



**A R C H I T E C T U R A L  
R E S O U R C E S • I N C.**

126 East Superior Street  
Duluth, Minnesota 55802  
Phone (218) 727- 8481  
Fax (218) 727-8483  
[www.arimn.com](http://www.arimn.com)

**CONSTRUCTION SPECIFICATION**

April 16, 2012

Project Number: 11-047

Bid Number: 12-09DS

Bid Opening Date: May 9, 2012 @ 2:00 p.m. local time

Duluth City Hall MIS Upgrade





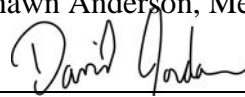
**CITY OF DULUTH**  
*Department of Administration*  
Office of City Architect  
1532 West Michigan Street  
Facilities Maintenance Shop  
Duluth, Minnesota 55806  
(218)730-4434

Project Name: City of Duluth MIS Upgrades

PROJECT NUMBER: 12-09DS

Date: April 16, 2012

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED ARCHITECT OR ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

Name	Registration Number
 Ryan Erspamer, Architect	49444
 Shawn Anderson, Mechanical Engineer	45413
 David Jordan, Electrical Engineer	42696

ARCHITECT: Architectural Resources, Inc.  
126 East Superior Street  
Duluth, Minnesota 55802  
(218)727-8481

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CITY OF DULUTH  
INVITATION TO BID

PROJECT NAME/DESCRIPTION: **Duluth City Hall MIS Upgrade**

PROJECT NUMBER: **11-047**

BID NUMBER: **12-09DS**

Sealed bids will be received by the City Purchasing Agent in and for the Corporation of the City of Duluth, Minnesota in Room 100 City Hall, Duluth, Minnesota 55802, (218) 730-5340 at 2:00 p.m., local time on **May 9, 2012**, for the **Duluth City Hall MIS Upgrade**; immediately thereafter, bids will be taken to Room 106A City Hall where they will be publicly opened and read aloud.

**NOTICE TO BIDDERS:**

1. **A Project Labor Agreement (PLA) will be required for any bid that is over or could virtually go over \$150,000.**
2. **Unless a Certificate of Exemption is provided, any out-of-state bidder receiving a bid award will have 8% retained from invoice payments on any contracts over \$50,000. Submit a signed copy from the State of Minnesota when submitting Payment and Performance Bonds. This form may be found at the following web address: [http://taxes.state.mn.us/Forms\\_and\\_Instructions/sde.pdf](http://taxes.state.mn.us/Forms_and_Instructions/sde.pdf)**

This advertisement is also available on the City of Duluth website at  
[http://www.duluthmn.gov/purchasing/bid\\_information.cfm](http://www.duluthmn.gov/purchasing/bid_information.cfm)

In general, this project consists of: **New technology closets and wiring, Data Center remodel and new HVAC for Data Center, new building electrical service.**

Proposal forms, contract documents, plans and specifications as prepared by the firm of Architectural Resources, Inc., are on file at the following offices: City Purchasing Office; City Architect's Office; Duluth Builder's Exchange; McGraw-Hill Construction; Minneapolis Builder's Exchange; Reed Construction Data, St. Paul Builder's Exchange and the office of Architectural Resources, Inc., 126 East Superior Street, Duluth, MN 55802.

Copies of these plans and specifications may be obtained from Architectural Resources, Inc., 126 East Superior Street, Duluth, MN 55802.

Copies of bidding documents may be obtained by bidders with a deposit of One Hundred Dollars and no/100 (\$100.00) for each set written to the City of Duluth including the project number on the check. This will be refunded upon the return of complete documents in useable condition. Documents to be returned to the office of Architectural Resources, Inc., 126 East Superior Street, Duluth, MN 55802.

A certified check or bank draft payable to the order of the City of Duluth, negotiable U.S. Government Bonds (at par value), or a satisfactory bid bond executed by the bidder and acceptable surety, in an amount equal to five percent (5%) of the total bid, shall be submitted with each bid.

Attention is called to the fact that not less than the minimum salaries, wages and benefits as set forth in the contract documents must be paid on this project. The contractor must take affirmative action

to ensure that the employees and applicants for employment are not discriminated against because of their race, color, creed, sex or national origin and must meet the affirmative action goals. Contractors are encouraged to subcontract with disadvantage business enterprises when possible.

The City of Duluth reserves the right to reject any or all bids or to waive any informalities in the bidding. Bids may be held by the City of Duluth for a period not to exceed thirty (30) days from the date of opening the bids for the purpose of reviewing the bids and investigating the qualifications of the bidders, prior to awarding the contract.

