G. Box Locations:
1. Locate boxes to be accessible. Provide access panels in accordance with Section 08 3100 as required where approved by the Architect.
2. Unless dimensioned, box locations indicated are approximate.

3. Locate boxes as required for devices installed under other sections or by others.
    a. Switches, Receptacles, and Other Wiring Devices: Comply with Section 26 2726.
    b. Communications Systems Outlets: Comply with Section 27 1005.
4. Locate boxes so that wall plates do not span different building finishes.
5. Locate boxes so that wall plates do not cross masonry joints.
6. Unless otherwise indicated, where multiple outlet boxes are installed at the same location at different mounting heights, install along a common vertical center line.
7. Do not install flush-mounted boxes on opposite sides of walls back-to-back. Provide minimum 6 inches (150 mm) horizontal separation unless otherwise indicated.
8. Acoustic-Rated Walls: Do not install flush-mounted boxes on opposite sides of walls back-to-back; provide minimum 24 inches (610 mm) horizontal separation.
9. Fire Resistance Rated Walls: Install flush-mounted boxes such that the required fire resistance will not be reduced.
10. Locate junction and pull boxes in the following areas, unless otherwise indicated or approved by the Architect:
    a. Concealed above accessible suspended ceilings.
    b. Within joists in areas with no ceiling.
    c. Electrical rooms.
    d. Mechanical equipment rooms.

H. Box Supports:

1. Secure and support boxes in accordance with NFPA 70 and Section 26 0529 using suitable supports and methods approved by the authority having jurisdiction.
2. Provide independent support from building structure except for cast metal boxes (other than boxes used for fixture support) supported by threaded conduit connections in accordance with NFPA 70. Do not provide support from piping, ductwork, or other systems.
3. Installation Above Suspended Ceilings: Do not provide support from ceiling grid or ceiling support system.

I. Install boxes plumb and level.

J. Flush-Mounted Boxes:

1. Install boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that front edge of box or associated raised cover is not set back from finished surface more than 1/4 inch (6 mm) or does not project beyond finished surface.
2. Install boxes in combustible materials such as wood so that front edge of box or associated raised cover is flush with finished surface.
3. Repair rough openings around boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that there are no gaps or open spaces greater than 1/8 inch (3 mm) at the edge of the box.

K. Install boxes as required to preserve insulation integrity.

L. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.

M. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 8400.

N. Close unused box openings.

O. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.

P. Provide grounding and bonding in accordance with Section 26 0526.

Q. Identify boxes in accordance with Section 26 0553.

3.3 CLEANING

A. Clean interior of boxes to remove dirt, debris, plaster and other foreign material.

3.4 PROTECTION

A. Immediately after installation, protect boxes from entry of moisture and foreign material until ready for installation of conductors.

END OF SECTION

SECTION 26 0553
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Electrical identification requirements.

B. Identification nameplates and labels.

C. Wire and cable markers.

D. Voltage markers.

E. Underground warning tape.

F. Warning signs and labels.

1.2 RELATED REQUIREMENTS

A. Section 26 0519 - Low-Voltage Electrical Power Conductors and Cables: Color coding for power conductors and cables 600 V and less; vinyl color coding electrical tape.

1.3 REFERENCE STANDARDS

A. ANSI Z535.2 - American National Standard for Environmental and Facility Safety Signs; 2011.

B. ANSI Z535.4 - American National Standard for Product Safety Signs and Labels; 2011.

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

D. NFPA 70E - Standard for Electrical Safety in the Workplace; 2015.

E. UL 969 - Marking and Labeling Systems; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Verify final designations for equipment, systems, and components to be identified prior to fabrication of identification products.

B. Sequencing:

1. Do not conceal items to be identified, in locations such as above suspended ceilings, until identification products have been installed.

2. Do not install identification products until final surface finishes and painting are complete.

1.5 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

1.6 FIELD CONDITIONS

A. Do not install adhesive products when ambient temperature is lower than recommended by manufacturer.

PART 2 PRODUCTS

2.1 IDENTIFICATION REQUIREMENTS

A. Identification for Equipment:

1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.

   a. Switchboards:

      1) Identify power source and circuit number. Include location.

      2) Use identification nameplate to identify load(s) served for each branch device. Do not identify spares and spaces.

   b. Panelboards:

      1) Identify power source and circuit number. Include location.

      2) Use typewritten circuit directory to identify load(s) served for panelboards with a door. Identify spares and spaces using pencil.

      3) For power panelboards without a door, use identification nameplate to identify load(s) served for each branch device. Do not identify spares and spaces.

   c. Transformers:

      1) Identify power source and circuit number. Include location.

      2) Identify load(s) served. Include location.

   d. Enclosed switches, circuit breakers, and motor controllers:

      1) Identify voltage and phase.

      2) Identify power source and circuit number. Include location.

      3) Identify load(s) served. Include location.

2. Use identification nameplate to identify equipment utilizing series ratings, where permitted, in accordance with NFPA 70.

3. Use identification nameplate to identify disconnect location for equipment with remote disconnecting means.

4. Use identification label on inside of door at each fused switch to identify required NEMA fuse class and size.

5. Arc Flash Hazard Warning Labels: Use warning labels to identify arc flash hazards for electrical equipment, such as switchboards, panelboards, industrial control panels, meter socket enclosures, and motor control centers that are likely to require examination, adjustment, servicing, or maintenance while energized.

   a. Minimum Size: 3.5 by 5 inches (89 mm by 127 mm).

   b. Legend: Include orange header that reads "WARNING", followed by the word message "Arc Flash and Shock Hazard; Appropriate PPE Required; Do not operate controls or open covers without appropriate personal protection equipment; Failure to comply may result in injury or death; Refer to NFPA 70E for minimum PPE requirements" or approved equivalent.

6. Use warning signs to identify electrical hazards for entrances to all rooms and other guarded locations that contain exposed live parts operating at 600 V nominal or less with the word message "DANGER; Electrical hazard; Authorized personnel only" or approved equivalent.

