



**JEFFERSON COUNTY**  
**DEPARTMENT OF ADMINISTRATIVE SERVICES**  
729 MAPLE ST / PO BOX 100  
HILLSBORO MO 63050  
[WWW.JEFFCOMO.ORG](http://WWW.JEFFCOMO.ORG)

**BID #:** 19-0008

**Invitation for Bid:** ADMINISTRATION CENTER RENOVATION  
PROJECT NO. PW19B007BLD

**Date Issued:** 1-9-2019

BIDS SHALL BE ACCEPTED UNTIL: TUESDAY, FEBRUARY 5, 2019, AT 2:00 P.M. LOCAL TIME.

**Specification  
Contact:**

**JASON JONAS**  
Department of Public Works  
636-797-5369  
jjonas@jeffcomo.org

**Contract  
Contact:**

**VICKIE PRATT**  
Department of Administrative Services  
636-797-5380

**Mail (3) Three  
Complete Copies  
With Vendor And  
Bid Information As  
Shown In Sample:**

**SAMPLE ENVELOPE**

*VENDOR NAME*

*VENDOR ADDRESS*

*CONTACT NUMBER*

**DEPARTMENT OF THE COUNTY CLERK**

**JEFFERSON COUNTY MISSOURI**

**729 MAPLE ST / PO BOX 100**

**HILLSBORO MO 63050-0100**

*SEALED BID: (BID NAME)*

**Contract Term:**

**ONE YEAR CONTRACT  
WITH A ONE YEAR  
RENEWAL OPTION  
UPON APPROVAL OF THE  
COUNTY COUNCIL AND  
COUNTY EXECUTIVE**

The undersigned certifies that he/she has the authority to bind this company in an agreement/contract to supply the commodity or service in accordance with all terms, conditions, and pricing specified. This Bid, if accepted, will constitute an Agreement and Contract with Jefferson County, Missouri, upon approval of the County Council and County Executive. Prices are firm during this agreement term, unless agreed upon in writing by the County. The County has the option to renew this agreement at the same terms and conditions as the original agreement for one additional one-year term with the written consent of the successful Bidder. Price increases for renewals are not authorized unless approved in writing by the County.

**Vendor  
Information:**

<b>Company Name</b>	<b>Authorized Agent (Print)</b>	
<b>Address</b>	<b>Signature</b>	
<b>City/State/Zip Code</b>	<b>Title</b>	
<b>Telephone #</b>	<b>Date</b>	<b>Tax ID #</b>
<b>E-mail</b>	<b>Fax #</b>	

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### **\*REQUIRED DOCUMENTS\***

1. Current and valid Certificate of Insurance or binder showing required insurance coverage must be provided with each bid.  
(County must be added as additional insured if awarded)
- 2a. Proof that Bidder does not owe delinquent real or personal property in Jefferson County (tax receipts for past 3 years)  
Obtain receipts at <http://jeffersonmo.devnetwedge.com>  
Or
- 2b. A notarized affidavit stating that the applicant does not own any real estate or personal property in Jefferson County on company letterhead.
3. A Notarized affidavit of work authorization and current business entity status with E-verification documentation. (pages 9 & 10)
4. Agreement to be executed by the County upon approval by the County Council and County Executive. (Bidder is required to complete company information and execute signature)
5. Cooperative Bid Form (last page)
6. All pages of the Invitation for Bid/Request for Proposal must be used when submitting your bid/proposal response along with initialing each page with the bid/proposal. Additional information may be included separately.
7. Bid deposits/bonds must be in the exact amount as stipulated in the bid. (if required)

**\*BIDS MAYBE REJECTED IF REQUIRED DOCUMENTATION IS NOT INCLUDED OR COMPLETED AT DISCRETION OF THE COUNTY**

## 1.0 BID REQUIREMENTS

Bidder shall initial all pages and return where the Bid Document denotes “BIDDER”S INITIALS: \_\_\_\_\_”

### 1.1 BID SUBMISSION:

Submit bid form in original (one original) and two (two copies) with all specification pages, if applicable. No facsimile or electronic bids shall be accepted and shall be rejected. The Vendor prior to the submission dead line as stated on page 1 must submit all bids. Late bids will not be accepted and returned to the vendor unopened. The County reserves the right to request additional written or oral information from Respondents in order to obtain clarification. A fully executed Affidavit is required by Section 285.530 RSMo and shall be submitted with the bid form. A copy of the Affidavit is attached hereto. Failure to execute the Affidavit shall result in the bid being rejected. Failure to comply with any provision, provide any required documentation, insurance forms or deposits or bonds in exact amounts or any other term or condition that is not in strict conformance shall result in the bid being rejected.

### 1.2 BASIS OF BID AWARD:

Award may be made on an item-by-item basis to the lowest and best Bidder(s) or award may be made to the lowest and best bid total, whichever provides the greatest value to the County from the standpoint of suitability to purpose, quality, service, previous experience, price, ability to deliver, or any other reason deemed to be in the best interest of the County. Quantities stated herein represent an estimate for the period stated. Orders shall be placed for actual requirements as needed. The County may reject any or all bids for any reason and may waive any informality. Bids submitted from a Missouri State Contract shall include a copy of the State Contract with the bid. Bid award does not constitute an order or obligation to order by the County. The issuance of a Purchase Order Number shall be construed as acceptance of a Contract with all terms, conditions, and prices firm during the length of the agreement terms.

### 1.3 BID AWARD:

It is further agreed that the Contract shall not be valid and binding upon the County until approved by the County Counselor, as to legal form and is subject to the Ordinances, Resolutions and Orders of Jefferson County, Missouri, and State and Federal Law. If no Bid or Bids have been awarded by the County Council within forty-five (45) days following the opening of the bids then all bids will be deemed Rejected.

### 1.4 BID PREPARATION:

1. Bidders are responsible for examination of drawings, specifications, schedules and instructions. Failure to do so will be at the Bidder's risk.
2. Each Bidder shall furnish the information required by the invitation. The Bidder shall sign all required documents. All deletions and erasures shall be initialed
3. Alternate bids for supplies or services other than specified shall not be considered unless authorized by invitation.
4. Bidder shall state a definite time for delivery of goods or for performance of services unless otherwise specified in the invitation for bid.
5. When specified, samples must be timely submitted and at no expense to the County.
6. Failure to adhere to all requirements may result in the response being disqualified as non-responsive.

### 1.5 MODIFICATION OR WITHDRAWAL OF BIDS:

Bids may be modified or withdrawn prior to the exact hour and date specified for receipt of bids, provided the modification or withdrawal is in writing and is delivered in the same manner as a bid submission.

### 1.6 LATE BIDS:

It is the responsibility of the Bidder to deliver his bid or bid modification on or before the date and time of the bid closing to the Department of the County Clerk. Bids received late will be rejected and returned unopened to the Bidder.

### 1.7 BID DEPOSITS/BONDS:

**Bid Guaranty:** The bidder shall submit a Bid Guaranty. The project bid bond form is included.

The bidder shall mark the box below to identify the type of Bid Guaranty.

- ☐ Paper Bid Bond  
☐ Cashier's Check

Bid Guaranty shall be made payable to the Owner, in the amount of five percent of the Bidder's maximum Bid price and in the form of a certified or bank check or a Bid Bond (on form attached, if a form is prescribed) issued by a Surety.

The Bid security of the Successful Bidder will be retained until such Bidder has executed the Agreement and furnished the required Contract Security within 15 days of the Notice of Award. Failure to do so may result in the annulment of the Notice of Award and forfeiture of the Bid Security. The Bid Security of any Bidder whom the Owner believes to have a reasonable chance of receiving the award, may be retained by the Owner until the earlier of the seventh day after the “effective date of the Agreement” (which is the date when the agreement has been executed by all parties) by Owner to

Contractor and the required Contract Security is furnished or the sixty-first day after the Bid opening. Bid Security of other Bidders will be returned within seven days of the Bid opening.

**1.8 MATERIAL AVAILABILITY:**

Bidders must accept responsibility for verification of material availability, product schedules and other pertinent data prior to submission of bid and delivery time. It is the responsibility of the Bidder to notify the County immediately if the materials specified are discontinued, replaced, or not available for an extended period of time. All materials ordered by the County, shall be as needed. A sample of materials may be requested.

**1.9 ALTERNATE BIDS:**

Alternate Bids for items will be accepted except when stated “NO SUBSTITUTIONS”. Bidders must submit complete specifications on all alternate bids with the bid form. Alternate bids without complete specifications may be rejected. Alternate bids and exceptions to bid clauses must be clearly noted on the bid form. The County may accept or reject alternate bids; whatever is most advantageous to the County.

**1.10 INCORPORATION OF DOCUMENTS:**

The terms of the Bid Invitation, Bid Specifications, Bid Form are and shall be incorporated into the contract as if fully setout therein. The Bid, if accepted and approved by the County Council and County Executive shall constitute the terms of a Contract or Agreement with Jefferson County, Missouri, subject to any further Amendments, Memoranda or other documents or specifications which must be set forth in writing and signed by all parties.

**1.11 ADDENDA:**

Addenda to bid specifications are incorporated by reference as if fully setout herein. It is the responsibility of the vendor to insure and verify that they are in receipt of and completed all attached addenda's prior to submission of bid forms. Verification is made by contacting the Office of Contracts and Grants at (636) 797-5380, or by reviewing the County Web Site. ([www.jeffcomo.org](http://www.jeffcomo.org)).

**1.12 INSURANCE:**

The Vendor/Contractor shall purchase and maintain insurance with an insurance company licensed to do business in the State of Missouri or in the state where the vendor is incorporated or otherwise licensed to do business and which shall remain, at all times during the term of any contract with the County, in full force and effect. Preference will be given to a Vendor/Contractor who provides insurance with an insurance company licensed to do business in the State of Missouri, but in any event said Vendor/Contractor shall provide said insurance at its own expense. Such insurance shall be provided as will protect the Vendor/Contractor from claims which may arise out of or result from the Vendor/Contractor's execution of the work, whether such execution be by himself, his employees, agents, or by anyone for whose acts any of them may be liable. If any such work covered by the Contract is to be performed on County owned or leased premises, the Vendor agrees to carry liability and workman's compensation insurance, satisfactory to the County, and to indemnify the County against all liability, loss, and damage arising out of any injuries to persons and property caused by the Vendor, his sub-contractors, employees or agents. The insurance coverage shall be such as to fully protect the County and the general public from any and all claims for injury and damage resulting by any actions on the part of the Vendor/Contractor or its' forces as enumerated above. All policies must name the County as an additional insured and provide for thirty (30) days written prior to any material changes or cancellation. Any disputes regarding a breach, insurance amounts, liability, coverage, lapse or otherwise shall be litigated in the Circuit Court of Jefferson County, Missouri and the same shall be incorporated into any Contract agreed to by the parties.

THE COUNTY REQUIRES A CURRENT AND VALID CERTIFICATE OF INSURANCE OR BINDER SHOWING REQUIRED INSURANCE COVERAGE MUST BE PROVIDED WITH EACH BID. JEFFERSON COUNTY MUST BE ADDED AS AN ADDITIONAL INSURED AFTER AWARD OF THE BID. ANY LAPSE IN INSURANCE COVERAGE OR CANCELLATION THEREOF BY THE CONTRACTOR OR SUB-CONTRACTORS DURING THE TERMS OF THE CONTRACT SHALL IMMEDIATELY BE DEEMED A MATERIAL BREACH UNDER THE TERMS OF ANY CONTRACT.

A. ☒ Required ☐ Not Required **Comprehensive General Liability Insurance**

The Vendor/Contractor shall maintain and keep in full force and effect during the terms of this Contract such comprehensive general liability insurance as shall protect them from claims which may arise from operations under this Contract, whether such operations be by themselves or by anyone directly or indirectly employed by them. The amounts of insurance shall be not less than \$1,000,000.00 combined single limit for any one occurrence covering both bodily injury and property damage, including accidental death.

B. ☒ Required ☐ Not Required **Professional Liability Insurance**

The Vendor/Contractor shall provide the County with proof of Professional Liability Insurance, which shall protect the County against any and all claims, which might arise as a result of the operation of the Vendor/Contractor in fulfilling the terms of this Contract during the life of the Contract. The minimum amounts of such insurance will be \$1,000,000.00. Should any work be subcontracted, these limits will also apply.



- C. (X) Required ( ) Not Required **Worker's Compensation Insurance:**  
per Missouri Revised Statutes Chapter 287

The Vendor/Contractor or his sub-contractor or contractors, shall maintain and keep in force of this Contract such worker's compensation insurance limits as required by the statutes of the State of Missouri and Employer's Liability with limits no less than \$500,000.00.

### 1.13 BID SUBMISSIONS

Bids submitted on separate forms are NOT acceptable unless specified in the Bid Document. Failure to complete bid forms to the satisfaction of the County may result in rejection of your bid. It is the responsibility of each Bidder before submitting a bid to examine ALL documents thoroughly, and request written or oral interpretation of clarifications soon after discovering any conflicts, ambiguities, errors, or omissions in the bidding documents. Request for clarification must be received prior to bid openings.

### 1.14 BID OPENINGS

Bids will be publicly opened and read aloud at the time indicated on page 1. The Bidders and the public are invited but not required to attend the formal opening of the bids. No decisions relating to the award of a contract or agreement will be made at the opening.

### 1.15 BID TABULATIONS

Bid Tabulations are not available for 5 to 7 business days following the Bid Opening. Bid submissions are open for public review at the time of the Bid Opening. Bid tabulations are posted on the County's web-site address, [www.jeffcomo.org](http://www.jeffcomo.org). **NO COPIES** of bid tabulations are sent to vendors.

## 2.0 BID RESPONSE AND CONTRACT

### 2.1 BIDDER REPRESENTATIONS:

The Bidder, by executing the Bid form certifies that:

- A. The bid complies with Invitation for Bid form and Bid Specifications.
- B. Bidder is not debarred or suspended from participation in Federal Assistance programs.

### 2.2 TAXES:

No bid or proposal shall be awarded by Jefferson County unless the prospective Bidder provides proof that the Bidder does not owe delinquent real or personal property taxes to Jefferson County. The prospective Bidder is required to provide proof in the form of an original paid tax receipt issued by the Jefferson County Collector or a verified affidavit stating that the applicant does not own any real or personal property in Jefferson County. Tax receipts for the past 3 years are required and may be obtained at <http://jeffersonmo.devnetwedge.com/> or a notarized affidavit stating that the applicant does not own any real or personal property in Jefferson County on company letterhead.

**Section 135.040 of the Jefferson County Code of Ordinances (Ord. No. 10-0411) requires that no bid or proposal shall be awarded by Jefferson County unless the prospective Bidder provides proof that the Bidder does not owe delinquent real or personal property, or that the Bidder does not own any real or personal property in Jefferson County. All delinquent real or personal property taxes shall be paid, in-full, prior to the award of any bid, or proof shall be provided that the Bidder does not own any real or personal property in Jefferson County prior to the award of any bid. Jefferson County considers that the failure to pay any and all real or personal property taxes due Jefferson County, Missouri, the failure to report all real or personal property owned, held or used in Jefferson County, the failure to provide proof thereof, and/or the failure to keep said tax bills current shall be deemed a material breach of the contract and will subject the contract to immediate cancellation. All taxes, due and owing, must be paid in full at the time the bid is awarded by Jefferson County and remain paid during the entire term of the contract unless the prospective Bidder provides proof that the Bidder does not own real or personal property in Jefferson County. This requirement shall not apply to the award of bids for projects which are funded in whole or in part by Federal funds.**

### 2.3 CERTIFICATION OF INDEPENDENT PRICE DETERMINATION:

- A. The prices in the bid shall be independently determined, without consultation, communication, or agreement for the purpose of restricting competition as to any matter relating to price with any Bidder or other person.
- B. Unless otherwise required by law, the prices shall not have been knowingly disclosed by the Bidder prior to opening.
- C. No attempt has been made or will be made by the Bidder to induce any other person or firm to submit or not to submit a bid.

**2.4 PRICE:**

The price(s) specified in this bid shall be firm and not subject to contingency or reservation. If the Vendor fails to honor stated prices as submitted in the Bid Form or Contract, the County reserves the right to obtain the same items from the next lower vendor who submitted a bid price for the item. The original vendor shall be responsible for the difference in price and required to make restitution to the County for the difference in price. The Bidder represents prices specified in the bid do not exceed current selling price for the same or substantially similar good or service, and are the same as or lower than other prices charged to the Bidder's most favored customer. In the event the stated prices are determined to be higher than the prices for which Supplier has sold the items, or services, to others, this contract price shall be reduced accordingly. **Bid prices are ALL INCLUSIVE: (Shipping, Handling, Delivery, and Assembly to locations specified by the County). Prices shall be firm for ALL County departments and locations for term of the agreement.**

**2.5 MISSOURI DOMESTIC PRODUCT PROCUREMENT ACT:**

Bidder represents that the goods provided comply with Sections 34.350 to 34.359, RSMo, known as the Domestic Product Procurement Act. The Act encourages the purchase of products manufactured or produced in the United States, State of Missouri, and Jefferson County, Missouri. Bidder shall include proof of compliance with the Act with the bid when requested.

**2.6 NON-EXCLUSIVE AGREEMENT:**

The contractor shall understand and agree that the contract shall not be construed as an exclusive agreement and further agrees that the County may secure identical and/or similar services or products from other sources at anytime in conjunction with or in replacement of the contractor's services.

**2.7 DEFINITIONS:**

- A. The term "County" means the Jefferson County, Missouri and its designated representatives.
- B. The term "Vendor" means Supplier, Contractor, and Seller and includes designated representatives.
- C. The term "IFB" means Invitation for Bid.
- D. The term "Agreement/Contract" means Binding Agreement, Contract, Request for Purchase, Order.

**2.8 INSPECTION, ACCEPTANCE AND APPROVALS:**

Goods shall at all times and places, including the period of manufacture, are subject to inspection and test by County. County will accept or give notice of rejection of goods delivered within a reasonable time after receipt. Acceptance shall not waive any warranty. All goods supplied are subject to final inspection and acceptance by County notwithstanding payment, prior inspections or approvals. County may require prompt replacement or correction of rejected goods at Supplier's expense, including a reduction in price for rejected goods. Supplier shall not resubmit rejected goods to County without prior written approval and instructions from County. In addition, Supplier shall identify resubmitted goods as previously rejected. Supplier shall provide and maintain a quality assurance and control system acceptable to County.

**2.9 WARRANTY:**

Unless otherwise agreed to in writing by the parties, Supplier warrants that items ordered to specifications will conform thereto and to any drawings, samples or other descriptions furnished or adopted by County, or, if not ordered to specifications will be fit and sufficient for the purpose intended, and that all items will be new, merchantable, of good material and workmanship, and free from defect. Such warranties, together with Supplier's service warranties and guarantees, if any, shall survive inspection, test, acceptance of, and payment for the items and shall run to County and its assigns. Except for latent defects, the County shall give notice of any nonconformity to the Supplier within one (1) year after acceptance. County may return for credit or require prompt correction or replacement of the defective or non-conforming goods or have the defective good corrected or replaced at Supplier's expense. Return to Supplier of any defective or non-conforming goods and delivery to County of any corrected or replaced goods shall be at Supplier's expense. Defective or non-conforming items shall not be corrected or replaced without written authorization by County. Goods required to be corrected or replaced shall be subject to the provisions of this clause and the clause hereof entitled "Inspection, Acceptance and Approvals" in the same manner and to the same extent as goods originally delivered under this contract.

**2.10 PAYMENT:**

County will pay Supplier for goods upon delivery to, submission of certified invoices with attached tipping fee receipts and acceptance. The County will not be responsible for articles or services furnished without a purchase order. Price is tax-exempt.

**2.11 CHANGE ORDER:**

County may make changes within the general scope of this contract. If any such changes cause an increase or decrease in the cost of or the time required for the performance of any part of the work, whether changed or not changed by any such order, an equitable adjustment shall be made in the price or delivery schedule or both, and any change order shall be in writing. Any claim by a Supplier for adjustment under this clause shall be asserted within fifteen (15) days from the date of receipt of this written order directing the change, provided, however, County, if it decides that the facts justify such action, may receive and act upon such claim asserted at any time prior to final payment.

## **2.12 DELIVERIES:**

Deliveries shall be made in strict accordance with any delivery schedule contained in the bid specification or contract and in the exact quantity ordered. Failure to adhere to delivery schedule is reason for termination in accordance with the "termination" clause. Deliveries are to be made at locations specified by the County at time of Order.

## **2.13 RESPONSIBILITY FOR SUPPLIES:**

Pursuant to Section 290.560 RSMo, Supplier/Contractor shall employ only Missouri laborers and laborers from nonrestrictive states except that other laborers may be used when Missouri laborers or laborers from nonrestrictive states are not available, or are incapable of performing the particular type of work involved, if so certified by the contractor and approved by the County. Except as otherwise provided, Supplier shall be responsible and bear all risks for loss and damage to goods until delivery at County's facilities, regardless of F.O.B. point, point of inspection or acceptance; and if the goods are rejected.

## **2.14 SUBCONTRACTS:**

Supplier shall not enter into any subcontract(s) in excess of \$25,000 or 20% of this contract price; whichever is less, for any goods without County's prior written approval.

## **2.15 CHOICE OF LAW:**

This bid and contract shall be governed and interpreted according to the laws of the State of Missouri. Venue for any court action shall be in Jefferson County, Missouri.

## **2.16 TERMINATION:**

- A. General: Performance of work may be terminated by the County in whole, or from time to time in part, whenever County shall determine that such termination is in the best interests of County with a thirty (30) day written notice. The Vendor may terminate the Agreement/Contract upon a sixty (60) day prior notice in writing. In the event of any termination of the Agreement/Contract by the Vendor, the County may purchase such supplies and/or services similar to those terminated and for the duration of the Agreement/Contract period the Vendor will be liable for all costs in excess of the established contract pricing.
- B. Bankruptcy or Insolvency: In the event bankruptcy proceedings are commenced by or against Supplier or under any provisions of the United States Bankruptcy Act or for the appointment of a receiver or trustee or a general assignment for the benefit of creditors of either party, County shall be entitled to terminate without further cost or liability. The County may cancel the Agreement/Contract or affirm the Contract and hold the Vendor responsible for damages.
- C. **Section 135.040 of the Jefferson County Code of Ordinances (Ord. No. 10-0411) requires that no bid or proposal shall be awarded by Jefferson County unless the prospective Bidder provides proof that the Bidder does not owe delinquent real or personal property, or that the Bidder does not own any real or personal property in Jefferson County. All delinquent real or personal property taxes shall be paid, in-full, prior to the award of any bid, or proof shall be provided that the Bidder does not own any real or personal property in Jefferson County prior to the award of any bid. Jefferson County considers that the failure to pay any and all real or personal property taxes due Jefferson County, Missouri, the failure to report all real or personal property owned, held or used in Jefferson County, the failure to provide proof thereof, and/or the failure to keep said tax bills current shall be deemed a material breach of the contract and will subject the contract to immediate cancellation. All taxes, due and owing, must be paid in full at the time the bid is awarded by Jefferson County and remain paid during the entire term of the contract unless the prospective Bidder provides proof that the Bidder does not own real or personal property in Jefferson County. This requirement shall not apply to the award of bids for projects which are funded in whole or in part by Federal funds.**
- D. Default: County may terminate the whole Contract or any part in either of the following circumstances:
  - D-1. If supplier fails to deliver the items required by the contract within the time specified; or
  - D-2. If supplier fails to perform any of the other provisions of the contract, or so fails to make progress as to endanger performance of the contract in accordance with its terms, and in either of these two circumstances does not cure such failure within a period of ten (10) days after notice from County specifying such failure. In the event of termination under subparagraph 1, County shall have the right to procure, on such terms and in such manner as it may deem appropriate, items similar to those terminated, and to recover from Supplier the excess cost for such similar items provided, however, Supplier shall not be liable for such excess costs where the failure upon which the termination is based has arisen out of causes beyond the control of Supplier and without the fault or negligence of Supplier. Such causes shall be deemed to include fires, floods, earthquakes, strikes, and acts of the public enemy. The rights of County provided in subparagraph 1 shall be in addition to any other rights provided by law or the contract.
  - D-3. In the event of the Supplier's non-compliance with the provisions as set forth, this Contract may be cancelled, terminated or suspended in whole or in part and the supplier may be declared ineligible for further County contracts. The rights and remedies of the County provided in this paragraph shall not be exclusive but are in addition to any remedies provided in this Contract or as provided for by law.

**2.17 NOTICE AND SERVICE THEREOF:**

Any notice from the County shall be in writing and considered delivered and the service thereof completed when said notice is posted, by certified or regular mail, to the Supplier, at the address stated on the bid form.

**2.18 CONTRACT TERM:**

Performance shall be governed solely by the terms and conditions as set forth in the Invitation for Bid, Bid Specifications, Bid Form and the Contract notwithstanding any language contained on any invoice, shipping order, bill of lading or other document furnished the Seller at any time and the acceptance by the County for any goods furnished.

**2.19 COMPLIANCE WITH APPLICABLE LAWS:**

Supplier warrants it has complied with all applicable laws, rules and ordinances of the United States, Missouri or any other Governmental authority or agency in the manufacture or sale of the goods, including but not limited to all provisions of the Fair Labor Standards Act of 1938, as amended, including provisions of the Home Rule Charter of Jefferson County, Missouri requiring all workers performing work under any contract with Jefferson County be paid a wage that is at least the prevailing hourly rate of wages for work of a similar character in Jefferson County.

**2.20 ACTS OF GOD:**

No party shall be liable for delays, nor defaults due to Acts of God or the public enemy, riots, strikes, fires, explosions, accidents, governmental actions of any kind or any other causes of a similar character beyond its control and without its fault or negligence.

**2.21 SELLER'S INVOICES:**

Invoices shall contain the following information. Contract number (if any), Purchase Order Number, Item number, contract description of goods or services, sizes, quantities, unit prices and extended totals. Invoices for and inquiries regarding payment should be addressed to the County Accounts Payable Clerk.

**2.22 APPROVAL:**

It is agreed the acceptance of a Bid shall not be valid and binding upon the County until approved by the County Purchasing Agent, County Council, and the County Counselor.

**2.23 RENEWAL OPTION:**

The County reserves the right to negotiate the contract for one (1) additional one-year term with the written consent of the awarded vendor. If the contractor/vendor requests an increase in compensation for any renewal period, the vendor shall notify the Office of Contracts and Grants no less than 60 days prior to the end of the contract period. The County shall notify the Vendor of the intent to exercise the renewal option. However, failure to notify the Vendor does not waive the County's right to exercise the renewal option.

Indicate: ☐ Individual: ☐ Partnership: ☐ Corporation.

**2.24 INDIVIDUAL, PARTNERSHIPS, CORPORATIONS:**

Incorporated in the State of \_\_\_\_\_.

**2.25 LITIGATION:**

This agreement shall be interpreted under the laws of the State of Missouri. Any disagreements, questions, controversies, litigation or other causes of action whatsoever arising from or under the terms of this agreement shall be resolved in the trial courts of 23rd Judicial Circuit Court of the State of Missouri-Hillsboro, Missouri.

**2.26 LANGUAGE:** Bids and all related documents will only be accepted in the English Language.

## **AFFIDAVIT OF WORK AUTHORIZATION**

The grantee, sub grantee, contractor or subcontractor who meets the section 285.525, RSMo definition of a business entity must complete and return the following Affidavit of Work Authorization.

Comes now \_\_\_\_\_ (Name of Business Entity Authorized Representative) as  
\_\_\_\_\_ ( Position/Title) first being duly sworn on my oath, affirm  
\_\_\_\_\_ (Business Entity Name) is enrolled and will continue to participate in the  
E-Verify federal work authorization program with respect to employees hired after enrollment in the program  
who are proposed to work in connection with the services related to \_\_\_\_\_  
(Bid/Grant/Subgrant/Contract/Subcontract) for the duration of the grant, subgrant, contractor, or subcontractor,  
if awarded in accordance with subsection 2 of section 285.530, RSMo. I also affirm that  
\_\_\_\_\_ (Business Entity Name) does not and will not knowingly employ a person  
who is an unauthorized alien in connection with the contracted services related to  
\_\_\_\_\_ (Bid/Grant/Subgrant/Contract/Subcontract) for the duration of  
the grant, subgrant, contract, or subcontract, if awarded.

*In Affirmation thereof, the facts stated above are true and correct. (The undersigned understands that false statements made in this filing are subject to the penalties provided under section 575.040, RSMo.)*

\_\_\_\_\_  
Authorized Representative's Signature

\_\_\_\_\_  
Printed Name

\_\_\_\_\_  
Title

\_\_\_\_\_  
Date

Subscribed and sworn to before me this \_\_\_\_\_ of \_\_\_\_\_. I am  
(DAY) (MONTH, YEAR)

commissioned as a notary public within the County of \_\_\_\_\_, State of  
(NAME OF COUNTY)

\_\_\_\_\_ and my commission expires on \_\_\_\_\_.  
(NAME OF STATE) (DATE)

\_\_\_\_\_  
Signature of Notary

\_\_\_\_\_  
Date

## **AFFIDAVIT OF WORK AUTHORIZATION**

(Continued)

### **CURRENT BUSINESS ENTITY STATUS**

I certify that \_\_\_\_\_ (Business Entity Name) **MEETS** the definition of a business entity as defined in section 285.525, RSMo pertaining to section 285.530, RSMo as stated above.

\_\_\_\_\_  
Authorized Business Entity  
Representative's Name  
(Please Print)

\_\_\_\_\_  
Authorized Business Entity  
Representative's Signature

\_\_\_\_\_  
Business Entity Name

\_\_\_\_\_  
Date

As a business entity, the grantee, sub grantee, contractor, or subcontractor must perform/provide the following. The grantee, sub grantee, contractor, or subcontractor shall check each to verify completion/submission:

- ☐ Enroll and participate in the E-Verify federal work authorization program (Website: <http://www.dhs.gov/e-verify>; Phone: 888-464-4218; Email: [e-verify@dhs.gov](mailto:e-verify@dhs.gov)) with respect to the employees hired after enrollment in the program who are proposed to work in connection with the services required herein;

AND

- ☐ Provide documentation affirming said company's/individual's enrollment and participation in the E-Verify federal work authorization program. Documentation shall include a page from the E-Verify Memorandum of Understanding (MOU) listing the grantee's, subgrantee's, contractor's, or subcontractor's name and the MOU signature page completed and signed, at minimum, by the grantee, subgrantee, contractor, or subcontractor and the Department of Homeland Security – Verification Division; (if the signature page of the MOU lists the grantee's, subgrantee's, contractor's, or subcontractor's name, then no additional pages of the MOU must be submitted).



**In Witness thereof, the parties hereto have executed this Agreement, in triplicate, as of this \_\_\_\_\_ day of \_\_\_\_\_ 2019:**

\_\_\_\_\_  
**Company Name**

**County of Jefferson, State of Missouri**

\_\_\_\_\_  
**Signature**

\_\_\_\_\_  
**Dennis Gannon County Executive**

\_\_\_\_\_  
**Print**

**Company Address:** \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**Phone:** \_\_\_\_\_

I hereby certify under section 50.660 RSMo there is either: (1) a balance of funds, otherwise unencumbered, to the credit of the appropriation to which the obligation contained herein is chargeable, and a cash balance otherwise unencumbered, in the treasury, to the credit of the funds from which payment is to be made, each sufficient to meet the obligation contained herein; or (2) bonds or taxes have been authorized by vote of the people and there is a sufficient unencumbered amount of the bonds yet to be sold or of the taxes levied and yet to be collected to meet the obligation in case there is not a sufficient unencumbered cash balance in the treasury.

\_\_\_\_\_  
**County Auditor**

**APPROVED AS TO FORM**

\_\_\_\_\_  
**County Counselor**

## COOPERATIVE BID FORM

Bid Name: \_\_\_\_\_

**INSTRUCTIONS:** Bidders **MUST** fill out this form as part of the bidding process and attach to your bid response to Jefferson County, Missouri.

### **COOPERATIVE PROCUREMENT CONTRACT**

This is a cooperating supply contract in accordance with Chapter 130, Section 130.020. K.3., of the Procurement Policy and Procedures, Jefferson County Code of Ordinances.

**Will you extend bid prices, cash terms, and all other terms and conditions of any contract resulting from this bid with Jefferson County, Missouri, to any Jefferson County, Missouri, Municipality, government agency, district, sub-district or other tax-supported entity?**

Yes \_\_\_\_\_ No \_\_\_\_\_

Although agreeing to the extension of the terms of this contract to municipalities or other tax-supported entities, *is not a prerequisite for award*, Jefferson County, Missouri, may take this factor into consideration if tie bids are received, in addition to the normal Terms and Conditions of the Invitation for Bid, enclosed herewith as a part of this bid.

**Bidders are encouraged to extend contract prices to  
Municipalities and any other tax-supported entities.**

If agreeable to the above, state the **minimum** dollar value *per order* you will require from a Municipality or any other tax-supported entity (**this shall not apply to Jefferson County, Missouri Government, Departments or Divisions**):

**MINIMUM DOLLAR VALUE PER ORDER:** \$ \_\_\_\_\_

**BY:** \_\_\_\_\_

**TITLE:** \_\_\_\_\_

**COMPANY:** \_\_\_\_\_

### **CONTACT INFORMATION FOR COOPERATIVE AGREEMENT**

**Phone** \_\_\_\_\_ **E-mail** \_\_\_\_\_

**THIS FORM WILL BECOME PART OF THE BID DOCUMENT PACKAGE SUBMITTED TO  
JEFFERSON COUNTY, MISSOURI**

# PROJECT BID PACKAGE

Administration Center Renovation  
Project No. PW19B007BLD



Jefferson County, Missouri  
P.O. BOX 100  
HILLSBORO, MO 63050

## REQUEST FOR BID

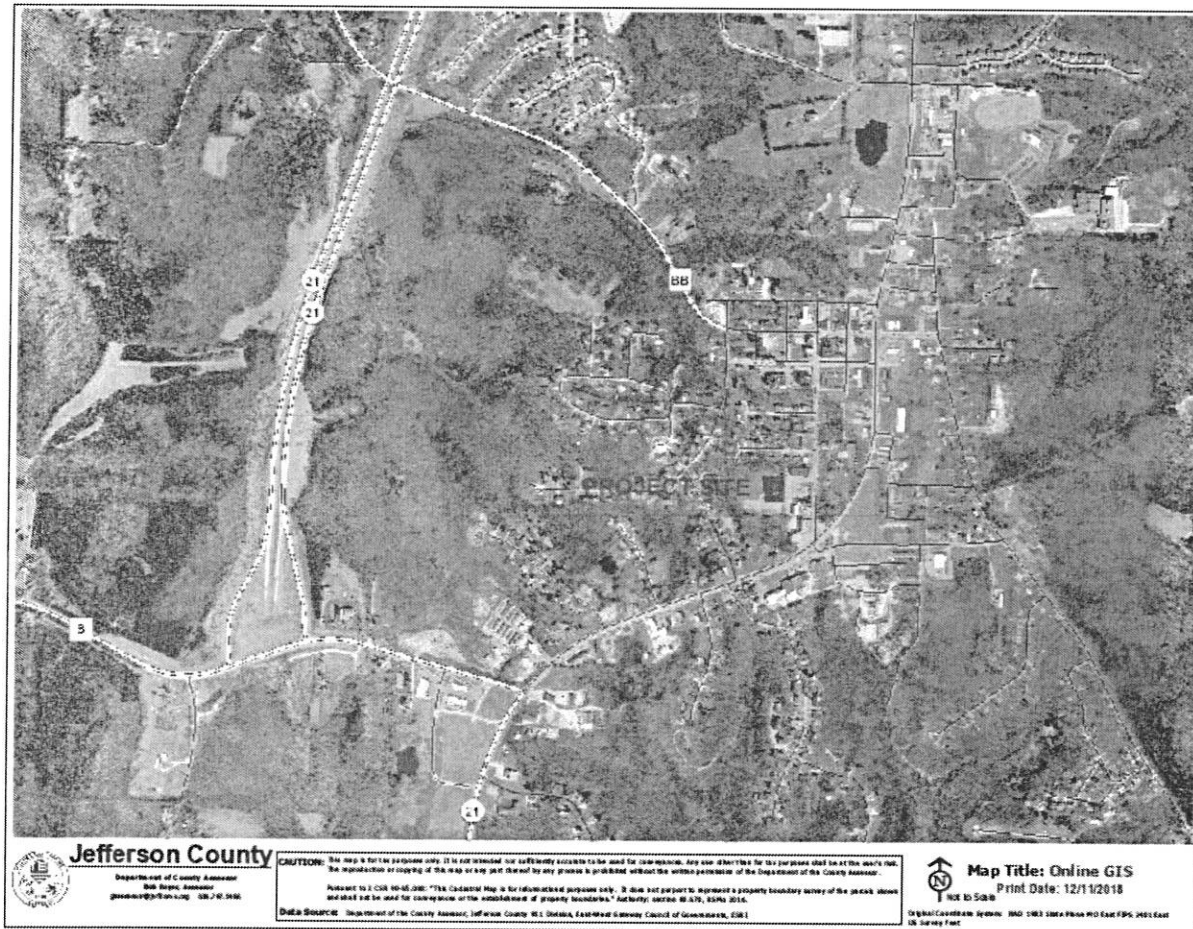
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# PROJECT LOCATION MAP

Administration Center, Hillsboro, Missouri 63050



## BID NOTICE

Sealed bids for the Administration Center Renovation Project No. PW19B007BLD, will be received at the Office of the County Clerk, Jefferson County Administration Center, 729 Maple Street, Hillsboro, Missouri 63050 until 2:00 o'clock P.M. (CDST) on the February 5, 2019, and at that time will be publicly opened and read. All bids shall be submitted in triplicate in an opaque sealed envelope, marked with the Project title, name and address of the Bidder, and accompanied by the other required documents. Bids submitted via fax or electronic will be rejected. Late Bids will not be accepted and will be returned to the sender, unopened.

The proposed work includes the remodeling of existing office spaces; with associated electrical/telecommunications, HVAC, plumbing, etc. improvements. The contractor will be responsible for providing the materials, labor and equipment necessary to complete the project in a timely manner in accordance with these Specifications and Contract Documents. The contractor shall be responsible for arranging delivery of materials to job sites. The bid shall also include disposal of all waste and demolition materials. Pre-bidding job site visits can be scheduled by contacting Mark McGee at (636)797-5011.

Work shall be in accordance with the Specifications, and Contract Documents. Where not specifically covered by these Specifications or Contract Documents, the Contractor shall adhere to the Latest Edition of the, Jefferson County Building Code or City of Hillsboro, Missouri Building Code requirements, whichever governs.

Specifications for this work will be available, at no cost, as a downloadable file from the Jefferson County website (<http://www.jeffcomo.org>), beginning January 14, 2019. The bidder will be responsible to check the County's website for addendum(s) regarding this project prior to bid opening.

All labor used in the construction of this public improvement shall be paid a wage no less than the prevailing hourly rate of wages of work of a similar character in this locality as established by the State of Missouri's "Annual Wage Order" that is currently effective 10 calendar days prior to bid opening.

The County of Jefferson, Missouri hereby notifies all bidders that it will affirmatively ensure that in any contract entered into pursuant to this advertisement, businesses owned and controlled by socially and economically disadvantaged individuals will be afforded full opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, religion, creed, sex, age, ancestry, or national origin in consideration for an award.

All bids shall be made on the forms provided. The Jefferson County, Missouri hereby reserves the right to reject any or all bids, to waive any informality in the bids received and to accept the bid that in its judgment will be for the best interest of Jefferson County, Missouri.

Contractors and sub-contractors who sign a contract to work on public works projects must provide a 10-Hour OSHA construction safety program, or similar program approved by the Department of Labor and Industrial Relations, to be completed by their on-site employees within sixty (60) days of beginning work on the construction project.

Each bid must be accompanied by a certified check or satisfactory bid bond payable to Jefferson County, Missouri, in the amount of five percent (5%) of the total amount of bid as a guarantee that the successful bidder will enter into a contract and furnish the required bonds within fifteen (15) days after the award is made.

END BID NOTICE



## PLAN HOLDER CONTACT INFORMATION

All potential bidders must complete this form and submit it to the Jefferson County email address listed below in order to provide contact information as required. All other plan holders may submit this form at their own option. Addendums will be posted on the county website. In the event of disruption of website services, all such information will be communicated to all registered plan holders.

Project: Jefferson County Administration Center Renovation

Project Number: PW19B007BLD

Project Estimates:	Base Bid Only	\$108,880.00
	Base Bid w/ Bid Option 1	\$163,315.00

Bid Opening Date: February 5, 2019

Company Name: \_\_\_\_\_

Company Address: \_\_\_\_\_

\_\_\_\_\_

Contract Name: \_\_\_\_\_

Contact Phone: \_\_\_\_\_

Contact Email: \_\_\_\_\_

Email Completed Form To: **[pwprojects@jeffcomo.org](mailto:pwprojects@jeffcomo.org)**

## INSTRUCTIONS TO BIDDERS AND NOTICE TO CONTRACTORS

(1) **PROPOSED WORK:** The proposed work includes the remodeling of existing office spaces; with associated electrical/telecommunications, HVAC, plumbing, etc. improvements. The contractor will be responsible for providing the materials, labor and equipment necessary to complete the project in a timely manner in accordance with these Specifications and the Project Manual. The contractor shall be responsible for arranging delivery of materials to job sites. The bid shall also include disposal of all waste and demolition materials.

(2) **PLANS AND SPECIFICATIONS:** Plan drawings and specifications for this project are available through the Jefferson County, Missouri Government website (Jeffcomo.org) under the "Invitation for Bids/Request for Proposals" tab in the "Services" box in the upper portion of the homepage. It is the bidder's responsibility to obtain these documents from the provided source, including copies for use in construction. Paper copies of any documents will require advance notice and are subject to administrative fees for labor and material costs. Plans, specifications, and any other contract documents are made available only for the purposes of obtaining bids, and as a resource to the awarded contractor. These documents do not confer a license or grant for any other use.

(3) **CONTRACT DOCUMENTS AND SITE CONDITIONS:** Before submitting a Bid, each Bidder must; (a) examine the Contract Documents thoroughly, (b) visit the site to familiarize themselves with local conditions that may in any manner affect cost, progress or performance of the Work, (c) familiarize themselves with federal, state and local laws, ordinances, rules and regulations that may in any manner affect cost, progress or performance of the Work; and (d) study and carefully correlate Bidder's observations with the Contract Documents. Each bidder will, at their own expense, make such investigations and tests as the bidder may deem necessary to determine their Bid for the performance of the Work in accordance with the time, price and other terms and conditions of the Contract Documents. On request, the County will provide each bidder access to the site to conduct such investigations and tests, as each bidder deems necessary for submission of his Bid. The property upon which the Work is to be performed is identified in the project specifications or plan drawings.

(4) **COMPLIANCE WITH CONTRACT PROVISIONS:** The bidder, having examined and being familiar with the local conditions affecting the work, and with the contract, contract documents and the request for bid, including any and all appendices, special provisions, general provisions and plans, hereby proposes to furnish all labor, materials, equipment, services, etc., required for the performance and completion of the work. By submitting this bid, the contractor acknowledges that all specifications, including those that are referenced in the bid documents, shall be specifications of the contract. It shall be conclusively presumed that they are in the bidder's possession, and they have been reviewed and used by the bidder in the preparation of any bid submitted on this project. All questions about the meaning or intent of the Contract Documents shall be submitted to the County Engineer. Replies will be issued by Addenda, mailed, or electronically delivered to all parties recorded by the County Engineer as having received the Bidding Documents. Oral and other interpretations or clarifications will be without legal effect. The bidder must have completed and submitted the Plan Holder's Contact form to be recorded as having received the Bidding Documents.

(5) **SUBCONTRACTORS:** No subcontract may be awarded by the prime contractor under this contract to anyone without approval of the County. In order for such approval to be obtained the Contractor shall submit a request to subcontract. This is not required for bid submittal. The proposed subcontractor must also submit, through the Contractor, the following documents in an acceptable form:

- a. Copy of any subcontracts, if requested
- b. Certification by proposed subcontractor regarding equal employment opportunity;
- c. Certification by proposed subcontractor concerning labor standards and prevailing wage requirements;
- d. Any such other documents and evidence as the County may reasonably request to show that the subcontractor has fully complied with any reporting requirements to which it is or was subject.
- e. Affidavit of Federal Employment Authorization to be completed and turned in by proposed subcontractors.
- f. Subcontractor shall have a certificate of insurance with the same limits as the prime contractor listing Jefferson County, Missouri as Additional Insured and as a certified holder. The endorsement is also required.

(6) **SALES AND USE TAX EXEMPTION:** Jefferson County, Missouri, a tax-exempt entity, will furnish a Missouri Project Exemption Certificate as described in Section 144.062 RSMo to the awarded contractor who in turn may use the certificate to purchase materials for a specific project performed for the tax-exempt entity. Only the materials and supplies incorporated or consumed during the construction of the project are exempt. The certificate will be issued to the contractor for a specific project for a defined period of time.

(7) **PERIOD OF PERFORMANCE:** If the bid is accepted, the bidder agrees that work shall be diligently prosecuted at such rate and in such manner as, in the judgment of the engineer, is necessary for the completion of the work within the time specified as follows:

Calendar Days: 120

(8) **BID GUARANTY:** The bidder shall submit a bid bond as specified on the Bid Bond Form.

(9) **LIQUIDATED DAMAGES:** The bidder agrees that, should the bidder fail to complete the work in the time specified or such additional time as may be allowed by the engineer under the contract, the amount of liquidated damages to be recovered shall be as follows:

Liquidated damages per day: \$ 500

(10) **ANTIDISCRIMINATION:** The Contracting Authority hereby notifies all bidders that it will affirmatively insure that in any contract entered into pursuant to this advertisement, businesses owned and controlled by socially and economically disadvantaged individuals will be afforded full opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, religion, creed, sex, age, ancestry, or national origin in consideration for an award.

**(11) PREVAILING WAGE (STATE ONLY):** This contract requires payment of the prevailing hourly rate of wages for each craft or type of worker required to execute the contract as determined by the Missouri Department of Labor and Industrial Relations. The applicable State Wage Rates for this contract are detailed in the “Annual Wage Order” that is effective 10 calendar days prior to bid opening. These supplemental bidding documents have important legal consequences. It shall be conclusively presumed that they are in the bidder's possession, and they have been reviewed and used by the bidder in the preparation of any bid submitted on this project.

**(12) WORKER ELIGIBILITY REQUIREMENTS:** Execution of the construction contract for this project is dependent upon the awarded bidder providing an Affidavit of Compliance AND E-Verify Memorandum-of-Understanding (MOU) between the bidder and Department of Homeland Security to the Contracting Authority as required by section 285.530 RSMo. **The cover page and signature page of the E-Verify MOU and the Affidavit must be submitted with the bid.**

A sample Affidavit of Compliance can be found at the Missouri Attorney General’s website at the following link:

[http://ago.mo.gov/forms/Affidavit\\_of\\_Compliance.pdf](http://ago.mo.gov/forms/Affidavit_of_Compliance.pdf)

All bidders must also be enrolled in the E-Verify Program, and include their MOU prior to contract execution. Bidders who are not enrolled will need to go to the following website link and select “Enroll in the Program” to get started. After completing the program, they will receive their E-Verify MOU with Department of Homeland Security. This document will need to be printed out and kept on file so that a copy can be attached to the Affidavit of Compliance.

[http://www.dhs.gov/files/programs/gc\\_1185221678150.shtm](http://www.dhs.gov/files/programs/gc_1185221678150.shtm)

This requirement also applies to subcontractors and contract labor, but this contract only requires submittal of the verification documents for the prime contractor. It is the prime contractor’s responsibility to verify the worker eligibility of their subcontractors in order to protect their own company from liability as required by Section 285.530 RSMo.

**(13) OSHA TEN HOUR TRAINING REQUIREMENTS:** Missouri Law, 292.675 RSMO, requires any awarded contractor and its subcontractor(s) to provide a ten-hour Occupational Safety and Health Animal Resource (OSHA) Construction Safety Program (or a similar program approved by the Missouri Department of Labor and Industrial Relations as a qualified substitute) for their on-site employees (laborers, workmen, drivers, equipment operators, and craftsmen) who have not previously completed such a program and are directly engaged in actual construction of the improvement (or working at a nearby or adjacent facility used for construction of the improvement). The awarded contractor and its subcontractor(s) shall require all such employees to complete this ten-hour program, pursuant to 292.675 RSMO, unless they hold documentation on their prior completion of said program. Penalties, for Non-Compliance include contractor forfeiture to the Contracting Authority in the amount of \$2,500, plus \$100 per contractor and subcontractor employee for each calendar day such employee is employed beyond the elapsed time period for required program completion under 292.675 RSMO.

**(14) ADDENDUM ACKNOWLEDGEMENT:** The bidder agrees that all addenda (if applicable) have been received, acknowledged and incorporated into their bid, prior to submittal. For paper bids, staple addenda to the bid in the appropriate part of the bid.

(15) **AWARD OF CONTRACT:** This project will be awarded to the lowest, responsive, responsible bidder. Per Section 130.060; Part A(3) of the Jefferson County Code of Ordinances, the County Council reserves the right to give preference and award the contract to a contractor based within Jefferson County when the difference in the delivered price is negligible. The Public Works Department define the term 'negligible' in this section of the Code of Ordinance to mean less than a one-percent (1%) difference in the total bidding price. The County may consider the qualifications and experience of Subcontractors and other persons and organizations (including those who are to furnish the principal items of material or equipment) proposed for those portions of the work as to which the identity of Subcontractors and other persons and organizations must be submitted as provided. Operating costs, maintenance considerations, performance data and guarantees of materials and equipment may also be considered by the County. The County may conduct such investigations as they deem necessary to assist in the evaluation of whether any Bid is responsive in accordance with the Contract Documents to the County's satisfaction within the prescribed time. If the contract is to be awarded, the County will give the successful Bidder a Notice of Award within four-fifteen days after the date of the Bid opening.

## GENERAL PROVISIONS

(1) **DEFINITIONS:** The following terms as used in these Contract Documents are respectively defined as follows:

- a) "Owner" – A person, firm, corporation, municipality or Government agency, by which the Contract will be awarded. Wherever the Owner is specified, it shall also be construed to mean Jefferson County, Missouri.
- b) "County" – Jefferson County, Missouri
- c) "Engineer" – County Engineer, Director of Public Works, or any appointed designee.
- d) "Architect" – The architectural firm responsible for the preparation of construction plan drawings and specifications and/or contracted to assist the County with construction phase services.
- e) "Contractor" - The person, firm, or corporation to whom the contract is awarded.
- f) "Subcontractor" - A person, firm, or corporation, performing any part of the Contractor's obligations hereunder at the site of work excluding, however, the furnishing of standard materials, such as cement, lumber, and other materials not worked to a special design under the plans and specifications for the work.
- g) "Contract Documents" - The agreement subscribed by the parties, the Invitation to Bidders, Information for Bidders, the Proposal, the Plan Drawings and Specifications, and the Project Manual.
- h) "Work" - The furnishing of all labor, materials, equipment and other incidentals necessary or convenient to the successful completion and carrying out of all duties and obligations of the Contractor under the Contract Documents.
- i) "Days" - Except where otherwise specifically provided in the Contract Documents, calendar days including Sundays and Holidays.

(2) **NOTICE:** Unless otherwise specified herein, any notice required under the Contract Documents shall be deemed given if deposited in the United States mail, first class postage prepaid. Notice may also be given by hand delivery to the authorized representative of the Owner.

(3) **INTENT OF THE CONTRACT DOCUMENTS:** The intention of the Contract Documents is to include in the contract price the cost of all labor, materials, water, fuel, tools, plant, equipment, light, transportation, professional services support and all other expense as may be necessary for the proper execution of the work. In interpreting the Contract Documents, words describing materials of work which have a well-known technical or trade meaning, unless otherwise specifically defined in the Contract Documents, shall be construed in accordance with such well-known meaning recognized by architects, engineers, and the trade.

The work shall be executed in strict conformity with the plans and specifications. The Contract Documents are complementary and what is called for by any one shall be as binding as if called



for by all. Anything stated in the specifications and not shown in the drawings, or shown in the drawings and not stated in the specifications, shall be of like effect as if shown or stated in both.

- (4) **PLANS / PROJECT SPECIFICATIONS:** Unless otherwise provided in the Contract Documents; the Plans, Project Manual and subsequent addendums are available; free of charge, as a downloadable file from the Jefferson County website. The Contractor will be responsible for reproducing the plans necessary to carry out all the work.

In the case of discrepancy in the plans, the matter shall be immediately submitted to the Architect or Owner without whose decision said discrepancy shall not be adjusted by the Contractor, save only at his own risk and expense.

- (5) **SUPERVISION AND PERSONNEL:** The Contractor shall have at the work site at all times a job supervisor. That individual shall be capable of reading and understanding the project plans and specifications, have authority to order materials and equipment and have authority to execute work as directed by the Owner. The Contractor shall provide the name and phone numbers of the person appointed as job supervisor prior to issuance of notice to proceed.

All workers shall have sufficient skill and experience to properly perform the work assigned to them. The owner may demand the dismissal of any person employed by the contractor in, about or upon the work who engages in misconduct, is incompetent or negligent in the due and proper performance of assigned duties, or who neglects or refuses to comply with any proper directions given. Such person shall not again be employed thereon without the written consent of the owner. Should the Contractor continue to employ or re-employ any such person, the Owner may suspend the work until the contractor complies with such orders.

- (6) **COMPLIANCE WITH LAWS:** The Contractor shall comply with all laws, ordinances, rules and regulations bearing in the conduct of the work and shall obtain, at his expense, all permits and licenses necessary for the prosecution of the work. Unless provided for in the contract, or granted a waiver, permits required from other departments of the county shall be obtained by the contractor.

The Contractor shall be responsible for the payment of all Federal, State, municipal or local taxes, including but not limited to sales and use taxes, applicable to the performance of the contract, and shall indemnify and hold harmless the Owner, from the consequences of his failure to pay such taxes. **Before award, the lowest bidder shall prove that delinquent property taxes are not owed to Jefferson County, MO, by submitting receipt of payment for last 3 years, or a notarized affidavit, on company letterhead, stating that the bidder does not own any real estate or personal property in Jefferson County.** Past receipts can be obtained from <http://jeffersonmo.devnetwedge.com>. The engineer may require proof that any or all tax liabilities of the contractor are not in a state of delinquency.

A sales tax exemption for construction materials is allowed by RSMo Section 144.062 RSMo, which applies to contractors for the County. If applicable to this contract, Jefferson County will issue an exemption certificate to the contractors, subcontractors, and suppliers for the purchase of materials used in construction.

- (7) **USE OF JOB SITE:** The Contractor shall confine his equipment, apparatus, the storage of materials and operations of his workmen to limits indicated by law, ordinance, permits, easements or plans and shall not encumber the premises with his materials. The Contractor

shall not load or permit any part of any structure to be loaded to the extent that its safety may be endangered.

- (8) **SANITARY PROVISIONS:** The Contractor shall provide and maintain a neat, sanitary job site, and accommodations for the use of his employees as may be necessary to comply with the sanitary requirements of laws or ordinances.
- (9) **SURVEYS:** The Contractor shall provide all surveys necessary to the performance of his work. All work shall be done to the lines, grades, and elevations shown on the plans. Any improperly located items, horizontally or vertically, may be subject to removal and replacement at the Contractor's expense. The Owner or Architect may, in his sole discretion, check from time to time the reference marks, lines, grades, and measurements established by the Contractor but his exercise or failure to exercise such right shall not relieve the Contractor of his obligation as stated herein.
- (10) **CONDITIONS AT THE SITE:** The Contractor shall make such investigations of conditions above or below the surface of the ground, as he may deem necessary for the proper and timely performance of his work, including but not limited to the making of borings. No oral representations by any persons respecting such conditions shall in any manner be binding upon the Owner or the Architect.

The Owner may have, for its own use, made borings at or near the site of the work. The boring data, if collected, will be made available to the Contractor, for his own convenience, if he desires to examine it. Any interpretations or conclusions drawn by the Contractor from such data shall be his own and the Owner makes no representation or guaranty concerning the accuracy or completeness of such data.

- (11) **UTILITIES AND OTHER OBSTRUCTIONS:** It shall be the sole responsibility of the Contractor in the performance of the contract to locate and avoid all utilities, other structures, and obstructions whether located below or above the surface of the ground. For that purpose, he shall employ all necessary precautions and methods to prevent damage to utilities, other structures, and obstructions. In the event such damage does occur, the Contractor shall be solely liable therefore and he shall notify the affected utility and Owner immediately, make or have made all necessary repairs and bear the expense thereof and all damage caused thereby. If the Contractor finds he cannot safely work at a location designated in the plans and specifications, either because of utilities, other structures or obstructions that may be damaged, he shall notify the Owner immediately.

Certain information relating to piping and underground utilities and structures, such as gas mains, water mains, and electric duct lines, has been gathered by the Architect for its purposes and has been shown on the plans for the convenience of the Contractor and for such use as he may, at his own risk, desire to make of it. Any interpretations or conclusions drawn by the Contractor from such data on the plans shall be his own and the Owner and the Architect makes no representations or guaranty concerning the accuracy or completeness of such data.

- (12) **STRUCTURES ENCOUNTERED AND PROTECTION OF LIFE AND PROPERTY:** The Contractor shall, at his own expense, support and protect all buildings, bridges, conduits, wires, water pipes, sewers, pavements, curbing, sidewalks, equipment and fixtures of all kinds and all other public or private property that may be encountered or endangered in the execution of the work herein contemplated. He shall replace, repair or to

otherwise make good any damage caused to any such property to the satisfaction of the Owner thereof. In the event the Contractor does not perform his obligations under this provision, the Owner reserves the right, at its election, to make good any damage to public or private property caused by the work of the Contractor and the cost thereof shall be borne by the Contractor. In the event the Contractor refuses or fails to pay bills therefore upon presentation, the Owner may pursue any remedies available to it or may deduct the amount thereof from any money that may be due to the Contractor hereunder from time to time.

Throughout the performance of the work, the Contractor shall construct and adequately maintain suitable and safe crossings over the trenches, and such detours as are necessary to care for the public and private traffic. The material excavated from trenches shall be deposited in such manner as shall give as little inconvenience as possible to the traveling public, to adjoining property owners, to other contractors or to the Owner.

All disturbed areas, material stockpiles, and equipment staging areas, shall be protected from erosion. All receiving streams and waterways shall be protected from siltation, pollutants, or any other material considered to be hazardous by any governmental regulator of streams and waterways. Crossings shall be installed for the passage of equipment across any stream or waterway, and allow free passage of water and aquatic life beneath the crossing. The crossing type shall be approved by the Engineer prior to installation. Unless otherwise listed as a bid item or incidental to another bid item, the contractor shall satisfy this requirement at his own expense.

The Contractor at his own expense shall provide the necessary watchmen and sufficient warning lights and barricades and take such other precautions as are necessary to protect life and property. The Contractor shall provide watchmen or additional watchmen at any point where they may be requested by the proper official of any municipality or governmental body affected. Nothing in this section shall be construed as requiring the Contractor to provide a road patrol.

- (13) **PROTECTION OF WORK:** The Contractor shall provide proper facilities, take all necessary precautions and assume the entire cost of protecting the work against adverse weather conditions and for handling all storm and flood water, sewage, seepage, ice or snow that may be encountered during the performance of the contract and the manner for providing for such contingencies and for carrying on the work in freezing weather shall meet with the approval of the Owner. If the Contractor shall fail to provide such protection or in the event of emergencies, the Owner may provide such protection at the Contractor's expense.

The contractor assumes all risk of damage to or destruction of the work covered by this contract until the work is completed and accepted by the Owner and shall repair or replace at his expense any work damaged or destroyed prior to such completion and acceptance regardless of cause.

- (14) **ACCIDENT PREVENTION:** Precaution shall be exercised at all times for the protection of persons (including employees) and property. The safety provisions of applicable laws and building and construction codes shall be observed. All persons on the site shall have completed, and have the ability to present proof of, a minimum of 10- hour OSHA construction safety training, or another comparable program.

- (15) **BLASTING:** The Contractor shall comply with all Federal, State, County and municipal laws, rules, and regulations applicable to the transportation, storage or use of explosives. The Contractor shall assume all responsibility for any injury or damage that may be done during the transportation, storage or use of any explosives.
- (16) **OTHER CONTRACTS:** The Owner may award other contracts for additional work, and the Contractor shall fully cooperate with such other contractors, and carefully schedule and fit his own work to that work provided under the other contract. The Contractor shall not commit or permit any act, which will interfere with the performance of work by any other contractor. It shall be at the sole discretion, and not to be assumed as a guarantee to the contractor, for the engineer to determine if conflicting, overlapping, or neighboring activities, was the sole cause of an unintended delay in the contractor's work schedule.
- (17) **CUTTING AND PATCHING:** The Contractor shall do all cutting, fitting, or patching of his work that may be required to make its several parts connect with the work of other contractors shown upon, or reasonably implied by the plans and specifications. The Contractor shall not endanger any work by cutting, digging, or otherwise, and shall not cut or alter the work of any other contractor.
- (18) **CLEANING UP:** The Contractor shall at all times keep the premises free from accumulation of waste material of rubbish and at the completion of the work shall remove from and about the site all his rubbish, tools, equipment, scaffolding and surplus materials and shall leave his work clean and ready for use.
- (19) **SURVEILLANCE AND INSPECTION:** The Contractor shall provide safe, sufficient and proper facilities at all times for the surveillance of work by the Architect, the Owner, or any other governmental agency that has the right of entry. The Contractor shall, within 24 hours after receiving written notice from the Owner, proceed to remove all materials rejected by the Owner, whether worked or unworked, and take down all portions of the work, which shall be considered as unsound or improper, or in any way failing to conform to the plans and specifications.

Should it be considered necessary or advisable by the Owner at any time before acceptance of the entire work to make an examination of work already completed by removing or tearing out same, the Contractor shall, on written request, promptly furnish all necessary facilities, labor, and material for that purpose. If such work is found to be defective or nonconforming in any material respect, due to the fault of the Contractor or his subcontractors, he shall defray all the expenses of such examination and of satisfactory reconstruction. If, however, such work is found to meet the requirements of the contract, an equitable adjustment shall be made in the contract price to compensate the Contractor for the additional services involved in such examination and reconstruction and, if completion of the work has been delayed thereby, he shall, in addition, be granted a suitable extension of time.

Unless otherwise provided in this contract, acceptance by the Owner will be made as promptly as practicable after completion of all work required by this contract. Acceptance shall be final and conclusive except as regards latent defects, fraud, or gross mistakes as may amount to fraud, or as regards the Owner's rights under any warranty or guarantee. Acceptance by the Owner may be contingent upon the acceptance by other governmental



bodies.

**(20) MATERIALS AND WORKMANSHIP:** Unless otherwise stipulated in the specifications, all workmanship, equipment, materials and articles incorporated in the work covered by this contract are to be new and of the best grade of their respective kinds for the purpose. When required by the plans and specifications, the Contractor shall furnish the Owner or Architect, for approval, certified copies of test results made of the materials or articles, which he contemplates incorporating in the work. Shop Drawings and/or samples of materials shall be submitted for approval when so directed. Machinery, equipment, materials and articles installed or used without such approval shall be at the risk of subsequent rejection. If not otherwise provided, material or work called for in this contract shall be furnished and performed in accordance with established practice and standards recognized by engineers and state transportation officials.

**(21) COOPERATION WITH UTILITIES:** All utility facilities and appurtenances, within the project limits, shall be located, or relocated, by the utility owner, unless otherwise specified. Locations of these utilities will be provided by the utility owners, or their provided third party, and may not be exact, particularly with regard to underground installations. The contractor shall use the Missouri One-Call System to satisfy this requirement.

The contractor shall lead the efforts to coordinate with utility owners and the engineer in the location and relocation of utility facilities, to minimize effects of the contractor's work, interruption to utility service, or duplication of work by the utility owners. Facilities or appurtenances that are to remain in place during construction shall be accounted for, and protected by the contractor's work procedures.

In the event, utility services are interrupted, and as a result of damage within the project limits, the contractor shall notify the appropriate utility authorities immediately, and cooperate with the utility owners until service has been restored. Work shall not begin around fire hydrants until provisions for continued service have been made and approved by the local fire authority. When the failure of the owners of utility facilities to cooperate and coordinate their work with that of the contractor results in actual delay to the contractor in the overall completion of the contractor's work, such delay will be considered in the count of working days or date specified for completion as contractor's sole compensation from the County, provided the contractor notified the engineer in writing of the delay at the time the delay occurred.

The contractor shall use every precaution to prevent damage to all public and private utilities. Repairs to damaged utilities caused by negligent or wrongful acts or omissions on the part of the contractor shall be corrected at the contractor's expense. Damaged facilities shall be restored to a condition similar or equal to that existing before the damage occurred. The utility will designate who shall repair the damaged facility and the contractor shall not make repairs without utility approval.

Should there be located, within the right of way any public or private utility, facilities that are to remain in place, and which will interfere with the contractor's proposed methods of operation, the contractor, in cooperation with the engineer, shall make all necessary arrangements with the owner for any temporary or permanent removal or relocation of such facilities desired for the contractor's convenience. Any cost involved shall be at the contractor's expense.

If utility facilities or appurtenances are found that are not noted in the contract, the Engineer shall be notified in writing as soon as possible of the conflict and will determine whether relocation of the utility is necessary to accommodate construction. If relocation is necessary, the contractor will make the necessary arrangements with the utility owner. Compensation for the relocation of utilities will be worked out between the County and the utility owner prior to the relocation of any utility. No compensation will be provided to the contractor for coordinating the location and/or relocation of utilities.

- (22) **“OR EQUAL CLAUSE”**: Whenever, in these specifications or in any of the Contract Documents, any article, appliance, device or material is designated by a manufacturer’s or vendor’s or proprietary or trade name and such words are not followed by the condition “or equal”, it shall be deemed that the words “or equal” do follow such designation unless the text clearly requires a contrary interpretation. Any article or material equaling the standards fixed may be used in place of that specifically mentioned by the specifications, provided that the material proposed is first submitted to and approved by the Owner or Architect. If by reason of the unavailability of material or equipment, a substitute item of material or equipment is approved by the Owner or Architect, the Owner shall receive the benefit of any economy resulting from the substitution.
- (23) **SUBLETTING OR ASSIGNING THE CONTRACT**: The bidder is specifically advised that any person, firm, or another party, to whom it is proposed to award a subcontract under this contract, must be acceptable to the County. Second tier subcontracting will not be permitted on this project. It will be the responsibility of the Contractor to ensure that his subcontractors do not, in turn, subcontract any portion of the work. The Contractor shall furnish to the County a signed copy of all subcontracts at or before the pre-construction meeting. This applies to Federal and local projects.
- (24) **WARRANTIES AND GUARANTEES**: Clauses that require the contractor to guarantee materials and workmanship and otherwise maintain the work for a specified period after satisfactory completion and final acceptance will not be approved. This is not even permissible as a non-participating bid item.
- Routine warranties or guarantees provided by a manufacturer are valid. Contractors’ warranties or guarantees providing for satisfactory in-service operation of mechanical and electrical equipment and relates components for a period not to exceed six (6) months following project acceptance are permissible
- (25) **MATERIAL TESTING**: All project sampling and testing of materials shall be performed by the County or by a testing firm contracted by the County. The Contractor shall assure that representatives of the County, testing firm contracted by the County, has the opportunity to sample and test materials used on this project. Costs associated with providing the sample materials shall be incidental to the cost of the project.
- (26) **TRAFFIC CONTROL**: All contractor operations, whether within the contract or incidental, shall adhere to the Federal Highway Administration’s Manual On Uniform Traffic Control Devices (MUTCD 2009 including revision 1 and 2, May 2012). Unless otherwise listed as a bid item or incidental to another bid item, the contractor shall satisfy this requirement at his own expense.



- (27) **STORM WATER POLLUTION PREVENTION PLAN (SWPPP):** The County's Storm Water Pollution Prevention Plan shall be the "Erosion and Sediment Control/Stormwater Management Design Manual" Chapter 505, Jefferson County Code of Ordinances. The ordinance can be found at the web address <http://www.ecode360.com/JE3328>.

For projects without a drawing showing erosion and sediment control measures, the Engineer or his representative will direct what measures are to be used and where they will be placed. Any measures not covered by a pay item or not specifically addressed in the Plans or Specifications as incidental will be by negotiated price. Concrete wash down pits shall be utilized for the washing of all concrete trucks. The pits shall be of adequate size to handle all wash down water. The pits shall be lined with a plastic liner (10 mil minimum) to prevent the seepage of the water into the adjoining ground. Berms may be necessary to prevent the migration of any splash water into the streams. The hardened waste from the wash down pits shall be removed and broken into pieces no larger than one cubic foot. The waste concrete pieces may be used as revetment, but will not be considered in measurement for payment. The cost of the wash down pits, berms, and disposal shall be incidental to the cost of the concrete.

Contractors shall provide the proper equipment, materials, and labor to perform dewatering measures for all drilling, saw cutting, or any other activity that can result in the creation of drilling "Slurry." Contractors shall submit a dewatering plan at the request of the Engineer. Dewatering activity costs shall be incidental to other items in the contract. Any spillage of hazardous waste shall be cleaned up by the Contractor at no additional cost to the Owner. Measures shall be taken to ensure that no hazardous waste reaches a stream or adjoining property.

Any fines assessed for not following the SWPPP will be the sole responsibility of the Contractor. If the Owner is fined by a State or Federal agency, liquidated damages in the amount of the fine will be charged to the Contractor by the Owner. Contractor agrees that it shall remit payment for said liquidated damages immediately upon request by Owner. Failure to do so may, at the Owner's option, be considered a breach of contract thereby entitling Owner to such other damages as may result. These damages shall be in addition to the liquidated damages described in this paragraph.

- (28) **SCHEDULE AND PROGRESS REPORTS:** The Contractor shall, as stated and required in the Contract Documents, submit to the Owner a project work schedule, covering all major operations in the work, for the County's review and approval. At the request of the Owner, the diagram shall be updated for relevancy to actual progress.
- (29) **TIME OF COMPLETION AND LIQUIDATED DAMAGES:** The parties recognize that time is of the essence of this contract and, after the Contractor receives a notice to proceed from the Owner, the work to be performed hereunder shall be commenced and shall be completed within the respective number of calendar days specified in the Contract Documents.

If the Contractor fails to complete the work within the time specified, or any extension thereof granted hereunder, the Contractor should pay the Owner the sum specified in the Contract Documents for each day the Contractor is in default. It is agreed that said daily sum is to be paid, not as a penalty, but as compensation to the Owner as liquidated damages for a loss

which the Owner will suffer because of such default through increased administrative and engineering costs and other tangible and intangible costs. Such damages may be at the Owner's option, be deducted from any monies held by it which are payable to the Contractor.

The completion of the work included under this Contract is defined for purposes of determining liquidated damages, as that time when all of the structures and appurtenances have been completed and tested and are, in the opinion of the Owner, ready for continuous permanent use and occupancy for the purposes intended, which includes all grading, cleaning up, or other minor work which is required to provide a completed project in accordance with the plans and specifications. At the Owner's discretion, unreasonable response time in the preparation and submittal of any required paperwork may also justify charging of working days or liquidated damages compensation. The date that liquidated damages are no longer applicable shall be the date of final acceptance from the Owner to the Contractor.

- (30) **PAYMENTS:** The Contractor, shall receive as full compensation for all accepted work hereunder, a sum equal to the value of the work done based on his proposal, attached hereto and made a part of this contract.

Payment shall be made to the contractor once per month, upon agreement and approval of the contractor submitted pay request. By the 15th calendar day of each month, the Contractor shall submit to the Owner, a pay estimate, in AIA standard format, showing the dollar amount requested for each line item represented in the contract. The engineer may request additional, or alternate invoicing requirements, depending on the structure of the original bid. The final payment shall be paid to the Contractor, subject to final acceptance of construction and approval of the final change order, within 30 days after completion and acceptance of the entire work herein be contracted for, and upon receipt by the County, and approval of, all final documentation. Final documentation shall include, but not be limited to:

- a. Affidavit, compliance with the prevailing wage law;
- b. Contractor's certification regarding the settlement of claims;
- c. Contractor's Final Pay Estimate;
- d. Letter from contractor stating the total amount paid (final contract amount) for completion of the project;
- e. Contractor's Final Lien Waiver and Final Lien Waivers from all subcontractors. The Engineer may request proof of payment to material suppliers, and which point, the contractor shall provide this information;
- f. Any certified payroll forms that had not been previously submitted;
- g. Certifications for materials, where required per Contract Documents;

- (31) **PAYMENTS NO EVIDENCE OF PERFORMANCE:** No certificate for payment made under this contract except the final certificate of final payment, shall be evidence of the performance of this contract, either wholly or in part. No Payment shall be construed to be an acceptance of defective work or improper materials.

## BID FORM

TO: JEFFERSON COUNTY, MISSOURI  
 BID FOR: ADMINISTRATION CENTER RENOVATION  
 PROJECT NO. PW19B007BLD

1. The undersigned BIDDER proposes and agrees, if this BID is accepted, to enter into an Agreement with the County in the form included in the Contract Documents to complete all Work as specified or indicated in the Contract Documents for the Contract Price and within the Contract Time indicated in this Bid and in accordance with the Contract Documents.
2. BIDDER accepts all terms and conditions of the Instructions to Bidders, Notice to Contractors and Project Manual specifications. This Bid will remain open for sixty (60) days after the day of Bid opening. BIDDER will sign the Agreement and submit all documents required within fifteen (15) days after the COUNTY'S Notice of Award.
3. In submitting this Bid, BIDDER represents, as more fully set forth in the Agreement, that:
  - (a) BIDDER has examined the site and locality where the Work is to be performed, the legal requirements (federal, state and local laws, ordinances, rules and regulations) and the conditions affecting cost, progress or performance of the Work and has made such independent investigations as BIDDER deems necessary; and
  - (b) This Bid is genuine and not made in the interest of or on behalf of any undisclosed person, firm or corporation and is not submitted in conformity with any agreement or rules of any group, association, organization or corporation; BIDDER has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid; BIDDER has not solicited or induced any person, firm or a corporation to refrain from bidding; and BIDDER has not sought by collusion to obtain for himself any advantage over any other Bidder or over the County.
4. Bidder will complete project for the following lump sum bid amounts. It is understood that these amounts represent all work that is necessary to execute all requirements of the Contract Documents.

### ADMINISTRATION CENTER RENOVATION – PW19B007BLD

#### Base Bid Lump Sum Amount – Lower Level Renovation Only

**Total Base Bid Cost** \$ \_\_\_\_\_

#### Bid Option 1 Lump Sum Amount – Upper Level Renovation Only \*\*

**Total Bid Option 1 Cost \*\*** \$ \_\_\_\_\_

**\*\* Bid Option 1 may not be awarded by the County due to potential funding constraints.**

**NOTICE TO BIDDER** - Bidders must complete the above section in its entirety.

5. BIDDER agrees that the work will be completed within the working days assigned or the CONTRACTOR shall pay the COUNTY, not as a penalty but as liquidated damages, a sum equal to Five Hundred (\$500.00) for each working or calendar day (excluding Saturdays, Sundays and Legal Holidays) elapsing between the expiration of such time limit plus such extensions as may be necessary to cover contingencies beyond the CONTRACTOR'S control and the date of the full completion.

The County reserves the right to negotiate additional terms for the time of completion with the successful bidder.

6. Communications concerning this Bid shall be addressed to the following:

Address: \_\_\_\_\_  
 \_\_\_\_\_

7. The terms used in this Bid which are defined in the Project Manual of the Construction Contract included as part of the Contract Documents have the meanings assigned to them in the Project Manual.

8. BIDDER has examined copies of all the Contract Documents and of the following addenda:

Date:	Number:
_____	_____
_____	_____
_____	_____
_____	_____

(receipts of all of which is hereby acknowledged) and also copies of the Bid Notice and the Instructions to Bidders:

9. Signatures:

SUBMITTED on \_\_\_\_\_, 20\_\_\_\_

By \_\_\_\_\_  
 (Corporation Name)

\_\_\_\_\_  
 (State of incorporation)

By \_\_\_\_\_  
(Name of person authorized to sign) (Signature and typed)

\_\_\_\_\_  
(Title)

(Corporate Seal)

Attest \_\_\_\_\_  
(Secretary) (Signature and typed)

Business Address: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Phone No.: \_\_\_\_\_

## BID BOND

Suitable bid security in the amount of:

\_\_\_\_\_

(\$ \_\_\_\_\_) Dollars and equal to five (5%) percent as called for in the advertisement for bids which accompanies this proposal. This sum is to be forfeited to the County of Jefferson if the party or parties making the proposal fail to enter into a contract with the approved securities within fifteen (15) days after the Notice of Award has been made. The undersigned has examined the Plans and Specifications for the work to be done and has satisfied himself as to the work to be done and the conditions under which it must be carried out.

The Contractor shall commence work within ten (10) days after the date of a written Notice to Proceed from the County and shall fully complete all work under this proposal within the scheduled time established by the Contract Documents. This proposal shall be equally binding to all heirs, administrators, executors, successors and assigns.

FIRM NAME: \_\_\_\_\_

BY: \_\_\_\_\_

TITLE: \_\_\_\_\_

ATTEST: \_\_\_\_\_

TITLE: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

\_\_\_\_\_

TELEPHONE: \_\_\_\_\_

## AGREEMENT FORM

THIS AGREEMENT is dated as of \_\_\_\_\_, in the year 2019 by and between JEFFERSON COUNTY, MISSOURI (hereinafter called OWNER OR COUNTY) and \_\_\_\_\_ (hereinafter called CONTRACTOR).

OWNER and CONTRACTOR, in consideration of the mutual covenants herein after set forth and in the amount of \_\_\_\_\_, agree as follows:

### ARTICLE 1. WORK

CONTRACTOR shall complete all work as specified or indicated in the Contract Documents for the **Administration Center Renovation**. The work is generally described as follows:

The proposed work includes the remodeling of existing office spaces; with associated electrical/telecommunications, HVAC, plumbing, etc. improvements. The contractor will be responsible for providing the materials, labor and equipment necessary to complete the project in a timely manner in accordance with the Specifications and other Contract Documents. The contractor shall be responsible for arranging delivery of materials to job sites. The bid shall also include disposal of all waste and demolition materials.

### ARTICLE 2. ENGINEER

The County has designated the Director of Public Works, who is hereinafter called ENGINEER and who has the authority assigned to OWNER in the Contract Documents in connection with completion of the Work in accordance with the Contract Documents.

### ARTICLE 3. CONTRACT TIME

**3.1 The County will issue a notice to proceed for purchasing materials to the CONTRACTOR 20 days before the notice to proceed with the work on site.** The Contractor shall register their company as well as subcontractors with the City of Hillsboro, Missouri if required by the City's permitting process. The Contractor will be responsible for any building construction permits required by the City of Hillsboro, Missouri. The Contractor will begin work on site and will continuously prosecute the work to the completion of the project. Allowance will be made for weather conditions and other occurrences beyond the control of the CONTRACTOR. **All work on the building site shall be completed in 120 calendar days.**

If the CONTRACTOR is unable to begin work as required, the ENGINEER shall be notified in writing. Unless the ENGINEER gives written approval for a delay in beginning the work, calendar days will begin to be counted for liquidated damages. The count will continue until the CONTRACTOR begins full operation. The count will resume when work is suspended, or full operation is not maintained.

3.2 Liquidated Damages. The Contractor agrees that should he fail to complete work in the time specified or such additional time as may be allowed by the Owner under this contract, the Contractor shall pay the County, not as a penalty but as **liquidated damages**, a sum equal to **Five Hundred (\$500.00)** for each working day (excluding Saturdays, Sundays and Legal Holidays) elapsing between the expiration of such time limit plus such extensions as may be necessary to cover contingencies beyond the CONTRACTOR'S control and the date of the full completion.

#### ARTICLE 4. CONTRACT PRICE

4.1 Owner shall pay Contractor for performance of the work in accordance with the contract documents in current funds.

#### ADMINISTRATION CENTER RENOVATION – PW19B007BLD

##### Base Bid Lump Sum Bid – Lower Level Renovation Only

**Total Base Bid Cost** \$ \_\_\_\_\_

##### Bid Option 1 Lump Sum Bid – Upper Level Renovation Only \*\*

**Total Bid Option 1 Cost \*\*** \$ \_\_\_\_\_

**\*\* Bid Option 1 may not be awarded by the County due to potential funding constraints.**

**NOTICE TO BIDDER** - Bidders must complete the above section in its entirety.

4.2 All costs associated with contractor licensing to the City of Hillsboro, Missouri need to be included in the cost estimates above.

5.0 Contractor shall submit Application for Payment in accordance with Project Manual. The Engineer as provided in the Project Manual will process application for Payment. The Contractor shall utilize the Application and Certification for Payment, AIA Document G702, or comparable document for all Applications of Payment.

5.1 Progress Payment. Owner will make progress payments per the Contract Bid Price on the basis of the Contractor's Application of Payment as recommended by the Engineer, on or about the First day of each month during the construction as provided below. All progress payments will be on the basis of the Work measured on the job site according to unit of measurement as shown within the job special provisions or Missouri Standard Specifications.

5.1.1 The Owner will require withholding of retainage as specified in the Project Manual. Release of retained percentage shall be as provided in the Project Manual.

5.1.2 When the Contractor receives any payment from the Owner, the Contractor shall make prompt payment to subcontractors and suppliers as detailed in the Project Manual.



5.2 Final Payment. Upon final completion and acceptance of the Work in accordance with specifications detailed in the Project Manual, Owner shall pay the remainder of the Contract Price as recommended by the ENGINEER.

#### ARTICLE 6. CONTRACTOR'S REPRESENTATIONS

In order to induce the County to enter into this Agreement CONTRACTOR makes the following representations:

6.1 CONTRACTOR has familiarized himself with the nature and extent of the Contract Documents, Work, locality, and with all local conditions and federal laws, state and local laws, ordinances, rules and regulations that in any manner may affect cost, progress or performance of the Work.

6.2 CONTRACTOR has studied carefully all reports of investigations and tests of subsurface and latent physical conditions at the site of otherwise affecting cost, progress or performance of the Work which were relied upon by the ENGINEER in the preparation of the Drawings and Specifications. When the information is available it will either be included in the bid documents or made available at the Jefferson County Public Works Department for the Contractor's review.

6.3 CONTRACTOR has made or caused to be made examinations, investigations and tests and studies of such reports and related data in addition to those referred to in Article 9 as he deems necessary for the performance of the Work at the Contract Price, within the Contract Time and in accordance with the other terms and conditions of the Contract documents; and no additional examinations, investigations, tests, reports or similar data will be required by CONTRACTOR for such purposes.

6.4 CONTRACTOR has correlated the results of all such observations, examinations, investigations, tests, reports and data with the terms and conditions of the Contract Documents.

6.5 CONTRACTOR has given ENGINEER written notice of all conflicts, errors or discrepancies that he has discovered in the Contract Documents and the written resolution thereof by ENGINEER is acceptable to CONTRACTOR.

#### ARTICLE 7. CONTRACT DOCUMENTS

The Contract Documents which comprise the entire agreement between OWNER and CONTRACTOR are attached to this Agreement, made a part hereof and consists of the following:

- 7.1 This Agreement
- 7.2 Exhibits to this Agreement (if any)
- 7.3 Contract Performance and Payment and Materials Bonds, consisting of 3 pages.
- 7.4 Notice of Award

- 7.5 Specifications bearing the title Project Manual for Jefferson County, Missouri Administration Center Renovation Project No. PW19B007BLD and consisting of all pages as listed in the table of contents thereof.
- 7.6 Addenda numbers \_\_\_ to \_\_\_, inclusive.
- 7.7 CONTRACTOR'S Bid and all attachments
- 7.8 Documentation submitted by CONTRACTOR prior to Notice of Award
- 7.9 Any Modification, including Change Orders, duly delivered after execution of agreement.

There are no Contract Documents other than those listed above in this Article 7. The Contract Documents may only be altered, amended or repealed by a Modification (as defined in Article 25 of the General Conditions).

#### ARTICLE 8. MISCELLANEOUS

8.1 Terms used in this Agreement which are defined in the Project Manual shall have the meanings indicated in the Project Manual.

8.2 No assignment by a party hereto of any rights under or interests in the Contract Documents will be binding on another party hereto without the written consent of the party sought to be bound; and specifically but without limitation, moneys that may become due and moneys that are due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents.

8.3 The County and CONTRACTOR each binds himself, his partners, successors, assigns and legal representatives to the other party hereto, his partners, successors, assigns and legal representatives in respect to all covenants, agreements and obligations contained in the Contract Documents.

#### ARTICLE 9. OTHER PROVISIONS

9.1 Access to records. In connection with this Contract the County shall have access to any books, documents, papers, and records of the CONTRACTOR, which are directly pertinent to this project for the purpose of making an audit, examination, excerpts, and transcriptions.

9.2 Applicable Laws and Regulations. The CONTRACTOR expressly agrees to comply with all applicable rules and regulations as set forth in the Contract Documents or as may be required by law, and further agrees to submit all certifications, notices, and affirmative action plans as may now or hereafter be required, and to place such conditions and provisions in any and all subcontracts as may be required.

9.3 Conflict of Interest. The CONTRACTOR covenants that he or she presently has not interest of any kind and shall not acquire any type of interest, direct or indirect, in the program or any property therein, which would conflict in any manner or degree with the performance of his or her services and obligation hereunder. The CONTRACTOR further covenants that in the performance of this contract, no person known to have any conflicting interest shall be knowingly employed in the performance of this Contract.

#### ARTICLE 10. VENUE

10.1 It is agreed by the parties that any action at law, suit in equity, or other judicial proceeding to enforce or construe this Agreement, or regarding its alleged breach, shall be instituted only in the Circuit Court of Jefferson County, Missouri.

IN WITNESS WHEREOF, the parties hereto have signed this agreement in quadruplicate. All portions of the Contract Documents have been signed or identified by OWNER and CONTRACTOR or by ENGINEER on their behalf.

FOR: JEFFERSON COUNTY, MISSOURI

BY: \_\_\_\_\_ Date: \_\_\_\_\_  
COUNTY EXECUTIVE

ATTEST: \_\_\_\_\_  
COUNTY CLERK DEPUTY CLERK

FOR: \_\_\_\_\_

BY: \_\_\_\_\_ Date: \_\_\_\_\_  
CONTRACTOR

ATTEST: \_\_\_\_\_

I hereby certify under section 50.660 RSMo there is either: (1) a balance of funds, otherwise unencumbered, to the credit of the appropriation to which the obligation contained herein is chargeable, and a cash balance otherwise unencumbered, in the treasury, to the credit of the funds from which payment is to be made, each sufficient to meet the obligation contained herein; or (2) bonds or taxes have been authorized by vote of the people and there is a sufficient unencumbered amount of the bonds yet to be sold or of the taxes levied and yet to be collected to meet the obligation in case there is not a sufficient unencumbered cash balance in the treasury.