The City of Duluth is an Equal Opportunity Employer. Contractor shall comply with all applicable Equal Employment Opportunity laws and regulations.

CITY OF DULUTH

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Dennis Sears  
Purchasing Agent



## INSTRUCTIONS TO BIDDERS

1. Use of Separate Bid Forms. These contract documents include a complete set of bidding and contract forms which are for the convenience of bidders and are not to be detached from the contract document, filled out, or executed. **Separate copies of bid forms are furnished for that purpose.**
2. Interpretations or Addenda. No oral interpretation will be made to any bidder as to the meaning of the contract documents or any part thereof. Every request for such an interpretation shall be made in writing to the City of Duluth. Any inquiry received seven or more days prior to the date fixed for opening of bids will be given consideration. Every interpretation made to a bidder will be in the form of an addendum to the contract documents, and when issued, will be on file in the offices of the Purchasing Agent and City Architect at least five days before bids are opened. In addition, all addenda will be mailed to each person holding contract documents, but it shall be the bidder's responsibility to make inquiry as to the addenda issued. All such addenda shall become part of the contract, and all bidders shall be bound by such addenda, whether or not received by the bidders.
3. Inspection of Site. Each bidder should visit the site of the proposed work and fully acquaint himself with the existing conditions there relating to construction and labor, and should fully inform himself as to the facilities involved, the difficulties, and the restrictions attending the performance of the contract. The bidder should thoroughly examine and familiarize himself with the drawings, technical specifications, and all other contract documents. The contractor, by the execution of the contract, shall in no way be relieved of any obligation under it due to his failure to receive or examine any form or legal instrument or to visit the site and acquaint himself with the conditions there existing; and the City of Duluth will be justified in rejecting any claim based on facts regarding which he should have been on notice as a result thereof.
4. Alternative Bids. No alternative bids will be considered unless alternative bids are specifically requested by the technical specifications.
5. Bids.
  - a. All bids must be submitted on forms supplied by the City of Duluth Purchasing Agent and shall be subject to all requirements of the contract documents, including the drawings, and these **Instructions to Bidders**. All bids must be regular in every respect; and no interlineations, excisions, or special conditions shall be made or included in the bid form by the bidder.

- b. Bid documents including the bid and the bid guaranty shall be enclosed in an envelope which shall be sealed and clearly labeled with the project number, if any, name of bidder, and date and time of bid opening, in order to guard against premature opening of the bid. If proposal is mailed, this envelope shall be placed in another envelope which shall be sealed and labeled with project number, if any, name of bidder, and date and time of bid opening -- and addressed to City of Duluth Purchasing Agent, 100 City Hall, Duluth, Minnesota 55802.
- c. The City of Duluth may consider as irregular any bid on which there is an alteration of or departure from the bid form hereto attached, and at its option may reject the same.
- d. If the project is awarded, it will be awarded by the City of Duluth to the lowest responsible bidder assuming that the bids are within funds available based on the lowest base bid and or in combination with selected alternates (if any). The alternates will be accepted in numerical priority order, as shown on the bid form. By the award of the contract, it is assumed that the work will be completed within the time-frame as specified within the contract documents.
- e. Each bidder shall include in his bid the following information:
  - Principals --      Names  
                                 Home Addresses, including city, state, & zip code
  - Firm --              Name  
                                 Address  
                                 City, State & Zip Code
  - Mechanical & Electrical Subcontractors -- Names of firms that will do the mechanical and electrical work and the amounts of the mechanical and electrical sub-bids, if applicable and when (where indicated on Bid Proposal Form).

6. Bid Guaranty.

- a. The bid must be accompanied by a bid guaranty which shall not be less than five percent (5%) of the amount of the bid. At the option of the bidder, the guaranty may be a certified check, bank draft, negotiable U.S. Government bond (at par value), or a bid bond. No bid will be considered unless it is accompanied by the required guaranty. Certified check or bank draft must be made payable to the order of the City of Duluth, Minnesota. Cash deposits will not be accepted. The bid guaranty shall insure the execution of the agreement and the furnishing of the surety bond or bonds by the successful bidder, all as required by the contract documents.

- b. Revised bids submitted before the opening of bids, whether forwarded by mail or telegram, if representing an increase in excess of two percent (2%) of the original bid, must have bid guaranty adjusted accordingly; otherwise, the bid will not be considered.
- c. Certified checks or bank drafts, or the amount thereof, bid bonds, and negotiable U.S. Government bonds of unsuccessful bidders, will be returned as soon as practical after the opening of bids.