7. Use warning labels to identify electrical hazards for equipment, compartments, and enclosures containing exposed live parts or exposed conductors operating at over 600 V nominal with the word message "DANGER; HIGH VOLTAGE; KEEP OUT".

8. Use warning labels, identification nameplates, or identification labels to identify electrical hazards for equipment where multiple power sources are present with the word message "DANGER; Hazardous voltage; Multiple power sources may be present; Disconnect all electric power including remote disconnects before servicing" or approved equivalent.

B. Identification for Conductors and Cables:

1. Color Coding for Power Conductors 600 V and Less: Comply with Section 26 0519.

2. Use identification nameplate or identification label to identify color code for ungrounded and grounded power conductors inside door or enclosure at each piece of feeder or branch-circuit distribution equipment when premises has feeders or branch circuits served by more than one nominal voltage system.

3. Use wire and cable markers to identify circuit number or other designation indicated for power, control, and instrumentation conductors and cables at the following locations:

   a. At each source and load connection.

   b. Within boxes when more than one circuit is present.

   c. Within equipment enclosures when conductors and cables enter or leave the enclosure.

4. Use wire and cable markers to identify connected grounding electrode system components for grounding electrode conductors.

5. Use underground warning tape to identify direct buried cables.

C. Identification for Raceways:

1. Use voltage markers or color-coded bands to identify systems other than normal power system for accessible conduits at maximum intervals of 20 feet (6.1 m).

   a. Color-Coded Bands: Use field-painting or vinyl color coding electrical tape to mark bands 3 inches (76 mm) wide.

      1) Color Code:

      2) Field-Painting: Comply with Section 09 9123 and 09 9113.

      3) Vinyl Color Coding Electrical Tape: Comply with Section 26 0519.

D. Identification for Boxes:

1. Use voltage markers to identify highest voltage present.

2. Use voltage markers or color coded boxes to identify systems other than normal power system.

   a. Color-Coded Boxes: Field-painted in accordance with Section 09 9123 and 09 9113 per the same color code used for raceways.

3. Use identification labels to identify circuits enclosed.

4. Use warning labels to identify electrical hazards for boxes containing exposed live parts or exposed conductors operating at over 600 V nominal with the word message "DANGER; HIGH VOLTAGE; KEEP OUT".

E. Identification for Devices:

1. Wiring Device and Wallplate Finishes: Comply with Section 26 2726.

2. Use identification label to identify fire alarm system devices.

   a. For devices concealed above suspended ceilings, provide additional identification on ceiling tile below device location.

3. Use identification label or engraved wallplate to identify serving branch circuit for all receptacles.

   a. For receptacles in public areas or in areas as directed by Architect, provide identification on inside surface of wallplate.

4. Use identification label or engraved wallplate to identify load controlled for wall-mounted control devices controlling loads that are not visible from the control location and for multiple wall-mounted control devices installed at one location.

5. Use identification label to identify receptacles protected by upstream GFI protection, where permitted.

F. Identification for Luminaires:

1. Use permanent red dot on luminaire frame to identify luminaires connected to emergency power system.

2.2 IDENTIFICATION NAMEPLATES AND LABELS

A. Identification Nameplates:

1. Materials:

   a. Indoor Clean, Dry Locations: Use plastic nameplates.

   b. Outdoor Locations: Use plastic, stainless steel, or aluminum nameplates suitable for exterior use.

2. Plastic Nameplates: Two-layer or three-layer laminated acrylic or electrically non-conductive phenolic with beveled edges; minimum thickness of 1/16 inch (1.6 mm); engraved text.

   a. Exception: Provide minimum thickness of 1/8 inch (3 mm) when any dimension is greater than 4 inches (100 mm).

3. Stainless Steel Nameplates: Minimum thickness of 1/32 inch (0.8 mm); engraved or laser-etched text.

4. Aluminum Nameplates: Anodized; minimum thickness of 1/32 inch (0.8 mm); engraved or laser-etched text.

5. Mounting Holes for Mechanical Fasteners: Two, centered on sides for sizes up to 1 inch (25 mm) high; Four, located at corners for larger sizes.

B. Identification Labels:

1. Materials: Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.

2. Text: Use factory pre-printed or machine-printed text. Do not use handwritten text unless otherwise indicated.

C. Format for Equipment Identification:

1. Minimum Size: 1 inch (25 mm) by 2.5 inches (64 mm).

2. Legend:

a. Equipment designation or other approved description.

3. Text: All capitalized unless otherwise indicated.

4. Minimum Text Height:

a. Equipment Designation: 1/2 inch (13 mm).

5. Color:

a. Normal Power System: White text on black background.

2.3 WIRE AND CABLE MARKERS

A. Markers for Conductors and Cables: Use wrap-around self-adhesive vinyl cloth, wrap-around self-adhesive vinyl self-laminating, heat-shrink sleeve, plastic sleeve, plastic clip-on, or vinyl split sleeve type markers suitable for the conductor or cable to be identified.

B. Markers for Conductor and Cable Bundles: Use plastic marker tags secured by nylon cable ties.

C. Legend: Power source and circuit number or other designation indicated.

D. Text: Use factory pre-printed or machine-printed text, all capitalized unless otherwise indicated.

1. Do not use handwritten text.

E. Minimum Text Height: 1/8 inch (3 mm).

F. Color: Black text on white background unless otherwise indicated.

2.4 VOLTAGE MARKERS

A. Markers for Conduits: Use factory pre-printed self-adhesive vinyl, self-adhesive vinyl cloth, or vinyl snap-around type markers.

B. Markers for Boxes and Equipment Enclosures: Use factory pre-printed self-adhesive vinyl or self-adhesive vinyl cloth type markers.