\_\_\_\_\_  
COUNTY AUDITOR

APPROVED AS TO FORM

\_\_\_\_\_  
COUNTY COUNSELOR

## AFFIDAVIT COMPLIANCE WITH THE PREVAILING WAGE LAW

Before me, the undersigned Notary Public, in and for the County of \_\_\_\_\_, State of \_\_\_\_\_, personally came and appeared \_\_\_\_\_  
(Name)

\_\_\_\_\_ of \_\_\_\_\_  
(Title) (Company Name)

(a corporation)(a partnership)(a proprietorship) and after being duly sworn did depose and say that all provisions and requirements set out in Chapter 290, Sections 290.210 through and including 290.340, Missouri Revised Statutes, pertaining to the payment of wages to workers employed on public works projects have been fully satisfied and there has been no exception to the full and complete compliance with said provisions and requirements with Wage Determination No. \_\_\_\_\_ or Annual Wage Order No. \_\_\_\_\_ issued by the Division of Labor Standards on project \_\_\_\_\_,

(Job Number)

\_\_\_\_\_,  
(Route or location, if building construction)

\_\_\_\_\_ County, Missouri, and completed on the \_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_.

\_\_\_\_\_  
Signature

Subscribed and sworn to me this \_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_.

My commission expires \_\_\_\_\_, 20\_\_\_\_.

Notary Public

(Revised 03-23-00)

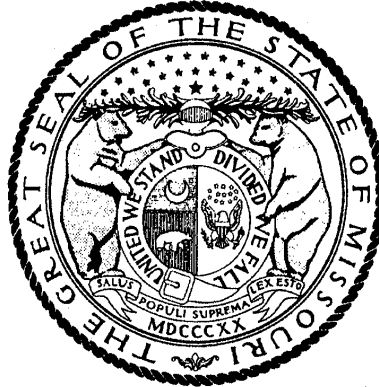
## ACKNOWLEDGEMENT OF REQUIREMENTS AND SPECIFICATIONS WITHIN THE PROJECT MANUAL

I, \_\_\_\_\_, do hereby sign and acknowledge that myself, or company  
FIRST & LAST NAME  
staff that work under my oversight, have reviewed all sections and pages of the following Project Manual for the Administration Center Renovation Project. By signing this acknowledgement form, the bid submitted by \_\_\_\_\_, is believed to be compliant  
BIDDING COMPANY NAME  
with the requirements and specifications stated in the Project Manual that follows.

# Missouri

## Division of Labor Standards

WAGE AND HOUR SECTION



ERIC R. GREITENS, Governor

## Annual Wage Order No. 25

Section 050

### JEFFERSON COUNTY

In accordance with Section 290.262 RSMo 2000, within thirty (30) days after a certified copy of this Annual Wage Order has been filed with the Secretary of State as indicated below, any person who may be affected by this Annual Wage Order may object by filing an objection in triplicate with the Labor and Industrial Relations Commission, P.O. Box 599, Jefferson City, MO 65102-0599. Such objections must set forth in writing the specific grounds of objection. Each objection shall certify that a copy has been furnished to the Division of Labor Standards, P.O. Box 449, Jefferson City, MO 65102-0449 pursuant to 8 CSR 20-5.010(1). A certified copy of the Annual Wage Order has been filed with the Secretary of State of Missouri.

Original Signed by

Matt Cowell, Director  
Division of Labor Standards

Filed With Secretary of State: March 9, 2018

Last Date Objections May Be Filed: April 9, 2018

Prepared by Missouri Department of Labor and Industrial Relations

OCCUPATIONAL TITLE	** Date of Increase	*	Basic Hourly Rates	Over-Time Schedule	Holiday Schedule	Total Fringe Benefits
Asbestos Worker (H & F) Insulator			\$38.70	55	60	\$23.17
Boilermaker	6/18		\$36.41	126	7	\$30.81
Bricklayer and Stone Mason	6/18		\$33.25	72	5	\$23.57
Carpenter	6/18	e	\$38.85	77	41	\$17.30
Cement Mason	6/18		\$32.66	80	6	\$19.00
Communication Technician			\$33.21	44	47	\$20.24
Electrician (Inside Wireman)			\$36.92	82	71	\$10.84 + 39%
Electrician (Outside-Line Construction\Lineman)			\$44.56	43	45	\$5.75 + 36%
Lineman Operator			\$38.35	43	45	\$5.75 + 36%
Groundman			\$29.48	43	45	\$5.75 + 36%
Elevator Constructor	6/18	a	\$48.54	26	54	\$34.395
Glazier			\$34.55	87	31	\$26.20
Ironworker			\$33.96	11	8	\$25.745
Laborer (Building):						
General		b	\$28.11	73	7	\$13.42
First Semi-Skilled		d	\$28.11	73	7	\$13.42
Second Semi-Skilled		c	\$28.11	73	7	\$13.42
Lather			USE CARPENTER RATE			
Linoleum Layer and Cutter	6/18		\$33.43	92	26	\$17.00
Marble Mason			\$32.12	76	51	\$15.25
Marble Finisher			\$26.67	76	51	\$14.48
Millwright	6/18		\$38.85	77	41	\$17.31
Operating Engineer						
Group I	6/18		\$32.96	3	66	\$27.43
Group II	6/18		\$32.96	3	66	\$27.43
Group III	6/18		\$31.06	3	66	\$27.43
Group III-A	6/18		\$32.96	3	66	\$27.43
Group IV	6/18		\$27.60	3	66	\$27.43
Group V	6/18		\$27.60	3	66	\$27.43
Painter			\$33.40	104	12	\$14.26
Pile Driver			USE CARPENTER RATE			
Pipe Fitter			\$39.25	91	69	\$27.18
Plasterer			\$31.81	67	3	\$18.68
Plumber			\$39.25	91	69	\$27.18
Roofer \ Waterproofer			\$32.70	15	73	\$17.97
Sheet Metal Worker			\$41.55	32	25	\$22.72
Sprinkler Fitter - Fire Protection			\$43.31	66	18	\$23.27
Terrazzo Worker			\$32.40	116	5	\$14.26
Terrazzo Finisher			\$30.65	116	5	\$12.73
Tile Setter			\$32.12	76	51	\$15.25
Tile Finisher			\$26.67	76	51	\$14.48
Traffic Control Service Driver			\$28.775	22	55	\$9.045
Truck Driver-Teamster			\$30.41	35	36	\$10.82

Fringe Benefit Percentage is of the Basic Hourly Rate

\*\*Annual Incremental Increase



OCCUPATIONAL TITLE	** Date of Increase	Basic Hourly Rates	Over-Time Schedule	Holiday Schedule	Total Fringe Benefits

\* Welders receive rate prescribed for the occupational title performing operation to which welding is incidental.

Use Building Construction Rates on Building construction in accordance with the classifications of construction work established in 8 CSR 30-3.040(2).

Use Heavy Construction Rates on Highway and Heavy construction in accordance with the classifications of construction work established in 8 CSR 30-3.040(3).

a - Vacation: Employees over 5 years - 8%; Employees under 5 years - 6%

b - Projects over \$1 Million - \$28.11; Projects under \$1 Million - \$25.96

c - Projects over \$1 Million - \$28.11; Projects under \$1 Million - \$25.96

d - Projects over \$1 Million - \$28.11; Projects under \$1 Million - \$25.96

\*\* e - Projects over \$1 Million - \$38.85; Projects under \$1 Million - \$33.76

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**FED:** Minimum requirement per Fair Labor Standards Act means time and one-half ( $1\frac{1}{2}$ ) shall be paid for all work in excess of forty (40) hours per work week.

**NO. 3:** Means the regular workday shall consist of eight (8) consecutive hours, exclusive of a thirty (30) minute lunch period, with pay at the straight time rate. The regular workday shall begin between the hours of 6:00 a.m. and 9:00 a.m. The Employer may have the option to schedule the work week from Monday through Thursday at ten (10) hours per day at the straight time rate of pay with all hours in excess of ten (10) hours in any one day to be paid at the applicable overtime rate. If the Employer elects to work from Monday through Thursday and is stopped due to inclement weather, holiday or other conditions beyond the control of the Employer, they shall have the option to work Friday at the straight time rate of pay to complete the forty (40) hours for the workweek. All overtime work performed on Monday through Saturday shall be paid at time and one-half ( $1\frac{1}{2}$ ) the hourly rate plus an amount equal to one-half ( $\frac{1}{2}$ ) of the hourly Total Indicated Fringe Benefits. All work performed on Sundays and recognized holidays shall be paid at double (2) the hourly rate plus an amount equal to the hourly Total Indicated Fringe Benefits. Shifts may be established when considered necessary by the Employer. Shift hours and rates will be as follows. If shifts are established, work on the First Shift will begin between 6:00 a.m. and 9:00 a.m. and consist of eight (8) hours of work plus one-half hour unpaid lunch. Hours worked during the first shift will be paid at the straight time rate of pay. The second shift shall start eight hours after the start of the first shift and consist of eight (8) hours of work plus one-half hour unpaid lunch. Work on the second shift will begin between 2:00 p.m. and 5:00 p.m. and be paid the straight time rate plus \$2.50 per hour. The third shift shall start eight hours after the start of the second shift and consist of eight (8) hours plus one-half hour unpaid lunch. Work on the third shift will begin between 10:00 p.m. and 1:00 a.m. and be paid the straight time rate plus \$3.50 per hour. The additional amounts that are to be paid are only applicable when working shifts. Shifts that begin on Saturday morning through those shifts which end on Sunday morning will be paid at time and one-half these rates. Shifts that begin on Sunday morning through those shifts which end on Monday morning will be paid at double time these rates.

**NO. 11:** Means eight (8) hours shall constitute a day's work, with the starting time to be established between 6:00 a.m. and 8:00 a.m. from Monday to Friday. Time and one-half ( $1\frac{1}{2}$ ) shall be paid for first two (2) hours of overtime Monday through Friday and the first eight (8) hours on Saturday. All other overtime hours Monday through Saturday shall be paid at double (2) time rate. Double (2) time shall be paid for all time on Sunday and recognized holidays or the days observed in lieu of these holidays.

**NO. 15:** Means the regular working day shall be scheduled to consist of at least eight (8) hours, but no more than ten (10) consecutive hours, exclusive of the lunch period. The regular working day may be scheduled to commence at any time between the hours of 5:00 a.m. and 10:00 a.m. All work performed in excess of forty (40) hours in one work week, or in excess of ten (10) hours in one work day shall be paid at the rate of one and one-half ( $1\frac{1}{2}$ ) times the regular hourly wage scale. Any work performed on a Saturday shall be paid for at the rate of one and one-half ( $1\frac{1}{2}$ ) times the regular hourly wage scale unless such Saturday work falls under the category of Saturday Make-Up Day. Any work performed by Employees anywhere on Sunday or recognized holidays, shall be paid for at the rate of double (2) time the regular wage scale. If, during the course of a work week, an Employee is unable to work for any reason, and, as a result, that Employee has not accumulated forty (40) hours of compensable time at the straight time rate, the Employer, at his option may offer the Employee the opportunity to work on Saturday at straight time; provided, however, if during the period worked by said Employee on Saturday, the Employee's compensable time at the straight time rate exceeds forty (40) hours, all time worked in excess of the forty (40) hours will be paid at the rate of one and one-half ( $1\frac{1}{2}$ ) times the regular hourly wage scale.

**NO. 22:** Means a regular work week of forty (40) hours will start on Monday and end on Friday. The regular work day shall be either eight (8) or ten (10) hours. If a crew is prevented from working forty (40) hours Monday through Friday, or any part thereof by reason of inclement weather, Saturday or any part thereof may be worked as a make-up day at the straight time rate. Employees who are part of a regular crew on a make-up day, notwithstanding the fact that they may not have been employed the entire week, shall work Saturday at the straight time rate. A workday is to begin between 6:00 a.m. and 9:00 a.m. However, the project starting time may be advanced or delayed if mutually agreed to by the interest parties. For all time worked on recognized holidays, or days observed as such, double (2) time shall be paid.

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**NO. 26:** Means that the regular working day shall consist of eight (8) hours worked between 6:00 a.m., and 5:00 p.m., five (5) days per week, Monday to Friday, inclusive. Hours of work at each jobsite shall be those established by the general contractor and worked by the majority of trades. (The above working hours may be changed by mutual agreement). Work performed on Construction Work on Saturdays, Sundays and before and after the regular working day on Monday to Friday, inclusive, shall be classified as overtime, and paid for at double (2) the rate of single time. The employer may establish hours worked on a jobsite for a four (4) ten (10) hour day work week at straight time pay for construction work; the regular working day shall consist of ten (10) hours worked consecutively, between 6:00 a.m. and 6:00 p.m., four (4) days per week, Monday to Thursday, inclusive. Any work performed on Friday, Saturday, Sunday and holidays, and before and after the regular working day on Monday to Thursday where a four (4) ten (10) hour day workweek has been established, will be paid at two times (2) the single time rate of pay. The rate of pay for all work performed on holidays shall be at two times (2) the single time rate of pay.

**NO. 32:** The regular working day shall consist of eight (8) hours of labor on the job between six (6) a.m. and four (4) p.m. and the regular working week shall consist of five (5) consecutive eight (8) hour days of labor on the job beginning with Monday and ending with Friday of each week. The normal work week is 40 hours. All full-time or part-time labor performed during such hours shall be recognized as regular working hours and paid for at the regular hourly rate. All work performed during regular work hours on Saturdays will be paid at time and one-half (1½). All work performed outside of regular working hours and performed during the regular work week, shall be at double (2) times the regular rate, except that the first two (2) hours following the regular work day shall be paid at one and one-half (1½) times the regular rate. An early starting time of 6:00 a.m. may be used mutually agreed upon by the interested parties. **SHIFT RATE:** Shift work would start after 4:00 p.m. to 6:00 a.m. The first 8 hours would be at 115% of the basic wage rate. Overtime Monday through Friday would be at 1½ of base shift rate. Saturday regular work day hours – 1½ of base shift rate. Saturday – work after 8 hours – 2 times the basic wage rate. Sunday and Holidays – 2 times the basic wage rate. All work performed on recognized holidays and Sundays shall be paid double (2) time. Appropriate overtime rates to be based on fifteen minute increments.

**NO. 35:** Means a regular work week of forty (40) hours, will start on Monday and end on Friday. The regular work day shall be either eight (8) or ten (10) hours. If a crew is prevented from working forty (40) hours Monday through Friday, or any part thereof by reason of inclement weather, Saturday or any part thereof maybe worked as a make-up day at the straight time rate. Employees who are part of a regular crew on a make-up day, notwithstanding the fact that they may not have been employed the entire week, shall work Saturday at the straight time rate. A work day is to begin between 6:00 a.m. and 9:00 a.m. However, the project starting time maybe advanced or delayed if mutually agreed to by the interested parties. For all time worked on recognized holidays, or days observed as such, double (2) time shall be paid.

**NO. 43:** Eight (8) hours shall constitute a work day between the hours of 7:00 a.m. and 4:30 p.m. Forty (40) hours within five (5) days, Monday through Friday inclusive, shall constitute the work week. Work performed in the 9th and 10th hour, Monday through Friday, shall be paid at time and one-half (1½) the regular straight time rate of pay. Contractor has the option to pay two (2) hours per day at the time and one-half (1½) the regular straight time rate of pay between the hours of 6:00 a.m. and 5:30 p.m., Monday through Friday. Work performed outside the regularly scheduled working hours and on Saturdays, Sundays and recognized legal holidays, or days celebrated as such, shall be paid for at the rate of double (2) time.

**NO. 44:** Means forty (40) hours shall constitute a work week, Monday through Friday. Eight (8) hours shall constitute a work day. Hours of work shall be between the hours of 7:00 a.m. and 4:30 p.m. All work performed before 7:00 a.m. and after 4:30 p.m. and all work performed in excess of eight (8) hours in any one work day, over forty (40) hours in any work week and the first eight (8) hours of work on Saturday, shall be paid at the rate of one and one-half (1½) times the regular rate of pay. All hours worked in excess of eight (8) hours on Saturday, all hours worked on Sunday and on holidays, or days that may be celebrated as such, and as designated by the federal government, shall be paid at two (2) times the regular rate of pay. All shifts for work performed between the hours of 4:30 p.m. and 1:00 a.m. shall receive eight (8) hours pay at the regular hourly rate of pay plus two dollars (\$2.00) per clock hour. All work performed between the hours of 12:30 a.m. and 9:00 a.m. on a third shift shall receive eight (8) hours pay at the regular hourly rate plus four dollars (\$4.00) per clock hour. All overtime work required after the completion of a regular shift shall be paid at one and one-half times (1½ x) the "shift" hourly rate.

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**NO. 55:** Means the regular work day shall be eight (8) hours between 6:00 a.m. and 4:30 p.m. The first two (2) hours of work performed in excess of the eight (8) hour work day, Monday through Friday, and the first ten (10) hours of work on Saturday, shall be paid at one & one-half (1½) times the straight time rate. All work performed on Sunday, observed holidays and in excess of ten (10) hours a day, Monday through Saturday, shall be paid at double (2) the straight time rate.

**NO. 66:** Means eight (8) hours shall constitute a day's work beginning at 7:00 a.m. (or 8:00) A.M. and ending at 3:30 (or 4:30) P.M. The work week shall be forty (40) hours beginning Monday at 7:00 a.m. (or 8:00) A.M. And ending Friday at 3:30 (or 4:30) P.M. The Employer at his option may use a flexible starting time between the hours of 6:00 a.m. and 8:00 a.m. All overtime, that is worked outside of the above established working hours of Monday through Friday, shall be paid at double (2) time, including Saturdays, Sundays and Holidays.

**NO. 67:** Means eight (8) hours shall constitute a day's work, with a flexible starting time to begin between 6:00 a.m. to 8:00 a.m., five (5) days a week, Monday through Friday. Any work over eight (8) hours in any one day shall be at the overtime rate, which is time & one-half (1½). Any work on Saturday shall be at time & one-half (1½), unless a Make-Up Day due to inclement weather is in effect. Any work on Sundays or holidays shall be at double (2) time. Four (4) days, ten (10) hours each day to be worked during Monday through Friday, shall be paid at straight time. A Make-Up Day Due To Inclement Weather Only - Employee(s) will be permitted to work an eight (8) hour make-up day on Saturday only, and the employee will receive the regular straight time wage rate.

**NO. 72:** Means that except as is otherwise provided herein, the work week shall be determined to begin at 8:00 a.m. Wednesday and end at 4:30 p.m. on the following Tuesday. Except as herein provided, working hours are from 8:00 a.m. to 11:55 a.m. and 12:30 p.m. to 4:25 p.m. and no more than the regular hours shall be worked during the forenoon or afternoon at the regular rate. In the case of days of inclement weather starting time and quitting time may be adjusted so long as the hours worked on such days do not exceed eight (8) and do not extend beyond 4:30 p.m. In circumstances where the Employee or Employees have regularly been working overtime on a particular day or days, no adjustment in the starting time shall operate to deprive Employees of overtime pay, which they would have otherwise received but for the change in the starting time. The parties understand that the application of the provisions of the preceding sentence will result in Employees receiving overtime pay even where they have not worked more than with (8) hours on a particular day. Regardless of the starting time, the forenoon working hours shall end at 11:55 a.m. and the afternoon working hours shall begin at 12:30 p.m. and end 8 hours and 25 minutes after the starting time fixed by the Employer for forenoon hours. Work performed by an employee on a non-holiday Saturday, except as hereinafter provided, or at night or before or after regular working hours on a non-holiday weekday, shall be considered overtime work, for which Employees working during such time shall be paid at the rate of one and one-half (1½) times their regular hourly wage rate for each hour or fraction thereof, worked during such time. Work performed on a Sunday or the recognized holidays shall be considered overtime work for which the Employee shall be paid twice the amount of his or her regular hourly wage rate for each hour or fraction thereof worked on any such day.

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**NO. 73:** Means eight (8) hours shall constitute a day's work to begin at 8:00 a.m. and end at 4:30 p.m. The starting time may be advanced one (1) or two (2) hours. Employees shall receive time and one-half (1½) for all time they are required to work before 8:00 a.m., during the lunch period or after 4:30 p.m. unless the starting time is advanced as provided above. Forty (40) hours shall constitute a week's work, Monday through Friday, or any part thereof by reason of inclement weather (rain or mud), Saturday or any part thereof may be worked as a make-up day at the straight time rate. The Employer shall have the option of working five (5) eight (8) hour day's or four (4) ten (10) hour day's Monday through Friday. If an Employer elects to work five (5) eight (8) hour days during any work week, hours worked more than eight (8) per day or forty (40) per week shall be paid at time and one-half (1½) the hourly rate Monday through Friday. If an employer elects to work four (4) ten (10) hour days in any week, work performed more than ten (10) hours per day or forty (40) hours per week shall be paid at time and one-half (1½) the hourly rate Monday through Friday. If an Employer is working ten (10) hour days and loses a day due to inclement weather, he may work ten (10) hours Friday at straight time. All time over the regular workday as defined and all hours worked on Saturday shall be paid at the rate of one and one-half (1½) the regular rate of wages. If workmen are required to work recognized holidays or days observed as such, or on Sunday, they shall receive double (2) the regular rate of pay for such work. If a laborer is assisting another craft on a make-up day and the other craft is receiving overtime pay the laborer shall receive the same overtime multiple as the craft assisted. No overtime rates shall be broken down into less than thirty (30) minute units of time. Projects that cannot be performed during regular workday: Building construction work, if required by the owner, the contractor may perform work outside the normal hours and employees shall be paid applicable straight time hourly wage rate plus a premium of \$1.50 per hour for the first eight hours worked. Any hours worked in excess of eight hours shall be paid at the applicable overtime rate plus \$1.50 per hour premium. Shift work: The Employer may elect to work, one, two or three shifts on any work. When two or more shifts are worked on any operation, the first shift or day shift shall consist of eight (8) hours exclusive of lunch time; the second or swing shift consist of eight (8) hours' work for eight and one-half hours pay, exclusive of lunch time; the third or graveyard shift shall consist of eight (8) hours' work for nine (9) hours' pay exclusive of lunch time. The swing shift shall be paid twenty-five cents (\$.25) per hour above the regular rate of pay. The graveyard shift shall be paid fifty cents (\$.50) per hour above the regular rate of pay. Multiple shift (second or third shift) operation will not be construed on the entire project if at any time it is deemed advisable and necessary for the employer to a specific operation. However, no shift shall be started between midnight and 6:00 a.m. except the graveyard shift on a three (3) shift operation, or except in unusual or emergency, regardless if the project is working one (1) or two (2) shift. Shifts shall be established for a minimum of three (3) consecutive workdays. When 2-10 or 12 hour shifts are worked, the second shift shall receive \$.50 per hour above regular rate of pay. When the employer elects to work 2-10 or 12 hour shifts, the first 8 hours shall be at straight time rates. The remaining 2 or 4 hours shall be at the overtime rate of time and one-half.

**NO. 76:** Means the standard workday shall consist of eight (8) hours of work between the hours of 8:00 a.m. and 4:30 p.m. with a thirty (30) minute unpaid lunch hour occurring in the middle of the shift. The standard workweek shall consist of five standard workdays commencing on Monday and ending on Friday. The normal starting and quitting times may be changed by mutual consent of interested parties. All time worked before and after the established eight (8) hour workday, Monday through Friday, and all time worked on Saturday, shall be paid for at the rate of time & one-half (1½) the hourly base wage rate in effect. All time worked on Sunday and holidays shall be paid at the rate of double (2) the hourly wage in effect. All work done on Saturday will be done at time & one-half (1½), unless Saturday shall be used as a make-up day. If an employee should lose one or more days in a work week and use Saturday as a make-up day the pay shall be at the regular hourly base wage rate and benefits.

**NO. 77:** Means the regular workday shall consist of eight (8) consecutive hours, exclusive of a thirty (30) minute lunch period, with pay at the regular straight time hourly rate. The regular workday shall begin on the job site between the hours of 6:00 a.m. and 8:00 a.m. with the starting time to be determined by the Employer, unless project owner requires different starting time. This adjustable starting time can, at the Employer's option, be staggered to permit starting portions of the work force at various times within the prescribed hours. The Employer may establish a four (4) ten (10) hour shift exclusive of the thirty (30) minute lunch period at the straight time wage rate. Forty (40) hours per week shall constitute a week's work Monday through Thursday. In the event a job is down due to weather conditions, safety or other conditions beyond the control of the Employer, then Friday may, at the option of the employer, be worked as a make-up day at the straight time wage rate. Straight time is not to exceed ten (10) hours a day or forty (40) hours per week. Time and one-half (1 ½) shall be paid for all overtime hours worked during the week, Monday through Friday and for all work performed on Saturday. Double (2) time shall be paid for all time worked on Sunday and recognized holidays.

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**NO. 80:** Means eight (8) hours shall constitute the regular work day and forty (40) hours a work week, Monday through Friday. The Employer shall establish the starting time between 6:30 a.m. through 9:00 a.m. An Employer may further adjust the starting time up to 9:30 a.m. throughout the year. Time and one-half (1½) shall be paid after eight (8) consecutive hours worked after the established starting time and for hours worked before the established starting time. Time and one-half (1½) shall be paid for work performed on Saturdays. Work performed on Sundays and Holidays shall be paid at the double (2) time rate of pay. The Employer when working on Highway and Road Work may have the option to schedule the work week for his paving crew only from Monday through Thursday at ten (10) hours per day at the straight time rate of pay with all hours in excess of ten (10) hours in any one day to be at the applicable overtime rate of time and one-half (1½). If the Employer elects to work from Monday through Thursday and is stopped due to inclement weather (rain, snow, sleet falling), the Employer shall have the option to work Friday at the straight time rate of pay to complete the forty (40) hours.

**NO. 82:** Means the work day shall consist of eight (8) hours worked between 7:00 a.m. and 4:30 p.m. Forty (40) hours will constitute the work week from Monday through Friday, inclusive. Up to four (4) hours of overtime work per day performed before or after the assigned normal work day, (twelve (12) continuous hours, starting no earlier than 6:00 a.m., Monday through Friday), shall be paid at a rate of one and one-half times (1.5x) that employee's hourly rate. Any additional overtime, Monday through Friday, shall be paid at two times (2x) the regular rate of pay. The first eight hours of overtime work on Saturday shall be paid at the rate of one and one-half times (1.5x) the regular rate of pay. Hours worked in excess of eight (8) hours on Saturday shall be paid at two times (2x) the regular rate of pay. Double time shall be paid for work performed on Sundays, recognized legal holidays or days that may be celebrated as such as designated by the federal government. All shifts for work performed between the hours of 4:30 p.m. and 1:00 a.m. shall be paid at the regular hourly rate plus two dollars (\$2.00) per clock hour. All shifts for work performed between the hours of 12:30 a.m. and 9:00 a.m. shall be paid at the regular hour rate plus four dollars (\$4.00) per clock hour. All overtime work required after the completion of a regular shift shall be paid at one and one-half times (1.5x) the "shift" hourly rate.

**NO. 87:** Means eight (8) hours starting between 6:00 a.m. and 8:00 a.m. and ending between 2:30 p.m. and 4:30 p.m. at the Employers discretion shall constitute a day's work. Any work prior to 6:00 a.m. or after eight (8) hours shall be paid at the overtime rate. Five (5) days from Monday through Friday inclusive shall constitute a regular work week. All hours before and after these regular hours shall be considered overtime and shall be paid for at the rate of double (2) time. All work on Saturday and Sunday shall be paid at double (2) the prevailing scale of wages.

**NO. 91:** Means eight (8) hours shall constitute a day's work commencing at 7:00 a.m. and ending at 3:30 p.m., allowing one-half (½) hour for lunch. The option exists for the Employer to use a flexible starting time between the hours of 6:00 a.m. and 9:00 a.m. The regular workweek shall consist of forty (40) hours of five (5) workdays, Monday through Friday. The workweek may consist of four (4) ten (10) hour days from Monday through Thursday, with Friday as a make-up day. If the make-up day is a holiday, the employee shall be paid at the double (2) time rate. The employees shall be paid time and one-half (1½) for work performed on Saturdays, before the regular starting time or after the regular quitting time or over eight (8) hours per work day (unless working a 10-hour work day, then time and one-half (1½) is paid for work performed over ten (10) hours a day) or over forty (40) hours per work week. Work performed on Sundays and recognized holidays shall be paid at the double (2) time rate of pay. **SHIFT WORK:** When it is necessary for the project to operate in shifts, there will be three (3) eight (8) hour shifts commencing at 8:00 a.m. Shift work must continue for a period of not less than three (3) consecutive work days, two (2) days which must be regular work days (Monday through Friday). In the event the second or third shift of any regular work day shall fall into a Saturday or a holiday, such extension into a Saturday or holiday shall be considered as part of the previous workday and employees shall be paid at the regular shift rate. The first day shift shall work a regular eight (8) hour day at regular rates. The second shift shall be eight (8) hours regular time pay plus \$2.50 per hour premium for eight (8) hours work. Third shift will be for eight (8) hours regular time pay plus \$3.00 per hour premium for eight (8) hours work.

**NO. 92:** Means all work performed from 8:00 a.m. to 4:30 p.m., Monday through Friday, will be at straight time pay up to forty (40) hours per week. All work performed Monday through Friday before 8:00 a.m. and after 4:30 p.m. will be done at time and one-half (1½). All work done on Saturday will be done at time and one-half (1½), unless the employer and employee agree that Saturday shall be used as a make-up day. The Employer may use a flexible starting time of 7:00 a.m. to 8:00 a.m., and quitting time of 3:30 p.m. to 4:30 p.m., and any such different work starting time shall determine whether wages are payable at the straight rate or the premium rate. All work performed on Saturday shall be paid for at time and one-half (1½), unless the Saturday has been used as a make-up day. All work performed on Sunday and holidays shall be paid for at the rate of double (2) time.

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BUILDING CONSTRUCTION - OVERTIME SCHEDULE**

**NO. 104:** Means eight (8) hours per day shall constitute a standard work day between the hours of 6:00 a.m. and 8:00 p.m. The standard work week shall be forty (40) hours between 6:00 a.m. on Monday and ending 8:00 p.m. on Friday. An overtime rate of time and one-half ( $1\frac{1}{2}$ ) the base hourly rate shall be paid on all hours in excess of eight (8) hours in a day Monday through Friday. Saturdays shall be considered overtime and work done on Saturday shall be paid at time and one-half ( $1\frac{1}{2}$ ) the prevailing scale. Sundays and holidays shall be considered overtime and work done on these days shall be paid at double (2) the prevailing scale.

**NO. 116:** Means the standard work day shall consist of eight (8) hours of work between the hours of 8:00 a.m. and 4:30 p.m. The standard work week shall consist of five standard work days commencing on Monday and ending on Friday inclusive. All time worked before and after the established eight (8) hour work day, Monday through Friday, and all time worked on Saturdays, shall be paid for at the rate of time & one-half ( $1\frac{1}{2}$ ) the hourly base wage rate in effect. All time worked on Sundays and recognized holidays shall be paid for at the rate of double (2) the hourly base wage rate in effect.

**NO. 126:** Means eight (8) hours per day shall constitute a day's work and forty (40) hours per week, Monday through Friday, shall constitute a week's work. The regular starting time shall be 8:00 a.m. If a second or third shift is used, the regular starting time of the second shift shall be 4:30 p.m. and the regular starting period for the third shift shall be 12:30 a.m. These times may be adjusted by the employer. The day shift shall work a regular eight (8) hours shift as outlined above. Employees working a second shift shall receive an additional \$0.25 above the regular hourly rate and perform seven and one-half ( $7\frac{1}{2}$ ) hours work for eight (8) hours pay. Third shift employees shall be paid an additional \$0.50 above the regular hourly rate and work seven (7) hours for eight (8) hours pay. When circumstances warrant, the Employer may change the regular workweek to four (4) ten-hour days at the regular time rate of pay. All time worked before and after the established workday of eight (8) hours, Monday through Friday, and all time worked on Saturday shall be paid at the rate of time and one-half ( $1\frac{1}{2}$ ) except in cases where work is part of an employee's regular Friday shift. All time worked on Sunday and recognized holidays shall be paid at the double (2) time rate of pay except in cases where work is part of an employee's previous day's shift. For all overtime hours worked \$29.15 of the fringe benefits portion of the prevailing wage shall be paid at the same overtime rate at which the cash portion of the prevailing wage is to be paid. The remaining \$1.66 of the fringe benefit portion of the prevailing wage may be paid at straight time.



## **JEFFERSON COUNTY BUILDING CONSTRUCTION - HOLIDAY SCHEDULE**

**NO. 3:** All work done on New Year's Day, Decoration Day, July 4th, Labor Day, Veteran's Day, Thanksgiving and Christmas shall be compensated at the double (2) time rate of pay. When any of these holidays fall on a Sunday, the following Monday shall be observed.

**NO. 5:** All work that shall be done on New Year's Day, Memorial Day, Independence Day, Labor Day, Veteran's Day, Thanksgiving Day, and Christmas Day shall be paid twice the amount of his or her regular hourly wage rate for each hour or fraction thereof worked on any such day .

**NO. 6:** The following days are recognized as holidays: New Year's Day, Memorial Day, Fourth of July, Labor Day, Veterans Day, Thanksgiving Day, Christmas Day and any additional holidays which may be mutually agreed upon. Whenever any such holiday falls on a Sunday, the following Monday shall be recognized and observed as the holiday. Work performed on Sundays and holidays shall be paid at the double time rate of pay. No work shall be performed on Labor Day.

**NO. 7:** The following days are assigned days and are recognized as holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Veteran's Day, Thanksgiving Day, and Christmas Day. If a holiday falls on a Sunday, it shall be observed on the following Monday. If a holiday falls on a Saturday, it shall be observed on the preceding Friday. No work shall be performed on Labor Day except in case of jeopardy to work under construction. This is applied to protect Labor Day. When a holiday falls during the normal work week, Monday through Friday, it shall be counted as eight (8) hours toward the forty (40) hour week. However, no reimbursement for these eight (8) hours is to be paid to the workman unless worked. If workman are required to work the above enumerated holidays or days observed as such, or on Sunday, they shall receive double (2) the regular rate of pay for such work.

**NO. 8:** All work performed on New Year's Day, Memorial Day, Independence Day, Labor Day, Veteran's Day, Thanksgiving Day, and Christmas Day, or the days observed in lieu of these holidays, shall be paid at the double time rate of pay.

**NO. 12:** All work done on New Year's Day, Decoration Day, Independence Day, Veteran's Day, Thanksgiving Day and Christmas Day shall be paid at the double time rate of pay. Should any of these days fall on Sunday, then the following day shall be observed as the holiday. Under no circumstances shall employees be permitted to work on Labor Day.

**NO. 18:** All work done on New Year's Day, Memorial Day, July 4th, Labor Day, Veteran's Day, Thanksgiving Day, the Friday following Thanksgiving and Christmas Day shall be paid at the double time rate of pay. When one of the above holidays falls on Sunday, the following Monday shall be considered the holiday, and when one of the above holidays falls on Saturday, the preceding Friday shall be considered the holiday, and all work performed on said day(s) shall be paid at the double time rate.

**NO. 25:** All work done on New Year's Day, Martin Luther King Day, Memorial Day, Independence Day, Labor Day, Veteran's Day, Thanksgiving Day, the day after Thanksgiving, Christmas Day, Presidential Election Day, or days locally observed as such, and Saturday and Sunday shall be recognized as holidays and shall be paid at the double (2) time rate of pay. If a named holiday falls on a Saturday, the holiday will be observed on the preceding Friday. When a named holiday falls on Sunday, the Monday after will be observed as the holiday. Appropriate overtime rates to be based on fifteen minute increments.

**NO. 26:** All work done on New Year's Day, Memorial Day, Fourth of July, Labor Day, Veteran's Day, Thanksgiving Day and Christmas Day shall be paid at the double time rate of pay. When a Holiday occurs on Saturday it shall not be observed on either the previous Friday or the following Monday. Such days shall be regular work days. If such a holiday occurs on Sunday it shall be observed on the following Monday.

**NO. 31:** All work done on New Year's Day, Presidents Day, Good Friday, Memorial Day, Fourth of July, Labor Day, Veteran's Day, Thanksgiving Day, Friday after Thanksgiving Day, Christmas Day, and Employee's Birthday shall be paid at the double time rate of pay. If a holiday falls on Sunday, the following Monday will be observed as the recognized holiday. If a holiday falls on Saturday, the preceding Friday will be observed as the recognized holiday.

## **JEFFERSON COUNTY BUILDING CONSTRUCTION - HOLIDAY SCHEDULE**

**NO. 36:** The following days are recognized as holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day. If a holiday falls on a Sunday, it shall be observed on the following Monday. No work shall be performed on Labor Day except in case of jeopardy to work under construction. This rule is applied to protect Labor Day. When a holiday falls during the normal work week, Monday through Friday, it shall be counted as eight (8) hours toward the forty (40) hour week; however, no reimbursement for this eight (8) hours is to be paid the workman unless worked. An Employer working a four (4) day, ten (10) hour schedule may use Friday as a make-up day when an observed holiday occurs during the work week. Employees have the option to work that make-up day. If workmen are required to work the above enumerated holidays, or days observed as such, they shall receive double (2) the regular rate of pay for such work.

**NO. 41:** The following days shall be observed as legal holidays: New Year's Day, Memorial Day, Fourth of July, Labor Day, Veteran's Day, Thanksgiving Day and Christmas Day. No work shall be performed on the Fourth of July, Labor Day or Christmas Day. Any work performed on the above holidays shall be paid for at two (2) times the regular straight time rate of pay. When any of the above holidays fall on Sunday, the following Monday shall be observed as such holiday. If a holiday falls on Saturday, it shall not be considered to be observed on the previous Friday or following Monday. Such days shall be regular workdays.

**NO. 45:** All work performed on New Year's Day, Memorial Day, Independence Day, Labor Day, Veteran's Day, Thanksgiving Day, the day after Thanksgiving, the day before Christmas, and Christmas Day, shall be paid at the double time rate of pay.

**NO. 47:** The following holidays are recognized: New Year's Day, Memorial Day, Fourth of July, Labor Day, Veteran's Day, Thanksgiving Day, the day after Thanksgiving and Christmas Day. When a holiday listed above falls on Saturday, it shall be celebrated on the Friday preceding the holiday. When a holiday falls on Sunday, the following Monday shall be observed. Holidays referred to above shall be paid for at the double (2) time rate of pay when worked.

**NO. 51:** All time worked on Sundays and recognized holidays shall be paid for at the rate of double (2) the hourly base wage rate in effect. The Employer agrees to recognize the following holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Veteran's Day, Thanksgiving Day and Christmas Day. If the holiday falls on Sunday, it shall be recognized on the following Monday. If the holiday falls on a Saturday, it shall be recognized as a Saturday only holiday.

**NO. 54:** All work performed on New Year's Day, Memorial Day, Independence Day, Labor Day, Veteran's Day, Thanksgiving Day, the Friday after Thanksgiving Day, and Christmas Day shall be paid at the double (2) time rate of pay. When a holiday falls on Saturday, it shall be observed on Friday. When a holiday falls on Sunday, it shall be observed on Monday.

**NO. 55:** The following days are recognized as holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day. If a holiday falls on a Sunday, it shall be observed on the following Monday. No work shall be performed on Labor Day except in case of jeopardy to work under construction. This rule is applied to protect Labor Day. When a holiday falls during the normal work week, Monday through Friday, it shall be counted as eight (8) hours toward the forty (40) hour week; however, no reimbursement for this eight (8) hours is to be paid the workmen unless worked. An Employer working a four (4) day, ten (10) hour schedule may use Friday as a makeup day when an observed holiday occurs during the work week. Employees have the option to work that make up day. If workmen are required to work the above enumerated holidays, or days observed as such, they shall receive double (2) the regular rate of pay for such work.

**NO. 60:** All work performed on New Year's Day, Armistice Day (Veteran's Day), Decoration Day (Memorial Day), Independence Day (Fourth of July), Thanksgiving Day and Christmas Day shall be paid at the double time rate of pay. No work shall be performed on Labor Day except when triple (3) time is paid. When a holiday falls on Saturday, Friday will be observed as the holiday. When a holiday falls on Sunday, the following Monday shall be observed as the holiday.

**JEFFERSON COUNTY  
BUILDING CONSTRUCTION - HOLIDAY SCHEDULE**

**NO. 66:** All work performed on Sundays and the following recognized holidays, or the days observed as such, of New Year's Day, Decoration Day, Fourth of July, Labor Day, Veteran's Day, Thanksgiving Day and Christmas Day, shall be paid at double (2) the hourly rate plus an amount equal to the hourly Total Indicated Fringe Benefits. Whenever any such holidays fall on a Sunday, the following Monday shall be observed as a holiday.

**NO. 69:** All work performed on New Year's Day, Memorial Day, July Fourth, Labor Day, Veteran's Day, Thanksgiving Day or Christmas Day shall be compensated at double (2) their straight-time hourly rate of pay. Friday after Thanksgiving and the day before Christmas are also holidays, however, if the employer chooses to work the normal work hours on these days, the employee will be paid at straight -time rate of pay. If a holiday falls on a Saturday, the holiday will be observed on Saturday; if a holiday falls on a Sunday, the holiday will be observed on the following Monday.

**NO. 71:** All work performed on the following recognized holidays, or days that may be celebrated as such, shall be paid at the double (2) time rate of pay: New Year's Day, Memorial Day, Independence Day, Labor Day, Veterans Day, Thanksgiving Day, Day after Thanksgiving and Christmas Day. If a holiday falls on Sunday, it shall be celebrated on Monday. If a holiday falls on Saturday, it shall be celebrated on the Friday proceeding such Saturday.

**NO. 73:** The following days are recognized as holidays: New Year's Day, Memorial Day, Fourth of July, Labor Day, Veteran's Day (or mutually agreed date of the Friday after Thanksgiving Day may be substituted for Veteran's Day), Thanksgiving Day and Christmas Day, or in the event that any of said Holidays falls on Sunday, then the day or days generally recognized as such. Any work performed anywhere on any of the aforesaid Holidays, or on the day or days recognized and observed as such, shall be paid for at double (2) time the regular hourly rate.

OCCUPATIONAL TITLE	* Date of Increase	Basic Hourly Rates	Over-Time Schedule	Holiday Schedule	Total Fringe Benefits
Carpenter	6/18	\$37.33	23	16	\$17.10
Cement Mason	6/18	\$32.66	17	11	\$19.00
Electrician (Outside-Line Construction\Lineman)		\$44.56	9	12	\$5.75 + 36%
Lineman Operator		\$38.35	9	12	\$5.75 + 36%
Lineman - Tree Trimmer	6/18	\$25.62	32	31	\$11.70 + 3%
Groundman		\$29.48	9	12	\$5.75 + 36%
Groundman - Tree Trimmer	6/18	\$20.30	32	31	\$8.88 + 3%
Laborer					
General Laborer	6/18	\$31.16	2	4	\$13.82
Skilled Laborer	6/18	\$31.76	2	4	\$13.82
Millwright	6/18	\$37.33	23	16	\$17.10
Operating Engineer					
Group I	6/18	\$32.96	10	9	\$27.43
Group II	6/18	\$32.96	10	9	\$27.43
Group III	6/18	\$31.66	10	9	\$27.43
Group IV	6/18	\$28.20	10	9	\$27.43
Oiler-Driver	6/18	\$28.66	10	9	\$27.43
Pile Driver	6/18	\$37.33	23	16	\$17.10
Traffic Control Service Driver		\$28.775	26	25	\$9.045
Truck Driver-Teamster		\$30.41	25	21	\$10.82

Use Heavy Construction Rates on Highway and Heavy construction in accordance with the classifications of construction work established in 8 CSR 30-3.040(3).

Use Building Construction Rates on Building construction in accordance with the classifications of construction work established in 8 CSR 30-3.040(2).

If a worker is performing work on a heavy construction project within an occupational title that is not listed on the Heavy Construction Rate Sheet, use the rate for that occupational title as shown on the Building Construction Rate sheet.

## JEFFERSON COUNTY HEAVY CONSTRUCTION - OVERTIME SCHEDULE

**FED:** Minimum requirement per Fair Labor Standards Act means time and one-half ( $1\frac{1}{2}$ ) shall be paid for all work in excess of forty (40) hours per work week.

**NO. 2:** Means a regular workweek shall be forty (40) hours and will start on Monday and end on Friday. The Employer shall have the option of working five 8-hour days or four 10-hour days Monday through Friday. If an Employer elects to work five 8-hour days during any workweek, hours worked more than eight (8) per day or 40 per week shall be paid at time and one-half the hourly rate Monday through Friday. If an Employer elects to work four 10-hour days in a week, work performed more than ten (10) hours per day or 40 hours per week shall be paid at time and one-half the hourly rate Monday through Friday. When working a five 8-hour day schedule and an Employer is prevented from working forty (40) hours Monday through Friday, or any part thereof, by reason of inclement weather, Saturday or any part thereof may be worked as a make-up day at the straight time rate. If an Employer is working a four 10-hour day schedule and loses a day due to inclement weather, he may work 10 hours Friday at straight time. All hours worked over the 40 hours Monday through Friday will be paid at  $1\frac{1}{2}$  overtime rate. A workday shift is to begin at the option of the Employer, between 6:00 a.m. and not later than 9:00 a.m. However, the project starting time may be advanced or delayed if required. If workmen are required to work the enumerated holidays or days observed as such or Sundays, they shall receive double (2) the regular rate of pay for such work. Overtime shall be computed at one-half ( $1/2$ ) hour intervals. Shift: The Contractor may elect to work one, two or three shifts on any work. When operating on more than one shift, the shifts shall be known as the day shift, swing shift, and graveyard shift as such terms are recognized in the industry. When two shifts are worked on any operation, the shifts will consist of eight (8) or ten (10) hours exclusive of lunchtime. When three shifts are worked the first day or day shift will consist of eight (8) hours exclusive of lunchtime. The second or swing shift shall consist of seven and one-half ( $7\frac{1}{2}$ ) hours work for eight hours pay, exclusive of lunchtime, and the third or the graveyard shift shall consist of seven (7) hours work for eight (8) hours pay, exclusive of the lunchtime. All time in excess of normal shifts shall be considered overtime. Multiple shift (the two or three shift) operation will not be construed on the entire project if at anytime it is deemed advisable and necessary for the Employer to multiple shift a specific operation. However, no shift shall be started between midnight and six a.m. except the graveyard shift on a three-shift operation, or except in an unusual or emergency situation. If an Employer starts a shift between midnight and 6 a.m. except the graveyard shift on a three-shift operation, he shall reimburse all employees for the entire shift at the double time rate. Completion of the second shift on a two-shift operation or completion of the graveyard shift on a three-shift operation that carries over into Saturday morning shall be at the straight time rate. Overtime shall be computed at  $\frac{1}{2}$  hour intervals.

**NO. 9:** Eight (8) hours shall constitute a work day between the hours of 7:00 a.m. and 4:30 p.m. Forty (40) hours within five (5) days, Monday through Friday inclusive, shall constitute the work week. Work performed in the 9th and 10th hour, Monday through Friday, shall be paid at time and one-half ( $1\frac{1}{2}$ ) the regular straight time rate of pay. Contractor has the option to pay two (2) hours per day at the time and one-half ( $1\frac{1}{2}$ ) the regular straight time rate of pay between the hours of 6:00 a.m. and 5:30 p.m., Monday through Friday. Work performed in the first eight (8) hours on Saturday shall be paid at the rate of one and eight tenths (1.8) the regular straight time rate. Work performed outside these hours and on Sundays and recognized legal holidays, or days celebrated as such, shall be paid for at the rate of double (2) time.

## JEFFERSON COUNTY HEAVY CONSTRUCTION - OVERTIME SCHEDULE

**NO. 10:** Means the regular workday for which employees shall be compensated at straight time hourly rate of pay shall, unless otherwise provided for, begin at 8:00 a.m. and end at 4:30 p.m. The regular workweek shall consist of five (5) days, Monday through Friday, beginning at 8:00 a.m. and ending at 4:30 p.m. except as may be modified. The starting time may be either advanced or delayed one hour or two hours at the discretion of the Employer. The Employer may have the option to schedule his work week from Monday through Thursday at ten (10) hours per day at the straight time rate of pay with all hours in excess of ten (10) hours in any one day to be at the applicable overtime rate. If the Employer elects to work Monday through Thursday and is stopped due to inclement weather, holidays or other conditions beyond the control of the Employer, he shall have the option to work Friday at the straight time rate of pay to complete the forty (40) hour workweek. All necessary overtime and work performed on Saturday, shall be paid at time and one-half ( $1\frac{1}{2}$ ) the hourly rate, plus an amount equal to one-half ( $\frac{1}{2}$ ) of the hourly Total Indicated Fringe Benefits. All work performed on Sundays and recognized holidays shall be paid at double (2) the hourly rate, plus an amount equal to the hourly Total Indicated Fringe Benefits. Shifts may be established when considered necessary by the Employer. Shift hours and rates will be as follows. If shifts are established, work on the First Shift will begin between 6:00 a.m. and 9:00 a.m. and consist of eight (8) hours of work plus one-half hour unpaid lunch. Hours worked during the first shift will be paid at the straight time rate of pay. The second shift shall start eight hours after the start of the first shift and consist of eight (8) hours of work plus one-half hour unpaid lunch. Work on the second shift will begin between 2:00 p.m. and 5:00 p.m. and be paid the straight time rate plus \$2.50 per hour. The third shift shall start eight hours after the start of the second shift and consist of eight (8) hours plus one-half hour unpaid lunch. Work on the third shift will begin between 10:00 p.m. and 1:00 a.m. and be paid the straight time rate plus \$3.50 per hour. The additional amounts that are to be paid are only applicable when working shifts. Shifts that begin on Saturday morning through those shifts which end on Sunday morning will be paid at time and one-half these rates. Shifts that begin on Sunday morning through those shifts which end on Monday morning will be paid at double time these rates.

**NO. 17:** Means eight (8) hours shall constitute the regular work day and forty (40) hours a work week, Monday through Friday. The Employer shall establish the starting time between 6:30 a.m. through 9:00 a.m. An Employer may further adjust the starting time up to 9:30 A.M. throughout the year. Time and one-half ( $1\frac{1}{2}$ ) shall be paid after eight (8) consecutive hours worked after the established starting time and for hours worked before the established starting time. Time and one-half ( $1\frac{1}{2}$ ) shall be paid for work performed on Saturdays. Work performed on Sundays and Holidays shall be paid at the double (2) time rate of pay. The Employer when working on Highway and Road Work may have the option to schedule the work week for his paving crew only from Monday through Thursday at ten (10) hours per day at the straight time rate of pay with all hours in excess of ten (10) hours in any one day to be at the applicable overtime rate of time and one-half ( $1\frac{1}{2}$ ). If the Employer elects to work from Monday through Thursday and is stopped due to inclement weather (rain, snow, sleet falling), the Employer shall have the option to work Friday at the straight time rate of pay to complete the forty (40) hours.

**NO. 23:** Means the regular workweek shall start on Monday and end on Friday, except where the Employer elects to work Monday through Thursday, (10) hours per day. All work over ten (10) hours in a day or forty (40) hours in a week shall be at the overtime rate of one and one-half ( $1\frac{1}{2}$ ) times the regular hourly rate. The regular workday shall be either eight (8) or ten (10) hours. If a job can't work forty (40) hours Monday through Friday because of inclement weather or other conditions beyond the control of the Employer, Friday or Saturday may be worked as a make-up day at straight time (if working 4-10's). Saturday may be worked as a make-up day at straight time (if working 5-8's). An Employer, who is working a four (4) ten (10) hour day work schedule may use Friday as a make-up day when a workday is lost due to a holiday. A workday is to begin at the option of the Employer but not later than 11:00 a.m. except when inclement weather, requirements of the owner or other conditions beyond the reasonable control of the Employer prevent work. Except as worked as a make-up day, time on Saturday shall be worked at one and one-half ( $1\frac{1}{2}$ ) times the regular rate. Work performed on Sunday shall be paid at two (2) times the regular rate. Work performed on recognized holidays or days observed as such, shall also be paid at the double (2) time rate of pay. For all overtime hours worked during the week or on Saturday \$16.25 of the fringe benefits portion of the prevailing wage shall be paid at time and one-half ( $1\frac{1}{2}$ ). For all overtime hours worked on Sundays or recognized holidays \$16.25 of the fringe benefits portion of the prevailing wage shall be paid double time. The remaining \$.60 of the fringe benefit portion of the prevailing wage shall be paid at straight time.

**JEFFERSON COUNTY  
HEAVY CONSTRUCTION - OVERTIME SCHEDULE**

**NO. 25:** Means a regular work week of forty (40) hours, starting on Monday and ending on Friday. The regular work day shall be either eight (8) or ten (10) hours. If a crew is prevented from working forty (40) hours Monday through Friday, or any part thereof by reason of inclement weather, Saturday or any part thereof maybe worked as a make-up day at the straight time rate. Employees who are part of a regular crew on a make-up day, notwithstanding the fact that they may not have been employed the entire week, shall work Saturday at the straight time rate. A work day is to begin between 6:00 a.m. and 9:00 a.m. However, the project starting time maybe advanced or delayed if mutually agreed to by the interest parties. All hours worked on recognized holidays, or days observed as such, double (2) time shall be paid.

**NO. 26:** Means a regular work week of forty (40) hours will start on Monday and end on Friday. The regular work day shall be either eight (8) or ten (10) hours. If a crew is prevented from working forty (40) hours Monday through Friday, or any part thereof by reason of inclement weather, Saturday or any part thereof may be worked as a make-up day at the straight time rate. Employees who are part of a regular crew on a make-up day, notwithstanding the fact that they may not have been employed the entire week, shall work Saturday at the straight time rate. A workday is to begin between 6:00 a.m. and 9:00 a.m. However, the project starting time may be advanced or delayed if mutually agreed to by the interest parties. For all time worked on recognized holidays, or days observed as such, double (2) time shall be paid.

**NO. 32:** Means the overtime rate shall be time and one-half the regular rate for work over forty (40) hours per week. Sundays and Holidays shall be paid at double the straight time rate.



## **JEFFERSON COUNTY HEAVY CONSTRUCTION - HOLIDAY SCHEDULE**

**NO. 4:** All work performed on New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Christmas Day, or observed as such, shall be paid at the double time rate of pay. When a Holiday falls on a Sunday, Monday shall be observed. No work shall be performed on Labor Day, except in case of jeopardy to life or property. This is applied to protect Labor Day.

**NO. 9:** All work performed on Sundays and the following recognized holidays, or the days observed as such, of New Year's Day, Decoration Day, Fourth of July, Labor Day, Veteran's Day, Thanksgiving Day and Christmas Day, shall be paid at double (2) the hourly rate plus an amount equal to the hourly Total Indicated Fringe Benefits. Whenever any such holidays fall on a Sunday, the following Monday shall be observed as a holiday.

**NO. 11:** Means all work performed on New Year's Day, Memorial Day, Fourth of July, Labor Day, Veteran's Day, Thanksgiving Day, Christmas Day, and any additional holidays which may be mutually agreed upon shall be paid at the double (2) time rate of pay. Whenever any such holiday falls on a Sunday, the following Monday shall be recognized and observed as the holiday. No work shall be performed on Labor Day.

**NO. 12:** All work performed on New Year's Day, Memorial Day, Fourth of July, Labor Day, Veteran's Day, Thanksgiving Day, Christmas Day, or days celebrated as such, shall be paid at the double time rate of pay. When one of the foregoing holidays falls on Sunday, it shall be celebrated on the following Monday. When one of the foregoing holidays falls on Saturday, it shall be celebrated on the Friday before the holiday.

**NO. 16:** The following days are recognized as holidays: New Year's Day, Memorial Day, Fourth of July, Labor Day, Thanksgiving Day and Christmas Day. If a holiday falls on Sunday, it shall be observed on the following Monday. If a holiday falls on Saturday, it shall be observed on the preceding Friday. No work shall be performed on Labor Day except in case of jeopardy to work under construction. This rule is applied to protect Labor Day. When a holiday falls during the normal work week, Monday through Friday, it shall be counted as eight (8) hours toward the forty (40) hour week; however, no reimbursement for this eight (8) hours is to be paid to the worker unless worked. If workers are required to work the above recognized holidays or days observed as such, they shall receive double (2) the regular rate of pay for such work.

**NO. 21:** The following days are recognized as holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day. If a holiday falls on a Sunday, it shall be observed on the following Monday. No work shall be performed on Labor Day except in case of jeopardy to work under construction. This rule is applied to protect Labor Day. When a holiday falls during the normal work week, Monday through Friday, it shall be counted as eight (8) hours toward the forty (40) hour week; however, no reimbursement for this eight (8) hours is to be paid the workman unless worked. An Employer working a four (4) day, ten (10) hour schedule may use Friday as a make-up day when an observed holiday occurs during the work week. Employees have the option to work that make-up day. If workmen are required to work the above enumerated holidays, or days observed as such, they shall receive double (2) the regular rate of pay for such work.

**NO. 25:** The following days are recognized as holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day. If a holiday falls on a Sunday, it shall be observed on the following Monday. No work shall be performed on Labor Day except in case of jeopardy to work under construction. This rule is applied to protect Labor Day. When a holiday falls during the normal work week, Monday through Friday, it shall be counted as eight (8) hours toward the forty (40) hour week; however, no reimbursement for this eight (8) hours is to be paid the workmen unless worked. An Employer working a four (4) day, ten (10) hour schedule may use Friday as a make-up day when an observed holiday occurs during the work week. Employees have the option to work that make up day. If workmen are required to work the above enumerated holidays, or days observed as such, they shall receive double (2) the regular rate of pay for such work.

**NO. 31:** All work performed on New Year's Day, Presidents' Day, Veterans' Day, Good Friday, Decoration Day, Fourth of July, Labor Day, Christmas Eve Day, Christmas Day, Thanksgiving Day and Day after Thanksgiving or days celebrated for the same.

# **PROJECT MANUAL FOR**

Jefferson County, MO  
Administration Center Renovation  
Project No.: PW19B007BLD

**Prepared for  
Jefferson County, MO**

DATE: December 2018

DOCUMENT 00 01 10

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Hillsboro, Missouri 63050

Project No.: PW19B007BLD

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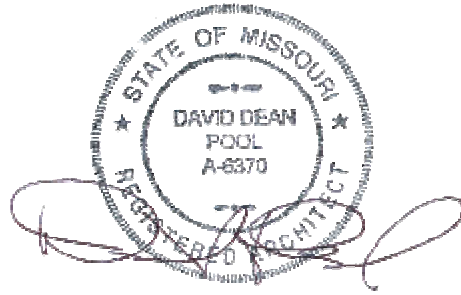
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## PROFESSIONAL SEALS AND CERTIFICATIONS

The following design professionals have signed and sealed the original plans and specifications for this project, Administration Center Renovation of Jefferson County, Missouri, Project No. 845-2606

David D. Pool, AIA  
Licensed Architect  
Missouri License  
Hurst-Rosche, Inc.  
3675 West Outer Road, Suite 101  
Arnold, Missouri 63010  
Phone: (636) 333-3351



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END OF SECTION

DOCUMENT 00 21 14

INSTRUCTIONS TO BIDDERS - AIA

PART 1 GENERAL

1.1 SUMMARY

- A. Document Includes:
  - 1. Instructions to Bidders.
  - 2. Facility examination.
  - 3. Prebid conference.
- B. Related Documents:
  - 1. Document 00 11 16 - Invitation To Bid.
  - 2. Document 00 31 00 - Available Project Information.
  - 3. Document 00 41 43 - Bid Form - Unit Price.
  - 4. Document 00 72 14 - General Conditions - AIA Stipulated Sum.
  - 5. Document 00 73 13 - Supplementary Conditions - AIA.

1.2 INSTRUCTIONS TO BIDDERS

- A. These Instructions to Bidders amend or supplement AIA Document A701-1997 - Instructions to Bidders and other provisions of Bidding Documents and Contract Documents.
- B. To be considered all bids must in accordance with these Instructions to Bidders.
- C. Those interested parties may obtain sets of Drawings and Specifications from the County website.

1.3 SITE EXAMINATION

- A. Bidders shall carefully examine documents and construction site to obtain first-hand knowledge of existing conditions. Contractors will not be given extra payments for conditions, which can be determined by examining site and these documents.
- B. Contact Jefferson County, MO; attention of Mark McGee, at the following address and phone number to arrange date and time to visit Project site:
  - 1. Address: 725 Maple Street  
Hillsboro, MO 63050
  - 2. Telephone: (636) 797-5011

1.4 THE SCHEDULE FOR BIDDING THIS PROJECT IS AS FOLLOWS

- A. Plans Available: County Website
- B. Latest Time to Submit  
Request for Interpretation: 7 Days Before Bid

- C. Latest Time to Issue an Addendum: 2 Days Before Bid
- D. Bid Closing 2/5/2019
- E. Bid Opening 2/5/2019  
Administration Center
- F. All requests for interpretations shall be in writing via mail or fax addressed to the Engineer and must be received seven (7) calendar days prior to date fixed for opening of bids in order to be given consideration. All questions must be submitted on the "Request for Interpretation Pre-Bid Question and Comment Form" included at the end of this section, and questions not submitted in accordance with this form and specified time frame will not be accepted. Any and all interpretations and supplemental instructions will be made by addendum to the Drawings and Specifications and forwarded to all bidders either by certified mail or fax transmittal. All responses by the Engineer must be in writing to be binding. Any response general in nature or affecting these Instructions to Bidders shall be sent via addendum as previously described. All bidders are required to return the signature page of the addendum, signed, and to the Engineer within 24 hours after receipt. Failure of any bidder to receive any such addendum or interpretations shall not relieve such bidder from an obligation under the bid as submitted. All addenda so issued shall become part of the Contract Documents. No addendum will be issued later than two (2) calendar days prior to bid date except one withdrawing the request for Bids or one postponing date for receiving Bids. Oral interpretations, changes or corrections will not be binding and Bidders shall not rely upon such interpretations, changes and corrections. Each Bidder shall ascertain prior to submitting Bid that all addenda issued have been received and shall acknowledge receipt in Bid.
- G. Materials, products and equipment described in Bidding Documents establish a standard of required function, dimension, appearance and quality to be met by any proposed substitution. No substitution will be considered prior to receipt of Bids unless the Engineer has received a written request for approval at least ten (10) days prior to the date for receipt of Bids. Each such request shall include name of material or equipment for which it is to be substituted and a complete description of the proposed substitute including drawings, cuts, performance and test data and any other information necessary for an evaluation. A statement setting forth any changes in other materials, equipment or other work that incorporation of the substitute would require shall be included. The burden of proof of the merit of proposed substitute is upon the proposer. Engineer's decision of approval or disapproval of a proposed substitution shall be final. If the Engineer approves any proposed substitution prior to receipt of Bids, such approval will be set forth in an addendum. Bidders shall not rely upon approvals made in any other manner. No substitutions will be considered after the contract award unless specifically provided in the Contract Documents.
- H. Bids shall be made on unaltered Bid Forms furnished by the Engineer. Fill in all blank spaces and submit three (3) copies. Bids shall be signed with name typed below signature. Where bidder is a corporation, bids must be signed with legal name of corporation followed by name of state of incorporation and legal signature of an officer authorized to bind the corporation to a contract.



- I. Each bidder submitting a bid shall submit on form provided a list of any subcontractors and major suppliers he proposes to use with the bid. Failure to do so could disqualify the bid.
- J. Each bidder shall designate on the attached bid form one person who shall serve as the bidder's contact person for all matters pertaining to the bid. In absence of such designation, the person who signs the bid shall be deemed the bidder contact.
- K. Each bid shall be accompanied by bid bond made payable to the Owner, in the amount of 5 percent of the bid sum. Security shall be either certified check, cashier's check, bank money order or bid bond issued by surety licensed to conduct business in the State of Missouri. Successful bidder's security will be retained until he has signed the contract and furnished required payment and performance bonds. Owner reserves the right to retain security of the next two (2) lowest bidders until the lowest bidder enters into contract or until Ninety (90) days after bid opening, whichever is shorter. All other bid security will be returned as soon as practicable. If any bidder refuses to enter into a contract, Owner will retain bid security as liquidated damages, but not as a penalty.
- L. All costs associated with the preparation and submission of a bid is the sole responsibility of the bidder. These costs shall not be chargeable to the Owner by any successful or unsuccessful bidder. All bids become the property of the Owner and shall not be returned except in the case of a late submission.
- M. Simultaneously, with delivery of the executed contract, the successful bidder, at its own expense, shall furnish surety in the form of a performance bond and a labor and material payment bond in the amount of one hundred percent (100%) of the contract amount. Surety for such bonds shall be a company duly authorized and licensed in the State of Missouri and acceptable to the Owner. The Attorney-In-Fact who signs bid bonds or contract bonds must file with each bond a certified and effectively dated copy of their power of attorney.
- N. All copies of the bid, bid security and any other documents required to be submitted with bid shall be enclosed in a sealed opaque envelope. Envelope shall be addressed to **Department of the County Clerk, Jefferson County Administration Center, 729 Maple Street, Hillsboro, MO 63050**, and shall be identified with project name, bidder's name and address. Mailed bid envelopes shall be enclosed in a separate mailing envelope with the notation "SEALED BID ENCLOSED" on the face thereof. Oral, telephonic or telegraphic Bids are invalid and will not receive consideration. Bids shall be deposited at the location designated in the Invitation to Bid prior to time and date designated for opening, or any extension thereof made by addendum. Bidder shall assume full responsibility for timely delivery at location designated for receipt of Bids. Bids received after time and date for receipt of bids will be returned unopened.
- O. A bid may not be modified, withdrawn or canceled during the Ninety (90) days immediately following bid opening, and each bidder so agrees in submitting his Bid. Any bidder may withdraw, cancel or modify its bid, at any time prior to scheduled time for opening of bids, by letter or telegram actually received by Owner prior to bid time, or, with proper identification, by personally securing bid submitted; if by telegram, written confirmation over signature of bidder shall be mailed and postmarked on or before date and time of bid opening. Withdrawn bids may be resubmitted up to bid opening time provided that they are in full compliance with these Instructions to Bidders.

- P.     Protests
1.     Any bidder who submitted a bid and believes the bid was improperly rejected or that the bid selected by the Owner is not in the best interest of the Owner may submit a written notice of intent to protest the bid to the Owner within seven (7) days. The Owner shall consider all protests before execution of a contract. Each protest must specify the reasons supporting the protest. The Owner may require that additional information be provided. Failure to supply such required information shall be cause for dismissal of the protest.
  2.     The Owner shall immediately investigate the allegations against the Owners actions and shall issue a written response to the protest.
  3.     This provision allowing for the submission of protest shall not confer any right on any bidder but is intended solely to assist the Owner in determining the best responsible bid.
- Q.     Any complaint or protest of the bidding procedure must be filed by the bidder to the Owner within seven (7) days of bid opening. The bidder shall notify the Owner in writing of his intent to protest bidding. The bidder shall perfect this notice of intent within seven (7) days.
- R.     Owner reserves right to disqualify bids and bidders, before or after opening, upon evidence of collusion with intent to defraud or other illegal practices upon part of bidder, lack of responsibility as evidenced by poor workmanship and progress of past work, incomplete work which, in judgment of Owner, might hinder or prevent prompt completion of additional work if awarded, for being in arrears on existing contracts, in litigation with the Owner, or having defaulted on a previous contract.
- S.     Bidder's attention is directed to the fact that all Federal and Missouri State Laws, municipal ordinances and regulations of any and all authority having jurisdiction over construction of the project shall apply to the contract throughout, and they will be deemed to be included in the contract the same as though herein written out in full. Successful Bidders shall be required to observe the Prevailing Wage Determination, as issued by the Missouri Department of Labor.
- T.     Owner is exempt from payment of Missouri Department of Revenue's Use and Sales Tax on material entering permanently into structure. Retail sales tax shall not be included in the bid amount.
- U.     Bids will be opened as announced in Invitation for Bids.
- V.     Owner reserves the right to reject any or all bids or any part thereof, to waive any informalities in bidding and to accept bids deemed most favorable to the Owner.
- W.     Notwithstanding any delay in preparation and execution of the formal Contract Agreement, each bidder shall be prepared, upon written notice of bid acceptance, to commence work within ten (10) days following receipt of official written Notice to Proceed, or on date stipulated in such notice.
- X.     Any work in providing or preparing to provide the services specified herein that is commenced by the successful bidder prior to execution of a written contract agreement shall be at the bidder's expense.

- Y. Accepted bidder shall assist and cooperate with the Owner in preparing the formal Contract Agreement, and, within fifteen (15) days following its presentation, shall execute it and return it to Owner.
- Z. The Owner requires the Project to be substantially completed in 120 calendar days from the Construction Start Date as stipulated in the Notice to Proceed. Should the Contractor fail to complete the Work within such time, contractor agrees to pay and will apply to the Owner for each and every day of such delay in completion of the Work beyond the Contract Time the sum of \$500.00 per day for Work not completed by the substantial completion date as liquidated damages.
- AA. If the successful bidder is doing business in the State of Missouri under a fictitious name, he/she shall furnish to the Owner, attached to the Bid Form, a properly certified copy of the certificate of Registration of Fictitious Name from the State of Missouri, and such certificate shall remain on file with the Owner.
- BB. Any successful bidder that is a corporation organized in a state other than Missouri shall furnish to the Owner, attached to the Bid Form, a properly certified copy of its current Certificate of Authority to do business in the State of Missouri, such certificate to remain on file with the Owner. No contract will be awarded by the Owner unless such certificate is furnished by the bidder.
- CC. Any successful bidder that is a corporation organized in the State of Missouri shall furnish at its own cost to the Owner, if requested, a Certificate of Good Standing issued by the Secretary of State, such certificate to remain on file with the Owner.
- DD. Section 285.230-234 RSMo 1994, transient employers (out-of-state employers who temporarily transact any business in the State of Missouri) may be required to file a bond with the Missouri Department of Revenue. No contract will be awarded by the Owner unless the successful bidder certifies that he/she has complied with all applicable provisions of Section 285.230-234 RSMo.

#### 1.5 STATEMENT OF BIDDER'S QUALIFICATIONS

- A. At the Owner request, each bidder may have to submit as part of the bid, a statement of bidder's qualifications which may be a part of the bid submittal documents as to provide a summary of past work experience. The Owner shall have the right to take such steps as it deems necessary to determine the ability of the bidder to perform the work and the bidder shall furnish to the Owner such additional information and data for this purpose as is requested. The Owner reserves the right to reject any bid where an investigation or consideration of the information submitted by such bidder does not satisfy the Owner that the bidder is qualified and experienced in performing the requirements of the contract documents.

#### 1.6 OWNER APPROVAL OF CONTRACTOR'S SUBCONTRACTORS, PROFESSIONAL CONSULTANTS AND MAJOR SUPPLIERS

- A. The Owner reserves the right to review and approve all Contractor's subcontractors, professional consultants and major suppliers, proposed to be used on this contract. The Owner is endeavoring the use of subcontractors, professional consultants and major suppliers, who have past experience with the type of construction, professional services

and supplier of construction materials that the project requires, for the successful and timely completion. All professional consultants shall be registered in the State of Missouri to provide the services to be rendered for this project. The Owner shall have the right to take such steps as it deems necessary to determine the ability of the subcontractors, professional consultants and suppliers to perform their contract requirements, and the Contractor shall furnish to the Owner a statement of qualifications for such purpose, with the Owner having the right to request additional information. The Owner reserves the right to reject any of the Contractor's subcontractors, professional consultants and suppliers where an investigation or consideration of the information submitted does not satisfy the Owner that the subcontractor, professional consultant or supplier is qualified and experienced to perform their respective obligations and duties of the contract documents. Contractor shall be required to resubmit names and credentials of replacement firms, within seven (7) days after receipt of a Letter of Denial, for those firms not approved by the Owner. Owner's denial of any of the Contractor's subcontractors, professional consultants or major suppliers will not cause the Contractor to be entitled to any additional compensation for having to replace unapproved firm(s), nor abrogate the Contractor's responsibility to complete and fulfill this contract in a satisfactory and timely manner.

#### 1.7 EXCESSIVE UNEMPLOYMENT

- A. The Contractor is responsible for determining if this contract will be awarded during a period of excessive unemployment as defined in Sections 290.550 RSMo through 290.580 RSMo. This determination can be made by accessing the webpage [www.labor.mo.gov](http://www.labor.mo.gov) for the Department of Labor and Industrial Relations, Division of Labor Standards, Prevailing Wage Section or by calling (573) 751-3403.
- B. If the contract is to be awarded during a period of excessive unemployment as defined in Sections 290.550 RSMo through 290.580 RSMo, the Contractor will use only Missouri labor or labor from non-restrictive states in the conduct of the work under this contract. The determination of a workers home state is based on permanent address. Failure to use Missouri labor or labor from non-restrictive states during the conduct of the work hereunder will expose the Contractor to penalties assessed by the Missouri Department of Labor and Industrial Relations, Division of Labor Standards.
- C. Contractor is responsible for the following: "Only Missouri laborers and laborers from non-restrictive states are allowed by law to be employed on Missouri's public works projects when the unemployment rate exceeds 5 percent for two (2) consecutive months. (See Sections 290.550 RSMo through 290.580 RSMo). *Restrictive states are as follows:* Alaska, Arizona, California, Colorado, Connecticut, Delaware, District of Columbia, Florida, Idaho, Illinois, Iowa, Maine, Massachusetts, Mississippi, Montana, Nevada, New Jersey, North Dakota, Oklahoma, South Dakota, the U.S. Virgin Islands, West Virginia and Wyoming. Contractors must not use laborers from these states during periods of excessive unemployment.

#### 1.8 ILLEGAL IMMIGRATION REFORM AND IMMIGRANT RESPONSIBILITY ACT

- A. The Contractor understands and agrees that by signing a contract for this project, they certify the following:
  - 1. The Contractor shall only utilize personnel authorized to work in the United States in accordance with applicable federal and state laws. This includes but is

not limited to the Illegal Immigration Reform and Immigrant Responsibility Act (IIRIRA) and INA Section 274A.

2. If the Contractor is found to be in violation of this requirement or the applicable laws of the state, federal and local laws and regulations, and if the Owner has reasonable cause to believe that the Contractor has knowingly employed individuals who are not eligible to work in the United States, the Owner shall have the right to cancel the contract immediately without penalty or recourse and the State of Missouri may suspend or debar the Contractor from doing business with the State.
3. The Contractor agrees to fully cooperate with any audit or investigation from federal, state or local law enforcement agencies.

#### 1.9 FEDERAL WORK AUTHORIZATION AFFIDAVIT

- A. Pursuant to Section 285.530 RSMo, Contractor shall provide the Owner with a sworn Affidavit affirming its enrollment and participation in a Federal work authorization program.

#### 1.10 SAFETY TRAINING AFFIDAVIT

- A. Pursuant to Section 292.675 RSMo, Contractor and its Subcontractors shall provide the Owner with a sworn Affidavit and proof that all on-site project employees have completed a ten (10) hour course in OSHA approved construction safety and health training, such proof to be provided within sixty (60) days of the date project work commences.

#### 1.11 FAILURE TO PROVIDE SAFETY TRAINING

- A. Pursuant to Section 292.675 RSMo, Contractor shall forfeit to the Owner, as a penalty, \$2,500 plus \$100 for each on-site employee of the Contractor or its Subcontractors, for each calendar day, or portion thereof, such on-site employee is employed without the safety training required under the Safety Training Affidavit paragraph above.

#### 1.12 TRANSFER OF ELECTRONIC FILES

##### A. **USE AND LIMITATIONS OF DIGITAL PLAN INFORMATION**

Subsequent to award of contract and execution of an agreement between A/E and receiving party for transfer of electronic files, digital plan information will be provided by the Engineer to the Contractor for the express purpose of locating existing project control points and benchmarks, and locating limited proposed plan information. All information will be provided in a "read only" standard AutoCAD 2004 format. Digital plan information is for users convenience and not contract documents.

##### **WARNING**

These electronic files are non-certified recordings of printed documents and are not a part of the contract documents. These files are provided only for the convenience of the receiving party and are intended solely for the exclusive use by that party for the purposes expressly authorized. In accordance with standard industry practice, only

printed copies of documents conveyed to you may be relied upon. Any use of the information obtained or derived from these electronic files will be at the receiving party's sole risk. Because data stored in electronic media format can deteriorate or be modified inadvertently or otherwise without authorization of the data's creator, the receiving party agrees that it has the obligation to perform acceptance tests prior to using any of the data. Upon use of the data, receiving party shall be deemed to have accepted the data thus transferred. Please check this electronic file for virus contamination prior to use. The receiving party also agrees to all terms and conditions contained within the agreement for transfer of electronic files

#### **AGREEMENT FOR TRANSFER OF ELECTRONIC FILES TERMS AND CONDITIONS**

1. A/E makes no representation as to the compatibility of the Electronic files with any hardware or software.
2. Since the information set forth on the Electronic files can be modified unintentionally or otherwise, the A/E reserves the right to remove all indicia of its ownership and/or involvement from each Electronic display.
3. All information on the Electronic files is considered instruments of the services of the A/E and shall not be used for other projects, for additions to this project, or completion of this project by others. Electronic files shall remain the property of the A/E, and in no case shall the transfer of these files be considered a sale.
4. A/E makes no representation or warranties (either express or implies) regarding the accuracy, completeness, or permanence of Electronic files, nor for their merchantability or fitness for a particular purpose. Addenda information or revisions made after this date indicated on the Electronic files may not have been incorporated. In the event of a conflict between the A/E's sealed contract drawings and Electronic files, the sealed contract drawings shall govern. It is the Contractor's responsibility to determine if any conflicts exist. The Electronic files shall not be considered to be Contract Documents as defined by the General Conditions of the Contract for Construction. In no event shall the A/E be liable for any loss of profit or any consequential damages as a result of your use or reuse of these Electronic files.
5. The use of the Electronic files prepared by the A/E shall not in any way obviate the receiving party's responsibility for the proper checking and coordination of dimensions, details, member sizes and gage, and quantities of materials as required to facilitate complete and accurate fabrication and erection.
6. The receiving party shall, to the fullest extent permitted by law, indemnify, defend and hold harmless the A/E and its sub consultants from all claims, damages, losses, expenses, penalties and liabilities of any kind, including attorney's fees, arising out of or resulting from the use of the Electronic files by the Contractor, or third party recipients of the Electronic files from the receiving party.

7. The A/E believes that no licensing or copyright fees are due to others on account of the transfer of the Electronic files, but to the extent any are, the receiving party will pay the appropriate fees and hold the A/E harmless for such claims.
8. This agreement shall be governed by the laws of the principal place of business of the A/E.

#### 1.13 EXISTING UTILITIES INFORMATION

- A. Contractor shall review all existing utilities information, including information contained herein, when considering their bid for this project for possible utility conflicts, possible utility relocates and/or possible construction damage to existing utilities. Any underground facilities, structures, or utilities that have been shown are from available records. Therefore, the relationship between the proposed work and the existing facilities, structures, or utilities must be considered approximate. It is the contractor's responsibility to notify all the local, and/or governing utility companies prior to construction to determine their exact locations and the existence of any not shown. Contractor shall coordinate with utility companies and the Owner as to the relocation or removal of any utilities shown or not shown.

#### PART 2 PRODUCTS

Not Used.

#### PART 3 EXECUTION

Not Used.

REQUEST FOR INTERPRETATION PRE-BID QUESTION AND COMMENT FORM

(All information entered shall be typed in black).

PROJECT NAME: JEFFERSON COUNTY, MO ADMINSTRATION CENTER RENOVATION

BIDDER: SUBMITTED BY (Name): Date:

ADDRESS: CITY: STATE: PHONE: Sheet of

Question No.	Page (or Drawing Sheet) Number	Drawing No. or Spec. Section Article & Paragraph Number	Question by Bidder

NOTE: ANY AND ALL QUESTIONS PERTAINING TO THIS BID MUST BE TYPED AND SUBMITTED ON THIS FORM AND MAILED OR FAXED TO RECEIVE A RESPONSE.

END OF DOCUMENT





DOCUMENT 00 52 14

AGREEMENT FORM - AIA

PART 1 GENERAL

1.1 SUMMARY

- A. Document Includes:
  - 1. Contract Agreement.
- A. Related Documents:
  - 2. Document 00 72 14 - General Conditions - AIA Stipulated Sum.
  - 3. Document 00 73 13 - Supplementary Conditions - AIA.

1.2 CONTRACT AGREEMENT BETWEEN OWNER AND CONTRACTOR

- A. THIS AGREEMENT made and entered into as of the \_\_\_\_\_ day of \_\_\_\_\_ in the year of Two Thousand and \_\_\_\_\_ by and between \_\_\_\_\_ hereinafter and in the Contract Documents called "Contractor" and **Jefferson County, Missouri**, hereinafter and in the Contract Documents called "Owner."
- B. WITNESSETH: That for and in consideration of the mutual covenants and agreements, hereinafter stated, Contractor and Owner covenant and agree as follows:
- C. THE CONTRACT WORK:
  - 1. Contractor covenants and agrees to furnish all labor, materials, equipment, transportation, construction plant and facilities necessary to perform all Work required by the Contract Documents, for the Project entitled:

**JEFFERSON COUNTY, MO  
ADMINISTRATION CENTER RENOVATION**

As shown on Drawings and described in Specifications prepared by **Hurst-Rosche, Inc.**, acting as, and in these Contract Documents referred to as Consultant and covenants and agrees to do and perform all acts and things required of Contractor by this Contract and the Contract Documents.

- D. TIME OF COMPLETION:
  - 1. Work performed under this Contract shall be commenced on date stipulated in written Notice to Proceed and, subject to authorized adjustments, work at the site may begin \_\_\_\_\_, Substantial Completion shall be achieved no later than \_\_\_\_\_.
  - 2. The Owner requires the Project to be substantially complete by 120 calendar days from Construction Start Date as stipulated in the Notice to Proceed. Should the Contractor fail to complete the Work within such time, contractor agrees to pay and will apply to the Owner for each and every day of such delay in completion

of the Work beyond the Contract Time the sum of Five Hundred Dollars Dollars (\$500) per day for Work not completed by the substantial completion date as liquidated damages.

E. CONTRACT SUM AND TERMS OF PAYMENT:

1. Contract Sum: The Owner, if Contractor shall faithfully fulfill and perform this Contract, covenants and agrees to pay Contractor in current funds, subject to additions and deductions by Change Order as provided in the Contract Documents, the sum of \_\_\_\_\_ Dollars (\$\_\_\_\_\_), which sum shall constitute the Contract Sum, said Contract Sum being derived from Contractor's Bid dated \_\_\_\_\_. It is understood and agreed that should there be any increase in wage rates, or in cost of materials or equipment, or in any other of Contractor's costs or should Contractor be compelled to pay premium wages, or for overtime work, during the life of this Contract and/or prior to completion of Contractor's work thereunder, Contractor shall absorb all such increased costs, without addition to the Contract Sum except when otherwise expressly provided in Contract Documents.
2. Payments: Owner shall make payments for work performed under the Contract as provided in Article Fourteen of the General Conditions and in accordance with other applicable articles of the Supplementary Conditions and Contract Documents.
3. Contractor's Fees for Changes in Work: In accordance with Contractor's Lump Sum bid, it is agreed that the following percentages for overhead and profit shall be applied on work added to or omitted from the Contract by written Change Order approved by Engineer and Owner in advance of performance of the work.

Additional Work performed by:

- |                     |                         |
|---------------------|-------------------------|
| 1. Own Forces ____% | 2. Subcontractors ____% |
|---------------------|-------------------------|

Omitted Work originally required by:

- |                     |                         |
|---------------------|-------------------------|
| 1. Own Forces ____% | 2. Subcontractors ____% |
|---------------------|-------------------------|

F. CONTRACT DOCUMENTS:

1. Contract Documents include the Contract Agreement, Contractor's Bid as accepted by Owner, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, and all Addenda issued prior to and all Modifications issued after execution of the Contract Agreement.

G. MISSOURI LABOR:

Contractor shall comply with all MISSOURI statutory requirements regarding labor, including, but not limited to, the following:

1. Missouri Division of Labor Standards, Annual Wage Order No. 25 or Current

H. PERFORMANCE BOND AND LABOR AND MATERIAL PAYMENT BOND:

1. Within fifteen (15) days immediately following date of his receipt of this contract, Contractor shall furnish Owner the signed Contract and Performance Bond and Labor and Material Payment Bond as required by and in accordance with the terms of Contract Documents in a penal sum of one hundred percent (100%) of the Contract sum.
2. In the event Contractor fails to furnish Owner such Contract and Bonds within said period, this Contract shall thereupon become null and void at Owner's option, exercised by written registered notice and mailed to Contractor by said Owner within five (5) days thereafter. Owner may then retain and enforce as liquidated damages, bid guarantee heretofore deposited with it in connection with Contractor's proposal for this Contract or the difference between his bid and a subsequent awarded bid, whichever is lesser.

I. IN WITNESS HEREOF, the parties hereto have executed this agreement as of the day and year first written above.

OWNER:

**Jefferson County, Missouri**

Attest:

BY \_\_\_\_\_

BY \_\_\_\_\_  
Clerk

TITLE \_\_\_\_\_

CONTRACTOR:

Attest:

\_\_\_\_\_

BY \_\_\_\_\_  
Secretary

BY \_\_\_\_\_

TITLE \_\_\_\_\_

(Corporate Seal)

END OF DOCUMENT

DOCUMENT 00 72 14

GENERAL CONDITIONS - AIA STIPULATED SUM

PART 1 GENERAL

1.1 SUMMARY

- A. Document Includes:
  - 1. General Conditions.
- B. Related Documents:
  - 1. Document 00 52 14 - Agreement Form - AIA Stipulated Sum.
  - 2. Document 00 73 13 - Supplementary Conditions - AIA.

1.2 GENERAL CONDITIONS

- A. AIA Document A201-1997, General Conditions of the Contract for Construction, is the General Conditions of the Contract.

1.3 SUPPLEMENTARY CONDITIONS

- A. Refer to Document 00 73 13 for modifications to General Conditions.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF DOCUMENT

SUPPLEMENTARY CONDITIONS - AIA

PART 1 GENERAL

1.1 SUMMARY

- A. Document Includes:
  - 1. General Conditions.
  - 2. Supplementary Conditions.
- B. Related Documents:
  - 1. Document 00 41 43 - Bid Form - Stipulated Sum
  - 2. Document 00 52 14 - Agreement Form - AIA

1.2 GENERAL CONDITIONS

- A. The General Conditions of the Contract for Construction, AIA Document A201, Fifteenth Edition, 1997, Articles 1 through 14, is a part of this Contract and is incorporated herein as fully as if here set forth. Copies of the General Conditions are on file and may be reviewed at the offices of the Engineer, or may be obtained from the American Institute of Architects, St. Louis Chapter, 919 Olive Street, St. Louis, MO 63101.

1.3 SUPPLEMENTARY CONDITIONS

- A. The following supplements modify, change, delete from or add to the "General Conditions of the Contract for Construction," AIA Document A201, Fifteenth Edition, 1997. Where any Article of the General Conditions is modified or changed or any Paragraph, Subparagraph or Clause thereof is modified, changed or deleted by these supplements, the unaltered provisions of that Article, Paragraph, Subparagraph or Clause shall remain in effect.

1.4 REFERENCE TO DIVISION 1

- A. Where provisions of General Conditions relate to project administrative or work-related requirements of the Contract, those paragraphs are deleted from General Conditions, and are specified in Division 1, General Requirements of the Specifications. The deleted paragraphs are:

3.4	3.6	3.7
3.8	3.10	3.11
3.12	3.13	3.14
3.15	9.2	

1.5 ARTICLE 1: CONTRACT DOCUMENTS

- A. DEFINITIONS: Replace 1.1.7 with new 1.1.7.
  - 1. "1.1.7 PROJECT MANUAL

The Project Manual is the collection of documents which includes the bidding requirements, sample forms and, certain Contract Documents such as the Conditions of the Contract and the Specifications.”

B. CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS: Add new Clauses 1.2.2.1 and 1.2.2.2.

1. “1.2.1.1 The Contractor further represents that he has carefully examined the Site of the Work at each location and that he has full knowledge of and fully understands the facilities, site conditions, difficulties and restrictions attending performance of the Work. Contractor further represents that he has taken all required measurements and carefully inspected existing constructions, irregularities and interferences which may affect the Work. No additional compensation will be allowed for conditions increasing Contractor's cost which were not known to or appreciated by him prior to executing the Contract if they could have been discovered by him following the foregoing procedures and thoroughly informing himself of all existing conditions affecting the Work.”
2. “1.2.1.2 Contractor will not, however, be required to excavate, penetrate or demolish any constructions or other work and conditions prior to executing the Contract in order to uncover and/or expose concealed conditions that affect the Work. If, during course of construction, Contractor uncovers conditions that affect the work that could not have been known and understood by the above described careful examination of conditions affecting the Work, he shall promptly notify the Engineer, in writing, who will determine if claims for additional costs or extensions of time are justified. If such claims are found to be justified, Contract will be modified in accordance with Article 12 of the General Conditions.”

1.6 ARTICLE 2: OWNER

A. 2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER:

1. Delete Subparagraphs 2.2.3 and 2.2.5 in their entireties and substitute the following:
  - a. “2.2.3 The Owner shall, at the request of the Contractor, furnish to Contractor any survey or other similar descriptive information of project site that Owner has in his possession. Upon demonstration of need by Contractor for specific additional survey information, Owner shall obtain and furnish such information to Contractor.”
  - b. “2.2.5 Contractor will be furnished, free of charge, 2 copies of Drawings and Project Manual as set forth in Division 1 of the Specifications. Additional copies will be furnished to Contractor at cost of reproduction, postage and handling.”

1.7 ARTICLE 3: CONTRACTOR

A. 3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR: Add new Subparagraph 3.2.3.1:

1. “3.2.3.1 Contractor shall satisfy himself as to the accuracy of all grades, elevations, dimensions and locations. Any errors due to Contractor's failure to so

verify all such grades, elevations, dimensions and locations shall be promptly rectified by Contractor without additional cost to Owner.”

- B. 3.4 LABOR AND MATERIALS: Delete Paragraph 3.4. in its entirety. Refer to Specification Section 01 10 00, Summary, for provisions on this subject. References to Paragraph 3.4 elsewhere in the Contract Documents shall read as referring to Section 01 10 00 of the Specifications.
- C. 3.6 TAXES: Delete Paragraph 3.6 in its entirety. Refer to Specification Section 01 10 00, Summary, for provisions on this subject. References to Paragraph 3.6 elsewhere in the Contract Documents shall read as referring to Section 01 10 00 of the Specifications.
- D. 3.7 PERMITS, FEES AND NOTICES: Delete Paragraph 3.7 in its entirety. Refer to Specification Section 01 10 00, Summary, for provisions on this subject. References to Paragraph 3.7 elsewhere in the Contract Documents shall read as referring to Section 01 10 00 of the Specifications.
- E. 3.8 ALLOWANCES: Delete Paragraph 3.8 in its entirety.
- F. 3.11 DOCUMENTS AND SAMPLES AT THE SITE: Delete Paragraph 3.11 in its entirety.
- G. 3.13 USE OF SITE: Delete Paragraph 3.13 in its entirety. Refer to Specification Section 01 10 00, Summary, for provisions on this subject. References to Paragraph 3.13 elsewhere in the Contract Documents shall read as referring to Section 01 10 00 of the Specifications.
- H. 3.15 CLEANING UP: Delete Paragraph 3.15 in its entirety. Refer to Specification Section 01 70 00, Execution and Closeout Requirements, for provisions on this subject. References to Paragraph 3.15 elsewhere in the Contract Documents shall read as referring to Section 01 70 00 of the Specifications.

#### 1.8 ARTICLE 5: SUBCONTRACTORS

- A. 5.2 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK: Add new Clause 5.2.1.1.:
  - a. “5.2.1.1. Within ten (10) days of notification of acceptance of his proposal, Contractor shall submit the names of those to whom he intends to award a Subcontract.”

#### 1.9 ARTICLE 6: CONSTRUCTION WORK BY OWNER OR BY SEPARATE CONTRACTORS

- A. 6.1 OWNER'S RIGHT TO PERFORM CONSTRUCTION AND TO AWARD SEPARATE CONTRACTS: Delete Subparagraph 6.1.3 and its entirety and substitute the following:
  - a. “6.1.3 General Contractor shall have responsibility of coordinating efforts of all contractors and to maintain overall direction of job progress. Each Contractor shall coordinate operational methods with other contractors and encourage communications among all trades. All Contractors shall make other contractors aware of any problems, delays



in materials shipments or lack of work force, and assist other contractors in maintaining job momentum and direction of overall project.”

1.10 ARTICLE 9: PAYMENTS AND COMPLETION

- A. 9.2 SCHEDULE OF VALUES: Add new Paragraph 9.2:
  - 1. “9.2 SCHEDULE OF VALUES: Delete Paragraph 9.2 in its entirety. Refer to Specification Section 01 20 00, Price and Payment Procedures, for provisions on this subject. References to Paragraph 9.2 elsewhere in the Contract Documents shall read as referring to Section 01 20 00 of the Specifications.”
- B. APPLICATIONS FOR PAYMENT: Add the following Sub-Subparagraph
  - 1. “9.3.1.3.: Until Substantial Completion, the Owner will pay 90 percent of the amount due Contractor on account of approved progress payments.”

1.11 ARTICLE 11: INSURANCE AND BONDS

- A. 11.1.1 In the first line following the word "maintain," insert the words "in a company or companies licensed to do business in the state in which the project is located."
- B. Add new Subparagraph 11.1.1.9:
  - 1. “1.1.1.9 General Liability Insurance shall be comprehensive, on occurrence form, and shall include:
    - 1. Premises and Operations.
    - 2. Independent Contractors.
    - 3. Products and Completed Operations.
    - 4. Broad Form Property Damage.
    - 5. Personal Injury.
    - 6. Explosion, Collapse and Underground damage where the hazard exists.
    - 7. Contractual liability.”
- C. Add the following Sub-Subparagraphs to Subparagraph 11.1.2:
  - 1. “11.1.2.1 The insurance required by Subparagraph 11.1.1 shall be written for not less than the following, or greater if required by law:
    - 1. Worker's Compensation:
      - a. State: Statutory
      - b. Applicable Federal: Statutory
      - c. Employer's Liability: \$500,000
    - 2. Comprehensive General Liability:
      - a. Bodily Injury:
        - \$1,000,000 Each Person
        - \$2,000,000 Aggregate

- b.      Property Damage:  
              \$1,000,000                      Each Occurrence  
              \$2,000,000                      Aggregate
- c.      \$1,000,000                      Combined Single

Limit Coverage for bodily injury and property damage per occurrence and in the same aggregate limit will be accepted in lieu of the separate limits specified above.

- 3.      Personal Injury:  
       a.      \$ 1,000,000      Combined single limit including owned non-owned, and hired motor vehicle.

4.      Comprehensive Automobile Liability:

- a.      Bodily Injury:  
              \$1,000,000                      Each Person  
              \$1,000,000                      Each Occurrence
- b.      Property Damage:  
              \$1,000,000                      Each Occurrence  
              \$2,000,000                      Aggregate
- c.      \$1,000,000                      Combined Single

Limit coverage for bodily injury and property damage per occurrence and in the same aggregate limit will be accepted in lieu of the separate limits specified above.

D.      11.1.2.2 Umbrella Form Liability Coverage:

“An Umbrella Form Liability coverage to not less than \$1,000,000 for any one occurrence and subject to the same aggregate over the Employer's Liability, Comprehensive General Liability, and Comprehensive Automobile Liability coverage is required.”

E.      Add the following Clause 11.1.3.1:

“11.1.3.1 The Owner and Engineer shall be named as additional insureds by endorsement for the purpose of coverage only with no liability for premium payments.”

F.      11.1.3: Add new Subparagraph 11.1.3.2:

“11.1.3.2 Contractor shall furnish one copy each of Certificates of Insurance herein required for each copy of the Agreement which shall specifically set forth evidence of all coverage required by Subparagraphs 11.1.1, 11.1.2 and 11.1.3. The form of the Certificate shall be AIA Document G705, Certificate of Insurance. Contractor shall furnish to the Owner copies of any endorsements that are subsequently issued amending

coverage or limits. The Contractor shall submit copies of subcontractor's Certificates of Insurance prior to the beginning of work.”

- G. 11.4.1 PROPERTY INSURANCE: Delete this Paragraph. Add new paragraph 11.4.1 as follows:

“11.4.1: The General Contractor shall be responsible to maintain property insurance upon the completed value of all work at the site under this contract to the full insurable value thereof. This insurance shall include the interests of the Owner, the General Contractor, Subcontractors, and Sub-subcontractors in the work and as their interests may appear in the work, and shall be an all-risk type policy, including theft, subject to the exclusions generally accepted in the insurance industry. This coverage is not intended to, and shall not, provide coverage for tools, equipment, scaffolding, forms, or other devices used by the Contractors or Subcontractors in performing work under this contract.”

## 1.12 ARTICLE 13: MISCELLANEOUS PROVISIONS

- A. Add new paragraph 13.8 as follows:

### “13.8 REFERENCED STANDARDS

13.8.1 No provision of any referenced standard specification, manual or code; whether or not specifically incorporated by reference in the Contract Documents; shall be effective to change the duties and responsibilities of Owner, Contractor or Engineer, or any of their consultants, agents or employees from those set forth in the Contract Documents, nor shall it be effective to assign to Engineer, or any of Engineer's consultants, agents or employees, any duty or authority to supervise or direct the furnishing or performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of Articles 1 through 14.”

## PART 2 PRODUCTS

Not Used.

## PART 3 EXECUTION

Not Used.

END OF SECTION

DOCUMENT 00 82 50

PREVAILING WAGE RATE

PART 1 GENERAL

- 1.1 Pursuant to Missouri Revised Statutes, Sections 290.210 through 290.340 as amended 1978, these specifications list on the following pages, the Missouri Department of Labor and Industrial Relations prevailing rate of wages for the county where the contract is being performed and for each craft or type of worker needed to execute the contract.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF DOCUMENT

DOCUMENT 00 86 00

DRAWINGS, SCHEDULES, AND DETAILS

PART 1 GENERAL

1.1 BIDDING & CONTRACT REQUIREMENTS

<u>DRAWING NO.</u>	<u>TITLE</u>
M-101	MAIN LEVEL HVAC DEMO PLANS AND SCHEDULES
M-102	LOWER LEVEL HVAC AND DEMO PLAN

1.2 All drawings dated and sealed.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF DOCUMENT

## SECTION 01 10 00

### SUMMARY

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Contract description.
- B. Contractor's use of site.
- C. Owner occupancy.
- D. Specification Conventions.
- E. Contractor's Duties.
- F. Contract Documents.

##### 1.2 CONTRACT DESCRIPTION

- A. Work of the Project includes:  
  
Renovation of the Administration Center. Perform Work of Contract per lump price cost with Owner in accordance with Conditions of Contract.

##### 1.3 CONTRACTOR'S USE OF SITE

- A. Limit use of site to allow:
  - 1. Owner occupancy.
  - 2. Work by Others and Work by Owner.
- B. Access to Site: Limited to normal working hours.
- C. Construction Operations: Limited to areas noted on Drawings.
- D. Time Restrictions for Performing Work:
- E. Allow for public use of all adjoining streets and sidewalks.

##### 1.4 OWNER OCCUPANCY

- A. The Owner will occupy the site during the entire period of construction.
- B. Cooperate with Owner to minimize conflict, and to facilitate Owner's operations.
- C. Schedule the Work to accommodate Owner occupancy.

## 1.5 SPECIFICATION CONVENTIONS

- A. These specifications are written in imperative mood and streamlined form. This imperative language is directed to the Contractor, unless specifically noted otherwise. The words “shall be” are included by inference where a colon (:) is used within sentences or phrases.

## 1.6 CONTRACTOR’S DUTIES

- A. Except as specifically noted, Contractor shall provide and pay for:
  - 1. All labor, materials, and equipment used for construction of and/or incorporated into the project.
  - 2. All tools, construction equipment and machinery.
  - 3. Required building permits, and all inspection fees by governmental authorities.
  - 4. Other facilities and services necessary for proper execution and complete of work.
- B. Owner is exempt from sales tax on product permanently incorporated in work.
  - 1. Obtain sales tax exemption certificate number from Owner.
  - 2. Place exemption certificate number on invoices for materials incorporated in work.
  - 3. Upon completion of work, file with Owner a notarized statement that all purchases made under exemption certificate were entitled to be exempt and furnish copies of invoice to Owner.
  - 4. Pay legally assessed penalties for improper use of exemption certificate number.
- C. Comply with codes, ordinances, rules, regulations, orders, and other legal requirements of public authorities, which bear on performance of work.
- D. Promptly submit written notice to Engineer of observed variance of contract documents from legal requirements.
  - 1. It is not the Contractor’s responsibility to make certain that drawings and specifications comply with codes and regulations.
    - a. Appropriate modifications to contract documents will account for/reflect necessary changes.
    - b. Assume responsibility for work known to be contrary to such requirements if written notice is not provided by the Contractor to the Engineer.
- E. Enforce strict discipline and good order among employees.
- F. Do not unreasonably encumber site with materials or equipment.
- G. Do not load structure with weight that will endanger structure.
- H. Assume full responsibility for protection and safekeeping of products stored on premises.
- I. Move any stored products, which interfere with operations of Owner or other Contractors.
- J. Obtain and pay for use of additional storage or work areas needed for operations.

- K. Contractor shall maintain building free from entrance of water at all times during construction.
- L. Contractor shall furnish, erect and maintain temporary ladders, ramps, or hoists as may be required for performance of his work.
  - 1. All such equipment shall be substantially designed, constructed, and maintained in accordance with applicable federal, state, and local laws, ordinances, and regulations, and shall be promptly removed when no longer needed.
- M. Contractor shall design, furnish, erect, maintain, and move all ladders and scaffolding required for this work.
  - 1. All ladders and scaffolding shall be designed, constructed, and maintained in accordance with applicable federal, state, and local law, ordinances, and regulations, and shall be promptly removed when no longer needed.

#### 1.7 CONTRACT DOCUMENTS

- A. Contractor will be furnished free of charge two (2) copies of drawings and specifications.
- B. On request, additional copies will be furnished to Contractor at cost of reproduction, postage and handling.

#### PART 2 PRODUCTS

Not Used.

#### PART 3 EXECUTION

Not Used.

END OF SECTION



## SECTION 01 20 00

### PRICE AND PAYMENT PROCEDURES

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Applications for payment.
- B. Change procedures.
- C. Defect assessment.
- D. Unit prices.

##### 1.2 APPLICATIONS FOR PAYMENT

- A. Submit four copies of each application on form supplied by County or Contractor's standard form or electronic media printout will be considered.
- B. Content and Format: Utilize Schedule of Values for listing items in Application for Payment.
- C. Submit updated construction schedule with each Application for Payment.
- D. For payment of stored materials (when permitted by the contract), include a line for Stored Materials on the Pay Application. (The contractor may wish to submit a sample payment application for Engineer Approval or request a payment application from the Engineer.) A separate schedule listing the stored and installed materials should be included as well as supplier price quotes justifying the price of the stored materials. The payments for stored materials will be deducted from the application as they are installed. All payments of stored materials shall be in accordance with paragraph K of this Section.
- E. Payment Period: Submit applications for payment to County for processing no later than ten (10) days prior to date established for progress payment meeting.
- F. Submit with transmittal letter as specified for Submittals in Section 01 33 00.
- G. Submit lien waivers.
- H. Substantiating Data: When County requires substantiating information, submit data justifying dollar amounts in question. Include the following with Application for Payment:
  - 1. Current construction photographs specified in Section 01 33 00.
  - 2. Partial release of liens from major subcontractors and vendors.
  - 3. Record documents as specified in Section 01 70 00, for review by Owner/Engineer, which will be returned to Contractor.
  - 4. Affidavits attesting to off-site stored products.
  - 5. Construction progress schedules, revised and current as specified in Section 01 32 16.

- I. Application for Payment No. 1 shall be accompanied by a notarized statement on Contractor's letterhead as follows:
  - 1. I certify that the funds requested for the accompanying Pay Request No. 1 will be used to pay all just and lawful bills against the undersigned and his subcontractors for labor, material and equipment employed in the performance of the work. I further certify that such bills will be paid no later than ten (10) calendar days from date of receipt of the Owner's disbursement.
  - 2. Execute statement with signature of a responsible officer of contracting firm.
- J. Each subsequent application for progress payment shall be accompanied by the following supporting documents:
  - 1. Partial or final waivers of lien in monetary amount from Contractor, each material supplier and/or subcontractor reflecting amounts incorporated into preceding request for progress payment.
  - 2. A notarized Affidavit of Payment to Material Suppliers and Subcontractors.
    - a. Affidavit shall be submitted in exact text as exhibit furnished by Engineer, signed by Contractor or Subcontractor.
    - b. Include unit item, actual amount of contract without overhead or profit, amount paid to date, and amount to become due (balance of account).
- K. Progress payments will be made for materials and equipment not incorporated in the work provided that:
  - 1. Such materials and equipment have been delivered to and suitable stored at site or some other location approved in writing by Owner and Engineer. All such materials stored off-site shall be marked or tagged with identification of project to which they are assigned.
  - 1. Contractor submits evidence of title to such materials and equipment.
  - 2. Care and custody of such materials and equipment and all costs incurred for movement and storage shall be responsibility of Contractor.
  - 3. Such materials and equipment are suitably insured by Contractor. Contractor shall submit a certificate of insurance showing the Owner as an additional insured and showing amount of insurance overage of suitable proof that material and equipment are stored in a bonded warehouse.
- L. Refer to section 01 70 00 for submittal requirements for application for final payment and related closeout procedures.

### 1.3 CHANGE ORDER PROCEDURES

- A. Submittals: Submit name of individual authorized to receive change documents, and be responsible for informing others in Contractor's employ or Subcontractors of changes to the Work.
- B. The County will advise of minor changes in the Work not involving adjustment to Contract Sum or Contract Time by issuing supplemental instructions in writing.
- C. The County may issue a Proposal Request including a detailed description of proposed change with supplementary or revised Drawings and specifications, a change in Contract Time for executing the change with stipulation of overtime work required and the period of time during which the requested price will be considered valid. Contractor will prepare and submit estimate within ten (10) days.

- D. Contractor may propose changes by submitting a request for change to Engineer, describing proposed change and its full effect on the Work. Include a statement describing reason for the change, and effect on Contract Sum and Contract Time with full documentation and a statement describing effect on Work by separate or other Contractors. Document requested substitutions in accordance with Section 01 60 00.
- E. Unit Price Change Order: For contract unit prices and quantities, the Change Order will be executed on fixed unit price basis. For unit costs or quantities of units of work, which are not pre-determined, execute Work under Construction Change Order. Changes in Contract Sum or Contract Time will be computed as specified for Change Order.
- F. County may issue directive, on Field Change Order form signed by Owner, instructing Contractor to proceed with change in the Work, for subsequent inclusion in a Change Order. Document will describe changes in the Work, and designate method of determining any change in Contract Sum or Contract Time. Promptly execute change.
- G. Time and Material Change Order: Submit itemized account and supporting data after completion of change, within time limits indicated in Conditions of the Contract. County will determine change allowable in Contract Sum and Contract Time as provided in Contract Documents.
- H. Maintain detailed records of work done on Time and Material basis. Provide full information required for evaluation of proposed changes, and to substantiate costs for changes in the Work.
- I. Document each quotation for change in cost or time with sufficient data to allow evaluation of quotation.
- J. Execution of Change Orders: Engineer will issue Change Orders for signatures of parties as provided in Conditions of the Contract.
- K. Correlation Of Contractor Submittals:
  - 1. Promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as separate line item and adjust Contract Sum/Price.
  - 2. Promptly revise progress schedules to reflect change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.
  - 3. Promptly enter changes in Project Record Documents.

#### 1.4 DEFECT ASSESSMENT

- A. Replace the Work, or portions of the Work, not conforming to specified requirements.
- B. If, in the opinion of the Engineer, it is not practical to remove and replace the Work, the Engineer will direct appropriate remedy or adjust payment.
- C. Individual specification sections may modify these options or may identify specific formula or percentage sum reduction.

- D. The authority of the Engineer or Owner to assess defects and identify payment adjustments, is final.
- E. Non-Payment For Rejected Products: Payment will not be made for rejected products for any of the following:
  - 1. Products wasted or disposed of in a manner that is not acceptable.
  - 2. Products determined as unacceptable before or after placement.
  - 3. Products not completely unloaded from transporting vehicle.
  - 4. Products placed beyond lines and levels of required Work.
  - 5. Products remaining on hand after completion of the Work.
  - 6. Loading, hauling, and disposing of rejected products.

## PART 2 PRODUCTS

Not Used.

## PART 3 EXECUTION

Not Used.

END OF SECTION

## SECTION 01 30 00

### ADMINISTRATIVE REQUIREMENTS

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Coordination and project conditions.
- B. Field engineering.
- C. Preconstruction meeting.

##### 1.2 COORDINATION AND PROJECT CONDITIONS

- A. Coordinate scheduling, submittals, and Work of various sections of Contract Documents to ensure efficient and orderly sequence of installation of interdependent construction elements.
- B. Coordinate completion and clean-up of Work of separate sections in preparation for Substantial Completion.
- C. 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.

##### 1.3 FIELD ENGINEERING

- A. Employ Land Surveyor registered in State of Missouri and acceptable to the Engineer.
- B. Locate and protect survey control and reference points. Promptly notify Engineer of discrepancies discovered.
- C. Control datum for survey is that shown on Drawings.
- D. Verify set-backs and easements; confirm drawing dimensions and elevations.
- E. Provide field-engineering services. Establish elevations, lines, and levels, utilizing recognized engineering survey practices.
- F. Maintain complete and accurate log of control and survey work as Work progresses.
- G. Protect survey control points prior to starting site work; preserve permanent reference points during construction.
- H. Promptly report to Engineer loss or destruction of reference point or relocation required because of changes in grades or other reasons.
- I. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Engineer.

#### 1.4 PRECONSTRUCTION MEETING

- A. Engineer will schedule meeting after Notice of Award.
- B. Attendance Required: Owner, Engineer, and Contractor.
- C. Agenda:
  - 1. Submission of list of Subcontractors, list of products, schedule of values, and progress schedule.
  - 2. Designation of personnel representing parties in Contract, and Engineer.
  - 3. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
  - 4. Scheduling.
- D. Engineer will record minutes and distribute copies with reasonable promptness after meeting to participants, with one copy to Engineer, Owner, and those affected by decisions made.

#### PART 2 PRODUCTS

Not Used.

#### PART 3 Execution

Not Used.

END OF SECTION

## SECTION 01 32 16

### CONSTRUCTION PROGRESS SCHEDULE

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Format.
- B. Schedules.
- C. Submittals.
- D. Review and evaluation.
- E. Updating schedules.
- F. Distribution.

##### 1.2 FORMAT

- A. Listings: Reading from left to right, in ascending order for each activity. Identify each activity with applicable specification section number.
- B. Diagram Sheet Size: 8-1/2" x 11"

##### 1.3 SCHEDULES

- A. Illustrate order and interdependence of activities and sequence of work; how start of given activity depends on completion of preceding activities, and how completion of activity may restrain start of subsequent activities.
- B. Illustrate complete sequence of construction by activity, identifying work of separate stages. Indicate dates for submittals including dates for Owner furnished items and return of submittals; dates for procurement and delivery of critical products; and dates for installation and provision for testing. Include legend for symbols and abbreviations used.
- 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. Monetary value of activity, keyed to Schedule of Values.
  - 11. Percentage of activity completed.

12. Responsibility.

- D. Required Sorts: List activities in sorts or groups:
1. By preceding work item or event number from lowest to highest.
  2. Listing of activities on critical path.

#### 1.4 SUBMITTALS

- A. Submit in accordance with Section 01 33 00 Submittal Procedures.

#### 1.5 REVIEW AND EVALUATION

- A. Review and Evaluate project status to determine work behind schedule and work ahead of schedule.

#### 1.6 UPDATING SCHEDULES

- 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. Update diagrams to graphically depict current status of Work.
- C. Identify activities modified since previous submittal, major changes in Work, and other identifiable changes.
- D. Indicate changes required to maintain Date of Substantial Completion.
- E. Prepare narrative report to define problem areas, anticipated delays, and impact on schedule. Report corrective action taken or proposed and its effect including effects of changes on schedules of separate contractors.

#### 1.7 DISTRIBUTION

- A. Following joint review, distribute copies of updated schedules to Contractor's project site file, to Subcontractors, suppliers, Engineer, Owner and other concerned parties.
- B. Instruct recipients to promptly report, in writing, problems anticipated by projections shown in schedules.

### PART 2 PRODUCTS

Not Used.

### PART 3 EXECUTION

Not Used.

END OF SECTION



SECTION 01 33 00  
SUBMITTAL PROCEDURES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Submittal procedures.
- B. Construction progress schedules.
- C. Proposed products list.
- D. Product data.
- E. Shop drawings.
- F. Test reports.
- G. Certificates.
- H. Manufacturer's instructions.
- I. Manufacturer's field reports.
- J. Construction photographs.

1.2 SUBMITTAL PROCEDURES

- A. **Transmit each submittal with shop drawing submittal form found at the end of this section.**
- B. 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 requirements of the Work and Contract Documents.
- C. Schedule submittals to expedite Project, and deliver to County at 725 Maple Street, Hillsboro, MO 63050.
- D. For each submittal for review, allow fifteen (15) days excluding delivery time to and from Contractor.
- E. Identify variations from Contract Documents and product or system limitations that may be detrimental to successful performance of completed Work.
- F. Allow space on submittals for Contractor and County review stamps.
- G. When revised for resubmission, identify changes made since previous submission.

- H. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report inability to comply with requirements.
- I. Submittals not requested will not be recognized or processed.

### 1.3 CONSTRUCTION PROGRESS SCHEDULES

- A. Prepare Construction Progress Schedule in accordance with Section 01 32 16 Construction Progress Schedule.
- B. Submit initial schedules within twenty (20) days after date established in Notice to Proceed. After review, resubmit required revised data within ten (10) days.
- C. Submit revised Progress Schedules with each Application for Payment.
- D. Distribute copies of reviewed schedules to Project site file, subcontractors, suppliers, and other concerned parties.
- E. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.
- F. Indicate delivery dates for Owner furnished products.
- G. Revisions To Schedules:
  - 1. Indicate progress of each activity to date of submittal, and projected completion date of each activity.
  - 2. Identify activities modified since previous submittal, major changes in scope, and other identifiable changes.
  - 3. Prepare narrative report to define problem areas, anticipated delays, and impact on Schedule. Report corrective action taken, or proposed, and its effect.

### 1.4 PROPOSED PRODUCTS LIST

- A. Within fifteen (15) days after date of Notice to Proceed, submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
- B. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.

### 1.5 PRODUCT DATA

- A. Product Data: Submit to County for review for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents.
- B. Submit number of copies Contractor requires, plus 3 copies County will retain.
- C. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

- D. Indicate product utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- E. After review, produce copies and distribute in accordance with SUBMITTAL PROCEDURES article and for record documents described in Section 01 70 00.

#### 1.6 SHOP DRAWINGS

- A. Shop Drawings: Submit to County for review for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents.
- B. Submit number of opaque reproductions Contractor requires, plus 3 copies County will retain.
- C. After review, produce copies and distribute in accordance with SUBMITTAL PROCEDURES article and for record documents described in Section 01 70 00.

#### 1.7 TEST REPORTS

- A. Submit for County's knowledge as contract administrator or for Owner.
- B. Submit test reports for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.

#### 1.8 CERTIFICATES

- A. When specified in individual specification sections, submit certification by manufacturer, installation/application subcontractor, or Contractor to County, in quantities specified for Product Data.
- B. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
- C. Certificates may be recent or previous test results on material or Product, but must be acceptable to County.

#### 1.9 MANUFACTURER'S INSTRUCTIONS

- A. When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, to County for delivery to Owner in quantities specified for Product Data.
- B. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

#### 1.10 MANUFACTURER'S FIELD REPORTS

- A. Submit reports for County's benefit as contract administrator or for Owner.
- B. Submit report in duplicate within thirty (30) days of observation to County for information.

- C. Submit for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.

#### 1.11 CONSTRUCTION PHOTOGRAPHS

- A. Photographs: Provide one set of prints; color, glossy; 4 x 6 inch size and a digital copy of each on a photo CD. Take photographs as evidence of existing project conditions.
- B. Identify each print on back. Identify name of Project, contract number orientation of view, date and time of view.

#### PART 2 PRODUCTS

Not Used.

#### PART 3 EXECUTION

Not Used.

## **SHOP DRAWING SUBMITTAL**

PROJECT: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

DATE: \_\_\_\_\_

PROJECT NO: \_\_\_\_\_

CONTRACTOR: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

PRESENTED BY:  
(Subcontractor/Supplier)

\_\_\_\_\_  
Company Name

\_\_\_\_\_  
Address

\_\_\_\_\_  
Phone/Fax

\_\_\_\_\_  
Contact Person

ITEM: \_\_\_\_\_

SPEC SECTION: \_\_\_\_\_

\_\_\_\_\_  
By approving and submitting these shop drawings,  
product data and samples, we represent that we have  
determined and verified all materials, field measure-  
ments and field construction criteria related thereto,  
or will do so, and that we have checked and coordi-  
nated information contained within submittal with  
requirements of the work and contract documents.

\_\_\_\_\_  
Contractor's Signature

\_\_\_\_\_  
Date

END OF SECTION

SECTION 01 40 00  
QUALITY REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Quality control and control of installation.
- B. Tolerances
- C. References.
- D. Testing and inspection services.
- E. Manufacturers' field services.
- F. Examination.

1.2 QUALITY CONTROL AND 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. When manufacturers' instructions conflict with Contract Documents, request clarification from Engineer 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. Perform Work by persons qualified to produce required and specified quality.
- F. Verify field measurements are as indicated on Shop Drawings or as instructed by manufacturer.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

1.3 TOLERANCES

- A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.
- B. Comply with manufacturers' tolerances. When manufacturers' tolerances conflict with Contract Documents, request clarification from County before proceeding.
- C. Adjust products to appropriate dimensions; position before securing products in place.

#### 1.4 REFERENCES

- A. For products or workmanship specified by association, trade, or other consensus standards, comply with requirements of standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Conform to reference standard by date of issue current on date of Contract Documents, except where specific date is established by code.
- C. Obtain copies of standards where required by product specification sections.
- D. When specified reference standards conflict with Contract Documents, request clarification from County before proceeding.
- E. Neither contractual relationships, duties, nor responsibilities of parties in Contract nor those of County shall be altered from Contract Documents by mention or inference otherwise in reference documents.

#### 1.5 TESTING AND INSPECTION SERVICES

- A. Owner will employ and pay for specified services of an independent firm to perform inspection services.
- B. The independent firm will perform inspections and other services specified in individual specification sections and as required by County.
- C. The Contractor will perform testing services when indicated by the pertinent specifications section.
- D. When testing services require laboratory services, the following will apply:
  - 1. Laboratory: Authorized to operate in State of Missouri.
  - 2. Laboratory Staff: Maintain full time specialist on staff to review services.
  - 3. Testing Equipment: Calibrated at reasonable intervals with devices of an accuracy traceable to National Bureau of Standards or accepted values of natural physical constants.
- E. Testing, inspections and source quality control may occur on or off project site. Perform off-site testing as required by Engineer or Owner.
- F. Reports will be submitted by independent firm to County and Contractor, indicating observations and results of tests and indicating compliance or non-compliance with Contract Documents.
- G. Contractor shall cooperate with independent firm; furnish samples of materials, design mix, equipment, tools, storage, safe access, and assistance by incidental labor as requested.
  - 1. Notify County and independent firm 24 hours prior to expected time for operations requiring services.
  - 2. Make arrangements with independent firm and pay for additional samples and tests required for Contractor's use.

- H. Testing and employment of testing agency or laboratory shall not relieve Contractor of obligation to perform Work in accordance with requirements of Contract Documents.
- I. Re-testing or re-inspection required because of non-conformance to specified requirements shall be performed by same independent firm or other firm on instructions by County. Payment for re-testing or re-inspection will be charged to Contractor by deducting testing charges from Contract Sum/Price.
- J. Agency Responsibilities:
  - 1. Test samples of mixes submitted by Contractor.
  - 2. Provide qualified personnel at site. Cooperate with Engineer and Contractor in performance of services.
  - 3. Perform specified sampling and testing of products in accordance with specified standards.
  - 4. Ascertain compliance of materials and mixes with requirements of Contract Documents.
  - 5. Promptly notify Engineer and Contractor of observed irregularities or non-conformance of Work or products.
  - 6. Perform additional tests required by County.
  - 7. Attend preconstruction meetings and any progress meetings.
- K. Agency Reports: After each test, promptly submit one copy of report to Engineer and to Contractor. When requested by County, provide interpretation of test results. Include the following:
  - 1. Date issued.
  - 2. Project title and number.
  - 3. Name of inspector.
  - 4. Date and time of sampling or inspection.
  - 5. Identification of product and specifications section.
  - 6. Location in Project.
  - 7. Type of inspection or test.
  - 8. Date of test.
  - 9. Results of tests.
  - 10. Conformance with Contract Documents.
- L. Limits On Testing Authority:
  - 1. Agency or laboratory may not release, revoke, alter, or enlarge on requirements of Contract Documents.
  - 2. Agency or laboratory may not approve or accept any portion of the Work.
  - 3. Agency or laboratory may not assume duties of Contractor.
  - 4. Agency or laboratory has no authority to stop the Work.

#### 1.6 MANUFACTURERS' FIELD SERVICES

- A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment as applicable, and to initiate instructions when necessary.



- B. Submit qualifications of observer to County thirty (30) days in advance of required observations.
- C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.
- D. Refer to Section 01 33 00 - SUBMITTAL PROCEDURES, MANUFACTURERS' FIELD REPORTS article.

## PART 2 PRODUCTS

Not Used.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verify existing site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.
- B. Verify 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. Verify utility services are available, of correct characteristics, and in correct locations.

END OF SECTION

## SECTION 01 50 00

### TEMPORARY FACILITIES AND CONTROLS

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Temporary Utilities:
  - 1. Temporary electricity.
  - 2. Temporary lighting for construction purposes.
  - 3. Temporary heating.
  - 4. Temporary cooling.
  - 5. Temporary ventilation.
  - 6. Temporary water service.
  - 7. Temporary sanitary facilities.
- B. Construction Facilities:
  - 1. Vehicular access.
  - 2. Parking.
  - 3. Progress cleaning and waste removal.
  - 4. Traffic regulation.
- C. Temporary Controls:
  - 1. Barriers.
  - 2. Enclosures and fencing.
  - 3. Security.
  - 4. Water control.
  - 5. Dust control.
  - 6. Erosion and sediment control.
  - 7. Noise control.
  - 8. Pollution control.
- D. Removal of utilities, facilities, and controls.

##### 1.2 TEMPORARY ELECTRICITY

- A. Provide and pay for power service required from utility source as needed for construction operation.
- B. Permanent convenience receptacles may be utilized during construction.

##### 1.3 TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES

- A. Provide branch wiring from power source to distribution boxes with lighting conductors, pigtails, and lamps for specified lighting levels or as construction project requires.
- B. Maintain lighting and provide routine repairs.

#### 1.4 TEMPORARY HEATING

- A. Provide and pay for heating devices and heat as needed to maintain specified conditions for construction operations.

#### 1.5 TEMPORARY COOLING

- A. Provide and pay for cooling devices and cooling as needed to maintain specified conditions for construction operations.

#### 1.6 TEMPORARY VENTILATION

- A. Ventilate enclosed areas to achieve curing of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

#### 1.7 TEMPORARY WATER SERVICE

- A. Owner will pay cost of temporary water for testing purposes. Exercise measures to conserve energy. Utilize Owner's existing water system, extend and supplement with temporary devices as needed to maintain specified conditions for construction operations.

#### 1.8 TEMPORARY SANITARY FACILITIES

- A. Provide and maintain required facilities and enclosures. Existing facility use is not permitted. Provide facilities at time of project mobilization.

#### 1.9 VEHICULAR ACCESS

- A. Access using existing gravel drive and/or proposed gravel access. Keep gravel access open for Owner.
- B. Provide and maintain access to fire hydrants and control valves free of obstructions.
- C. Provide means of removing mud from vehicle wheels before entering streets.
- D. Use existing on-site roads for construction traffic.
- E. Access to site from limited access highways not permitted except at permitted access points.

#### 1.10 PARKING

- A. Utilize existing District property for parking.
- B. When site space is not adequate, provide additional off-site parking.
- C. Tracked vehicles not allowed on paved areas.
- D. Do not allow vehicle parking on existing pavement.
- E. Use of existing on-site streets and driveways used for construction traffic is not permitted. Tracked vehicles not allowed on paved areas.

- F. Maintenance:
  - 1. Maintain traffic and parking areas in sound condition free of excavated material, construction equipment, products, mud, snow, and ice.
  - 2. Maintain existing and permanent paved areas used for construction; promptly repair breaks, potholes, low areas, standing water, and other deficiencies, to maintain paving and drainage in original, or specified, condition.
- G. Mud From Site Vehicles: Provide means of removing mud from vehicle wheels before entering streets.

#### 1.11 PROGRESS CLEANING AND WASTE REMOVAL

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in 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 spaces.
- C. Collect and remove waste materials, debris, and rubbish from site weekly and dispose off-site.

#### 1.12 TRAFFIC REGULATION

- A. Signs, Signals, And Devices:
  - 1. Post Mounted and Wall Mounted Traffic Control and Informational Signs: As approved by authority having jurisdiction.
  - 2. Traffic Control Signals: As approved by local jurisdictions.
  - 3. Traffic Cones and Drums, Flares and Lights: As approved by authority having jurisdiction.
  - 4. Flagperson Equipment: As required by authority having jurisdiction.
- B. Flag Persons: Provide trained and equipped flag persons to regulate traffic when construction operations or traffic encroach on public traffic lanes.
- C. Haul Routes:
  - 1. Consult with authority having jurisdiction, establish public thoroughfares to be used for haul routes and site access.
- D. Traffic Signs And Signals:
  - 1. Provide signs at approaches to site and on site, at crossroads, detours, parking areas, and elsewhere as needed to direct construction and affected public traffic.
- E. Removal:
  - 1. Remove equipment and devices when no longer required.
  - 2. Repair damage caused by installation.
  - 3. Remove post settings to depth of 2 feet.

### 1.13 BARRIERS

- A. Provide barriers to prevent unauthorized entry to construction areas and to allow for Owner's use of site, and to protect existing facilities and adjacent properties from damage from construction operations.
- B. Provide barricades required by authorities having jurisdiction for public rights-of-way.
- C. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

### 1.14 ENCLOSURES AND FENCING

- A. Construction: Plastic construction netting or chain link.

### 1.15 SECURITY

- A. Security Program:
  - 1. Protect Work from theft, vandalism, and unauthorized entry.
  - 2. Initiate program at project mobilization.
  - 3. Maintain program throughout construction period until Owner occupancy.

### 1.16 WATER CONTROL

- A. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.
- B. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.

### 1.17 DUST CONTROL

- A. Execute Work by methods to minimize raising dust from construction operations.
- B. Provide positive means to prevent air-borne dust from dispersing into atmosphere.

### 1.18 EROSION AND SEDIMENT CONTROL

- A. Refer to Erosion Control and SWPPP Specification.
- B. Plan and execute construction by methods to control surface drainage from cuts and fills, from borrow and waste disposal area. Prevent erosion and sedimentation.
- C. Minimize surface area of bare soil exposed at one time.
- D. Provide temporary measures including berms, dikes, and drains, and other devices to prevent water flow.
- E. Construct fill and waste areas by selective placement to avoid erosive surface silts or clays.

- F. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.

#### 1.19 NOISE CONTROL

- A. Provide methods, means, and facilities to minimize noise produced by construction operations.

#### 1.20 POLLUTION CONTROL

- A. Refer to Erosion Control and SWPPP Specification.
- B. Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations.
- C. Comply with pollution and environmental control requirements of MoDNR.

#### 1.21 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

- A. Remove temporary utilities, equipment, facilities, materials, prior to Final inspection.
- B. Clean and repair damage caused by installation or use of temporary work.
- C. Restore existing facilities used during construction to original condition. Restore permanent facilities used during construction to specified condition.

### PART 2 PRODUCTS

Not Used.

### PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01 60 00  
PRODUCT REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Products.
- B. Product delivery requirements.
- C. Product storage and handling requirements.
- D. Product options.
- E. Product substitution procedures.

1.2 PRODUCTS

- A. Furnish products of qualified manufacturers suitable for intended use. Furnish products of each type by single manufacturer unless specified otherwise.
- B. Do not use materials and equipment removed from existing premises, except as specifically permitted by Contract Documents.
- C. Furnish interchangeable components from same manufacturer for components being replaced.

1.3 PRODUCT DELIVERY REQUIREMENTS

- A. Transport and handle products in accordance with manufacturer's instructions.
- B. Promptly inspect shipments to ensure products comply with requirements, quantities are correct, and products are undamaged.
- C. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

1.4 PRODUCT STORAGE AND HANDLING REQUIREMENTS

- A. Store and protect products in accordance with manufacturers' instructions.
- B. Store with seals and labels intact and legible.
- C. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.
- D. For exterior storage of fabricated products, place on sloped supports above ground.

- E. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- F. Store loose granular materials on solid flat surfaces in well-drained area. Prevent mixing with foreign matter.
- G. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- H. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

#### 1.5 PRODUCT OPTIONS

- A. Products Specified by Naming One or More Manufacturers with Provision for Substitutions: Submit request for substitution for any manufacturer not named in accordance with the following article.

#### 1.6 PRODUCT SUBSTITUTION PROCEDURES

- A. Instructions to Bidders specify time restrictions for submitting requests for Substitutions during bidding period to requirements specified in this section.
- B. Substitutions may be considered when a product becomes unavailable through no fault of Contractor.
- C. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.
- D. A request constitutes a representation that Bidder:
  - 1. Has investigated proposed product and determined that it meets or exceeds quality level of specified product.
  - 2. Will provide same warranty for Substitution as for specified product.
  - 3. Will coordinate installation and make changes to other Work, which may be required for the Work to be complete with no additional cost to Owner.
  - 4. Waives claims for additional costs or time extension which may subsequently become apparent.
  - 5. Will reimburse Owner and Engineer for review or redesign services associated with re-approval by authorities having jurisdiction.
- E. 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 Contract Documents.



## PART 2 PRODUCTS

Not Used.

## PART 3 EXECUTION

Not Used.

END OF SECTION

## SECTION 01 70 00

### EXECUTION AND CLOSEOUT REQUIREMENTS

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Closeout procedures.
- B. Final cleaning.
- C. Starting of systems.
- D. Demonstration and instructions.
- E. Testing, adjusting, and balancing.
- F. Protecting installed construction.
- G. Project record documents.
- H. Operation and maintenance date.
- I. Manual for materials and finishes.
- J. Manual for equipment and systems.
- K. Spare parts and maintenance products.
- L. Product warranties and product bonds.
- M. Maintenance service.

##### 1.2 CLOSEOUT PROCEDURES

- A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Engineer's review.
- B. Provide submittals to County required by authorities having jurisdiction.
- C. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.

##### 1.3 FINAL CLEANING

- A. Execute final cleaning prior to final project assessment.
- B. Clean equipment and fixtures to sanitary condition with cleaning materials appropriate to surface and material being cleaned.

- C. Clean site; sweep paved areas, rake clean landscaped surfaces.
- D. Remove rocks from grassed or landscaped areas.
- E. Remove waste and surplus materials, rubbish, and construction facilities from site.

#### 1.4 STARTING OF SYSTEMS

- A. Coordinate schedule for start-up of various equipment and systems.
- B. Notify County seven (7) days prior to start-up of each item.
- C. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.
- D. Submit a written report in accordance with Section 01 33 00 that equipment or system has been properly installed and is functioning correctly.

#### 1.5 DEMONSTRATION AND INSTRUCTIONS

- A. Demonstrate operation and maintenance of products to Owner's personnel two weeks prior to date of final inspection.
- B. Demonstrate Project equipment and instruct in classroom environment located at Owners office and instructed by qualified manufacturer's representative who is knowledgeable about the Project.
- C. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owner's personnel in detail to explain all aspects of operation and maintenance.
- D. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at agreed time, at designated location.
- E. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.
- F. Required instruction time for each item of equipment and system is specified in individual sections.

#### 1.6 TESTING, ADJUSTING AND BALANCING

- A. Contractor will appoint, employ, and pay for services of independent firm to provide testing, adjusting, and balancing.
- B. Reports will be submitted by independent firm to Engineer indicating observations and results of tests and indicating compliance or non-compliance with requirements of Contract Documents.

## 1.7 PROTECTING INSTALLED CONSTRUCTION

- A. Protect installed Work and provide special protection where specified in individual specification sections.
- B. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
- C. Prohibit traffic from landscaped areas.

## 1.8 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.
  - 7. Permits including the following:
    - a. Local Agency Permits (building, plumbing, etc.)
- 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, not less than weekly.
- 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: Legibly mark each item to record actual construction including:
  - 1. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
  - 2. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
  - 3. Field changes of dimension and detail.
  - 4. Details not on original Contract drawings.
- G. Submit documents to Engineer with claim for final Application for Payment.

## 1.9 OPERATION AND MAINTENANCE DATA

- A. Submit data bound in 8-1/2 x 11 inch text pages, three D side ring binders with durable plastic covers.

- B. Prepare binder cover with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS", title of project, and subject matter of binder when multiple binders are required.
- C. Internally subdivide binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.
- D. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
- E. Contents: Prepare Table of Contents for each volume, with each product or system description identified, typed on white paper, in three parts as follows:
  - 1. Part 1: Directory, listing names, addresses, and telephone numbers of Engineer, Contractor, Subcontractors, and major equipment suppliers.
  - 2. Part 2: Operation and maintenance instructions, arranged by system and subdivided by specification section or as accepted by the Owner. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
    - a. Significant design criteria.
    - b. List of equipment.
    - c. Parts list for each component.
    - d. Operating instructions.
    - e. Maintenance instructions for equipment and systems.
    - f. Maintenance instructions for special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
  - 3. Part 3: Project documents and certificates, including the following:
    - a. Shop drawings and product data.
    - b. Air and water balance reports.
    - c. Certificates.
    - d. Originals of warranties and bonds.

#### 1.10 MANUAL FOR MATERIALS AND FINISHES

- A. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Engineer will review draft and return one copy with comments.
- B. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit documents within ten (10) days after acceptance.
- C. Submit one copy of completed volumes fifteen (15) days prior to final inspection. Draft copy be reviewed and returned after final inspection, with County comments. Revise content of document sets as required prior to final submission.
- D. Submit two sets of revised final volumes in final form within ten (10) days after final inspection.
- E. Building Products, Applied Materials, and Finishes: Include product data, with catalog number, size, composition, and color and texture designations. Include information for re-ordering custom manufactured products.

- F. Instructions for Care and Maintenance: Include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- G. Moisture Protection and Weather Exposed Products: Include product data listing applicable reference standards, chemical composition, and details of installation. Include recommendations for inspections, maintenance, and repair.
- H. Additional Requirements: As specified in individual product specification sections.
- I. Include listing in Table of Contents for design data, with tabbed fly sheet and space for insertion of data.

#### 1.11 MANUAL FOR EQUIPMENT AND SYSTEMS

- A. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. County will review draft and return one copy with comments.
- B. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit documents within ten (10) days after acceptance.
- C. Submit one copy of completed volumes fifteen (15) days prior to final inspection. Draft copy to be reviewed and returned after final inspection, with County comments. Revise content of document sets as required prior to final submission.
- D. Submit two sets of revised final volumes in final form within ten (10) days after final inspection.
- E. Each Item of Equipment and Each System: Include description of unit or system, and component parts. Identify function, normal operating characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and model number of replaceable parts.
- F. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed.
- G. Include color-coded wiring diagrams as installed.
- H. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shutdown, and emergency instructions. Include summer, winter, and special operating instructions.
- I. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and troubleshooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- J. Include servicing and lubrication schedule, and list of lubricants required.
- K. Include manufacturer's printed operation and maintenance instructions.
- L. Include sequence of operation by controls manufacturer.

- M. Include original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- N. Include control diagrams by controls manufacturer as installed.
- O. Include Contractor's coordination drawings, with color-coded piping diagrams as installed.
- P. Include charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- Q. Include list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- R. Include test and balancing reports as specified in Section 01 40 00.
- S. Additional Requirements: As specified in individual product specification sections.
- T. Include listing in Table of Contents for design data, with tabbed dividers and space for insertion of data.

#### 1.12 SPARE PARTS AND MAINTENANCE PRODUCTS

- A. Furnish spare parts, maintenance, and extra products in quantities specified in individual specification sections.
- B. Deliver to Project site and place in location as directed by Owner; obtain receipt prior to final payment.

#### 1.13 PRODUCT WARRANTIES AND PRODUCT BONDS

- A. Obtain warranties and bonds executed in duplicate by responsible subcontractors, suppliers, and manufacturers, within ten (10) days after completion of applicable item of work.
- B. Execute and assemble transferable warranty documents and bonds from subcontractors, suppliers, and manufacturers.
- C. Verify documents are in proper form, contain full information, and are notarized.
- D. Co-execute submittals when required.
- E. Include Table of Contents and assemble in three D side ring binder with durable plastic cover.
- F. Submit prior to final Application for Payment.
- G. Time Of Submittals:
  - 1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within ten (10) days after acceptance.

2. Make other submittals within ten (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 ten (10) days after acceptance, listing date of acceptance as beginning of warranty or bond period.

#### 1.14 MAINTENANCE SERVICE

- A. Furnish service and maintenance of components indicated in specification sections during warranty period.
- B. Examine system components at frequency consistent with reliable operation. Clean, adjust, and lubricate as required.
- C. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by manufacturer of original component.
- D. Do not assign or transfer maintenance service to agent or Subcontractor without prior written consent of Owner.

#### PART 2 PRODUCTS

Not Used.

#### PART 3 EXECUTION

Not Used.

END OF SECTION



## SECTION 024119 - SELECTIVE DEMOLITION

### 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. Demolition and removal of selected portions of building or structure.
  - 2. Demolition and removal of selected site elements.
  - 3. Salvage of existing items to be reused or recycled.

- B. Related Requirements:

- 1. Section 011000 "Summary" for restrictions on use of the premises, Owner-occupancy requirements, and phasing requirements.

#### 1.3 DEFINITIONS

- A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged or reinstalled.
- B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and **deliver to Owner ready for reuse**.
- C. Remove and Reinstall: Detach items from existing construction, in a manner to prevent damage, prepare for reuse, and reinstall where indicated.
- D. Existing to Remain: Leave existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.
- E. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

#### 1.4 MATERIALS OWNERSHIP

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

#### 1.5 PREINSTALLATION MEETINGS

- A. Predemolition Conference: Conduct conference at **Project site**.
  - 1. Inspect and discuss condition of construction to be selectively demolished.
  - 2. Review structural load limitations of existing structure.
  - 3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
  - 4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
  - 5. Review areas where existing construction is to remain and requires protection.

#### 1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For refrigerant recovery technician.
- B. Engineering Survey: Submit engineering survey of condition of building.
- C. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, **for environmental protection, for dust control and, for noise control**. Indicate proposed locations and construction of barriers.
- D. Schedule of Selective Demolition Activities: Indicate the following:
  - 1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's **building manager's** on-site operations are uninterrupted.
  - 2. Interruption of utility services. Indicate how long utility services will be interrupted.
  - 3. Coordination for shutoff, capping, and continuation of utility services.
  - 4. Use of elevator and stairs.
  - 5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
- E. Predemolition Photographs or Video: Show existing conditions of adjoining construction, including finish surfaces, that might be misconstrued as damage caused by demolition operations. Submit before Work begins.
- F. Warranties: Documentation indicating that existing warranties are still in effect after completion of selective demolition.

#### 1.7 CLOSEOUT SUBMITTALS

- A. Inventory: Submit a list of items that have been removed and salvaged.

#### 1.8 QUALITY ASSURANCE

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

#### 1.9 FIELD CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
  - 1. Hazardous materials will be removed by Owner before start of the Work.
  - 2. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.
- E. Storage or sale of removed items or materials on-site is not permitted.
- F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
  - 1. Maintain fire-protection facilities in service during selective demolition operations.

#### 1.10 WARRANTY

- A. Notify warrantor on completion of selective demolition, and obtain documentation verifying that existing system has been inspected and warranty remains in effect. Submit documentation at Project closeout.

#### 1.11 COORDINATION

- A. Arrange selective demolition schedule so as not to interfere with Owner's operations.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ASSE A10.6 and NFPA 241.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- B. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.
- C. Verify that hazardous materials have been remediated before proceeding with building demolition operations.
- D. Survey of Existing Conditions: Record existing conditions by use of **measured drawings**
  - 1. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage operations.
  - 2. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

### 3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
- B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.
  - 1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
  - 2. Arrange to shut off utilities with utility companies.
  - 3. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.

4. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated on Drawings to be removed.
  - a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
  - b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.
  - c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
  - d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
  - e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
  - f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
  - g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material and leave in place.

### 3.3 PROTECTION

- A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
  1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
  2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
  3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
  4. Cover and protect furniture, furnishings, and equipment that have not been removed.
  5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 015000 "Temporary Facilities and Controls."
- B. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
  1. Strengthen or add new supports when required during progress of selective demolition.
- C. Remove temporary barricades and protections where hazards no longer exist.

### 3.4 SELECTIVE DEMOLITION, GENERAL

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
  2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
  3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
  4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
  5. Maintain adequate ventilation when using cutting torches.
  6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
  7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
  8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
  9. Dispose of demolished items and materials promptly.
- B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
- C. Removed and Salvaged Items:
1. Clean salvaged items.
  2. Pack or crate items after cleaning. Identify contents of containers.
  3. Store items in a secure area until delivery to Owner.
  4. Transport items to Owner's storage area **designated by Owner**.
  5. Protect items from damage during transport and storage.
- D. Removed and Reinstalled Items:
1. Clean and repair items to functional condition adequate for intended reuse.
  2. Pack or crate items after cleaning and repairing. Identify contents of containers.
  3. Protect items from damage during transport and storage.
  4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
- E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition **and cleaned** and reinstalled in their original locations after selective demolition operations are complete.

### 3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Concrete: Demolish in small sections. Using power-driven saw, cut concrete to a depth of at least **3/4 inch (19 mm)** at junctures with construction to remain. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete. Neatly trim openings to dimensions indicated.
- B. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, and then remove concrete between saw cuts.
- C. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, and then remove masonry between saw cuts.
- D. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, and then break up and remove.
- E. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings." **Do not use methods requiring solvent-based adhesive strippers.**

### 3.6 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove demolition waste materials from Project site **and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction.**
  - 1. Do not allow demolished materials to accumulate on-site.
  - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
  - 3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
  - 4. Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."
- B. Burning: Do not burn demolished materials.

### 3.7 CLEANING

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

## SECTION 05 40 00

### COLD-FORMED METAL FRAMING

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. Section includes formed steel stud walls, steel joist, and bridging.
- B. Related Sections:
  - 1. Section 05 31 13 - Steel Floor Decking: Metal floor decking supported by wall stud metal framing.
  - 2. Section 05 31 23 - Steel Roof Decking: Metal roof decking supported by wall stud metal framing.
  - 3. Section 07 21 16 - Blanket Insulation: Insulation within framing members.
  - 4. Section 07 26 00 - Vapor Retarders.
  - 5. Section 07 27 00 - Air Barriers.
  - 6. Section 09 21 16 - Gypsum Board Assemblies: Light weight, non-load bearing metal stud framing.

##### 1.2 REFERENCES

- A. American Iron and Steel Institute:
  - 1. AISI General - Standard for Cold-Formed Steel Framing - General Provisions.
  - 2. AISI Header - Standard for Cold-Formed Steel Framing - Header Design.
  - 3. AISI NASPEC - North American Specification for Design of Cold-Formed Steel Structural Members.
  - 4. AISI - Residential Steel Framing Manual.
- B. ASTM International:
  - 1. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
  - 2. ASTM A780 - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
  - 3. ASTM A1003/A1003M - Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members.
  - 4. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
  - 5. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
  - 6. ASTM A1003/A1003M - Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members.
  - 7. ASTM C955 - Standard Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Panel Products and Metal Plaster Bases.



- C. American Welding Society:
  - 1. AWS D1.1 - Structural Welding Code - Steel.
  - 2. AWS D1.3 - Structural Welding Code - Sheet Steel.
- D. National Association of Architectural Metal Manufacturers:
  - 1. NAAMM ML/SFA 540 - Lightweight Steel Framing Systems Manual.
- E. SSPC: The Society for Protective Coatings:
  - 1. SSPC Paint 15 - Steel Joist Shop Paint.
  - 2. SSPC Paint 20 - Zinc-Rich Primers (Type I - Inorganic and Type II - Organic).
- F. Steel Stud Manufacturers Association:
  - 1. SSMA - Product Technical Information.

### 1.3 SYSTEM DESCRIPTION

- A. Maximum Allowable Deflection: 1: 360 of span.

### 1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal requirements.
- B. Shop Drawings:
  - 1. Indicate component details, anchorage, loading, welds, type and location of fasteners, and accessories or items required of related Work.
  - 2. Indicate member layout.
  - 3. Submit calculations for loadings and stresses of specially fabricated framing under direct supervision of a Professional Engineer experienced in design of this Work and licensed in State of Illinois.
- C. Product Data: Submit data on standard framing members; describe materials and finish, product criteria, and limitations.
- D. Manufacturer's Installation Instructions: Submit special procedures, and perimeter conditions requiring special attention.
- E. Mill Certifications: Submit mill certifications for steel delivered to site. Certify steel bare metal thickness in 0.001 inch, yield strength, tensile strength, total elongation in 2 inch or 8 inch gauge length, chemical analysis, and galvanized coating thickness.

### 1.5 QUALITY ASSURANCE

- A. Calculate structural properties of framing members in accordance with AISI NASPEC.
- B. Furnish framing materials in accordance with SSMA - Product Technical Information.

## 1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.
- B. Installer: Company specializing in performing Work of this section with minimum 3 years experience.
- C. Design structural elements under direct supervision of Professional Engineer experienced in design of this Work and licensed in State of Missouri.
- D. Form, fabricate, provide, and connect components in accordance with NAAMM ML/SFA 540 - Lightweight Steel Framing Systems Manual.

## 1.7 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

## PART 2 PRODUCTS

### 2.1 COLD-FORMED METAL FRAMING

- A. Manufacturers:
  - 1. Clark Steel Framing Systems.
  - 2. Harrison Manufacturing Co.
  - 3. Marino\Ware.
  - 4. Unimast Incorporated.
  - 5. DALE/INCOR Inc.
  - 6. Dietrich Inc.
  - 7. Substitutions: Section 01 60 00 - Product Requirements.

### 2.2 FRAMING MATERIALS

- A. Framing members: ASTM A653
- B. Framing Materials: Roll from new sheet steel; cold reduction steels not being acceptable.

### 2.3 ACCESSORIES

- A. Bracing, Furring, Bridging: Formed sheet steel, thickness determined by performance requirements specified.
- B. Plates, Gussets, Clips: Formed sheet steel, thickness determined by performance requirements specified.
- C. Touch-Up Paint: SSPC Paint 20 (Type II Organic zinc rich).

## 2.4 FASTENERS

- A. Self-drilling, Self-tapping Screws, Bolts, Nuts, and Washers: Steel, hot dip galvanized.
- B. Anchorage Devices: Power actuated, and drilled expansion bolts.
- C. Welding: In conformance with AWS D1.1 and AWS D1.3.

## 2.5 FABRICATION

- A. Fabricate assemblies of formed sections of sizes and profiles required.
- B. Fit, reinforce, and brace framing members to suit design requirements.
- C. Fit and assemble in largest practical sections for delivery to site, ready for installation.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify building framing components are ready to receive Work.
- C. Verify rough-in utilities are in proper location.

END OF SECTION

## SECTION 06 10 53

### MISCELLANEOUS ROUGH CARPENTRY

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. Section includes blocking in wall and roof openings; wood furring and grounds; concealed wood blocking for support of toilet and bath accessories, and wall cabinets; telephone and electrical panel back boards; and preservative treatment of wood.
- B. Related Sections:
  - 1. Division 8 – Openings: Window and Door openings to receive wood blocking

##### 1.2 REFERENCES

- A. American National Standards Institute:
  - 1. ANSI A208.1 - Mat-Formed Wood Particleboard.
- B. American Wood-Preservers' Association:
  - 1. AWWPA C1 - All Timber Products - Preservative Treatment by Pressure Process.
  - 2. AWWPA C20 - Structural Lumber - Fire-Retardant Treatment by Pressure Processes.
- C. ASTM International:
  - 1. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- D. National Fire Protection Association:
  - 1. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials.
- E. The Redwood Inspection Service:
  - 1. RIS - Standard Specifications for Grades of California Redwood Lumber.
- F. Southern Pine Inspection Bureau:
  - 1. SPIB - Standard Grading Rules for Southern Pine Lumber.
- G. Underwriters Laboratories Inc.:
  - 1. UL 723 - Tests for Surface Burning Characteristics of Building Materials.
- H. U. S Department of Commerce National Institute of Standards and Technology:
  - 1. DOC PS 1 - Construction and Industrial Plywood.
  - 2. DOC PS 2 - Performance Standard for Wood-Based Structural-Use Panels.
  - 3. DOC PS 20 - American Softwood Lumber Standard.

- I. West Coast Lumber Inspection Bureau:
  - 1. WCLIB - Standard Grading Rules for West Coast Lumber.

- J. Western Wood Products Association:
  - 1. WWPA G-5 - Western Lumber Grading Rules.

### 1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit technical data on wood preservative and fire retardant treatment materials and application instructions.

### 1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with the following:
  - 1. Lumber Grading Agency: Certified by DOC PS 20.
  - 2. Wood Structural Panel Grading Agency: Certified by EWA - The Engineered Wood Association.
  - 3. Lumber: DOC PS 20.
  - 4. Wood Structural Panels: DOC PS 1 or DOC PS 2.
- B. Surface Burning Characteristics:
  - 1. Fire Retardant Treated Materials: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84 NFPA 255 UL 723.
- C. Apply label from agency approved by authority having jurisdiction to identify each preservative treated and fire retardant treated material.
- D. Maintain one copy of each document on site.

## PART 2 PRODUCTS

### 2.1 MATERIALS

- A. Lumber Grading Rules: AP&PA. SPIB. WCLIB.
- B. Miscellaneous Framing: Stress Group D, S/P/F, species, grade 19 percent maximum moisture content after treatment, pressure preservative treat.
- C. Plywood: APA/EWA Rated Sheathing Structural I, Grade C-D; Exposure Durability 2; unsanded.

### 2.2 ACCESSORIES

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

2. Nails and Staples: ASTM F1667.
3. Anchors: Toggle bolt type for anchorage to hollow masonry. Expansion shield and lag bolt type for anchorage to solid masonry or concrete. Bolt or ballistic fastener for anchorages to steel.

### 2.3 FACTORY WOOD TREATMENT

- A. Wood Preservative (Pressure Treatment): AWP C1 using water borne preservative with 0.25 percent retainage.
- B. Fire Retardant Treatment: Pressure treatment, AWP C20 for lumber and AWP C27 for plywood, Interior Type, chemically treated and pressure impregnated; capable of providing a maximum flame spread/smoke development of 25/450.
- C. Moisture Content After Treatment:
  1. Lumber: Maximum 19 percent.
  2. Structural Panels: Maximum 15 percent.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify substrate conditions are ready to receive blocking, curbing and framing.

### 3.2 PREPARATION

- A. Coordinate placement of blocking, curbing and framing items.

### 3.3 INSTALLATION

- A. Set members level and plumb, in correct position.
- B. Place horizontal members, crown side up.
- C. Construct curb members of solid wood sections.
- D. Curb roof openings except where prefabricated curbs are provided. Form corners by alternating lapping side members.
- E. Coordinate curb installation with installation of decking and support of deck openings, and parapet construction.

### 3.4 SITE APPLIED WOOD TREATMENT

- A. Apply preservative treatment.

- B. Brush apply two coats of preservative treatment on wood in contact with cementitious materials, roofing and related metal flashings and treat site-sawn cuts.
- C. Allow preservative to dry prior to erecting members.

END OF SECTION

## SECTION 06 10 53

### MISCELLANEOUS ROUGH CARPENTRY

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. Section includes roof curbs, cants, and perimeter nailers; blocking in wall and roof openings; wood furring and grounds; concealed wood blocking for support of toilet and bath accessories, and wall cabinets; telephone and electrical panel back boards; and preservative treatment of wood.
- B. Related Sections:
  - 1. Section 05 31 23: Steel roof decking to receive wood curbs.
  - 2. Division 8 – Openings: Window and Door openings to receive wood blocking

##### 1.2 REFERENCES

- A. American National Standards Institute:
  - 1. ANSI A208.1 - Mat-Formed Wood Particleboard.
- B. American Wood-Preservers' Association:
  - 1. AWWPA C1 - All Timber Products - Preservative Treatment by Pressure Process.
  - 2. AWWPA C20 - Structural Lumber - Fire-Retardant Treatment by Pressure Processes.
- C. ASTM International:
  - 1. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- D. National Fire Protection Association:
  - 1. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials.
- E. The Redwood Inspection Service:
  - 1. RIS - Standard Specifications for Grades of California Redwood Lumber.
- F. Southern Pine Inspection Bureau:
  - 1. SPIB - Standard Grading Rules for Southern Pine Lumber.
- G. Underwriters Laboratories Inc.:
  - 1. UL 723 - Tests for Surface Burning Characteristics of Building Materials.
- H. U. S Department of Commerce National Institute of Standards and Technology:
  - 1. DOC PS 1 - Construction and Industrial Plywood.
  - 2. DOC PS 2 - Performance Standard for Wood-Based Structural-Use Panels.
  - 3. DOC PS 20 - American Softwood Lumber Standard.



- I. West Coast Lumber Inspection Bureau:
  - 1. WCLIB - Standard Grading Rules for West Coast Lumber.

- J. Western Wood Products Association:
  - 1. WWPA G-5 - Western Lumber Grading Rules.

### 1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit technical data on wood preservative and fire retardant treatment materials and application instructions.

### 1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with the following:
  - 1. Lumber Grading Agency: Certified by DOC PS 20.
  - 2. Wood Structural Panel Grading Agency: Certified by EWA - The Engineered Wood Association.
  - 3. Lumber: DOC PS 20.
  - 4. Wood Structural Panels: DOC PS 1 or DOC PS 2.
- B. Surface Burning Characteristics:
  - 1. Fire Retardant Treated Materials: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84 NFPA 255 UL 723.
- C. Apply label from agency approved by authority having jurisdiction to identify each preservative treated and fire retardant treated material.
- D. Maintain one copy of each document on site.

## PART 2 PRODUCTS

### 2.1 MATERIALS

- A. Lumber Grading Rules: AP&PA. SPIB. WCLIB.
- B. Miscellaneous Framing: Stress Group D, S/P/F, species, grade 19 percent maximum moisture content after treatment, pressure preservative treat.
- C. Plywood: APA/EWA Rated Sheathing Structural I, Grade C-D; Exposure Durability 2; unsanded.

### 2.2 ACCESSORIES

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

2. Nails and Staples: ASTM F1667.
3. Anchors: Toggle bolt type for anchorage to hollow masonry. Expansion shield and lag bolt type for anchorage to solid masonry or concrete. Bolt or ballistic fastener for anchorages to steel.

## 2.3 FACTORY WOOD TREATMENT

- A. Wood Preservative (Pressure Treatment): AWP C1 using water borne preservative with 0.25 percent retainage.
- B. Fire Retardant Treatment: Pressure treatment, AWP C20 for lumber and AWP C27 for plywood, Interior Type, chemically treated and pressure impregnated; capable of providing a maximum flame spread/smoke development of 25/450.
- C. Moisture Content After Treatment:
  1. Lumber: Maximum 19 percent.
  2. Structural Panels: Maximum 15 percent.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify substrate conditions are ready to receive blocking, curbing and framing.

### 3.2 PREPARATION

- A. Coordinate placement of blocking, curbing and framing items.

### 3.3 INSTALLATION

- A. Set members level and plumb, in correct position.
- B. Place horizontal members, crown side up.
- C. Construct curb members of solid wood sections.
- D. Curb roof openings except where prefabricated curbs are provided. Form corners by alternating lapping side members.
- E. Coordinate curb installation with installation of decking and support of deck openings, and parapet construction.

### 3.4 SITE APPLIED WOOD TREATMENT

- A. Apply preservative treatment.

- B. Brush apply two coats of preservative treatment on wood in contact with cementitious materials, roofing and related metal flashings and treat site-sawn cuts.
- C. Allow preservative to dry prior to erecting members.

### 3.5 SCHEDULES

- A. Roof Blocking:S/P/F species, 19 percent maximum moisture content, pressure preservative treatment.
- B. Telephone and Electrical Panel Boards: 3/4 inch thick, square edges, site brush applied preservative treated.

END OF SECTION

## SECTION 08 12 14

### STANDARD STEEL FRAMES

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. Section includes fire rated, non-rated, and thermally insulated steel frames.
- B. Related Sections:
  - 1. Section 08 71 00 - Door Hardware: Hardware, silencers, and weatherstripping.
  - 2. Section 09 90 00 - Painting and Coating: Field painting of frames.

##### 1.2 REFERENCES

- A. American National Standards Institute:
  - 1. ANSI A250.8 - Recommended Specifications for Standard Steel Doors and Frames.
- B. ASTM International:
  - 1. ASTM A591/A591M - Standard Specification for Steel Sheet, Electrolytic Zinc-Coated, for Light Coating Mass Applications.
  - 2. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- C. National Fire Protection Association:
  - 1. NFPA 80 - Standard for Fire Doors, Fire Windows.
  - 2. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies.
- D. Underwriters Laboratories Inc.:
  - 1. UL 10B - Fire Tests of Door Assemblies.
  - 2. UL 10C - Positive Pressure Fire Tests of Door Assemblies.
  - 3. UL 1784 - Air Leakage Tests of Door Assemblies.
- E. Uniform Building Code:
  - 1. UBC Standard 7-2 - Fire Tests of Door Assemblies.

##### 1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Shop Drawings: Indicate frame elevations, reinforcement, anchor types and spacing, location of cut-outs for hardware, and finish.
- C. Product Data: Submit frame configuration and finishes.
- D. Manufacturer's Installation Instructions: Submit special installation instructions.
- E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

## 1.5 QUALITY ASSURANCE

- A. Conform to requirements of ANSI A250.8.
- B. Fire Rated Frame Construction: Conform to one of the following:
  - 1. NFPA 252; with neutral pressure level at 40 inches maximum above sill at 5 minutes into test.
  - 2. UL 10C.
- C. Fire Rated Frame Construction: Conform to UBC Standard 7-2.
- D. Installed Fire Rated Frame Assembly: Conform to NFPA 80 for fire rated class same as fire door.
- E. Attach label from agency approved by authority having jurisdiction to identify each fire rated door frame.

## 1.6 QUALIFICATIONS

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

## 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Accept frames on site in manufacturer's packaging. Inspect for damage.
- C. Break seal on-site to permit ventilation.

## 1.8 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate Work with frame opening construction, door, and hardware installation.
- C. Sequence installation to accommodate required door hardware electric wire connections.

# PART 2 PRODUCTS

## 2.1 STANDARD STEEL FRAMES

- A. Manufacturers:
  - 1. Amweld Building Products, Inc.
  - 2. Ceco Door Products.
  - 3. Republic Builders Products.
  - 4. Steelcraft.
  - 5. Curries Company.

- B. Product Description: Standard shop fabricated steel frames, fire rated and non-rated types.
  - 1. Exterior Frames:
    - a. Level 4, nominal 14 gage/0.067 inch thick material, base metal thickness.
  - 2. Interior Frames:
    - a. Level 2, nominal 16 gage/0.053 inch thick material, base metal thickness.

## 2.2 ACCESSORIES

- A. Removable Stops: Rolled steel shape, mitered corners; prepared for countersink style tamper proof screws.
- B. Bituminous Coating: Non-asbestos fibered asphalt emulsion.
- C. Primer: ANSI A250.10 rust inhibitive type.
- D. Silencers: Specified in Section 08 71 00.
- E. Weatherstripping: Specified in Section 08 71 00.

## 2.3 FABRICATION

- A. Fabricate frames as welded unit.
- B. Fabricate frames with hardware reinforcement plates welded in place. Provide mortar guard boxes as applicable.
- E. Reinforce frames wider than 48 inches with roll formed steel channels fitted tightly into frame head, flush with top.
- F. Prepare frames for silencers. Provide three single silencers for single doors and mullions of double doors on strike side. Provide two single silencers on frame head at double doors without mullions.
- G. Attach fire rated label to each fire rated frame.
- H. Fabricate frames to suit masonry wall coursing with 4 inch head member.

## 2.4 SHOP FINISHING

- A. Steel Sheet: Galvanized to ASTM A653/A653M G90. Exterior frames to be galvanized.
- B. Primer: Baked.
- C. Coat inside of frame profile with bituminous coating to minimum thickness of 1/16 inch at door frames in masonry and concrete walls.
- D. Finish Paint: Field application as per Section 09 90 00.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify opening sizes and tolerances are acceptable.

### 3.2 INSTALLATION

- A. Install frames in accordance with ANSI A250.8.
- B. Coordinate with masonry and gypsum board wall construction for anchor placement.
- C. Coordinate installation of glass specified in Section 08 80 00.
- D. Coordinate installation of frames with installation of hardware specified in Section 08 71 00 and doors in Section 08 13 14 and 08 14 16.
- E. Install roll formed steel reinforcement channels between two abutting frames. Anchor to structure and floor.

### 3.3 ERECTION TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Maximum Diagonal Distortion: 1/16 inch measured with straight edges, crossed corner to corner.

### 3.4 SCHEDULE

- A. Refer to Door and Frame Schedule on Drawings.

END OF SECTION

SECTION 08 14 16  
FLUSH WOOD DOORS

PART 1        GENERAL

1.1        SUMMARY

- A.        Section includes flush wood doors; flush and flush glazed configuration; fire rated and non-rated.
- B.        Related Sections:
  - 1.        Section 08 12 14 - Standard Steel Frames.
  - 2.        Section 08 71 00 - Door Hardware.

1.2        REFERENCES

- A.        American National Standards Institute:
  - 1.        ANSI A135.4 - Basic Hardboard.
- B.        ASTM International:
  - 1.        ASTM E413 - Standard Classification for Rating Sound Insulation.
- C.        Architectural Woodwork Institute:
  - 1.        AWI - Quality Standards Illustrated.
- D.        Forest Stewardship Council:
  - 1.        FSC Guidelines - Forest Stewardship Council Guidelines.
- E.        Hardwood Plywood and Veneer Association:
  - 1.        HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood.
- F.        Intertek Testing Services (Warnock Hersey Listed):
  - 1.        WH - Certification Listings.
- G.        National Electrical Manufacturers Association:
  - 1.        NEMA LD 3 - High Pressure Decorative Laminates.
- H.        National Fire Protection Association:
  - 1.        NFPA 80 - Standard for Fire Doors, Fire Windows.
  - 2.        NFPA 252 - Standard Methods of Fire Tests of Door Assemblies.
- I.        South Coast Air Quality Management District:
  - 1.        SCAQMD Rule 1168 - Adhesive and Sealant Applications.



- J. Underwriters Laboratories Inc.:
  - 1. UL - Building Materials Directory.
  - 2. UL 10B - Fire Tests of Door Assemblies.
  - 3. UL 10C - Positive Pressure Fire Tests of Door Assemblies.
  - 4. UL 1784 - Air Leakage Tests of Door Assemblies.
- K. Uniform Building Code:
  - 1. UBC Standard 7-2 - Fire Tests of Door Assemblies.

### 1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Shop Drawings: Illustrate door opening criteria, elevations, sizes, types, swings, undercuts required, special beveling, special blocking for hardware, factory machining criteria, factory finishing criteria, and identify cutouts for glazing.
- C. Product Data: Submit information on door core materials and construction, and on veneer species, type and characteristics.
- D. Samples:
  - 1. Submit two samples of door veneer, 6 x 6 inch in size illustrating wood grain, stain color, and sheen.
- E. Manufacturer's Installation Instructions: Submit special installation instructions.
- F. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

### 1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with AWI Quality Standard Section 1300, Custom Grade.
- B. Finish doors in accordance with AWI Quality Standard Section 1500.
- C. Fire Rated Door Construction: Conform to NFPA 252.
- D. Installed Fire Rated Door Assembly: Conform to NFPA 80 for fire rated class as scheduled.
- E. Attach label from agency approved by authority having jurisdiction to identify each fire rated door.

### 1.6 QUALIFICATIONS

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

## 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Package, deliver and store doors in accordance with AWI Section 1300.
- C. Protect doors with resilient packaging. Do not store in damp or wet areas; or in areas where sunlight might bleach veneer. Seal top and bottom edges when stored more than one week.
  - 1. Break seal on site to permit ventilation.

## 1.8 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate Work with door opening construction, door frame and door hardware installation.

## 1.9 WARRANTY

- A. Section 01 70 00 - Execution and Closeout Requirements: Product warranties and product bonds.
- B. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.
- C. Furnish manufacturer's "Life of Installation" warranty for interior doors.

# PART 2 PRODUCTS

## 2.1 FLUSH WOOD DOORS

- A. Manufacturers:
  - 1. Algoma Hardwoods Inc.
  - 2. Eggers Industries.
  - 3. Marshfield Door systems.
  - 4. Graham Manufacturing Corp.
- B. Product Description: Solid core flush wood doors; wood veneer facing material; fire rated and non-rated types; flush design; without louvers; factory pre-fit; factory finished; wood doors.
  - 1. Flush Interior Doors: 1-3/4 inches thick; solid core, five or seven ply construction, fire rated as indicated on Drawings.

## 2.2 COMPONENTS

- A. Solid Core, Non-Rated: AWI Section 1300, Type PC - Particleboard.
- B. Solid Core, Fire Rated: AWI Section 1300, Type FD 1-1/2 FD 1 FD ¾ FD ½ FD 1/3.
- C. Interior Veneer Facing: AWI Custom quality wood, plain sliced, with book matched

grain, for transparent finish. Pair match multiple door leaves in single opening.

1. Wood: Red Oak.

D. Facing Adhesive: Type II - water resistant.

## 2.3 ACCESSORIES

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

## 2.4 FABRICATION

A. Fabricate doors in accordance with AWI Quality Standards requirements.

B. Sound Rating For Single Door Leaf and Frame Assembly: ASTM E413, minimum STC 35.

D. Furnish lock blocks at lock edge and top of door for closer for hardware reinforcement.

E. Vertical Exposed Edge of Stiles: Of same species as veneer facing.

F. Fit door edge trim to edge of stiles after applying veneer facing.

G. Bond edge banding to cores.

H. Factory machine doors for finish hardware in accordance with hardware requirements and dimensions. Do not machine for surface hardware.

I. Factory fit doors for frame opening dimensions identified on shop drawings.

J. Provide edge clearances in accordance with AWI 1300.

## 2.5 SHOP FINISHING

A. Finish work in accordance with AWI - Section 1500 Factory Finishing; Custom Stained Transparent:

1. Transparent finish TR-6: Catalyzed polyurethane or equal, custom quality, satin sheen.

B. Factory finish doors in accordance with approved sample.

C. Seal door top edge with clear sealer.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify opening sizes and tolerances are acceptable.
- C. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

### 3.2 INSTALLATION

- A. Install doors in accordance with AWI Quality Standards requirements.
- B. Trim non-rated door width by cutting equally on both jamb edges.
- C. Trim door height by cutting bottom edges to maximum of 3/4 inch.
  - 1. Trim fire door height at bottom edge only, in accordance with fire rating requirements.
- D. Machine cut doors for hardware installation.
- E. Coordinate installation of doors with installation of frames specified in Section 08 12 14, hardware specified in Section 08 71 00, and glazing specified in Section 08 80 00.

### 3.3 INSTALLATION TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Conform to AWI requirements for fit and clearance tolerances.
- C. Conform to AWI Section 1300 requirements for maximum diagonal distortion.

### 3.4 ADJUSTING

- A. Section 01 70 00 - Execution and Closeout Requirements: Testing, adjusting, and balancing.
- B. Adjust door for smooth and balanced door movement.
- C. Adjust closer for full closure.

### 3.5 SCHEDULE

- A. Refer to Door and Frame Schedule on Drawings.

END OF SECTION

## SECTION 08 71 00

### DOOR HARDWARE

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. Section includes hardware for steel doors.
  - 1. Provide door gaskets, including weatherstripping and seals, and thresholds.
- B. Related Sections:
  - 1. Section 08 14 16 - Flush Wood Doors.
  - 2. Section 08 12 14 - Standard Steel Frames.

##### 1.2 REFERENCES

- A. American National Standards Institute:
  - 1. ANSI A156.1 - Butts and Hinges.
  - 2. ANSI A156.2 - Bored and Preassembled Locks and Latches.
  - 3. ANSI A156.3 - Exit Devices.
  - 4. ANSI A156.4 - Door Controls - Closures.
  - 5. ANSI A156.5 - Auxiliary Locks and Associated Products.
  - 6. ANSI A156.6 - Architectural Door Trim.
  - 7. ANSI A156.7 - Template Hinge Dimensions.
  - 8. ANSI A156.16 - Auxiliary Hardware.
  - 9. ANSI A156.18 - Materials and Finishes
  - 10. ANSI A156 - Complete Set of 24 BHMA Standards (A156 Series) with Binder.
- B. Builders Hardware Manufacturers Association:
  - 1. BHMA Directory of Certified Products.
- C. National Fire Protection Association:
  - 1. NFPA 80 - Standard for Fire Doors, Fire Windows.
  - 2. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies.
- D. Underwriters Laboratories Inc.:
  - 1. UL 10B - Fire Tests of Door Assemblies.
  - 2. UL 305 - Panic Hardware.
  - 3. UL - Building Materials Directory.

##### 1.3 PERFORMANCE REQUIREMENTS

- A. Fire Rated Openings: Provide door hardware listed by UL or Intertek Testing Services (Warnock Hersey Listed), or other testing laboratory approved by applicable authorities.
  - 1. Hardware: Tested in accordance with NFPA 252.

#### 1.4 SUBMITTALS

- A. Section 01330 - Submittal Procedures: Submittal procedures.
- B. Shop Drawings:
  - 1. Indicate locations and mounting heights of each type of hardware, schedules, catalog cuts, electrical characteristics and connection requirements.
  - 2. Submit manufacturer's parts lists, and templates.
- C. Manufacturer's Installation Instructions: Submit special procedures, and perimeter conditions requiring special attention.
- D. Keys and Keying.
  - 1. All keying nomenclature shall be prepared using symbols, nomenclature and overall method as described in ASAHCB NBHA Handbook – AIA File.
  - 2. Hardware supplier shall provide keying in accordance with instructions of Architect/Engineer, including three keys for each lock and six master keys.
  - 3. Before hardware is ordered, a complete keying schematic drawing shall be furnished to Architect/Engineer for approval.

#### 1.5 CLOSEOUT SUBMITTALS

- A. Section 01700 - Execution Requirements: Closeout procedures.
- B. Project Record Documents: Record actual locations of installed cylinders and their master key code.
- C. Operation and Maintenance Data: Submit data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.
- D. Keys: Deliver with identifying tags to Owner by security shipment direct from hardware supplier.

#### 1.6 QUALITY ASSURANCE

- A. Perform Work in accordance with the following requirements:
  - 1. ANSI A156 series.
  - 2. NFPA 80.
  - 3. UL 305.

#### 1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum ten years experience.
- B. Hardware Supplier: Company specializing in supplying commercial and institutional door hardware with minimum ten years experience.

- C. Hardware Supplier Personnel: Employ Architectural Hardware Consultant (AHC) to assist in work of this section.
- D. Products Requiring Electrical Connection: Listed and classified by Underwriters' Laboratories, Inc., as suitable for purpose specified and indicated.

#### 1.8 PRE-INSTALLATION MEETINGS

- A. Section 01300 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.
- C. Include persons involved with installation of doors, frames, and hardware.

#### 1.9 DELIVERY, STORAGE, AND HANDLING

- A. Section 01600 - Product Requirements: Product storage and handling requirements.
- B. Package hardware items individually with necessary fasteners, instructions, and installation templates, when necessary; label and identify each package with door opening code to match hardware schedule.

#### 1.10 COORDINATION

- A. Section 01300 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate Work with other directly affected sections involving manufacture or fabrication of internal reinforcement for door hardware and recessed items.
  - 1. Provide templates or actual hardware as required to ensure proper preparation of doors and frames.
- C. Coordinate Owner's keying requirements during course of Work. Owner existing keying system is by Sargent.

#### 1.11 WARRANTY

- A. Section 01700 - Execution Requirements: Product warranties and product bonds.
- B. Furnish two-year manufacturer warranty for defects due to faulty workmanship or materials.
- C. Furnish ten-year manufacturer warranty for closers.

#### 1.12 MAINTENANCE MATERIALS

- A. Section 01700 - Execution Requirements: Maintenance materials.
- B. Furnish special wrenches and tools applicable for each different and for each special hardware component.

## PART 2 PRODUCTS

### 2.1 DOOR HARDWARE

- A. Manufacturers: Catalog numbers of manufacturers listed have been used to establish quality required. Only manufacturers listed are approved. Other manufacturers seeking approval shall do so in writing per General Requirements and shall list exact catalog numbers and description of items he proposes to furnish.
- B. Designations: Following abbreviations identify listed manufacturers.
1. BAL Baldwin Hardware Mfg. corp., Reading, PA.
  2. GJ Glynn-Johnson, div. of Dayton-Walter Corp., Chicago, IL 60640
  3. HAG Hager Hinge Co., St. Louis, MO 63104.
  4. IVE Ives, div. of Leigh Products, New Haven, CT 06508.
  5. LAW Lawrence Brothers, Inc., Sterling, IL 61081.
  6. LCN LCN Closer, Princeton, IL 61356.
  7. MCK McKinney Products Co., Scranton, PA 18505.
  8. NAT National Guard Products, Memphis, TN 38107.
  9. NOR Norton Door Controls, Charlotte, NC 28229.
  10. PEM Pemko, Ventura, CA 93003.
  11. RED Reed Exit Hardware, Charlotte, NC 28229
  12. REE Reese Enterprises, Inc., Rosemount, MN 55068.
  13. RIX Rixson-Firemark, Franklin Park, IL 60131.
  14. ROC Rockwood Manufacturing Co., rockwood, PA 15557.
  15. SAR Sargent, Div. of Kidde, New Haven, CT 06511.
  16. STA Stanley Hardware, New Britain, CT 06500.
  17. VON Von DuPrin, Indianapolis, IN
  18. ROFU ROFU International Corp., Tacoma, WA 98424.

### 2.2 COMPONENTS

- A. General Hardware Requirements: Where not specifically indicated, comply with applicable ANSI A156 standard for type of hardware required. Furnish each type of hardware with accessories as required for applications indicated and for complete, finished, operational doors.
1. Templates: Furnish templates or physical hardware items to door and frame manufacturers sufficiently in advance to avoid delay in Work.
  2. Reinforcing Units: Furnished by door and frame manufacturers; coordinated by hardware supplier or hardware manufacturer.
  3. Fasteners: Furnish as recommended by hardware manufacturer and as required to secure hardware.
    - a. Finish: Match hardware item being fastened.
  4. Fire Ratings: Provide hardware with UL or Intertek Testing Services (Warnock Hersey Listed) listings for type of application involved.
  5. Electrical Devices: Make provisions and coordinate requirements for electrical devices and connections for hardware.
- B. Hinges: Continuous hinge, manufactured of 6063-T6 aluminum.
1. Components: Two interlocking geared leaves and a cover channel applied the full length of the door without mortising (concealed).