7. Collusive Agreements

- a. The successful bidder on each City of Duluth construction project shall be required to execute a City of Duluth non-collusive affidavit to the effect that he has not entered into a collusive agreement with any other person, firm, or corporation in regard to any bid submitted.
- b. Before executing any subcontract, the successful bidder shall submit the name of any proposed subcontractor for prior approval, and an affidavit substantially in the form provided in Section 103 of General Conditions hereof.

8. Unit Prices. The unit price for each of the several items in the proposal of each bidder shall include its prorata share of overhead so that the sum of the products obtained by multiplying the quantity shown for each item by the unit price bid represents the total bid. Any bid not conforming to this requirement may be rejected as informal. The special attention of all bidders is called to this provision; for should conditions make it necessary to revise the quantities, no limit will be fixed for such increased or decreased quantities nor extra compensation allowed, provided the net monetary value of all such additive and subtractive changes in quantities of such items of work (i.e., difference in cost) shall not increase or decrease the original contract price by more than twenty-five percent (25%), except for work not covered in the drawings and technical specifications as provided for in Section 109 hereof.

9. Corrections. Erasures or other changes in the bids must be explained or noted over the signature of the bidder.

10. Time for Receiving Bids.

- a. Bids received prior to the advertised hour of opening will be securely kept, sealed. The officer whose duty it is to open them will decide when the specified time has arrived, and no bid received thereafter will be considered; except that when a bid arrives by mail after the time fixed for opening, but before the reading of all other bids is completed, and it is shown to the satisfaction of the City Purchasing office that the non-arrival on time was due solely to delay in the mails for which the bidder was not responsible, such bid will be received and considered.

- b. Bidders are cautioned that, while telegraphic modifications of bids may be received as provided above, such modifications, if not explicit and if in any sense subject to misinterpretation, shall make the bid so modified or amended, subject to rejection.
- 11. Opening of Bids. At the time and place fixed for the opening of bids, the City Purchasing Agent will cause to be opened and publicly read aloud every bid received within the time set for receiving bids, irrespective of any irregularities therein. Bidders and other persons properly interested may be present, in person or by representative.
- 12. Withdrawal of Bids. Bids may be withdrawn on written or telegraphic request dispatched by the bidder in time for delivery in the normal course of business to the time fixed for opening; provided, that written confirmation of any telegraphic withdrawal over the signature of the bidder is placed in the mail and postmarked prior to the time set for bid opening. The bid guaranty of any bidder withdrawing his bid in accordance with the foregoing conditions will be returned promptly.
- 13. Award of Contract: Rejection of Bids.
  - a. The contract will be awarded to the responsible bidder submitting the lowest bid complying with the conditions of the Invitation to Bid. The City of Duluth, however, reserves the right to reject any and all such bids and to waive any informality in bids received whenever such rejection or waiver is in its interest.
  - b. The City of Duluth reserves the right to consider as unqualified to do the work of general construction, any bidder who does not habitually perform with his own forces the major portions of the work involved in construction of the improvements embraced in the contract documents.
- 14. Execution of Agreement: Performance and Payment Bond.
  - a. Subsequent to the award and within ten (10) days after the prescribed forms are presented for signature, the successful bidder shall execute and deliver to the City of Duluth an agreement in the form as furnished by the City, in such number of copies as the City of Duluth may require.
  - b. Having satisfied all conditions of award as set forth elsewhere in these documents, the successful bidder shall, within the period specified in paragraph "a" above, furnish:
    - 1) A performance bond for the use and benefit of the City of Duluth to complete the contract according to its terms, and conditioned on saving the City of Duluth harmless from all costs and charges that may accrue on account of completing the specified work; and

- 2) A payment bond for the use and benefit of all persons furnishing labor and materials for the performance of the contract conditioned upon the payment, as they become due, of all just claims for labor and materials.

Both the performance bond and the payment bond shall be in a penal sum of not less than the amount of the contract awarded. Such bonds shall be in the same form as that included in the contract documents and shall bear the same date as, or a date subsequent to, that of the agreement. A current power of attorney for the person who signs for any surety company shall be attached to such bonds.