C. Minimum Size:

1. Markers for Conduits: As recommended by manufacturer for conduit size to be identified.

2. Markers for Pull Boxes: 1 1/8 by 4 1/2 inches (29 by 110 mm).

3. Markers for Junction Boxes: 1/2 by 2 1/4 inches (13 by 57 mm).

D. Legend:

1. Markers for Voltage Identification: Highest voltage present.

2. Markers for System Identification:

E. Color: Black text on orange background unless otherwise indicated.

2.5 WARNING SIGNS AND LABELS

A. Comply with ANSI Z535.2 or ANSI Z535.4 as applicable.

B. Warning Signs:

1. Materials:

a. Indoor Dry, Clean Locations: Use factory pre-printed rigid plastic or self-adhesive vinyl signs.

b. Outdoor Locations: Use factory pre-printed rigid aluminum signs.

2. Rigid Signs: Provide four mounting holes at corners for mechanical fasteners.

3. Minimum Size: 7 by 10 inches (178 by 254 mm) unless otherwise indicated.

C. Warning Labels:

1. Materials: Use factory pre-printed or machine-printed self-adhesive polyester or self-adhesive vinyl labels; UV, chemical, water, heat, and abrasion resistant; produced using materials recognized to UL 969.

a. Do not use labels designed to be completed using handwritten text.

b. Provide polyester overlaminate to protect handwritten text.

2. Machine-Printed Labels: Use thermal transfer process printing machines and accessories recommended by label manufacturer.

3. Minimum Size: 2 by 4 inches (51 mm by 102 mm) unless otherwise indicated.

PART 3 EXECUTION

3.1 PREPARATION

A. Clean surfaces to receive adhesive products according to manufacturer's instructions.

3.2 INSTALLATION

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

B. Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance. Unless otherwise indicated, locate products as follows:

1. Surface-Mounted Equipment: Enclosure front.

2. Flush-Mounted Equipment: Inside of equipment door.

3. Free-Standing Equipment: Enclosure front; also enclosure rear for equipment with rear access.

4. Elevated Equipment: Legible from the floor or working platform.

5. Branch Devices: Adjacent to device.

6. Interior Components: Legible from the point of access.
7. Conduits: Legible from the floor.
8. Boxes: Outside face of cover.
9. Conductors and Cables: Legible from the point of access.
10. Devices: Outside face of cover.

C. Install identification products centered, level, and parallel with lines of item being identified.

D. Secure nameplates to exterior surfaces of enclosures using stainless steel screws and to interior surfaces using self-adhesive backing or epoxy cement.

E. Install self-adhesive labels and markers to achieve maximum adhesion, with no bubbles or wrinkles and edges properly sealed.

F. Install underground warning tape above buried lines with one tape per trench at 3 inches (75 mm) below finished grade.

G. Secure rigid signs using stainless steel screws.

H. Mark all handwritten text, where permitted, to be neat and legible.

3.3 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Replace self-adhesive labels and markers that exhibit bubbles, wrinkles, curling or other signs of improper adhesion.

END OF SECTION

SECTION 26 0923

LIGHTING CONTROL DEVICES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Occupancy sensors.

1.2 RELATED REQUIREMENTS

A. Section 26 0526 - Grounding and Bonding for Electrical Systems.

B. Section 26 0537 - Boxes.

C. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

D. Section 26 2726 - Wiring Devices: Devices for manual control of lighting, including wall switches, wall dimmers, and fan speed controllers.

E. Section 26 5100 - Interior Lighting.

1.3 REFERENCE STANDARDS

A. 47 CFR 15 - Radio Frequency Devices; current edition.

B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.

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

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate the placement of lighting control devices with millwork, furniture, equipment, etc. installed under other sections or by others.

2. Coordinate the placement of wall switch occupancy sensors with actual installed door swings.

3. Coordinate the placement of occupancy sensors with millwork, furniture, equipment or other potential obstructions to motion detection coverage installed under other sections or by others.

4. Notify Architect/Engineer of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.

B. Sequencing:

1. Do not install lighting control devices until final surface finishes and painting are complete.

1.5 SUBMITTALS

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

B. Product Data: Include ratings, configurations, standard wiring diagrams, dimensions, colors, service condition requirements, and installed features.

1. Occupancy Sensors: Include detailed motion detection coverage range diagrams.

C. Shop Drawings:

1. Occupancy Sensors: Provide lighting plan indicating location, model number, and orientation of each occupancy sensor and associated system component.

D. Operation and Maintenance Data: Include detailed information on device programming and setup.

E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. See Section 01 6000 - Product Requirements, for additional provisions.

F. Project Record Documents: Record actual installed locations and settings for lighting control devices.

1.6 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

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

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

D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.7 DELIVERY, STORAGE, AND PROTECTION

A. Store products in a clean, dry space in original manufacturer's packaging in accordance with manufacturer's written instructions until ready for installation.

1.8 FIELD CONDITIONS

A. Maintain field conditions within manufacturer's required service conditions during and after installation.

1.9 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Provide five year manufacturer warranty for all occupancy sensors.

PART 2 PRODUCTS

2.1 LIGHTING CONTROL DEVICES - GENERAL REQUIREMENTS

A. Provide products listed, classified, and labeled as suitable for the purpose intended.

B. Unless specifically indicated to be excluded, provide all required conduit, wiring, connectors, hardware, components, accessories, etc. as required for a complete operating system.

C. Products for Switching of Electronic Fluorescent Ballasts: Tested and rated to be suitable for peak inrush currents specified in NEMA 410.

2.2 OCCUPANCY SENSORS

A. All Occupancy Sensors:

1. Description: Factory-assembled commercial specification grade devices for indoor use capable of sensing both major motion, such as walking, and minor motion, such as small desktop level movements, according to published coverage areas, for automatic control of load indicated.

2. Sensor Technology:

a. Passive Infrared (PIR) Occupancy Sensors: Designed to detect occupancy by sensing movement of thermal energy between zones.

b. Passive Infrared/Ultrasonic Dual Technology Occupancy Sensors: Designed to detect occupancy using a combination of both passive infrared and ultrasonic technologies.

3. Provide LED to visually indicate motion detection with separate color LEDs for each sensor type in dual technology units.

4. Operation: Unless otherwise indicated, occupancy sensor to turn load on when occupant presence is detected and to turn load off when no occupant presence is detected during an adjustable turn-off delay time interval.