2. Finish: Clear satin anodized for interior doors. Two coat (PVDF) Kynar 500 finish for exterior hollow metal doors.
- C. Locksets: Furnish locksets compatible with specified cylinders. Typical 2-3/4 inch backset for interior doors and 3-3/4 inch backset for exterior doors. Furnish standard strikes with extended lips to protect trim from being marred by latch bolt.
1. Bored (Cylindrical) Locksets: ANSI A156.2, Series 4000, Grade 1 unless otherwise indicated.
- D. Latch Sets: Typical 2-3/4 inch backset. Furnish standard strikes with extended lips to protect trim from being marred by latch bolt.
1. Bored (Cylindrical) Latch Sets: ANSI A156.2, Series 4000, Grade 1 unless otherwise indicated.
- E. Exit Devices: ANSI A156.3, Grade 1 concealed vertical rod type and rim type, with push pad, unless otherwise indicated. Furnish standard strikes with extended lips to protect trim from being marred by latch bolt.
1. Types: Suitable for doors requiring exit devices.
  2. Coordinators: Furnish overhead concealed in frame type at pairs of doors.
  3. Provide access control exit device series, type, and function where specified in hardware groups.
  4. All exit devices shall be UL listed for panic. Exit devices for labeled doors shall be UL listed as "Fire Exit Hardware".
  5. Provide exit devices factory cut to door width and height. Locate exit devices at a height recommended by the exit device manufacturer, allowable by governing building codes, and approved by the Architect/Engineer.
  6. Provide access control products with non-volatile memory.
  7. In addition to user codes, provide a Master Code as standard. The Master Code assigns emergency, supervisory, and user codes.
  8. Provide SofLink™ Plus Software (PK) and computer cable kit (#52-2393), capable of working with Microsoft Windows operating systems (95 or higher), required to program time zone periods, holidays, automatic unlock with first entry, and listing 1,000 event transaction history - unlock, egress activation, entry into programming mode, date, time, user number, and door number.
  9. Locking and unlocking of the lever handle shall be done by electronic strike. Egress from the inside at all times. Provide lever design to match lockset levers.
  10. LED's on unit indicate status – unlocked and programming mode.
  11. Provide weatherseal gasketing at exterior applications.
  12. Provide cylinder-dogging feature for non-rated exit devices.
  13. Provide keyed removable mullions, as specified in the Hardware Groups.
  18. Provide cylinders for exit devices with cylinder override and cylinder dogging.
- F. Cylinders: ANSI A156.5, Grade 1, 6 pin type cylinders interchangeable core type cylinders.
1. Keying: Keyed as directed by Owner. Master keyed. RB Keyway.
  2. Include construction keying.
  3. Keys: Nickel silver. Stamp keys with "DO NOT DUPLICATE".
  4. Supply keys in the following minimum quantities:
    - a. 6 master keys.
    - b. 4 construction keys.
    - c. 3 change keys for each lock.

- G. Closers: ANSI A156.4 modern type with cover, surface mounted closers; full rack and pinion type with steel spring and non-freezing hydraulic fluid; closers required for fire rated doors unless otherwise indicated.
1. Adjustability: Furnish controls for regulating closing, latching, speeds, and back checking.
  2. Arms: Type to suit individual condition; parallel-arm closers at reverse bevel doors and where doors swing full 180 degrees.
  3. Location: Mount closers on inside of exterior doors, room side of interior doors typical; mount on pull side of other doors.
  4. Operating Pressure: Maximum operating pressure as follows.
    - a. Interior Doors: Maximum 5 pounds.
    - b. Exterior Doors: Maximum 8.5 pound.
    - c. Fire Rated Doors: As required for fire rating, maximum 15 pounds.
- H. Push/Pulls, Manual and Automatic Bolts, Protection Plates, Gaskets, Thresholds, and Trim: Furnish as indicated in Schedule, with accessories as required for complete operational door installations.
1. Push/Pulls: ANSI A156.6; push plates minimum 0.050 inch thick. Furnish straight push-pull, push-pull plate type pulls with bolts to secure from opposite door face; furnish with minimum 0.050 inch pull plates unless otherwise indicated.
  2. Manual and Automatic Bolts: ANSI A156.16 Grade 1 top and bottom flush bolts, with dust-proof floor strike, unless otherwise indicated.
  3. Kickplates: ANSI A156.6, metal; height indicated in Schedule by 2 inch less than door width; minimum 0.050 inch thick stainless steel.
  4. Weatherstripping: Furnish continuous weatherstripping at top and sides of exterior doors.
  5. Fire Rated Gaskets: Furnish continuous fire rated gaskets at top and sides of fire rated doors.
  6. Thresholds: Maximum 1/2 inch height.
  7. Wall Stops: ANSI A156.1, Grade 1, convex pad wall stop with no visible screws.
- I. Electronic Access Controls: Furnish a system that is compatible with the existing system used by Jefferson County. CTS will provide and install access controls.
- J. Electronic Strikes: Furnish stainless steel strike and appropriate face plate with Satin Stainless Steel finish 630. Fail secure. Plug-in connector, UL rated, Heavy Duty, non-handed, dual voltage VDC continuous duty. Components must be compatible with the hardware specified. CTS will provide and install electronic strikes.

## 2.3 ACCESSORIES

- A. Lock Trim: Furnish levers as indicated in Schedule.
- B. Through Bolts: Do not permit through bolts and grommet nuts on door faces in occupied areas unless no alternative is possible.

## 2.4 FINISHING

- A. Finishes: ANSI A156.18; furnish following finishes except where otherwise indicated in Schedule at end of section.
1. Typical Exterior Exposed and High Use Interior Door Hardware:
    - a. BHMA 630, satin finished stainless steel.
    - b. BHMA 626, satin chromium plated brass or bronze.
  2. Typical Interior Door Hardware:
    - a. BHMA 626, satin chromium plated brass or bronze.
    - b. BHMA 630, satin finished stainless steel.
  3. Closers: Finish appearance to match door hardware on same face of door.
    - a. BHMA 628, satin aluminum, clear anodized.
  4. Thresholds: Finish appearance to match door hardware on exterior face of door.
    - a. BHMA 628, satin aluminum, clear anodized.
  5. Other Items: Furnish manufacturer's standard finishes to match similar hardware types on same door, and maintain acceptable finish considering anticipated use and BHMA category of finish.

## 2.5 PRODUCTS

- A. Hinges:
1. Hinges: continuous, geared aluminum, heavy duty, concealed leaf 180° opening, two-coat fluoropolymer coating system at exterior hollow metal doors, and clear anodized at interior doors.
    - a. Manufacturers:
      - 1) HAG – 780 – 112HD.
      - 2) MCK – 12HD.
      - 3) PEM – CFM 85 SLFHD.
- B. Locksets:
1. Lockset: Cylindrical, heavy duty, access function (F109).
    - a. Manufacturers:
      - 1) SAR – 10G05 x LL.
  2. Lockset: Cylindrical, heavy duty, office function (F82).
    - a. Manufacturers:
      - 1) SAR – 10G24 x LL.
  3. Lockset: Cylindrical, heavy duty, storeroom function (F86).
    - a. Manufacturers:
      - 1) SAR – 10G04 x LL.
  4. Latchset: Cylindrical, heavy duty, passage function (F75).
    - a. Manufacturers:
      - 1) SAR – 10U15 x LL.
- C. Electronic Strikes
1. Electronic Strike: Rim device.
    - a. Manufacturers:
      - 1) Provided and installed by CTS.

2. Electronic Strike: Rim device double doors with mullion.
  - a. Manufacturers:
    - 1) Provided and installed by CTS.

D. Closers:

1. Closer: Universal, not-handed, parallel arm with built-in cushioned stop and hold open function.
  - a. Manufacturers:
    - 1) LCN – 4110 – 3049 SC Series.
    - 2) NOR – UNI7500H Series.
    - 3) COR – DC2200 x A12 Series.
    - 4) SAR – 281-CPSH Series.
2. Closer: Universal, not-handed, parallel arm with built-in cushioned stop.
  - a. Manufacturers:
    - 1) LCN – 4110 Series with Spring Cush Arm.
    - 2) NOR – UNI 7500 Series.
    - 3) COR – DC2200 x A11 Series.
    - 4) SAR – 281-CPS Series.
3. Closer: Universal, not handed, parallel arm.
  - a. Manufacturers:
    - 1) LCN – 4110 Series.
    - 2) NOR – 7500 Series.
    - 3) COR – DC2200 Series.
    - 4) SAR – 281-P Series.

E. Stops:

1. Door Stop: Wall mount, interior.
  - a. Manufacturers:
    - 1) BAL – 4280 Series.
    - 2) GJ – 50W.
    - 3) ROC – 409.

F. Threshold:

1. Saddle, aluminum, 6" x ½".
  - a. Manufacturers:
    - 1) NAT – 8426.
    - 2) PEM – 253 x 3AFG.
    - 3) REE – S473A.

G. Cover Plate:

1. Flat plate, aluminum, 5" x ¼".
  - a. Manufacturers:
    - 1) NAT – 818.
    - 2) PEM – 14/1A.

H. Weatherstrip:

1. Door Frame: Head and jamb, surface mount.
  - a. Manufacturers:
    - 1) NAT – 110NSA.

- 2) PEM – 319CR.
    - 3) REE – FS473A.
  - 2. Door Bottom: Sill protection.
    - a. Manufacturers:
      - 1) NAT – 200NA.
      - 2) PEM – 315CN.
      - 3) REE – 323A.
  - 3. Door Top: Drip strip.
    - a. Manufacturers.
      - 1) NAT – 16AD.
      - 2) PEM – 346C.
      - 3) REE – R201A.
- I. Smoke and Draft Control Gasketing:
  - 1. Door Frame: Head and jamb, surface mount, self-adhesive silicone bulb, color as selected by Architect/Engineer.
    - a. Manufacturers:
      - 1) NAT – 5050.
      - 2) PEM – S88.
      - 3) REE – 638CH.
- J. Flush Bolts:
  - 1. Automatic flush bolt, recessed in metal door, inactive leaf, top and bottom, dustproof floor strike.
    - a. Manufacturers:
      - 1) GJ – FB-7
      - 2) IVE – FB-31P.
- K. Push/Pull:
  - 1. Push/Pull: Wrought, 0.050” thick, beveled edges, pull cast.
    - a. Manufacturers:
      - 1) ROC – 70B push x 107 x 70B push/pull.
      - 2) BAL – 2123 push x 2365 push/pull.
      - 3) IVE – 8200 3.5 x 15 push; 8200 x 15 x 8102-8 push/pull.
- L. Kickplate:
  - 1. Kickplate: Stainless steel, 0.050 thick, beveled three sides, 8” high x 2” less door width.
    - a. Manufacturers:
      - 1) ROC – doorplate Series.
      - 2) BAL – 2001.
      - 3) IVE – 8400 Series.
- M. Astragal:
  - 1. Astragal, pair of doors, meeting stile, surface mount.
    - a. Manufacturers:
      - 1) PEM – 351C.
      - 2) REE – 95C.
- N. Cylinder:
  - 1. Cylinder, 6 pin, interchangeable core.

- a. Manufacturers:
      - 1) COR.
      - 2) SCH.
  - O. Removable Mullion: Lockable.
    - 1. Heavy duty.
      - a. Manufacturers:
        - 1) SAR – 12 L980, steel, top and bottom retainers mortise cylinder.
        - 2) COR – 700 Series, steel, top and bottom retainers mortise cylinder.
  - P. Coordinator: Gravity type
    - 1. Gravity type.
      - a. Manufacturers:
        - 1) GJ – Cor 85
        - 2) IVE – Cor 9G

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Section 01300 - Administrative Requirements: Coordination and project conditions.
- B. Verify doors and frames are ready to receive door hardware and dimensions are as indicated on shop drawings.
- C. Verify electric power is available to power operated devices and is of correct characteristics.

### 3.2 INSTALLATION

- A. Coordinate mounting heights with door and frame manufacturers. Use templates provided by hardware item manufacturer.
- B. Mounting Heights From Finished Floor to Center Line of Hardware Item: Comply with manufacturer recommendations and applicable codes where not otherwise indicated.
  - 1. Locksets: 38 inch.
  - 2. Push/Pulls: 42 inch.
  - 3. Dead Locks: 48 inch.
  - 4. Push Pad Type Exit Devices: 42 inch.

### 3.3 FIELD QUALITY CONTROL

- A. Section 01700 - Execution Requirements: Testing, adjusting, and balancing.
- B. Architectural Hardware Consultant inspect installation and certify hardware and installation has been furnished and installed in accordance with manufacturer's instructions and as specified.

### 3.4 ADJUSTING

- A. Section 01700 - Execution Requirements: Testing, adjusting, and balancing.
- B. Adjust hardware for smooth operation.

### 3.5 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01700 - Execution Requirements: Protecting installed construction.
- B. Do not permit adjacent work to damage hardware or hardware finish.

### 3.6 FINISH HARDWARE SCHEDULE

- A. Provide finish hardware for each door to comply with requirements of Section “Finish Hardware”, hardware set numbers indicated in Door Schedule and the following schedule of hardware sets:

- 1. Group 1, Door 201.
  - a. Each to have:
    - 1) Hinges: #1.
    - 2) Lockset: #4
    - 3) Closers: #1.
    - 4) Cylinders #1.
- 2. Group 2, Door 206.
  - a. Each to have:
    - 1) Hinges: #1.
    - 2) Lockset: #1.
    - 3) Closers: #1.
    - 4) Electronic Strike: #1
    - 5) Gaskets: #1.
- 3. Group 3, Door 207. (Double Door)
  - a. Each to have:
    - 1) Hinges: #1.
    - 2) Lockset: #1.
    - 3) Closer: #2.
    - 4) Stop: #1.
    - 5) Kickplate: #1.
    - 6) Gaskets: #1.
    - 7) Removable Mullion
    - 8) Electronic Strike: #2
    - .
- 4. Group 4, Doors 203, 204, 205 and 208.
  - a. Each to have:
    - 1) Hinges: #1.
    - 2) Lockset: #2.
    - 3) Closer: #2.
    - 4) Stop: #1.
    - 5) Kickplate: #1.

5. Group 5, Doors 209 and 210.

- a. Each to have:
- 1) Hinges: #1.
  - 2) Lockset: #3.
  - 3) Closer: #1.
  - 4) Stop: #1.
  - 5) Kickplate: #1.

- B. Where a pair of doors is installed, items listed are per leaf, except locks where inactive door is listed.

END OF SECTION



## SECTION 09 21 16

### GYPSUM BOARD ASSEMBLIES

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. Section includes metal stud wall framing; metal channel ceiling framing; gypsum board and joint treatment; gypsum sheathing; cementitious backer board; and finish.
- B. Related Sections:
  - 1. Section 06 10 53 – Miscellaneous Rough Carpentry: Wood blocking for support of surface and recessed fixtures and accessories.
  - 2. Section 07 21 16 – Blanket Insulation: Acoustic and Thermal Insulation.

##### 1.2 REFERENCES

- A. ASTM International:
  - 1. ASTM C475 - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
  - 2. ASTM C514 - Standard Specification for Nails for the Application of Gypsum Board.
  - 3. ASTM C557 - Standard Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing.
  - 4. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members.
  - 5. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
  - 6. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.
  - 7. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board.
  - 8. 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.
  - 9. ASTM C1002 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases.
  - 10. ASTM C1007 - Standard Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories.
  - 11. ASTM C1178 - Standard Specification for Glass Mat Water-Resistant Gypsum Backing Panel.
  - 12. ASTM C1280 - Standard Specification for Application of Gypsum Sheathing.
  - 13. ASTM C1396/C1396M - Standard Specification for Gypsum Board.
  - 14. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
  - 15. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.

- 16. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
- B. Gypsum Association:
  - 1. GA 214 - Recommended Levels of Gypsum Board Finish.
  - 2. GA 216 - Application and Finishing of Gypsum Board.
  - 3. GA 600 - Fire Resistance Design Manual Sound Control.
- C. Intertek Testing Services (Warnock Hersey Listed):
  - 1. WH - Certification Listings.
- D. National Fire Protection Association:
  - 1. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials.
- E. Underwriters Laboratories Inc.:
  - 1. UL - Fire Resistance Directory.
  - 2. UL 723 - Tests for Surface Burning Characteristics of Building Materials.

### 1.3 PERFORMANCE REQUIREMENTS

- A. Conform to applicable code for fire rated assemblies as follows. Fire rated partitions:  
Listed Assembly by UL No.
- B. Acoustic Attenuation for Identified Interior Partitions: 52 STC in accordance with ASTM E90.

### 1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Shop Drawings: Indicate special details associated with fireproofing and acoustic seals.
- C. Product Data: Submit data on metal framing, gypsum board, joint tape, and acoustic accessories.

### 1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with ASTM C840, ASTM C1280, GA-214, GA-216 and GA-600.
- B. Maintain one copy of each document on site.

### 1.6 QUALIFICATIONS

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

- B. Installer: Company specializing in performing Work of this section with minimum three years experience.

## 1.7 PRE-INSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

## PART 2 PRODUCTS

### 2.1 GYPSUM BOARD ASSEMBLIES

- A. Manufacturers:
  - 1. Celotex Building Products.
  - 2. G-P Gypsum Corp.
  - 3. National Gypsum Co.
  - 4. United States Gypsum Co.

### 2.2 COMPONENTS

- A. Framing Materials:
  - 1. Studs and Tracks: ASTM C645; GA-216 and GA-600; galvanized sheet steel, 18 gauge minimum unless indicated otherwise on Drawings; C shape, of depth as shown on Drawings.
  - 2. Furring, Framing, and Accessories: ASTM C645, GA-216 and GA-600.
  - 3. Fasteners: ASTM C1002; Screws.
  - 4. Anchorage to Substrate: Tie wire, nails, screws, and other metal supports, of type and size to suit application; to rigidly secure materials in place.
- B. Steel Framing Components for Suspended Gypsum Board Ceilings (flat)
  - 1. Grid suspension system shall be manufacturer's standard grid suspension system
  - 2. composed of main beams and cross furring members which interlock to form a modular supporting network conforming to ASTM C645.
  - 3. Hanger Wire: Pre-stretched 12 gauge wire, yield strength of 394 lbs.
  - 4. Acceptable products:

	<u>Manufacturer</u>	<u>Product</u>
a.	Chicago Metallic	640 Furring System
b.	Donn	Rigid X
c.	Gold Bond	Drywall Suspension System
- C. Gypsum Board Materials:
  - 1. Fire Rated Gypsum Board: ASTM C36; fire resistive type, UL or WH rated; 5/8-inch thick, maximum available length in place; ends square cut, tapered edges.
  - 2. Moisture Resistant Gypsum Board: ASTM C630; 5/8-inch thick, maximum available length in place; ends square cut, tapered edges (for use in areas adjacent to plumbing fixtures where ceramic wall tile is not scheduled for installation).

3. Gypsum Sheathing Board: ASTM C79; moisture resistant type; 5/8-inch thick; maximum available size in place, ends square cut; square edges; water repellent paper faces.
4. Cementitious Backing Board: High density, glass fiber reinforced, 5/8-inch thick; 2-inch wide coated glass fiber tape for joints and corners.

## 2.3 ACCESSORIES

- A. Corner Beads: Metal.
- B. Edge Trim: GA-216; Type LC and L bead.
- C. Joint Materials: ASTM C475; GA-216; reinforcing tape, joint compound, adhesive, and water.
- D. Fasteners: ASTM C1002, Type S12 and GA-216.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Section 01 30 00 – Administrative Requirements: Coordination and project conditions.
- B. Verify site conditions are ready to receive work and opening dimensions are as indicated on shop drawings.

### 3.2 INSTALLATION

- A. Metal Stud Installation.
  1. Install studs in accordance with ASTM C754, GA-216 and GA-600.
  2. Metal Stud Spacing: 16 inches on center, unless indicated otherwise on Drawings.
  3. Refer to Drawings for indication of partitions extending stud framing through ceiling to structure above. Maintain clearance under structural building members to avoid deflection transfer to studs. Provide extended leg ceiling runners.
  4. Door Opening Framing: Install double studs at doorframe jambs. Install stud tracks on each side of opening, at frame head height, and between studs and adjacent studs.
  5. Blocking: Nail wood blocking to studs. Install blocking for support of plumbing fixtures, toilet partitions, wall cabinets, and toilet accessories.
- B. Ceiling Framing Installation
  1. Install in accordance with ASTM C754 and GA-216.
  2. Coordinate location of hangers with other work.
  3. Install ceiling framing independent of walls, columns and above ceiling work.
  4. Reinforce openings in ceiling suspension system which interrupt main carrying channels or furring channels, with lateral channel bracing. Extend bracing minimum 24 inches past each end of openings.

5. Laterally brace entire suspension system.
- C. Acoustic Accessories Installation:
1. Install acoustic sealant at gypsum board perimeter at:
    - a. Metal Framing: Two beads.
    - b. Seal penetration of partitions by conduit, pipe, ductwork, and rough-in boxes.
- D. Gypsum Board Installation:
1. Install gypsum board in accordance with GA-216 and GA-600.
  2. Erect single layer fire rated gypsum board horizontally, with edges and ends occurring over firm bearing.
  3. Erect exterior gypsum sheathing in accordance with ASTM C1280, horizontally, with edges butted and ends occurring over firm bearing.
  4. Use screws when fastening gypsum board to metal furring or framing.
  5. Place control joints consistent with lines of building spaces.
  6. Place corner beads at external corners. Use longest practical length. Place edge trim where gypsum board abuts dissimilar materials as indicated on Drawings.
- E. Joint Treatment:
1. Finish in accordance with GA-214 Level 5.
  2. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
  3. Fill and finish joints and corners of cementitious backing board. Finish in accordance with GA-214 Level 5 and tolerance as stated in Article 3.3.
- F. Texture Finish: Trowel apply finish texture coating.

### 3.3 ERECTION TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Maximum Variation of Finished Gypsum Board Surface from Flat Surface: 1/8 inch in 10 feet.

### 3.4 SCHEDULES

- A. Finishes in accordance with GA-214 Level:
1. Level 1: Above finished ceilings concealed from view.
  2. Level 5: Walls exposed to view.
  3. Level 5: Ceilings exposed to view.

END OF SECTION

## SECTION 09 51 13

### ACOUSTICAL PANEL CEILINGS

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. Section includes suspended metal grid ceiling system, perimeter trim, acoustic panels
- B. Related Sections:
  - 1. Section 23 37 00 - Air Outlets and Inlets: Air diffusion devices in ceiling system.
  - 2. Section 26 51 19 - LED Interior Lighting: Light fixtures in ceiling system.

##### 1.2 REFERENCES

- A. ASTM International:
  - 1. ASTM C635 - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
  - 2. ASTM C636 - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.
  - 3. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
  - 4. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
  - 5. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
  - 6. ASTM E580 - Standard Practice for Application of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Requiring Seismic Restraint.
  - 7. ASTM E1264 - Standard Classification for Acoustical Ceiling Products.
- B. Ceilings and Interior Systems Construction Association:
  - 1. Cisca - Acoustical Ceilings: Use and Practice.
- C. Intertek Testing Services (Warnock Hersey Listed):
  - 1. WH - Certification Listings.
- D. National Fire Protection Association:
  - 1. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials.
  - 2. NFPA 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth.
- E. Underwriters Laboratories Inc.:

1. UL - Fire Resistance Directory.
2. UL 723 - Tests for Surface Burning Characteristics of Building Materials.

### 1.3 PERFORMANCE REQUIREMENTS

- A. Suspension System: Rigidly secure acoustic ceiling system including integral mechanical and electrical components with maximum deflection of 1: 240.

### 1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Shop Drawings: Indicate grid layout and related dimensioning, junctions with other work or ceiling finishes, interrelation of mechanical and electrical items related to system. Indicate method of suspension where interference exists.
- C. Product Data: Submit data on metal grid system components, and acoustic units.
- D. Samples: Submit two samples full size 4 x 4 inch in size illustrating material and finish of acoustic units.
- E. Samples: Submit two samples each, 12 inches long, of suspension system main runner, cross runner, and perimeter molding.
- F. Manufacturer's Installation Instructions: Submit special procedures, and perimeter conditions requiring special attention.

### 1.5 QUALITY ASSURANCE

- A. Conform to Cisca requirements.

### 1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.
- B. Installer: Company specializing in performing work of this section with minimum three years experience.

### 1.7 PRE-INSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

### 1.8 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 - Product Requirements.

- B. Maintain uniform temperature of minimum 55 degrees F, and maximum humidity of 65-70 percent prior to, during, and after acoustic unit installation.

## 1.9 SEQUENCING

- A. Section 01 10 00 - Requirements for sequencing.
- B. Sequence Work to ensure acoustic 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.
- C. Install acoustic units after interior wet work is dry.

## 1.10 EXTRA MATERIALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Spare parts and maintenance products.
- B. Furnish 5% of total acoustic unit area of extra panels to Owner.

## PART 2 PRODUCTS

### 2.1 SUSPENDED ACOUSTICAL CEILINGS

- A. Manufacturers:
  - 1. Armstrong World Industries:
    - a. Type A Ceiling (Non-fire rated): Fine fissured (1728) panel.
  - 2. Celotex Building Products:
    - a. Type A Ceiling (Non-fire rated): Fine fissured (HHF-157) panel.
  - 3. USG Interiors:
    - a. Type A Ceiling (Non-fire rated): Radar ClimaPlus (2210) panel.

### 2.3 COMPONENTS

- A. Acoustic Panels: (Type A): ASTM E1264, conforming to the following:
  - 1. Size: 24 x 24 inches.
  - 2. Thickness: 5/8 inches.
  - 3. Composition: Mineral.
  - 4. NRC Range: 0.50 to 0.60.
  - 5. Edge: Square.
  - 6. Surface Color: White.
  - 7. Surface Finish: Non-directional fissured.



- B. Grid:
1. Non-fire Rated Grid: ASTM C635, intermediate duty; exposed T components die cut and interlocking.
    - a. Armstrong: Prelude XL.
    - b. Celotex: Elite Narrow Stab System.
    - c. USG: Donn DX
  3. Grid Materials: Commercial quality cold rolled steel with galvanized coating.
  4. Exposed Grid Surface Width: 15/16 inch with reveal.
  5. Grid Finish: White color.
  6. Accessories: Stabilizer bars, clips, splices, perimeter moldings, and hold down clips, as required for suspended grid system.
  7. Support Channels and Hangers: Galvanized Primed steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.
  8. Perimeter Molding: Step molding,  $\frac{3}{4}$ " x  $\frac{3}{4}$ " with 15/16" horizontal edge.

## 2.4 ACCESSORIES

- A. Gasket for Perimeter Moldings: Closed cell rubber sponge tape.
- B. Touch-up Paint: Type and color to match acoustic grid units.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify layout of hangers will not interfere with other work.

### 3.2 INSTALLATION

- A. Lay-In Grid Suspension System:
1. Install suspension system in accordance with ASTM C635, ASTM C636 and as supplemented in this section.
  2. Install system in accordance with ASTM E580.
  3. Install system capable of supporting imposed loads to deflection of 1/240 maximum.
  4. Locate system on room axis according to reflected plan.

5. Install after major above ceiling work is complete. Coordinate location of hangers with other work.
6. Install hanger clips during steel deck erection. Install additional hangers and inserts as required.
7. 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.
8. Where ducts or other equipment prevent regular spacing of hangers, reinforce nearest affected hangers and related carrying channels to span extra distance.
9. Do not support components on main runners or cross runners when weight causes total dead load to exceed deflection capability. Support fixture loads by supplementary hangers located within 6 inches of each corner; or support components independently.
10. Do not eccentrically load system, or produce rotation of runners.
11. Perimeter Molding:
  - a. Install edge molding at intersection of ceiling and vertical surfaces with continuous gasket.
  - b. Use longest practical lengths.
  - c. Miter and rivet corners.
  - d. Install at junctions with other interruptions.
12. Install light fixture boxes constructed of acoustic panel above light fixtures in accordance with UL assembly requirements and light fixture ventilation requirements.

B. Acoustic Units:

1. Install units after above ceiling work is complete.
2. Install acoustic units level, in uniform plane, and free from twist, warp, and dents.
3. Cutting Acoustic Units:
  - a. Cut to fit irregular grid and perimeter edge trim.
  - b. Cut square reveal edges to field cut units.

### 3.3 ERECTION TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.
- C. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

END OF SECTION

## SECTION 09 68 13

### TILE CARPETING

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. Section includes carpet tile, fully adhered and accessories.

##### 1.2 REFERENCE

- A. Carpet and Rug Institute:
  - 1. CRI 104 - Standard for Installation of Commercial Carpet.
  - 2. CRI Green Label Plus Testing Program.
- B. Consumer Products Safety Commission:
  - 1. CPSC 16 CFR 1630 - Standard for the Surface Flammability of Carpets and Rugs.
- C. National Fire Protection Association:
  - 1. NFPA 253 - Standard Method of Test for Critical Radiant Flux for Floor Covering Systems Using a Radiant Heat Energy Source.
- D. South Coast Air Quality Management District:
  - 1. SCAQMD Rule 1168 - Adhesive and Sealant Applications.

##### 1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Shop Drawings: Indicate layout of joints, direction of carpet pile, and location of edge moldings.
- C. Product Data: Submit data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.
- D. Samples:
  - 1. Submit four carpet tiles illustrating color and pattern design for each carpet color selected.
  - 2. Submit two 12 inch long samples of edge strip, and base cap.
- E. Manufacturer's Installation Instructions: Submit special procedures, perimeter conditions requiring special attention.

#### 1.4 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
- B. Operation and Maintenance Data: Submit maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.

#### 1.5 QUALITY ASSURANCE

- A. Surface Burning Characteristics:
  - 1. Floor Finishes: Comply with one of the following:
    - a. Class I, minimum 0.45 watts/sq cm when tested in accordance with NFPA 253.
    - b. CPSC 16 CFR 1630.

#### 1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing work of this section with minimum three years documented experience.
  - 1. FCIB or IFCI certified carpet installers.

#### 1.7 PRE-INSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

#### 1.8 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 - Product Requirements.
- B. Store materials in area of installation for 48 hours prior to installation.

#### 1.9 EXTRA MATERIALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Spare parts and maintenance products.
- B. Supply 20 pieces of carpet tiles of each color and pattern selected.

## PART 2 PRODUCTS

### 2.1 CARPET TILE

- A. Manufacturers:
  - 1. Interface Flooring Systems, Inc.
  - 2. Miliken Carpet
  - 3. Mohawk Flooring
  - 4. Shaw Contract Group

### 2.2 COMPONENTS

- 1. Wear Classification: EN 1307 33 Heavy Contract
- 2. Product Definition: Tufted Patterned Structured Loop Tile.
- 3. Pile Material: 100% Antron Excel SC Solution Dyed Nylon 6.6
- 4. Pile Weight: 678 +/- 5% gm/sq m).
- 5. Pile Height: 4.0 mm +/- 0.3 mm
- 6. Total Weight: 4628g/m sq. +/-5%
- 7. Total Thickness: 7.3 mm +/- 0.5 mm
- 8. Light Fastness: 6 (ISO 105)
- 9. Tufts per m/sq.: 165,200 +/- 5%
- 10. Backing Type: Graphlex
- 11. Size: 50 x 50 cm +/- 0.15%

### 2.3 ACCESSORIES

- A. Sub-Floor Filler: Type recommended by flooring material manufacturer.
- B. Moldings and Edge Strips: Extruded aluminum.
- C. Contact Adhesive: Recommended by carpet manufacturer.
- D. Vinyl Wall Base:

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify floor surfaces are smooth and flat within manufacturers tolerances.

### 3.2 PREPARATION

- A. Remove sub-floor ridges and bumps. Fill minor or local low spots, cracks, joints, holes, and other defects with sub-floor filler.
  - B. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Prohibit traffic until filler is cured.
- 845-2606

- C. Clean substrate.

### 3.3 INSTALLATION

- A. Install carpet tile in accordance with CRI 104.
- B. Do not mix carpet from different cartons unless from same dye lot.
- C. Cut carpet tile clean. Fit carpet tight to intersection with vertical surfaces without gaps.
- D. Install carpet tile alternating to next unit.
- E. Locate change of color or pattern between rooms under door centerline.
- F. Fully adhere carpet tile to substrate.
- G. Adhere carpet tile as base finish up vertical surfaces to form base. Terminate top of base with cap strip.
- H. Trim carpet tile neatly at walls and around interruptions.
- I. Complete installation of edge strips, concealing exposed edges.

### 3.4 CLEANING

- A. Section 01 70 00 - Execution and Closeout Requirements: Final cleaning.
- B. Remove excess adhesive from floor, base, and wall surfaces without damage.
- C. Clean and vacuum carpet surfaces.

END OF SECTION

SECTION 09 90 00  
PAINTING AND COATING

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes surface preparation and field application of paints, paint pavement markings, and other coatings.
- B. Related Sections:
  - 1. Section 08 12 14 – Standard Steel Frames: Shop primed items.
  - 2. Section 09 21 16 – Gypsum Board Assemblies: Gypsum wall board.

1.2 REFERENCES

- A. ASTM International:
  - 1. ASTM D16 - Standard Terminology Relating to Paint, Varnish, Lacquer, and Related Products.
  - 2. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials.
  - 3. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- B. National Fire Protection Association:
  - 1. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials.
- C. Painting and Decorating Contractors of America:
  - 1. PDCA - Architectural Painting Specification Manual.
- D. SSPC: The Society for Protective Coatings:
  - 1. SSPC - Steel Structures Painting Manual.
- E. Underwriters Laboratories Inc.:
  - 1. UL 723 - Tests for Surface Burning Characteristics of Building Materials.
- F. IDOT: Illinois Department of Transportation:
  - 1. IDOT – Standard Specifications for Road and Bridge Construction
- G. Recommended Standards for Water Works, 2003 Edition

### 1.3 DEFINITIONS

- A. Conform to ASTM D16 for interpretation of terms used in this section.

### 1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit data on finishing products and special coating.
- C. Samples:
  - 1. Submit two paper chip samples, 2 x 2 inch in size illustrating range of colors and textures available for each surface finishing product scheduled.
- D. Manufacturer's Installation Instructions: Submit special surface preparation procedures, substrate conditions requiring special attention.
- E. Manufacturer's Certificate: For paint pavement markings, certify products meet requirements of IDOT Standard Specifications Section 780.

### 1.5 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
- B. Operation and Maintenance Data: Submit data on cleaning, touch-up, and repair of painted and coated surfaces.

### 1.6 QUALIFICATIONS

- A. Materials specified are those that have been evaluated for the specified service. Products of The Sherwin-Williams Company are listed to provide a standard of quality in the special coatings section. Equivalent material of other manufacturers may be substituted on written approval of the Owner only. Any requests for substitution shall include manufacture's literature for each product listing the name, product number, generic type, descriptive information, solids by volume, recommended dry film thickness and certified test data showing results to equal the performance criteria of the products listed herein. In addition, a list of ten projects shall be submitted in which each product has been used and rendered satisfactory service.
- B. Coatings used inside potable water containing vessels shall be ANSI/NSF 61 registered for potable water immersion service.
- C. Applicator: Company specializing in performing work of this section with minimum five years experience.

### 1.7 PRE-INSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.



- B. Convene minimum one week prior to commencing work of this section.

#### 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- C. 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.
- D. Paint Materials: Store at minimum ambient temperature of 45 degrees F and maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

#### 1.9 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 - Product Requirements.
- B. Do not apply materials when surface and ambient temperatures are outside temperature ranges required by paint product manufacturer.
- C. Do not apply exterior coatings during rain or snow when relative humidity is outside humidity ranges, or moisture content of surfaces exceed those required by paint product manufacturer.
- D. Minimum Application Temperatures for Latex Paints: 45 degrees F for interiors; 50 degrees F for exterior; unless required otherwise by manufacturer's instructions.
- E. Conform to United States and Illinois Environmental Protection Agency (EPA) standards and specifications for air quality.

#### 1.10 SEQUENCING

- A. Section 01 10 00 - Summary: Work sequence.
- B. Sequence application to the following:
  - 1. Do not apply finish coats until paintable sealant is applied.

#### 1.11 WARRANTY

- A. Section 01 70 00 - Execution and Closeout Requirements: Product warranties and product bonds.
- B. Furnish five-year manufacturer warranty for paints and coatings.

## PART 2 PRODUCTS

### 2.1 PAINTS AND COATINGS

- A. Manufacturers (Paint – Office Areas):
  - 1. MAB Paints.
  - 2. Sherwin-Williams
  - 3. Glidden
- B. Materials selected for coating systems shall be from a single manufacturer.

### 2.2 COMPONENTS

- A. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners and other materials not specifically indicated but required to achieve finishes specified; commercial quality.
- B. Patching Materials: Latex filler.
- C. Fastener Head Cover Materials: Latex filler.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify surfaces and substrate conditions are ready to receive Work as instructed by product manufacturer.
- C. Examine surfaces scheduled to be finished prior to commencement of work. Report conditions capable of affecting proper application.
- D. Test shop applied primer for compatibility with specified topcoat materials by applying a test patch in accordance with ASTM D5064.
- E. Measure moisture content of surfaces using electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the limits recommended by the paint manufacturer.
- F. Do not apply paint pavement markings to concrete surfaces until concrete has cured for 28 days.

### 3.2 PREPARATION

- A. Surface Appurtenances: Remove or mask electrical plates, hardware, light fixture trim, escutcheons, and fittings prior to preparing surfaces or finishing.

- B. Surfaces: Correct defects and clean surfaces capable of affecting work of this section. Remove or repair existing coatings exhibiting surface defects.
- C. Marks: Seal with stain blocker those which may bleed through surface finishes.
- D. Impervious Surfaces: Remove mildew by scrubbing with appropriate solution of mildew remover. Rinse with clean water and allow surface to dry.
- E. Asphalt, Creosote, or Bituminous Surfaces Scheduled for Paint Finish: Remove foreign particles to permit adhesion of finishing materials. Apply compatible sealer or primer.
- F. Concrete Floors: Remove contamination and prepare in accordance with ASTM D4259 to achieve ICRI CSP as recommended by coating manufacturer.
- G. Gypsum Board Surfaces: Fill minor defects with filler compound. Spot prime defects after repair.
- H. Galvanized Surfaces: Remove all soluble and insoluble contaminants and corrosion. Remove any storage stains per Section 6.2 of ASTM D6386. Sweep (Abrasive) Blasting per SSPC-SP 16 to achieve a uniform anchor profile (1.0-2.0 mils).
- I. Concrete and Unit Masonry Surfaces Scheduled to Receive Paint Finish: Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter. Remove oil and grease; rinse well and allow to dry. Remove stains caused by weathering of corroding metals. Allow to dry.
- J. Plaster Surfaces: Fill hairline cracks, small holes, and imperfections with latex patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.
- K. Uncoated Steel and Iron Surfaces: Remove grease, mill scale, weld splatter, dirt, and rust. Spot prime paint after repairs.
- L. Shop Primed Steel Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent in accordance with SSPC-SP 1. Prime bare steel surfaces. Prime metal items including shop primed items.
- M. Metal Doors Scheduled for Painting: Prime metal door top and bottom edge surfaces.
- N. Surface Preparation for Paint Pavement Markings
  1. Clean and dry paved surface prior to painting
  2. Blow or sweep surface free of dirt, debris, oil, grease or gasoline.
  3. Spot location of final pavement markings as specified and as indicated on Drawings by applying pavement spots 10 feet on center.
  4. Notify Architect/Engineer after placing pavement spots and minimum 3 days prior to applying traffic lines.

### 3.3 APPLICATION

- A. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- B. Apply each coat to uniform appearance. Apply each coat of paint slightly darker than preceding coat unless specified otherwise.
- C. Sand wood and metal surfaces lightly between coats to achieve required finish.
- D. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- E. Where clear finishes are required, tint fillers to match wood. Work fillers into grain before set. Wipe excess from surface.
- F. Prime concealed surfaces of interior woodwork with primer paint.
- G. Prime concealed surfaces of interior wood surfaces scheduled to receive stain or varnish finish with gloss varnish reduced 25 percent with thinner.
- H. Finishing Mechanical and Electrical Equipment:
  - 1. Refer to Section 22 05 53, Section 23 05 53, Section 26 05 53, and Section 27 05 53 for schedule of color coding and identification banding of equipment, duct work, piping, and conduit.
  - 2. Paint shop primed equipment.
  - 3. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
  - 4. Prime and paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, except where items are shop finished.
  - 5. Paint interior surfaces of air ducts visible through grilles and louvers with one coat of flat black paint, such as Sherwin-Williams ProMar Flat Black, or equivalent, to visible surfaces. Paint dampers exposed behind louvers, grilles, to match face panels.
  - 6. Paint exposed conduit and electrical equipment occurring in finished areas.
  - 7. Paint both sides and edges of plywood backboards for electrical and telephone equipment before installing equipment.
  - 8. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.
- I. Prevent splattering and over spray when applying paint pavement markings.

### 3.4 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Inspect and test questionable coated areas.

### 3.5 CLEANING AND TOUCH-UP

- A. Section 01 70 00 - Execution and Closeout Requirements: Final cleaning.
- B. Collect waste material which may constitute fire hazard, place in closed metal containers, and remove daily from site.
- C. At conclusion of work, remove all empty containers, rags, drop cloths, excess materials and debris from project site.
- D. Remove paint drops, splatters and runs from surfaces not scheduled to receive paint.
- E. Touch up or repaint any skips, mars or thin spots.

### 3.6 SCHEDULE – PAINT:

- A. Exterior Ferrous Metal Primer (Alkyd) <340 g/L VOC:
  - 1. M-A-B – Rust-O-Lastic Anti-Corrosive Primer applied at 2.0-3.5 mils DFT.
  - 2. Sherwin-Williams-Kem Bond HS Universal Alkyd Primer (B50WZ4) applied at 2.0-3.5 mils DFT.
- B. Exterior Ferrous Metal Finish (Alkyd) <340 g/L VOC:
  - 1. M-A-B Rust-O-Lastic Finish applied at 1.5-3.5 mils DFT.
  - 2. Sherwin-Williams – Industrial Enamel HS (B54 WZ series) applied at 1.5-3.5 mils DFT.
- C. Interior Ferrous Metal Primer (Polyamid Epoxy):
  - 1. M-A-B – Ply-Tile Rust Seal applied at 2.0-6.0 mils DFT.
  - 2. Sherwin-Williams – Recoatable Epoxy Primer or Macropoxy 646 FC, applied at 2.0-6.0 mils DFT.
  - 3.
- D. Interior Ferrous Metal Finish (Acrylic Polyurethane):
  - 1. M-A-B – Ply-Thane 890 HS Coating applied at 2.0-3.0 mils DFT.
  - 2. Sherwin-Williams – Acrolon 218 HS or HiSolids Polyurethane, B65 Series applied at 2.0-3.0 mils DFT.
- E. Interior Ferrous Metal (Exposed Structure and Decking) Finish – Office Area – Dry Fall-out (modified Alkyd):
  - 1. M-A-B – Uni-Coat applied at 2.0-4.0 mils DFT.
  - 2. Sherwin-Williams – Waterbased Dry Fall applied at 2.0-4.0 mils DFT.
- F. Masonry Block Filler (Acrylic Latex):
  - 1. M-A-B – Block Kote #30000 applied at 4.0-8.0 mils DFT.
  - 2. Sherwin-Williams – Heavy Duty Block Filler (B42W46) applied at 4.0-8.0 mils DFT.
- G. Masonry Block Finish (Acrylic Latex): Smooth texture.
  - 1. M-A-B – Fresh Kote Latex House Paint applied at 4.0-8.0 mils DFT.

2. Sherwin-Williams – Loxon XP or UltraCrete applied at 4.0-8.0 mils DFT.
- H. Gypsum Board Wall and Ceiling Primer (Acrylic Latex) <200 g/L VOC:
1. M-A-B – Rich-Lux Latex Sealer/Undercoater applied at 1.8 mils/coat or as recommended by paint manufacture.
  2. Sherwin-Williams – PrepRite 200 Latex Primer (B28W200) applied at 1.8 mils/coat or as recommended by paint manufacture.
  3. Glidden – Spread Ultra Latex Primer Sealer applied at 1.8 mils/coat or as recommended by paint manufacture.
- I. Gypsum Board Wall Finish (Vinyl Acetate/Acrylic Latex) <150 g/L VOC:
1. M-A-B – Rich-Lux Luster Lite Latex applied at 1.6 mils/coat or as recommended by paint manufacture.
  2. Sherwin-Williams – ProMar 200 Interior Latex Eg-Shel (B20W2251) applied at 1.6 mils/coat or as recommended by paint manufacture.
  3. Glidden – Spread Ultra Eggshell Latex applied at 1.6 mils/coat or as recommended by paint manufacture.
- J. Gypsum Board Ceiling Finish (Acrylic Latex) <100 g/L VOC:
1. M-A-B – Rich-Lux Luster Lite Latex applied at 1.6 mils/coat or as recommended by paint manufacture.
  2. Sherwin-Williams – ProMar 200 Interior Latex Eg-Shel (B20W2251) applied at 1.6 mils/coat or as recommended by paint manufacture.
  3. Glidden – Acrylic Eggshell Latex applied at 1.6 mils/coat or as recommended by paint manufacture.

### 3.7 PROTECTION

- A. Protect work of other trades and surfaces not being painted.
- B. Automatic fire sprinklers must not be painted and must be protected from paint over spray. Any sprinklers inadvertently painted must be replaced rather than cleaned.
- C. Protect completed work from damage by other trades.
- D. Protect paint pavement markings from vehicular and pedestrian traffic until paint is dry and tack free.

END OF SECTION

SECTION 10 14 00  
ROOM-IDENTIFICATION SIGNAGE

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes interior signs.

1.2 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Shop Drawings: Indicate sign styles, lettering font, foreground and background colors, locations, overall dimensions of each sign.
- C. Samples: Submit two signs, illustrating type, style, letter font, and colors specified; method of attachment.
- D. Manufacturer's Installation Instructions: Submit installation template and attachment devices.

1.3 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years experience.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Package signs, labeled in name groups.
- C. Store adhesive attachment tape at ambient room temperatures.

1.5 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.
- B. Do not install signs when ambient temperature is lower than recommended by manufacturer.
- C. Maintain this minimum temperature during and after installation of signs.

## PART 2 PRODUCTS

### 2.1 INTERIOR SIGNS

- A. Manufacturers:
  - 1. APCO Graphics.
  - 2. ASI Sign Systems.
  - 3. Daktronics, Inc.
  - 4. Inpro Corporation.

### 2.2 COMPONENTS

- A. ADA compliant signs will consist of polyester based photopolymer, photoexposed and processed to achieve raised 1/32 inch raised letters and Braille. Photopolymer is then laminated to an acrylic back plate as required by the sign type. Copy color is to be applied by silk-screening or hot-stamping. Raised lettering and Braille are to be integral with the sign face. The following methods of producing raised letter and Braille are not acceptable:
  - 1. Glued-on plastic letters and Braille strips.
  - 2. Engraving or routing to achieve raised letters and Braille.
- B. Slip Signage – Acrylic panels mounted to glazing with clear adhesive tape. Panel will be open at the top and capable of displaying an 8 ½” x 11” paper sign. Provide one (1) Conference Room, two (2) Control Room, one (1) Break Room, one (1) Lab, one (1) Entrance, one (1) in Elevator. Provide software capable of creating custom printing for these panels.
- C. Exterior Signage – 1’ 3” high cast bronze letters. Font, Avant Garde Medium. Letters attached to the pre-cast concrete panels with concealed stud mounts.
- D. Signs shall comply with ADA regulations with the requirements indicated for materials, thicknesses, finish, contrast, shapes, sized, and details of construction. Installed dimensional tolerances to be plus/minus 1/16 inch.
- E. Graphics to be precisely formed by manufacturer’s photomechanical stratification process to comply with the following:
  - 1. Braille: Grade 2 Braille including 189 part-work or whole work contractions in addition to Grade 1 Braille 63 characters. Tactile is required whenever Braille is required.
  - 2. Non-Tactile: Letters and numbers shall have a width-to-height ratio between 3:5 and 1:1 and stroke width ratio between 1:5 and 1:10 using upper case “X” to calculate ratios. Use type styles with medium weight; upper and lower case lettering is not permitted; serif typestyles are not permitted.
  - 3. Symbols: Symbol itself is not required to be tactile but equivalent verbal description is required both in tactile letters and Braille.
  - 4. Tactile: 1/32 inch raised capital letters without serifs at least 5/8 inch height and not more than 2 inches height based on upper case “X”. Braille is required whenever tactile is required.
    - a. Individually applied characters are prohibited.



## 2.3 FINISHES

- A. Paints: Background color shall be applied, via spray application, over entire ADA (photopolymer) portion of plaque using airdried polyurethane. Spraying copy color first followed by floor coating is prohibited. Roller coated copy is not acceptable.
- B. Finishes: Background and copy finish shall be clean, sharp and free of airborne debris and “orange peel” texture.
- C. Topcoat: Entire plaque shall be spray top coated with a clear matte urethane to protect the surface painted surface.

## 2.4 ACCESSORIES

- A. Tape Adhesive: Double sided tape, permanent adhesive.

# PART 3 EXECUTION

## 3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.

## 3.2 INSTALLATION

- A. Install signs after doors and surfaces are finished, in locations indicated on Drawings.
- B. Locate sign on wall surface, level, 60 inches to sign centerline above floor adjacent to latch side of door.

## 3.3 SCHEDULES

- A. Signs
  1. Door 206, “WORK AREA”.
  2. Door 207, “WORK AREA”.
  3. Door 210 , “STORAGE ROOM”.
  4. Door 209, “IT ROOM”.
  5. Door 201, “CONFERENCE ROOM”.
  6. Door 208, “OFFICE”.
  7. Door 207, “STORAGE AREA 201”.
  8. Opening to Room 204, “COPY/SUPPLY ROOM”.

END OF SECTION

## SECTION 10 52 30

### FIRE EXTINGUISHERS AND CABINETS

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. Section includes fire extinguishers; fire extinguisher cabinets; and brackets for wall mounting.

##### 1.2 REFERENCES

- A. National Fire Protection Association:
  - 1. NFPA 10 - Standard for Portable Fire Extinguishers.
- B. Underwriters Laboratories Inc.:
  - 1. UL - Fire Protection Equipment Directory.

##### 1.3 PERFORMANCE REQUIREMENTS

- A. Conform to NFPA 10 code.
- B. Provide extinguishers classified and labeled by Underwriters Laboratories Inc. for purpose specified and indicated.
- C. Provide fire extinguisher cabinets classified and labeled by Underwriters Laboratories Inc. for purpose specified and indicated.

##### 1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Shop Drawings: Indicate cabinet physical dimensions, wall bracket mounted measurements, and locations.
- C. Product Data: Submit extinguisher operational features, color and finish, and anchorage details.
- D. Manufacturer's Installation Instructions: Submit special criteria and wall opening coordination requirements.
- E. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

##### 1.5 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution Requirements: Closeout procedures.
- B. Operation and Maintenance Data: Submit test, refill or recharge schedules and re-certification requirements.

## 1.6 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.
- B. Do not install extinguishers when ambient temperature are capable of freezing extinguisher ingredients.

## PART 2 PRODUCTS

### 2.1 FIRE EXTINGUISHERS

- A. Manufacturers:
  - 1. JL Industries.
  - 2. Kidde Fire Extinguishers.
  - 3. Larsen's Manufacturing Co.
  - 4. Substitutions: Section 01 60 00 - Product Requirements.
- B. Multi-purpose Dry Chemical (Type 1): 5 lb. Capacity, UL rating 2A-10B:C, steel cylinder, red enamel finish, pressure gauge, fully charged, in cabinets or on brackets as shown.
- C. Halotron 1 (Type 2): 5 lb. Capacity, UL rating 5 B:C, steel cylinder, red enamel finish, pressure gauge, fully charged, mount on wall bracket.

### 2.2 FIRE EXTINGUISHER CABINETS

- A. Manufacturers:
  - 1. JL Industries.
  - 2. Kidde Fire Extinguishers.
  - 3. Larsen's Manufacturing Co.
  - 4. Substitutions: Section 01 60 00 - Product Requirements.
- B. Metal: Formed aluminum.
- C. Configuration: Surface type, sized to accommodate accessories.
- D. Trim Type: Flat or Returned to wall surface.
- E. Door: 0.016 inch thick, reinforced for flatness and rigidity; latch lock with break glass access.
- F. Door Glazing: Glass, clear, ¼ inch thick tempered.
- G. Cabinet Mounting Hardware: Appropriate to cabinet.
- H. Form cabinet enclosure with right angle inside corners and seams. Form perimeter trim and door stiles.
- I. Pre-drill for anchors.

- J. Hinge doors for 180 degree opening with continuous piano hinge. Furnish nylon catch.
- K. Weld, fill, and grind components smooth.
- L. Glaze doors with resilient channel gasket glazing.
- M. Finishing Cabinet Exterior Trim and Door: Clear anodized aluminum.
- N. Finishing Cabinet Interior: White enamel.

## 2.3 ACCESSORIES

- A. Extinguisher Brackets: Formed steel, white enamel finish.
- B. Graphic Identification: Provide red die cut letters spelling "Fire Extinguisher" on door.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

### 3.2 INSTALLATION

- A. Install cabinets plumb and level in wall openings, 54 inches from finished floor to top of cabinet.
- B. Secure rigidly in place.
- C. Place extinguishers and accessories in cabinets or on wall brackets – see Drawings.

END OF SECTION

## SECTION 11 52 13

### PROJECTION SCREENS

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. Section Includes:
  - 1. Electrically operated, ceiling recessed, front projection screens.
  - 2. Related accessories.
- B. Related Sections:
  - 1. Section 09 51 13 - Acoustical Ceilings: Ceiling for recessed screen installation.
  - 2. Division 26- Equipment Wiring Connections: Electrical characteristics and wiring connections.

##### 1.2 REFERENCES

- A. National Fire Protection Association:
  - 1. NFPA 701 - Standard Methods of Fire Tests for Flame Propagation of Textiles and Films.
- B. Underwriters Laboratories Inc.:
  - 1. UL - Electrical Appliance and Utilization Equipment Directory.

##### 1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Shop Drawings: Submit manufacturer's wiring diagram for electrically operated controls. Also detailed drawings concealed mounting.
- C. Product Data: Submit manufacturer's product data on materials, finishes, operation of unit, and electrical requirements.
- D. Samples: Submit two samples, 6 x 6 inch in size illustrating screen case prefinished components, and screen surface.
- E. Manufacturer's Installation Instructions: Submit detailed installation instructions including rough-in measurements.
- F. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

#### 1.4 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.
- B. Operation and Maintenance Data:
  - 1. Submit parts catalog with complete list of equipment replacement parts; identify each entry with equipment description and identifying code.
  - 2. Submit technical information for servicing operating equipment.

#### 1.5 QUALITY ASSURANCE

- A. Flame Resistant Fabrics: Passes when tested in accordance with NFPA 701, Test 1 or Test 2.
- B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories, Inc., as suitable for purpose specified and indicated.

#### 1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years experience.
- B. Installer: Company specializing in performing work of this section with minimum three years experience.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Deliver projection screens after building is enclosed, other work within spaces where screens are to be installed is substantially complete, and installation of screens is ready to take place.
- C. Protect projection screens from damage before, during and after installation.

#### 1.8 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

#### 1.9 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.
- B. Coordinate installation of ceilings, walls, electric service power characteristics, and location.

## PART 2 PRODUCTS

### 2.1 PROJECTION SCREEN - ELECTRICALLY OPERATED EXPOSED

- A. Manufacturers:
  - 1. Draper Shade and Screen Co.
  - 2. DaLite Screen Co., Inc.
  - 3. Substitutions: Not Permitted.
- B. Electric motor operated, extruded aluminum case, independently motorized closure, tab tensioned. Screen case extruded aluminum, white finish. UL approved "Suitable for use in environmental air space." Bottom of case fully enclosed by aluminum panels and motorized aluminum trap door with concealed hinges. Trap door supported entirely along front and back edges without crack around perimeter of door. Trap door opens into case when screen is lowered. Closure panels screw-attached to case and may be removed manually for access to roller and drive assembly.
  - 1. Quiet Motor mounted inside screen roller on rubber isolation insulators. Motor UL certified, rated 110-120V AC, 60 Hz, three wire, instantly reversible, lifetime lubricated with pre-set accessible limit switches. Motor with overload protection and electric brake.
  - 2. Motor Screen Controls, UL certified.
    - a. Low voltage control unit with three button 24V switches and cover plate to stop or reverse screen at any point.
- C. Mounting: Designed and fabricated for wall or ceiling installation as scheduled with appropriate hardware.
- D. Disconnect Switch: Factory mount disconnect switch in control panel.

### 2.2 SCREEN SURFACES

- A. Screen: Matte white with minimum gain characteristics and black masking borders. On axis gain of 1.0; viewing cone of up to 180 degrees.
- B. Size: Audio Visual Format. Black masking borders are standard.
  - 1. 70 inches x 70 inches.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify rough-in opening and conditions are acceptable.
- C. Verify electrical power is available and of correct characteristics.

### 3.2 INSTALLATION

- A. Install projection screens at location indicated on Drawings.
- B. Coordinate with electrical connection.
- C. Coordinate installation with ceiling finishes for application of ceiling finish to screen case bottom panels.
- D. Securely anchor to supporting substrate.
- E. Install to produce smoothly operating screen with plumb and straight vertical edges and plumb and flat viewing surfaces when lowered.
- F. Test electrically-operated units to verify screen controls, limit switches, closure and other operating components are in optimum functioning conditions.

### 3.3 ADJUSTING

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for balancing and adjusting.
- B. Adjust installed unit for smooth and balanced operation.

### 3.4 CLEANING

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for cleaning.
- B. Remove protective coverings from finished surfaces. Clean surfaces and components ready for inspection.

### 3.5 DEMONSTRATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for demonstration and training.
- B. Demonstrate electrically operated projection screens to Owner. Allow two hours duration for demonstration.

### 3.6 PROTECTION OF FINISHED WORK

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Do not permit use of projection screens after installation.

END OF SECTION



## SECTION 12 30 40

### GENERAL CASEWORK

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. Section includes:
  - 1. Prefabricated plastic laminate casework, flush overlay design, as shown on Drawings.
  - 2. Fillers, scribes, finished ends, finished backs, work surfaces/back splashes, and cutouts required to provide a complete and finished project. Plastic laminate work surfaces shall include backer sheet.
- B. Related Sections:
  - 1. Section 06 10 53 – Miscellaneous Rough Carpentry.

##### 1.2 REFERENCES

- A. American National Standards Institute.
  - 1. ANSI A156.9 - Cabinets Hardware.
  - 2. ANSI A208.1 - Mat formed Particleboard.
- B. Architectural Woodwork Institute.
  - 1. AWI - Quality Standards Illustrated.
- C. National Electrical Manufacturers Association.
  - 1. NEMA LD3- High Pressure Decorative Laminates.

##### 1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal Procedures.
- B. Shop drawings shall be submitted for approval within thirty days after formal notification of award of contract. Drawings shall consist of floor plans indicating arrangement and relation to adjacent work and equipment, and complete elevations of casework. Centerline of service requirements shall be noted for use by other trades. A schedule of all sinks, fittings, and accessories that are part of this contract shall be provided.
- C. Color samples shall be submitted for selection by Architect/Engineer. Samples of actual material and color shall be available as required.
- D. Additional catalog cuts, details and samples of hardware as requested by Architect for evaluation and coordination.

#### 1.4 QUALITY ASSURANCE;

- A. Manufacturer: Company specializing in manufacture of institutional and commercial plastic laminate casework with minimum of five years experience.
- B. Installer Qualifications: Installer with 5 years experience who has successfully completed installations of plastic laminate faced casework similar in material, design, and extent to that indicated for this project.
- C. Perform work in accordance with AWI Architectural Woodwork Quality Standards Illustrated, Custom Grade.

#### 1.5 PRE-INSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Protect units from moisture damage.

#### 1.7 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 - Product Requirements.
- B. During and after installation of Work of this section, maintain same temperature and humidity conditions in building spaces as will occur after occupancy.

#### 1.8 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

#### 1.9 WARRANTY

- A. Casework manufacturer shall warrant for a period of three years, the product manufactured by it to be free from defects in material and workmanship when properly installed under normal use, but not limited to delamination, swelling or warping.
- B. Accessory equipment (sinks, fittings, etc.) shall be warranted by appropriate manufacturer's guarantee.

### PART 2 PRODUCTS

#### 2.1 MANUFACTURERS

- A. WKI, Harrisburg, IL.
- B. Stevens Cabinet Co., Division of Stevens Industries, Teutopolis, IL.

- C. TMI Systems Design Corporation, Dickinson, ND.
  - 1. Dealer: Golterman & Sabo, St. Louis, MO
- D. Case Systems, Inc., Midland, MI.
  - 1. Dealer: Ravensberg, Inc., Murphysboro, IL
- E. LSI Corporation of America, Inc., Plymouth, MN.
  - 1. Dealer: Glen Alspaugh Company LLP, St. Louis, MO.

## 2.2 MATERIALS

- A. Core material.
  - 1. Cabinet components having particleboard core material shall be of a minimum 45 lb. Density, M-2 industrial grade. The particleboard used shall have been tested under ANSI A208.1 1993 standards and/or ASTM D1037-91A.
  - 2. Medium density fiberboard (MDF) shall be used in high stress areas as drawer members and shall be minimum 48 lb. Density MD-21 grade and tested under ANSI A208.2 1994 standards.
  - 3. Industrial hardboard shall be pre-finished ¼ inch thickness composed of wood fibers, phenolic resin binders and moisture inhibitors that meet or exceed the hardboard product standard ANSI/AHA A135.4 1988.
- B. Surface Material.
  - 1. Exposed exterior shall be high-pressure decorative plastic laminate thermoset to core using catalyzed PVA glue with a minimum average pressure of 90 psi and average 180 degree F temperature. High-pressure decorative plastic laminate shall meet NEMA LD 3-1995, VGS.028 specification standards.
  - 2. Exposed doors and drawer fronts shall be high pressure decorative plastic laminate thermoset to core using catalyzed PVA glue with a minimum average pressure of 90 psi and average 180 degree F. temperature. High-pressure decorative plastic laminate shall meet NEMA LD 3-1995, VGS.028 specification standards.
  - 3. Exposed interior shall be permanently thermofused melamine laminate, fused to core using a minimum average pressure of 320 psi and average 320 degree F. temperature. Thermofused melamine laminate shall meet ALA 1996 specification standards, as tested against the high-pressure laminate NEMA LD 3-1995, VGS.028 specification standards. (Warranted for life against declamations).
  - 4. Semi-exposed and concealed surfaces shall be permanently thermofused melamine laminate or high-pressure decorative plastic laminate cabinet liner, 0.020" thickness for balanced construction. Thermofused melamine laminate shall meet the ALA 1996 specifications standards, as tested against the high-pressure laminate NEMA LD 3-1995, VGS.028 specification standards.
- C. Edgings.
  - 1. Exposed exterior cabinet front edges shall be banded with a contrasting or matching rigid PVC extrusion, 0.020 inch in thickness, resistant to chip, crack and high impact. Edging shall have a satin finish with a UV cured topcoat for

additional durability. The 0.020 inch thick edging shall be applied with waterproof hot melt adhesive.

2. Door and drawer front edges shall be edged with a high impact vinyl plastic extrusion. Edging shall be barbed tee design with textured satin finish and shall be chip and crack resistant.
3. Adjustable shelves shall be banded with PVC extrusion, resistant to chip, crack and high impact. Edging shall have a satin finish with a UV cured top coat for additional durability. Edging shall be applied with waterproof hot melt adhesive. 0.020 inch thick PVC edging shall be applied to four edges of adjustable shelf.
4. All other interior components, including drawers, shall be banded with a PVC extrusion, 0.020 inch in thickness, resistant to chip, crack, and high impact. Edging shall have a satin finish with a UV cured topcoat for additional durability. Edging to be machined applied with waterproof hot melt adhesive.

D. Color Selections.

1. Exposed cabinet exteriors shall be selected by Architect/Engineer from Wilsonart, Formica, or Pionite full range of available color groups in high-pressure decorative plastic laminate.
2. Exposed doors and drawer fronts shall be chosen from Wilsonart, Formica, or Pionite full range of available color groups in high pressure decorative plastic laminate.
3. Semi-exposed surfaces, including drawer box components, shall be finished in either pearl or grey as selected from casework manufacturer's standard interior color selections.
4. Exposed interior components, including both faces of shelves and interior face of backs to be pearl or grey.
5. Door and drawer front edges shall be chosen from one of 70 trim group colors in 0.020 inch thick PVC in contrasting or matching colors as depicted in manufacturer's color guide, or commercial match to selected exposed exterior color, based on availability.
6. Exposed front edge of cabinet, including exposed interior edges, shall be selected from one of 70 trim group colors in 0.020 inch thick PVC in contrasting or matching colors as depicted in manufacturer's color guide, or commercial match to selected exposed exterior color based on availability.
7. Semi-exposed edges of cabinet components including drawers, shall be either pearl or grey in 0.020 inch thick PVC.
8. Five knuckle hinges shall be available with black, pearl or chrome epoxy finish.
9. Pulls shall be available in chrome, brass, bent wire and injection molded pulls in either bent wire or contour design, to be available in 20 colors as selected from manufacturer's color selector.
10. Casework of substitute brands with lesser amounts or more restrictive selection requirements will not be considered equal and shall be rejected.
11. Finishes to be laminate manufacturer's matte, suede, or equivalent finish as approved by Architect/Engineer. Samples will be reviewed by Architect/Engineer for color, texture, and pattern only.

## 2.3 HARDWARE

- A. Hinges shall be fully concealed from view when door is closed and shall permit 165-degree door swing. Hinge crank shall be heavy steel with a concealed, integral self-closing spring mechanism. Hinge boss shall be heavy stamp steel. Nylon inserts shall be provided in the door for positive screw attachment. Hinge attachment to sides of cabinets shall employ special 5mm threaded fasteners for additional strength. Hinges shall have three dimensional adjustment capabilities. Hinge shall have a lifetime guarantee warranted by the hinge manufacturer. Doors less than 48 inches in height shall have two hinges each door; doors 48 inches – 63 inches in height shall have three hinges each door; all doors greater than 63 inches in height shall have four hinges each door.
- B. Door catches shall be a heavy-duty spring loaded, large diameter (17.5 mm - 11/16 inch) roller type catch mounted at bottom edge. All doors over 48 inches in height shall be provided with roller catch at both top and bottom of door.
- C. Catch strike plate shall be injection molded ABS, with an integrally molded engagement ridge. Strike plate shall also provide a wide face bumper insuring a positive doorstop.
- D. Pulls shall be solid metal bent wire, 4 inches length, available in chrome or brass finish.
- E. Drawer and slide out shelves shall be suspended with bottom mount, side and bottom attached nylon roller epoxy coated steel slides to ensure quiet, smooth operation. Lateral stability is achieved through a special formed captive profile. Slides shall have 100 pounds Load rating, with both in and out drawer stop, 3 inches self-close feature and a side adjustment cam allowing 3 mm side-to-side alignment.
- F. Drawers specifically noted for full extension file use shall be suspended with bottom mount, side and bottom attached nylon roller epoxy coated steel slides to ensure quiet, smooth operation. Lateral stability is achieved through a special formed captive profile. Slides shall have 150 pounds Load rating, with both in and out drawer stop, and 3 inches self close feature. File drawer shall include extruded top mounted molded side rails to accept standard hanging file folders.
- G. Self-support clips for 1 inch thick adjustable shelves shall be injection molded clear polycarbonate. Support clips shall incorporate integral molded lock tabs to retain shelf from tipping or inadvertently being lifted out. Support clip shall have 5 mm diameter double pin engagement into precision bored hole pattern in cabinet vertical members. Clips shall have a molded ridge, which provides pressure against edge of shelving to maintain positive pin engagement. Clip shall be designed in such a manner to provide means for permanent retention to shelf. Static test load must exceed 200 lb. Per clip.
- H. Dividers that are ¼ inch thick shall be fully adjustable and retained with injection molded clear polycarbonate clip.
- I. Locks shall be cylinder type, diecast, with five disc tumbler mechanism. Each lock shall be provided with milled brass key. Master keying shall be available. Locks shall be Remov-A-Core to give flexibility for different pass key options. Locks shall be provided

where indicated on equipment drawings as an option or as part of standard catalog cabinet description.

## 2.4 COMPONENTS

- A. Base, wall and tall cabinet ends shall be  $\frac{3}{4}$  inch thick particle board, laminated for balanced construction, surfaced as described in Article 2.2.B.1 and edged as described in Article 2.2.C.1.
- B. Base and tall cabinet tops and bottoms shall be  $\frac{3}{4}$  inch thick particle board, laminated for balanced construction, surfaced as described in Article 2.2.B.3 and edged as described in Article 2.2.C.1.
- C. Wall cabinet top and bottom shall be 1 inch thick particle board, laminated for balanced construction, surfaced as described in Article 2.2.B.3 and edge as described in Article 2.2.C.1.
- D. Vertical cabinet members shall be  $\frac{3}{4}$  inch thick particle board, laminated for balanced construction, surfaced as described in Article 2.2.B.3 and edge as described in Article 2.2.C.4.
- E. Cabinet backs shall be  $\frac{1}{4}$  inches thick pre-finished industrial hardboard.
- F. Frame rails shall be  $\frac{3}{4}$  inch thick x  $3\frac{3}{4}$  inches wide particle board, laminated for balanced construction, surfaced, as described in Article 2.2.B.3 and edged as described in Article 2.2.C.1.
- G. Subbase shall consist of two toe kick support rails shall be  $\frac{3}{4}$  inch thick x  $3\frac{3}{4}$  inches high particleboard and be inset from cabinet front and back edge, to give additional load support.
- H. Mounting rails shall be  $\frac{3}{4}$  inch thick x  $3\frac{3}{4}$  inches wide particleboard. Wall cabinets shall have rails positioned at the top and bottom. Tall cabinets shall have rails positioned at the top and intermediate location. Base cabinet shall have rails positioned at the top of unit.
- I. Drawers shall be full box design with a separate front. Drawer sides and ends shall be constructed to  $\frac{5}{8}$  inch medium density fiberboard with pearl or grey color thermofused melamine laminate and matching PVC top edges. Bottoms shall be  $\frac{1}{4}$  inch thick medium density fiberboard; pearl or grey color thermofused melamine laminate.
- J. Adjustable shelves shall be 1 inch thick. Edges of shelf shall be banded as described in Article 2.2.C.3 with a high impact, rigid PVC extrusion, pearl or grey in color.
- K. Solid hinged doors and drawer fronts shall be  $\frac{3}{4}$  inch thick material of balanced construction, surfaced as described in Section 2.2.B.2 edged as described in Article 2.2.C.2.

## 2.5 CONSTRUCTION

- A. Cabinet parts shall be accurately machined and precision bored for custom grade quality joinery construction, utilizing automatic machinery to ensure consistent sizing on modular cabinets. Cabinets shall be assembled under controlled case clamp conditions, assuring final cabinet squareness and proper joint compressions.
- B. Cabinet ends shall be bored to receive 8 mm, industrial grade hardwood laterally fluted dowels with chamfered ends. Cabinet ends shall be prepared to receive adjustable shelf hardware at 32 mm (approximately 1 ¼ inches) centers. Door hinges and drawer slides shall be machined drilled to maintain vertical and horizontal alignment of components. Inset grooving with chamfer shall be machined ¾ inch from rear edge to accept the ¼ inch back. Base and tall units shall have one-piece end panels continuous to floor for added load capabilities.
- C. Tops and bottoms shall be joined to cabinet ends using a minimum of six dowels at each joint for 24-inch deep cabinets and a minimum of four dowels at each joint, for 12-inch deep cabinets. All dowels to be industrial grade hardwood, laterally fluted, with chamfered ends and 8 mm in diameter. Top of base cabinet will be full depth. Inset grooving with chamfer shall be machined ¾ inch from rear edge to accept the ¼ inch back.
- D. Vertical dividers shall be bored to receive adjustable shelf hardware at 32 mm (approximately 1 ¼ inches) centers. Dividers shall be jointed to tops and bottoms with 8 mm diameter hardwood dowels.
- E. Frame rails shall be joined to ends with 8 mm diameter hardwood dowels.
- F. Two toe kick supports shall be inset from cabinet front and back edges, and doweled into cabinet ends with 8 mm hardwood dowels.
- G. Mounting rails shall be fully concealed behind backs. Rails shall be ¾ inch thick and fastened to cabinet ends with 8 mm hardwood dowels. Wall and tall cabinet shall incorporate two mounting rails. Wall cabinets shall have rails positioned at top and bottom. Tall cabinets shall have rails positioned at top and intermediate location. Base units shall have rail positioned in the upper back area.
- H. Back panels shall be ¼ inch thick and inset ¾ inch from rear edge of cabinet. Back shall be glued and continuously trapped in top, bottom, and ends of cabinets.
- I. Drawer corner joints shall be interlocking dowel pin design. Hardwood dowel pins, 8 mm diameter shall be inserted into drawer fronts and backs to fit into machined hole patterns in drawer sides. Bottoms shall be trapped into grooves on all four sides glued and mechanical fastened. Drawers shall be suspended on slides as described in Article 2.3.E.

## 2.6 WORK SURFACES

- A. Core material having particleboard shall be a minimum 45 lb. Density, M-2 industrial grade. The particleboard used shall have been tested under ANSI A208.1 1993 standards and/or ASTM D1037-91A.
- B. Surface material shall be high-pressure decorative plastic laminate thermoset to core using catalyzed PVA glue with a minimum average pressure of 90 psi and average 180 degree F temperature. High-pressure decorative plastic laminate shall meet NEMA LD 3-1995, HGS.048 specification standards. High-pressure decorative plastic laminate thermoset to core using catalyzed PVA glue with a minimum average pressure of 90 psi and average 180 degree F temperature. High-pressure decorative plastic laminate shall meet NEMA LD 3-1995, HGP.039 specification standards. High-pressure decorative chemical-resistant plastic laminate thermoset to core using catalyzed PVA glue with a minimum average pressure of 90 psi and average 180 degree F temperature. High-pressure decorative plastic laminate shall meet NEMA LD 3-1995, VGS.028 specification standards. At present there is no general industry standard for a high pressure, chemical resistant laminate.
- C. Color selection shall be Wilsonart, Formica, or Pionite color groups in high-pressure decorative plastic laminate.
- D. Exposed edges shall be banded with same laminate as work surfaces. The edging shall be applied with waterproof hot melt adhesive.
- E. Underside of all work surfaces to have BK-20 backer or approved equivalent. This balance sheet shall be thermoset to core using catalyzed PVA glue with a minimum average pressure of 90 psi and average 180 degree F temperature.
- F. Design and construction of work surfaces shall be 30 mm (1 3/16 inches) thick with square self edge at front edge (self-edge standard). Laminate countertops shall have wafers for alignment and tight-joint fasteners at all joints. Top edge of separate backsplashes to have square self-edge. Where countertops abut wall, separate end splashes are to be provided.

## PART 3 EXECUTION

### 3.1 INSTALLATION

- A. The installer must examine the job site and the conditions under which the work in this section is to be performed, and notify the contractor in writing of any unsatisfactory conditions. Do not proceed with work under this section until unsatisfactory conditions have been corrected in a manner acceptable to the installer.
- B. Casework, countertops, and related materials to be conditioned to average prevailing humidity condition in installation areas prior to start of work.



- C. Install casework and countertops with factory-trained supervision authorized by manufacturer. Casework shall be installed plumb, level, true and straight with no distortions. (Shim as required). Securely attached to building structure with anchorage devices of appropriate type, size and quantity to meet applicable codes, specifications, and safety conditions. Where laminate clad casework and countertop abuts other finished work, scribe and trim to accurate fit.
- D. Adjust casework and hardware so that doors and drawers operate smoothly without warp or bind. Lubricate operating hardware as recommended by the manufacturer.
- E. Repair, or remove and replace, defective work as directed upon completion of installation.
- F. Clean plastic surfaces, repair minor damage per plastic laminate manufacturer's recommendations. Replace other damaged parts of units.
- G. Advise contractor of procedures and precautions for protection of casework and countertops from damage by other trades until acceptance of work by owner.
- H. Cover casework with 4-mil polyethylene film for protection against soiling and deterioration during remainder of construction period.

END OF SECTION

## SECTION 211300

### FIRE PROTECTION

#### 211301 GENERAL

- A. The Fire Protection Contractor (FPC) shall include all material, equipment and labor to extend existing sprinkler system to new storage room.
- B. Applicable provisions of the General, Supplementary General Conditions and Special Conditions and all sections of Division 1 General Requirements shall govern work under this section.
- C. The word "Provide", as used in these specifications and on the drawings, means the contractor shall furnish, handle, and install unless otherwise noted or specified.
- D. Scope of Work, under this contract, shall include but not be limited to the following:
  - 1. Modification of an existing wet pipe automatic sprinkler system.

#### 211302 CONTRACTOR'S RESPONSIBILITY

- A. Submit material and equipment data information on all equipment used above and below ground.
- B. Submit shop drawings showing all equipment locations and piping layouts, with adequate details and sections to show complete installation. Submit hydraulic calculations to prove that piping layout will provide required densities.
- C. It is the Contractor's responsibility to coordinate with other trades.
- D. Provide necessary supports and/or framing for securing equipment.
- E. The Contractor shall not scale the drawings. Refer to architectural plans for building construction and dimensions. Examine existing field conditions in order to insure proper rough-in and installation of Contractor's work.
- F. Obtain all permits and approvals from authorities having jurisdiction. Submit one copy of each approval to Owner, before proceeding with installation.

- G. Pay all fees and assessments associated with this work.
- H. Cutting and Patching
  - 1. All openings for piping and ductwork not provided by sleeves and framed openings shall be cut by the respective Contractor. Under no circumstances shall any structural members, load bearing walls or footings be cut without the written approval of the Architect/Engineer.
  - 2. Patching of holes or openings to the underside of finished material shall be provided by the respective Contractor. Final finish material and painting will be provided by the General Contractor.

#### 211303 CODES

- A. Installation to conform to NFPA-13, NFPA-24 and NFPA-231C, latest editions.
- B. IBC 2012.
- C. All state, county and local codes, ordinances, rules and regulations.

#### 211305 TRADE AND LOCAL PRACTICES

The Contractor shall comply with all local customs and labor trade agreements in the installation of systems and/or equipment provided as a part of his contract.

#### 211306 SHOP DRAWINGS

- A. The Contractor shall submit six (6) copies of the shop drawings. The Contractor shall accept full responsibility for all equipment and components provided without the engineers prior shop drawing approval.
- B. Contractor shall provide hydrant flow tests to incorporate into his pipe sizing.
- C. Shop drawings, both piping layout drawings and pipe sizing calculations shall be provided signed and sealed by a State of Illinois Registered Professional Engineer.

#### 211307 MATERIALS AND WORKMANSHIP

- D. Materials and equipment specified is used to establish a standard of quality. Similar materials and equipment of equal quality will be considered upon request prior to bidding.
- E. Unless otherwise accepted, all materials and equipment shall be new and shall conform to A.S.A. and A.S.T.M. standards as applicable. All materials and equipment shall have a flame spread smoke developed rating no higher than 25/50.
- F. All material and equipment shall be U.L. listed for fire protection service and/or FM labels as applicable or specified.

- G. Acceptable Manufacturers - The first-named manufacturer's equipment has been used to determine space requirements; should another manufacturer's equipment be used in preparing proposals, Contractor shall be responsible for determining that said equipment will fit space allocated. Coordination responsibility with other trades and associated costs for equipment or use of product other than the first manufacturer named shall be that of the Contractor furnishing the equipment.
- H. Equipment installation - Specified equipment shall be installed in strict accordance with the manufacturer's instructions, including transporting, supporting, and maintaining proper clearance for maintenance. Any discrepancy between the manufacturer's instructions and the contract documents shall be brought to the Architect/Engineer's attention prior to installation.
- I. All piping to run parallel to building lines.

#### 211308 CLEANING

All equipment shall be cleaned before final inspection.

#### 211309 RECORD DRAWINGS

The contractor shall keep day-to-day record of systems installation and shall provide record set of "As-Built" drawings prior to Owner's final acceptance of the system. Drawings shall be on corrected set of reproducible mylars furnished at the Contractor's expense.

#### 211310 FINAL INSPECTION

Complete installation shall be subject to final inspection by the Architect/Engineer. The contractor shall correct all deficient materials, equipment and workmanship.

#### 211311 GUARANTEE

The contractor shall guarantee all material, equipment and workmanship for a period of one (1) year from date of final acceptance by the Owner.

#### 211312 ABOVEGROUND PIPE

- A. Pipe sizes 1" to 2" shall be black steel, schedule 40 or threadable thinwall pipe, suitable for 175 psi working pressure, per ASTM-A135. Pipe shall be Allied or equal.
- B. Pipe 2.5" and larger shall be black steel, schedule 40 or schedule 10, suitable for 175 psi working pressure, per ASTM-A135. Pipe shall be Allied or equal.
- C. Joining of pipe and fittings shall be per NFPA-13. Threaded pipe and fittings shall have threads cut to ANSI/ASME B1.20.1 requirements. Pipe joined with grooved fittings shall be joined by a listed combination of fittings, gaskets and grooves.

- D. Screwed fittings shall be Class 125, cast-iron manufactured in accordance to ANSI B16.4. Fittings shall be Grinnell or equal.
- E. Grooved fittings shall be ductile iron conforming to ASTM A-536. Fittings shall be Victaulic or equal.
- F. Where there are two (2) or more of like equipment, they shall be of the same manufacture.

#### 211313 AUTOMATIC SPRINKLERS

Provide automatic sprinklers to match existing. Provide 1/2" orifice ordinary temperature rated pendent head for areas with finished ceiling.

Pendent head to have chrome finish and be able to be semi-recessed. Automatic sprinklers to be by Automatic Sprinkler, Central, Gem, Reliable, Star or Viking.

#### 211314 TESTING

Hydrostatic test all pipe, above and below ground for a period of 2 hours and not less than 200 psi. Tests to be according to NFPA-24 for below ground pipe and NFPA-13 for above ground pipe.

Repair or replace any part of system as required to eliminate leakage in accordance with NFPA standards for "Little or No Leakage". Chalking of threads will not be accepted. After repairs, retest as specified to demonstrate compliance.

END OF SECTION

## SECTION 230529 - HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

### 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. Metal pipe hangers and supports.
  - 2. Fiberglass pipe hangers.
  - 3. Fastener systems.
  - 4. Pipe stands.
  - 5. Equipment supports.

- B. Related Sections:

- 1. Section 055000 "Metal Fabrications" for structural-steel shapes and plates for trapeze hangers for pipe and equipment supports.
  - 2. Section 230516 "Expansion Fittings and Loops for HVAC Piping" for pipe guides and anchors.
  - 3. Section 230548 "Vibration and Seismic Controls for HVAC" for vibration isolation devices.
  - 4. Section 233113 "Metal Ducts" for duct hangers and supports.

#### 1.3 DEFINITIONS

- A. MSS: Manufacturers Standardization Society of the Valve and Fittings Industry Inc.

#### 1.4 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design trapeze pipe hangers and equipment supports, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Structural Performance: Hangers and supports for HVAC piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.
  - 1. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.

2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
3. Design seismic-restraint hangers and supports for piping and equipment and obtain approval from authorities having jurisdiction.

## 1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication and installation details and include calculations for the following; include Product Data for components:
  1. Metal framing systems.
  2. Fiberglass strut systems.
  3. Pipe stands.
  4. Equipment supports.

## 1.6 INFORMATIONAL SUBMITTALS

- A. Welding certificates.

## 1.7 QUALITY ASSURANCE

- A. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

# PART 2 - PRODUCTS

## 2.1 METAL PIPE HANGERS AND SUPPORTS

- A. Carbon-Steel Pipe Hangers and Supports:
  1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
  2. Galvanized Metallic Coatings: Pregalvanized or hot dipped.
  3. Nonmetallic Coatings: Plastic coating, jacket, or liner.
  4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
  5. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.
- B. Stainless-Steel Pipe Hangers and Supports:
  1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
  2. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
  3. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.
- C. Copper Pipe Hangers:

1. Description: MSS SP-58, Types 1 through 58, copper-coated-steel, factory-fabricated components.
2. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.

## 2.2 FIBERGLASS PIPE HANGERS

### A. Clevis-Type, Fiberglass Pipe Hangers:

1. Description: Similar to MSS SP-58, Type 1, steel pipe hanger except hanger is made of fiberglass or fiberglass-reinforced resin.
2. Hanger Rods: Continuous-thread rod, washer, and nuts made of stainless steel.

### B. Strap-Type, Fiberglass Pipe Hangers:

1. Description: Similar to MSS SP-58, Type 9 or Type 10, steel pipe hanger except hanger is made of fiberglass-reinforced resin.
2. Hanger Rod and Fittings: Continuous-thread rod, washer, and nuts made of stainless steel.

## 2.3 FASTENER SYSTEMS

- A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
- B. Mechanical-Expansion Anchors: Insert-wedge-type, stainless-steel anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

## 2.4 PIPE STANDS

- A. General Requirements for Pipe Stands: Shop- or field-fabricated assemblies made of manufactured corrosion-resistant components to support roof-mounted piping.
- B. Compact Pipe Stand: One-piece plastic unit with integral-rod roller, pipe clamps, or V-shaped cradle to support pipe, for roof installation without membrane penetration.
- C. Low-Type, Single-Pipe Stand: One-piece stainless-steel base unit with plastic roller, for roof installation without membrane penetration.
- D. High-Type, Single-Pipe Stand:
  1. Description: Assembly of base, vertical and horizontal members, and pipe support, for roof installation without membrane penetration.
  2. Base: Stainless steel.
  3. Vertical Members: Two or more cadmium-plated-steel or stainless-steel, continuous-thread rods.
  4. Horizontal Member: Cadmium-plated-steel or stainless-steel rod with plastic or stainless-steel, roller-type pipe support.



E. High-Type, Multiple-Pipe Stand:

1. Description: Assembly of bases, vertical and horizontal members, and pipe supports, for roof installation without membrane penetration.
2. Bases: One or more; plastic.
3. Vertical Members: Two or more protective-coated-steel channels.
4. Horizontal Member: Protective-coated-steel channel.
5. Pipe Supports: Galvanized-steel, clevis-type pipe hangers.

F. Curb-Mounted-Type Pipe Stands: Shop- or field-fabricated pipe supports made from structural-steel shapes, continuous-thread rods, and rollers, for mounting on permanent stationary roof curb.

## 2.5 EQUIPMENT SUPPORTS

A. Description: Welded, shop- or field-fabricated equipment support made from structural carbon-steel shapes.

## 2.6 MISCELLANEOUS MATERIALS

A. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.

B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.

1. Properties: Nonstaining, noncorrosive, and nongaseous.
2. Design Mix: 5000-psi, 28-day compressive strength.

## PART 3 - EXECUTION

### 3.1 HANGER AND SUPPORT INSTALLATION

A. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.

1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.
2. Field fabricate from ASTM A 36/A 36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.

B. Fiberglass Pipe-Hanger Installation: Comply with applicable portions of MSS SP-69 and MSS SP-89. Install hangers and attachments as required to properly support piping from building structure.

C. Fastener System Installation:

1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches thick in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
  2. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.
- D. Pipe Stand Installation:
1. Pipe Stand Types except Curb-Mounted Type: Assemble components and mount on smooth roof surface. Do not penetrate roof membrane.
  2. Curb-Mounted-Type Pipe Stands: Assemble components or fabricate pipe stand and mount on permanent, stationary roof curb. See Section 077200 "Roof Accessories" for curbs.
- E. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.
- F. Equipment Support Installation: Fabricate from welded-structural-steel shapes.
- G. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
- H. Install lateral bracing with pipe hangers and supports to prevent swaying.
- I. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.
- J. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
- K. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.
- L. Insulated Piping:
1. Attach clamps and spacers to piping.
    - a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
    - b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
    - c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.
  2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.

- a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.
- 3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.
- 4. Shield Dimensions for Pipe: Not less than the following:
  - a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
  - b. NPS 4: 12 inches long and 0.06 inch thick.
  - c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.
  - d. NPS 8 to NPS 14: 24 inches long and 0.075 inch thick.
  - e. NPS 16 to NPS 24: 24 inches long and 0.105 inch thick.
- 5. Pipes NPS 8 and Larger: Include wood or reinforced calcium-silicate-insulation inserts of length at least as long as protective shield.
- 6. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

### 3.2 EQUIPMENT SUPPORTS

- A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.
- B. Grouting: Place grout under supports for equipment and make bearing surface smooth.
- C. Provide lateral bracing, to prevent swaying, for equipment supports.

### 3.3 METAL FABRICATIONS

- A. Cut, drill, and fit miscellaneous metal fabrications for equipment supports.
- B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.
- C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and 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. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

### 3.4 ADJUSTING

- A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

- B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches .

### 3.5 PAINTING

- A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
  - 1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils.
- B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

### 3.6 HANGER AND SUPPORT SCHEDULE

- A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.
- B. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.
- C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.
- D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.
- E. Use carbon-steel pipe hangers and supports and attachments for general service applications.
- F. Use stainless-steel pipe hangers and stainless-steel or corrosion-resistant attachments for hostile environment applications.
- G. Use copper-plated pipe hangers and copper or stainless-steel attachments for copper piping and tubing.
- H. Use padded hangers for piping that is subject to scratching.
- I. Use thermal-hanger shield inserts for insulated piping and tubing.
- J. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
  - 1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2 to NPS 30.
  - 2. Yoke-Type Pipe Clamps (MSS Type 2): For suspension of up to 1050 deg F ), pipes NPS 4 to NPS 24, requiring up to 4 inches of insulation.
  - 3. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes NPS 3/4 to NPS 36, requiring clamp flexibility and up to 4 inches of insulation.
  - 4. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes NPS 1/2 to NPS 24 if little or no insulation is required.

5. Pipe Hangers (MSS Type 5): For suspension of pipes NPS 1/2 to NPS 4, to allow off-center closure for hanger installation before pipe erection.
  6. Adjustable, Swivel Split- or Solid-Ring Hangers (MSS Type 6): For suspension of noninsulated, stationary pipes NPS 3/4 to NPS 8.
  7. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
  8. Adjustable Band Hangers (MSS Type 9): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
  9. Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
  10. Split Pipe Ring with or without Turnbuckle Hangers (MSS Type 11): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 8.
  11. Extension Hinged or Two-Bolt Split Pipe Clamps (MSS Type 12): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 3.
  12. U-Bolts (MSS Type 24): For support of heavy pipes NPS 1/2 to NPS 30.
  13. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.
  14. Pipe Saddle Supports (MSS Type 36): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate.
  15. Pipe Stanchion Saddles (MSS Type 37): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate, and with U-bolt to retain pipe.
  16. Adjustable Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes NPS 2-1/2 to NPS 36 if vertical adjustment is required, with steel-pipe base stanchion support and cast-iron floor flange.
  17. Single-Pipe Rolls (MSS Type 41): For suspension of pipes NPS 1 to NPS 30, from two rods if longitudinal movement caused by expansion and contraction might occur.
  18. Adjustable Roller Hangers (MSS Type 43): For suspension of pipes NPS 2-1/2 to NPS 24, from single rod if horizontal movement caused by expansion and contraction might occur.
  19. Complete Pipe Rolls (MSS Type 44): For support of pipes NPS 2 to NPS 42 if longitudinal movement caused by expansion and contraction might occur but vertical adjustment is not necessary.
  20. Pipe Roll and Plate Units (MSS Type 45): For support of pipes NPS 2 to NPS 24 if small horizontal movement caused by expansion and contraction might occur and vertical adjustment is not necessary.
  21. Adjustable Pipe Roll and Base Units (MSS Type 46): For support of pipes NPS 2 to NPS 30 if vertical and lateral adjustment during installation might be required in addition to expansion and contraction.
- K. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24.
  2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 to NPS 24 if longer ends are required for riser clamps.
- L. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
  2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.
  3. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
  4. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
  5. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F piping installations.
- M. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
  2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction, to attach to top flange of structural shape.
  3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
  4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
  5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
  6. C-Clamps (MSS Type 23): For structural shapes.
  7. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
  8. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
  9. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
  10. Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.
  11. Malleable-Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
  12. Welded-Steel Brackets: For support of pipes from below or for suspending from above by using clip and rod. Use one of the following for indicated loads:
    - a. Light (MSS Type 31): 750 lb.
    - b. Medium (MSS Type 32): 1500 lb.
    - c. Heavy (MSS Type 33): 3000 lb.
  13. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
  14. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
  15. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.
- N. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
  2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
  3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.

- O. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Restraint-Control Devices (MSS Type 47): Where indicated to control piping movement.
  2. Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed 1-1/4 inches.
  3. Spring-Cushion Roll Hangers (MSS Type 49): For equipping Type 41, roll hanger with springs.
  4. Spring Sway Braces (MSS Type 50): To retard sway, shock, vibration, or thermal expansion in piping systems.
  5. Variable-Spring Hangers (MSS Type 51): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from hanger.
  6. Variable-Spring Base Supports (MSS Type 52): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from base support.
  7. Variable-Spring Trapeze Hangers (MSS Type 53): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from trapeze support.
  8. Constant Supports: For critical piping stress and if necessary to avoid transfer of stress from one support to another support, critical terminal, or connected equipment. Include auxiliary stops for erection, hydrostatic test, and load-adjustment capability. These supports include the following types:
    - a. Horizontal (MSS Type 54): Mounted horizontally.
    - b. Vertical (MSS Type 55): Mounted vertically.
    - c. Trapeze (MSS Type 56): Two vertical-type supports and one trapeze member.
- P. Comply with MSS SP-69 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.
- Q. Comply with MFMA-103 for metal framing system selections and applications that are not specified in piping system Sections.
- R. Use powder-actuated fasteners or mechanical-expansion anchors instead of building attachments where required in concrete construction.

END OF SECTION

## SECTION 230548 - VIBRATION AND SEISMIC CONTROLS FOR HVAC

### 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. Elastomeric isolation pads.
  - 2. Elastomeric isolation mounts.
  - 3. Restrained elastomeric isolation mounts.
  - 4. Open-spring isolators.
  - 5. Housed-spring isolators.
  - 6. Restrained-spring isolators.
  - 7. Resilient pipe guides.
  - 8. Elastomeric hangers.
  - 9. Spring hangers.
  - 10. Snubbers.
  - 11. Restraint channel bracings.
  - 12. Restraint cables.
  - 13. Seismic-restraint accessories.
  - 14. Mechanical anchor bolts.
  - 15. Adhesive anchor bolts.

#### 1.3 DEFINITIONS

- A. IBC: International Building Code.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include rated load, rated deflection, and overload capacity for each vibration isolation device.
  - 2. Illustrate and indicate style, material, strength, fastening provision, and finish for each type and size of vibration isolation device and seismic-restraint component required.
    - a. Tabulate types and sizes of seismic restraints, complete with report numbers and rated strength in tension and shear as evaluated by a Professional Engineer.
    - b. Annotate to indicate application of each product submitted and compliance with requirements.



3. Interlocking Snubbers: Include ratings for horizontal, vertical, and combined loads.
- B. Shop Drawings:
1. Detail fabrication and assembly of equipment bases. Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.
  2. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.
- C. Delegated-Design Submittal: For each vibration isolation and seismic-restraint device.
1. Include design calculations and details for selecting vibration isolators, seismic restraints, and vibration isolation bases complying with performance requirements, design criteria, and analysis data signed and sealed by the qualified Professional Engineer responsible for their preparation.
  2. Design Calculations: Calculate static and dynamic loading due to equipment weight, operation, and seismic forces required to select vibration isolators and seismic restraints and for designing vibration isolation bases.
    - a. Coordinate design calculations with wind load calculations required for equipment mounted outdoors. Comply with requirements in other Sections for equipment mounted outdoors.
  3. Riser Supports: Include riser diagrams and calculations showing anticipated expansion and contraction at each support point, initial and final loads on building structure, spring deflection changes, and seismic loads. Include certification that riser system was examined for excessive stress and that none exists.
  4. Seismic-Restraint Details:
    - a. Design Analysis: To support selection and arrangement of seismic restraints. Include calculations of combined tensile and shear loads.
    - b. Details: Indicate fabrication and arrangement. Detail attachments of restraints to the restrained items and to the structure. Show attachment locations, methods, and spacing. Identify components, list their strengths, and indicate directions and values of forces transmitted to the structure during seismic events. Indicate association with vibration isolation devices.
    - c. Coordinate seismic-restraint and vibration isolation details with wind-restraint details required for equipment mounted outdoors. Comply with requirements in other Sections for equipment mounted outdoors.
    - d. Preapproval and Evaluation Documentation: By an agency acceptable to authorities having jurisdiction, showing maximum ratings of restraint items and the basis for approval (tests or calculations).

## 1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Show coordination of vibration isolation device installation and seismic bracing for HVAC piping and equipment with other systems and equipment in the vicinity, including other supports and restraints, if any.

- B. Qualification Data: For Professional Engineer and testing agency.
- C. Air-Mounting System Performance Certification: Include natural frequency, load, and damping test data performed by an independent agency.
- D. Field quality-control reports.

## 1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910.7 and that is acceptable to authorities having jurisdiction.
- B. Comply with seismic-restraint requirements in the IBC unless requirements in this Section are more stringent.
- C. Seismic-restraint devices shall have horizontal and vertical load testing and analysis and shall bear anchorage preapproval by another agency acceptable to authorities having jurisdiction, showing maximum seismic-restraint ratings. Ratings based on independent testing are preferred to ratings based on calculations. If preapproved ratings are unavailable, submittals based on independent testing are preferred. Calculations (including combining shear and tensile loads) to support seismic-restraint designs must be signed and sealed by a qualified Professional Engineer.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Seismic-Restraint Loading:
  - 1. Site Class as Defined in the IBC for this site.
  - 2. Assigned Seismic Use Group or Building Category as Defined in the IBC for this site.
  - 3. Rated strengths, features, and applications shall be as defined in reports by an agency acceptable to authorities having jurisdiction.
    - a. Structural Safety Factor: Allowable strength in tension, shear, and pullout force of components shall be at least **four** times the maximum seismic forces to which they are subjected.
- B. Manufacturers:
  - 1. AVT Incorporated
  - 2. BRD Noise & Vibration Control, Inc.
  - 3. California Dynamics Corporation
  - 4. Dynasonics
  - 5. Isolation Technology, Inc.
  - 6. Kinetics Noise Control, Inc.
  - 7. Mason Industries, Inc.
  - 8. Vibration Isolation

9. Vibration Mounting & Controls, Inc.
10. Substitution: Section 01600 - Product Requirements.

## 2.2 ELASTOMERIC ISOLATION PADS

- A. Elastomeric Isolation Pads:
  1. Fabrication: Single or multiple layers of sufficient durometer stiffness for uniform loading over pad area.
  2. Size: Factory or field cut to match requirements of supported equipment.
  3. Pad Material: Oil and water resistant with elastomeric properties.
  4. Surface Pattern: Smooth pattern.
  5. Infused nonwoven cotton or synthetic fibers.
  6. Load-bearing metal plates adhered to pads.
  7. Sandwich-Core Material: Resilient and elastomeric.

## 2.3 ELASTOMERIC ISOLATION MOUNTS

- A. Double-Deflection, Elastomeric Isolation Mounts:
  1. Mounting Plates:
    - a. Top Plate: Encapsulated steel load transfer top plates, factory drilled and threaded with threaded studs or bolts.
    - b. Baseplate: Encapsulated steel bottom plates with holes provided for anchoring to support structure.
  2. Elastomeric Material: Molded, oil-resistant rubber, neoprene, or other elastomeric material.

## 2.4 RESTRAINED ELASTOMERIC ISOLATION MOUNTS

- A. Restrained Elastomeric Isolation Mounts:
  1. Description: All-directional isolator with seismic restraints containing two separate and opposing elastomeric elements that prevent central threaded element and attachment hardware from contacting the housing during normal operation.
    - a. Housing: Cast-ductile iron or welded steel.
    - b. Elastomeric Material: Molded, oil-resistant rubber, neoprene, or other elastomeric material.

## 2.5 OPEN-SPRING ISOLATORS

- A. Freestanding, Laterally Stable, Open-Spring Isolators:
  1. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
  2. Minimum Additional Travel: 50 percent of the required deflection at rated load.
  3. Lateral Stiffness: More than 80 percent of rated vertical stiffness.

4. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
5. Baseplates: Factory-drilled steel plate for bolting to structure with an elastomeric isolator pad attached to the underside. Baseplates shall limit floor load to 500 psig.
6. Top Plate and Adjustment Bolt: Threaded top plate with adjustment bolt and cap screw to fasten and level equipment.

## 2.6 HOUSED-SPRING ISOLATORS

- A. Freestanding, Laterally Stable, Open-Spring Isolators in Two-Part Telescoping Housing:
  1. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
  2. Minimum Additional Travel: 50 percent of the required deflection at rated load.
  3. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
  4. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
  5. Two-Part Telescoping Housing: A steel top and bottom frame separated by an elastomeric material and enclosing the spring isolators.
    - a. Drilled base housing for bolting to structure with an elastomeric isolator pad attached to the underside. Bases shall limit floor load to 500 psig.
    - b. Top housing with threaded mounting holes and internal leveling device.

## 2.7 RESTRAINED-SPRING ISOLATORS

- A. Freestanding, Laterally Stable, Open-Spring Isolators with Vertical-Limit Stop Restraint:
  1. Housing: Steel housing with vertical-limit stops to prevent spring extension due to weight being removed.
    - a. Base with holes for bolting to structure with an elastomeric isolator pad attached to the underside. Bases shall limit floor load to 500 psig.
    - b. Top plate with threaded mounting holes.
    - c. Internal leveling bolt that acts as blocking during installation.
  2. Restraint: Limit stop as required for equipment and authorities having jurisdiction.
  3. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
  4. Minimum Additional Travel: 50 percent of the required deflection at rated load.
  5. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
  6. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.

## 2.8 RESILIENT PIPE GUIDES

- A. Description: Telescopic arrangement of two steel tubes or post and sleeve arrangement separated by a minimum 1/2-inch thick neoprene.

1. Factory-Set Height Guide with Shear Pin: Shear pin shall be removable and reinsertable to allow for selection of pipe movement. Guides shall be capable of motion to meet location requirements.

## 2.9 ELASTOMERIC HANGERS

- A. Elastomeric Mount in a Steel Frame with Upper and Lower Steel Hanger Rods:
  1. Frame: Steel, fabricated with a connection for an upper threaded hanger rod and an opening on the underside to allow for a maximum of 30 degrees of angular lower hanger-rod misalignment without binding or reducing isolation efficiency.
  2. Dampening Element: Molded, oil-resistant rubber, neoprene, or other elastomeric material with a projecting bushing for the underside opening preventing steel to steel contact.

## 2.10 SPRING HANGERS

- A. Combination Coil-Spring and Elastomeric-Insert Hanger with Spring and Insert in Compression:
  1. Frame: Steel, fabricated for connection to threaded hanger rods and to allow for a maximum of 30 degrees of angular hanger-rod misalignment without binding or reducing isolation efficiency.
  2. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
  3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
  4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
  5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
  6. Elastomeric Element: Molded, oil-resistant rubber or neoprene. Steel-washer-reinforced cup to support spring and bushing projecting through bottom of frame.
  7. Adjustable Vertical Stop: Steel washer with neoprene washer "up-stop" on lower threaded rod.
  8. Self-centering hanger-rod cap to ensure concentricity between hanger rod and support spring coil.

## 2.11 SNUBBERS

- A. Description: Factory fabricated using welded structural-steel shapes and plates, anchor bolts, and replaceable resilient isolation washers and bushings.
  1. Anchor bolts for attaching to concrete shall be seismic-rated, drill-in, and stud-wedge or female-wedge type.
  2. Resilient Isolation Washers and Bushings: Oil- and water-resistant neoprene.
  3. Maximum 1/4-inch air gap, and minimum 1/4-inch thick resilient cushion.

## 2.12 RESTRAINT CHANNEL BRACINGS

- A. Description: MFMA-4, shop- or field-fabricated bracing assembly made of slotted steel channels with accessories for attachment to braced component at one end and to building structure at the other end and other matching components and with corrosion-resistant coating; rated in tension, compression, and torsion forces.

## 2.13 RESTRAINT CABLES

- A. Restraint Cables: ASTM A 492 stainless-steel cables. End connections made of steel assemblies with thimbles, brackets, swivel, and bolts designed for restraining cable service; with a minimum of two clamping bolts for cable engagement.

## 2.14 SEISMIC-RESTRAINT ACCESSORIES

- A. Hanger-Rod Stiffener: Steel tube or steel slotted-support-system sleeve with internally bolted connections to hanger rod.
- B. Hinged and Swivel Brace Attachments: Multifunctional steel connectors for attaching hangers to rigid channel bracings and restraint cables.
- C. Bushings for Floor-Mounted Equipment Anchor Bolts: Neoprene bushings designed for rigid equipment mountings, and matched to type and size of anchor bolts and studs.
- D. Bushing Assemblies for Wall-Mounted Equipment Anchorage: Assemblies of neoprene elements and steel sleeves designed for rigid equipment mountings, and matched to type and size of attachment devices used.
- E. Resilient Isolation Washers and Bushings: One-piece, molded, oil- and water-resistant neoprene, with a flat washer face.

## 2.15 MECHANICAL ANCHOR BOLTS

- A. Mechanical Anchor Bolts: Drilled-in and stud-wedge or female-wedge type in zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488.

## 2.16 ADHESIVE ANCHOR BOLTS

- A. Adhesive Anchor Bolts: Drilled-in and capsule anchor system containing PVC or urethane methacrylate-based resin and accelerator, or injected polymer or hybrid mortar adhesive. Provide anchor bolts and hardware with zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas and equipment to receive vibration isolation and seismic control devices for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in of reinforcement and cast-in-place anchors to verify actual locations before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 APPLICATIONS

- A. Multiple Pipe Supports: Secure pipes to trapeze member with clamps approved for application by an agency acceptable to authorities having jurisdiction.
- B. Hanger-Rod Stiffeners: Install hanger-rod stiffeners where required to prevent buckling of hanger rods due to seismic forces.
- C. Strength of Support and Seismic-Restraint Assemblies: Where not indicated, select sizes of components so strength is adequate to carry present and future static and seismic loads within specified loading limits.

### 3.3 VIBRATION CONTROL AND SEISMIC-RESTRAINT DEVICE INSTALLATION

- A. Coordinate the location of embedded connection hardware with supported equipment attachment and mounting points and with requirements for concrete reinforcement and formwork specified in Section 033000 "Cast-in-Place Concrete."
- B. Installation of vibration isolators must not cause any change of position of equipment, piping, or ductwork resulting in stresses or misalignment.
- C. Comply with requirements in Section 077200 "Roof Accessories" for installation of roof curbs, equipment supports, and roof penetrations.
- D. Equipment Restraints:
  - 1. Install seismic snubbers on HVAC equipment mounted on vibration isolators. Locate snubbers as close as possible to vibration isolators and bolt to equipment base and supporting structure.
  - 2. Install resilient bolt isolation washers on equipment anchor bolts where clearance between anchor and adjacent surface exceeds 0.125 inch.
  - 3. Install seismic-restraint devices using methods approved by a Professional Engineer that provides required submittals for component.
- E. Piping Restraints:

1. Comply with requirements in MSS SP-127.
  2. Space lateral supports a maximum of 40 feet o.c., and longitudinal supports a maximum of 80 feet o.c.
  3. Brace a change of direction longer than 12 feet.
- F. Install cables so they do not bend across edges of adjacent equipment or building structure.
- G. Install seismic-restraint devices using methods approved by a Professional Engineer that provides required submittals for component.
- H. Install bushing assemblies for anchor bolts for floor-mounted equipment, arranged to provide resilient media between anchor bolt and mounting hole in concrete base.
- I. Install bushing assemblies for mounting bolts for wall-mounted equipment, arranged to provide resilient media where equipment or equipment-mounting channels are attached to wall.
- J. Attachment to Structure: If specific attachment is not indicated, anchor bracing to structure at flanges of beams, at upper truss chords of bar joists, or at concrete members.
- K. Drilled-in Anchors:
1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcing or embedded items during coring or drilling. Notify the structural engineer if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid pre-stressed tendons, electrical and telecommunications conduit, and gas lines.
  2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
  3. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
  4. Adhesive Anchors: Clean holes to remove loose material and drilling dust prior to installation of adhesive. Place adhesive in holes proceeding from the bottom of the hole and progressing toward the surface in such a manner as to avoid introduction of air pockets in the adhesive.
  5. Set anchors to manufacturer's recommended torque, using a torque wrench.
  6. Install zinc-coated steel anchors for interior and stainless-steel anchors for exterior applications.

### 3.4 ACCOMMODATION OF DIFFERENTIAL SEISMIC MOTION

- A. Install flexible connections in piping where they cross seismic joints, where adjacent sections or branches are supported by different structural elements, and where the connections terminate with connection to equipment that is anchored to a different structural element from the one supporting the connections as they approach equipment.

### 3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.



B. Perform tests and inspections.

C. Tests and Inspections:

1. Provide evidence of recent calibration of test equipment by a testing agency acceptable to authorities having jurisdiction.
2. Schedule test with Owner, through Architect, before connecting anchorage device to restrained component (unless post-connection testing has been approved), and with at least seven days' advance notice.
3. Obtain Architect's approval before transmitting test loads to structure. Provide temporary load-spreading members.
4. Test at least four of each type and size of installed anchors and fasteners selected by Architect.
5. Test to 90 percent of rated proof load of device.
6. Measure isolator restraint clearance.
7. Measure isolator deflection.
8. Verify snubber minimum clearances.

D. Remove and replace malfunctioning units and retest as specified above.

E. Prepare test and inspection reports.

### 3.6 ADJUSTING

A. Adjust isolators after piping system is at operating weight.

B. Adjust limit stops on restrained-spring isolators to mount equipment at normal operating height. After equipment installation is complete, adjust limit stops so they are out of contact during normal operation.

END OF SECTION

## SECTION 230553 - IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

### 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. Equipment labels.
  - 2. Warning signs and labels.
  - 3. Pipe labels.
  - 4. Duct labels.
  - 5. Stencils.
  - 6. Valve tags.
  - 7. Warning tags.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For color, letter style, and graphic representation required for each identification material and device.
- C. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.
- D. Valve numbering scheme.
- E. Valve Schedules: For each piping system to include in maintenance manuals.

### PART 2 - PRODUCTS

#### 2.1 EQUIPMENT LABELS

- A. Metal Labels for Equipment:
  - 1. Manufacturers:
    - a. Brady Corporation
    - b. Brimar Industries, Inc.
    - c. Carlton Industries, LP

- d. Champion America
  - e. Craftmark Pipe Markers
  - f. Kolbi Pipe Marker Co.
  - g. LEM Products Inc.
  - h. Marking Services, Inc.
  - i. Substitutions: Section 01 60 00 - Product Requirements.
- 2. Material and Thickness: Brass, 0.032-inch or stainless steel, 0.025 minimum thickness, and having predrilled or stamped holes for attachment hardware.
  - 3. Letter Color: Blue
  - 4. Background Color: White
  - 5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
  - 6. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-quarters the size of principal lettering.
  - 7. Fasteners: Stainless-steel self-tapping screws.
  - 8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

B. Plastic Labels for Equipment:

- 1. Manufacturers:
  - a. Brady Corporation
  - b. Brimar Industries, Inc.
  - c. Carlton Industries, LP
  - d. Champion America
  - e. Craftmark Pipe Markers
  - f. Kolbi Pipe Marker Co.
  - g. LEM Products Inc.
  - h. Marking Services, Inc.
  - i. Substitutions: Section 01 60 00 - Product Requirements.
- 2. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.
- 3. Letter Color: Blue
- 4. Background Color: White.
- 5. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
- 6. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
- 7. Minimum Letter Size: 1/4 inc for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-quarters the size of principal lettering.
- 8. Fasteners: Stainless-steel self-tapping screw.
- 9. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

C. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), and the Specification Section number and title where equipment is specified.

- D. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number, and identify Drawing numbers where equipment is indicated (plans, details, and schedules) and the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

## 2.2 WARNING SIGNS AND LABELS

- A. Manufacturers:
  - a. Brady Corporation
  - b. Brimar Industries, Inc.
  - c. Carlton Industries, LP
  - d. Champion America
  - e. Craftmark Pipe Markers
  - f. Kolbi Pipe Marker Co.
  - g. LEM Products Inc.
  - h. Marking Services, Inc.
  - i. Substitutions: Section 01 60 00 - Product Requirements.
- B. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving 1/8 inch thick, and having predrilled holes for attachment hardware.
- C. Letter Color: Blue
- D. Background Color: White
- E. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
- F. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
- G. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-quarters the size of principal lettering.
- H. Fasteners: Stainless-steel self-tapping screws.
- I. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- J. Label Content: Include caution and warning information plus emergency notification instructions.

## 2.3 PIPE LABELS

- A. Manufacturers:
  - a. Brady Corporation
  - b. Brimar Industries, Inc.
  - c. Carlton Industries, LP

- d. Champion America
  - e. Craftmark Pipe Markers
  - f. Kolbi Pipe Marker Co.
  - g. LEM Products Inc.
  - h. Marking Services, Inc.
  - i. Substitutions: Section 01 60 00 - Product Requirements.
- B. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction according to ASME A13.1.
- C. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.
- D. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.
- E. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings; also include pipe size and an arrow indicating flow direction.
  - 1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions or as separate unit on each pipe label to indicate flow direction.
  - 2. Lettering Size: At least 1/2 inch viewing distances up to 72 inches and proportionately larger lettering for greater viewing distances.

## 2.4 DUCT LABELS

- 1. Manufacturers:
  - a. Brady Corporation
  - b. Brimar Industries, Inc.
  - c. Carlton Industries, LP
  - d. Champion America
  - e. Craftmark Pipe Markers
  - f. Kolbi Pipe Marker Co.
  - g. LEM Products Inc.
  - h. Marking Services, Inc.
  - i. Substitutions: Section 01 60 00 - Product Requirements.
- B. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.
- C. Letter Color: Blue
- D. Background Color: White
- E. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
- F. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

- G. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-quarters the size of principal lettering.
- H. Fasteners: Stainless-steel self-tapping screws
- I. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- J. Duct Label Contents: Include identification of duct service using same designations or abbreviations as used on Drawings; also include duct size and an arrow indicating flow direction.
  - 1. Flow-Direction Arrows: Integral with duct system service lettering to accommodate both directions or as separate unit on each duct label to indicate flow direction.

## 2.5 STENCILS

### A. Stencils for Piping:

- 1. Manufacturers:
  - a. Brimar Industries, Inc.
  - b. Carlton Industries, LP
  - c. Champion America
  - d. Craftmark Pipe Markers
  - e. Kolbi Pipe Marker Co.
  - f. Marking Services, Inc.
  - g. Substitutions: Section 01 60 00 - Product Requirements.
- 2. Lettering Size: least 1/2 inch for viewing distances up to 72 inches and proportionately larger lettering for greater viewing distances.
- 3. Stencil Material: Aluminum or Brass
- 4. Stencil Paint: Exterior, gloss, alkyd enamel in colors complying with recommendations in ASME A13.1 unless otherwise indicated. Paint may be in pressurized spray-can form.
- 5. Identification Paint: Exterior, alkyd enamel in colors according to ASME A13.1 unless otherwise indicated. Paint may be in pressurized spray-can form.

### B. Stencils for Ducts:

- 1. Manufacturers:
  - a. Brimar Industries, Inc.
  - b. Carlton Industries, LP
  - c. Champion America
  - d. Craftmark Pipe Markers
  - e. Kolbi Pipe Marker Co.
  - f. Marking Services, Inc.
  - g. Substitutions: Section 01 60 00 - Product Requirements.
- 2. Lettering Size: Minimum letter height of 1-1/4 inches for viewing distances up to 15 feet and proportionately larger lettering for greater viewing distances.
- 3. Stencil Material: Aluminum or Brass

4. Stencil Paint: Exterior, gloss, alkyd enamel
5. Paint may be in pressurized spray-can form.
6. Identification Paint: Exterior, alkyd enamel
7. Paint may be in pressurized spray-can form.

C. Stencils for Access Panels and Door Labels, Equipment Labels, and Similar Operational Instructions:

1. Manufacturers:
  - a. Brimar Industries, Inc.
  - b. Carlton Industries, LP
  - c. Champion America
  - d. Craftmark Pipe Markers
  - e. Kolbi Pipe Marker Co.
  - f. Marking Services, Inc.
  - g. Substitutions: Section 01 60 00 - Product Requirements.
2. Lettering Size: Minimum letter height of 1/2 inch for viewing distances up to 72 inches and proportionately larger lettering for greater viewing distances.
3. Stencil Material: Aluminum or Brass
4. Stencil Paint: Exterior, gloss, alkyd enamel
5. . Paint may be in pressurized spray-can form.
6. Identification Paint: Exterior, alkyd enamel. Paint may be in pressurized spray-can form.

## 2.6 VALVE TAGS

1. Manufacturers:
  - a. Brimar Industries, Inc.
  - b. Carlton Industries, LP
  - c. Champion America
  - d. Craftmark Pipe Markers
  - e. Kolbi Pipe Marker Co.
  - f. Marking Services, Inc.
  - g. Substitutions: Section 01 60 00 - Product Requirements.
- B. Description: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers.
  1. Tag Material: Brass, 0.032-inch or stainless steel, 0.025-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
  2. Fasteners: Brass wire-link chain or beaded chain or S-hook.
- C. Valve Schedules: For each piping system, on 8-1/2-by-11-inch bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.
  1. Valve-tag schedule shall be included in operation and maintenance data.

## 2.7 WARNING TAGS

1. Manufacturers:
  - a. Brimar Industries, Inc.
  - b. Carlton Industries, LP
  - c. Champion America
  - d. Craftmark Pipe Markers
  - e. Kolbi Pipe Marker Co.
  - f. Marking Services, Inc.
  - g. Substitutions: Section 01 60 00 - Product Requirements.
- B. Description: Preprinted or partially preprinted accident-prevention tags of plasticized card stock with matte finish suitable for writing.
  1. Size: 3 by 5-1/4 inches
  2. Fasteners: Brass grommet and wire
  3. Nomenclature: Large-size primary caption such as "DANGER," "CAUTION," or "DO NOT OPERATE."
  4. Color: Safety-yellow background with black lettering.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

### 3.2 GENERAL INSTALLATION REQUIREMENTS

- A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- B. Coordinate installation of identifying devices with locations of access panels and doors.
- C. Install identifying devices before installing acoustical ceilings and similar concealment.

### 3.3 EQUIPMENT LABEL INSTALLATION

- A. Install or permanently fasten labels on each major item of mechanical equipment.
- B. Locate equipment labels where accessible and visible.

### 3.4 PIPE LABEL INSTALLATION

- A. Piping Color Coding: Painting of piping is specified in Section 099123 "Interior Painting."



- B. Stenciled Pipe Label Option: Stenciled labels may be provided instead of manufactured pipe labels, at Installer's option. Install stenciled pipe labels, complying with ASME A13.1, with painted, color-coded bands or rectangles on each piping system.
  - 1. Identification Paint: Use for contrasting background.
  - 2. Stencil Paint: Use for pipe marking.
- C. Pipe Label Locations: Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:
  - 1. Near each valve and control device.
  - 2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
  - 3. Near penetrations and on both sides of through walls, floors, ceilings, and inaccessible 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. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
  - 7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.
- D. Directional Flow Arrows: Arrows shall be used to indicate direction of flow in pipes, including pipes where flow is allowed in both directions.
- E. Pipe Label Color Schedule:
  - 1. Chilled-Water Piping: Black letters on a safety-orange background.
  - 2. Condenser-Water Piping: White letters on a safety-green background
  - 3. Heating Water Piping: Black letters on a safety-orange background
  - 4. Refrigerant Piping: White letters on a safety-purple background

### 3.5 DUCT LABEL INSTALLATION

- A. Install self-adhesive duct labels with permanent adhesive on air ducts in the following color codes:
  - 1. Blue For cold-air supply ducts.
  - 2. Yellow: For hot-air supply ducts.
  - 3. Green: For exhaust-, outside-, relief-, return-, and mixed-air ducts.
- B. Stenciled Duct Label Option: Stenciled labels showing service and flow direction may be provided instead of plastic-laminated duct labels, at Installer's option.
- C. Locate labels near points where ducts enter into and exit from concealed spaces and at maximum intervals of 50 feet in each space where ducts are exposed or concealed by removable ceiling system.

### 3.6 VALVE-TAG INSTALLATION

- A. Install tags on valves and control devices in piping systems, except check valves, valves within factory-fabricated equipment units, shutoff valves, faucets, convenience and lawn-watering hose connections, and HVAC terminal devices and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.
- B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following subparagraphs:
  - 1. Valve-Tag Size and Shape:
    - a. Chilled Water: 1-1/2 inches, round.
    - b. Condenser Water: 1-1/2 round
    - c. Refrigerant: 1-1/2 round
    - d. Hot Water: 1-1/2 round
    - e. Gas: 1-1/2 round
  - 2. Valve-Tag Colors:
    - a. Toxic and Corrosive Fluids: Black letters on a safety-orange background.
    - b. Flammable Fluids: Black letters on a safety-yellow background.
    - c. Combustible Fluids: White letters on a safety-brown background.
    - d. Potable and Other Water: White letters on a safety-green background.
    - e. Compressed Air: White letters on a safety-blue background.
    - f. Defined by User: White letters on a safety-purple background, black letters on a safety-white background, white letters on a safety-gray background, and white letters on a safety-black background

### 3.7 WARNING-TAG INSTALLATION

- A. Write required message on, and attach warning tags to, equipment and other items where required.

END OF SECTION

## SECTION 230593 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

### 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. Balancing Air Systems:
  - a. Constant-volume air systems.
  - b. Diffusers
2. Testing, adjusting, and balancing existing systems and equipment.
3. Sound tests.
4. Vibration tests.
5. Duct leakage tests.
6. Control system verification.

#### 1.3 DEFINITIONS

- A. AABC: Associated Air Balance Council.
- B. BAS: Building automation systems.
- C. NEBB: National Environmental Balancing Bureau.
- D. TAB: Testing, adjusting, and balancing.
- E. TABB: Testing, Adjusting, and Balancing Bureau.
- F. TAB Specialist: An independent entity meeting qualifications to perform TAB work.
- G. TDH: Total dynamic head.

#### 1.4 PREINSTALLATION MEETINGS

- A. TAB Conference: If requested by the Owner, conduct a TAB conference at Project site after approval of the TAB strategies and procedures plan to develop a mutual understanding of the details. Provide a minimum of 14 days' advance notice of scheduled meeting time and location.
  1. Minimum Agenda Items:

- a. The Contract Documents examination report.
- b. The TAB plan.
- c. Needs for coordination and cooperation of trades and subcontractors.
- d. Proposed procedures for documentation and communication flow.

## 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: Within 30 days of Contractor's Notice to Proceed, submit documentation that the TAB specialist and this Project's TAB team members meet the qualifications specified in "Quality Assurance" Article.
- B. Contract Documents Examination Report: Within 30 days of Contractor's Notice to Proceed, submit the Contract Documents review report as specified in Part 3.
- C. Strategies and Procedures Plan: Within 30 days of Contractor's Notice to Proceed, submit TAB strategies and step-by-step procedures as specified in "Preparation" Article.
- D. System Readiness Checklists: Within 30 days of Contractor's Notice to Proceed, submit system readiness checklists as specified in "Preparation" Article.
- E. Examination Report: Submit a summary report of the examination review required in "Examination" Article.
- F. Certified TAB reports.
- G. Sample report forms.
- H. Instrument calibration reports, to include the following:
  - 1. Instrument type and make.
  - 2. Serial number.
  - 3. Application.
  - 4. Dates of use.
  - 5. Dates of calibration.

## 1.6 QUALITY ASSURANCE

- A. TAB Specialists Qualifications: Certified by AABC
  - 1. TAB Field Supervisor: Employee of the TAB specialist and certified by AABC.
  - 2. TAB Technician: Employee of the TAB specialist and certified by AABC as a TAB technician.
- B. Instrumentation Type, Quantity, Accuracy, and Calibration: Comply with requirements in ASHRAE 111, Section 4, "Instrumentation."
- C. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 7.2.2 - "Air Balancing."

- D. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6.7.2.3 - "System Balancing."

## 1.7 FIELD CONDITIONS

- A. Full Owner Occupancy: Owner will occupy the site and existing building during entire TAB period. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.
- B. Partial Owner Occupancy: Owner may occupy completed areas of building before Substantial Completion. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

## PART 2 - PRODUCTS (Not Applicable)

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems designs that may preclude proper TAB of systems and equipment.
- B. Examine installed systems for balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are applicable for intended purpose and are accessible.
- C. Examine the approved submittals for HVAC systems and equipment.
- D. Examine design data including HVAC system descriptions, statements of design assumptions for environmental conditions and systems output, and statements of philosophies and assumptions about HVAC system and equipment controls.
- E. Examine ceiling plenums and underfloor air plenums used for supply, return, or relief air to verify that they are properly separated from adjacent areas. Verify that penetrations in plenum walls are sealed and fire-stopped if required.
- F. Examine equipment performance data including fan and pump curves.
  - 1. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
  - 2. Calculate system-effect factors to reduce performance ratings of HVAC equipment when installed under conditions different from the conditions used to rate equipment performance. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," or in SMACNA's "HVAC Systems - Duct Design." Compare results with the design data and installed conditions.

- G. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.
- H. Examine test reports specified in individual system and equipment Sections.
- I. Examine HVAC equipment and verify that bearings are greased, belts are aligned and tight, filters are clean, and equipment with functioning controls is ready for operation.
- J. Examine terminal units, such as variable-air-volume boxes, and verify that they are accessible and their controls are connected and functioning.
- K. Examine strainers. Verify that startup screens have been replaced by permanent screens with indicated perforations.
- L. Examine control valves for proper installation for their intended function of throttling, diverting, or mixing fluid flows.
- M. Examine heat-transfer coils for correct piping connections and for clean and straight fins.
- N. Examine operating safety interlocks and controls on HVAC equipment.
- O. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

### 3.2 PREPARATION

- A. Prepare a TAB plan that includes the following:
  - 1. Equipment and systems to be tested.
  - 2. Strategies and step-by-step procedures for balancing the systems.
  - 3. Instrumentation to be used.
  - 4. Sample forms with specific identification for all equipment.
- B. Perform system-readiness checks of HVAC systems and equipment to verify system readiness for TAB work. Include, at a minimum, the following:
  - 1. Airside:
    - a. Verify that leakage and pressure tests on air distribution systems have been satisfactorily completed.
    - b. Duct systems are complete with terminals installed.
    - c. Volume, smoke, and fire dampers are open and functional.
    - d. Clean filters are installed.
    - e. Fans are operating, free of vibration, and rotating in correct direction.
    - f. Variable-frequency controllers' startup is complete and safeties are verified.
    - g. Automatic temperature-control systems are operational.
    - h. Ceilings are installed.
    - i. Windows and doors are installed.
    - j. Suitable access to balancing devices and equipment is provided.

### 3.3 GENERAL PROCEDURES FOR TESTING AND BALANCING

- A. Perform testing and balancing procedures on each system according to the procedures contained in AABC's "National Standards for Total System Balance and in this Section.
- B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures.
  - 1. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts.
  - 2. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish according to Section 230713 "Duct Insulation," Section 230716 "HVAC Equipment Insulation," and Section 230719 "HVAC Piping Insulation."
- C. Mark equipment and balancing devices, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.
- D. Take and report testing and balancing measurements in inch-pound (IP) units.

### 3.4 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

- A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Cross-check the summation of required outlet volumes with required fan volumes.
- B. Prepare schematic diagrams of systems' "as-built" duct layouts.
- C. For variable-air-volume systems, develop a plan to simulate diversity.
- D. Determine the best locations in main and branch ducts for accurate duct-airflow measurements.
- E. Check airflow patterns from the outdoor-air louvers and dampers and the return- and exhaust-air dampers through the supply-fan discharge and mixing dampers.
- F. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
- G. Verify that motor starters are equipped with properly sized thermal protection.
- H. Check dampers for proper position to achieve desired airflow path.
- I. Check for airflow blockages.
- J. Check condensate drains for proper connections and functioning.
- K. Check for proper sealing of air-handling-unit components.
- L. Verify that air duct system is sealed as specified in Section 233113 "Metal Ducts."

### 3.5 PROCEDURES FOR CONSTANT-VOLUME AIR SYSTEMS

- A. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.
  - 1. Measure total airflow.
    - a. Set outside-air, return-air, and relief-air dampers for proper position that simulates minimum outdoor-air conditions.
    - b. Where duct conditions allow, measure airflow by Pitot-tube traverse. If necessary, perform multiple Pitot-tube traverses to obtain total airflow.
    - c. Where duct conditions are not suitable for Pitot-tube traverse measurements, a coil traverse may be acceptable.
    - d. If a reliable Pitot-tube traverse or coil traverse is not possible, measure airflow at terminals and calculate the total airflow.
  - 2. Measure fan static pressures as follows:
    - a. Measure static pressure directly at the fan outlet or through the flexible connection.
    - b. Measure static pressure directly at the fan inlet or through the flexible connection.
    - c. Measure static pressure across each component that makes up the air-handling system.
    - d. Report artificial loading of filters at the time static pressures are measured.
  - 3. Review Record Documents to determine variations in design static pressures versus actual static pressures. Calculate actual system-effect factors. Recommend adjustments to accommodate actual conditions.
  - 4. Obtain approval from Architect, Owner, Construction Manager or commissioning authority for adjustment of fan speed higher or lower than indicated speed. Comply with requirements in HVAC Sections for air-handling units for adjustment of fans, belts, and pulley sizes to achieve indicated air-handling-unit performance.
  - 5. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload occurs. Measure amperage in full-cooling, full-heating, economizer, and any other operating mode to determine the maximum required brake horsepower.
- B. Adjust volume dampers for main duct, submain ducts, and major branch ducts to indicated airflows.
  - 1. Measure airflow of submain and branch ducts.
  - 2. Adjust submain and branch duct volume dampers for specified airflow.
  - 3. Re-measure each submain and branch duct after all have been adjusted.
- C. Adjust air inlets and outlets for each space to indicated airflows.
  - 1. Set airflow patterns of adjustable outlets for proper distribution without drafts.
  - 2. Measure inlets and outlets airflow.
  - 3. Adjust each inlet and outlet for specified airflow.
  - 4. Re-measure each inlet and outlet after they have been adjusted.



D. Verify final system conditions.

1. Re-measure and confirm that minimum outdoor, return, and relief airflows are within design. Readjust to design if necessary.
2. Re-measure and confirm that total airflow is within design.
3. Re-measure all final fan operating data, rpms, volts, amps, and static profile.
4. Mark all final settings.
5. Test system in economizer mode. Verify proper operation and adjust if necessary.
6. Measure and record all operating data.
7. Record final fan-performance data.

### 3.6 SOUND TESTS

A. After the systems are balanced and construction is Substantially Complete, measure and record sound levels at 10 locations as designated by the Architect.

B. Instrumentation:

1. The sound-testing meter shall be a portable, general-purpose testing meter consisting of a microphone, processing unit, and readout.
2. The sound-testing meter shall be capable of showing fluctuations at minimum and maximum levels, and measuring the equivalent continuous sound pressure level (LEQ).
3. The sound-testing meter must be capable of using 1/3 octave band filters to measure mid-frequencies from 31.5 Hz to 8000 Hz.
4. The accuracy of the sound-testing meter shall be plus or minus one decibel.

C. Test Procedures:

1. Perform test at quietest background noise period. Note cause of unpreventable sound that affects test outcome.
2. Equipment should be operating at design values.
3. Calibrate the sound-testing meter prior to taking measurements.
4. Use a microphone suitable for the type of noise levels measured that is compatible with meter. Provide a windshield for outside or in-duct measurements.
5. Record a set of background measurements in dBA and sound pressure levels in the eight un-weighted octave bands 31.5 Hz to 4000 Hz (RC) with the equipment off.
6. Take sound readings in dBA and sound pressure levels in the eight un-weighted octave bands 63 31.5 Hz to 4000 Hz (RC) with the equipment operating.
7. Take readings no closer than 36 inches from a wall or from the operating equipment and approximately 60 inches from the floor, with the meter held or mounted on a tripod.
8. For outdoor measurements, move sound-testing meter slowly and scan area that has the most exposure to noise source being tested. Use A-weighted scale for this type of reading.

D. Reporting:

1. Report shall record the following:
  - a. Location.
  - b. System tested.

- c. dBA reading.
  - d. Sound pressure level in each octave band with equipment on and off.
- 2. Plot sound pressure levels on NC worksheet with equipment on and off.

### 3.7 VIBRATION TESTS

- A. After systems are balanced and construction is Substantially Complete, measure and record vibration levels on equipment having motor horsepower equal to or greater than 15.
- B. Instrumentation:
  - 1. Use portable, battery-operated, and microprocessor-controlled vibration meter with or without a built-in printer.
  - 2. The meter shall automatically identify engineering units, filter bandwidth, amplitude, and frequency scale values.
  - 3. The meter shall be able to measure machine vibration displacement in mils of deflection, velocity in inches per second, and acceleration in inches per second squared.
  - 4. Verify calibration date is current for vibration meter before taking readings.
- C. Test Procedures:
  - 1. To ensure accurate readings, verify that accelerometer has a clean, flat surface and is mounted properly.
  - 2. With the unit running, set up vibration meter in a safe, secure location. Connect transducer to meter with proper cables. Hold magnetic tip of transducer on top of the bearing, and measure unit in mils of deflection. Record measurement, then move transducer to the side of the bearing and record in mils of deflection. Record an axial reading in mils of deflection by holding nonmagnetic, pointed transducer tip on end of shaft.
  - 3. Change vibration meter to velocity (inches per second) measurements. Repeat and record above measurements.
  - 4. Record CPM or rpm.
  - 5. Read each bearing on motor, fan, and pump as required. Track and record vibration levels from rotating component through casing to base.
- D. Reporting:
  - 1. Report shall record location and the system tested.
  - 2. Include horizontal-vertical-axial measurements for tests.
  - 3. Verify that vibration limits follow Specifications, or, if not specified, follow the General Machinery Vibration Severity Chart or Vibration Acceleration General Severity Chart from the AABC National Standards. Acceptable levels of vibration are normally "smooth" to "good."
  - 4. Include in report General Machinery Vibration Severity Chart, with conditions plotted.

### 3.8 DUCT LEAKAGE TESTS

- A. Witness the duct pressure testing performed by Installer.

- B. Verify that proper test methods are used and that leakage rates are within specified tolerances.
- C. Report deficiencies observed.

### 3.9 CONTROLS VERIFICATION

- A. In conjunction with system balancing, perform the following:
  - 1. Verify temperature control system is operating within the design limitations.
  - 2. Confirm that the sequences of operation are in compliance with Contract Documents.
  - 3. Verify that controllers are calibrated and function as intended.
  - 4. Verify that controller set points are as indicated.
  - 5. Verify the operation of lockout or interlock systems.
  - 6. Verify the operation of valve and damper actuators.
  - 7. Verify that controlled devices are properly installed and connected to correct controller.
  - 8. Verify that controlled devices travel freely and are in position indicated by controller: open, closed, or modulating.
  - 9. Verify location and installation of sensors to ensure that they sense only intended temperature, humidity, or pressure.
- B. Reporting: Include a summary of verifications performed, remaining deficiencies, and variations from indicated conditions.

### 3.10 PROCEDURES FOR TESTING, ADJUSTING, AND BALANCING EXISTING SYSTEMS

- A. Perform a preconstruction inspection of existing equipment that is to remain and be reused.
  - 1. Measure and record the operating speed, airflow, and static pressure of each fan.
  - 2. Measure motor voltage and amperage. Compare the values to motor nameplate information.
  - 3. Check the refrigerant charge.
  - 4. Check the condition of filters.
  - 5. Check the condition of coils.
  - 6. Check the operation of the drain pan and condensate-drain trap.
  - 7. Check bearings and other lubricated parts for proper lubrication.
  - 8. Report on the operating condition of the equipment and the results of the measurements taken. Report deficiencies.
- B. Before performing testing and balancing of existing systems, inspect existing equipment that is to remain and be reused to verify that existing equipment has been cleaned and refurbished. Verify the following:
  - 1. New filters are installed.
  - 2. Coils are clean and fins combed.
  - 3. Drain pans are clean.
  - 4. Fans are clean.
  - 5. Bearings and other parts are properly lubricated.
  - 6. Deficiencies noted in the preconstruction report are corrected.

- C. Perform testing and balancing of existing systems to the extent that existing systems are affected by the renovation work.
  - 1. Compare the indicated airflow of the renovated work to the measured fan airflows, and determine the new fan speed and the face velocity of filters and coils.
  - 2. Verify that the indicated airflows of the renovated work result in filter and coil face velocities and fan speeds that are within the acceptable limits defined by equipment manufacturer.
  - 3. If calculations increase or decrease the airflow rates and water flow rates by more than 5 percent, make equipment adjustments to achieve the calculated rates. If increase or decrease is 5 percent or less, equipment adjustments are not required.
  - 4. Balance each air outlet.

### 3.11 TOLERANCES

- A. Set HVAC system's airflow rates and water flow rates within the following tolerances:
  - 1. Supply, Return, and Exhaust Fans and Equipment with Fans: Plus or minus 10 percent.
  - 2. Air Outlets and Inlets: Plus or minus 10 percent.
- B. Maintaining pressure relationships as designed shall have priority over the tolerances specified above.

### 3.12 PROGRESS REPORTING

- A. Initial Construction-Phase Report: Based on examination of the Contract Documents as specified in "Examination" Article, prepare a report on the adequacy of design for systems balancing devices. Recommend changes and additions to systems balancing devices to facilitate proper performance measuring and balancing. Recommend changes and additions to HVAC systems and general construction to allow access for performance measuring and balancing devices.
- B. Status Reports: Prepare monthly progress reports to describe completed procedures, procedures in progress, and scheduled procedures. Include a list of deficiencies and problems found in systems being tested and balanced. Prepare a separate report for each system and each building floor for systems serving multiple floors.

### 3.13 FINAL REPORT

- A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.
  - 1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.
  - 2. Include a list of instruments used for procedures, along with proof of calibration.
  - 3. Certify validity and accuracy of field data.
- B. Final Report Contents: In addition to certified field-report data, include the following:

1. Pump curves.
2. Fan curves.
3. Manufacturers' test data.
4. Field test reports prepared by system and equipment installers.
5. Other information relative to equipment performance; do not include Shop Drawings and Product Data.

C. General Report Data: In addition to form titles and entries, include the following data:

1. Title page.
2. Name and address of the TAB specialist.
3. Project name.
4. Project location.
5. Architect's name and address.
6. Engineer's name and address.
7. Contractor's name and address.
8. Report date.
9. Signature of TAB supervisor who certifies the report.
10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
11. Summary of contents including the following:
  - a. Indicated versus final performance.
  - b. Notable characteristics of systems.
  - c. Description of system operation sequence if it varies from the Contract Documents.
12. Nomenclature sheets for each item of equipment.
13. Data for terminal units, including manufacturer's name, type, size, and fittings.
14. Notes to explain why certain final data in the body of reports vary from indicated values.
15. Test conditions for fans and pump performance forms including the following:
  - a. Settings for outdoor-, return-, and exhaust-air dampers.
  - b. Conditions of filters.
  - c. Cooling coil, wet- and dry-bulb conditions.
  - d. Face and bypass damper settings at coils.
  - e. Fan drive settings including settings and percentage of maximum pitch diameter.
  - f. Inlet vane settings for variable-air-volume systems.
  - g. Settings for supply-air, static-pressure controller.
  - h. Other system operating conditions that affect performance.

D. System Diagrams: Include schematic layouts of air and hydronic distribution systems. Present each system with single-line diagram and include the following:

1. Quantities of outdoor, supply, return, and exhaust airflows.
2. Water and steam flow rates.
3. Duct, outlet, and inlet sizes.
4. Pipe and valve sizes and locations.
5. Terminal units.
6. Balancing stations.
7. Position of balancing devices.

E. Electric-Coil Test Reports: For electric furnaces, duct coils, and electric coils installed in central-station air-handling units, include the following:

1. Unit Data:
  - a. System identification.
  - b. Location.
  - c. Coil identification.
  - d. Capacity in Btu/h.
  - e. Number of stages.
  - f. Connected volts, phase, and hertz.
  - g. Rated amperage.
  - h. Airflow rate in cfm.
  - i. Face area in sq. ft..
  - j. Minimum face velocity in fpm.
2. Test Data (Indicated and Actual Values):
  - a. Heat output in Btu/h
  - b. Airflow rate in cfm.
  - c. Air velocity in fpm.
  - d. Entering-air temperature in deg F.
  - e. Leaving-air temperature in deg F.
  - f. Voltage at each connection.
  - g. Amperage for each phase.

F. Air-Terminal-Device Reports:

1. Unit Data:
  - a. System and air-handling unit identification.
  - b. Location and zone.
  - c. Apparatus used for test.
  - d. Area served.
  - e. Make.
  - f. Number from system diagram.
  - g. Type and model number.
  - h. Size.
  - i. Effective area in sq. ft..
2. Test Data (Indicated and Actual Values):
  - a. Airflow rate in cfm.
  - b. Air velocity in fpm.
  - c. Preliminary airflow rate as needed in cfm.
  - d. Preliminary velocity as needed in fpm.
  - e. Final airflow rate in cfm.
  - f. Final velocity in fpm.
  - g. Space temperature in deg F.

G. Instrument Calibration Reports:

1. Report Data:
  - a. Instrument type and make.
  - b. Serial number.
  - c. Application.
  - d. Dates of use.
  - e. Dates of calibration.

### 3.14 VERIFICATION OF TAB REPORT

- A. The TAB specialist's test and balance engineer shall conduct the inspection in the presence of Architect, Owner, Construction Manager or commissioning authority.
- B. Architect, Owner, Construction Manager or Commissioning authority shall randomly select measurements, documented in the final report, to be rechecked. Rechecking shall be limited to either 10 percent of the total measurements recorded or the extent of measurements that can be accomplished in a normal 8-hour business day.
- C. If rechecks yield measurements that differ from the measurements documented in the final report by more than the tolerances allowed, the measurements shall be noted as "FAILED."
- D. If the number of "FAILED" measurements is greater than 10 percent of the total measurements checked during the final inspection, the testing and balancing shall be considered incomplete and shall be rejected.
- E. If TAB work fails, proceed as follows:
  1. TAB specialists shall recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes; resubmit the final report and request a second final inspection.
  2. If the second final inspection also fails, Owner may contract the services of another TAB specialist to complete TAB work according to the Contract Documents and deduct the cost of the services from the original TAB specialist's final payment.
  3. If the second verification also fails, Owner, design professional or Architect may contact AABC Headquarters regarding the AABC National Performance Guaranty.
- F. Prepare test and inspection reports.

### 3.15 ADDITIONAL TESTS

- A. Within 90 days of completing TAB, perform additional TAB to verify that balanced conditions are being maintained throughout and to correct unusual conditions.
- B. Seasonal Periods: If initial TAB procedures were not performed during near-peak summer and winter conditions, perform additional TAB during near-peak summer and winter conditions.

END OF SECTION

## SECTION 230713 - DUCT INSULATION

### 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 insulating the following duct services:
  - 1. Indoor, concealed supply and outdoor air.
  - 2. Indoor, concealed return located in unconditioned space.
- B. Related Sections:
  - 1. Section 233113 "Metal Ducts" for duct liners.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory- and field-applied if any).
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
  - 1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
  - 2. Detail insulation application at elbows, fittings, dampers, specialties and flanges for each type of insulation.
  - 3. Detail application of field-applied jackets.
  - 4. Detail application at linkages of control devices.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.
- C. Field quality-control reports.



## 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.
  - 1. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
  - 2. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
  - 3. Demolish and remove mockups when directed.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

## 1.7 COORDINATION

- A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 230529 "Hangers and Supports for HVAC Piping and Equipment."
- B. Coordinate clearance requirements with duct Installer for duct insulation application. Before preparing ductwork Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.
- C. Coordinate installation and testing of heat tracing.

## 1.8 SCHEDULING

- A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.
- B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

## PART 2 - PRODUCTS

### 2.1 INSULATION MATERIALS

- A. Comply with requirements in "Duct Insulation Schedule, General," "Indoor Duct and Plenum Insulation Schedule," and "Aboveground, Outdoor Duct and Plenum Insulation Schedule" articles for where insulating materials shall be applied.
- B. Products shall not contain asbestos, lead, mercury, or mercury compounds.

- C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.
- D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.
- E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.
- F. Flexible Elastomeric Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type II for sheet materials.
  - 1. Manufacturers:
    - a. Aeroflex USA, Inc.
    - b. Armacell LLC
    - c. K-Flex USA
    - d. Substitutions: Section 01 60 00 - Product Requirements.
- G. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II and ASTM C 1290, Type III with factory-applied FSK jacket. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. CertainTeed Corporation.
    - b. Johns Manville; a Berkshire Hathaway company.
    - c. Knauf Insulation.
    - d. Manson Insulation Inc.
    - e. Owens Corning.
    - f. Substitutions: Section 01 60 00 - Product Requirements.
- H. Mineral-Fiber Board Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 612, Type IA or Type IB. For duct and plenum applications, provide insulation with factory-applied ASJ. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. CertainTeed Corporation.
    - b. Johns Manville; a Berkshire Hathaway company.
    - c. Knauf Insulation.
    - d. Manson Insulation Inc.
    - e. Owens Corning.
    - f. Substitutions: Section 01 60 00 - Product Requirements.

## 2.2 FIRE-RATED INSULATION SYSTEMS

- A. Fire-Rated Board: Structural-grade, press-molded, xonolite calcium silicate, fireproofing board suitable for operating temperatures up to 1700 deg F. Comply with ASTM C 656, Type II, Grade 6. Tested and certified to provide a 1-hour fire rating by an NRTL acceptable to authorities having jurisdiction.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
    - a. Johns Manville; a Berkshire Hathaway company.
    - b. Substitutions: Section 01 60 00 - Product Requirements.
- B. Fire-Rated Blanket: High-temperature, flexible, blanket insulation with FSK jacket that is tested and certified to provide a 1-hour fire rating by an NRTL acceptable to authorities having jurisdiction.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. 3M.
    - b. CertainTeed Corporation.
    - c. Johns Manville; a Berkshire Hathaway company.
    - d. Nelson Firestop; a brand of Emerson Industrial Automation.
    - e. Thermal Ceramics.
    - f. Unifrax Corporation.
    - g. Substitutions: Section 01 60 00 - Product Requirements.

## 2.3 ADHESIVES

- A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.
- B. Flexible Elastomeric and Polyolefin Adhesive: Comply with MIL-A-24179A, Type II, Class I.
- C. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.
- D. ASJ Adhesive, and FSK Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.
- E. PVC Jacket Adhesive: Compatible with PVC jacket.

## 2.4 MASTICS

- A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.
- B. Vapor-Barrier Mastic: Water based; suitable for indoor use on below ambient services.
  - 1. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm at 43-mil dry film thickness.

2. Service Temperature Range: Minus 20 to plus 180 deg F.
  3. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.
  4. Color: White.
- C. Breather Mastic: Water based; suitable for indoor and outdoor use on above ambient services.
1. Water-Vapor Permeance: ASTM F 1249, 1.8 perms at 0.0625-inch dry film thickness.
  2. Service Temperature Range: Minus 20 to plus 180 deg F.
  3. Solids Content: 60 percent by volume and 66 percent by weight.
  4. Color: White.

## 2.5 LAGGING ADHESIVES

- A. Description: Comply with MIL-A-3316C, Class I, Grade A and shall be compatible with insulation materials, jackets, and substrates.
1. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fire-resistant lagging cloths over duct insulation.
  2. Service Temperature Range: 0 to plus 180 deg F.
  3. Color: White.

## 2.6 SEALANTS

- A. FSK and Metal Jacket Flashing Sealants:
1. Materials shall be compatible with insulation materials, jackets, and substrates.
  2. Fire- and water-resistant, flexible, elastomeric sealant.
  3. Service Temperature Range: Minus 40 to plus 250 deg F.
  4. Color: Aluminum.
- B. ASJ Flashing Sealants, and Vinyl and PVC Jacket Flashing Sealants:
1. Materials shall be compatible with insulation materials, jackets, and substrates.
  2. Fire- and water-resistant, flexible, elastomeric sealant.
  3. Service Temperature Range: Minus 40 to plus 250 deg F.
  4. Color: White.

## 2.7 FACTORY-APPLIED JACKETS

- A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:
1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.
  2. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.
  3. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.
  4. FSP Jacket: Aluminum-foil, fiberglass-reinforced scrim with polyethylene backing; complying with ASTM C 1136, Type II.
  5. Vinyl Jacket: White vinyl with a permeance of 1.3 perms when tested according to ASTM E 96/E 96M, Procedure A, and complying with NFPA 90A and NFPA 90B.

## 2.8 FIELD-APPLIED FABRIC-REINFORCING MESH

- A. Woven Glass-Fiber Fabric: Approximately 6 oz./sq. yd. with a thread count of 5 strands by 5 strands/sq. in. for covering ducts.
- B. Woven Polyester Fabric: Approximately 1 oz./sq. yd. with a thread count of 10 strands by 10 strands/sq. in., in a Leno weave, for ducts.

## 2.9 FIELD-APPLIED CLOTHS

- A. Woven Glass-Fiber Fabric: Comply with MIL-C-20079H, Type I, plain weave, and presized a minimum of 8 oz./sq. yd..

## 2.10 FIELD-APPLIED JACKETS

- A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.
- B. FSK Jacket: Aluminum-foil-face, fiberglass-reinforced scrim with kraft-paper backing.
- C. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.
  - 1. Adhesive: As recommended by jacket material manufacturer.
  - 2. Color: White.
- D. Metal Jacket:
  - 1. Aluminum Jacket: Comply with ASTM B 209, Alloy 3003, 3005, 3105, or 5005, Temper H-14.
    - a. Sheet and roll stock ready for shop or field sizing.
    - b. Finish and thickness are indicated in field-applied jacket schedules.
    - c. Moisture Barrier for Indoor Applications: 1-mil-thick, heat-bonded polyethylene and kraft paper.
    - d. Moisture Barrier for Outdoor Applications: 3-mil-thick, heat-bonded polyethylene and kraft paper.
  - 2. Stainless-Steel Jacket: ASTM A 167 or ASTM A 240/A 240M.
    - a. Sheet and roll stock ready for shop or field sizing.
    - b. Material, finish, and thickness are indicated in field-applied jacket schedules.
    - c. Moisture Barrier for Indoor Applications: 1-mil-thick, heat-bonded polyethylene and kraft paper.
    - d. Moisture Barrier for Outdoor Applications: 3-mil-thick, heat-bonded polyethylene and kraft paper.
- E. Self-Adhesive Outdoor Jacket: 60-mil-thick, laminated vapor barrier and waterproofing membrane for installation over insulation located aboveground outdoors; consisting of a rubberized bituminous resin on a crosslaminated polyethylene film covered with white aluminum-foil facing.

## 2.11 TAPES

- A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.
  - 1. Width: 3 inches.
  - 2. Thickness: 11.5 mils.
  - 3. Adhesion: 90 ounces force/inch in width.
  - 4. Elongation: 2 percent.
  - 5. Tensile Strength: 40 lbf/inch in width.
  - 6. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.
- B. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.
  - 1. Width: 3 inches.
  - 2. Thickness: 6.5 mils.
  - 3. Adhesion: 90 ounces force/inch in width.
  - 4. Elongation: 2 percent.
  - 5. Tensile Strength: 40 lbf/inch in width.
  - 6. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.
- C. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive; suitable for indoor and outdoor applications.
  - 1. Width: 2 inches.
  - 2. Thickness: 6 mils.
  - 3. Adhesion: 64 ounces force/inch in width.
  - 4. Elongation: 500 percent.
  - 5. Tensile Strength: 18 lbf/inch in width.
- D. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.
  - 1. Width: 2 inches.
  - 2. Thickness: 3.7 mils.
  - 3. Adhesion: 100 ounces force/inch in width.
  - 4. Elongation: 5 percent.
  - 5. Tensile Strength: 34 lbf/inch in width.

## 2.12 SECUREMENTS

- A. Bands:
  - 1. Stainless Steel: ASTM A 167 or ASTM A 240/A 240M, Type 304 or Type 316; 0.015 inch thick, 1/2 inch wide with wing seal or closed seal.
  - 2. Aluminum: ASTM B 209, Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick, 1/2 inch wide with wing seal or closed seal.
  - 3. Springs: Twin spring set constructed of stainless steel with ends flat and slotted to accept metal bands. Spring size determined by manufacturer for application.
- B. Insulation Pins and Hangers:
  - 1. Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.106-inch- diameter shank, length to suit depth of insulation indicated.

- a.
- 2. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.106-inch- diameter shank, length to suit depth of insulation indicated with integral 1-1/2-inch galvanized carbon-steel washer.
  - a.
- 3. Metal, Adhesively Attached, Perforated-Base Insulation Hangers: Baseplate welded to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:
  - a. Baseplate: Perforated, galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
  - b. Spindle: Aluminum or Stainless steel, fully annealed, 0.106-inch-diameter shank, length to suit depth of insulation indicated.
  - c. Adhesive: Recommended by hanger manufacturer. Product with demonstrated capability to bond insulation hanger securely to substrates indicated without damaging insulation, hangers, and substrates.
- 4. Nonmetal, Adhesively Attached, Perforated-Base Insulation Hangers: Baseplate fastened to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:
  - a. Baseplate: Perforated, nylon sheet, 0.030 inch thick by 1-1/2 inches in diameter.
  - b. Spindle: Nylon, 0.106-inch-diameter shank, length to suit depth of insulation indicated, up to 2-1/2 inches.
  - c. Adhesive: Recommended by hanger manufacturer. Product with demonstrated capability to bond insulation hanger securely to substrates indicated without damaging insulation, hangers, and substrates.
- 5. Self-Sticking-Base Insulation Hangers: Baseplate welded to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:
  - a.
  - b. Baseplate: Galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
  - c. Spindle: Aluminum or Stainless steel, fully annealed, 0.106-inch-diameter shank, length to suit depth of insulation indicated.
  - d. Adhesive-backed base with a peel-off protective cover.
- 6. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch-thick, aluminum or stainless-steel sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.
  - a. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in exposed locations.
- 7. Nonmetal Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch-thick nylon sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.

- C. Staples: Outward-clinching insulation staples, nominal 3/4-inch-wide, stainless steel or Monel.
- D. Wire: 0.062-inch soft-annealed, stainless steel.

## 2.13 CORNER ANGLES

- A. PVC Corner Angles: 30 mils thick, minimum 1 by 1 inch, PVC according to ASTM D 1784, Class 16354-C. White or color-coded to match adjacent surface.
- B. Aluminum Corner Angles: 0.040 inch thick, minimum 1 by 1 inch, aluminum according to ASTM B 209, Alloy 3003, 3005, 3105, or 5005; Temper H-14.
- C. Stainless-Steel Corner Angles: 0.024 inch thick, minimum 1 by 1 inch, stainless steel according to ASTM A 167 or ASTM A 240/A 240M, Type 304 or Type 316.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.
  - 1. Verify that systems to be insulated have been tested and are free of defects.
  - 2. Verify that surfaces to be insulated are clean and dry.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

### 3.3 GENERAL INSTALLATION REQUIREMENTS

- A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of ducts and fittings.
- B. Install insulation materials, vapor barriers or retarders, jackets, and thicknesses required for each item of duct system as specified in insulation system schedules.
- C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- D. Install insulation with longitudinal seams at top and bottom of horizontal runs.
- E. Install multiple layers of insulation with longitudinal and end seams staggered.



- F. Keep insulation materials dry during application and finishing.
- G. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
- H. Install insulation with least number of joints practical.
- I. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
  - 1. Install insulation continuously through hangers and around anchor attachments.
  - 2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
  - 3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
- J. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
- K. Install insulation with factory-applied jackets as follows:
  - 1. Draw jacket tight and smooth.
  - 2. Cover circumferential joints with 3-inch-wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
  - 3. Overlap jacket longitudinal seams at least 1-1/2 inches. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches o.c.
    - a. For below ambient services, apply vapor-barrier mastic over staples.
  - 4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
  - 5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to duct flanges and fittings.
- L. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
- M. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.
- N. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

### 3.4 PENETRATIONS

- A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.
  - 1. Seal penetrations with flashing sealant.
  - 2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
  - 3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches below top of roof flashing.
  - 4. Seal jacket to roof flashing with flashing sealant.
- B. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.
  - 1. Seal penetrations with flashing sealant.
  - 2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
  - 3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches.
  - 4. Seal jacket to wall flashing with flashing sealant.
- C. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.
- D. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Terminate insulation at fire damper sleeves for fire-rated wall and partition penetrations. Externally insulate damper sleeves to match adjacent insulation and overlap duct insulation at least 2 inches.
  - 1. Comply with requirements in Section 078413 "Penetration Firestopping."
- E. Insulation Installation at Floor Penetrations:
  - 1. Duct: For penetrations through fire-rated assemblies, terminate insulation at fire damper sleeves and externally insulate damper sleeve beyond floor to match adjacent duct insulation. Overlap damper sleeve and duct insulation at least 2 inches.
  - 2. Seal penetrations through fire-rated assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

### 3.5 INSTALLATION OF FLEXIBLE ELASTOMERIC INSULATION

- A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

### 3.6 INSTALLATION OF MINERAL-FIBER INSULATION

#### A. Blanket Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.

1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 50 percent coverage of duct and plenum surfaces.
2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:
  - a. On duct sides with dimensions 18 inches and smaller, place pins along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 16 inches o.c.
  - b. On duct sides with dimensions larger than 18 inches, place pins 16 inches o.c. each way, and 3 inches maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
  - c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
  - d. Do not overcompress insulation during installation.
  - e. Impale insulation over pins and attach speed washers.
  - f. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.
4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches from one edge and one end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch outward-clinching staples, 1 inch o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.
  - a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
  - b. Install vapor stops for ductwork and plenums operating below 50 deg F at 18-foot intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to two times the insulation thickness, but not less than 3 inches.
5. Overlap unfaced blankets a minimum of 2 inches on longitudinal seams and end joints. At end joints, secure with steel bands spaced a maximum of 18 inches o.c.
6. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
7. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch-wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.

#### B. Board Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.

1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 50 percent coverage of duct and plenum surfaces.
2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:
  - a. On duct sides with dimensions 18 inches and smaller, place pins along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 16 inches o.c.
  - b. On duct sides with dimensions larger than 18 inches, space pins 16 inches o.c. each way, and 3 inches maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
  - c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
  - d. Do not overcompress insulation during installation.
  - e. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.
4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches from one edge and one end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch outward-clinching staples, 1 inch o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.
  - a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
  - b. Install vapor stops for ductwork and plenums operating below 50 deg F at 18-foot intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to two times the insulation thickness, but not less than 3 inches.
5. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Groove and score insulation to fit as closely as possible to outside and inside radius of elbows. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
6. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch-wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.

### 3.7 FIELD-APPLIED JACKET INSTALLATION

- A. Where glass-cloth jackets are indicated, install directly over bare insulation or insulation with factory-applied jackets.
  1. Draw jacket smooth and tight to surface with 2-inch overlap at seams and joints.
  2. Embed glass cloth between two 0.062-inch-thick coats of lagging adhesive.

3. Completely encapsulate insulation with coating, leaving no exposed insulation.
- B. Where FSK jackets are indicated, install as follows:
1. Draw jacket material smooth and tight.
  2. Install lap or joint strips with same material as jacket.
  3. Secure jacket to insulation with manufacturer's recommended adhesive.
  4. Install jacket with 1-1/2-inch laps at longitudinal seams and 3-inch-wide joint strips at end joints.
  5. Seal openings, punctures, and breaks in vapor-retarder jackets and exposed insulation with vapor-barrier mastic.
- C. Where PVC jackets are indicated, install with 1-inch overlap at longitudinal seams and end joints; for horizontal applications, install with longitudinal seams along top and bottom of tanks and vessels. Seal with manufacturer's recommended adhesive.
1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.
- D. Where metal jackets are indicated, install with 2-inch overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel bands 12 inches o.c. and at end joints.

### 3.8 FIRE-RATED INSULATION SYSTEM INSTALLATION

- A. Where fire-rated insulation system is indicated, secure system to ducts and duct hangers and supports to maintain a continuous fire rating.
- B. Insulate duct access panels and doors to achieve same fire rating as duct.
- C. Install firestopping at penetrations through fire-rated assemblies. Fire-stop systems are specified in Section 078413 "Penetration Firestopping."

### 3.9 FINISHES

- A. Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."
1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.
    - a. Finish Coat Material: Interior, flat, latex-emulsion size.
- B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.
- C. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.

- D. Do not field paint aluminum or stainless-steel jackets.

### 3.10 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Perform tests and inspections.
- C. Tests and Inspections:
  - 1. Inspect ductwork, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to one location(s) for each duct system defined in the "Duct Insulation Schedule, General" Article.
- D. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

### 3.11 DUCT INSULATION SCHEDULE, GENERAL

- A. Plenums and Ducts Requiring Insulation:
  - 1. Indoor, concealed supply and outdoor air.
  - 2. Indoor, exposed supply and outdoor air.
  - 3. Indoor, concealed return located in unconditioned space.
  - 4. Indoor, exposed return located in unconditioned space.
  - 5. Indoor, concealed exhaust between isolation damper and penetration of building exterior.
- B. Items Not Insulated:
  - 1. Fibrous-glass ducts.
  - 2. Metal ducts with duct liner of sufficient thickness to comply with energy code and ASHRAE/IESNA 90.1.
  - 3. Factory-insulated flexible ducts.
  - 4. Factory-insulated plenums and casings.
  - 5. Flexible connectors.
  - 6. Vibration-control devices.
  - 7. Factory-insulated access panels and doors.

### 3.12 INDOOR DUCT AND PLENUM INSULATION SCHEDULE

- A. Concealed, round and flat-oval, supply-air duct insulation shall be one of the following:
  - 1. Flexible Elastomeric: 1 inch thick.
  - 2. Mineral-Fiber Blanket: 1-1/2 inches thick and 0.75-lb/cu. ft. nominal density.
  - 3. Mineral-Fiber Board: 1-1/2 inches thick and 2-lb/cu. ft. nominal density.
- B. Concealed, round and flat-oval, return-air duct insulation shall be one of the following:

1. Flexible Elastomeric: 1 inch thick.
  2. Mineral-Fiber Blanket: 1-1/2 inches thick and 0.75-lb/cu. ft. nominal density.
  3. Mineral-Fiber Board: 1-1/2 inches thick and 2-lb/cu. ft. nominal density.
- C. Concealed, round and flat-oval, outdoor-air duct insulation shall be one of the following:
1. Flexible Elastomeric: 1 inch thick.
  2. Mineral-Fiber Blanket: 1-1/2 inches thick and 0.75-lb/cu. ft. nominal density.
  3. Mineral-Fiber Board: 1-1/2 inches thick and 2-lb/cu. ft. nominal density.
- D. Concealed, rectangular, supply-air duct insulation shall be one of the following:
1. Flexible Elastomeric: 1 inch thick.
  2. Mineral-Fiber Blanket: 1-1/2 inches thick and 0.75-lb/cu. ft. nominal density.
  3. Mineral-Fiber Board: 1-1/2 inches thick and 2-lb/cu. ft. nominal density.
- E. Concealed, rectangular, return-air duct insulation shall be one of the following:
1. Flexible Elastomeric: 1 inch thick.
  2. Mineral-Fiber Blanket: 1-1/2 inches thick and 0.75-lb/cu. ft. nominal density.
  3. Mineral-Fiber Board: 1-1/2 inches thick and 2-lb/cu. ft. nominal density.
- F. Concealed, rectangular, outdoor-air duct insulation shall be one of the following:
1. Flexible Elastomeric: 1 inch thick.
  2. Mineral-Fiber Blanket: 1-1/2 inches thick and 0.75-lb/cu. ft. nominal density.
  3. Mineral-Fiber Board: 1-1/2 inches thick and 2-lb/cu. ft. nominal density.
- G. Concealed, return-air plenum insulation shall be one of the following:
1. Flexible Elastomeric: 1 inch thick.
  2. Mineral-Fiber Blanket: 1-1/2 inches thick and 0.75-lb/cu. ft. nominal density.
  3. Mineral-Fiber Board: 1-1/2 inches thick and 2-lb/cu. ft. nominal density.

### 3.13 INDOOR, FIELD-APPLIED JACKET SCHEDULE

- A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.
- B. If more than one material is listed, selection from materials listed is Contractor's option.
- C. Ducts and Plenums, Exposed: Shall be one of the following:
1. PVC: 20 mils thick.
  2. Aluminum, Smooth: 0.016 inch thick.
  3. Painted Aluminum, Smooth: 0.016 inch thick.
  4. Stainless Steel, Type 304 or Type 316, Smooth 2B Finish: 0.016 inch thick.

END OF SECTION

## SECTION 233113 - METAL DUCTS

### 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. Single-wall rectangular ducts and fittings.
2. Double-wall rectangular ducts and fittings.
3. Single-wall round ducts and fittings.
4. Double-wall round ducts and fittings.
5. Sheet metal materials.
6. Duct liner.
7. Sealant and gaskets.
8. Hangers and supports.
9. Seismic-restraint devices.

- B. Related Sections:

1. Section 230593 "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing requirements for metal ducts.
2. Section 233300 "Air Duct Accessories" for dampers, sound-control devices, duct-mounting access doors and panels, turning vanes, and flexible ducts.

#### 1.3 PERFORMANCE REQUIREMENTS

- A. Delegated Duct Design: Duct construction, including sheet metal thicknesses, seam and joint construction, reinforcements, and hangers and supports, shall comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and performance requirements and design criteria indicated in "Duct Schedule" Article.
- B. Structural Performance: Duct hangers and supports and seismic restraints shall withstand the effects of gravity and seismic loads and stresses within limits and under conditions described in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and SMACNA's "Seismic Restraint Manual: Guidelines for Mechanical Systems."
  1. Seismic Hazard Level A: Seismic force to weight ratio, 0.48.
  2. Seismic Hazard Level B: Seismic force to weight ratio, 0.30.
  3. Seismic Hazard Level C: Seismic force to weight ratio, 0.15.



- C. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of the following products:

1. Liners and adhesives.
2. Sealants and gaskets.
3. Seismic-restraint devices.

- B. Shop Drawings:

1. Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.
2. Factory- and shop-fabricated ducts and fittings.
3. Duct layout indicating sizes, configuration, liner material, and static-pressure classes.
4. Elevation of top of ducts.
5. Dimensions of main duct runs from building grid lines.
6. Fittings.
7. Reinforcement and spacing.
8. Seam and joint construction.
9. Penetrations through fire-rated and other partitions.
10. Equipment installation based on equipment being used on Project.
11. Locations for duct accessories, including dampers, turning vanes, and access doors and panels.
12. Hangers and supports, including methods for duct and building attachment, seismic restraints, and vibration isolation.

- C. Delegated-Design Submittal:

1. Sheet metal thicknesses.
2. Joint and seam construction and sealing.
3. Reinforcement details and spacing.
4. Materials, fabrication, assembly, and spacing of hangers and supports.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Duct installation in congested spaces, indicating coordination with general construction, building components, and other building services. Indicate proposed changes to duct layout.
2. Suspended ceiling components.
3. Structural members to which duct will be attached.
4. Size and location of initial access modules for acoustical tile.
5. Penetrations of smoke barriers and fire-rated construction.
6. Items penetrating finished ceiling including the following:

- a. Lighting fixtures.
- b. Air outlets and inlets.
- c. Speakers.
- d. Sprinklers.
- e. Access panels.
- f. Perimeter moldings.

B. Field quality-control reports.

## 1.6 QUALITY ASSURANCE

- 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel," for hangers and supports.
- 2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum," for aluminum supports.
- 3. AWS D9.1M/D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.

## PART 2 - PRODUCTS

### 2.1 SINGLE-WALL RECTANGULAR DUCTS AND FITTINGS

- A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.
- B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-1, "Rectangular Duct/Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Duct/Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- D. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 4, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

### 2.2 DOUBLE-WALL RECTANGULAR DUCTS AND FITTINGS

- A. Manufacturers:
  - 1. McGill Airflow Corporation.
  - 2. MKT Metal Manufacturing.
  - 3. Sheet Metal Connectors, Inc.

4. Substitutions: Section 01 60 00 - Product Requirements.
- B. Rectangular Ducts: Fabricate ducts with indicated dimensions for the inner duct.
  - C. Outer Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.
  - D. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-1, "Rectangular Duct/Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
  - E. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Duct/Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
  - F. Interstitial Insulation: Fibrous-glass liner complying with ASTM C 1071, NFPA 90A, or NFPA 90B; and with NAIMA AH124, "Fibrous Glass Duct Liner Standard."
    - 1. Maximum Thermal Conductivity: 0.27 Btu x in./h x sq. ft. x deg F at 75 deg F mean temperature.
    - 2. Install spacers that position the inner duct at uniform distance from outer duct without compressing insulation.
    - 3. Coat insulation with antimicrobial coating.
    - 4. Cover insulation with polyester film complying with UL 181, Class 1.
  - G. Interstitial Insulation: Flexible elastomeric duct liner complying with ASTM C 534, Type II for sheet materials, and with NFPA 90A or NFPA 90B.
    - 1. Maximum Thermal Conductivity: 0.25 Btu x in./h x sq. ft. x deg F at 75 deg F mean temperature.
  - H. Inner Duct: Minimum 0.028-inch solid sheet steel.
  - I. Formed-on Transverse Joints (Flanges): Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-1, "Rectangular Duct/Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
  - J. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Duct/Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

## 2.3 SINGLE-WALL ROUND DUCTS AND FITTINGS

- A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 3, "Round, Oval, and Flexible Duct," based on indicated static-pressure class unless otherwise indicated.
- A. Manufacturers:
  - 1. Ductmate Industries, Inc.
  - 2. Linx Industries.
  - 3. McGill Airflow Corporation.
  - 4. MKT Metal Manufacturing.
  - 5. SEMCO Incorporated.
  - 6. Sheet Metal Connectors, Inc.
  - 7. Spiral Manufacturing Co. Inc.
  - 8. Stamped Fittings, Inc.
  - 9. Substitutions: Section 01 60 00 - Product Requirements.
- B. Flat-Oval Ducts: Indicated dimensions are the duct width (major dimension) and diameter of the round sides connecting the flat portions of the duct (minor dimension).
- C. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-1, "Round Duct Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
  - 1. Transverse Joints in Ducts Larger Than 60 Inches in Diameter: Flanged.
- D. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-2, "Round Duct Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
  - 1. Fabricate round ducts larger than 90 inches in diameter with butt-welded longitudinal seams.
  - 2. Fabricate flat-oval ducts larger than 72 inches in width (major dimension) with butt-welded longitudinal seams.
- E. Tees and Laterals: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

## 2.4 DOUBLE-WALL ROUND DUCTS AND FITTINGS

- A. Manufacturers:
  - 1. Linx Industries.
  - 2. McGill Airflow Corporation.

3. MKT Metal Manufacturing.
  4. SEMCO Incorporated.
  5. Sheet Metal Connectors, Inc.
  6. Substitutions: Section 01 60 00 - Product Requirements.
- B. Flat-Oval Ducts: Indicated dimensions are the duct width (major dimension) and diameter of the round sides connecting the flat portions of the duct (minor dimension) of the inner duct.
- C. Outer Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 3, "Round, Oval, and Flexible Duct," based on static-pressure class unless otherwise indicated.
1. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-1, "Round Duct Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
    - a. Transverse Joints in Ducts Larger Than 60 Inches in Diameter: Flanged.
  2. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-2, "Round Duct Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
    - a. Fabricate round ducts larger than 90 inches in diameter with butt-welded longitudinal seams.
    - b. Fabricate flat-oval ducts larger than 72 inches in width (major dimension) with butt-welded longitudinal seams.
  3. Tees and Laterals: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- D. Inner Duct: Minimum 0.028-inch solid sheet steel.
- E. Interstitial Insulation: Fibrous-glass liner complying with ASTM C 1071, NFPA 90A, or NFPA 90B; and with NAIMA AH124, "Fibrous Glass Duct Liner Standard."
1. Maximum Thermal Conductivity: 0.27 Btu x in./h x sq. ft. x deg F at 75 deg F mean temperature.
  2. Install spacers that position the inner duct at uniform distance from outer duct without compressing insulation.
  3. Coat insulation with antimicrobial coating.
  4. Cover insulation with polyester film complying with UL 181, Class 1.
- F. Interstitial Insulation: Flexible elastomeric duct liner complying with ASTM C 534, Type II for sheet materials, and with NFPA 90A or NFPA 90B.