5. Dual Technology Occupancy Sensors: Field configurable turn-on and hold-on activation with settings for activation by either or both sensing technologies.

6. Passive Infrared Lens Field of View: Field customizable by addition of factory masking material, adjustment of integral blinders, or similar means to block motion detection in selected areas.

7. Turn-Off Delay: Field adjustable, with time delay settings up to 30 minutes.

8. Compatibility (Non-Dimming Sensors): Suitable for controlling incandescent lighting, low-voltage lighting with electronic and magnetic transformers, fluorescent lighting with electronic and magnetic ballasts, LED lighting, and fractional motor loads, with no minimum load requirements.

9. Load Rating for Line Voltage Occupancy Sensors: As required to control the load indicated on the drawings.

B. Wall Switch Occupancy Sensors:

1. All Wall Switch Occupancy Sensors:

a. Description: Occupancy sensors designed for installation in standard wall box at standard wall switch mounting height with a field of view of 180 degrees, integrated manual control capability, and no leakage current to load in off mode.

b. Where indicated, provide two-circuit units for control of two separate lighting loads, with separate manual controls and separately programmable operation for each load.

c. Operation: Field selectable to operate either as occupancy sensor (automatic on/off) or as vacancy sensor (manual-on/automatic off).

d. Manual-Off Override Control: When used to turn off load while in automatic-on mode, unit to revert back to automatic mode after no occupant presence is detected during the delayed-off time interval.

e. Finish: Match finishes specified for wiring devices in Section 26 2726, unless otherwise indicated.

C. Ceiling Mounted Occupancy Sensors:

1. All Ceiling Mounted Occupancy Sensors:

a. Description: Low profile occupancy sensors designed for ceiling installation.

b. Unless otherwise indicated or required to control the load indicated on the drawings, provide low voltage units, for use with separate compatible accessory power packs.

c. Provide field selectable setting for disabling LED motion detector visual indicator.

d. Occupancy sensor to be field selectable as either manual-on/automatic-off or automatic on/off.

2. Passive Infrared/Ultrasonic Dual Technology Ceiling Mounted Occupancy Sensors:

a. Extended Range Sensors: Capable of detecting motion within an area of 1,200 square feet (111.5 sq m) at a mounting height of 9 feet (2.7 m), with a field of view of 360 degrees.

D. Power Packs for Low Voltage Occupancy Sensors:

1. Description: Plenum rated, self-contained low voltage class 2 transformer and relay compatible with specified low voltage occupancy sensors for switching of line voltage loads.

2. Provide quantity and configuration of power and slave packs with all associated wiring and accessories as required to control the load indicated on the drawings.

3. Input Supply Voltage: Dual rated for 120/277 V ac.

4. Load Rating: As required to control the load indicated on the drawings.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field measurements are as shown on the drawings.

B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.

C. Verify that openings for outlet boxes are neatly cut and will be completely covered by devices or wall plates.

D. Verify that final surface finishes are complete, including painting.

E. Verify that branch circuit wiring installation is completed, tested, and ready for connection to lighting control devices.

F. Verify that the service voltage and ratings of lighting control devices are appropriate for the service voltage and load requirements at the location to be installed.

G. Verify that conditions are satisfactory for installation prior to starting work.

3.2 PREPARATION

A. Provide extension rings to bring outlet boxes flush with finished surface.

B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.3 INSTALLATION

A. Perform work in a neat and workmanlike manner in accordance with NECA 1 and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.

B. Coordinate locations of outlet boxes provided under Section 26 0537 as required for installation of lighting control devices provided under this section.

C. Install lighting control devices in accordance with manufacturer's instructions.

D. Unless otherwise indicated, connect lighting control device grounding terminal or conductor to branch circuit equipment grounding conductor and to outlet box with bonding jumper.

E. Install lighting control devices plumb and level, and held securely in place.

F. Where required and not furnished with lighting control device, provide wall plate in accordance with Section 26 2726.

G. Where applicable, install lighting control devices and associated wall plates to fit completely flush to mounting surface with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.

H. Identify lighting control devices in accordance with Section 26 0553.

I. Occupancy Sensor Locations:

1. Location Adjustments: Within the design intent, reasonably minor adjustments to locations may be made in order to optimize coverage and avoid conflicts or problems affecting coverage.

2. Locate ultrasonic and dual technology passive infrared/ultrasonic occupancy sensors a minimum of 6 feet (1.8 m) from air supply ducts or other sources of heavy air flow and as per manufacturer's recommendations, in order to minimize false triggers.

3.4 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Inspect each lighting control device for damage and defects.

C. Test occupancy sensors to verify proper operation, including time delays and ambient light thresholds where applicable. Verify optimal coverage for entire room or area. Record test results in written report to be included with submittals.

D. Correct wiring deficiencies and replace damaged or defective lighting control devices.

3.5 ADJUSTING

A. Adjust devices and wall plates to be flush and level.

B. Adjust occupancy sensor settings to minimize undesired activations while optimizing energy savings, and to achieve desired function as indicated or as directed by Architect/Engineer.

C. Where indicated or as directed by Architect, install factory masking material or adjust integral blinders on passive infrared (PIR) and dual technology occupancy sensor lenses to block undesired motion detection.

3.6 CLEANING

A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

3.7 COMMISSIONING

A. See Section 01 9113 - General Commissioning Requirements for commissioning requirements.

3.8 CLOSEOUT ACTIVITIES

A. See Section 01 7800 - Closeout Submittals, for closeout submittals.

B. See Section 01 7900 - Demonstration and Training, for additional requirements.

C. Demonstration: Demonstrate proper operation of lighting control devices to Architect/Engineer, and correct deficiencies or make adjustments as directed.

D. Training: Train Owner's personnel on operation, adjustment, programming, and maintenance of lighting control devices.

1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.

2. Provide minimum of two hours of training.

3. Instructor: Qualified contractor familiar with the project and with sufficient knowledge of the installed lighting control devices.