1. Maximum Thermal Conductivity: 0.25 Btu x in./h x sq. ft. x deg F at 75 deg F mean temperature.

## 2.5 SHEET METAL MATERIALS

- A. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.
- B. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
  1. Galvanized Coating Designation: G60.
  2. Finishes for Surfaces Exposed to View: Mill phosphatized.
- C. Carbon-Steel Sheets: Comply with ASTM A 1008/A 1008M, with oiled, matte finish for exposed ducts.
- D. Stainless-Steel Sheets: Comply with ASTM A 480/A 480M, Type 304 or 316, as indicated in the "Duct Schedule" Article; cold rolled, annealed, sheet. Exposed surface finish shall be No. 2B, No. 2D, No. 3, or No. 4 as indicated in the "Duct Schedule" Article.
- E. Aluminum Sheets: Comply with ASTM B 209 Alloy 3003, H14 temper; with mill finish for concealed ducts, and standard, one-side bright finish for duct surfaces exposed to view.
- F. Factory- or Shop-Applied Antimicrobial Coating:
  1. Apply to the surface of sheet metal that will form the interior surface of the duct. An untreated clear coating shall be applied to the exterior surface.
  2. Antimicrobial compound shall be tested for efficacy by an NRTL and registered by the EPA for use in HVAC systems.
  3. Coating containing the antimicrobial compound shall have a hardness of 2H, minimum, when tested according to ASTM D 3363.
  4. Surface-Burning Characteristics: Maximum flame-spread index of 25 and maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.
  5. Shop-Applied Coating Color: Black.
  6. Antimicrobial coating on sheet metal is not required for duct containing liner treated with antimicrobial coating.
- G. Reinforcement Shapes and Plates: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
  1. Where black- and galvanized-steel shapes and plates are used to reinforce aluminum ducts, isolate the different metals with butyl rubber, neoprene, or EPDM gasket materials.
- H. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

## 2.6 DUCT LINER

- A. Fibrous-Glass Duct Liner: Comply with ASTM C 1071, NFPA 90A, or NFPA 90B; and with NAIMA AH124, "Fibrous Glass Duct Liner Standard."
- B. Manufacturers:
  - 1. CertainTeed Corporation.
  - 2. Johns Manville.
  - 3. Knauf Insulation.
  - 4. Owens Corning.
  - 5. Substitutions: Section 01 60 00 - Product Requirements.
    - a. Maximum Thermal Conductivity:
      - 1) Type I, Flexible: 0.27 Btu x in./h x sq. ft. x deg F at 75 deg F mean temperature.
      - 2) Type II, Rigid: 0.23 Btu x in./h x sq. ft. x deg F at 75 deg F mean temperature.
  - 6. Antimicrobial Erosion-Resistant Coating: Apply to the surface of the liner that will form the interior surface of the duct to act as a moisture repellent and erosion-resistant coating. Antimicrobial compound shall be tested for efficacy by an NRTL and registered by the EPA for use in HVAC systems.
  - 7. Water-Based Liner Adhesive: Comply with NFPA 90A or NFPA 90B and with ASTM C 916.
- C. Flexible Elastomeric Duct Liner: Preformed, cellular, closed-cell, sheet materials complying with ASTM C 534, Type II, Grade 1; and with NFPA 90A or NFPA 90B.
- D. Manufacturers:
  - 1. Aeroflex USA, Inc.
  - 2. Armacell LLC.
  - 3. Rubatex International, LLC.
  - 4. Substitutions: Section 01 60 00 - Product Requirements.
  - 5. Surface-Burning Characteristics: Maximum flame-spread index of 25 and maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.
  - 6. Liner Adhesive: As recommended by insulation manufacturer and complying with NFPA 90A or NFPA 90B.
- E. Natural-Fiber Duct Liner: 85 percent cotton, 10 percent borate, and 5 percent polybinding fibers, treated with a microbial growth inhibitor and complying with NFPA 90A or NFPA 90B.
- F. Manufacturers:
  - 1. Bonded Logic, Inc.
  - 2. Reflectix, Inc.
  - 3. Substitutions: Section 01 60 00 - Product Requirements.
  - 4. Maximum Thermal Conductivity: 0.24 Btu x in./h x sq. ft. x deg F at 75 deg F mean temperature when tested according to ASTM C 518.
  - 5. Surface-Burning Characteristics: Maximum flame-spread index of 25 and maximum smoke-developed index of 50 when tested according to ASTM E 84; certified by an NRTL.

6. Liner Adhesive: As recommended by insulation manufacturer and complying with NFPA 90A or NFPA 90B.

G. Insulation Pins and Washers:

1. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.106-inch-diameter shank, length to suit depth of insulation indicated with integral 1-1/2-inch galvanized carbon-steel washer.
2. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch-thick stainless steel; with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.

H. Shop Application of Duct Liner: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 7-11, "Flexible Duct Liner Installation."

1. Adhere a single layer of indicated thickness of duct liner with at least 90 percent adhesive coverage at liner contact surface area. Attaining indicated thickness with multiple layers of duct liner is prohibited.
2. Apply adhesive to transverse edges of liner facing upstream that do not receive metal nosing.
3. Butt transverse joints without gaps, and coat joint with adhesive.
4. Fold and compress liner in corners of rectangular ducts or cut and fit to ensure butted-edge overlapping.
5. Do not apply liner in rectangular ducts with longitudinal joints, except at corners of ducts, unless duct size and dimensions of standard liner make longitudinal joints necessary.
6. Secure liner with mechanical fasteners 4 inches from corners and at intervals not exceeding 12 inches transversely; at 3 inches from transverse joints and at intervals not exceeding 18 inches longitudinally.
7. Secure transversely oriented liner edges facing the airstream with metal nosings that have either channel or "Z" profiles or are integrally formed from duct wall. Fabricate edge facings at the following locations:
  - a. Fan discharges.
  - b. Intervals of lined duct preceding unlined duct.
8. Secure insulation between perforated sheet metal inner duct of same thickness as specified for outer shell. Use mechanical fasteners that maintain inner duct at uniform distance from outer shell without compressing insulation.
  - a. Sheet Metal Inner Duct Perforations: 3/32-inch diameter, with an overall open area of 23 percent.
9. Terminate inner ducts with buildouts attached to fire-damper sleeves, dampers, turning vane assemblies, or other devices. Fabricated buildouts (metal hat sections) or other buildout means are optional; when used, secure buildouts to duct walls with bolts, screws, rivets, or welds.



## 2.7 SEALANT AND GASKETS

- A. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets shall be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.
- B. Two-Part Tape Sealing System:
  - 1. Tape: Woven cotton fiber impregnated with mineral gypsum and modified acrylic/silicone activator to react exothermically with tape to form hard, durable, airtight seal.
  - 2. Tape Width: 3 inches.
  - 3. Sealant: Modified styrene acrylic.
  - 4. Water resistant.
  - 5. Mold and mildew resistant.
  - 6. Maximum Static-Pressure Class: 10-inch wg, positive and negative.
  - 7. Service: Indoor and outdoor.
  - 8. Service Temperature: Minus 40 to plus 200 deg F.
  - 9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum.
- C. Water-Based Joint and Seam Sealant:
  - 1. Application Method: Brush on.
  - 2. Solids Content: Minimum 65 percent.
  - 3. Shore A Hardness: Minimum 20.
  - 4. Water resistant.
  - 5. Mold and mildew resistant.
  - 6. VOC: Maximum 75 g/L (less water).
  - 7. Maximum Static-Pressure Class: 10-inch wg, positive and negative.
  - 8. Service: Indoor or outdoor.
  - 9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.
- D. Flanged Joint Sealant: Comply with ASTM C 920.
  - 1. General: Single-component, acid-curing, silicone, elastomeric.
  - 2. Type: S.
  - 3. Grade: NS.
  - 4. Class: 25.
  - 5. Use: O.
- E. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.
- F. Round Duct Joint O-Ring Seals:
  - 1. Seal shall provide maximum leakage class of 3 cfm/100 sq. ft. at 1-inch wg and shall be rated for 10-inch wg static-pressure class, positive or negative.
  - 2. EPDM O-ring to seal in concave bead in coupling or fitting spigot.
  - 3. Double-lipped, EPDM O-ring seal, mechanically fastened to factory-fabricated couplings and fitting spigots.

## 2.8 HANGERS AND SUPPORTS

- A. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.
- B. Hanger Rods for Corrosive Environments: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.
- C. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct."
- D. Steel Cables for Galvanized-Steel Ducts: Galvanized steel complying with ASTM A 603.
- E. Steel Cables for Stainless-Steel Ducts: Stainless steel complying with ASTM A 492.
- F. Steel Cable End Connections: Cadmium-plated steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.
- G. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.
- H. Trapeze and Riser Supports:
  - 1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.
  - 2. Supports for Stainless-Steel Ducts: Stainless-steel shapes and plates.
  - 3. Supports for Aluminum Ducts: Aluminum or galvanized steel coated with zinc chromate.

## 2.9 SEISMIC-RESTRAINT DEVICES

- A. Manufacturers:
  - 1. B-line
  - 2. Ductmate Industries, Inc.
  - 3. Hilti, Inc.
  - 4. Kinetics Noise Control, Inc.
  - 5. Mason Industries, Inc.
  - 6. TOLCO
  - 7. Unistrut
  - 8. Vibrationa & Seismic Technologies, LLC
  - 9. Substitutions: Section 01 60 00 - Product Requirements.
- B. General Requirements for Restraint Components: Rated strengths, features, and applications shall be as defined in reports by a professional engineer in an agency acceptable to authorities having jurisdiction.
  - 1. Structural Safety Factor: Allowable strength in tension, shear, and pullout force of components shall be at least four times the maximum seismic forces to which they will be subjected.
- C. Channel Support System: Shop- or field-fabricated support assembly made of slotted steel channels rated in tension, compression, and torsion forces and with accessories for attachment

to braced component at one end and to building structure at the other end. Include matching components and corrosion-resistant coating.

- D. Restraint Cables: ASTM A 492, stainless-steel cables with end connections made of cadmium-plated steel assemblies with brackets, swivel, and bolts designed for restraining cable service; and with an automatic-locking and clamping device or double-cable clips.
- E. Hanger Rod Stiffener: Steel tube or steel slotted-support-system sleeve with internally bolted connections to hanger rod.
- F. Mechanical Anchor Bolts: Drilled-in and stud-wedge or female-wedge type. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488.

## PART 3 - EXECUTION

### 3.1 DUCT INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and Coordination Drawings.
- B. Install ducts according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.
- C. Install round ducts in maximum practical lengths.
- D. Install ducts with fewest possible joints.
- E. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.
- F. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.
- G. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.
- H. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures.
- I. Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges of same metal thickness as the duct. Overlap openings on four sides by at least 1-1/2 inches.
- J. Where ducts pass through fire-rated interior partitions and exterior walls, install fire dampers. Comply with requirements in Section 233300 "Air Duct Accessories" for fire and smoke dampers.

- K. Protect duct interiors from moisture, construction debris and dust, and other foreign materials. Comply with SMACNA's "IAQ Guidelines for Occupied Buildings Under Construction," Appendix G, "Duct Cleanliness for New Construction Guidelines."

### 3.2 INSTALLATION OF EXPOSED DUCTWORK

- A. Protect ducts exposed in finished spaces from being dented, scratched, or damaged.
- B. Trim duct sealants flush with metal. Create a smooth and uniform exposed bead. Do not use two-part tape sealing system.
- C. Grind welds to provide smooth surface free of burrs, sharp edges, and weld splatter. When welding stainless steel with a No. 3 or 4 finish, grind the welds flush, polish the exposed welds, and treat the welds to remove discoloration caused by welding.
- D. Maintain consistency, symmetry, and uniformity in the arrangement and fabrication of fittings, hangers and supports, duct accessories, and air outlets.
- E. Repair or replace damaged sections and finished work that does not comply with these requirements.

### 3.3 DUCT SEALING

- A. Seal ducts for duct static-pressure, seal classes, and leakage classes specified in "Duct Schedule" Article according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- B. Seal ducts to the following seal classes according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible":
  - 1. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
  - 2. Outdoor, Supply-Air Ducts: Seal Class A.
  - 3. Outdoor, Exhaust Ducts: Seal Class C.
  - 4. Outdoor, Return-Air Ducts: Seal Class C.
  - 5. Unconditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg and Lower: Seal Class B.
  - 6. Unconditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg Seal Class A.
  - 7. Unconditioned Space, Exhaust Ducts: Seal Class C.
  - 8. Unconditioned Space, Return-Air Ducts: Seal Class B.
  - 9. Conditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg and Lower: Seal Class C.
  - 10. Conditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg: Seal Class B.
  - 11. Conditioned Space, Exhaust Ducts: Seal Class B.
  - 12. Conditioned Space, Return-Air Ducts: Seal Class C.

### 3.4 HANGER AND SUPPORT INSTALLATION

- A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 5, "Hangers and Supports."
- B. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.
  - 1. Where practical, install concrete inserts before placing concrete.
  - 2. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
  - 3. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick.
  - 4. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.
  - 5. Do not use powder-actuated concrete fasteners for seismic restraints.
- C. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches of each elbow and within 48 inches of each branch intersection.
- D. Hangers Exposed to View: Threaded rod and angle or channel supports.
- E. Support vertical ducts with steel angles or channel secured to the sides of the duct with welds, bolts, sheet metal screws, or blind rivets; support at each floor and at a maximum intervals of 16 feet.
- F. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

### 3.5 SEISMIC-RESTRAINT-DEVICE INSTALLATION

- A. Install ducts with hangers and braces designed to support the duct and to restrain against seismic forces required by applicable building codes. Comply with SMACNA's "Seismic Restraint Manual: Guidelines for Mechanical Systems."
  - 1. Space lateral supports a maximum of 40 feet o.c., and longitudinal supports a maximum of 80 feet o.c.
  - 2. Brace a change of direction longer than 12 feet.
- B. Select seismic-restraint devices with capacities adequate to carry present and future static and seismic loads.
- C. Install cables so they do not bend across edges of adjacent equipment or building structure.
- D. Install cable restraints on ducts that are suspended with vibration isolators.
- E. Install seismic-restraint devices using methods approved by a professional engineer in an agency acceptable to authorities having jurisdiction].

- F. Attachment to Structure: If specific attachment is not indicated, anchor bracing and restraints to structure, to flanges of beams, to upper truss chords of bar joists, or to concrete members.
- G. Drilling for and Setting Anchors:
  - 1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcement or embedded items during drilling. Notify the Architect if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.
  - 2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
  - 3. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
  - 4. Set anchors to manufacturer's recommended torque, using a torque wrench.
  - 5. Install zinc-coated steel anchors for interior applications and stainless-steel anchors for applications exposed to weather.

### 3.6 CONNECTIONS

- A. Make connections to equipment with flexible connectors complying with Section 233300 "Air Duct Accessories."
- B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

### 3.7 PAINTING

- A. Paint interior of metal ducts that are visible through registers and grilles and that do not have duct liner. Apply one coat of flat, black, latex paint over a compatible galvanized-steel primer. Paint materials and application requirements are specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

### 3.8 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Leakage Tests:
  - 1. Comply with SMACNA's "HVAC Air Duct Leakage Test Manual." Submit a test report for each test.
  - 2. Test the following systems:
    - a. Supply Ducts with a Pressure Class of 2-Inch wg or Higher: Test representative duct sections, selected by Architect from sections installed, totaling no less than 50 percent of total installed duct area for each designated pressure class.

- b. Return Ducts with a Pressure Class of 2-Inch wg or Higher: Test representative duct sections, selected by Architect from sections installed, totaling no less than 50 percent of total installed duct area for each designated pressure class.
    - c. Exhaust Ducts with a Pressure Class of 2-Inch wg or Higher: Test representative duct sections, selected by Architect from sections installed, totaling no less than 50 percent of total installed duct area for each designated pressure class.
    - d. Outdoor Air Ducts with a Pressure Class of 2-Inch wg or Higher: Test representative duct sections, selected by Architect from sections installed, totaling no less than 50 percent of total installed duct area for each designated pressure class.
  - 3. Disassemble, reassemble, and seal segments of systems to accommodate leakage testing and for compliance with test requirements.
  - 4. Test for leaks before applying external insulation.
  - 5. Conduct tests at static pressures equal to maximum design pressure of system or section being tested. If static-pressure classes are not indicated, test system at maximum system design pressure. Do not pressurize systems above maximum design operating pressure.
  - 6. Give seven days' advance notice for testing.
- C. Duct system will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

### 3.9 DUCT CLEANING

- A. Clean new and existing duct system(s) before testing, adjusting, and balancing.
- B. Use service openings for entry and inspection.
  - 1. Create new openings and install access panels appropriate for duct static-pressure class if required for cleaning access. Provide insulated panels for insulated or lined duct. Patch insulation and liner as recommended by duct liner manufacturer. Comply with Section 233300 "Air Duct Accessories" for access panels and doors.
  - 2. Disconnect and reconnect flexible ducts as needed for cleaning and inspection.
  - 3. Remove and reinstall ceiling to gain access during the cleaning process.
- C. Particulate Collection and Odor Control:
  - 1. When venting vacuuming system inside the building, use HEPA filtration with 99.97 percent collection efficiency for 0.3-micron-size (or larger) particles.
  - 2. When venting vacuuming system to outdoors, use filter to collect debris removed from HVAC system, and locate exhaust downwind and away from air intakes and other points of entry into building.
- D. Clean the following components by removing surface contaminants and deposits:
  - 1. Air outlets and inlets (registers, grilles, and diffusers).
  - 2. Supply, return, and exhaust fans including fan housings, plenums (except ceiling supply and return plenums), scrolls, blades or vanes, shafts, baffles, dampers, and drive assemblies.

3. Air-handling unit internal surfaces and components including mixing box, coil section, air wash systems, spray eliminators, condensate drain pans, humidifiers and dehumidifiers, filters and filter sections, and condensate collectors and drains.
4. Coils and related components.
5. Return-air ducts, dampers, actuators, and turning vanes except in ceiling plenums and mechanical equipment rooms.
6. Supply-air ducts, dampers, actuators, and turning vanes.
7. Dedicated exhaust and ventilation components and makeup air systems.

E. Mechanical Cleaning Methodology:

1. Clean metal duct systems using mechanical cleaning methods that extract contaminants from within duct systems and remove contaminants from building.
2. Use vacuum-collection devices that are operated continuously during cleaning. Connect vacuum device to downstream end of duct sections so areas being cleaned are under negative pressure.
3. Use mechanical agitation to dislodge debris adhered to interior duct surfaces without damaging integrity of metal ducts, duct liner, or duct accessories.
4. Clean fibrous-glass duct liner with HEPA vacuuming equipment; do not permit duct liner to get wet. Replace fibrous-glass duct liner that is damaged, deteriorated, or delaminated or that has friable material, mold, or fungus growth.
5. Clean coils and coil drain pans according to NADCA 1992. Keep drain pan operational. Rinse coils with clean water to remove latent residues and cleaning materials; comb and straighten fins.
6. Provide drainage and cleanup for wash-down procedures.
7. Antimicrobial Agents and Coatings: Apply EPA-registered antimicrobial agents if fungus is present. Apply antimicrobial agents according to manufacturer's written instructions after removal of surface deposits and debris.

### 3.10 START UP

- A. Air Balance: Comply with requirements in Section 230593 "Testing, Adjusting, and Balancing for HVAC."

### 3.11 DUCT SCHEDULE

- A. Fabricate ducts with galvanized sheet steel except as otherwise indicated and as follows:

B. Supply Ducts:

1. Ducts Connected to Fan Coil Units, Furnaces, Heat Pumps, and Terminal Units:
  - a. Pressure Class: Positive 1-inch wg.
  - b. Minimum SMACNA Seal Class: B.
  - c. SMACNA Leakage Class for Rectangular: 12.
  - d. SMACNA Leakage Class for Round and Flat Oval: 12.
2. Ducts Connected to Constant-Volume Air-Handling Units



- a. Pressure Class: Positive 2-inch wg.
- b. Minimum SMACNA Seal Class: A.
- c. SMACNA Leakage Class for Rectangular: 6.
- d. SMACNA Leakage Class for Round and Flat Oval: 6.

C. Return Ducts:

1. Ducts Connected to Fan Coil Units, Furnaces, Heat Pumps, and Terminal Units:

- a. Pressure Class: Positive or negative 1-inch wg.
- b. Minimum SMACNA Seal Class: B.
- c. SMACNA Leakage Class for Rectangular: 12.
- d. SMACNA Leakage Class for Round and Flat Oval: 12.

2. Ducts Connected to Air-Handling Units:

- a. Pressure Class: Positive or negative 2-inch wg.
- b. Minimum SMACNA Seal Class: A.
- c. SMACNA Leakage Class for Rectangular: 6.
- d. SMACNA Leakage Class for Round and Flat Oval: 6.

D. Exhaust Ducts:

1. Ducts Connected to Fans Exhausting (ASHRAE 62.1, Class 1 and 2) Air:

- a. Pressure Class: Negative 2-inch wg.
- b. Minimum SMACNA Seal Class: A if negative pressure, and A if positive pressure.
- c. SMACNA Leakage Class for Rectangular: 12.
- d. SMACNA Leakage Class for Round and Flat Oval: 6.

2. Ducts Connected to Air-Handling Units:

- a. Pressure Class: Positive or negative 2-inch wg.
- b. Minimum SMACNA Seal Class: A if negative pressure, and A if positive pressure.
- c. SMACNA Leakage Class for Rectangular: 6.
- d. SMACNA Leakage Class for Round and Flat Oval: 6.

E. Outdoor-Air (Not Filtered, Heated, or Cooled) Ducts:

1. Ducts Connected to Fan Coil Units, Furnaces, Heat Pumps, and Terminal Units:

- a. Pressure Class: Positive or negative 1-inch wg.
- b. Minimum SMACNA Seal Class: B.
- c. SMACNA Leakage Class for Rectangular: 12.
- d. SMACNA Leakage Class for Round and Flat Oval: 12.

2. Ducts Connected to Air-Handling Units:

- a. Pressure Class: Positive or negative 2-inch wg.
- b. Minimum SMACNA Seal Class: A.
- c. SMACNA Leakage Class for Rectangular: 6.

d. SMACNA Leakage Class for Round and Flat Oval: 6.

F. Intermediate Reinforcement:

1. Galvanized-Steel Ducts: Galvanized steel.
2. PVC-Coated Ducts:
  - a. Exposed to Airstream: Match duct material.
  - b. Not Exposed to Airstream: Galvanized.
3. Stainless-Steel Ducts:
  - a. Exposed to Airstream: Match duct material.
  - b. Not Exposed to Airstream: Galvanized.
4. Aluminum Ducts: Aluminum.

G. Liner:

1. Supply Air Ducts: Fibrous glass, Type I: 1-1/2 inch thick or Flexible elastomeric: 1 inch thick.
2. Return Air Ducts: Fibrous glass, Type I: 1-1/2 inch thick or Flexible elastomeric: 1 inch thick.
3. Exhaust Air Ducts: Fibrous glass, Type I: 1 inch thick or Flexible elastomeric: 1 inch thick.
4. Transfer Ducts: Fibrous glass, Type I: 1-1/2 inch thick or Flexible elastomeric: 1 inch thick.

H. Double-Wall Duct Interstitial Insulation:

1. Supply Air Ducts: 1 inch thick.
2. Return Air Ducts: 1 inch thick.
3. Exhaust Air Ducts: 1 inch thick.

I. Elbow Configuration:

1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-2, "Rectangular Elbows."
  - a. Velocity 1000 fpm or Lower:
    - 1) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."
  - b. Velocity 1000 to 1500 fpm:
    - 1) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."
  - c. Velocity 1500 fpm or Higher:

- 1) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."
2. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-2, "Rectangular Elbows."
  - a. Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."
3. Round Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-4, "Round Duct Elbows."
  - a. Minimum Radius-to-Diameter Ratio and Elbow Segments: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 3-1, "Mitered Elbows." Elbows with less than 90-degree change of direction have proportionately fewer segments.
    - 1) Velocity 1000 fpm or Lower: 0.5 radius-to-diameter ratio and three segments for 90-degree elbow.
    - 2) Velocity 1000 to 1500 fpm: 1.0 radius-to-diameter ratio and four segments for 90-degree elbow.
    - 3) Velocity 1500 fpm or Higher: 1.5 radius-to-diameter ratio and five segments for 90-degree elbow.
  - b. Round Elbows, 12 Inches and Smaller in Diameter: Stamped or pleated.
  - c. Round Elbows, 14 Inches and Larger in Diameter: Standing seam.

J. Branch Configuration:

1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-6, "Branch Connection."
  - a. Rectangular Main to Rectangular Branch: 45-degree entry.
  - b. Rectangular Main to Round Branch: Spin in.
2. Round and Flat Oval: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees." Saddle taps are permitted in existing duct.
  - a. Velocity 1000 fpm or Lower: 90-degree tap.
  - b. Velocity 1000 to 1500 fpm: Conical tap.
  - c. Velocity 1500 fpm or Higher: 45-degree lateral.

END OF SECTION

## SECTION 233300 - AIR DUCT ACCESSORIES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:

1. Backdraft and pressure relief dampers.
2. Barometric relief dampers.
3. Manual volume dampers.
4. Control dampers.
5. Smoke dampers.
6. Flange connectors.
7. Duct silencers.
8. Turning vanes.
9. Remote damper operators.
10. Duct-mounted access doors.
11. Flexible connectors.
12. Duct accessory hardware.

- B. Related Requirements:

1. Section 233113 "Metal Ducts" for insulated metal ducts.

#### 1.3 ACTION SUBMITTALS

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

1. For duct silencers, include pressure drop and dynamic insertion loss data. Include breakout noise calculations for high transmission loss casings.

- B. Shop Drawings: For duct accessories. Include plans, elevations, sections, details and attachments to other work.

1. Detail duct accessories fabrication and installation in ducts and other construction. Include dimensions, weights, loads, and required clearances; and method of field assembly into duct systems and other construction. Include the following:
  - a. Special fittings.
  - b. Manual volume damper installations.
  - c. Control-damper installations.

- d. Fire-damper, smoke-damper, combination fire- and smoke-damper, ceiling, and corridor damper installations, including sleeves; and duct-mounted access doors and remote damper operators.
- e. Duct security bars.
- f. Wiring Diagrams: For power, signal, and control wiring.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which ceiling-mounted access panels and access doors required for access to duct accessories are shown and coordinated with each other, using input from Installers of the items involved.
- B. Source quality-control reports.

#### 1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For air duct accessories to include in operation and maintenance manuals.

#### 1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Fusible Links: Furnish quantity equal to 10 percent of amount installed.

### PART 2 - PRODUCTS

#### 2.1 ASSEMBLY DESCRIPTION

- A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."
- B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

#### 2.2 MATERIALS

- A. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
  - 1. Galvanized Coating Designation: G60.
  - 2. Exposed-Surface Finish: Mill phosphatized.

- B. Stainless-Steel Sheets: Comply with ASTM A 480/A 480M, Type 304, and having a No. 2 finish for concealed ducts and No. 2 finish for exposed ducts.
- C. Aluminum Sheets: Comply with ASTM B 209, Alloy 3003, Temper H14; with mill finish for concealed ducts and standard, 1-side bright finish for exposed ducts.
- D. Extruded Aluminum: Comply with ASTM B 221, Alloy 6063, Temper T6.
- E. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.
- F. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

## 2.3 BACKDRAFT AND PRESSURE RELIEF DAMPERS

- A. Description: Gravity balanced.
- B. Maximum Air Velocity: 1250 fpm.
- C. Maximum System Pressure: 2-inch wg.
- D. Frame: Hat-shaped, 0.05-inch-thick, galvanized sheet steel, 0.094-inch-thick, galvanized sheet steel, 0.063-inch-thick extruded aluminum, 0.03-inch-thick stainless steel, or 0.05-inch-thick stainless steel, with welded corners or mechanically attached and mounting flange.
- E. Blades: Multiple single-piece blades, maximum 6-inch width, 0.025-inch-thick, roll-formed aluminum or 0.050-inch-thick aluminum sheet with sealed edges.
- F. Blade Action: Parallel.
- G. Blade Seals: Neoprene, mechanically locked.
- H. Blade Axles:
  - 1. Material: Galvanized steel, Stainless steel or Aluminum].
  - 2. Diameter: 0.20 inch.
- I. Tie Bars and Brackets: Aluminum or Galvanized steel.
- J. Return Spring: Adjustable tension.
- K. Bearings: Steel ball or synthetic pivot bushings.
- L. Accessories:
  - 1. Adjustment device to permit setting for varying differential static pressure.
  - 2. Counterweights and spring-assist kits for vertical airflow installations.
  - 3. Electric actuators.
  - 4. Chain pulls.
  - 5. Screen Mounting: Front mounted in sleeve.

- a. Sleeve Thickness: 20 gage minimum.
- b. Sleeve Length: 6 inches minimum.
- 6. Screen Mounting: Rear mounted.
- 7. Screen Material: Galvanized steel or Aluminum.
- 8. Screen Type: Bird and Insect.
- 9. 90-degree stops.

## 2.4 BAROMETRIC RELIEF DAMPERS

- A. Suitable for horizontal or vertical mounting.
- B. Maximum Air Velocity: 1250 fpm.
- C. Maximum System Pressure: 2-inch wg.
- D. Frame: Hat-shaped, 0.05-inch-thick, galvanized sheet steel, 0.094-inch-thick, galvanized sheet steel, 0.063-inch-thick extruded aluminum, 0.03-inch-thick stainless steel, or 0.05-inch-thick stainless steel, with welded corners or mechanically attached and mounting flange.
- E. Blades: Multiple single-piece blades, maximum 6-inch width, 0.025-inch-thick, roll-formed aluminum or 0.050-inch-thick aluminum sheet with sealed edges.
- F. Blade Action: Parallel.
- G. Blade Seals: Neoprene, mechanically locked.
- H. Blade Axles:
  - 1. Material: Galvanized steel, Stainless steel or Aluminum].
  - 2. Diameter: 0.20 inch.
- I. Tie Bars and Brackets: Aluminum or Galvanized steel.
- J. Return Spring: Adjustable tension.
- K. Bearings: Steel ball or synthetic pivot bushings.
- L. Accessories:
  - 1. Flange on intake.
  - 2. Adjustment device to permit setting for varying differential static pressures.

## 2.5 MANUAL VOLUME DAMPERS

- A. Standard, Steel, Manual Volume Dampers:
  - 1. Standard leakage rating, with linkage outside airstream.
  - 2. Suitable for horizontal or vertical applications.
  - 3. Frames:

- a. Frame: Hat-shaped, 0.094-inch-thick, galvanized sheet steel or 0.05-inch-thick stainless steel.
    - b. Mitered and welded corners.
    - c. Flanges for attaching to walls and flangeless frames for installing in ducts.
  - 4. Blades:
    - a. Multiple or single blade.
    - b. Parallel- or opposed-blade design.
    - c. Stiffen damper blades for stability.
    - d. Galvanized or Stainless-steel, 0.064 inch thick.
  - 5. Blade Axles: Galvanized steel or Stainless steel Nonferrous metal.
  - 6. Bearings:
    - a. Stainless-steel sleeve.
    - b. Dampers in ducts with pressure classes of 3-inch wg or less shall have axles full length of damper blades and bearings at both ends of operating shaft.
  - 7. Tie Bars and Brackets: Galvanized steel.
- B. Standard, Aluminum, Manual Volume Dampers:
- 1. Standard leakage rating, with linkage outside airstream.
  - 2. Suitable for horizontal or vertical applications.
  - 3. Frames: Hat-shaped, 0.10-inch-thick, aluminum sheet channels; frames with flanges for attaching to walls and flangeless frames for installing in ducts.
  - 4. Blades:
    - a. Multiple or single blade.
    - b. Parallel- or opposed-blade design.
    - c. Stiffen damper blades for stability.
    - d. Roll-Formed Aluminum Blades: 0.10-inch-thick aluminum sheet.
    - e. Extruded-Aluminum Blades: 0.050-inch-thick extruded aluminum.
  - 5. Blade Axles: Galvanized steel or Stainless steel.
  - 6. Bearings:
    - a. Stainless-steel sleeve.
    - b. Dampers in ducts with pressure classes of 3-inch wg or less shall have axles full length of damper blades and bearings at both ends of operating shaft.
  - 7. Tie Bars and Brackets: Aluminum.
- C. Low-Leakage, Steel, Manual Volume Dampers:
- 1. Comply with AMCA 500-D testing for damper rating.
  - 2. Low-leakage rating, with linkage outside airstream, and bearing AMCA's Certified Ratings Seal for both air performance and air leakage.
  - 3. Suitable for horizontal or vertical applications.
  - 4. Frames:
    - a. Hat shaped.



- b. 0.094-inch-thick, galvanized sheet steel or 0.05-inch-thick stainless steel.
    - c. Mitered and welded corners.
    - d. Flanges for attaching to walls and flangeless frames for installing in ducts.
  - 5. Blades:
    - a. Multiple or single blade.
    - b. Parallel- or opposed-blade design.
    - c. Stiffen damper blades for stability.
    - d. Galvanized or Stainless, roll-formed steel, 0.064 inch thick.
  - 6. Blade Axles: Galvanized steel or Stainless steel.
  - 7. Bearings:
    - a. Stainless-steel sleeve.
    - b. Dampers in ducts with pressure classes of 3-inch wg or less shall have axles full length of damper blades and bearings at both ends of operating shaft.
  - 8. Blade Seals: Neoprene.
  - 9. Jamb Seals: Cambered stainless steel or aluminum.
  - 10. Tie Bars and Brackets: Galvanized steel or Aluminum.
  - 11. Accessories:
    - a. Include locking device to hold single-blade dampers in a fixed position without vibration.
- D. Low-Leakage, Aluminum, Manual Volume Dampers:
- 1. Comply with AMCA 500-D testing for damper rating.
  - 2. Low-leakage rating, with linkage outside airstream, and bearing AMCA's Certified Ratings Seal for both air performance and air leakage.
  - 3. Suitable for horizontal or vertical applications.
  - 4. Frames: Hat-shaped, 0.10-inch-thick, aluminum sheet channels; frames with flanges for attaching to walls and flangeless frames for installing in ducts.
  - 5. Blades:
    - a. Multiple or single blade.
    - b. Parallel- or opposed-blade design.
    - c. Roll-Formed Aluminum Blades: 0.10-inch-thick aluminum sheet.
    - d. Extruded-Aluminum Blades: 0.050-inch-thick extruded aluminum.
  - 6. Blade Axles: Galvanized steel or Stainless steel.
  - 7. Bearings:
    - a. Stainless-steel sleeve.
    - b. Dampers in ducts with pressure classes of 3-inch wg or less shall have axles full length of damper blades and bearings at both ends of operating shaft.
  - 8. Blade Seals: Neoprene.
  - 9. Jamb Seals: Cambered Stainless Steel or Aluminum.
  - 10. Tie Bars and Brackets: Galvanized steel or Aluminum.
  - 11. Accessories:

- a. Include locking device to hold single-blade dampers in a fixed position without vibration.

E. Jackshaft:

1. Size: 1-inch diameter.
2. Material: Galvanized-steel pipe rotating within pipe-bearing assembly mounted on supports at each mullion and at each end of multiple-damper assemblies.
3. Length and Number of Mountings: As required to connect linkage of each damper in multiple-damper assembly.

F. Damper Hardware:

1. Zinc-plated, die-cast core with dial and handle made of 3/32-inch-thick zinc-plated steel, and a 3/4-inch hexagon locking nut.
2. Include center hole to suit damper operating-rod size.
3. Include elevated platform for insulated duct mounting.

## 2.6 CONTROL DAMPERS

A. Manufacturers

1. American Warming and Ventilating.
2. Arrow United Industries.
3. Cesco Products.
4. Flex-Tek Group.
5. Greenheck Fan Corporation.
6. Lloyd Industries.
7. McGill AirFlow LLC.
8. Metal Form Manufacturing, Inc.
9. Nailor Industries.
10. NCA Manufacturing, Inc.
11. Pottorff.
12. Ruskin Company.
13. Vent Products Co., Inc
14. Substitutions: Section 01 60 00 - Product Requirements.

B. Low-leakage rating, with linkage outside airstream, and bearing AMCA's Certified Ratings Seal for both air performance and air leakage.

C. Frames:

1. Hat shaped.
2. 0.094-inch- thick, galvanized sheet steel or 0.05-inch-thick stainless steel.
3. Mitered and welded corners.

D. Blades:

1. Multiple blade with maximum blade width of 6 inches.
2. Opposed-blade design.
3. Galvanized-steel, Stainless steel or Aluminum.

4. 0.064 inch thick single skin or 0.0747-inch-thick dual skin.
  5. Blade Edging: Inflatable seal blade edging, or replaceable rubber seals.
- E. Blade Axles: 1/2-inch-diameter; galvanized steel or stainless steel; blade-linkage hardware of zinc-plated steel and brass; ends sealed against blade bearings.
1. Operating Temperature Range: From minus 40 to plus 200 deg F.
- F. Bearings:
1. Stainless-steel sleeve.
  2. Dampers in ducts with pressure classes of 3-inch wg or less shall have axles full length of damper blades and bearings at both ends of operating shaft.
  3. Thrust bearings at each end of every blade.

## 2.7 SMOKE DAMPERS

- A. Manufacturers
1. Aire Technologies.
  2. American Warming and Ventilating.
  3. Cesco Products.
  4. Greenheck Fan Corporation.
  5. Nailor Industries.
  6. Pottorff.
  7. Ruskin Company.
  8. Substitutions: Section 01 60 00 - Product Requirements.
- B. General Requirements: Label according to UL 555S by an NRTL.
- C. Smoke Detector: Integral, factory wired for single-point connection.
- D. Frame: Hat-shaped, 0.094-inch-thick, galvanized sheet steel, with interlocking, gusseted or mechanically attached corners and mounting flange.
- E. Blades: Roll-formed, horizontal, interlocking or overlapping, 0.034-inch-thick, galvanized sheet steel.
- F. Leakage: Class I.
- G. Rated pressure and velocity to exceed design airflow conditions.
- H. Mounting Sleeve: Factory-installed, 0.039-inch-thick, galvanized sheet steel; length to suit wall or floor application with factory-furnished silicone caulking.
- I. Damper Motors: Modulating or two-position action.
- J. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Section 230513 "Common Motor Requirements for HVAC Equipment."

1. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
2. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in Section 230923 "Direct Digital Control (DDC) System for HVAC."
3. Permanent-Split-Capacitor or Shaded-Pole Motors: With oil-immersed and sealed gear trains.
4. Spring-Return Motors: Equip with an integral spiral-spring mechanism where indicated. Enclose entire spring mechanism in a removable housing designed for service or adjustments. Size for running torque rating of 150 in. x lbf and breakaway torque rating of 150 in. x lbf.
5. Outdoor Motors and Motors in Outdoor-Air Intakes: Equip with O-ring gaskets designed to make motors weatherproof. Equip motors with internal heaters to permit normal operation at minus 40 deg F.
6. Nonspring-Return Motors: For dampers larger than 25 sq. ft., size motor for running torque rating of 150 in. x lbf and breakaway torque rating of 300 in. x lbf.
7. Electrical Connection: 115 V, single phase, 60 Hz.

K. Accessories:

1. Auxiliary switches for fan control or position indication.
2. Test and reset switches damper mounted.

## 2.8 FLANGE CONNECTORS

A. Manufacturers

1. CL Ward & Family Inc.
2. Ductmate Industries, Inc.
3. Hardcast, Inc.
4. Nexus PDQ
5. Ward Industries
6. Substitutions: Section 01 60 00 - Product Requirements.

B. Description: Add-on or roll-formed, factory-fabricated, slide-on transverse flange connectors, gaskets, and components.

C. Material: Galvanized steel.

D. Gage and Shape: Match connecting ductwork.

## 2.9 DUCT SILENCERS

A. Manufacturers

1. Dynasonics
2. Flex-Tek Group
3. Industrial Noise Controlm Inc.
4. McGill Airflow LLC
5. Ruskin Company
6. Vibro-acoustics

7. Substitutions: Section 01 60 00 - Product Requirements.

B. General Requirements:

1. Factory fabricated.
2. Fire-Performance Characteristics: Adhesives, sealants, packing materials, and accessory materials shall have flame-spread index not exceeding 25 and smoke-developed index not exceeding 50 when tested according to ASTM E 84.
3. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

C. Shape:

1. Rectangular straight with splitters or baffles.
2. Round straight with center bodies or pods.
3. Rectangular elbow with splitters or baffles.
4. Round elbow with center bodies or pods.
5. Rectangular transitional with splitters or baffles.

D. Rectangular Silencer Outer Casing: ASTM A 653/A 653M, G90, galvanized sheet steel, 0.034 inch thick.

E. Round Silencer Outer Casing: ASTM A 653/A 653M, G90, galvanized sheet steel.

1. Sheet Metal Thickness for Units up to 24 Inches in Diameter: 0.034 inch thick.
2. Sheet Metal Thickness for Units 26 through 40 Inches in Diameter: 0.040 inch thick.
3. Sheet Metal Thickness for Units 42 through 52 Inches in Diameter: 0.05 inch thick.
4. Sheet Metal Thickness for Units 54 through 60 Inches in Diameter: 0.064 inch thick.

F. Inner Casing and Baffles: ASTM A 653/A 653M, G90 galvanized sheet metal, 0.034 inch thick, and with 1/8-inch-diameter perforations.

G. Special Construction:

1. Suitable for outdoor use.
2. High transmission loss to achieve STC 45.

H. Connection Sizes: Match connecting ductwork unless otherwise indicated.

I. Principal Sound-Absorbing Mechanism:

1. Controlled impedance membranes and broadly tuned resonators without absorptive media.
2. Dissipative type with fill material.
  - a. Fill Material: Moisture-proof nonfibrous material.
  - b. Erosion Barrier: Polymer bag enclosing fill, and heat sealed before assembly.
3. Lining: Mylar or Fiberglas cloth.

J. Fabricate silencers to form rigid units that will not pulsate, vibrate, rattle, or otherwise react to system pressure variations. Do not use mechanical fasteners for unit assemblies.

1. Joints: Lock formed and sealed or flanged connections.
2. Suspended Units: Factory-installed suspension hooks or lugs attached to frame in quantities and spaced to prevent deflection or distortion.
3. Reinforcement: Cross or trapeze angles for rigid suspension.

K. Accessories:

1. Integral **1-1/2-hour** fire damper with access door. Access door to be high transmission loss to match silencer.
2. Factory-installed end caps to prevent contamination during shipping.
3. Removable splitters.
4. Airflow measuring devices.

## 2.10 TURNING VANES

- A. Manufactured Turning Vanes for Metal Ducts: Curved blades of galvanized sheet steel; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.
  1. Acoustic Turning Vanes: Fabricate airfoil-shaped aluminum extrusions with perforated faces and fibrous-glass fill.
- B. Manufactured Turning Vanes for Nonmetal Ducts: Fabricate curved blades of resin-bonded fiberglass with acrylic polymer coating; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.
- C. General Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 4-3, "Vanes and Vane Runners," and 4-4, "Vane Support in Elbows."
- D. Vane Construction: Single wall for ducts up to 48 inches wide and double wall for larger dimensions.

## 2.11 REMOTE DAMPER OPERATORS

- A. Description: Cable system designed for remote manual damper adjustment.
- B. Tubing: Copper or Aluminum.
- C. Cable: Stainless steel or Steel.
- D. Wall-Box Mounting: Recessed where possible. Surface everywhere else..
- E. Wall-Box Cover-Plate Material: Stainless steel.

## 2.12 DUCT-MOUNTED ACCESS DOORS

- A. Duct-Mounted Access Doors: Fabricate access panels according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 7-2, "Duct Access Doors and Panels," and 7-3, "Access Doors - Round Duct."

1. Door:
  - a. Double wall, rectangular.
  - b. Galvanized sheet metal with insulation fill and thickness as indicated for duct pressure class.
  - c. Vision panel.
  - d. Hinges and Latches: 1-by-1-inch butt or piano hinge and cam latches.
  - e. Fabricate doors airtight and suitable for duct pressure class.
2. Frame: Galvanized sheet steel, with bend-over tabs and foam gaskets.
3. Number of Hinges and Locks:
  - a. Access Doors Less Than 12 Inches Square: No hinges and two sash locks.
  - b. Access Doors up to 18 Inches Square: Continuous and two sash locks.
  - c. Access Doors up to 24 by 48 Inches: Continuous and two compression latches with outside and inside handles.
  - d. Access Doors Larger Than 24 by 48 Inches: Continuous and two compression latches with outside and inside handles.

B. Pressure Relief Access Door:

1. Door and Frame Material: Galvanized sheet steel.
2. Door: Single wall with metal thickness applicable for duct pressure class.
3. Operation: Open outward for positive-pressure ducts and inward for negative-pressure ducts.
4. Factory set at 3.0- to 8.0-inch wg.
5. Doors close when pressures are within set-point range.
6. Hinge: Continuous piano.
7. Latches: Cam.
8. Seal: Neoprene or foam rubber.
9. Insulation Fill: 1-inch- thick, fibrous-glass or polystyrene-foam board.

## 2.13 DUCT ACCESS PANEL ASSEMBLIES

- A. Labeled according to UL 1978 by an NRTL.
- B. Panel and Frame: Minimum thickness 0.0428-inch stainless steel.
- C. Fasteners: Stainless steel. Panel fasteners shall not penetrate duct wall.
- D. Gasket: Comply with NFPA 96; grease-tight, high-temperature ceramic fiber, rated for minimum 2000 deg F.
- E. Minimum Pressure Rating: 10-inch wg, positive or negative.

## 2.14 FLEXIBLE CONNECTORS

- A. Materials: Flame-retardant or noncombustible fabrics.
- B. Coatings and Adhesives: Comply with UL 181, Class 1.

- C. Metal-Edged Connectors: Factory fabricated with a fabric strip 3-1/2 inches wide attached to two strips of 2-3/4-inch- wide, 0.028-inch- thick, galvanized sheet steel or 0.032-inch- thick aluminum sheets. Provide metal compatible with connected ducts.
- D. Indoor System, Flexible Connector Fabric: Glass fabric double coated with neoprene.
  - 1. Minimum Weight: 26 oz./sq. yd..
  - 2. Tensile Strength: 480 lbf/inch in the warp and 360 lbf/inch in the filling.
  - 3. Service Temperature: Minus 40 to plus 200 deg F.
- E. Outdoor System, Flexible Connector Fabric: Glass fabric double coated with weatherproof, synthetic rubber resistant to UV rays and ozone.
  - 1. Minimum Weight: 24 oz./sq. yd.
  - 2. Tensile Strength: 530 lbf/inch in the warp and 440 lbf/inch in the filling.
  - 3. Service Temperature: Minus 50 to plus 250 deg F.
- F. Thrust Limits: Combination coil spring and elastomeric insert with spring and insert in compression, and with a load stop. Include rod and angle-iron brackets for attaching to fan discharge and duct.
  - 1. Frame: Steel, fabricated for connection to threaded rods and to allow for a maximum of 30 degrees of angular rod misalignment without binding or reducing isolation efficiency.
  - 2. Outdoor Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
  - 3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
  - 4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
  - 5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
  - 6. Elastomeric Element: Molded, oil-resistant rubber or neoprene.
  - 7. Coil Spring: Factory set and field adjustable for a maximum of 1/4-inch movement at start and stop.

## 2.15 DUCT ACCESSORY HARDWARE

- A. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments and of length to suit duct-insulation thickness.
- B. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.



## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for metal ducts and in NAIMA AH116, "Fibrous Glass Duct Construction Standards," for fibrous-glass ducts.
- B. Install duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel and fibrous-glass ducts, stainless-steel accessories in stainless-steel ducts, and aluminum accessories in aluminum ducts.
- C. Compliance with ASHRAE/IESNA 90.1-2004 includes Section 6.4.3.3.3 - "Shutoff Damper Controls," restricts the use of backdraft dampers, and requires control dampers for certain applications. Install backdraft dampers at inlet of exhaust fans or exhaust ducts as close as possible to exhaust fan unless otherwise indicated.
- D. Install volume dampers at points on supply, return, and exhaust systems where branches extend from larger ducts. Where dampers are installed in ducts having duct liner, install dampers with hat channels of same depth as liner, and terminate liner with nosing at hat channel.
  - 1. Install steel volume dampers in steel ducts.
  - 2. Install aluminum volume dampers in aluminum ducts.
- E. Set dampers to fully open position before testing, adjusting, and balancing.
- F. Install test holes at fan inlets and outlets and elsewhere as indicated.
- G. Install fire and smoke dampers according to UL listing.
- H. Install duct security bars. Construct duct security bars from 0.164-inch steel sleeve, continuously welded at all joints and 1/2-inch- diameter steel bars, 6 inches o.c. in each direction in center of sleeve. Weld each bar to steel sleeve and each crossing bar. Weld 2-1/2-by-2-1/2-by-1/4-inch steel angle to 4 sides and both ends of sleeve. Connect duct security bars to ducts with flexible connections. Provide 12-by-12-inch hinged access panel with cam lock in duct in each side of sleeve.
- I. Connect ducts to duct silencers with flexible duct connectors.
- J. Install duct access doors on sides of ducts to allow for inspecting, adjusting, and maintaining accessories and equipment at the following locations:
  - 1. On both sides of duct coils.
  - 2. Upstream and downstream from duct filters.
  - 3. At outdoor-air intakes and mixed-air plenums.
  - 4. At drain pans and seals.
  - 5. Downstream from manual volume dampers, control dampers, backdraft dampers, and equipment.
  - 6. Adjacent to and close enough to fire or smoke dampers, to reset or reinstall fusible links. Access doors for access to fire or smoke dampers having fusible links shall be pressure

- relief access doors and shall be outward operation for access doors installed upstream from dampers and inward operation for access doors installed downstream from dampers.
7. At each change in direction and at maximum 50-foot spacing.
  8. Upstream and downstream from turning vanes.
  9. Upstream or downstream from duct silencers.
  10. Control devices requiring inspection.
  11. Elsewhere as indicated.
- K. Install access doors with swing against duct static pressure.
- L. Access Door Sizes:
1. One-Hand or Inspection Access: 8 by 5 inches.
  2. Two-Hand Access: 12 by 6 inches.
  3. Head and Hand Access: 18 by 10 inches.
  4. Head and Shoulders Access: 21 by 14 inches.
  5. Body Access: 25 by 14 inches.
  6. Body plus Ladder Access: 25 by 17 inches.
- M. Label access doors according to Section 230553 "Identification for HVAC Piping and Equipment" to indicate the purpose of access door.
- N. Install flexible connectors to connect ducts to equipment.
- O. For fans developing static pressures of 5-inch wg and more, cover flexible connectors with loaded vinyl sheet held in place with metal straps.
- P. Connect terminal units to supply ducts with maximum 12-inch lengths of flexible duct. Do not use flexible ducts to change directions.
- Q. Connect diffusers or light troffer boots to ducts with maximum 60-inch lengths of flexible duct clamped or strapped in place.
- R. Connect flexible ducts to metal ducts with adhesive plus sheet metal screws.
- S. Install duct test holes where required for testing and balancing purposes.
- T. Install thrust limits at centerline of thrust, symmetrical on both sides of equipment. Attach thrust limits at centerline of thrust and adjust to a maximum of 1/4-inch movement during start and stop of fans.

### 3.2 FIELD QUALITY CONTROL

- A. Tests and Inspections:
1. Operate dampers to verify full range of movement.
  2. Inspect locations of access doors and verify that purpose of access door can be performed.
  3. Operate fire, smoke, and combination fire and smoke dampers to verify full range of movement and verify that proper heat-response device is installed.

4. Inspect turning vanes for proper and secure installation.
5. Operate remote damper operators to verify full range of movement of operator and damper.

END OF SECTION

## SECTION 233346 - FLEXIBLE DUCTS

### 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. Insulated flexible ducts.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For flexible ducts.
  - 1. Include plans showing locations and mounting and attachment details.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which ceiling-mounted access panels and access doors required for access to duct accessories are shown and coordinated with each other, using input from installers of the items involved.

### PART 2 - PRODUCTS

#### 2.1 ASSEMBLY DESCRIPTION

- A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."
- B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.
- C. Comply with the Air Diffusion Council's "ADC Flexible Air Duct Test Code FD 72-R1."
- D. Comply with ASTM E 96/E 96M, "Test Methods for Water Vapor Transmission of Materials."

## 2.2 INSULATED FLEXIBLE DUCTS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Flexmaster U.S.A., Inc.
  - 2. JP Lamborn Co.
  - 3. McGill AirFlow LLC.
  - 4. Thermaflex; a Flex-Tek Group company.
  - 5. Ward Industries; a brand of Hart & Cooley, Inc.
  - 6. Substitutions: Section 01 60 00 – Product Requirements
- B. Insulated, Flexible Duct: UL 181, Class 1, two-ply vinyl film supported by helically wound, spring-steel wire; fibrous-glass insulation; polyethylene or aluminized vapor-barrier film.
  - 1. Pressure Rating: 10-inch wg positive and 1.0-inch wg negative.
  - 2. Maximum Air Velocity: 4000 fpm.
  - 3. Temperature Range: Minus 10 to plus 160 deg F.
  - 4. Insulation R-Value: Comply with ASHRAE/IES 90.1.

## 2.3 FLEXIBLE DUCT CONNECTORS

- A. Clamps: Stainless-steel band with cadmium-plated hex screw to tighten band with a worm-gear action in sizes 3 through 18 inches, to suit duct size.
- B. Non-Clamp Connectors: Adhesive plus sheet metal screws.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install flexible ducts according to applicable details in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for metal ducts and in NAIMA AH116, "Fibrous Glass Duct Construction Standards," for fibrous-glass ducts.
- B. Install in indoor applications only. Flexible ductwork should not be exposed to UV lighting.
- C. Connect terminal units to supply ducts directly or with maximum lengths of flexible duct. Do not use flexible ducts to change directions.
- D. Connect diffusers or light troffer boots to ducts directly or with maximum 60-inch lengths of flexible duct clamped or strapped in place.
- E. Connect flexible ducts to metal ducts with adhesive plus sheet metal screws.
- F. Install duct test holes where required for testing and balancing purposes.
- G. Installation:

1. Install ducts fully extended.
2. Do not bend ducts across sharp corners.
3. Bends of flexible ducting shall not exceed a minimum of one duct diameter.
4. Avoid contact with metal fixtures, water lines, pipes, or conduits.
5. Install flexible ducts in a direct line, without sags, twists, or turns.

H. Supporting Flexible Ducts:

1. Suspend flexible ducts with bands 1-1/2 inches wide or wider and spaced a maximum of 48 inches apart. Maximum centerline sag between supports shall not exceed 1/2 inch per 12 inches.
2. Install extra supports at bends placed approximately one duct diameter from center line of the bend.
3. Ducts may rest on ceiling joists or truss supports. Spacing between supports shall not exceed the maximum spacing per manufacturer's written installation instructions.
4. Vertically installed ducts shall be stabilized by support straps at a maximum of 72 inches o.c.

END OF SECTION

## SECTION 233713 - AIR OUTLETS AND INLETS

### 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. Rectangular and square ceiling diffusers.
  - 2. Perforated diffusers.
- B. Related Requirements:
  - 1. Section 233300 "Air Duct Accessories" for fire and smoke dampers and volume-control dampers not integral to diffusers.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Data Sheet: Indicate materials of construction, finish, and mounting details; and performance data including throw and drop, static-pressure drop, and noise ratings.
  - 2. Diffuser Schedule: Indicate drawing designation, room location, quantity, model number, size, and accessories furnished.
- B. Samples: For each exposed product and for each color and texture specified. Actual size of smallest diffuser indicated.
- C. Samples for Initial Selection: For diffusers with factory-applied color finishes. Actual size of smallest diffuser indicated.
- D. Samples for Verification: For diffusers, in manufacturer's standard sizes to verify color selected. Actual size of smallest diffuser indicated.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
  - 1. Ceiling suspension assembly members.
  - 2. Method of attaching hangers to building structure.
  - 3. Size and location of initial access modules for acoustical tile.

4. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.
  5. Duct access panels.
- B. Source quality-control reports.

## PART 2 - PRODUCTS

### 2.1 RECTANGULAR AND SQUARE CEILING DIFFUSERS

- A. Manufacturers:
1. Carnes Company.
  2. Hart & Cooley Inc.
  3. Krueger.
  4. Nailor Industries, Inc.
  5. Price Industries.
  6. Titus.
  7. Tuttle & Bailly
  8. Substitutions: Section 01 60 00 - Product Requirements.
- B. Devices shall be specifically designed for variable-air-volume flows.
- C. Material: Aluminum.
- D. Finish: Baked enamel, color selected by Architect.
- E. Face Size: As indicated in Schedule.
- F. Mounting: As indicated in Schedule.
- G. Pattern: Adjustable.
- H. Dampers: Radial opposed blade.
- I. Accessories:
1. Equalizing grid.
  2. Plaster ring.
  3. Safety chain.
  4. Wire guard.
  5. Sectorizing baffles.
  6. Operating rod extension.

### 2.2 PERFORATED DIFFUSERS

- A. Manufacturers:
1. Carnes Company.
  2. Hart & Cooley Inc.
  3. Krueger.



4. Nailor Industries, Inc.
5. Price Industries.
6. Titus.
7. Tuttle & Baily
8. Substitutions: Section 01 60 00 - Product Requirements.

- B. Devices shall be specifically designed for variable-air-volume flows.
- C. Material: Steel backpan and pattern controllers, with aluminum face.
- D. Finish: Baked enamel, color selected by Architect.
- E. Face Size: As indicated in Schedule.
- F. Duct Inlet: As indicated in Schedule.
- G. Mounting: As indicated in Schedule.
- H. Dampers: Opposed blade.
- I. Accessories:
  1. Equalizing grid.
  2. Plaster ring.
  3. Safety chain.
  4. Wire guard.
  5. Sectorizing baffles.
  6. Operating rod extension.

## 2.3 SOURCE QUALITY CONTROL

- A. Verification of Performance: Rate diffusers according to ASHRAE 70, "Method of Testing for Rating the Performance of Air Outlets and Inlets."

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas where diffusers are installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Install diffusers level and plumb.

- B. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practical. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.
- C. Install diffusers with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

### 3.3 ADJUSTING

- A. After installation, adjust diffusers to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION

## SECTION 238219 - FAN COIL UNITS

### 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. Ducted fan coil units and accessories.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include rated capacities, operating characteristics, and furnished specialties and accessories.
- B. Shop Drawings:
  - 1. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
  - 2. Include diagrams for power, signal, and control wiring.
- C. Samples for Initial Selection: For units with factory-applied color finishes.
- D. Samples for Verification: For each type of fan coil unit indicated.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Floor plans, reflected ceiling plans, and other details, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
  - 1. Suspended ceiling components.
  - 2. Structural members to which fan coil units will be attached.
  - 3. Method of attaching hangers to building structure.
  - 4. Size and location of initial access modules for acoustical tile.
  - 5. Items penetrating finished ceiling, including the following:
    - a. Lighting fixtures.
    - b. Air outlets and inlets.

- c. Speakers.
- d. Sprinklers.
- e. Access panels.

6. Perimeter moldings.

B. Seismic Qualification Certificates: For fan coil units, accessories, and components, from manufacturer.

- 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
- 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
- 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

C. Field quality-control reports.

D. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fan coil units to include in emergency, operation, and maintenance manuals.

- 1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:
  - a. Maintenance schedules and repair part lists for motors, coils, integral controls, and filters.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

- 1. Fan Coil Unit Filters: Furnish 2 spare filters for each filter installed.
- 2. Fan Belts: Furnish 1 spare fan belt for each unit installed.

1.7 QUALITY ASSURANCE

A. Comply with NFPA 70.

B. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup."

C. ASHRAE/IES 90.1 Compliance: Applicable requirements in ASHRAE/IES 90.1, Section 6 - "Heating, Ventilating, and Air-Conditioning."

## 1.8 COORDINATION

- A. Coordinate layout and installation of fan coil units and suspension system components with other construction that penetrates or is supported by ceilings, including light fixtures, HVAC equipment, fire-suppression-system components, and partition assemblies.
- B. Coordinate size and location of wall sleeves for outdoor-air intake.

## 1.9 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of condensing units that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Compressor failure.
    - b. Condenser coil leak.
  - 2. Warranty Period: Four years from date of Substantial Completion.
  - 3. Warranty Period (Compressor Only): Five years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 SYSTEM DESCRIPTION

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Factory-packaged and -tested units rated according to AHRI 440, ASHRAE 33, and UL 1995.

### 2.2 DUCTED FAN COIL UNITS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Carrier Corporation; a unit of United Technologies Corp.
  - 2. Daikin Applied.
  - 3. ENVIRO-TEC; by Johnson Controls, Inc.
  - 4. Greenheck Fan Corporation.
  - 5. Titus.
  - 6. Trane Inc.
  - 7. YORK; a Johnson Controls company.
  - 8. Substitutions: Section 01 60 00 - Product Requirements.
- B. Coil Section Insulation: 1/2-inch- thick, coated glass fiber complying with ASTM C 1071 and attached with adhesive complying with ASTM C 916.

1. Surface-Burning Characteristics: Insulation and adhesive shall have a combined maximum flame-spread index of 25 and smoke-developed index of 50 when tested according to ASTM E 84 by a qualified testing agency.
  2. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
- C. Coil Section Insulation: Insulate coil section according to Section 230616 "HVAC Equipment Insulation."
1. Surface-Burning Characteristics: Insulation and adhesive shall have a combined maximum flame-spread index of 25 and smoke-developed index of 50 when tested according to ASTM E 84 by a qualified testing agency.
  2. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
- D. Main and Auxiliary Drain Pans: Stainless steel. Fabricate pans and drain connections to comply with ASHRAE 62.1.
- E. Chassis: Galvanized steel where exposed to moisture, with baked-enamel finish and removable access panel. Floor-mounting units shall have leveling screws.
- F. Cabinets: Steel with baked-enamel finish in manufacturer's standard paint color.
1. Supply-Air Plenum: Sheet metal plenum finished and insulated to match the chassis.
  2. Return-Air Plenum: Sheet metal plenum finished to match the chassis.
  3. Mixing Plenum: Sheet metal plenum finished and insulated to match the chassis with outdoor- and return-air, formed-steel dampers.
  4. Dampers: Galvanized steel with extruded-vinyl blade seals, flexible-metal jamb seals, and interlocking linkage.
- G. Filters: Minimum arrestance and a minimum efficiency reporting value (MERV) according to ASHRAE 52.2 and all addendums.
- H. MERV Rating: 6 when tested according to ASHRAE 52.2.
1. Glass Fiber Treated with Adhesive: 80 percent arrestance and MERV 5.
- I. Electric-Resistance Heating Coils: Nickel-chromium heating wire, free of expansion noise and hum, mounted in ceramic inserts in a galvanized-steel housing; with fuses in terminal box for overcurrent protection and limit controls for high-temperature protection of heaters. Terminate elements in stainless-steel machine-staked terminals secured with stainless-steel hardware.
- J. Direct-Driven Fans: Double width, forward curved, centrifugal; with permanently lubricated, multispeed motor resiliently mounted in the fan inlet. Aluminum or painted-steel wheels, and painted-steel or galvanized-steel fan scrolls.
1. Motors: Comply with requirements in Section 230513 "Common Motor Requirements for HVAC Equipment."
- K. Belt-Driven Fans: Double width, forward curved, centrifugal; with permanently lubricated, single-speed motor installed on an adjustable fan base resiliently mounted in the cabinet. Aluminum or painted-steel wheels, and painted-steel or galvanized-steel fan scrolls.

1. Motors: Comply with requirements in Section 230513 "Common Motor Requirements for HVAC Equipment."
- L. Control devices and operational sequence are specified in Section 230548 "Vibration and Seismic Controls for HVAC Piping and Equipment."
- M. Basic Unit Controls:
  1. Control voltage transformer.
  2. Wall-mounting thermostat with the following features.
    - a. Heat-cool-off switch.
    - b. Fan on-auto switch.
    - c. Fan-speed switch.
    - d. Automatic changeover.
    - e. Adjustable deadband.
    - f. Exposed set point.
    - g. Exposed indication.
    - h. Degree F indication.
  3. Wall-mounting humidistat.
    - a. Concealed set point.
    - b. Concealed indication.
  4. Wall-mounting temperature sensor.
  5. Unoccupied-period-override push button.
  6. Data entry and access port.
    - a. Input data includes room temperature, and humidity set points and occupied and unoccupied periods.
    - b. Output data includes room temperature and humidity, supply-air temperature, entering-water temperature, operating mode, and status.
- N. DDC Terminal Controller:
  1. Scheduled Operation: Occupied and unoccupied periods on seven-day clock with a minimum of four programmable periods per day.
  2. Unoccupied-Period-Override Operation: Two hours.
  3. Unit Supply-Air Fan Operation:
    - a. Occupied Periods: Fan runs continuously.
    - b. Unoccupied Periods: Fan cycles to maintain room setback temperature.
  4. Hydronic-Cooling-Coil Operation:
    - a. Occupied Periods: Modulate control valve to maintain room temperature.
    - b. Unoccupied Periods: Close control valve.
  5. Refrigerant-Coil Operation:

- a. Occupied Periods: Start compressor to maintain room temperature or humidistat set point.
  - b. Unoccupied Periods: Stop compressor cooling and cycle compressor for heating to maintain setback temperature.
- 6. Heating-Coil Operation:
  - a. Occupied Periods: Energize electric-resistance coil to provide heating if room temperature falls below thermostat set point.
  - b. Unoccupied Periods: Start fan and energize electric-resistance coil if room temperature falls below setback temperature.
  - c. Switch refrigerant-reversing valve to operate supplemental coil for heating when outdoor temperature is below 25 deg F.
- O. Interface with DDC System for HVAC Requirements:
  - 1. Interface relay for scheduled operation.
  - 2. Interface relay to provide indication of fault at the central workstation.
  - 3. Provide BACnet or LonWorks interface for interface with existing central DDC system for HVAC workstation for the following functions:
    - a. Adjust set points.
    - b. Fan coil unit start, stop, and operating status.
    - c. Data inquiry, including supply- and room-air temperature and humidity.
    - d. Occupied and unoccupied schedules.
- P. Electrical Connection: Factory wire motors and controls for a single electrical connection.
- Q. Capacities and Characteristics: See Schedules on Drawing Sheets. Coordinate Electrical loads/requirements with electrical trade.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas, with Installer present, to receive fan coil units for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for piping and electrical connections to verify actual locations before fan coil unit installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Install fan coil units level and plumb.
- B. Install fan coil units to comply with NFPA 90A.



- C. Suspend fan coil units from structure with elastomeric hangers. Vibration isolators are specified in Section 230548 "Vibration and Seismic Controls for HVAC Piping and Equipment."
- D. Verify locations of thermostats, humidistats, and other exposed control sensors with Drawings and room details before installation. Install devices above ceiling suspended directly from structure.
- E. Install new filters in each fan coil unit within two weeks after Substantial Completion.

### 3.3 CONNECTIONS

- A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping, fittings, and specialties. Specific connection requirements are as follows:
  - 1. Install piping adjacent to machine to allow service and maintenance.
  - 2. Connect piping to fan coil unit factory hydronic piping package. Install piping package if shipped loose.
  - 3. Connect condensate drain to indirect waste.
    - a. Install condensate trap of adequate depth to seal against fan pressure. Install cleanouts in piping at changes of direction.
- B. Connect supply-air and return-air ducts to fan coil units with flexible duct connectors specified in Section 233300 "Air Duct Accessories." Comply with safety requirements in UL 1995 for duct connections.
- C. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."
- D. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

### 3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- C. Perform the following tests and inspections:
  - 1. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
  - 2. Operate electric heating elements through each stage to verify proper operation and electrical connections.
  - 3. Test and adjust controls and safety devices. Replace damaged and malfunctioning controls and equipment.
- D. Remove and replace malfunctioning units and retest as specified above.

- E. Prepare test and inspection reports.

### 3.5 ADJUSTING

- A. Adjust initial temperature and humidity set points.
- B. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

### 3.6 DEMONSTRATION

- A. Train Owner's maintenance personnel to adjust, operate, and maintain fan coil units.

END OF SECTION

## SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:

1. Copper building wire rated 600 V or less.
2. Aluminum building wire rated 600 V or less.
3. Metal-clad cable, Type MC, rated 600 V or less.
4. Armored cable, Type AC, rated 600 V or less.
5. Photovoltaic cable, Type PV, rated 2000 V or less.
6. Mineral-insulated cable, Type MI, rated 600 V or less.
7. Connectors, splices, and terminations rated 600 V and less.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Product Schedule: Indicate type, use, location, and termination locations.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer's authorized service representative.
- B. Field quality-control reports.

#### 1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Member company of NETA.
  1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

## PART 2 - PRODUCTS

### 2.1 COPPER BUILDING WIRE

- A. Description: Flexible, insulated and uninsulated, drawn copper current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V or less.
- B. Standards:
  - 1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
  - 2. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."
- C. Conductors: Copper, complying with ASTM B 3 for bare annealed copper and with ASTM B 8 for stranded conductors.
- D. Conductor Insulation:
  - 1. Type THHN and Type THWN-2: Comply with UL 83.
  - 2. Type THW and Type THW-2: Comply with NEMA WC-70/ICEA S-95-658 and UL 83.
  - 3. Type XHHW-2: Comply with UL 44.

### 2.2 METAL-CLAD CABLE, TYPE MC

- A. Description: A factory assembly of one or more current-carrying insulated conductors in an overall metallic sheath.
- B. Standards:
  - 1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
  - 2. Comply with UL 1569.
  - 3. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."
- C. Circuits:
  - 1. Single circuit.
- D. Conductors: Copper, complying with ASTM B 3 for bare annealed copper and with ASTM B 8 for stranded conductors.
- E. Ground Conductor: Bare.
- F. Conductor Insulation:
  - 1. Type THHN/THWN-2: Comply with UL 83.
- G. Armor: Steel, interlocked.

- H. Jacket: PVC applied over armor.

## 2.3 CONNECTORS AND SPLICES

- A. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated; listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.

## PART 3 - EXECUTION

### 3.1 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders: Copper; solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
- B. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

### 3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Exposed Branch Circuits, Including in Crawlspace: Type THHN/THWN-2, single conductors in raceway; Metal-clad cable, Type MC.
- B. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN/THWN-2, single conductors in raceway; Metal-clad cable, Type MC.
- C. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, strain relief device at terminations to suit application.

### 3.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.
- B. Complete raceway installation between conductor and cable termination points according to Section 260533 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.
- C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

### 3.4 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.
- B. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
- C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches of slack.

### 3.5 IDENTIFICATION

- A. Identify and color-code conductors and cables according to Section 260553 "Identification for Electrical Systems."
- B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

### 3.6 FIELD QUALITY CONTROL

- A. Perform tests and inspections with the assistance of a factory-authorized service representative.
  - 1. Perform each of the following visual and electrical tests:
    - a. Inspect exposed sections of conductor and cable for physical damage and correct connection according to the single-line diagram.
    - b. Test bolted connections for high resistance using one of the following:
      - 1) A low-resistance ohmmeter.
      - 2) Calibrated torque wrench.
      - 3) Thermographic survey.
    - c. Inspect compression-applied connectors for correct cable match and indentation.
    - d. Inspect for correct identification.
    - e. Inspect cable jacket and condition.
    - f. Insulation-resistance test on each conductor for ground and adjacent conductors. Apply a potential of 500-V dc for 300-V rated cable and 1000-V dc for 600-V rated cable for a one-minute duration.
    - g. Continuity test on each conductor and cable.
    - h. Uniform resistance of parallel conductors.
- B. Cables will be considered defective if they do not pass tests and inspections.
- C. Prepare test and inspection reports to record the following:
  - 1. Procedures used.
  - 2. Results that comply with requirements.

3. Results that do not comply with requirements, and corrective action taken to achieve compliance with requirements.

END OF SECTION

## SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

### 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 grounding and bonding systems and equipment.

#### 1.3 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For grounding to include in emergency, operation, and maintenance manuals.

#### 1.4 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Certified by NETA.

### PART 2 - PRODUCTS

#### 2.1 SYSTEM DESCRIPTION

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with UL 467 for grounding and bonding materials and equipment.

#### 2.2 CONDUCTORS

- A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
- B. Bare Copper Conductors:
  - 1. Solid Conductors: ASTM B 3.
  - 2. Stranded Conductors: ASTM B 8.
  - 3. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
  - 4. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.



## 2.3 CONNECTORS

- A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.
- B. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.
- C. Bus-Bar Connectors: Compression type, copper or copper alloy, with two wire terminals.
- D. Beam Clamps: Mechanical type, terminal, ground wire access from four directions, with dual, tin-plated or silicon bronze bolts.
- E. Cable-to-Cable Connectors: Compression type, copper or copper alloy.
- F. Cable Tray Ground Clamp: Mechanical type, zinc-plated malleable iron.
- G. Conduit Hubs: Mechanical type, terminal with threaded hub.
- H. Ground Rod Clamps: Mechanical type, copper or copper alloy, terminal with hex head bolt.
- I. Signal Reference Grid Clamp: Mechanical type, stamped-steel terminal with hex head screw.
- J. Straps: Solid copper, copper lugs. Rated for 600 A.
- K. U-Bolt Clamps: Mechanical type, copper or copper alloy, terminal listed for direct burial.

## PART 3 - EXECUTION

### 3.1 APPLICATIONS

- A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.
- B. Conductor Terminations and Connections:
  - 1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
  - 2. Connections to Structural Steel: Welded connectors.

### 3.2 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with all feeders and branch circuits.
- B. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:
  - 1. Feeders and branch circuits.
  - 2. Lighting circuits.

3. Receptacle circuits.
  4. Single-phase motor and appliance branch circuits.
  5. Three-phase motor and appliance branch circuits.
  6. Flexible raceway runs.
  7. Armored and metal-clad cable runs.
- C. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.

### 3.3 INSTALLATION

- A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- B. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.
1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
- C. Bonding Interior Metal Ducts: Bond metal air ducts to equipment grounding conductors of associated fans, blowers, electric heaters, and air cleaners. Install bonding jumper to bond across flexible duct connections to achieve continuity.

### 3.4 FIELD QUALITY CONTROL

- A. Perform tests and inspections with the assistance of a factory-authorized service representative.
- B. Tests and Inspections:
1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
  2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
  3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal. Make tests at ground rods before any conductors are connected.
    - a. Perform tests by fall-of-potential method according to IEEE 81.
- C. Grounding system will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.
- E. Report measured ground resistances that exceed the following values:
1. Power and Lighting Equipment or System with Capacity of 500 kVA and Less: 10 ohms.

- F. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

END OF SECTION

## SECTION 260533 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

### 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. Metal conduits, tubing, and fittings.
  - 2. Nonmetal conduits, tubing, and fittings.
  - 3. Metal wireways and auxiliary gutters.
  - 4. Nonmetal wireways and auxiliary gutters.
  - 5. Surface raceways.
  - 6. Boxes, enclosures, and cabinets.
- B. GRC: Galvanized rigid steel conduit.
- C. IMC: Intermediate metal conduit.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For surface raceways, wireways and fittings.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of items involved:
  - 1. Structural members in paths of conduit groups with common supports.
  - 2. HVAC and plumbing items and architectural features in paths of conduit groups with common supports.
- B. Source quality-control reports.

## PART 2 - PRODUCTS

### 2.1 METAL CONDUITS, TUBING, AND FITTINGS

- A. Listing and Labeling: Metal conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. GRC: Comply with ANSI C80.1 and UL 6.
- C. IMC: Comply with ANSI C80.6 and UL 1242.
- D. PVC-Coated Steel Conduit: PVC-coated rigid steel conduit.
  - 1. Comply with NEMA RN 1.
  - 2. Coating Thickness: 0.040 inch, minimum.
- E. EMT: Comply with ANSI C80.3 and UL 797.
- F. FMC: Comply with UL 1; zinc-coated steel.
- G. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.
- H. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.
  - 1. Fittings for EMT:
    - a. Material: Steel.
    - b. Type: Setscrew or compression.
  - 2. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.
  - 3. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch, with overlapping sleeves protecting threaded joints.
- I. Joint Compound for IMC, GRC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

### 2.2 NONMETALLIC CONDUITS AND FITTINGS

- A. Listing and Labeling: Nonmetallic conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Fiberglass:
  - 1. Comply with NEMA TC 14.
  - 2. Comply with UL 2515 for aboveground raceways.
  - 3. Comply with UL 2420 for belowground raceways.

- C. ENT: Comply with NEMA TC 13 and UL 1653.
- D. RNC: Type EPC-40-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.
- E. LFNC: Comply with UL 1660.
- F. RTRC: Comply with UL 2515A and NEMA TC 14.
- G. Fittings for ENT and RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.
- H. Fittings for LFNC: Comply with UL 514B.
- I. Solvents and Adhesives: As recommended by conduit manufacturer.

## 2.3 METAL WIREWAYS AND AUXILIARY GUTTERS

- A. Description: Sheet metal, complying with UL 870 and NEMA 250, Type 1 unless otherwise indicated, and sized according to NFPA 70.
  - 1. Metal wireways installed outdoors shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.
- C. Wireway Covers: Hinged type unless otherwise indicated.
- D. Finish: Manufacturer's standard enamel finish.

## 2.4 NONMETALLIC WIREWAYS AND AUXILIARY GUTTERS

- A. Listing and Labeling: Nonmetallic wireways and auxiliary gutters shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Description: Fiberglass polyester, extruded and fabricated to required size and shape, without holes or knockouts. Cover shall be gasketed with oil-resistant gasket material and fastened with captive screws treated for corrosion resistance. Connections shall be flanged and have stainless-steel screws and oil-resistant gaskets.
- C. Fittings and Accessories: Couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings shall match and mate with wireways as required for complete system.
- D. Solvents and Adhesives: As recommended by conduit manufacturer.

## 2.5 SURFACE RACEWAYS

- A. Listing and Labeling: Surface raceways and tele-power poles shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Surface Metal Raceways: Galvanized steel with snap-on covers complying with UL 5. Manufacturer's standard enamel finish in color selected by Architect.
- C. Surface Nonmetallic Raceways: Two- or three-piece construction, complying with UL 5A, and manufactured of rigid PVC with texture and color selected by Architect from manufacturer's standard colors. Product shall comply with UL 94 V-0 requirements for self-extinguishing characteristics.
- D. Tele-Power Poles:
  - 1. Material: Aluminum with clear anodized finish.
  - 2. Fittings and Accessories: Dividers, end caps, covers, cutouts, wiring harnesses, devices, mounting materials, and other fittings shall match and mate with tele-power pole as required for complete system.

## 2.6 BOXES, ENCLOSURES, AND CABINETS

- A. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.
- B. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.
- C. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, aluminum, Type FD, with gasketed cover.
- D. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C.
- E. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb. Outlet boxes designed for attachment of luminaires weighing more than 50 lb shall be listed and marked for the maximum allowable weight.
- F. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- G. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, cast aluminum with gasketed cover.
- H. Box extensions used to accommodate new building finishes shall be of same material as recessed box.
- I. Device Box Dimensions: 4 inches square by 2-1/8 inches deep.
- J. Gangable boxes are allowed.

## PART 3 - EXECUTION

### 3.1 RACEWAY APPLICATION

- A. Indoors: Apply raceway products as specified below unless otherwise indicated:
  - 1. Exposed, Not Subject to Physical Damage: EMT, ENT or RNC.
  - 2. Exposed, Not Subject to Severe Physical Damage: EMT.
  - 3. Concealed in Ceilings and Interior Walls and Partitions: EMT, ENT or RNC, Type EPC-40-PVC.
  - 4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
  - 5. Damp or Wet Locations: GRC.
  - 6. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4 stainless steel in damp or wet locations.
- B. Minimum Raceway Size: 3/4-inch trade size.
- C. Raceway Fittings: Compatible with raceways and suitable for use and location.
  - 1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
  - 2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with this type of conduit. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
  - 3. EMT: Use compression, steel fittings. Comply with NEMA FB 2.10.
  - 4. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.
- D. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.
- E. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F.

### 3.2 INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.
- B. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- C. Complete raceway installation before starting conductor installation.
- D. Arrange stub-ups so curved portions of bends are not visible above finished slab.



- E. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches of changes in direction.
- F. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
- G. Support conduit within 12 inches of enclosures to which attached.
- H. Stub-ups to Above Recessed Ceilings:
  - 1. Use EMT, IMC, or RMC for raceways.
  - 2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.
- I. Coat field-cut threads on PVC-coated raceway with a corrosion-preventing conductive compound prior to assembly.
- J. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.
- K. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.
- L. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.
- M. Cut conduit perpendicular to the length. For conduits 2-inch trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.
- N. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.
- O. Surface Raceways:
  - 1. Install surface raceway with a minimum 2-inch radius control at bend points.
  - 2. Secure surface raceway with screws or other anchor-type devices at intervals not exceeding 48 inches and with no less than two supports per straight raceway section. Support surface raceway according to manufacturer's written instructions. Tape and glue are not acceptable support methods.
- P. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings according to NFPA 70.
- Q. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:

1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
  2. Where otherwise required by NFPA 70.
- R. Comply with manufacturer's written instructions for solvent welding RNC and fittings.
- S. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 72 inches of flexible conduit for recessed luminaires, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.
1. Use LFMC in damp or wet locations subject to severe physical damage.
  2. Use LFMC or LFNC in damp or wet locations not subject to severe physical damage.
- T. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.
- U. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surfaces to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box.
- V. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.
- W. Locate boxes so that cover or plate will not span different building finishes.
- X. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.
- Y. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

### 3.3 PROTECTION

- A. Protect coatings, finishes, and cabinets from damage and deterioration.
1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
  2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION

## SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

### 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. Color and legend requirements for raceways, conductors, and warning labels and signs.
2. Labels.
3. Tags.
4. Cable ties.
5. Paint for identification.
6. Fasteners for labels and signs.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for electrical identification products.
- B. Samples: For each type of label and sign to illustrate composition, size, colors, lettering style, mounting provisions, and graphic features of identification products.
- C. Identification Schedule: For each piece of electrical equipment and electrical system components to be an index of nomenclature for electrical equipment and system components used in identification signs and labels. Use same designations indicated on Drawings.

### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- A. Comply with ASME A13.1 and IEEE C2.
- B. Comply with NFPA 70.
- C. Comply with ANSI Z535.4 for safety signs and labels.

- D. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

## 2.2 COLOR AND LEGEND REQUIREMENTS

- A. Raceways and Cables Carrying Circuits at 600 V or Less:
  - 1. Black letters on an orange field.
  - 2. Legend: Indicate voltage and system or service type.
- B. Color-Coding for Phase- and Voltage-Level Identification, 600 V or Less: Use colors listed below for ungrounded branch-circuit conductors.
  - 1. Color shall be factory applied or field applied for sizes larger than No. 8 AWG if authorities having jurisdiction permit.
  - 2. Colors for 208/120-V Circuits:
    - a. Phase A: Black.
    - b. Phase B: Red.
    - c. Phase C: Blue.
  - 3. Colors for 480/277-V Circuits:
    - a. Phase A: Brown.
    - b. Phase B: Orange.
    - c. Phase C: Yellow.
  - 4. Color for Neutral: White.
  - 5. Color for Equipment Grounds: Green.
- C. Equipment Identification Labels:
  - 1. Black letters on a white field.

## 2.3 LABELS

- A. Vinyl Wraparound Labels: Preprinted, flexible labels laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing label ends.
- B. Snap-around Labels: Slit, pre-tensioned, flexible, pre-printed, color-coded acrylic sleeves, with diameters sized to suit diameters and that stay in place by gripping action.
- C. Self-Adhesive Wraparound Labels: Preprinted or Write-on, 3-mil- thick, vinyl flexible label with acrylic pressure-sensitive adhesive.
  - 1. Self-Lamination: Clear; UV-, weather- and chemical-resistant; self-laminating, protective shield over the legend. Labels sized such that the clear shield overlaps the entire printed legend.
  - 2. Marker for Labels: Permanent, waterproof, black ink marker recommended by tag manufacturer.

- D. Self-Adhesive Labels: Vinyl, thermal, transfer-printed, 3-mil- thick, multicolor, weather- and UV-resistant, pressure-sensitive adhesive labels, configured for intended use and location.
  - 1. Minimum Nominal Size:
    - a. 1-1/2 by 6 inches for raceway and conductors.
    - b. 3-1/2 by 5 inches for equipment.

## 2.4 TAGS

- A. Metal Tags: Brass or aluminum, 2 by 2 by 0.05 inch, with stamped legend, punched for use with self-locking cable tie fastener.
- B. Nonmetallic Preprinted Tags: Polyethylene tags, 0.023 inch thick, color-coded for phase and voltage level, with factory printed permanent designations; punched for use with self-locking cable tie fastener.
- C. Write-on Tags:
  - 1. Polyester Tags: 0.015 inch thick, with corrosion-resistant grommet and cable tie for attachment.
  - 2. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.

## 2.5 CABLE TIES

- A. General-Purpose Cable Ties: Fungus inert, self-extinguishing, one piece, self-locking, and Type 6/6 nylon.
  - 1. Minimum Width: 3/16 inch.
  - 2. Tensile Strength at 73 Deg F according to ASTM D 638: 12,000 psi.
  - 3. Temperature Range: Minus 40 to plus 185 deg F.
  - 4. Color: Black, except where used for color-coding.
- B. Plenum-Rated Cable Ties: Self-extinguishing, UV stabilized, one piece, and self-locking.
  - 1. Minimum Width: 3/16 inch.
  - 2. Tensile Strength at 73 Deg F according to ASTM D 638: 7000 psi.
  - 3. UL 94 Flame Rating: 94V-0.
  - 4. Temperature Range: Minus 50 to plus 284 deg F.
  - 5. Color: Black.

## 2.6 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Retain paint system applicable for surface material and location.
- B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Self-Adhesive Identification Products: Before applying electrical identification products, clean substrates of substances that could impair bond, using materials and methods recommended by manufacturer of identification product.

### 3.2 INSTALLATION

- A. Verify and coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and operation and maintenance manual. Use consistent designations throughout Project.
- B. Install identifying devices before installing acoustical ceilings and similar concealment.
- C. Verify identity of each item before installing identification products.
- D. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and operation and maintenance manual.
- E. Apply identification devices to surfaces that require finish after completing finish work.
- F. System Identification for Raceways and Cables under 600 V: Identification shall completely encircle cable or conduit. Place identification of two-color markings in contact, side by side.
  - 1. Secure tight to surface of conductor, cable, or raceway.
- G. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.
- H. Elevated Components: Increase sizes of labels, signs, and letters to those appropriate for viewing from the floor.
- I. Accessible Fittings for Raceways: Identify the covers of each junction and pull box of the following systems with the wiring system legend and system voltage. System legends shall be as follows:
  - 1. "EMERGENCY POWER."
  - 2. "POWER."
  - 3. "UPS."
- J. Vinyl Wraparound Labels:
  - 1. Secure tight to surface of raceway or cable at a location with high visibility and accessibility.
  - 2. Attach labels that are not self-adhesive type with clear vinyl tape, with adhesive appropriate to the location and substrate.

- K. Snap-around Labels: Secure tight to surface at a location with high visibility and accessibility.
- L. Self-Adhesive Wraparound Labels: Secure tight to surface at a location with high visibility and accessibility.
- M. Self-Adhesive Labels:
  - 1. On each item, install unique designation label that is consistent with wiring diagrams, schedules, and operation and maintenance manual.
  - 2. Unless otherwise indicated, provide a single line of text with 1/2-inch- high letters on 1-1/2-inch- high label; where two lines of text are required, use labels 2 inches high.
- N. Snap-around Color-Coding Bands: Secure tight to surface at a location with high visibility and accessibility.
- O. Marker Tapes: Secure tight to surface at a location with high visibility and accessibility.
- P. Self-Adhesive Vinyl Tape: Secure tight to surface at a location with high visibility and accessibility.
  - 1. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding.
- Q. Metal Tags:
  - 1. Place in a location with high visibility and accessibility.
  - 2. Secure using general-purpose cable ties.
- R. Nonmetallic Preprinted Tags:
  - 1. Place in a location with high visibility and accessibility.
  - 2. Secure using general-purpose cable ties.
- S. Write-on Tags:
  - 1. Place in a location with high visibility and accessibility.
  - 2. Secure using general-purpose cable ties.
- T. Baked-Enamel Signs:
  - 1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
  - 2. Unless otherwise indicated, provide a single line of text with 1/2-inch- high letters on minimum 1-1/2-inch- high sign; where two lines of text are required, use signs minimum 2 inches high.
- U. Metal-Backed Butyrate Signs:
  - 1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.

2. Unless otherwise indicated, provide a single line of text with 1/2-inch- high letters on 1-1/2-inch- high sign; where two lines of text are required, use labels 2 inches high.

V. Laminated Acrylic or Melamine Plastic Signs:

1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
2. Unless otherwise indicated, provide a single line of text with 1/2-inch- high letters on 1-1/2-inch- high sign; where two lines of text are required, use labels 2 inches high.

W. Cable Ties: General purpose, for attaching tags, except as listed below:

1. In Spaces Handling Environmental Air: Plenum rated.

### 3.3 IDENTIFICATION SCHEDULE

- A. Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment. Install access doors or panels to provide view of identifying devices.
- B. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, pull points, and locations of high visibility. Identify by system and circuit designation.
- C. Accessible Raceways, Armored and Metal-Clad Cables, More Than 600 V: Vinyl wraparound labels, Snap-around labels, or Self-adhesive labels.
1. Locate identification at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.
- D. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Branch Circuits, More Than 30 A and 120 V to Ground: Identify with self-adhesive raceway labels.
1. Locate identification at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.
- E. Accessible Fittings for Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive labels containing the wiring system legend and system voltage. System legends shall be as follows:
1. "EMERGENCY POWER."
  2. "POWER."
  3. "UPS."
- F. Power-Circuit Conductor Identification, 600 V or Less: For conductors in pull and junction boxes, use vinyl wraparound labels, self-adhesive wraparound labels, snap-around labels or self-adhesive vinyl tape to identify the phase.



1. Locate identification at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.
- G. Control-Circuit Conductor Identification: For conductors and cables in pull and junction boxes, use self-adhesive labels with the conductor or cable designation, origin, and destination.
- H. Control-Circuit Conductor Termination Identification: For identification at terminations, provide self-adhesive labels with the conductor designation.
- I. Auxiliary Electrical Systems Conductor Identification: Self-adhesive vinyl tape that is uniform and consistent with system used by manufacturer for factory-installed connections.
  1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
- J. Warning Labels for Indoor Boxes, and Enclosures for Power and Lighting: Metal-backed, butyrate warning signs.
  1. Apply to exterior of door, cover, or other access.
- K. Operating Instruction Signs: Metal-backed, butyrate warning signs or Laminated acrylic or melamine plastic signs.
- L. Equipment Identification Labels:
  1. Indoor Equipment: Self-adhesive label, Metal-backed butyrate signs, Laminated acrylic or melamine plastic sign.
  2. Equipment to Be Labeled:
    - a. Access doors and panels for concealed electrical items.
    - b. Enclosed switches.
    - c. Remote-controlled switches, dimmer modules, and control devices.

END OF SECTION 260553

## SECTION 262726 - WIRING DEVICES

### 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. Straight-blade convenience receptacles.
  - 2. GFCI receptacles.
  - 3. Pendant cord-connector devices.
  - 4. Cord and plug sets.
  - 5. Toggle switches.
  - 6. Decorator-style convenience.
  - 7. Wall plates.
  - 8. Service poles.

#### 1.3 DEFINITIONS

- A. Abbreviations of Manufacturers' Names:
  - 1. Cooper: Cooper Wiring Devices; Division of Cooper Industries, Inc.
  - 2. Hubbell: Hubbell Incorporated: Wiring Devices-Kellems.
  - 3. Leviton: Leviton Mfg. Company, Inc.
  - 4. Pass & Seymour: Pass& Seymour/Legrand.
- B. BAS: Building automation system.
- C. GFCI: Ground-fault circuit interrupter.
- D. Pigtail: Short lead used to connect a device to a branch-circuit conductor.
- E. UTP: Unshielded twisted pair.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.

- C. Samples: One for each type of device and wall plate specified, in each color specified.

## 1.5 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

## 1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing-label warnings and instruction manuals that include labeling conditions.

## 1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Service/Power Poles: No less than one.

# PART 2 - PRODUCTS

## 2.1 GENERAL WIRING-DEVICE REQUIREMENTS

- A. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NFPA 70.
- C. Devices that are manufactured for use with modular plug-in connectors may be substituted under the following conditions:
  1. Connectors shall comply with UL 2459 and shall be made with stranding building wire.
  2. Devices shall comply with the requirements in this Section.
- D. Devices for Owner-Furnished Equipment:
  1. Receptacles: Match plug configurations.
  2. Cord and Plug Sets: Match equipment requirements.
- E. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

## 2.2 STRAIGHT-BLADE RECEPTACLES

- A. Duplex Convenience Receptacles: 125 V, 20 A; comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596.

## 2.3 GFCI RECEPTACLES

### A. General Description:

1. 125 V, 20 A, straight blade, feed-through type.
2. Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, UL 943 Class A, and FS W-C-596.
3. Include indicator light that shows when the GFCI has malfunctioned and no longer provides proper GFCI protection.

## 2.4 PENDANT CORD-CONNECTOR DEVICES

### A. Description:

1. Matching, locking-type plug and receptacle body connector.
2. NEMA WD 6 Configurations L5-20P and L5-20R, heavy-duty grade, and FS W-C-596.
3. Body: Nylon, with screw-open, cable-gripping jaws and provision for attaching external cable grip.
4. External Cable Grip: Woven wire-mesh type made of high-strength, galvanized-steel wire strand, matched to cable diameter, and with attachment provision designed for corresponding connector.

## 2.5 CORD AND PLUG SETS

### A. Description:

1. Match voltage and current ratings and number of conductors to requirements of equipment being connected.
2. Cord: Rubber-insulated, stranded-copper conductors, with Type SOW-A jacket; with green-insulated grounding conductor and ampacity of at least 130 percent of the equipment rating.
3. Plug: Nylon body and integral cable-clamping jaws. Match cord and receptacle type for connection.

## 2.6 TOGGLE SWITCHES

- A. Comply with NEMA WD 1, UL 20, and FS W-S-896.

## 2.7 DECORATOR-STYLE DEVICES

- A. Convenience Receptacles: Square face, 125 V, 15 A; comply with NEMA WD 1, NEMA WD 6 Configuration 5-15R, and UL 498.
- B. GFCI, Feed-Through Type, Convenience Receptacles: Square face, 125 V, 15 A; comply with NEMA WD 1, NEMA WD 6 Configuration 5-15R, UL 498, and UL 943 Class A.
- C. Toggle Switches: Square Face, 120/277 V, 15 A; comply with NEMA WD 1, UL 20, and FS W-S-896.

## 2.8 WALL PLATES

- A. Single and combination types shall match corresponding wiring devices.
  - 1. Plate-Securing Screws: Metal with head color to match plate finish.
  - 2. Material for Finished Spaces: Smooth, high-impact thermoplastic.
  - 3. Material for Unfinished Spaces: Galvanized steel.
  - 4. Material for Damp Locations: Thermoplastic with spring-loaded lift cover, and listed and labeled for use in wet and damp locations.

## 2.9 SERVICE POLES

- A. Description:
  - 1. Factory-assembled and -wired units to extend power and voice and data communication from distribution wiring concealed in ceiling to devices or outlets in pole near floor.
  - 2. Poles: Nominal 2.5-inch- square cross section, with height adequate to extend from floor to at least 6 inches above ceiling, and with separate channels for power wiring and voice and data communication cabling.
  - 3. Mounting: Ceiling trim flange with concealed bracing arranged for positive connection to ceiling supports; with pole foot and carpet pad attachment.
  - 4. Finishes: Satin-anodized aluminum.
  - 5. Wiring: Sized for minimum of five No. 12 AWG power and ground conductors and a minimum of four, four-pair, Category 3 or Category 5 voice and data communication cables.
  - 6. Power Receptacles: Two duplex, 20-A, straight-blade receptacles per workspace, complying with requirements in this Section.
  - 7. Data Communication Outlets: Four RJ-45 jacks per workspace.

## 2.10 FINISHES

- A. Device Color:
  - 1. Wiring Devices Connected to Normal Power System: As selected by Architect unless otherwise indicated or required by NFPA 70 or device listing.
- B. Wall Plate Color: For plastic covers, match device color.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Comply with NECA 1, including mounting heights listed in that standard, unless otherwise indicated.
- B. Coordination with Other Trades:

1. Protect installed devices and their boxes. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of boxes.
2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
4. Install wiring devices after all wall preparation, including painting, is complete.

C. Conductors:

1. Do not strip insulation from conductors until right before they are spliced or terminated on devices.
2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
4. Existing Conductors:
  - a. Cut back and pigtail, or replace all damaged conductors.
  - b. Straighten conductors that remain and remove corrosion and foreign matter.
  - c. Pigtailling existing conductors is permitted, provided the outlet box is large enough.

D. Device Installation:

1. Replace devices that have been in temporary use during construction and that were installed before building finishing operations were complete.
2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
4. Connect devices to branch circuits using pigtails that are not less than 6 inches in length.
5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, two-thirds to three-fourths of the way around terminal screw.
6. Use a torque screwdriver when a torque is recommended or required by manufacturer.
7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
8. Tighten unused terminal screws on the device.
9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.

E. Receptacle Orientation:

1. Install ground pin of vertically mounted receptacles up, and on horizontally mounted receptacles to the right.

F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

- G. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.
- H. Adjust locations of service poles to suit arrangement of partitions and furnishings.

### 3.2 GFCI RECEPTACLES

- A. Install non-feed-through-type GFCI receptacles where protection of downstream receptacles is not required.

### 3.3 IDENTIFICATION

- A. Comply with Section 260553 "Identification for Electrical Systems."
- B. Identify each receptacle with panelboard identification and circuit number. Use hot, stamped, or engraved machine printing with white-filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.

### 3.4 FIELD QUALITY CONTROL

- A. Test Instruments: Use instruments that comply with UL 1436.
- B. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated digital-display indicators of measurement.
- C. Perform the following tests and inspections:
  - 1. Test Instruments: Use instruments that comply with UL 1436.
  - 2. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated digital-display indicators of measurement.
- D. Tests for Convenience Receptacles:
  - 1. Line Voltage: Acceptable range is 105 to 132 V.
  - 2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is unacceptable.
  - 3. Ground Impedance: Values of up to 2 ohms are acceptable.
  - 4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
  - 5. Using the test plug, verify that the device and its outlet box are securely mounted.
  - 6. Tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.
- E. Wiring device will be considered defective if it does not pass tests and inspections.
- F. Prepare test and inspection reports.

END OF SECTION

## SECTION 265119 - LED INTERIOR LIGHTING

### PART 1 - 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 the following types of LED luminaires:
  - 1. Recessed linear.
  - 2. Materials.
  - 3. Finishes.
  - 4. Luminaire support.

#### 1.3 DEFINITIONS

- A. CCT: Correlated color temperature.
- B. CRI: Color Rendering Index.
- C. Fixture: See "Luminaire."
- D. IP: International Protection or Ingress Protection Rating.
- E. LED: Light-emitting diode.
- F. Lumen: Measured output of lamp and luminaire, or both.
- G. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Arrange in order of luminaire designation.
  - 2. Include data on features, accessories, and finishes.
  - 3. Include physical description and dimensions of luminaires.
  - 4. Include emergency lighting units, including batteries and chargers.
  - 5. Include life, output (lumens, CCT, and CRI), and energy efficiency data.
- B. Shop Drawings: For nonstandard or custom luminaires.
  - 1. Include plans, elevations, sections, and mounting and attachment details.



2. Include details of luminaire assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
  3. Include diagrams for power, signal, and control wiring.
- C. Samples: For each luminaire and for each color and texture with standard factory-applied finish.
- D. Samples for Initial Selection: For each type of luminaire with custom factory-applied finishes.
1. Include Samples of luminaires and accessories involving color and finish selection.
- E. Samples for Verification: For each type of luminaire.
1. Include Samples of luminaires and accessories to verify finish selection.
- F. Product Schedule: For luminaires and lamps.

## 1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plan(s) and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
1. Luminaires.
  2. Suspended ceiling components.
  3. Partitions and millwork that penetrate the ceiling or extend to within 12 inches of the plane of the luminaires.
  4. Structural members to which equipment and or luminaires will be attached.
  5. Initial access modules for acoustical tile, including size and locations.
  6. Items penetrating finished ceiling, including the following:
    - a. Other luminaires.
    - b. Air outlets and inlets.
    - c. Speakers.
    - d. Sprinklers.
    - e. Access panels.
  7. Moldings.
- B. Qualification Data: For testing laboratory providing photometric data for luminaires.
- C. Seismic Qualification Certificates: For luminaires, accessories, and components, from manufacturer.
1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
  2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
- D. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

- E. Product Certificates: For each type of luminaire.
- F. Product Test Reports: For each luminaire.
- G. Sample warranty.

#### 1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For luminaires and lighting systems to include in operation and maintenance manuals.
  - 1. Provide a list of all lamp types used on Project; use ANSI and manufacturers' codes.

#### 1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Lamps: Furnish at least one of each type.
  - 2. Diffusers and Lenses: Furnish at least one of each type.

#### 1.8 QUALITY ASSURANCE

- A. Luminaire Photometric Data Testing Laboratory Qualifications: Luminaire manufacturer's laboratory that is accredited under the NVLAP for Energy Efficient Lighting Products.
- B. Provide luminaires from a single manufacturer for each luminaire type.
- C. Each luminaire type shall be binned within a three-step MacAdam Ellipse to ensure color consistency among luminaires.

#### 1.9 DELIVERY, STORAGE, AND HANDLING

- A. Protect finishes of exposed surfaces by applying a strippable, temporary protective covering before shipping.

#### 1.10 WARRANTY

- A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.
- B. Warranty Period: Five years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Luminaires shall withstand the effects of earthquake motions determined according to ASCE 7.
- B. Seismic Performance: Luminaires and lamps shall be labeled vibration and shock resistant.
  - 1. The term "withstand" means "the luminaire will remain in place without separation of any parts when subjected to the seismic forces specified and the luminaire will be fully operational during and after the seismic event."

### 2.2 LUMINAIRE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Standards:
  - 1. ENERGY STAR certified.
  - 2. California Title 24 compliant.
  - 3. NRTL Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by an NRTL.
  - 4. FM Global Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by FM Global.
  - 5. UL Listing: Listed for damp location.
  - 6. Recessed luminaires shall comply with NEMA LE 4.
  - 7. User Replaceable Lamps:
    - a. Bulb shape complying with ANSI C78.79.
    - b. Lamp base complying with ANSI C81.61.
- C. CRI of minimum 80. CCT of 3000 K.
- D. Rated lamp life of 50,000 hours to L70.
- E. Lamps dimmable from 100 percent to 0 percent of maximum light output.
- F. Internal driver.
- G. Nominal Operating Voltage: 277 V ac.
  - 1. Lens Thickness: At least 0.125 inch minimum unless otherwise indicated.
- H. Housings:
  - 1. Extruded-aluminum housing and heat sink.
  - 2. Powder-coat finish.

## 2.3 RECESSED LINEAR

- A. Minimum 1,500 lumens. Minimum allowable efficacy of 85 lumens per watt.
- B. Integral junction box with conduit fittings.
- C. Manufacturers:
  - 1. Type A: Lithonia 2TL2-33L-FW-A12-EZ1-LP835-N80, or equivalent.
  - 2. Type B: Lithonia 2TL4-40L-FW-A12-EZ1-LP835-N80, or equivalent.
  - 3. Type BE: Lithonia 2TL4-40L-FW-A12-EZ1-LP835-N80-EL14L, or equivalent.
  - 4. Substitutions: Permitted.

## 2.4 MATERIALS

- A. Metal Parts:
  - 1. Free of burrs and sharp corners and edges.
  - 2. Sheet metal components shall be steel unless otherwise indicated.
  - 3. Form and support to prevent warping and sagging.
- B. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.
- C. Diffusers:
  - 1. Prismatic acrylic.
  - 2. Acrylic Diffusers: One hundred percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
  - 3. Lens Thickness: At least 0.125 inch minimum unless otherwise indicated.
- D. Housings:
  - 1. Extruded-aluminum housing and heat sink.
  - 2. Powder-coat finish.
- E. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps. Locate labels where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.
  - 1. Label shall include the following lamp characteristics:
    - a. "USE ONLY" and include specific lamp type.
    - b. Lamp diameter, shape, size, wattage, and coating.
    - c. CCT and CRI for all luminaires.

## 2.5 METAL FINISHES

- A. Variations in finishes are unacceptable in the same piece. Variations in finishes of adjoining components are acceptable if they are within the range of approved Samples and if they can be and are assembled or installed to minimize contrast.

## 2.6 LUMINAIRE SUPPORT

- A. Wires: ASTM A 641/A 641 M, Class 3, soft temper, zinc-coated steel, 12 gauge.
- B. Hook Hangers: Integrated assembly matched to luminaire, line voltage, and equipment with threaded attachment, cord, and locking-type plug.

# PART 3 - EXECUTION

## 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for luminaire to verify actual locations of luminaire and electrical connections before luminaire installation. Proceed with installation only after unsatisfactory conditions have been corrected.

## 3.2 TEMPORARY LIGHTING

- A. If approved by the Architect, use selected permanent luminaires for temporary lighting. When construction is sufficiently complete, clean luminaires used for temporary lighting and install new lamps.

## 3.3 INSTALLATION

- A. Comply with NECA 1.
- B. Install luminaires level, plumb, and square with ceilings and walls unless otherwise indicated.
- C. Install lamps in each luminaire.
- D. Supports:
  - 1. Sized and rated for luminaire weight.
  - 2. Able to maintain luminaire position after cleaning and relamping.
  - 3. Provide support for luminaire without causing deflection of ceiling or wall.
  - 4. Luminaire mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire weight and vertical force of 400 percent of luminaire weight.
- E. Ceiling-Grid-Mounted Luminaires:

1. Secure to any required outlet box.
2. Secure luminaire to the luminaire opening using approved fasteners in a minimum of four locations, spaced near corners of luminaire.
3. Use approved devices and support components to connect luminaire to ceiling grid and building structure in a minimum of four locations, spaced near corners of luminaire.

### 3.4 IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

### 3.5 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
  1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
  2. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery power and retransfer to normal.
- B. Luminaire will be considered defective if it does not pass operation tests and inspections.
- C. Prepare test and inspection reports.

### 3.6 ADJUSTING

- A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting the direction of aim of luminaires to suit occupied conditions. Make up to two visits to Project during other-than-normal hours for this purpose. Some of this work may be required during hours of darkness.
  1. During adjustment visits, inspect all luminaires. Replace lamps or luminaires that are defective.
  2. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
  3. Adjust the aim of luminaires in the presence of the Architect.

END OF SECTION

## SECTION 265219 - EMERGENCY AND EXIT LIGHTING

### 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. Exit signs.
  - 2. Luminaire supports.

#### 1.3 DEFINITIONS

- A. CCT: Correlated color temperature.
- B. CRI: Color Rendering Index.
- C. Emergency Lighting Unit: A lighting unit with internal or external emergency battery powered supply and the means for controlling and charging the battery and unit operation.
- D. Fixture: See "Luminaire" Paragraph.
- E. Lumen: Measured output of lamp and luminaire, or both.
- F. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of exit sign.
  - 1. Include data on features, accessories, and finishes.
  - 2. Include physical description of the unit and dimensions.
  - 3. Battery and charger for light units.
  - 4. Include life, output of luminaire (lumens, CCT, and CRI), and energy-efficiency data.
- B. Product Schedule:
  - 1. For exit signs.

## 1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plan(s) and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
  - 1. Luminaires.
  - 2. Suspended ceiling components.
  - 3. Partitions and millwork that penetrate the ceiling or extend to within 12 inches of the plane of the luminaires.
  - 4. Structural members to which equipment will be attached.
  - 5. Size and location of initial access modules for acoustical tile.
  - 6. Items penetrating finished ceiling including the following:
    - a. Other luminaires.
    - b. Air outlets and inlets.
    - c. Speakers.
    - d. Sprinklers.
    - e. Access panels.
  - 7. Moldings.
- B. Qualification Data: For testing laboratory providing photometric data for luminaires.
- C. Product Certificates: For each type of luminaire.
- D. Seismic Qualification Data: For luminaires, accessories, and components, from manufacturer.
  - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
  - 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
  - 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
  - 4. Provide seismic qualification certificate for each piece of equipment.
- E. Sample Warranty: For manufacturer's warranty.

## 1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For luminaires and lighting systems to include in emergency, operation, and maintenance manuals.
  - 1. Provide a list of all lamp types used on Project; use ANSI and manufacturers' codes.

## 1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.



1. Lamps: Furnish at least one of each type.
2. Luminaire-mounted, emergency battery pack: Furnish at least one of each type.
3. Globes and Guards: Furnish at least one of each type.

## 1.8 QUALITY ASSURANCE

- A. Luminaire Photometric Data Testing Laboratory Qualifications: Luminaire manufacturer's laboratory that is accredited under the National Volunteer Laboratory Accreditation Program for Energy Efficient Lighting Products.
- B. FM Global Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by FM Global.

## 1.9 DELIVERY, STORAGE, AND HANDLING

- A. Protect finishes of exposed surfaces by applying a strippable, temporary protective covering before shipping.

## 1.10 WARRANTY

- A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.
  1. Warranty Period: Five year(s) from date of Substantial Completion.
- B. Special Warranty for Emergency Lighting Batteries: Manufacturer's standard form in which manufacturer of battery-powered emergency lighting unit agrees to repair or replace components of rechargeable batteries that fail in materials or workmanship within specified warranty period.
  1. Warranty Period for Emergency Power Unit Batteries: Five ears from date of Substantial Completion. Full warranty shall apply for the entire warranty period.
  2. Warranty Period for Self-Powered Exit Sign Batteries: Five years from date of Substantial Completion. Full warranty shall apply for the entire warranty period.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Luminaires shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
  1. The term "withstand" means "the luminaire will remain in place without separation of any parts when subjected to the seismic forces specified and the luminaire will be fully operational during and after the seismic event."

## 2.2 GENERAL REQUIREMENTS FOR EMERGENCY LIGHTING

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. NRTL Compliance: Fabricate and label emergency lighting units, exit signs, and batteries to comply with UL 924.
- C. Comply with NFPA 70 and NFPA 101.
- D. Comply with NEMA LE 4 for recessed luminaires.
- E. Lamp Base: Comply with ANSI C81.61.
- F. Bulb Shape: Complying with ANSI C79.1.
- G. Internal Type Emergency Power Unit: Self-contained, modular, battery-inverter unit, factory mounted within luminaire body and compatible with ballast.
  - 1. Emergency Connection: Operate one lamp continuously at an output of 1100 lumens each upon loss of normal power. Connect unswitched circuit to battery-inverter unit and switched circuit to luminaire ballast.
  - 2. Operation: Relay automatically turns lamp on when power-supply circuit voltage drops to 80 percent of nominal voltage or below. Lamp automatically disconnects from battery when voltage approaches deep-discharge level. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
  - 3. Environmental Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated:
    - a. Ambient Temperature: Less than 0 deg F or exceeding 104 deg F, with an average value exceeding 95 deg F over a 24-hour period.
    - b. Ambient Storage Temperature: Not less than minus 4 deg F and not exceeding 140 deg F.
    - c. Humidity: More than 95 percent (condensing).
    - d. Altitude: Exceeding 3300 feet.
  - 4. Test Push-Button and Indicator Light: Visible and accessible without opening luminaire or entering ceiling space.
    - a. Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
    - b. Indicator Light: LED indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
  - 5. Battery: Sealed, maintenance-free, nickel-cadmium type.
  - 6. Charger: Fully automatic, solid-state, constant-current type with sealed power transfer relay.
  - 7. Remote Test: Switch in handheld remote device aimed in direction of tested unit initiates coded infrared signal. Signal reception by factory-installed infrared receiver in tested unit triggers simulation of loss of its normal power supply, providing visual confirmation of either proper or failed emergency response.

8. Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and a flashing red LED.
- H. External Type: Self-contained, modular, battery-inverter unit, suitable for powering one or more lamps, remote mounted from luminaire.
1. Emergency Connection: Operate one LED lamp continuously. Connect unswitched circuit to battery-inverter unit and switched circuit to luminaire ballast.
  2. Operation: Relay automatically turns lamp on when power-supply circuit voltage drops to 80 percent of nominal voltage or below. Lamp automatically disconnects from battery when voltage approaches deep-discharge level. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
  3. Nightlight Connection: Operate lamp in a remote luminaire continuously.
  4. Battery: Sealed, maintenance-free, nickel-cadmium type.
  5. Charger: Fully automatic, solid-state, constant-current type.
  6. Housing: NEMA 250, Type 1 enclosure listed for installation inside, on top of, or remote from luminaire. Remote assembly shall be located no less than half the distance recommended by the ballast manufacturer, whichever is less.
  7. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
  8. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
  9. Remote Test: Switch in handheld remote device aimed in direction of tested unit initiates coded infrared signal. Signal reception by factory-installed infrared receiver in tested unit triggers simulation of loss of its normal power supply, providing visual confirmation of either proper or failed emergency response.
  10. Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and a flashing red LED.

## 2.3 EMERGENCY LIGHTING

- A. General Requirements for Emergency Lighting Units: Self-contained units.
- B. Emergency Luminaires:
1. Emergency Luminaires: Drawings, with the following additional features:
    - a. Operating at nominal voltage of 277 V ac.
    - b. Internal emergency power unit.
    - c. Rated for installation in damp locations, and for sealed and gasketed luminaires in wet locations.

## 2.4 EXIT SIGNS

- A. General Requirements for Exit Signs: Comply with UL 924; for sign colors, visibility, luminance, and lettering size, comply with authorities having jurisdiction.

- B. Internally Lighted Signs:
  - 1. Operating at nominal voltage of 277 V ac.
  - 2. Lamps for AC Operation: LEDs; 50,000 hours minimum rated lamp life.
  - 3. Self-Powered Exit Signs (Battery Type): Internal emergency power unit.
- C. Manufacturers:
  - 1. Type X: Lithonia LQM-S-3-R-120/277-ELN-SD, or equivalent.
  - 2. Substitutions: Permitted.

## 2.5 MATERIALS

- A. Metal Parts:
  - 1. Free of burrs and sharp corners and edges.
  - 2. Sheet metal components shall be steel unless otherwise indicated.
  - 3. Form and support to prevent warping and sagging.
- B. Doors, Frames, and Other Internal Access:
  - 1. Smooth operating, free of light leakage under operating conditions.
  - 2. Designed to permit relamping without use of tools.
  - 3. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.
- C. Diffusers and Globes:
  - 1. Prismatic acrylic.
  - 2. Glass: Annealed crystal glass unless otherwise indicated.
  - 3. Acrylic: 100 percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
  - 4. Lens Thickness: At least 0.125 inch minimum unless otherwise indicated.
- D. Housings:
  - 1. Extruded aluminum housing and heat sink.
  - 2. Powder coat finish.
- E. Conduit: Flexible metallic conduit, minimum 3/4 inch in diameter.

## 2.6 METAL FINISHES

- A. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for conditions affecting performance of luminaires.
- B. Examine roughing-in for luminaire to verify actual locations of luminaire and electrical connections before luminaire installation.
- C. Examine walls, floors, roofs, and ceilings for suitable conditions where emergency lighting luminaires will be installed.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Comply with NECA 1.
- B. Install luminaires level, plumb, and square with ceilings and walls unless otherwise indicated.
- C. Install lamps in each luminaire.
- D. Supports:
  - 1. Sized and rated for luminaire and emergency power unit weight.
  - 2. Able to maintain luminaire position when testing emergency power unit.
  - 3. Provide support for luminaire and emergency power unit without causing deflection of ceiling or wall.
  - 4. Luminaire-mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire and emergency power unit weight and vertical force of 400 percent of luminaire weight.
- E. Wall-Mounted Luminaire Support:
  - 1. Attached to a minimum 20-gage backing plate attached to wall structural members.
  - 2. Do not attach luminaires directly to gypsum board.
- F. Ceiling Grid Mounted Luminaires:
  - 1. Secure to any required outlet box.
  - 2. Secure emergency power unit using approved fasteners in a minimum of four locations, spaced near corners of emergency power unit.
  - 3. Use approved devices and support components to connect luminaire to ceiling grid and building structure in a minimum of four locations, spaced near corners of luminaire.

### 3.3 IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

### 3.4 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
  - 1. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery power and retransfer to normal.
- B. Luminaire will be considered defective if it does not pass operation tests and inspections.
- C. Prepare test and inspection reports.

### 3.5 ADJUSTING

- A. Adjustments: Within 12 months of date of Substantial Completion, provide on-site visit to do the following:
  - 1. Inspect all luminaires. Replace lamps, emergency power units, batteries, signs, or luminaires that are defective.
    - a. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
  - 2. Conduct short-duration tests on all emergency lighting.

END OF SECTION

## SECTION 270500 - COMMON WORK RESULTS FOR COMMUNICATIONS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. When equipment furnished for or by the Owner as indicated on the drawings or specified, this Contractor shall make all connections to Owner furnished equipment. The Contractor shall verify exact requirements and locations before installation.
- B. Support from bar joists shall be allowed only at panel points in top or bottom chords.
  - 1. Loading shall not exceed 5 lbs./S.F. or 100 lbs. per panel point applied at the panel point.
  - 2. If support must occur between panel points, then threaded rods shall be dropped from both panel points, an adequate angle attached to both, and then the support attached to the angle as required.
  - 3. Supports shall not be attached to or through steel roof decks.
  - 4. Supports shall not be attached to the ceiling grid.
- C. The Contractor shall take field measurements necessary for his Work, and shall be responsible for the accurate location and size of openings, recesses, slots, ferrules, and the like.
- D. The Contractor shall be required to cooperate with "Other Trades" at the site and other Contractors in the coordination of his Work to avoid interferences with installations by other trades and Contractors.
- E. Deviations from the Drawings, to avoid interferences, shall be considered a "Job Condition" and no additional compensation will be considered applicable. In the event that such interferences occur in course of the Work, due to an error, omission, or oversight by the Contractor, no additional compensation shall be allowed. Interferences which may occur during the course of construction shall be brought to the immediate attention of the Architect/Engineer, and the Architect/Engineer decision, confirmed in writing, shall be final.
- F. Related sections include the following:
  - 1. Division 1 General Requirements
  - 2. Division 26 Electrical
  - 3. Division 27 Communications

### 1.3 REFERENCES

- A. Work shall be in accordance with codes, rules, ordinances, regulations of authorities, bodies, associations, and governments, having proper and legal jurisdiction. Specifically, the following requirements shall be met in their entirety.
  - 1. State and Local Rules, Regulations, Codes, Statutes and Ordinances
  - 2. National Fire Protection Association – applicable requirements
  - 3. National Board of Fire Protection
  - 4. National Electric Code – applicable requirements
  - 5. Other Codes and Standards as specifically noted in each Section of the Specifications
- B. Electrical equipment shall be Underwriter’s approved; also, shall meet requirements established by N.F.P.A., N.E.M.A., and A.N.S.I. and as specified hereinafter.
- C. Abbreviations used in these Specifications.
  - N.E.C. - National Electric Code – Latest Edition adopted by the National Fire Protection Association
  - N.E.M.A. - National Electrical Manufacturers Association
  - I.P.C.E.A. - Insulated Power Cable Engineers Association
  - A.N.S.I. - American National Standards Institute, Inc.
  - F.C.C. - Federal Communications Commission
  - N.A.B. - National Association of Broadcasters
  - N.A.E.B. - National Association of Educational Broadcasters
  - I.T.L. - Independent Testing Laboratories
  - E.T.L. - Electrical Testing Laboratories
  - U.L. - Underwriters Laboratories
  - B.I.C.S.I. - Building Industry Consulting Service International
  - I.E.E.E. - The Institute of Electrical and Electronics Engineers, Inc.
  - T.I.A. - Telecommunications Industry Association
  - E.I.A. - Electronic Industries Association
  - R.C.D.D. - Registered Communication Distribution Designer
  - N.I.C.E.T. - National Institute of Certification in Engineering Technologies

### 1.4 SUBMITTALS

- A. Provide shop drawings for each section separately as follows:
  - 1. Provide an index with a complete material list in the Specification sequence.
  - 2. Each Specification Section shall have its own material list.
  - 3. Provide product cut sheet for each specified item in sequence.
  - 4. Each manufacturer’s product cut sheet shall be highlighted.
  - 5. DO NOT submit more than one section at a time, if the shop drawings are to be submitted electronically.
- B. Provide wiring diagrams and system layout drawings showing all devices, equipment, home runs, labeling, dB loss, etc. for each of the following systems:
  - 1. Network electronics.
  - 2. Voice over IP telephone.
  - 3. Video distribution system.



- C. Partial shop drawings from one section WILL NOT BE ACCEPTABLE.
- D. Submittals will be returned unchecked if they do not follow the outlines above.
- E. Shop drawing submittals that are not required will be returned unchecked.

#### 1.5 QUALITY ASSURANCE

- A. The cabling system components and equipment shall be listed by Underwriters Laboratories, Inc., and the components shall bear the UL label. The system shall be installed in accordance with requirements set by National Electric Code.
- B. Installing Contractor shall have five years' experience in cable installations.
- C. the name, registration number, and seal of the RCDD responsible for this Project.
- D. Contractors shall have staffed office (secretary, project manager, technicians, etc.) within 100 miles of the project and provide a service response time of a maximum of two (2) hours from time of notification of major system failure.
- E. The Data Contractor shall have network certification in the manufacturer's equipment that he/she is installing.

#### 1.6 TECHNOLOGY ABBREVIATIONS

- A. Cable Pathway
  - 1. Shafts, conduits, surface mounted raceway, boxes, cable tray, and floor penetrations that provide routing space for communications cabling.

#### 1.7 PRECEDENCE

- A. Contractors shall review both Drawings and Schedules of Communications Systems for any discrepancy.
- B. If there is a discrepancy in the number of rooms and quantities between the Drawings and the Schedules, the Contractor shall include the higher of the two quantities.
- C. If the products specified are no longer available, Contractor shall provide replacement products that meet or exceed performance specifications of the original specified model at no cost to the Project.
- D. If the Contractor bids products that do not meet or exceed the performance specifications or the original specified model, the Contractor shall provide products that meet the performance specifications as approved by the Architect/Engineer at no cost to the project.

## PART 2 - EXECUTION

### 2.1 EXPLANATION AND PRECEDENCE OF DRAWINGS

- A. For purposes of clarity and legibility, the Telecommunication drawings are essentially diagrammatic and, although size and location of equipment are closely drawn to scale whenever possible, Contractor shall make use of the data in all of the Contract Documents and shall verify this information at the building site.
- B. The Drawings indicate required size and points of termination of wiring and other related items and may suggest proper routes for such items to conform to structure, avoid obstructions and preserve clearances. It is not intended that Drawings indicate every necessary offset. It shall be the Work of the Contractor to install each item in a manner to conform to structure, avoid obstructions, preserve headroom, and keep opening and passageways clear.
- C. It is intended that apparatus be located in coordination with architectural elements, and shall be installed at exact height and location stipulated.
- D. Contractor shall fully inform himself regarding peculiarities and limitations of the spaces available for the installation of work and materials provided under his Contract.
- E. Contractor shall carefully examine existing conditions, existing wiring and other materials on the premises and compare the documents with the existing conditions. Variances and necessary changes shall be adjusted by appropriate modifications.
- F. Contractor shall carefully examine the Division 26 drawings for pathways, etc.

### 2.2 PERMITS, FEES, REGULATIONS, INSPECTIONS

- A. Contractor shall arrange and pay for permits, fees, and inspections required in connection with his work for this project, from local, county, state, and public agencies, and shall obtain permits from railroad, state highway, and utility companies.
- B. Work shall be inspected by approved local and state inspection bureaus, Electrical Inspection Agency, and/or authority, and local utilities.
- C. Upon completion of the Work, the Contractor shall furnish to the Architect/Engineer, a certification of inspection and approval from said Bureau or Agency before final payment on contract will be allowed.
- D. Contractor shall verify the right of way with all local and state agencies.

### 2.3 HOISTS, RIGGING, TRANSPORTATION, AND SCAFFOLDING

- A. Contractor shall provide scaffolding, staging, cribbing, tackle, hoists, and rigging necessary for placing of his materials and equipment in their proper places in the project.

- B. Contractor shall pay costs for transportation of materials and equipment to the job site and shall include such costs in his proposal.
- C. Scaffolding and hoisting equipment shall comply with requirements of pertinent Federal, State, and Local Laws and Codes.

## 2.4 PROTECTION

- A. In addition to other requirements of the Contract, the Contractor shall provide various types of protection as follows:
  - 1. Protect finished floors during installation, etc.
  - 2. Protect equipment, finished surfaces from paint droppings, insulation adhesive, and sizing droppings by use of drop cloths.
  - 3. Protect countertops during cutting for grommets.
  - 4. Protect video projectors, televisions, DVD, switches, sound system, etc. from dirt.
- B. Contractor shall be responsible for the protection of finished work from other trades from damage or defacement by his operations and shall remedy such damage at his own expense.

## 2.5 CUTTING AND PATCHING

- A. Contractor shall do his own cutting and patching of building materials and piping, as required for the installation of his Work, but no structural members shall be cut without the approval of the Architect and such cutting shall be done in a manner directed by the Architect.
- B. Patching of and repair of damage to Work in place shall be done in a neat and workmanlike manner, meeting with the approval of the Architect. Contractor whose operations require cutting of work in place, or who causes damage which entails repairs of such work, shall employ mechanics of the particular trade whose work must be cut or which is damaged, and shall pay the costs of such patching or repair.
- C. Contractor shall be responsible for any additional sleeves and cores should they be required. NO change order shall be issued to provide sleeves in addition to those provided under the Electrical Contract.

## 2.6 FINAL COMPLETION

- A. Communication installation shall be cleaned prior to Substantial Completion of the Work.
- B. Retouch or repaint factory painted prime and finish coats, where scratched or damaged. Whenever retouching will not be satisfactory, the Architect/Engineer may require complete repainting until the desired appearance is obtained.
- C. Contractor shall clean equipment; restore damaged materials; remove grease, oil, chemical, paint spots, and stains; and generally leave the Work in A-1 condition.

- D. Contractor and his subcontractors, on completion of his Work, shall remove tools, equipment, surplus materials, and rubbish pertaining to his operations, and pay costs for such removal and disposal from the site.

## 2.7 GUARANTEE AND WARRANTY

- A. Contractor shall submit written certificates, warranting that each item of equipment furnished complies with the requirements of the Drawings and Specifications.

## 2.8 SUPERVISION AND COOPERATION

- A. Work by the Contractor under this Division 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 related equipment and materials furnished under other contracts or by the Owner.

## 2.9 COLOR CHART

- A. All voice, video, and data cables and connectors to have the following colors:

Description Item	Jack	Cable	I.D.	Notes
Telephone	By Owner	By Owner	T	4 Pair Cable
Data/Computer	By Owner	By Owner	D	4 Pair Cable
AV Control Cable	By Owner	By Owner	L	4 Pair Cable
Security Cable	-	White	S	Multi-Conductors
Card Reader	-	Orange	CR	18/6
Telephone Patch Cord	-	By Owner		
Data Patch Cord	-	By Owner		
Coax	-	Black/White		
S-Video	-	Black/White		
VGA	-	Black/White		

2.10 EXISTING MATERIALS

- A. Coordinate demolition and removal of communication equipment with the Owner.

2.11 MATERIAL LIST

- A. Contractors shall provide with their bids complete materials list showing manufacturer's name, catalog numbers, description, and quantities for each item in each system, per section number.
- B. The lowest responsible bidders shall provide unit pricing for all materials as described in Part "A" above, within 24 hours with NO exceptions.
- C. If a subcontractor is utilized for any portion of the work, all contact information, references, material list, and any other information shall be provided per the specified requirements.

END OF SECTION

## SECTION 270526 - GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS

### 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. Grounding conductors.
  - 2. Grounding connectors.
  - 3. Grounding labeling.

#### 1.3 DEFINITIONS

- A. BCT: Bonding conductor for telecommunications.
- B. EMT: Electrical metallic tubing.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For communications equipment room signal reference grid. Include plans, elevations, sections, details, and attachments to other work.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. As-Built Data: Plans showing as-built locations of grounding and bonding infrastructure, including the following:
  - 1. BCT and routing of their bonding conductors.
- B. Field quality-control reports.

#### 1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For grounding to include in emergency, operation, and maintenance manuals.

## PART 2 - PRODUCTS

### 2.1 SYSTEM COMPONENTS

- A. Comply with J-STD-607-A.

### 2.2 CONDUCTORS

- A. Comply with UL 486A-486B.
- B. Insulated Conductors: Stranded copper wire, green insulation, insulated for 600 V, and complying with UL 83.
  - 1. Ground wire for custom-length equipment ground jumpers shall be No. 6 AWG, 19-strand, UL-listed, Type THHN wire.
  - 2. Cable Tray Equipment Grounding Wire: No. 8 AWG.
- C. Cable Tray Grounding Jumper:
  - 1. Not smaller than No. 10 AWG 26 kmils and not longer than 12 inches. If jumper is a wire, it shall have a crimped grounding lug with one hole and standard barrel for one crimp. If jumper is a flexible braid, it shall have a one- or two-hole ferrule. Attach with grounding screw or connector provided by cable tray manufacturer.
- D. Bare Copper Conductors:
  - 1. Solid Conductors: ASTM B 3.
  - 2. Stranded Conductors: ASTM B 8.
  - 3. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
  - 4. Bonding Jumper: Tinned-copper tape, braided conductors terminated with two-hole copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

### 2.3 CONNECTORS

- A. Irreversible connectors listed for the purpose. Listed by an NRTL as complying with NFPA 70 for specific types, sizes, and combinations of conductors and other items connected. Comply with UL 486A-486B.
- B. Compression Wire Connectors: Crimp-and-compress connectors that bond to the conductor when the connector is compressed around the conductor. Comply with UL 467.
  - 1. Electroplated tinned copper, C and H shaped.
- C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

## 2.4 LABELING

- A. Comply with TIA/EIA-606-A and UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.
- B. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch. Overlay shall provide a weatherproof and UV-resistant seal for label.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine the ac grounding electrode system and equipment grounding for compliance with requirements for maximum ground-resistance level and other conditions affecting performance of grounding and bonding of the electrical system.
- B. Inspect the test results of the ac grounding system measured at the point of BCT connection.
- C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- D. Proceed with connection of the BCT only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Bonding shall include the grounding electrode system. The bonding of these elements shall form a loop so that each element is connected to at least two others.
- B. Comply with NECA 1.
- C. Comply with J-STD-607-A.

### 3.3 APPLICATION

- A. Conductors: Install solid conductor for No. 8 AWG and smaller and stranded conductors for No. 6 AWG and larger unless otherwise indicated.
- B. Conductor Terminations and Connections:
  - 1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
  - 2. Connections to Structural Steel: Welded connectors.
- C. Conductor Support:
  - 1. Secure grounding and bonding conductors at intervals of not less than 36 inches.
- D. Grounding and Bonding Conductors:



1. Install in the straightest and shortest route between the origination and termination point, and no longer than required. The bend radius shall not be smaller than eight times the diameter of the conductor. No one bend may exceed 90 degrees.
2. Install without splices.
3. Support at not more than 36-inch intervals.
4. Install grounding and bonding conductors in 3/4-inch PVC conduit until conduit enters a telecommunications room. The grounding and bonding conductor pathway through a plenum shall be in EMT. Conductors shall not be installed in EMT unless otherwise indicated.
  - a. If a grounding and bonding conductor is installed in ferrous metallic conduit, bond the conductor to the conduit using a grounding bushing and bond both ends of the conduit to a TGB.

### 3.4 CONNECTIONS

- A. Bond metallic equipment in a telecommunications equipment room to the grounding busbar in that room, using equipment grounding conductors not smaller than No. 6 AWG.
- B. Stacking of conductors under a single bolt is not permitted when connecting to busbars.
- C. Assemble the wire connector to the conductor, complying with manufacturer's written instructions and as follows:
  1. Use crimping tool and the die specific to the connector.
  2. Pretwist the conductor.
  3. Apply an antioxidant compound to all bolted and compression connections.

### 3.5 IDENTIFICATION

- A. Labels shall be preprinted or computer-printed type.
  1. Label the BCT and each telecommunications backbone conductor at its attachment point: "WARNING! TELECOMMUNICATIONS BONDING CONDUCTOR. DO NOT REMOVE OR DISCONNECT!"

### 3.6 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Perform tests and inspections.
- C. Tests and Inspections:
  1. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.

2. Test for ground loop currents using a digital clamp-on ammeter, with a full-scale of not more than 10 A, displaying current in increments of 0.01 A at an accuracy of plus/minus 2.0 percent.
  - a. With the grounding infrastructure completed and the communications system electronics operating, measure the current in every conductor connected to the TMGB and in each TGB. Maximum acceptable ac current level is 1 A.
- D. Excessive Ground Resistance: If resistance to ground at the BCT exceeds 5 ohms, notify Architect promptly and include recommendations to reduce ground resistance.
- E. Grounding system will be considered defective if it does not pass tests and inspections.
- F. Prepare test and inspection reports.

END OF SECTION

## SECTION 27 13 43

### COMMUNICATIONS SERVICES CABLING

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. Section includes components and devices to extend existing DATA/LAN and VOIP Telecommunications system to serve the new addition as indicated on Drawings.
- B. Related Sections:
  - 1. Section 26 05 33 - Conduits and Backboxes.
  - 2. Section 26 27 26 - Wiring Devices and Wall plates.
  - 3. Section 27 05 26 - Grounding and Bonding for Communications Systems.

##### 1.2 REFERENCES

- A. International Electrical Testing Association:
  - 1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
- B. National Fire Protection Association:
  - 1. NFPA 262 - Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces.
- C. Telecommunications Industry Association/Electronic Industries Alliance:
  - 1. TIA/EIA 568 - Commercial Building Telecommunications Cabling Standard.
  - 2. TIA/EIA 569 - Commercial Building Standard for Telecommunications Pathways and Spaces.
- D. Underwriters Laboratories, Inc.:
  - 1. UL 2043 - Fire Test for Heat and Visible Smoke Release for Discrete Products and their Accessories Installed in Air-Handling Spaces.

##### 1.3 SYSTEM DESCRIPTION

- A. Backbone Pathway from existing DATA and VOIP network equipment in existing building to new communications and data room: Conform to TIA/EIA 569 using Cat-6 cabling in conduit.
- B. Horizontal Pathway: Conform to TIA/EIA 569, using raceway, backboards, and cabinets where indicated on Drawings.
- C. Horizontal Wiring:
  - 1. DATA/LAN: Complete from new data patch panel in standard 19" rack installed in communications and data room, to each outlet location indicated, using Cat-6 compliant materials and methods. Cabling shall be routed concealed in conduit

where in walls, supported from structure where exposed and in cable trays throughout, terminated at 8P8C wall jacks labeled "LAN."

2. VOIP Telecommunications: Complete from new telecommunications patch panel in standard 19" rack installed in communications and data room, to each outlet location indicated, using Cat-5e compliant materials and methods. Cabling shall be routed concealed in conduit where in walls, supported from structure where exposed and in cable trays throughout, terminated at 8P8C wall jacks labeled "VOIP."
3. IP/CAMERA: Complete from new communications and data room, with minimum 8' cabling looped and labeled, unterminated, for future use by owner. Homerun to each above-ceiling outlet location indicated, using Cat-6 compliant materials and methods. Cabling shall be routed concealed in conduit where in walls, supported from structure where exposed and in cable trays throughout, to a surface-mounted "finish" box 6" above accessible ceiling grid on the nearest wall location where shown on project Drawings. Identify finish box with label "CAMERA" and leave minimum 48" slack cabling looped and secured to structure above.

- D. Project includes wall outlets, terminated cabling and patch panel infrastructure to the rack only. All active data and telecommunications gear or equipment is Not In Contract (by others).

#### 1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit catalog data for each termination device, cable, and outlet device.
- C. Test Reports: Indicate procedures and results for specified field testing and inspection.

#### 1.5 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
- B. Project Record Documents: Record actual locations and sizes of pathways and outlets.

#### 1.6 QUALITY ASSURANCE

- A. Provide wiring materials located in plenums with peak optical density not greater than 0.5, average optical density not greater than 0.15, and flame spread not greater than 5 feet when tested in accordance with NFPA 262.
- B. Provide combustible electrical equipment exposed within plenums with peak rate of heat release not greater than 100 kW, peak optical density not greater than 0.5, and average optical density not greater than 0.15 when tested in accordance with UL 2043.

#### 1.7 QUALIFICATIONS

- A. Installer: Company specializing in installing products specified in this section with minimum three years experience.

## 1.8 PRE-INSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

## 1.9 EXTRA MATERIALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Spare parts and maintenance products.
- B. Furnish two extra modular faceplates and outlet jacks of each type used, with part number and supplier contact information, secured to each patch panel/rack in data room.

## 1.10 COORDINATION

- A. Coordinate with owner's IT staff for termination location to connect new extension cabling to existing building systems.

# PART 2 PRODUCTS

## 2.1 TELECOM/VOIP PATCH PANEL

- A. Connect to existing panel in Room 238.

## 2.2 DATA PATCH PANEL

- A. Product Description: TIA/EIA-568-C compliant, rack-mounted assembly including back-side cabling terminals with face-side accessible jacks, with adequate capacity for active circuits shown on Drawings and with minimum 10% spare/unused circuit locations.

## 2.3 TELEPHONE OUTLET JACKS

- A. Design Base: Panduit; Cat6 RJ45 Data Jacks.
- B. Product Description: Modular; Conform to TIA/EIA 568 requirements for CAT-6 cable connectors for 8P8C termination and snap-in installation to modular faceplates.
- C. Modular faceplate shall include blank snap-in plate for all spaces not used.

## 2.4 DATA OUTLET JACKS

- A. Design Base: Panduit; Cat6 RJ45 Data Jacks.
- B. Product Description: Modular; Conform to TIA/EIA 568 requirements for CAT-6 cable connectors for 8P8C termination and snap-in installation to modular faceplates.
- C. Modular faceplate shall include blank snap-in plate for all spaces not used.

## 2.5 UNSHIELDED BACKBONE CABLE

- A. Manufacturers
  - 1. General Model GenSPEED 6000 series or higher.
  - 2. Belden Model 7851A series or higher.
  - 3. Berk-Tek Model LANmark-2000 series or higher.
  - 4. CDT Model AdvanceNET series or higher.
  - 5. Panduit Model TX6500 series or higher.
- B. Product Description: TIA/EIA 568, Category 6, UL Type CMP where exposed in plenum, sweep tested and characterized to min. of 500 MHz, NGT 50 dB attenuation, unshielded twisted pair (UTP) plenum rated cable with 4 pairs, ripcord, 24 AWG copper conductor.

## 2.6 UNSHIELDED HORIZONTAL DATA CABLE

- A. Manufacturers
  - 1. General Model GenSPEED 6000 series or higher.
  - 2. Belden Model 7851A series or higher.
  - 3. Berk-Tek Model LANmark-2000 series or higher.
  - 4. CDT Model AdvanceNET series or higher.
  - 5. Panduit Model TX6500 series or higher.
- B. Product Description: TIA/EIA 568, Category 6, UL Type CMP where exposed in plenum, sweep tested and characterized to min. of 500 MHz, NGT 50 dB attenuation, unshielded twisted pair (UTP) plenum rated cable with 4 pairs, ripcord, 24 AWG copper conductor.

## PART 3 EXECUTION

### 3.1 EXISTING WORK

- A. Maintain access to existing telecommunications equipment, cabling, and terminations and other installations remaining active and requiring access.
- B. Extend existing telecommunications installations using materials and methods as specified.

### 3.2 INSTALLATION

- A. Install pathways in accordance with TIA/EIA 569.
- B. All cabling to be run at parallels and perpendiculars to structure, secured as high as possible directly to highest structural member available, until entry into open cable tray, where all cabling of similar systems shall be bound together.
- C. Install wire and cable in accordance with TIA/EIA 568. Terminate each end of each cable using T568B pin/pair assignments.
- D. Install termination equipment and enclosures plumb, and attach securely to building wall or floor at each corner.

- E. Install and leave polyethylene pulling string in each conduit over 10 feet in length or containing bends.
- F. Install engraved plastic nameplates on each panel. Mark cabinets with legend "TELEPHONE", "CAMERA", "ACCESS CONTROL", etc.
- G. Ground and bond pathways, cable shields, and equipment in accordance with NEC and Section 270526.

### 3.3 FIELD QUALITY CONTROL

- A. 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Inspect and test copper cables and terminations in accordance with TIA/EIA 568.

END OF SECTION



# ADMINISTRATION CENTER RENOVATION

## COUNTY OF JEFFERSON, MO

### 729 Maple St., Hillsboro, Mo 63050

ARCHITECT / ENGINEER:

**HURST-ROSCHÉ, INC.**  
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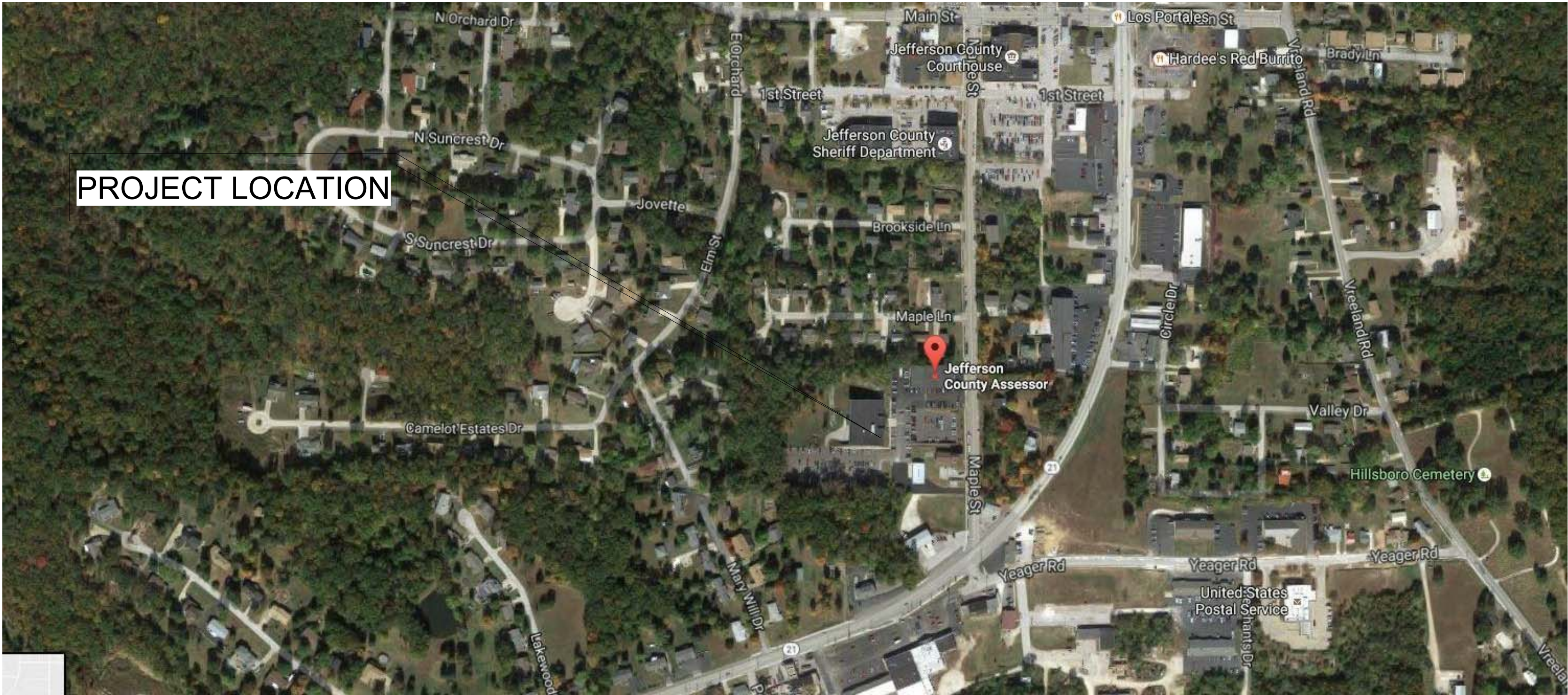
1400 E. TREMONT ST., P.O. BOX 130  
HILLSBORO, ILLINOIS 62049  
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200 N. MARKET ST.  
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(618) 998-0075 FAX (618) 998-0076

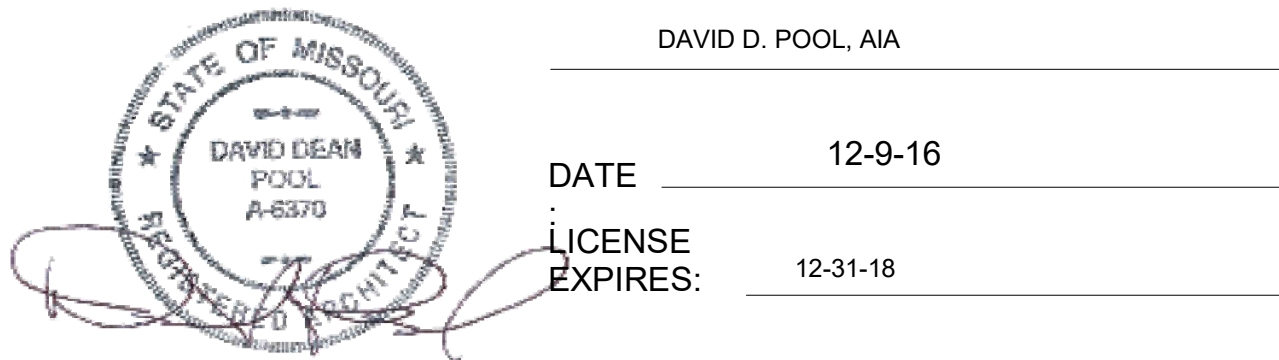
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AREA LOCATION MAP



DATE: 12-9-16



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AB	ANCHOR BOLT
ABV	ABOVE
AC	ACOUSTICAL
ACC	ACCESS
ACT	ACOUSTICAL CEILING TILE
ACU	AIR CONDITIONING UNIT
AD	AREA DRAIN
ADH	ADHESIVE
ADJ	ADJACENT
ADJT	ADJUSTABLE
AFF	ABOVE FINISH FLOOR
AGL	ABOVE GROUND LEVEL
AHU	AIR HANDLING UNIT
ALT	ALTERNATE, ALTERNATIVE
ALUM	ALUMINUM
ANC	ANCHOR, ANCHORAGE
AP	ACCESS PANEL
APD	AIR PRESSURE DROP
ARCH	ARCHITECT
ASPH	ASPHALT
AUTO	AUTOMATIC
BD	BOARD
BEL	BELOW
BL	BRICK LEDGE
BLDG	BUILDING
BLE	BRICK LEDGE ELEVATION
BLK	BLOCK
BLKG	BLOCKING
BM	BENCH MARK, BEAM
BOF	BOTTOM OF FOOTING
B.O.S.	BOTTOM OF STEEL
BOT	BOTTOM
BPL	BEARING PLATE
BRG	BEARING
BS	BOTH SIDES
BSE	BOTTOM STEEL ELEVATION
BTU/H	BRITISH THERMAL UNIT PER HOUR
BTWN	BETWEEN
BVL	BEVELED
BW	BOTH WAYS
C	CONVECTOR UNIT
CAB	CABINET
CC	COOLING COIL
CEM	CEMENT
CER	CERAMIC
CF	CUBIC FOOT
CFL	COUNTERFLASHING
CFM	CUBIC FEET PER MINUTE
CG	CORNER GUARD
CH	CABINET HEATER
CHAM	CHAMFER
CI	CAST IRON
CIR	CIRCLE
CJ	CONTROL JOINT
CK	CAULKING
CL	CLEARANCE
C	CENTERLINE
CLG	CEILING
CLL	CONTRACT LIMIT LINE
CLR	CLEAR (ANCE)
CLS	CLOSURE
CMU	CONCRETE MASONRY UNIT
CO	CLEAN OUT
COL	COLUMN
COMB	COMBINATION
COMP	COMPRESS (ED), (ION), (IBLE)
CONC	CONCRETE
CONST	CONSTRUCTION
CONT	CONTINUOUS
CONTR	CONTRACT (OR)
COTF	CLEAN OUT TO FLOOR
COTG	CLEAN OUT TO GRADE
COTW	CLEAN OUT TO WALL
CPR	COPPER
CPT	CARPET (ED)
CS	COUNTERSINK
CSMT	CASEMENT
CT	CERAMIC TILE
CTR	CENTER
CTW	CERAMIC TILE WAINSCOTT
CU-X	CONDENSER UNIT
CW	CASEWORK
CWR	COLD WATER RETURN
CWS	COLD WATER SUPPLY
CY	CUBIC YARD
DB/WB	DRY BULB / WET BULB
DCW	DOMESTIC COLD WATER

DBL	DOUBLE
DEG	DEGREES
DEMO	DEMOLISH, DEMOLITION
DEP	DEPRESSED
DFD	DYNAMIC FIRE DAMPER
DH	DOUBLE HUNG
DHW	DOMESTIC HOT WATER
DI	DUCTILE IRON
DIAG	DIAGONAL
DIAM	DIAMETER
DIM	DIMENSION
DIV	DIVISION
DL	DEAD LOAD
DMT	DEMOUNTABLE
DPR	DAMPER
DR	DOOR
DS	DOWNSPOUT
DT	DRAINTILE
DTL	DETAIL
DWG	DRAWING
DWL	DOWEL(S)
DWR	DRAWER
EAT	ENTERIN AIR TEMPERATURE
EF	EXHAUST FAN
EG	EXHAUST GRILL
EH	ELECTRIC HEATER
EJ	EXPANSION JOINT
EL	ELEVATION
ELEC	ELECTRIC (AL)
ELEV	ELEVATOR
ENC	ENCLOSE (URE)
EP	ELECTRICAL PANELBOARD
EQ	EQUAL
EQP	EQUIPMENT
ESP	EXTERNAL STATIC PRESSURE
EST	ESTIMATE
EW	EACH WAY
EWC	ELECTRIC WATER COOLER
EWC-X	ELECTRIC WATER COOLER
EWT	ENTERING WATER TEMPERATURE
EXG	EXISTING
EXH	EXHAUST AIR
EXP	EXPOSED
EXT	EXTERNAL (IOR)
F	DEGREES FAHRENHEIT
FA	FIRE ALARM
FACP	FIRE ALARM CONTROL PANEL
FAS	FASTEN, FASTENER
FBD	FIBERBOARD
FBO	FURNISHED BY OTHERS
FC	FAN COIL
FD	FLOOR DRAIN
FD-X	FLOOR DRAIN
FE	FIRE EXTINGUISHER
FEC	FIRE EXTINGUISHER CABINET
FF	FINISHED FLOOR
FFE	FINISHED FLOOR ELEVATION
FFL	FINISHED FLOOR LINE
FGE	FINISHED GRADE ELEVATION
FGL	FIBERGLASS
FIN	FINISH (ED)
FJT	FLUSH JOINT
FLA	FULL LOAD AMPS
FLG	FLASHING
FLR	FLOOR (ING)
FLUR	FLUORESCENT
FLX	FLEXIBLE
FND	FOUNDATION
FOC	FACE OF CONCRETE
FOM	FACE OF MASONRY
FOS	FACE OF STUDS
FP	FIREPROOF
FPL	FLOOR PLATE
FBM	FEET PER MINUTE
FR	FRAME (D), (ING)
FRA	FRESH AIR
FRT	FIRE-RETARDANT
FS	FULL SIZE
FS-X	FLOOR SINK
FT	FEET
FTG	FOOTING
FUR	FURRED (ING)
FURN	FURNACE
FUT	FUTURE
G	GLASS
Ga	GAGE, GAUGE
GALV	GALVANIZED

GB	GRAB BAR
GC	GENERAL CONTRACT (OR)
GLF	GLASS FIBER
GPM	GALLONS PER MINUTE
GR	GRADE, GRADING
GRT	GROUT
GVL	GRAVEL
GWB	GYPSPUM WALL BOARD
GYP BD	GYPSPUM BOARD
G	GLASS
GA	GAGE, GAUGE
GALV	GALVANIZED
GB	GRAB BAR
GC	GENERAL CONTRACT (OR)
GLF	GLASS FIBER
GPM	GALLONS PER MINUTE
GR	GRADE, GRADING
GRT	GROUT
GVL	GRAVEL
GWB	GYPSPUM WALL BOARD
GYP BD	GYPSPUM BOARD
HB	HOSE BIB
HC	HOLLOW CORE
HD	HEAVY DUTY
HDR	HEADER
HDW	HARDWARE
HJT	HEAD JOINT
HM	HOLLOW METAL
HORIZ	HORIZONTAL
HP	HORSEPOWER
HSS	STRUCTURAL TUBE
HT	HEIGHT
HTG	HEATING
HVC	HEATING, VENTILATING, AND AIR
CONDITIONING	
HWD	HARDWOOD
HWH	HOT WATER HEATER
HWR	HOT WATER RETURN
HWS	HOT WATER SUPPLY
HYD	HYDRANT
HYD-X	WALL HYDRANT
HZ	HERTZ
ID	INSIDE DIAMETER
IF	INSIDE FACE
IN	INCH
INCL	INCLUDING
INS	INSULATE (D), (ION)
INT	INTERIOR
J	JOIST
JBE	JOIST BEARING ELEVATION
JF	JOINT FILLER
JT	JOINT
KPL	KICKPLATE
L	LENGTH
LAD	LADDER
LAM	LAMINATE (D)
LAT	LEAVING AIR TEMPERATURE
LAV	LAVATORY
LAV-X	LAVATORY
LBL	LABEL
LF	LINEAL FEET
LH	LEFT HAND
LL	LIVE LOAD
LLH	LONG LEG HORIZONTAL
LLV	LONG LEG VERTICAL
LPT	LOW POINT
LRA	LOCKED ROTO AMPS
LT	LIGHT
LTL	LINTEL
LU	LOUVER
LW	LIGHTWEIGHT
LWT	LEAVING WATER TEMPERATURE
LVR	LOUVER
M/MECH	MECHANICAL
MAS	MASONRY
MAU-X	MAKE UP AIR UNIT
MAX	MAXIMUM
MBH	1,000 BTU/Hr.
MBR	MEMBER
MCT	MOSAIC CERAMIC TILE
MED	MEDIUM
MFG	MANUFACTURE (ER)
MI	MALLEABLE IRON
MIN	MINIMUM

MISC	MISCELLANEOUS
MLD	MOLDING
MMB	MEMBRANE
MO	MASONRY OPENING
MOV	MOVABLE
MRACT	MOISTURE RESISTANT ACT
MS-X	MOP SINK
MT	MOUNT (ED), (ING)
MTL	METAL
MULL	MULLION
MVD	MANUAL VOLUME DAMPER
MWK	MILLWORK
NAT	NATURAL
NC	NORMALLY CLOSED
NIC	NOT IN CONTRACT
No	NUMBER
NOP	NORMALLY OPEN
NOM	NOMINAL
NRC	NOISE REDUCTION COEFFICIENT
NTS	NOT TO SCALE
OA	OUTSIDE AIR
OC	ON CENTER
OD	OUTSIDE DIAMETER
OF	OUTSIDE FACE
OH	OVERHEAD
OPG	OPENING
OPP	OPPOSITE
OWSJ	OPEN WEB STEEL JOIST
P	PAINT (ED)
PAR	PARALLEL
PCF	POUNDS PER CUBIC FOOT
PERF	PERFORATE (D)
PERI	PERIMETER
PFB	PREFABRICATE (D)
PFN	PREFINISHED
PHK	PREHEAT COIL
PK	PARKING
PL	PLATE
PLUM	PLUMBING
PLF	POUNDS PER LINEAL FOOT
PLAS	PLASTER
PLASM	PLASTIC LAMINATE
PNL	PANEL
PORC.	PORCELAIN
PPT	PORCELAIN PAVER TILE
PRF	PREFORMED
PRV	PRESSURE REDUCING VALVE
PSF	POUNDS PER SQUARE FOOT
PSI	POUNDS PER SQUARE INCH
PT	POINT
PTN	PARTITION
PVC	POLYVINYL CHLORIDE
PWD	PLYWOOD
RA	RETURN AIR
RAD	RADIUS
RB	RUBBER BASE
REF	REFERENCE
REINF	REINFORCE (D), (ING)
REM	REMOVE
RES	RESILIENT
RET	RETURN
REV	REVISION (S), REVISED
RFA	RELIEF AIR
RFG	ROOFING
RFL	REFLECT (ED), (IVE), (OR)
RH	RELATIVE HUMIDITY
RHC	REHEAT COIL
RH-X	RELIEF HOOD
RL	RAIL (ING)
RM	ROOM
RO	ROUGH OPENING
RTU	ROOF TOP UNIT
RV	RELIEF VALVE
RVS	REVERSE (SIDE)
S	SENSOR
SA	SUPPLY AIR
SAN	SANITARY
SC	SOLID CORE
SCH	SCHEDULE
SEC	SECTION
SF	SQUARE FOOT
SHTG	SHEATHING
SHT	SHEET
SIM	SIMILAR
SK-X	SINK
SL	SLEEVE

SP	STATIC PRESSURE
SPEC	SPECIFICATIONS
SPL	SPECIAL
SQ	SQUARE
SS	STAINLESS STEEL
STA	STATION
STD	STANDARD
STL	STEEL
STO	STORAGE
STRUCT	STRUCTURAL
SY	SQUARE YARD
SYM	SYMMETRY (ICAL)
SYS	SYSTEM
S&V	STAINED AND VARNISHED
T	THERMOSTAT
TCE	TOP OF CONCRETE ELEVATION
TEL	TELEPHONE
THK	THICK (NESS)
THR	THRESHOLD
TMV-X	THERMOSTATIC MIXING VALVE
T.O.C.	TOP OF CONCRETE
TOF	TOP OF FOOTING
TOL	TOLERANCE
T.O.S.	TOP OF STEEL
TSE	TOP OF STEEL ELEVATION
TSL	TOP OF SLAB
TV	TELEVISION
TWR	TEMPERED WATER RETURN
TWS	TEMPERED WATER SUPPLY
TYP	TYPICAL
T&G	TONGUE AND GROOVE
VAR	VARNISH
VB	VAPOR BARRIER
VCT	VINYL COMPOSITON TILE
VERT	VERTICAL
VJ	V-JOINT (ED)
VNR	VENEER PLASTER
VTR	VENT THROUGH ROOF
VWC	VINYL WALL COVERING
W	WIDTH, WIDE
WB	WOOD BASE
WC	WATER CLOSET/WATER COLUMN
WC-X	WATER CLOSET
WD	WOOD
WF	WALL FINISH
WF-X	WATER FOUNTAIN
WH-X	WATER HEATER
WP	WATER PROOFING
WPD	WATER PRESSURE DROP
WPT	WORKING POINT
WR	WATER REPELLENT
WS	WATERSTOP
WSCT	WAINSCOT
WWF	WELDED WIRE FABRIC
W/	WITH
W/O	WITHOUT

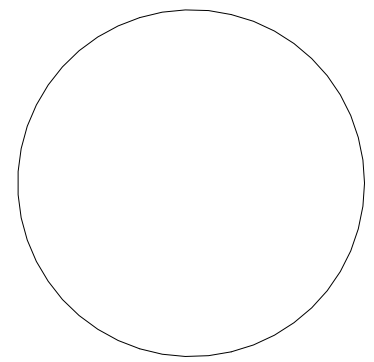
## DRAWING INDEX

GENERAL	
G-101	COVER SHEET
G-102	ABBREVIATIONS, DRAWING INDEX, MATERIAL DESIGNATION, AND CODE REFRENCE
ARCHITECTURAL	
A-101	LOWER LEVEL DEMO AND RENOVATION FLOOR PLANS
A-102	MAIN LEVEL DEMO AND RENOVATION PLANS
A-201	INTERIOR ELEVATIONS, DOOR SCHEDULE, ROOM FINISH SCHEDULE, AND DOOR DETAILS
MECHANICAL	
M-101	MAIN LEVEL HVAC, DEMO PLANS AND SCHEDULES
M-102	LOWER LEVEL HVAC AND DEMO PLAN
ELECTRICAL	
E-101	MAIN LEVEL POWER/DATA PLANS
E-102	LOWER LEVEL POWER/DATA PLANS
E-103	MAIN LEVEL LIGHTING PLANS
E-104	LOWER LEVEL LIGHTING PLANS



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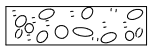
ADMINISTRATION CENTER RENOVATION

COUNTY OF JEFFERSON, MO  
729 Maple St., Hillsboro, Mo 63050

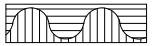
## MATERIAL DESIGNATION



EARTH



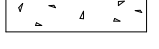
POROUS FILL  
stone, gravel, etc.



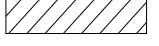
ROCK



LIGHTWEIGHT  
CONCRETE



STRUCTURAL  
CONCRETE



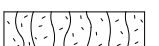
BRICK



CONCRETE  
MASONRY UNITS



STRUCTURAL  
GLAZED TILE



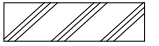
CUT STONE



MARBLE



RUBBLE STONE



ALUMINUM



STEEL  
large  
scale



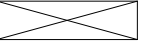
STEEL  
small scale



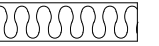
PLYWOOD



FINISH WOOD



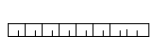
ROUGH WOOD



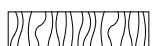
INSULATION  
loose or batt



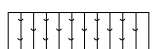
INSULATION  
rigid



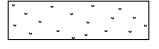
ACOUSTICAL TILE



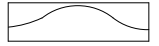
CERAMIC TILE



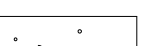
QUARRY TILE



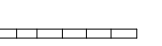
TERRAZZO



GYPSPUM WALLBOARD



PLASTER, SAND  
CEMENT, GROUT



RESILIENT FLOORING

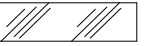
Elevation



CONCRETE, PLASTER



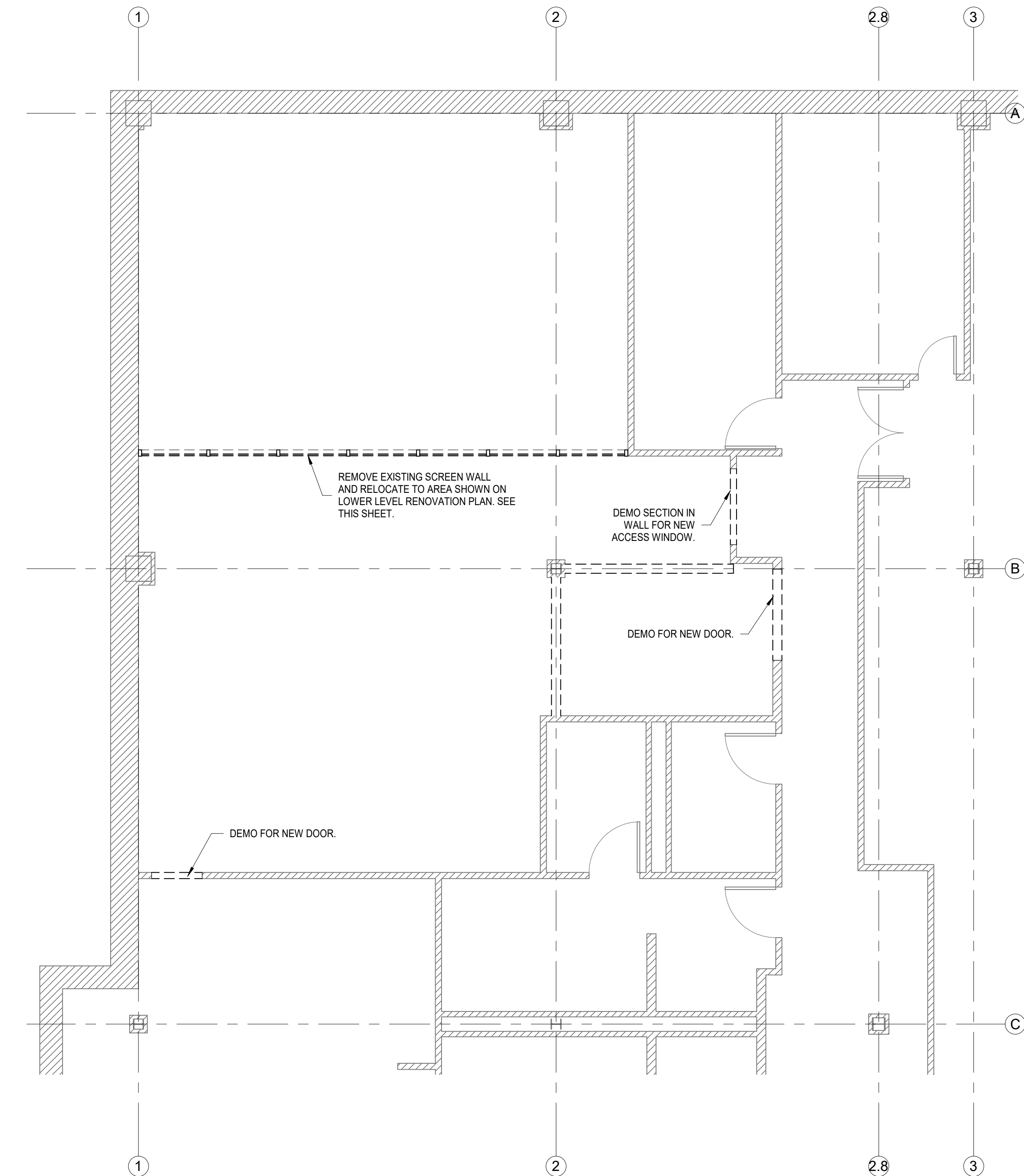
SHEET METAL



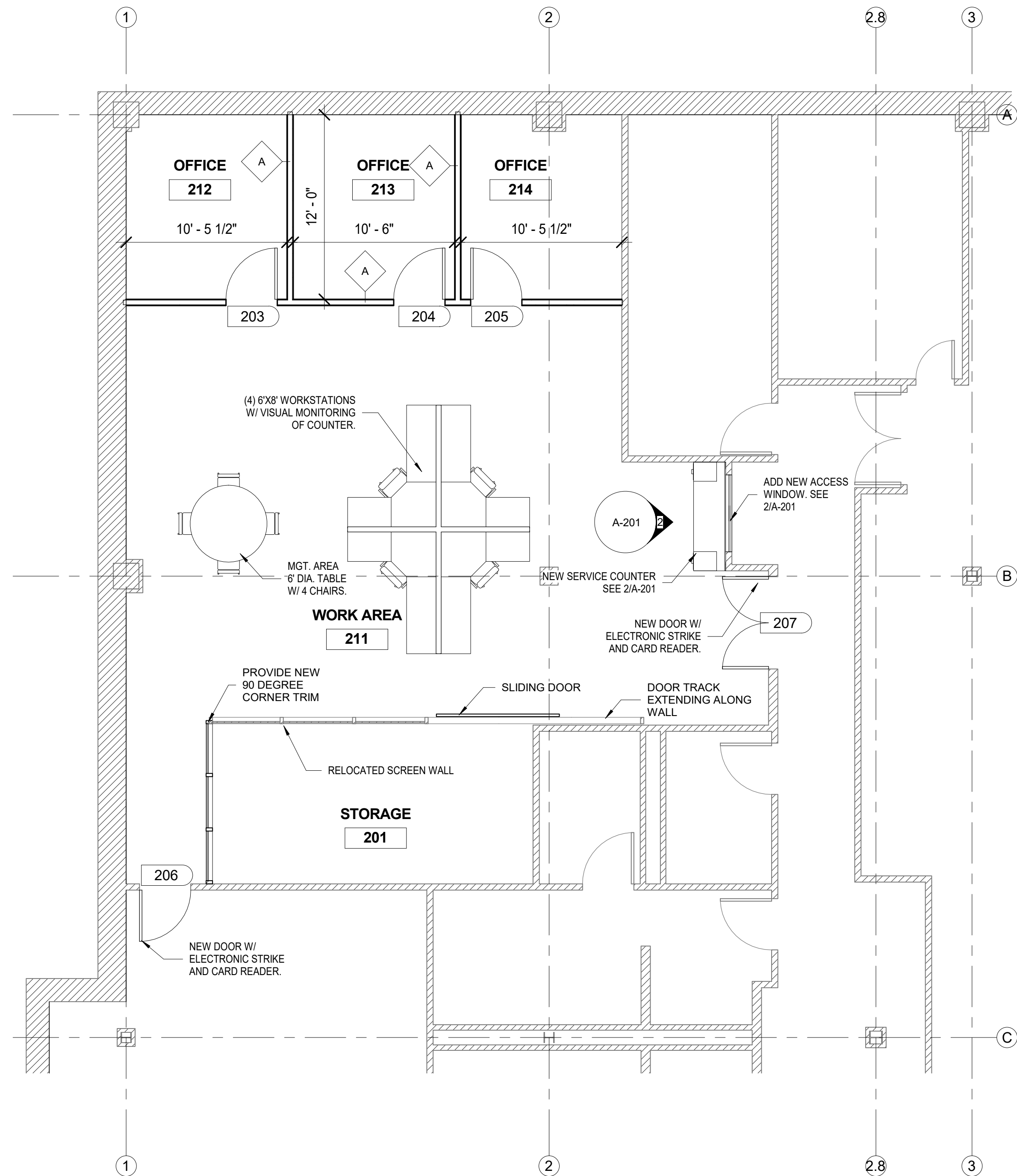
GLAZING



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NORTH  
1  
A-101  
**LOWER LEVEL DEMO PLAN**  
SCALE - 3/16" = 1'-0"



NORTH  
2  
A-101  
**LOWER LEVEL RENOVATION PLAN**  
SCALE - 3/16" = 1'-0"

**General Notes:**

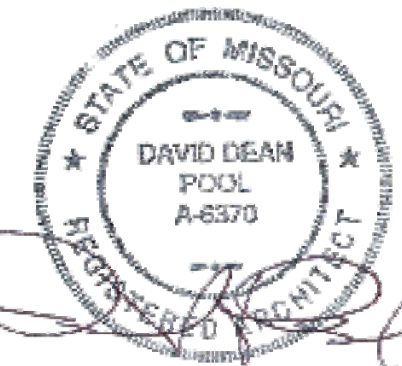
1. CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS AND CONDITIONS AND MAKE MINOR ADJUSTMENTS AS NECESSARY. NOTIFY ARCHITECT OF ANY DISCREPANCIES WHICH MAY AFFECT THE OUTCOME OF THE WORK. DIMENSIONS SHOWN ARE FROM FACE OF FINISH TO FACE OF FINISH UNLESS OTHERWISE NOTED.
2. ALL EXISTING FINISHES DISTURBED DURING CONSTRUCTION SHALL BE RESTORED TO A CONDITION AT LEAST EQUAL IN MATERIAL AND APPEARANCE TO THAT WHICH EXISTED BEFORE CONSTRUCTION BEGAN.
3. UPON COMPLETION OF CONSTRUCTION ACTIVITIES, CONTRACTOR SHALL CLEAN ALL WORK AREAS SO THAT THEY ARE FREE OF ALL CONSTRUCTION DIRT AND DEBRIS. PROTECT EXISTING UTILITIES DURING CONSTRUCTION.
4. EXISTING SITE AND BUILDING WILL BE OCCUPIED THROUGHOUT CONSTRUCTION. PROVIDE ACCESS TO ALL USERS AND EMERGENCY VEHICLES/PERSONNEL AT ALL TIMES. CONTRACTOR SHALL COORDINATE WITH OWNER FOR SCHEDULED OCCUPANCY.
5. CONTRACTOR SHALL NOTIFY OWNER AND ARCHITECT/ENGINEER PRIOR TO USE OF ANY SCAFFOLDING, LIFTS, SWING STAGES, ETC. USE OF SUCH MATERIALS AND EQUIPMENT SHALL MEET ALL FEDERAL, STATE, AND LOCAL SAFETY REGULATIONS.
6. CONTRACTOR SHALL COORDINATE ALL WORK WITH THE OWNER, ARCHITECT/ENGINEER, AND OTHER TRADES THROUGHOUT THE PROJECT.
- 7.
- 8.