4. Location: At project site.

END OF SECTION

SECTION 26 2726
WIRING DEVICES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Wall switches.

B. Receptacles.

C. Wall plates.

1.2 RELATED REQUIREMENTS

A. Section 26 0537 - Boxes.

B. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

1.3 REFERENCE STANDARDS

A. FS W-C-596 - Connector, Electrical, Power, General Specification for; Federal Specification; Revision G, 2001.

B. FS W-S-896 - Switches, Toggle (Toggle and Lock), Flush-mounted (General Specification); Federal Specification; Revision F, 1999.

C. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.

D. NEMA WD 1 - General Color Requirements for Wiring Devices; 1999 (R 2010).

E. NEMA WD 6 - Wiring Devices - Dimensional Specifications; 2012.

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

G. UL 20 - General-Use Snap Switches; Current Edition, Including All Revisions.

H. UL 498 - Attachment Plugs and Receptacles; Current Edition, Including All Revisions.

I. UL 514D - Cover Plates for Flush-Mounted Wiring Devices; Current Edition, Including All Revisions.

J. UL 943 - Ground-Fault Circuit-Interrupters; Current Edition, Including All Revisions.

K. UL 1472 - Solid-State Dimming Controls; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate the placement of outlet boxes with millwork, furniture, equipment, etc. installed under other sections or by others.

2. Coordinate wiring device ratings and configurations with the electrical requirements of actual equipment to be installed.

3. Coordinate the placement of outlet boxes for wall switches with actual installed door swings.

4. Coordinate the installation and preparation of uneven surfaces, such as split face block, to provide suitable surface for installation of wiring devices.

5. Notify Architect/Engineer of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.

B. Sequencing:

1. Do not install wiring devices until final surface finishes and painting are complete.

1.5 SUBMITTALS

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

B. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.

C. Operation and Maintenance Data:

1. GFCI Receptacles: Include information on status indicators.

D. Project Record Documents: Record actual installed locations of wiring devices.

E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. See Section 01 6000 - Product Requirements, for additional provisions.

1.6 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

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

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

D. Products: Listed, classified, and labeled as suitable for the purpose intended.

E. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.7 DELIVERY, STORAGE, AND PROTECTION

A. Store in a clean, dry space in original manufacturer's packaging until ready for installation.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Hubbell Incorporated: www.hubbell-wiring.com.

B. Leviton Manufacturing Company, Inc: www.leviton.com.

C. Cooper Wiring Devices

D. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us

E. Source Limitations: Where possible, provide products for each type of wiring device produced by a single manufacturer and obtained from a single supplier.

2.2 WIRING DEVICE APPLICATIONS

A. Provide wiring devices suitable for intended use and with ratings adequate for load served.

B. Provide weather resistant GFCI receptacles with specified weatherproof covers for receptacles installed outdoors or in damp or wet locations.

C. Provide GFCI protection for receptacles installed within 6 feet (1.8 m) of sinks.

D. Provide GFCI protection for receptacles installed in kitchens.

E. Provide GFCI protection for receptacles serving electric drinking fountains.

2.3 WIRING DEVICE FINISHES

A. Provide wiring device finishes as described below unless otherwise indicated.

B. Wiring Devices, Unless Otherwise Indicated: Ivory with ivory nylon wall plate.

2.4 WALL SWITCHES

A. Manufacturers:

1. Hubbell Incorporated: www.hubbell-wiring.com.

2. Cooper Wiring Devices

3. Leviton Manufacturing Company, Inc: www.leviton.com.

4. Lutron

5. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us

B. Wall Switches - General Requirements: AC only, quiet operating, general-use snap switches with silver alloy contacts, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 20 and where applicable, FS W-S-896; types as indicated on the drawings.

1. Wiring Provisions: Terminal screws for side wiring and screw actuated binding clamp for back wiring with separate ground terminal screw.

C. Standard Wall Switches: Industrial specification grade, 20 A, 120/277 V with standard toggle type switch actuator and maintained contacts; single pole single throw, double pole single throw, three way, or four way as indicated on the drawings.

2.5 RECEPTACLES

A. Manufacturers:

1. Hubbell Incorporated: www.hubbell-wiring.com.

2. Cooper Wiring Devices.

3. Leviton Manufacturing Company, Inc: www.leviton.com.

4. Lutron Electronics Company, Inc; Designer Style: www.lutron.com.

5. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us

B. Receptacles - General Requirements: Self-grounding, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 498, and where applicable, FS W-C-596; types as indicated on the drawings.

1. Wiring Provisions: Terminal screws for side wiring or screw actuated binding clamp for back wiring with separate ground terminal screw.

2. NEMA configurations specified are according to NEMA WD 6.

3. Hospital Grade Receptacles: Listed as complying with UL 498 Supplement SD, with green dot hospital grade mark on device face.

C. Convenience Receptacles:

1. Standard Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R; single or duplex as indicated on the drawings.

2. Weather Resistant Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R, listed and labeled as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations; single or duplex as indicated on the drawings.

3. Illuminated Convenience Receptacles: Hospital grade, 20A, 125V, NEMA 5-20R; illuminated face or indicator light to indicate power is being supplied to receptacle; single or duplex as indicated on the drawings.

D. GFCI Receptacles:

1. GFCI Receptacles - General Requirements: Self-testing, with feed-through protection and light to indicate ground fault tripped condition and loss of protection; listed as complying with UL 943, class A.

a. Provide test and reset buttons of same color as device.

2. Standard GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style.

3. Weather Resistant GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations.

2.6 WALL PLATES

A. Manufacturers:

1. Hubbell Incorporated: www.hubbell-wiring.com.

2. Leviton Manufacturing Company, Inc: www.leviton.com.

3. Lutron Electronics Company, Inc; www.lutron.com.

4. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us

5. Source Limitations: Where wall controls are furnished as part of lighting control system, provide accessory matching receptacles and wallplates by the same manufacturer in locations indicated.