HURST-ROSCHKE, INC.  
PROFESSIONAL DESIGN NUMBER: 184-000298

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PH:636.333.3351

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SIGNATURE  
12-9-16  
DATE  
12-31-18  
LICENSE EXPIRES

ADMINISTRATION CENTER RENOVATION  
COUNTY OF JEFFERSON, MO  
729 Maple St., Hillsboro, Mo 63050

MARK	DATE	DESCRIPTION

DATE: 12-9-16  
PROJECT NO: 845-2606  
DESIGN: RLM  
DRAWN: MCW  
CHECK: JLV

LOWER LEVEL DEMO  
AND RENOVATION  
FLOOR PLANS

A-101



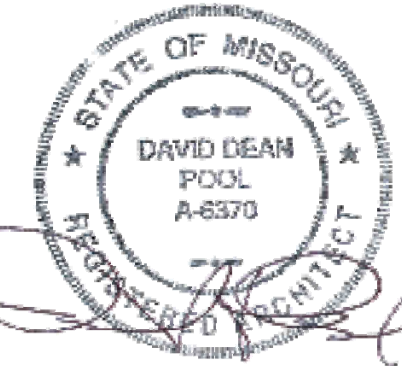




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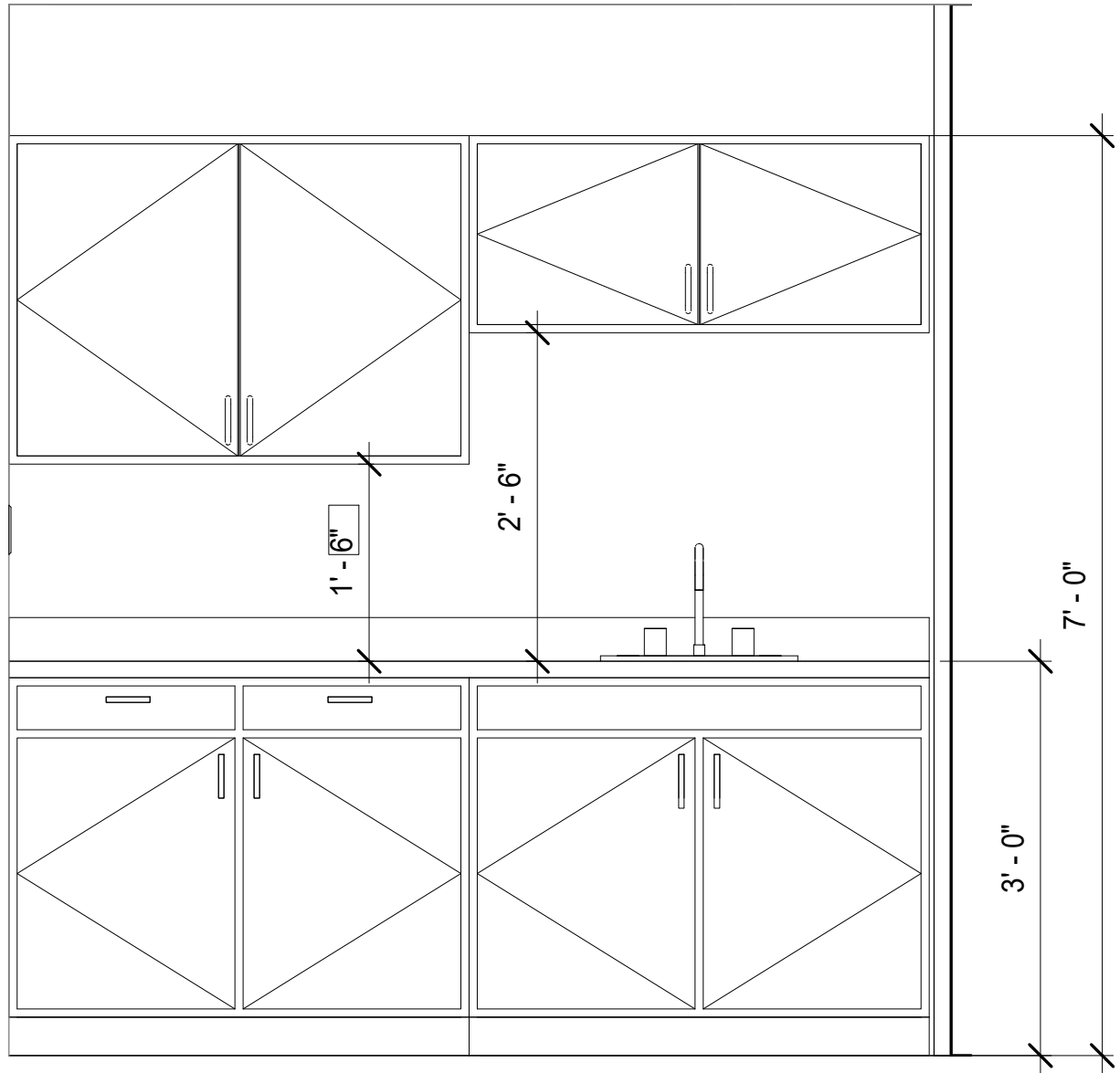
ADMINISTRATION CENTER RENOVATION  
COUNTY OF JEFFERSON, MO  
729 Maple St., Hillsboro, Mo 63050

MARK	DATE	DESCRIPTION

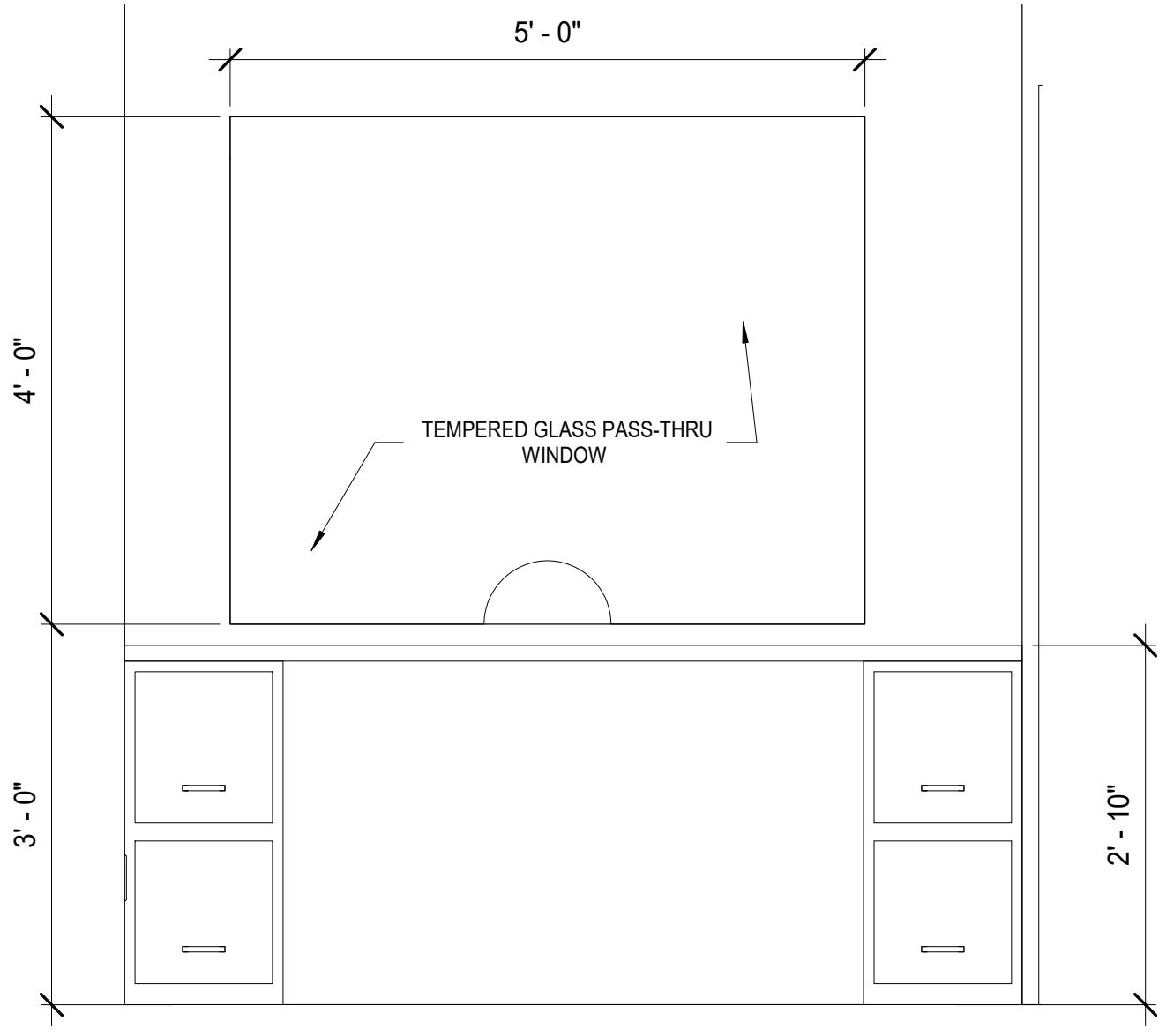
DATE: 12-9-16  
PROJECT NO: 845-2606  
DESIGN: RLM  
DRAWN: MCW  
CHECK: JLV

INTERIOR  
ELEVATIONS, DOOR  
SCHEDULE, ROOM  
FINISH SCHEDULE,  
AND DOOR DETAILS

A-201



1  
A-201  
**COPY/SUPPLY ROOM CASEWORK**  
SCALE - 3/4" = 1'-0"

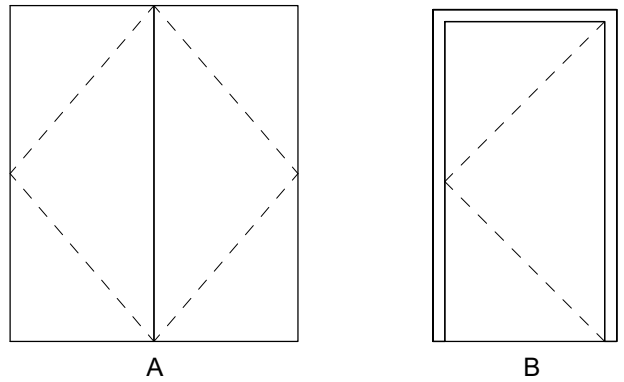


2  
A-201  
**SERVICE COUNTER ELEVATION**  
SCALE - 3/4" = 1'-0"

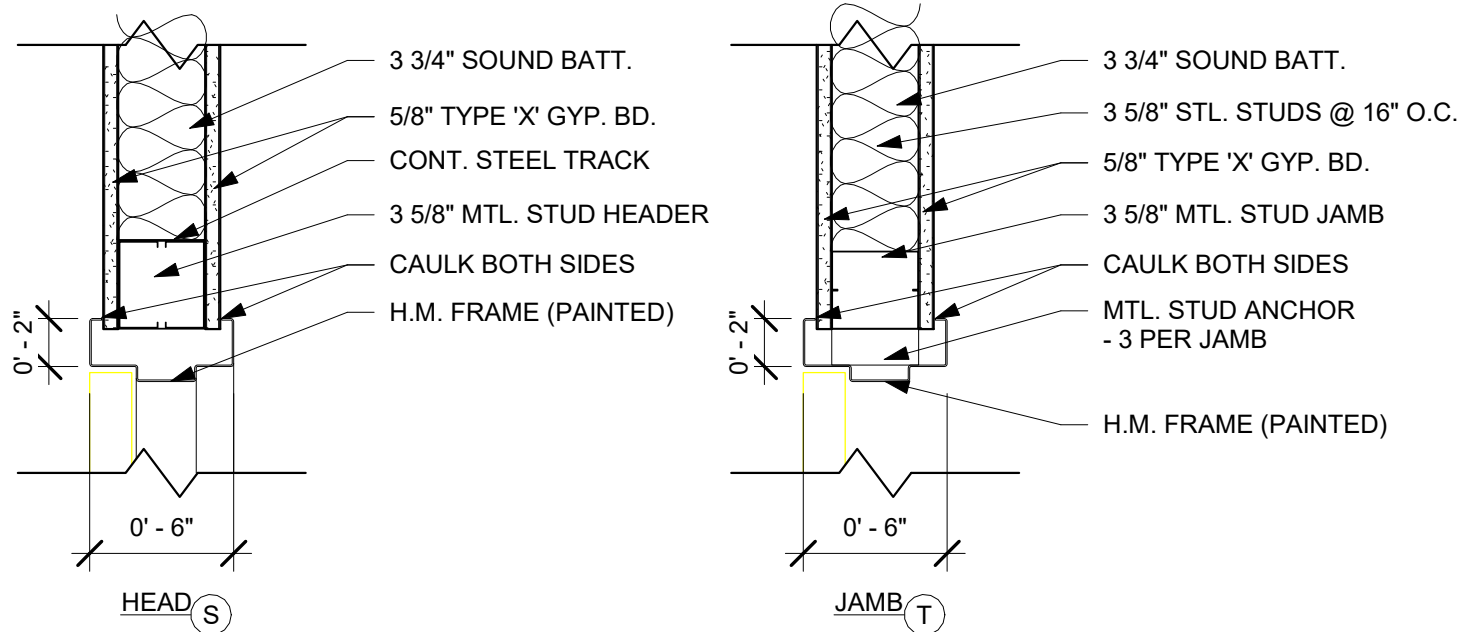
ROOM FINISH SCHEDULE					
Room Number	Room Name	Floor Finish	Base Finish	Wall Finish	Ceiling Finish
201	STORAGE	NONE	VINYL WALL BASE	PAINTED GYP. BD.	A.C.T.
202	WAITING	TILE CARPET	VINYL WALL BASE	PAINTED GYP. BD.	A.C.T.
203	STORAGE	TILE CARPET	VINYL WALL BASE	PAINTED GYP. BD.	A.C.T.
204	COPY/SUPPLY	TILE CARPET	VINYL WALL BASE	PAINTED GYP. BD.	A.C.T.
205	OFFICE	TILE CARPET	VINYL WALL BASE	PAINTED GYP. BD.	A.C.T.
206	I.T. CLOSET	NONE	NONE	NONE	NONE
207	OFFICE	TILE CARPET	VINYL WALL BASE	PAINTED GYP. BD.	A.C.T.
208	OFFICE	TILE CARPET	VINYL WALL BASE	PAINTED GYP. BD.	A.C.T.

ROOM FINISH SCHEDULE					
Room Number	Room Name	Floor Finish	Base Finish	Wall Finish	Ceiling Finish
209	OFFICE	TILE CARPET	VINYL WALL BASE	PAINTED GYP. BD.	A.C.T.
210	MEETING AREA	TILE CARPET	VINYL WALL BASE	PAINTED GYP. BD.	A.C.T.
211	WORK AREA	TILE CARPET	VINYL WALL BASE	PAINTED GYP. BD.	A.C.T.
212	OFFICE	TILE CARPET	VINYL WALL BASE	PAINTED GYP. BD.	A.C.T.
213	OFFICE	TILE CARPET	VINYL WALL BASE	PAINTED GYP. BD.	A.C.T.
214	OFFICE	TILE CARPET	VINYL WALL BASE	PAINTED GYP. BD.	A.C.T.
215	CONF. ROOM	TILE CARPET	VINYL WALL BASE	PAINTED GYP. BD.	A.C.T.

Door Schedule											
Door Number	Type	Elevations	Door					Hardware Set	Function	Function Number	Comments
			Width	Height	Thickness	Material	Finish				
201	13	B	3' - 4"	6' - 8"	0' - 2"			1	PASSAGE	F75	
203	13	B	3' - 4"	6' - 8"	0' - 2"			4	OFFICE	F82	
204	13	B	3' - 4"	6' - 8"	0' - 2"			4	OFFICE	F82	
205	13	B	3' - 4"	6' - 8"	0' - 2"			4	OFFICE	F82	
206	13	B	3' - 4"	6' - 8"	0' - 2"			2	ACCESS	F109	ELECTRONIC STRIKE, FIRE RATED DOUBLE DOOR, ELECTRONIC STRIKE, FIRE RATED
207	30	A	6' - 0"	7' - 0"	0' - 2"			3	ACCESS	F109	
208	13	B	3' - 4"	6' - 8"	0' - 2"			4	OFFICE	F82	
209	13	B	3' - 4"	6' - 8"	0' - 2"			5	STOREROOM	F86	
210	13	B	3' - 4"	6' - 8"	0' - 2"			5	STOREROOM	F86	



DOOR ELEVATIONS



3  
A-201  
**Door Details**  
SCALE - 1 1/2" = 1'-0"

HVAC GENERAL NOTES:

1.

PROVIDE ALL MATERIALS AND EQUIPMENT AND PERFORM ALL LABOR REQUIRED TO INSTALL COMPLETE AND OPERABLE MECHANICAL SYSTEMS AS INDICATED ON THE DRAWINGS, AS SPECIFIED, AND AS REQUIRED BY CODE.
2.

CONTRACT DOCUMENT DRAWINGS FOR MECHANICAL WORK ARE DIAGRAMMATIC AND ARE INTENDED TO CONVEY SCOPE AND GENERAL ARRANGEMENTS ONLY.
3.

INSTALL ALL MECHANICAL EQUIPMENT AND APPURTENANCES IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS, CONTRACT DOCUMENTS, AND APPLICABLE CODES AND REGULATIONS.
4.

WHERE TWO OR MORE ITEMS OF THE SAME TYPE AND EQUIPMENT ARE REQUIRED, THE PRODUCT OF ONE MANUFACTURER SHALL BE USED.
5.

ALL EXPOSED CONTROL WIRE SHALL BE INSIDE CONDUIT OR SURFACE MOUNTED RACEWAYS. CONDUIT SHALL COMPLY WITH THE NATIONAL ELECTRIC CODE AND SPECIFICATIONS.
6.

WHEN WORK IS SUBCONTRACTED, IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO COORDINATE SUBCONTRACTORS AND THE ASSOCIATED CONTRACTS. MECHANICAL EQUIPMENT, DUCTWORK AND PIPING SHALL BE ANCHORED DIRECTLY FROM STRUCTURE, NO ITEMS MAY BE SUPPORTED FROM DECK.
7.

INSTALL ALL PIPING WITHOUT FORCING OR SPRINGING.
9.

ALL DUCTWORK AND PIPING SHALL CLEAR DOORS AND WINDOWS.
10.

ALL DUCTWORK DIMENSIONS, AS SHOWN ON THE DRAWINGS, ARE INTERNAL CLEAR DIMENSIONS AND DUCT SIZES SHALL BE INCREASED TO COMPENSATE FOR DUCT LINING THICKNESS.
11.

PROVIDE ALL 90 DEGREE SQUARE ELBOWS WITH DOUBLE RADIUS TURNING VANES UNLESS OTHERWISE INDICATED. PROVIDE ACCESS DOORS UPSTREAM OF ALL ELBOWS WITH TURNING VANES.
12.

COORDINATE DIFFUSER, REGISTER AND GRILLE LOCATIONS WITH ARCHITECTURAL REFLECTED CEILING PLANS, LIGHTING AND OTHER CEILING ITEMS AND MAKE MINOR DUCT MODIFICATIONS TO SUIT.
13.

LOCATE ALL MECHANICAL EQUIPMENT FOR UNOBSTRUCTED ACCESS TO UNIT ACCESS PANELS, FILTERS, CONTROLS AND VALVING.
14.

PROVIDE FLEXIBLE CONNECTIONS IN ALL DUCTWORK SYSTEMS CONNECTED TO EQUIPMENT. FANS AND OTHER APPLICATIONS WITCH REQUIRE VIBRATION ISOLATION. FLEXIBLE CONNECTIONS SHALL BE PROVIDED AT THE POINT OF CONNECTION TO THE EQUIPMENT UNLESS OTHERWISE INDICATED, MINIMUM 1" SPACING BETWEEN METAL.
15.

RUNS OF FLEXIBLE DUCT SHALL NOT EXCEED 6 FEET AT SIZE OF CONNECTED DEVICES. LONGER RUNS SHALL BE NEXT STANDARD SIZE LARGER AND ONLY WHERE SHOWN OR PRE-APPROVED BY ENGINEER.
16.

APPROVED EQUAL SHALL ME AS APPROVED BY THE ENGINEER PRIOR TO BID DATE.
17.

BALANCE AIR FLOW TO ALL NEW HVAC EQUIPMENT, REFER TO TESTING AND BALANCE SPECIFICATIONS.
18.

SEAL ALL DUCTWORK SEAMS AND JOINTS WITH BOTH MASTIC AND MECHANICAL FASTENERS.
19.

VOLUME DAMPERS SHALL BE INSTALLED IN BRANCH TAKE-OFFS TO EACH SUPPLY DIFFUSER.
20.

ADD OR RELOCATE SPRINKLERS AS NEEDED IN RENOVATED AREAS PER NFPA 13 CODES. (THIS APPLIES TO BOTH FLOORS IN ALL AREAS RENOVATED.)

HVAC KEYED NOTES:

1.

REMOVE AND PROPERLY DISPOSE OF EXISTING SUPPLY DIFFUSER/RETURN GRILLE AND ASSOCIATED DUCT APPROXIMATELY AS SHOWN. PREPARE EXISTING SUPPLY DUCT FOR RE-CONNECTION OF NEW AS SHOWN IN DETAIL #2 THIS SHEET.
2.

PROVIDE AND INSTALL NEW SUPPLY DIFFUSER AS SCHEDULED AND FLEXIBLE DUCT APPROXIMATELY WHERE SHOWN. CONNECT TO EXISTING SUPPLY DUCT. BALANCE SYSTEMS AND ZONES TO CFM VALUES SHOWN. COORDINATE EXACT LOCATION WITH LIGHTING/SPRINKLER HEADS/ETC. TO AVOID CONFLICT AT NO ADDITIONAL COST TO THE OWNER OR A/E.
3.

PROVIDE AND INSTALL NEW RETURN GRILLE WITH 90 DEGREE RIGID DUCT BOARD SOUND BOOT FOR RETURN TO PLENUM. COORDINATE EXACT LOCATION WITH LIGHTING/SPRINKLER HEADS/ETC. TO AVOID CONFLICT AT NO ADDITIONAL COST TO THE OWNER OR A/E.
4.

PROVIDE AND INSTALL NEW FAN TERMINAL UNIT AS SCHEDULED. INSTALL ABOVE CEILING. MOUNT DIRECTLY FROM STRUCTURE WITH SEISMIC/VIBRATION ISOLATION RATED HANGERS. BALANCE OUTSIDE AIR TO NEW FTU TO BE 40 CFM, +/- 5 CFM. PROVIDE AND INSTALL NEW SUPPLY DUCT TO NEW DIFFUSERS IN OFFICES AS SHOWN.

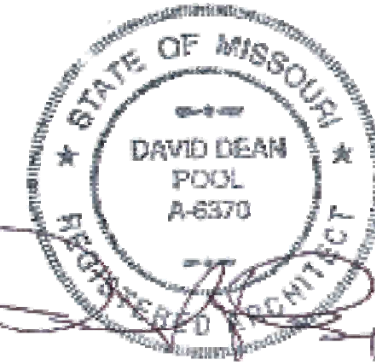
FACILITIES IN THE EXISTING BUILDING AND INDICATED ON THE DRAWINGS HAVE BEEN TAKEN FROM EXISTING BUILDING DRAWINGS AND FIELD INSPECTIONS AT THE PROJECT, BUT ITS COMPLETE ACCURACY IS NOT GUARANTEED. CONTRACTOR SHALL VERIFY AND/ OR DETERMINE EXISTING CONDITIONS INVOLVING HIS WORK IN THE FIELD.



HURST-ROSCH, INC.  
PROFESSIONAL DESIGN NUMBER: 184-000298

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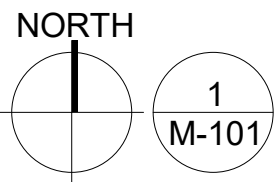
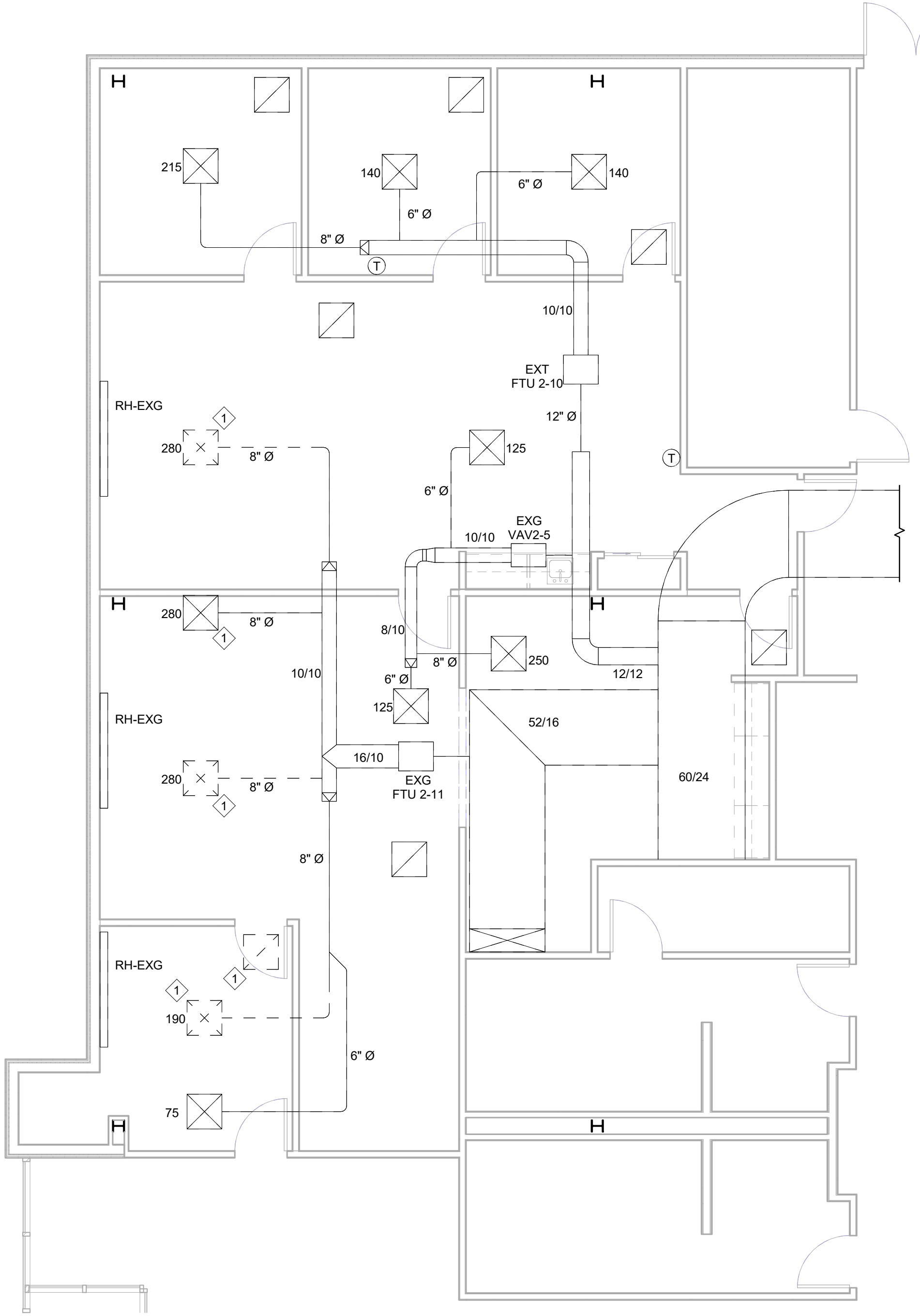


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12-9-16  
DATE  
12-31-18  
LICENSE EXPIRES

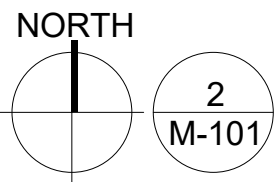
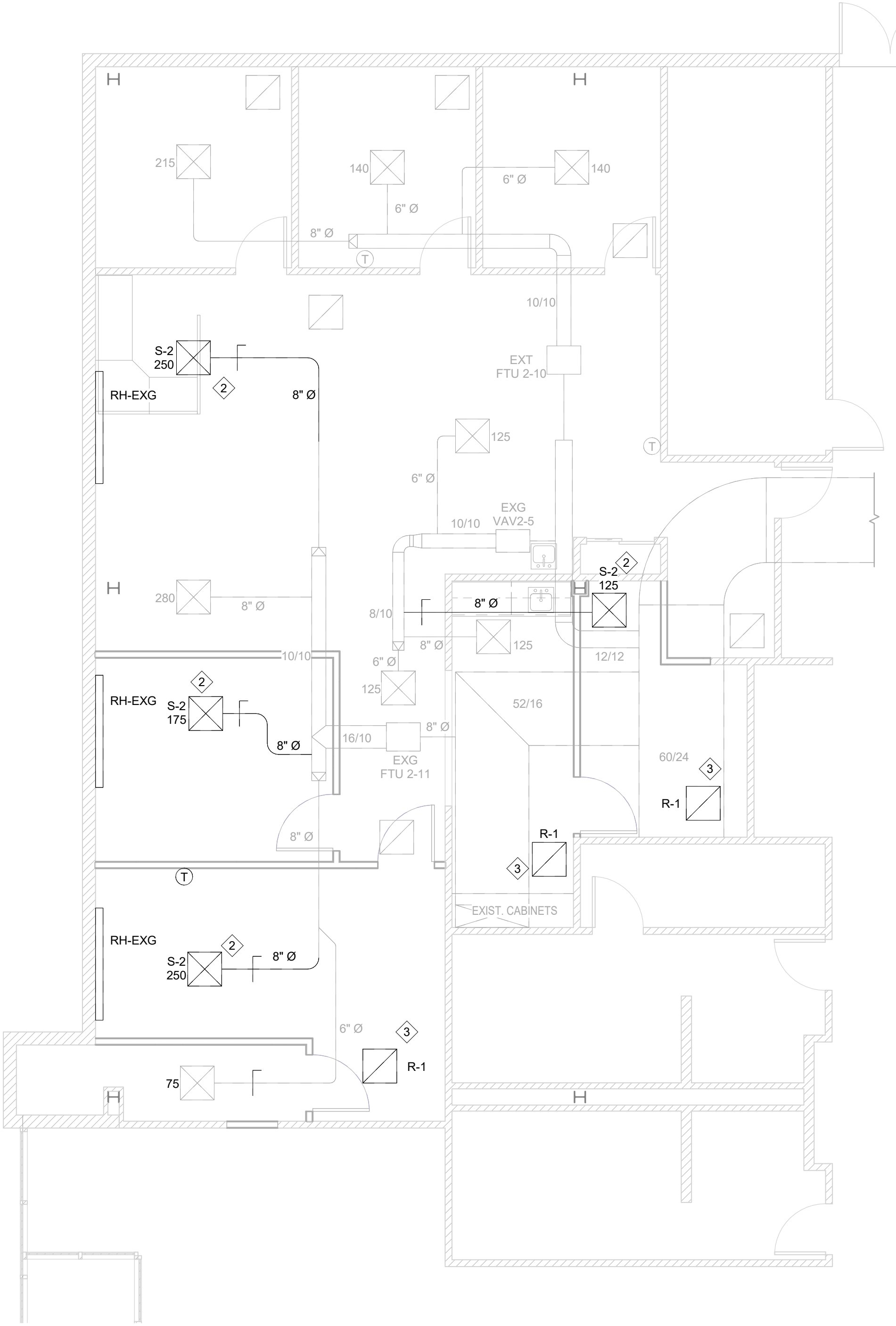
HVAC LEGEND	
	FAN TERMINAL UNIT
	RADIANT HEATER
	THERMOSTAT
	SUPPLY DIFFUSER
	RETURN GRILLE
	TO BE REMOVED
	EXISTING TO REMAIN

GRILLE, REGISTER, AND DIFFUSER SCHEDULE							
MARK	TYPE	DESIGN MODEL (TITUS)	MODULE SIZE	NECK SIZE	CFM RANGE	PATTERN	VOL. DAMPER (YES/NO)
S-1	SUPPLY	TDC	24/24	6"ø	75-100	4-WAY	YES
S-2	SUPPLY	TDC	24/24	8"ø	125-250	4-WAY	YES
R-1	RETURN	50F	24/24	12/12	100-300	NA	NO
NOTES: 1. VOLUME DAMPER INDICATES MANUAL BALANCING DAMPER INSTALLED AT BRANCH TAKEOFF FOR ALL ACCESSIBLE CEILING AREAS FOR NON-DUCT MOUNTED DIFFUSERS. 2. ALL DIFFUSERS SHALL HAVE BORDER TYPES AND ALL OPTIONS SHALL BE COMPATIBLE WITH DUCT, ARCHITECTURAL CEILING TYPE, OR WALL TYPE AT THE LOCATION INDICATED ON PLANS FOR EACH AIR DEVICE. 3. SEE THE PLANS FOR LOCATION, QUANTITIES, AND AIRFLOW CAPACITY AFTER BALANCING OF EACH AIR DEVICE. 4. PROVIDE EARTHQUAKE TABS FOR DEVICES LOCATED IN LAY-IN CEILINGS. 5. PROVIDE RETURN GRILLES WITH 90 DEGREE RDB SOUND BOOT FOR RETURN TO PLENUM.							

FAN TERMINAL UNIT SCHEDULE						
MARK	MODEL (TRANE)	HP (KVA)	CFM	ELECTRICAL		
				VOLTS	PH	WIRE
FTU-1-7B	DB20742 - 3.0 -1P	3.194	475	277	1	3
						14.41



MAIN LEVEL HVAC DEMO PLAN  
SCALE - 3/16" = 1'-0"



MAIN LEVEL HVAC PLAN  
SCALE - 3/16" = 1'-0"

ADMINISTRATION CENTER RENOVATION  
COUNTY OF JEFFERSON, MO  
729 Maple St., Hillsboro, Mo 63050

MARK	DATE	DESCRIPTION

DATE: 12-9-16

PROJECT NO: 845-2606

DESIGN: MCW

DRAWN: JLW

CHECK: JLW

MAIN LEVEL HVAC,  
DEMO PLANS AND  
SCHEDULES

M-101



1. PROVIDE ALL MATERIALS AND EQUIPMENT AND PERFORM ALL LABOR REQUIRED TO INSTALL COMPLETE AND OPERABLE MECHANICAL SYSTEMS AS INDICATED ON THE DRAWINGS, AS SPECIFIED, AND AS REQUIRED BY CODE.
2. CONTRACT DOCUMENT DRAWINGS FOR MECHANICAL WORK ARE DIAGRAMMATIC AND ARE INTENDED TO CONVEY SCOPE AND GENERAL ARRANGEMENTS ONLY.
3. INSTALL ALL MECHANICAL EQUIPMENT AND APPURTENANCES IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS, CONTRACT DOCUMENTS, AND APPLICABLE CODES AND REGULATIONS.
4. WHERE TWO OR MORE ITEMS OF THE SAME TYPE AND EQUIPMENT ARE REQUIRED, THE PRODUCT OF ONE MANUFACTURER SHALL BE USED.
5. ALL EXPOSED CONTROL WIRE SHALL BE INSIDE CONDUIT OR SURFACE MOUNTED RACEWAYS. CONDUIT SHALL COMPLY WITH THE NATIONAL ELECTRIC CODE AND SPECIFICATIONS.
6. WHEN WORK IS SUBCONTRACTED, IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO COORDINATE SUBCONTRACTORS AND THE ASSOCIATED CONTRACTS.
7. MECHANICAL EQUIPMENT, DUCTWORK AND PIPING SHALL BE ANCHORED DIRECTLY FROM STRUCTURE, NO ITEMS MAY BE SUPPORTED FROM DECK.
8. INSTALL ALL PIPING WITHOUT FORCING OR SPRINGING.
9. ALL DUCTWORK AND PIPING SHALL CLEAR DOORS AND WINDOWS.
10. ALL DUCTWORK DIMENSIONS, AS SHOWN ON THE DRAWINGS, ARE INTERNAL CLEAR DIMENSIONS AND DUCT SIZES SHALL BE INCREASED TO COMPENSATE FOR DUCT LINING THICKNESS.
11. PROVIDE ALL 90 DEGREE SQUARE ELBOWS WITH DOUBLE RADIUS TURNING VANES UNLESS OTHERWISE INDICATED. PROVIDE ACCESS DOORS UPSTREAM OF ALL ELBOWS WITH TURNING VANES.
12. COORDINATE DIFFUSER, REGISTER AND GRILLE LOCATIONS WITH ARCHITECTURAL REFLECTED CEILING PLANS, LIGHTING AND OTHER CEILING ITEMS AND MAKE MINOR DUCT MODIFICATIONS TO SUIT.
13. LOCATE ALL MECHANICAL EQUIPMENT FOR UNOBSTRUCTED ACCESS TO UNIT ACCESS PANELS, FILTERS, CONTROLS AND VALVING.
14. PROVIDE FLEXIBLE CONNECTIONS IN ALL DUCTWORK SYSTEMS CONNECTED TO EQUIPMENT, FANS AND OTHER APPLICATIONS WITH REQUIRE VIBRATION ISOLATION. FLEXIBLE CONNECTIONS SHALL BE PROVIDED AT THE POINT OF CONNECTION TO THE EQUIPMENT UNLESS OTHERWISE INDICATED. MINIMUM 1" SPACING BETWEEN FLEXIBLE CONNECTIONS.
15. RUNS OF FLEXIBLE DUCT SHALL NOT EXCEED 6 FEET AT SIZE OF CONNECTED DEVICES. LONGER RUNS SHALL BE NEXT STANDARD SIZE LARGER AND ONLY WHERE SHOWN OR PRE-APPROVED BY ENGINEER.
16. APPROVED EQUIP SHALL ME AS APPROVED BY THE ENGINEER PRIOR TO BID DATE.
17. BALANCE AIR FLOW TO ALL NEW HVAC EQUIPMENT, REFER TO TESTING AND BALANCE SPECIFICATIONS.
18. SEAL ALL DUCTWORK SEAMS AND JOINTS WITH BOTH MASTIC AND MECHANICAL FASTENERS.
19. VOLUME DAMPERS SHALL BE INSTALLED IN BRANCH TAKE-OFFS TO EACH SUPPLY DIFFUSER.
20. ADD OR RELOCATE SPRINKLERS AS NEEDED IN RENOVATED AREAS PER NFPA 13 CODES. (THIS APPLIES TO BOTH FLOORS IN ALL AREAS RENOVATED.)

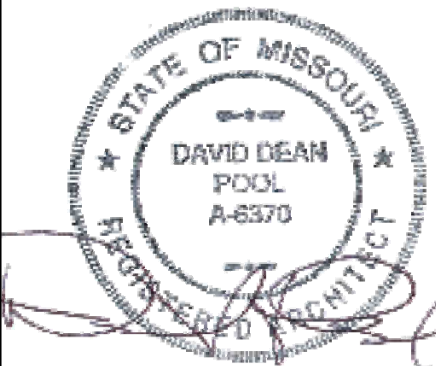


1. REMOVE AND PROPERLY DISPOSE OF EXISTING SUPPLY DIFFUSER/RETURN GRILLE AND ASSOCIATED DUCT APPROXIMATELY AS SHOWN. PREPARE EXISTING SUPPLY DUCT FOR RE-CONNECTION OF NEW AS SHOWN IN DETAIL #2 THIS SHEET
2. REMOVE AND INSTALL NEW SUPPLY DIFFUSER AS SHOWN AND AGRILE DUCT APPROXIMATELY HERE SHOWN. CONNECT TO EXISTING SUPPLY DUCT. BALANCE SYSTEMS AND ZONES TO CFM VALUES SHOWN. COORDINATE EXACT LOCATION WITH LIGHTING/SPRINKLER HEADS/ ETC. TO AVOID CONFLICT AT NO ADDITIONAL COST TO THE OWNER OR A/E.
3. REMOVE AND INSTALL NEW RETURN GRILLE WITH 90 DEGREE RIGID DUCT BOARD SOUND BOOT FOR RETURN TO PLENUM. COORDINATE EXACT LOCATION WITH LIGHTING/SPRINKLER HEADS/ETC. TO AVOID CONFLICT AT NO ADDITIONAL COST TO THE OWNER OR A/E.
4. PROVIDE AND INSTALL NEW FAN TERMINAL UNIT AS SCHEDULED. INSTALL ABOVE CEILING. MOUNT DIRECTLY FROM STRUCTURE WITH SEISMIC/VIBRATION ISOLATION RIGID HANGERS. BALANCE OUTSIDE AIR TO NEW FIT TO BE 40 CFM. 47-5 CFM. PROVIDE AND INSTALL NEW SUPPLY DUCT TO NEW DIFFUSERS IN OFFICES AS SHOWN.

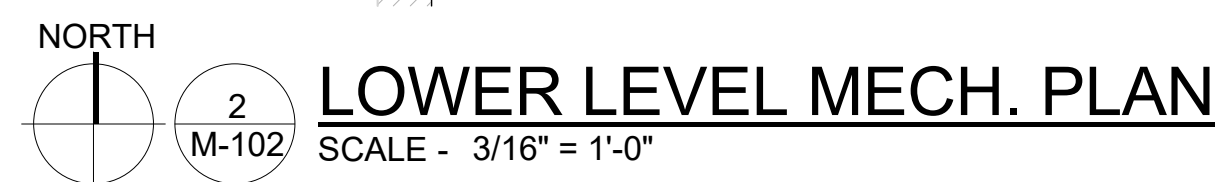


**HURST-ROSCH, INC.**  
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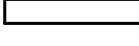
MARK	DATE	DESCRIPTION
DATE: 12-9-16		
PROJECT NO: 845-2606		
DESIGN: LO	DRAWN: MCW	CHECK: JLV

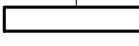
M-102

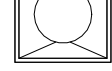
SYMBOLS LEGEND

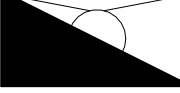
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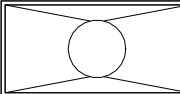
GFCI DUPLEX RECEPTACLE
- 


DUPLEX RECEPTACLE
- 


TELEPHONE/DATA JACK
- 

TOGGLE SWITCH
- 

2X2 LED TROFFER, TYPE "A"
- 

2X4 LED TROFFER, EMERGENCY TYPE "BE"
- 

2X4 LED TROFFER, TYPE "B"
- 

EXIT SIGN TYPE "X"
- 

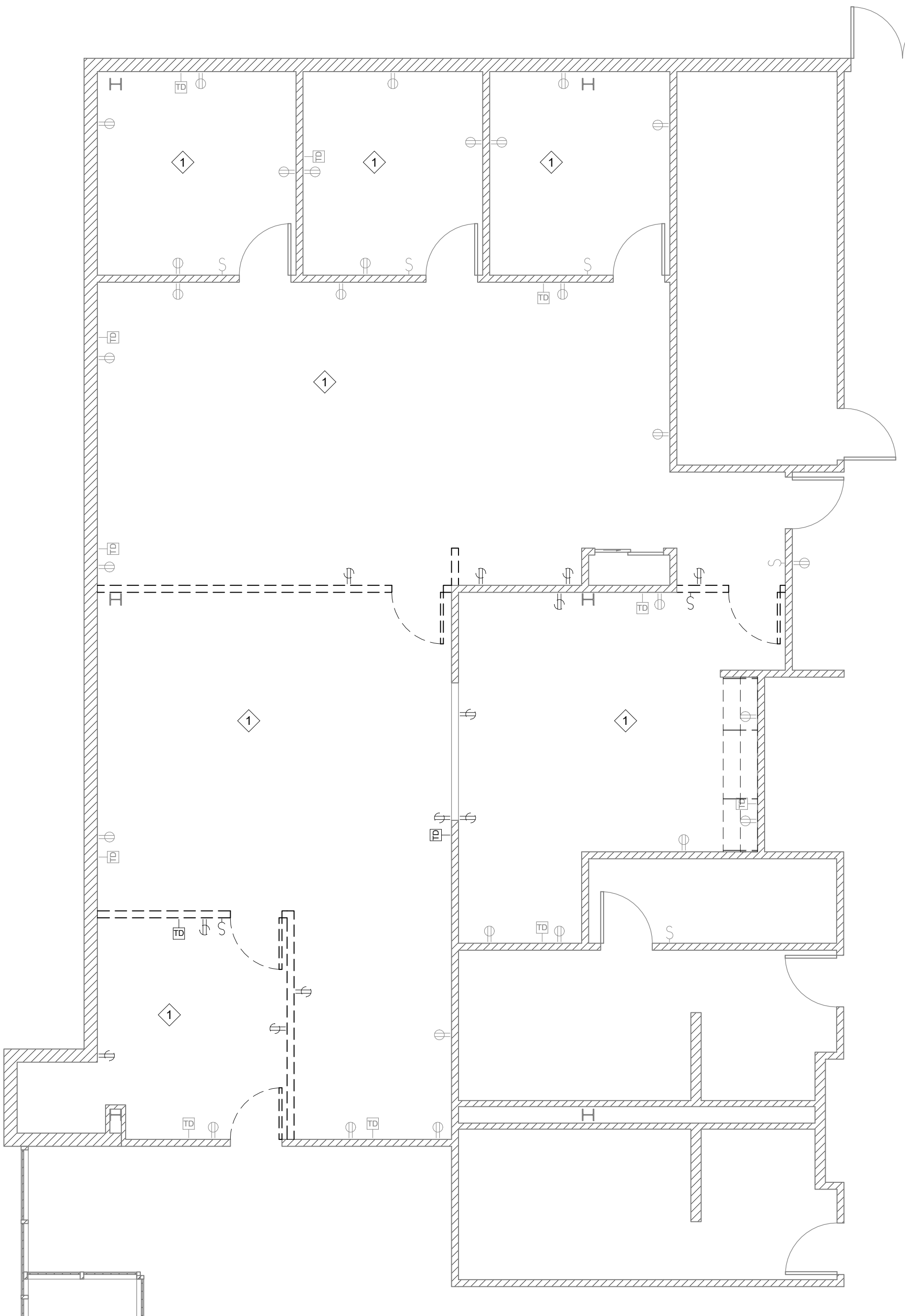
JUNCTION BOX

GENERAL NOTES:

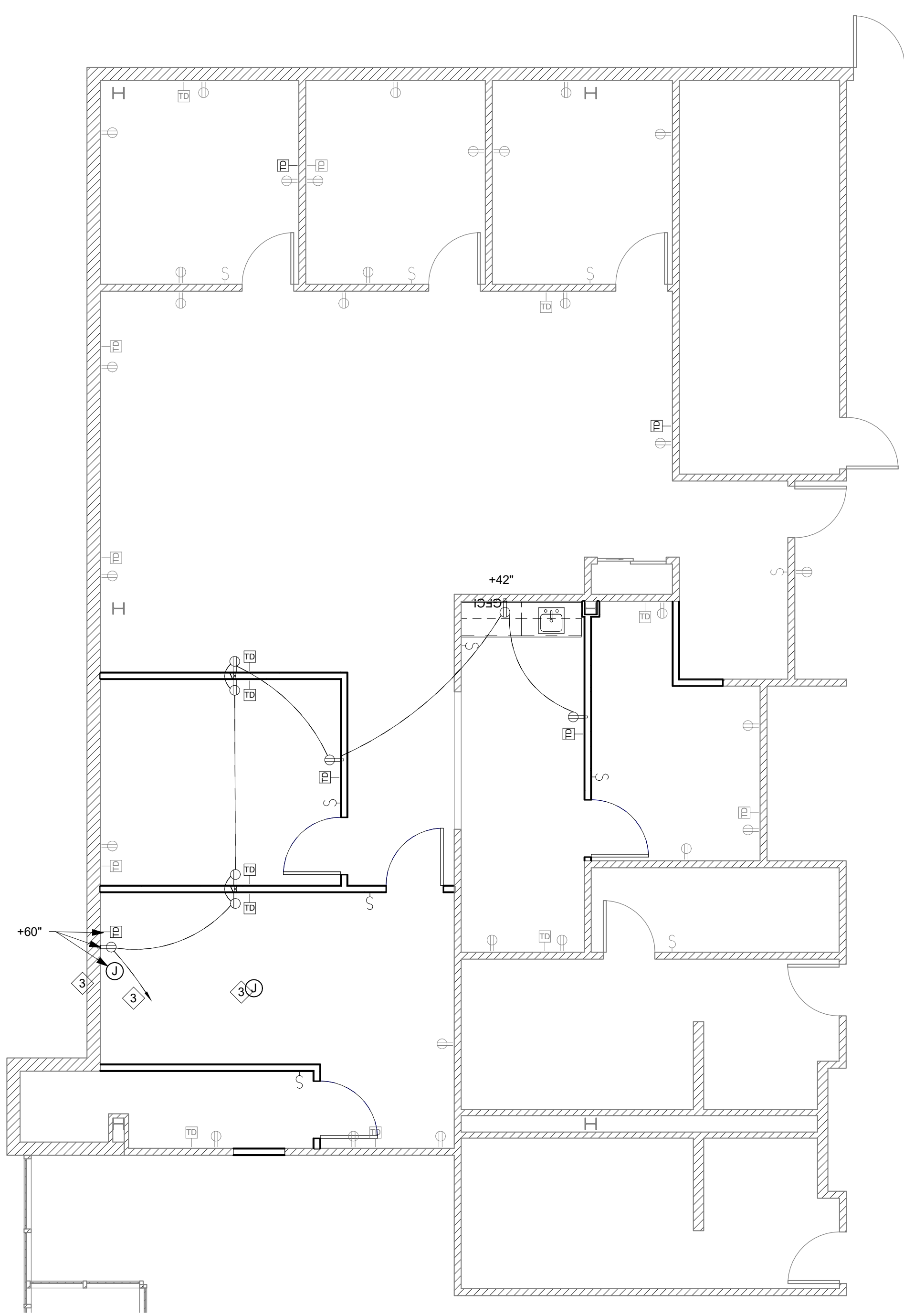
1. ALL WORK SHALL BE IN ACCORDANCE WITH CURRENT EDITION OF THE STATE OF MISSOURI BUILDING CODE & THE NATIONAL ELECTRICAL CODE.
2. SEAL ALL PENETRATIONS W/ APPROPRIATE FIRE, WEATHER & THERMAL STOPS. COORDINATE FIRE WALL LOCATIONS W/ ARCHITECTURAL SHEETS.
3. COORDINATE ALL WORK WITH OTHER TRADES AS REQUIRED.
4. MECHANICAL EQUIPMENT VARIES FROM MANUFACTURER TO MANUFACTURER. COORDINATE LOCATION OF DISCONNECTS, POWER CONNECTIONS, AND MOTOR PROTECTION WITH EQUIPMENT SUPPLIED.
5. DISCONNECTS SHALL BE GENERAL-DUTY WITH A GROUND BUS.
6. ALL CONDUCTORS SHALL BE #12 GAUGE COPPER IN 3/4" CONDUIT MINIMUM UNLESS NOTED OTHERWISE. SWITCH LEGS SHALL BE PERMITTED TO BE INSTALLED IN 1/2" CONDUITS.
7. ALL CONDUIT SHALL BE CONCEALED IN WALLS, CEILINGS, AND/OR FLOORS.
8. ALL WIRING DEVICES SHALL BE RECESSED EXCEPT IN MECHANICAL ROOMS, CONDUIT MAY BE EXPOSED.
9. RECEPTACLES AND SWITCHES SHALL BE SPECIFICATION GRADE AND SHALL INCLUDE A GROUND LUG.
10. CONTRACTOR SHALL COORDINATE ALL ELECTRICAL SERVICE WORK WITH THE CITY OF HILLSBORO.
11. CONTRACTOR SHALL PROVIDE COMPLETED TYPED CIRCUIT DIRECTORIES FOR ALL PANEL BOARDS.
12. ALL LIGHTING FIXTURES ARE TO BE REMOVED AND RETURNED TO THE OWNER OR DISPOSED OF PROPERLY.
13. ALL DATA CABLING TO BE HOMERUN TO EXISTING DATA RACK IN EXISTING COMPUTER ROOM 238.

KEYED NOTES:

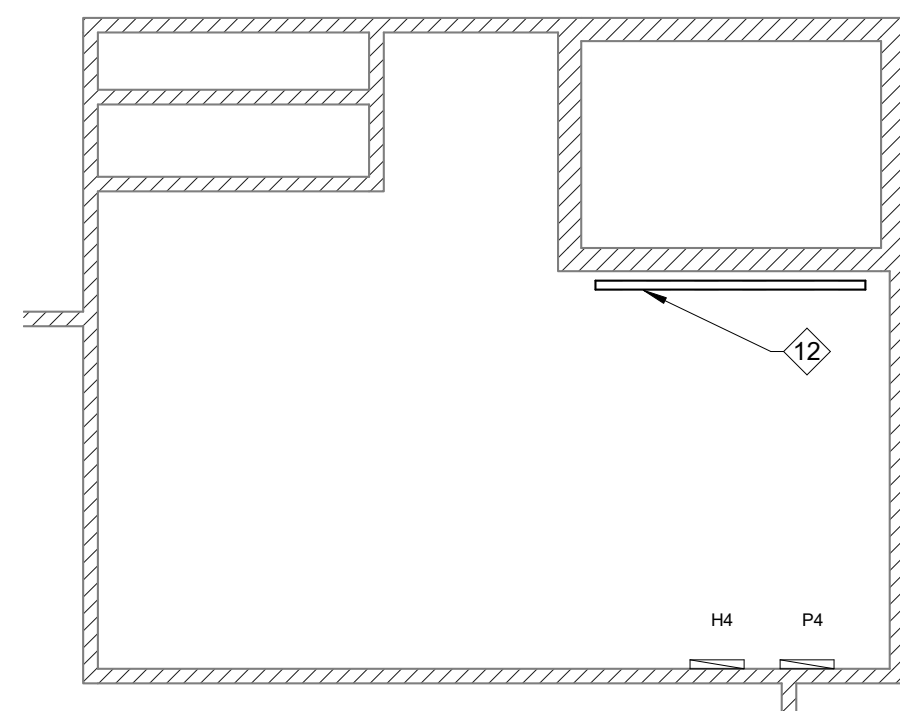
1. ALL RECEPTACLES/DATA JACKS IN THIS SPACE ARE EXISTING TO REMAIN UNLESS OTHERWISE NOTED. IF RECEPTACLES ON A CIRCUIT ARE BEING REMOVED, CONTRACTOR MUST MAINTAIN POWER TO THE REST OF THE RECEPTACLES ON THAT CIRCUIT.
2. CONNECT TO EXISTING SPARE 20A SINGLE POLE BREAKER IN PANEL P4, LOCATED IN EXISTING COMPUTER ROOM 238.
3. PROVIDE JUNCTION BOXES AS SHOWN, AND HDMI CABLING BETWEEN BOXES, FOR PROJECTOR CONTROLS. COORDINATE EXACT LOCATIONS WITH ARCHITECT.
4. CONNECT TO EXISTING SPARE 20A SINGLE POLE BREAKER IN PANEL P1, LOCATED IN EXISTING MECHANICAL ROOM 132.
5. PROVIDE JUNCTION BOX AT DOOR FOR CAMERA. COORDINATE EXACT LOCATION WITH ARCHITECT. COORDINATE REQUIREMENTS WITH CTS AND OWNER.
6. PROVIDE JUNCTION BOX/CONNECTION AND WIRING TO CAMERA AND DOOR RELEASE BUTTON. COORDINATE EXACT REQUIREMENTS WITH CTS.
7. PROVIDE JUNCTION BOX FOR CARD READER. COORDINATE EXACT LOCATION WITH ARCHITECT. COORDINATE REQUIREMENTS WITH CTS.
8. PROVIDE POWER CONNECTION AND 30A DISCONNECT SWITCH FOR FTU-1-7B. CONNECT TO NEW 2 POLE 30A BREAKER IN PANEL H1, LOCATED IN MECHANICAL ROOM 132. COORDINATE ALL WORK WITH MECHANICAL TRADE.
9. CONNECT TO UNSWITCHED LEG OF LIGHTING CIRCUIT.
10. CONNECT TO EXISTING SPARE 20A SINGLE POLE BREAKER IN PANEL H2, LOCATED IN COMPUTER ROOM 238.
11. CONNECT TO EXISTING SPARE 20A SINGLE POLE BREAKER IN PANEL H1, LOCATED IN MECHANICAL ROOM 132.
12. PROVIDE A 8"x4"x3/4" PLYWOOD BOARD FOR TELEPHONE/COMPUTER TERMINATIONS. MOUNT BOARD 30 INCHES A.F.F. AND PAINT GRAY. PROVIDE TWO (2) 4 INCH EMPTY CONDUITS TO TELEPHONE PEDESTAL LOCATION. PROVIDE ONE (1) 2 INCH EMPTY CONDUIT STUBBED 5'-0" OUTSIDE OF BUILDING TO ACCOMMODATE CATV CABLE. MARK LOCATION OF CONDUIT.



NORTH  
1  
E-101  
MAIN LEVEL POWER/DATA DEMO PLAN  
SCALE - 3/16" = 1'-0"



NORTH  
2  
E-101  
MAIN LEVEL POWER/DATA PLAN  
SCALE - 3/16" = 1'-0"



NORTH  
4  
E-101  
MAIN LEVEL PWR./DATA PLAN - RM. 238  
SCALE - 3/16" = 1'-0"

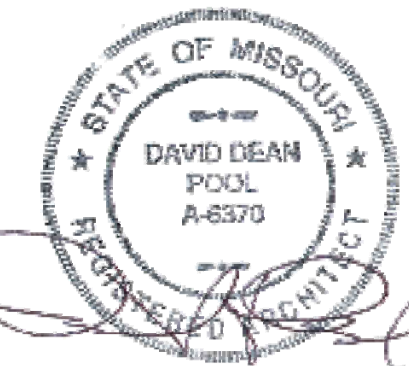
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SIGNATURE  
12-9-16  
DATE  
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LICENSE EXPIRES

ADMINISTRATION CENTER RENOVATION  
COUNTY OF JEFFERSON, MO  
729 Maple St., Hillsboro, Mo 63050

MARK	DATE	DESCRIPTION
DATE: 12-9-16		
PROJECT NO: 845-2606		
DESIGN: TA	DRAWN: MCW	CHECK: Checker

MAIN LEVEL  
POWER/DATA PLANS

E-101

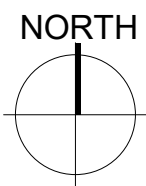
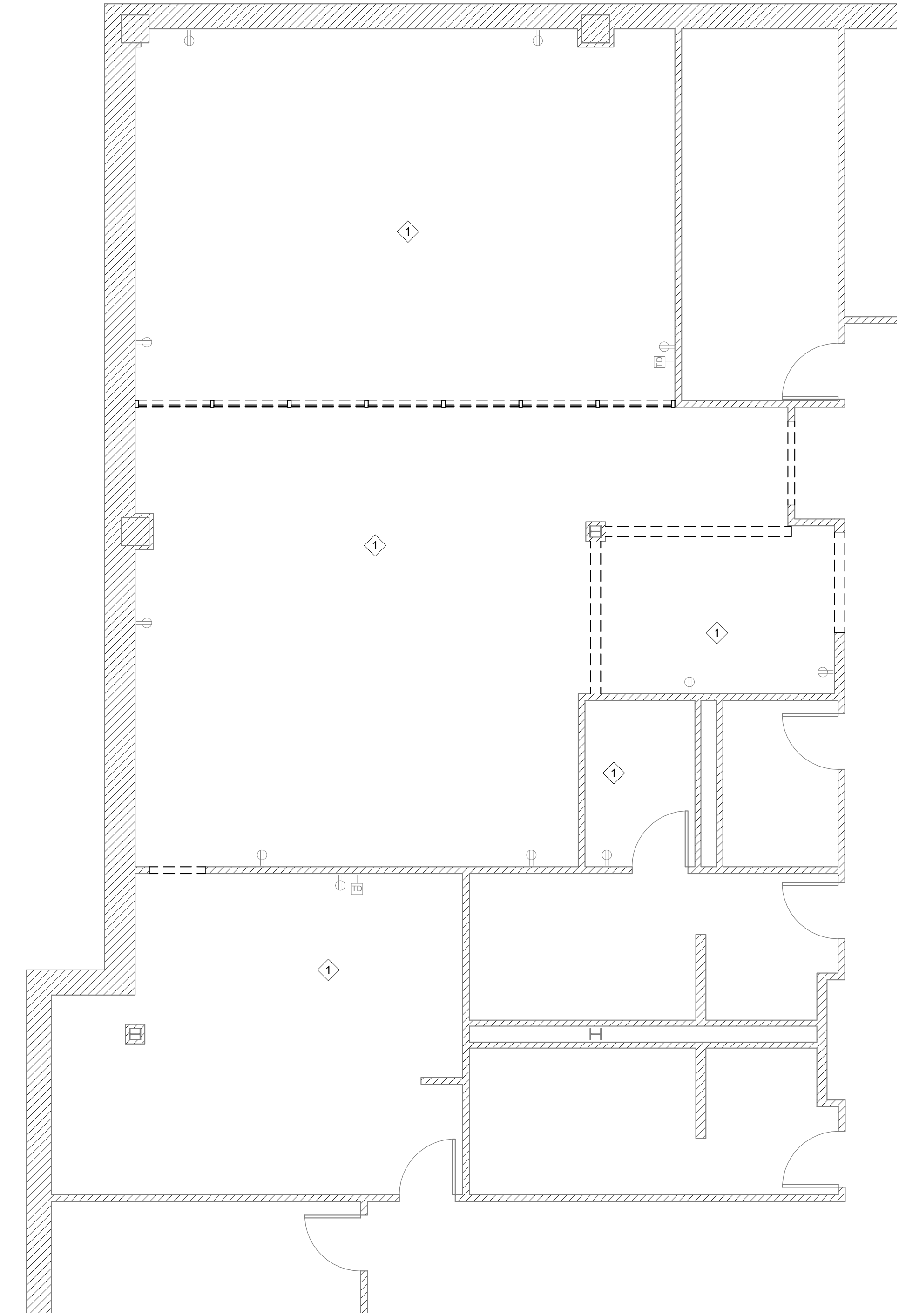


GENERAL NOTES:

1. ALL WORK SHALL BE IN ACCORDANCE WITH CURRENT EDITION OF THE STATE OF MISSOURI BUILDING CODE & THE NATIONAL ELECTRICAL CODE.
2. SEAL ALL PENETRATIONS w/ APPROPRIATE FIRE, WEATHER & THERMAL STOPS. COORDINATE FIRE WALL LOCATIONS w/ ARCHITECTURAL SHEETS.
3. COORDINATE ALL WORK WITH OTHER TRADES AS REQUIRED.
4. MECHANICAL EQUIPMENT VARIES FROM MANUFACTURER TO MANUFACTURER. COORDINATE LOCATION OF DISCONNECTS, POWER CONNECTIONS, AND MOTOR PROTECTION WITH EQUIPMENT SUPPLIER.
5. DISCONNECTS SHALL BE GENERAL-DUTY WITH A GROUND BUS.
6. ALL CONDUCTORS SHALL BE #12 GAUGE COPPER IN 3/4" CONDUIT MINIMUM UNLESS NOTED OTHERWISE. SWITCH LEGS SHALL BE PERMITTED TO BE INSTALLED IN 1/2" CONDUITS.
7. ALL CONDUIT SHALL BE CONCEALED IN WALLS, CEILINGS, AND/OR FLOORS.
8. ALL WIRING DEVICES SHALL BE RECESSED EXCEPT IN MECHANICAL ROOMS. CONDUIT MAY BE EXPOSED.
9. RECEPTACLES AND SWITCHES SHALL BE SPECIFICATION GRADE AND SHALL INCLUDE A GROUND LUG.
10. CONTRACTOR SHALL COORDINATE ALL ELECTRICAL SERVICE WORK WITH THE CITY OF HILLSBORO.
11. CONTRACTOR SHALL PROVIDE COMPLETED TYPED CIRCUIT DIRECTORIES FOR ALL PANEL BOARDS.
12. ALL LIGHTING FIXTURES ARE TO BE REMOVED AND RETURNED TO THE OWNER OR DISPOSED OF PROPERLY.
13. ALL DATA CABLEING TO BE HOMERUN TO EXISTING DATA RACK IN EXISTING COMPUTER ROOM 238.

KEYED NOTES: ◆

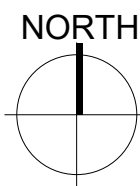
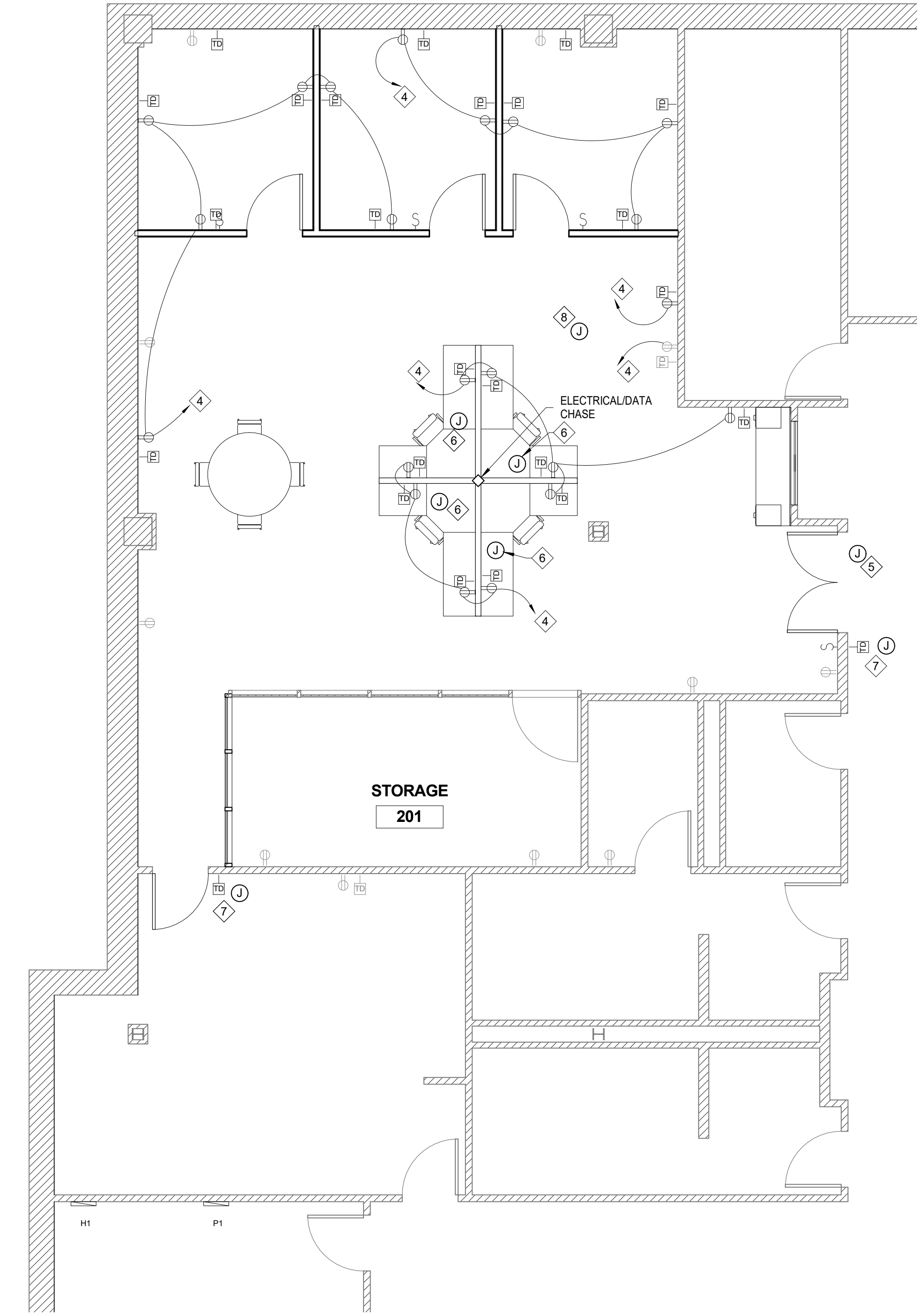
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2. CONNECT TO EXISTING SPARE 20A SINGLE POLE BREAKER IN PANEL P4, LOCATED IN EXISTING COMPUTER ROOM 238.
3. PROVIDE JUNCTION BOXES AS SHOWN, AND HDMI CABLING BETWEEN BOXES, FOR PROJECTOR CONTROLS. COORDINATE EXACT LOCATIONS WITH ARCHITECT.
4. CONNECT TO EXISTING SPARE 20A SINGLE POLE BREAKER IN PANEL P1, LOCATED IN EXISTING MECHANICAL ROOM 132.
5. PROVIDE JUNCTION BOX AT DOOR FOR CAMERA. COORDINATE EXACT LOCATION WITH ARCHITECT. COORDINATE REQUIREMENTS WITH CTS AND OWNER.
6. PROVIDE JUNCTION BOX/CONNECTION AND WIRING TO CAMERA AND DOOR RELEASE BUTTON. COORDINATE EXACT REQUIREMENTS WITH CTS.
7. PROVIDE JUNCTION BOX FOR CARD READER. COORDINATE EXACT LOCATION WITH ARCHITECT. COORDINATE REQUIREMENTS WITH CTS.
8. PROVIDE POWER CONNECTION AND 30A DISCONNECT SWITCH FOR FTU-1-7B. CONNECT TO NEW 2 POLE 30A BREAKER IN PANEL H1, LOCATED IN MECHANICAL ROOM 132. COORDINATE ALL WORK WITH MECHANICAL TRADE.
9. CONNECT TO UNSWITCHED LEG OF LIGHTING CIRCUIT.
10. CONNECT TO EXISTING SPARE 20A SINGLE POLE BREAKER IN PANEL H2, LOCATED IN COMPUTER ROOM 238.
11. CONNECT TO EXISTING SPARE 20A SINGLE POLE BREAKER IN PANEL H1, LOCATED IN MECHANICAL ROOM 132.
12. PROVIDE A 8'x4'x3/4" PLYWOOD BOARD FOR TELEPHONE/COMPUTER TERMINATIONS. MOUNT BOARD 30 INCHES A.F.F. AND PAINT GRAY. PROVIDE TWO (2) 4 INCH EMPTY CONDUITS TO TELEPHONE PEDESTAL LOCATION. PROVIDE ONE (1) 2 INCH EMPTY CONDUIT STUBBED 5'-0" OUTSIDE OF BUILDING TO ACCOMMODATE CATV CABLE. MARK LOCATION OF CONDUIT.



1  
E-102

LOWER LVL. POWER/DATA DEMO PLAN

SCALE - 3/16" = 1'-0"



2  
E-102

LOWER LEVEL POWER/DATA PLAN

SCALE - 3/16" = 1'-0"

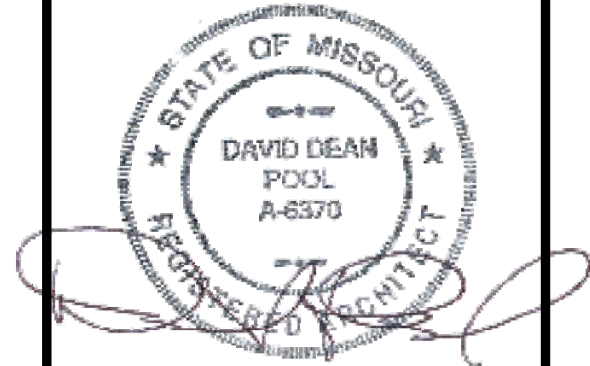
FACILITIES IN THE EXISTING BUILDING AND INDICATED ON THE DRAWINGS HAVE BEEN TAKEN FROM EXISTING BUILDING DRAWINGS AND FIELD INSPECTIONS AT THE PROJECT, BUT ITS COMPLETE ACCURACY IS NOT GUARANTEED. CONTRACTOR SHALL VERIFY AND/OR DETERMINE EXISTING CONDITIONS INVOLVING HIS WORK IN THE FIELD.



HURST-ROSCH, INC.  
PROFESSIONAL DESIGN NUMBER: 184-00206

3675 W. OUTER RD.,  
SUITE 101, ARNOLD, MO  
PH:636.333.3351

www.hurst-rosche.com  
HILLSBORO, IL  
MARION, IL  
EAST ST. LOUIS, IL  
SPRINGFIELD, IL  
NEOSHO, MO



SIGNATURE  
12-9-16  
DATE  
12-31-18  
LICENSE EXPIRES

ADMINISTRATION CENTER RENOVATION  
COUNTY OF JEFFERSON, MO  
729 Maple St., Hillsboro, Mo 63050

MARK	DATE	DESCRIPTION
DATE: 12-9-16		
PROJECT NO: 845-2606		
DESIGN: TA	DRAWN: MCW	CHECK: Checker

LOWER LEVEL  
POWER/DATA PLANS

E-102



GENERAL NOTES:

1. ALL WORK SHALL BE IN ACCORDANCE WITH CURRENT EDITION OF THE STATE OF MISSOURI BUILDING CODE & THE NATIONAL ELECTRICAL CODE.
2. SEAL ALL PENETRATIONS w/ APPROPRIATE FIRE, WEATHER & THERMAL STOPS. COORDINATE FIRE WALL LOCATIONS w/ ARCHITECTURAL SHEETS.
3. COORDINATE ALL WORK WITH OTHER TRADES AS REQUIRED.
4. MECHANICAL EQUIPMENT VARIES FROM MANUFACTURER TO MANUFACTURER. COORDINATE LOCATION OF DISCONNECTS, POWER CONNECTIONS, AND MOTOR PROTECTION WITH EQUIPMENT SUPPLIER.
5. DISCONNECTS SHALL BE GENERAL-DUTY WITH A GROUND BUS.
6. ALL CONDUCTORS SHALL BE #12 GAUGE COPPER IN 3/4" CONDUIT MINIMUM UNLESS NOTED OTHERWISE. SWITCH LEGS SHALL BE PERMITTED TO BE INSTALLED IN 1/2" CONDUITS.
7. ALL CONDUIT SHALL BE CONCEALED IN WALLS, CEILINGS, AND/OR FLOORS.
8. ALL WIRING DEVICES SHALL BE RECESSED EXCEPT IN MECHANICAL ROOMS. CONDUIT MAY BE EXPOSED.
9. RECEPTACLES AND SWITCHES SHALL BE SPECIFICATION GRADE AND SHALL INCLUDE A GROUND LUG.
10. CONTRACTOR SHALL COORDINATE ALL ELECTRICAL SERVICE WORK WITH THE CITY OF HILLSBORO.
11. CONTRACTOR SHALL PROVIDE COMPLETED TYPED CIRCUIT DIRECTORIES FOR ALL PANEL BORDS.
12. ALL LIGHTING FIXTURES ARE TO BE REMOVED AND RETURNED TO THE OWNER OR DISPOSED OF PROPERLY.
13. ALL DATA CABLEING TO BE HOMERUN TO EXISTING DATA RACK IN EXISTING COMPUTER ROOM 238.

KEYED NOTES: ◆ #

1. ALL RECEPTACLES/DATA JACKS IN THIS SPACE ARE EXISTING TO REMAIN UNLESS OTHERWISE NOTED. IF RECEPTACLES ON A CIRCUIT ARE BEING REMOVED, CONTRACTOR MUST MAINTAIN POWER TO THE REST OF THE RECEPTACLES ON THAT CIRCUIT.
2. CONNECT TO EXISTING SPARE 20A SINGLE POLE BREAKER IN PANEL P4, LOCATED IN EXISTING COMPUTER ROOM 238.
3. PROVIDE JUNCTION BOXES AS SHOWN, AND HDMI CABLING BETWEEN BOXES, FOR PROJECTOR CONTROLS. COORDINATE EXACT LOCATIONS WITH ARCHITECT.
4. CONNECT TO EXISTING SPARE 20A SINGLE POLE BREAKER IN PANEL P1, LOCATED IN EXISTING MECHANICAL ROOM 132.
5. PROVIDE JUNCTION BOX AT DOOR FOR CAMERA. COORDINATE EXACT LOCATION WITH ARCHITECT. COORDINATE REQUIREMENTS WITH CTS AND OWNER.
6. PROVIDE JUNCTION BOX/CONNECTION AND WIRING TO CAMERA AND DOOR RELEASE BUTTON. COORDINATE EXACT REQUIREMENTS WITH CTS.
7. PROVIDE JUNCTION BOX FOR CARD READER. COORDINATE EXACT LOCATION WITH ARCHITECT. COORDINATE REQUIREMENTS WITH CTS.
8. PROVIDE POWER CONNECTION AND 30A DISCONNECT SWITCH FOR FTU-1-7B. CONNECT TO NEW 2 POLE 30A BREAKER IN PANEL H1, LOCATED IN MECHANICAL ROOM 132. COORDINATE ALL WORK WITH MECHANICAL TRADE.
9. CONNECT TO UNSWITCHED LEG OF LIGHTING CIRCUIT.
10. CONNECT TO EXISTING SPARE 20A SINGLE POLE BREAKER IN PANEL H2, LOCATED IN COMPUTER ROOM 238.
11. CONNECT TO EXISTING SPARE 20A SINGLE POLE BREAKER IN PANEL H1, LOCATED IN MECHANICAL ROOM 132.
12. PROVIDE A 8'X4'X3/4" PLYWOOD BOARD FOR TELEPHONE/COMPUTER TERMINATIONS. MOUNT BOARD 30 INCHES A.F.F. AND PAINT GRAY. PROVIDE TWO (2) 4 INCH EMPTY CONDUITS TO TELEPHONE PEDESTAL LOCATION. PROVIDE ONE (1) 2 INCH EMPTY CONDUIT STUBBED 5'-0" OUTSIDE OF BUILDING TO ACCOMMODATE CATV CABLE. MARK LOCATION OF CONDUIT.

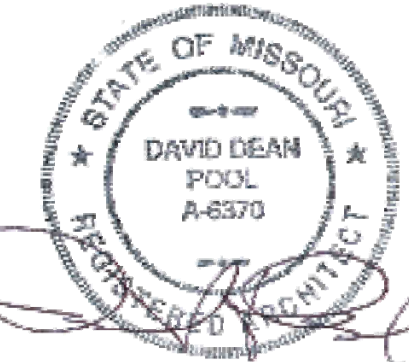
FACILITIES IN THE EXISTING BUILDING AND INDICATED ON THE DRAWINGS HAVE BEEN TAKEN FROM EXISTING BUILDING DRAWINGS AND FIELD INSPECTIONS AT THE PROJECT. BUT ITS COMPLETE ACCURACY IS NOT GUARANTEED. CONTRACTOR SHALL VERIFY AND/OR DETERMINE EXISTING CONDITIONS INVOLVING HIS WORK IN THE FIELD.



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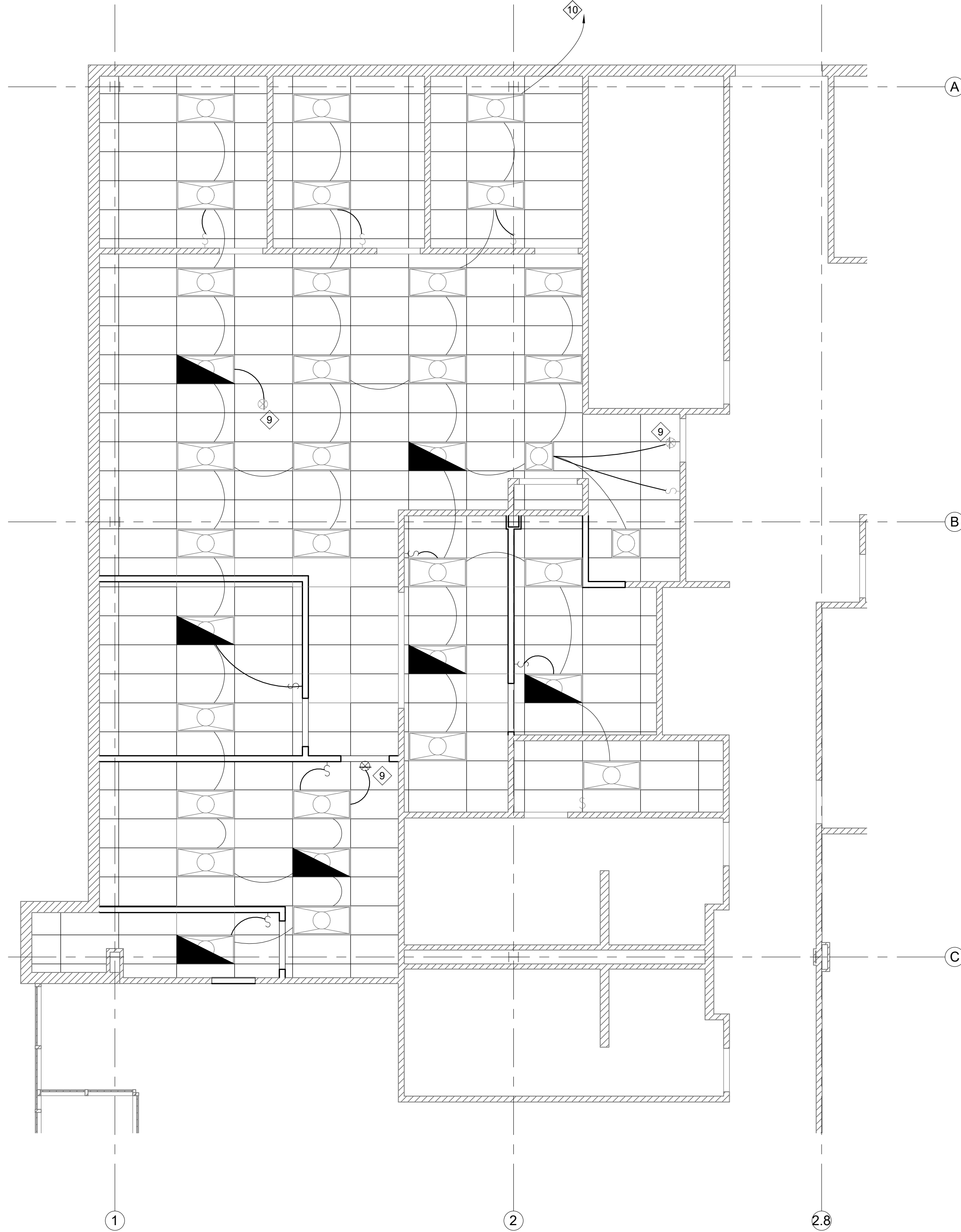
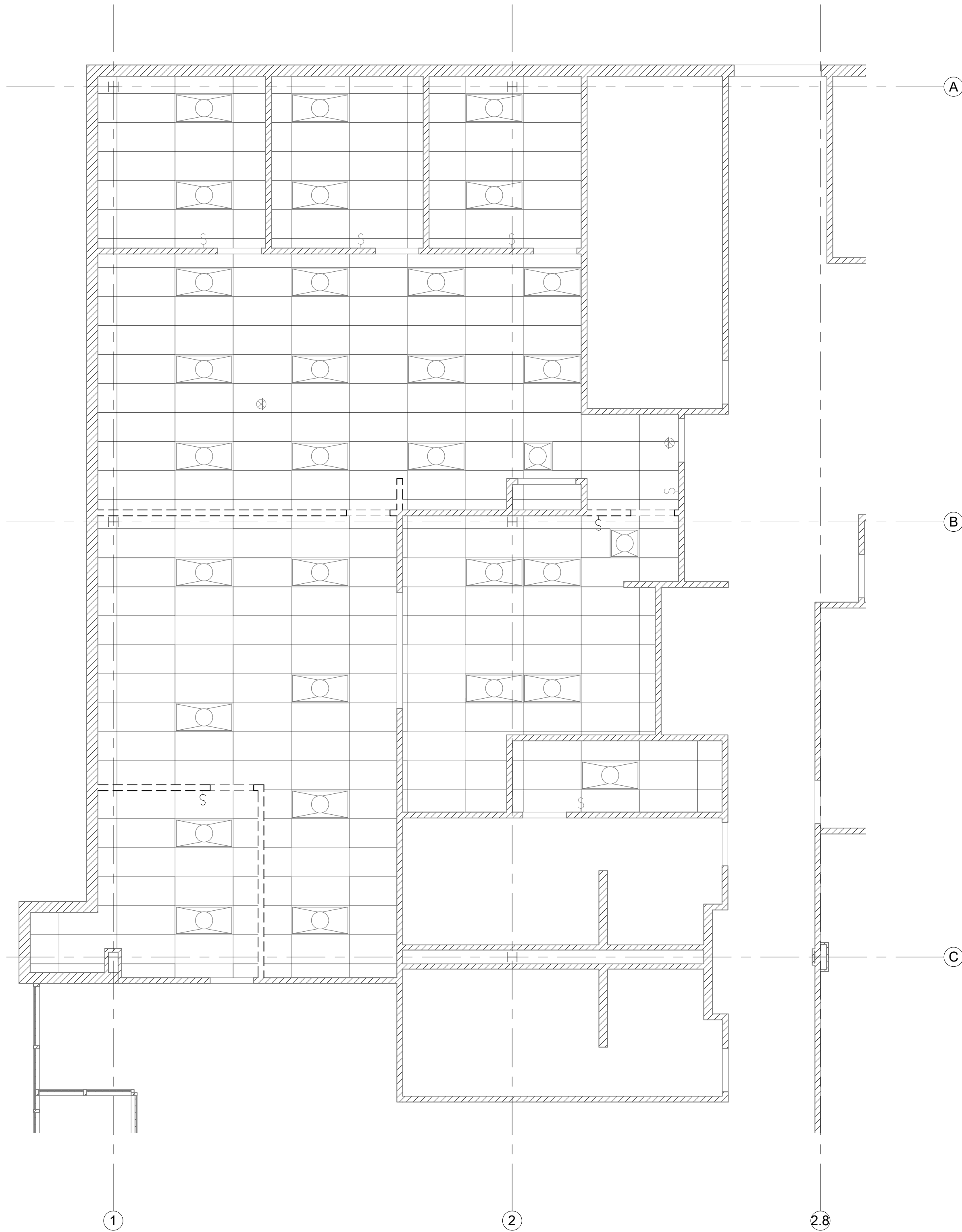
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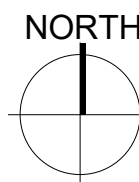
MAIN LEVEL LIGHTING PLANS

E-103



1  
E-103

MAIN LEVEL LIGHTING DEMO PLAN  
SCALE - 3/16" = 1'-0"



2  
E-103

MAIN LEVEL LIGHTING PLAN  
SCALE - 3/16" = 1'-0"

6. ALL WORK SHALL BE IN ACCORDANCE WITH CURRENT NATIONAL ELECTRICAL CODE, INTERNATIONAL BUILDING CODE AND THE NATIONAL ELECTRICAL CODE.
7. SEAL ALL PENETRATIONS W/ APPROPRIATE FIRE, WEATHER & VIBRATION PROTECTORS. COORDINATE WITH ARCHITECTURAL, STRUCTURAL, MECHANICAL & ELECTRICAL SHEETS.
8. ALL WORK SHALL BE COORDINATED WITH OTHER TRADES AS REQUIRED.
9. EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S INSTALLATION REQUIREMENTS. EQUIPMENT VARIES FROM MANUFACTURER TO MANUFACTURER. COORDINATE LOCATION OF DISCONNECTS, CONDUIT CONNECTIONS, AND MOTOR PROTECTION WITH EQUIPMENT SUPPLIED.
10. DISCONNECTS SHALL BE GENERAL DUTY WITH A GROUNDING TERMINAL IN THE OPEN POSITION.
11. ALL CONDUCTORS SHALL BE #12 GAUGE COPPER IN 3/4" O.D. RIGID CONDUIT UNLESS OTHERWISE SPECIFIED. CONDUIT LESS SHALL BE PERMITTED TO BE INSTALLED IN 1/2" O.D. RIGID CONDUIT.
12. ALL CONDUIT SHALL BE CONCEALED IN WALLS, CEILINGS AND FLOORS.
13. ALL WIRING DEVICES SHALL BE RECEIVED EXISTING IN MECHANICAL ROOMS, CONDUIT MAY BE RUN THROUGH MECHANICAL AND SWIMMING POOL AREAS. ALL NEW DEVICES SHALL INCLUDE A GROUND LUG.
14. ALL WORK SHALL BE COMPLETED IN ACCORDANCE WITH THE CITY OF HILLSBORO.
15. ALL WORK SHALL PROVIDE FOR THE USE OF TYPED CIRCUIT DIRECTORIES FOR ALL PANEL BOARDS.
16. ALL LEADS WIRING SHALL BE PROTECTED, COVERED AND RETURNED TO THE OWNER OR EXPOSED OF PROPERLY. ALL DATA CABLEING TO BE HUNG ON TO DISTANT DATA CENTER EXISTING CONDUITS.

ALL RECEPTACLES/DATA JACKS IN THIS SPACE ARE EXISTING TO REMAIN UNLESS OTHERWISE NOTED. IF RECEPTACLES ON A CIRCUIT ARE BEING REMOVED, CONTRACTOR MUST MAINTAIN POWER TO THE REST OF THE RECEPTACLES ON THAT CIRCUIT. CONNECT TO EXISTING SPARE 20A SINGLE POLE BREAKER IN PANEL P4, LOCATED IN EXISTING COMPUTER ROOM 238.

PROVIDE JUNCTION BOX/CONNECTION AND HDMI CABLEING BETWEEN BOXES, FOR PROJECTOR CONTROLS. COORDINATE EXACT LOCATIONS WITH ARCHITECT.

CONNECT TO EXISTING SPARE 20A SINGLE POLE BREAKER IN PANEL P1, LOCATED IN EXISTING MECHANICAL ROOM 132. PROVIDE JUNCTION BOX AT DOOR FOR CAMERA. COORDINATE EXACT LOCATION WITH ARCHITECT. COORDINATE REQUIREMENTS WITH CTS AND OWNER.

PROVIDE JUNCTION BOX/CONNECTION AND WIRING TO CAMERA AND DOOR RELEASE BUTTON. COORDINATE EXACT REQUIREMENTS WITH CTS.

PROVIDE JUNCTION BOX FOR CARD READER. COORDINATE EXACT LOCATION WITH ARCHITECT. COORDINATE REQUIREMENTS WITH CTS.

PROVIDE POWER CONNECTION AND 30A DISCONNECT SWITCH FOR FTU-1-7B. CONNECT TO NEW 2 POLE 30A BREAKER IN PANEL P4, LOCATED IN MECHANICAL ROOM 132. COORDINATE ALL WORK WITH MECHANICAL TRADE.

CONNECT TO UNSWITCHED LEG OF LIGHTING CIRCUIT.

CONNECT TO EXISTING SPARE 20A SINGLE POLE BREAKER IN PANEL H2, LOCATED IN COMPUTER ROOM 238.

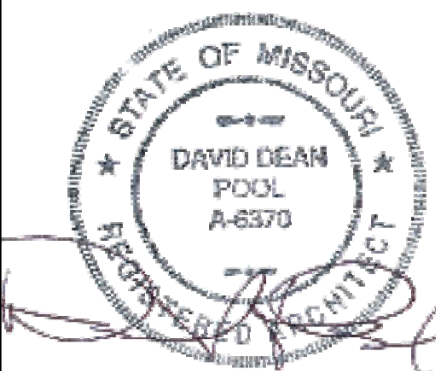
CONNECT TO EXISTING SPARE 20A SINGLE POLE BREAKER IN PANEL H1, LOCATED IN MECHANICAL ROOM 132.

PROVIDE A 4"x4"x3/4" PLYWOOD BOARD FOR TELEPHONE/COMPUTER TERMINATIONS. MOUNT BOARD 30 INCHES A.F.F. AND PAINT GRAY. PROVIDE TWO (2) 4 INCH EMPTY CONDUITS FOR TELEPHONE PEDestal LOCATIONS. PROVIDE ONE (1) 2 INCH EMPTY CONDUIT STUBBED 5'-0" OUTSIDE OF BUILDING TO ACCOMMODATE CATV CABLE. MARK LOCATION OF CONDUIT.



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E-104

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