B. Wall Plates: Comply with UL 514D.

1. Configuration: One piece cover as required for quantity and types of corresponding wiring devices.

2. Size: Standard
3. Screws: Metal with slotted heads finished to match wall plate finish.

C. Nylon Wall Plates: Smooth finish, high-impact thermoplastic.

D. Premarked Wall Plates: Factory labeled as indicated; hot stamped for nylon wall plates and engraved for metal wall plates.

E. Weatherproof Covers for Wet Locations: Gasketed, cast aluminum, with hinged lockable cover and corrosion-resistant screws; listed as suitable for use in wet locations while in use with attachment plugs connected and identified as extra-duty type.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field measurements are as shown on the drawings.

B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.

C. Verify that wall openings are neatly cut and will be completely covered by wall plates.

D. Verify that final surface finishes are complete, including painting.

E. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

F. Verify that conditions are satisfactory for installation prior to starting work.

3.2 PREPARATION

A. Provide extension rings to bring outlet boxes flush with finished surface.

B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.3 INSTALLATION

A. Perform work in a neat and workmanlike manner in accordance with NECA 1 and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.

B. Coordinate locations of outlet boxes provided under Section 26 0537 as required for installation of wiring devices provided under this section.

1. Mounting Heights: Unless otherwise indicated, as follows:
   a. Wall Switches: 48 inches (1.2 m) above finished floor.
   b. Wall Dimmers: 48 inches (1.2 m) above finished floor.
   c. Receptacles: 18 inches (450 mm) above finished floor or 6 inches (150 mm) above counter.
2. Orient outlet boxes for vertical installation of wiring devices unless otherwise indicated.
3. Where multiple receptacles, wall switches, or wall dimmers are installed at the same location and at the same mounting height, gang devices together under a common wall plate.
4. Locate wall switches on strike side of door with edge of wall plate 3 inches (80 mm) from edge of door frame. Where locations are indicated otherwise, notify Architect/Engineer to obtain direction prior to proceeding with work.
5. Locate receptacles for electric drinking fountains concealed behind drinking fountain according to manufacturer's instructions.

C. Install wiring devices in accordance with manufacturer's instructions.

D. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.

E. Where required, connect wiring devices using pigtails not less than 6 inches (150 mm) long. Do not connect more than one conductor to wiring device terminals.

F. Connect wiring devices by wrapping conductor clockwise 3/4 turn around screw terminal and tightening to proper torque specified by the manufacturer. Where present, do not use push-in pressure terminals that do not rely on screw-actuated binding.

G. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.

H. Provide GFCI receptacles with integral GFCI protection at each location indicated. Do not use feed-through wiring to protect downstream devices.

I. Install wiring devices plumb and level with mounting yoke held rigidly in place.

J. Install wall switches with OFF position down.

K. Install vertically mounted receptacles with grounding pole on bottom and horizontally mounted receptacles with grounding pole on left.

L. Install wall plates to fit completely flush to wall with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.

M. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.

N. Identify wiring devices in accordance with Section 26 0553.

3.4 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Inspect each wiring device for damage and defects.

C. Operate each wall switch, wall dimmer, and fan speed controller with circuit energized to verify proper operation.

D. Test each receptacle to verify operation and proper polarity.

E. Test each GFCI receptacle for proper tripping operation according to manufacturer's instructions.

F. Correct wiring deficiencies and replace damaged or defective wiring devices.

3.5 ADJUSTING

A. Adjust devices and wall plates to be flush and level.

3.6 CLEANING

A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

END OF SECTION

SECTION 26 2818

ENCLOSED SWITCHES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Enclosed safety switches.

1.2 RELATED REQUIREMENTS

A. Section 26 0526 - Grounding and Bonding for Electrical Systems.

B. Section 26 0529 - Hangers and Supports for Electrical Systems.

C. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

1.3 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.

B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.

C. NEMA KS 1 - Heavy Duty Enclosed and Dead-Front Switches (600 Volts Maximum); 2013.

D. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2013.

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

F. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.

G. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.

H. UL 98 - Enclosed and Dead-Front Switches; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate the work with other trades. Avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and within working clearances for electrical equipment required by NFPA 70.

2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.

3. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.

4. Notify Architect/Engineer of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

1.5 SUBMITTALS

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

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for enclosed switches and other installed components and accessories.

C. Shop Drawings: Indicate outline and support point dimensions, voltage and current ratings, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.

1. Include dimensioned plan and elevation views of enclosed switches and adjacent equipment with all required clearances indicated.

2. Include wiring diagrams showing all factory and field connections.

D. Project Record Documents: Record actual locations of enclosed switches.

E. Maintenance Data: Include information on replacement parts and recommended maintenance procedures and intervals.

F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. See Section 01 6000 - Product Requirements, for additional provisions.

1.6 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

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

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

D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

B. Handle carefully in accordance with manufacturer's written instructions to avoid damage to enclosed switch internal components, enclosure, and finish.

1.8 FIELD CONDITIONS

A. Maintain ambient temperature between -22 degrees F (-30 degrees C) and 104 degrees F (40 degrees C) during and after installation of enclosed switches.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Eaton Corporation; www.eaton.com.

B. General Electric Company; www.geindustrial.com.

C. Schneider Electric; Square D Products; www.schneider-electric.us.

D. Source Limitations: Furnish enclosed switches and associated components produced by the same manufacturer as the other electrical distribution equipment used for this project and obtained from a single supplier.

2.2 ENCLOSED SAFETY SWITCHES

A. Description: Quick-make, quick-break enclosed safety switches listed and labeled as complying with UL 98; heavy duty; ratings, configurations, and features as indicated on the drawings.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:

1. Altitude: Less than 6,600 feet (2,000 m).

2. Ambient Temperature: Between -22 degrees F (-30 degrees C) and 104 degrees F (40 degrees C).

D. Horsepower Rating: Suitable for connected load.

E. Voltage Rating: Suitable for circuit voltage.

F. Short Circuit Current Rating:

1. Provide enclosed safety switches, when protected by the fuses or supply side overcurrent protective devices to be installed, with listed short circuit current rating not less than the available fault current at the installed location as determined by short circuit study performed in accordance with Section 26 0573.

G. Provide with switch blade contact position that is visible when the cover is open.

H. Fuse Clips for Fusible Switches: As required to accept fuses indicated.

1. Where NEMA Class R fuses are installed, provide rejection feature to prevent installation of fuses other than Class R.

I. Conductor Terminations: Suitable for use with the conductors to be installed.

J. Provide solidly bonded equipment ground bus in each enclosed safety switch, with a suitable lug for terminating each equipment grounding conductor.

K. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.

1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:

a. Indoor Clean, Dry Locations: Type 12 .

b. Outdoor Locations: Type 3R.

L. Provide safety interlock to prevent opening the cover with the switch in the ON position with capability of overriding interlock for testing purposes.

M. Heavy Duty Switches:

1. Comply with NEMA KS 1.

2. Conductor Terminations:

a. Provide mechanical lugs unless otherwise indicated.

b. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.

3. Provide externally operable handle with means for locking in the OFF position, capable of accepting three padlocks.

    a. Provide means for locking handle in the ON position.

N. Provide the following features and accessories where indicated or where required to complete installation:

1. Hubs: As required for environment type; sized to accept conduits to be installed.

2. Auxiliary Switch: SPDT switch suitable for connection to system indicated, with auxiliary contact operation before switch blades open and after switch blades close.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field measurements are as shown on the drawings.

B. Verify that the ratings of the enclosed switches are consistent with the indicated requirements.

C. Verify that mounting surfaces are ready to receive enclosed safety switches.

D. Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

A. Install enclosed switches in accordance with manufacturer's instructions.

B. Install enclosed switches securely, in a neat and workmanlike manner in accordance with NECA 1.

C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

D. Provide required supports in accordance with Section 26 0529.

E. Install enclosed switches plumb.

F. Except where indicated to be mounted adjacent to the equipment they supply, mount enclosed switches such that the highest position of the operating handle does not exceed 79 inches (2000 mm) above the floor or working platform.

G. Provide grounding and bonding in accordance with Section 26 0526.

H. Provide fuses complying with Section 26 2813 for fusible switches as indicated or as required by equipment manufacturer's recommendations.

I. Where accessories are not self-powered, provide control power source as indicated or as required to complete installation.

J. Identify enclosed switches in accordance with Section 26 0553.

3.3 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Inspect and test in accordance with NETA ATS, except Section 4.

C. Perform inspections and tests listed in NETA ATS, Section 7.5.1.1.

D. Correct deficiencies and replace damaged or defective enclosed safety switches or associated components.

3.4 ADJUSTING

A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

3.5 CLEANING

A. Clean dirt and debris from switch enclosures and components according to manufacturer's instructions.

B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION

SECTION 26 5100
INTERIOR LIGHTING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Interior luminaires.

1.2 RELATED REQUIREMENTS

A. Section 26 0537 - Boxes.

B. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

C. Section 26 0923 - Lighting Control Devices: Automatic controls for lighting including occupancy sensors, outdoor motion sensors, time switches, outdoor photo controls, and daylighting controls.

D. Section 26 0943 - Network Lighting Controls - Lutron QS/Quantum.

E. Section 26 0943 - Network Lighting Controls - Lutron Homeworks QS.

F. Section 26 2726 - Wiring Devices: Manual wall switches and wall dimmers.

1.3 REFERENCE STANDARDS

A. 47 CFR 15 - Radio Frequency Devices; current edition.

B. ANSI C82.11 - American National Standard for Lamp Ballasts - High Frequency Fluorescent Lamp Ballasts - Supplements; 2011.

C. IEEE C62.41.2 - Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and less) AC Power Circuits; 2002 (Cor 1, 2012).

D. IESNA LM-63 - ANSI Approved Standard File Format for Electronic Transfer of Photometric Data and Related Information; 2002 (Reaffirmed 2008).

E. IES LM-79 - Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products; Illuminating Engineering Society; 2008.

F. IES LM-80 - Approved Method: Measuring Luminous Flux and Color Maintenance of LED Packages, Arrays, and Modules; Illuminating Engineering Society; 2015.

G. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.

H. NECA/IESNA 500 - Standard for Installing Indoor Commercial Lighting Systems; 2006.

I. NECA/IESNA 502 - Standard for Installing Industrial Lighting Systems; 2006.

J. NEMA LE 4 - Recessed Luminaires, Ceiling Compatibility; 2012.

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

L. NFPA 101 - Life Safety Code; 2015.

M. UL 1598 - Luminaires; Current Edition, Including All Revisions.

N. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate the installation of luminaires with mounting surfaces installed under other sections or by others. Coordinate the work with placement of supports, anchors, etc. required for mounting. Coordinate compatibility of luminaires and associated trims with mounting surfaces at installed locations.

2. Coordinate the placement of luminaires with structural members, ductwork, piping, equipment, diffusers, fire suppression system components, and other potential conflicts installed under other sections or by others.

3. Coordinate the placement of exit signs with furniture, equipment, signage or other potential obstructions to visibility installed under other sections or by others.

4. Notify Architect/Engineer of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.

1.5 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

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

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

D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.6 DELIVERY, STORAGE, AND PROTECTION

A. Receive, handle, and store products according to NECA/IESNA 500 (commercial lighting), NECA/IESNA 502 (industrial lighting), and manufacturer's written instructions.

B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.

1.7 FIELD CONDITIONS

A. Maintain field conditions within manufacturer's required service conditions during and after installation.

PART 2 PRODUCTS

2.1 LUMINAIRE TYPES

A. No new light fixtures required, re-install existing.

2.2 ACCESSORIES

A. Stems for Suspended Luminaires: Steel tubing, minimum 1/2" size, factory finished to match luminaire or field-painted as directed.

B. Threaded Rods for Suspended Luminaires: Zinc-plated steel, minimum 1/4" size, field-painted as directed.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field measurements are as shown on the drawings.

B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.

C. Verify that suitable support frames are installed where required.

D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.

E. Verify that conditions are satisfactory for installation prior to starting work.

3.2 PREPARATION

A. Provide extension rings to bring outlet boxes flush with finished surface.

B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.3 INSTALLATION

A. Coordinate locations of outlet boxes provided under Section 26 0537 as required for installation of luminaires provided under this section.

B. Install products according to manufacturer's instructions.

C. Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 1 (general workmanship) and NECA 500 (commercial lighting).

D. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.

E. Suspended Ceiling Mounted Luminaires:

1. Do not use ceiling tiles to bear weight of luminaires.

2. Do not use ceiling support system to bear weight of luminaires unless ceiling support system is certified as suitable to do so.

3. Secure surface-mounted and pendant-mounted luminaires to building structure.

4. Secure lay-in luminaires to ceiling support channels using listed safety clips at four corners.

5. In addition to ceiling support wires, provide two galvanized steel safety wire(s), minimum 12 gage, connected from opposing corners of each recessed luminaire to building structure.

6. See appropriate Division 9 section where suspended grid ceiling is specified for additional requirements.

F. Recessed Luminaires:

1. Install trims tight to mounting surface with no visible light leakage.

2. Luminaires Recessed in Fire-Rated Ceilings: Install using accessories and firestopping materials to meet regulatory requirements for fire rating.

G. Suspended Luminaires:

1. Unless otherwise indicated, specified mounting heights are to bottom of luminaire.
2. Install using the suspension method indicated, with support lengths and accessories as required for specified mounting height.
3. Provide minimum of two supports for each luminaire equal to or exceeding 4 feet in length, with no more than 4 feet (1.2 m) between supports.
4. Unless otherwise indicated, support pendants from swivel hangers.

H. Install accessories furnished with each luminaire.

I. Bond products and metal accessories to branch circuit equipment grounding conductor.

J. Fluorescent Luminaires Controlled by Dual-Level Switching: Connect such that each switch controls the same corresponding lamps in each luminaire.

K. Exit Signs:

1. Unless otherwise indicated, connect unit to unswitched power from same circuit feeding normal lighting in same room or area. Bypass local switches, contactors, or other lighting controls.

3.4 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Inspect each product for damage and defects.

C. Operate each luminaire after installation and connection to verify proper operation.

D. Test fluorescent emergency power supply units to verify proper operation upon loss of normal power supply.

E. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Architect/Engineer.

3.5 ADJUSTING

A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Architect/Engineer. Secure locking fittings in place.

B. Exit Signs with Field-Selectable Directional Arrows: Set as indicated or as required to properly designate egress path as directed by Architect/Engineer or authority having jurisdiction.

3.6 CLEANING

A. Clean surfaces according to NECA 500 (commercial lighting), NECA 502 (industrial lighting), and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

3.7 CLOSEOUT ACTIVITIES

A. See Section 01 7800 - Closeout Submittals, for closeout submittals.

B. See Section 01 7900 - Demonstration and Training, for additional requirements.

C. Just prior to Substantial Completion, replace all lamps that have failed .

3.8 PROTECTION

A. Protect installed luminaires from subsequent construction operations.

END OF SECTION

Form 131084 (11-16)

BID BOND

SOLICITATION NUMBER: _____

KNOW ALL PERSONS BY THESE PRESENTS: That we, _____
(Company Name)

_____ of _____
(City,State)

as principal, and the _____
(Surety)

of _____
(Address)

as Surety, are held and firmly bound unto the Iowa Department of Transportation and to the State of Iowa, or Municipality as defined in Iowa Code, Section 73A.1 as applicable, hereinafter defined as Obligee, to the percent of the submitted lump sum price shown in the solicitation documents of the specified project, by which payment by said principal and surety bind themselves, their heirs, executors, administrators, successors, and assigns jointly and severally, firmly by these presents.

WHEREAS, the principal is herewith submitting his/her or its sealed solicitation for:

County _____

Type of Work _____

Solicitation Due Date _____ , 20 _____ .

NOW THEREFORE, if the said solicitation or proposal submitted by said principal be accepted, and the principal be awarded a contract with the Obligee in accordance with the terms of such solicitation, and give such bond as may be specified in the solicitation or contract documents with good and sufficient surety for the faithful performance of such contract and for the prompt payment of labor and material furnished in the prosecution thereof, then this obligation shall become null and void or in the event of the failure of the principal to enter such contract and give such bond, the principal shall pay to the Obligee the full amount of the bid bond, together with court costs, attorney's fees, and any other expense of recovery.

IN WITNESS WHEREOF, the principal and surety have caused these presents to be signed this _____ day of

_____ , 20 _____ .

_____
Principal
(Company Name)

By _____
Authorized Signature

_____
Address

_____
Surety

By _____
Authorized Surety Representative

Bidders Request for Alternatives or Exceptions (BRAE)

Letting Date: __01/11/2017_____

Proposal No.: ___17847_____ BRAE form due on or before:_12/30/2016_

Item: _____ Spec. No.:_____

Request: _____

_____

Bidder Proposes to furnish in lieu of above: _____

_____

_____

_____

NOTE: The determination of acceptance of this BRAE request is only valid for the bid for which it was submitted. BRAE approvals received for this bid do not determine or set a precedent for what is acceptable in any other bid posted by the State of Iowa.

Email/Fax to:

Iowa Department of Transportation
Purchasing Section
Attention: _Jody McNaughton
Email: jody.mcnaughton@iowadot.us

Fax No.: 515-239-1538

Submitted By _____

Company _____

Address _____

_____
City State Zip

Phone No. _____

Fax No. _____

==========

DOT USE ONLY

Approved _____ Disapproved _____

Reason _____

_____

_____

Signature: _____ Date: _____

Bidder _____

_____

_____

_____

SEALED BID

LETTING DATE: January 11, 2017
PROPOSAL NO: 17847
PROPOSAL DESCRIPTION: Ames DOT Drivers License Station Remodel

Iowa Department of Transportation
PURCHASING - SEALED BID PROPOSAL
800 Lincoln Way
Ames, IA 50010