- c. The failure of the successful bidder to execute such agreement to supply the required bond or bonds within ten (10) days after the prescribed forms are presented for signature, or within such extended period as the City of Duluth may grant, based on reasons determined sufficient by the City of Duluth, shall constitute a default, and the City of Duluth may either award the contract to the next lowest responsible bidder or re-advertise for bids, and may charge against the bidder the difference between the amount of the bid and the amount for which a contract for the work is subsequently executed, irrespective of whether the amount thus due exceeds the amount of the bid bond. If a more favorable bid is received by re-advertising, the defaulting bidder shall have no claim against the City of Duluth for a refund.

15. Wages and Salaries.

- a. Attention of bidders is particularly called to the requirements concerning the payment of not less than the prevailing wage and salary rates specified in the contract documents and the conditions of employment with respect to certain categories and classifications of employees.
- b. The rates of pay set forth under **General Conditions** are the minimums to be paid during the life of the contract. It is therefore the responsibility of bidders to inform themselves as to local labor conditions, such as the length of work day and work week, overtime compensations, health and welfare contributions, labor supply, and prospective changes or adjustments of rates.

16. Equal Employment Opportunity. Attention of bidders is particularly called to the requirement for ensuring that employees and applicants for employment are not discriminated against because of their race, color, religion, sex, or national origin. (See Supplementary General Conditions, Part II, Section II).

17. Employment and Business. Attention of bidders is particularly called to the requirement that, to the greatest extent feasible, opportunities for training and employment made possible by this project shall be given to lower income residents of the City of Duluth. Additionally, efforts should be made, if any work

is subcontracted, to award subcontracts to concerns located in or owned in substantial part by persons residing in the City of Duluth.

18. Sales and Use Taxes. It is assumed that, in the preparation of his proposal, the bidder has taken into consideration his liability from any sales, use, or excise tax that might be assessed in the purchase of, storage, use, or consumption of any materials, services, or supplies for performance of the contract work. Any such tax paid by the contractor will be considered as his expense, for which no direct compensation will be made by the City to the contractor over and above the accepted bid.
19. Pre-Bid/Pre-Construction Meetings.
  - a. Seven (7) days prior to bid date, a pre-bid meeting will be held (see **Bid Form** for time and place). All prime bidders are requested to attend. All bidders will be allowed to make inquiries regarding the contract documents. All formal decisions will be documented by addendum. Failure of any prime bidders to attend this meeting could jeopardize the contract award.
  - b. Approximately seven (7) days after City Council approval of contract award, the successful bidder is required to attend a pre-construction meeting. At this meeting, the successful bidder will present his construction schedule, cost breakdown, required submittals, etc.
20. Equal Employment Opportunity (EEO) Affirmative Action Policy Statement and Compliance Certificate.
  - a. The successful bidder on each City of Duluth construction project shall be required to execute a certificate substantially in the form herein provided.
  - b. Before executing any subcontract in excess of \$2,500, the successful bidder shall require the subcontractor to execute a form similar in nature to the form herein provided.



REQUEST FOR BID  
Date: April 16, 2012  
Project #: 12-09DS  
Bid #

## CITY OF DULUTH

RETURN BY BID OPENING TIME TO:

PURCHASING DIVISION  
100 City Hall, 411 W First Street  
Duluth, Minnesota 55802

### Duluth City Hall MIS Upgrade

PHONE: (218) 730-5340  
FAX: (218) 730-5921

Pre-bid Meeting at 10:00 AM on Monday, April 30, 2012 at Lobby Duluth City Hall, 411 W. 1st Street Duluth, MN 55802.

### BID OPENING AT 2:00PM ON MAY 9, 2012

NOTE: All bids must be written, signed and transmitted in a sealed envelope, plainly marked with the Subject Matter and Opening Date. The City of Duluth reserves the right to split award where there is substantial savings to the City, waive informalities and to reject any and all bids. Bidder shall state in proposal if Bid price is based on acceptance of total order. Sales Tax is not to be included in the unit price. Bidder shall state freight charges if, the proposal F.O.B. is shipping point, freight not allowed. Low Bid will not be the only consideration for award of Bid. All pages shall be signed or initialed by authorized bidder's representative as indicated at the bottom of the page(s) of the request for bid forms.

RETURN BID IN DUPLICATE WITH DUPLICATE DESCRIPTIVE  
LITERATURE TO THE CITY PURCHASING OFFICE

BID DEPOSIT REQUIREMENTS: 5% of Bid Amount  
Deposit shall mean cash, cashier's check, or corporate surety bond payable to or in favor of City of Duluth.

PERFORMANCE and PAYMENT BONDS: Shall be required of the successful bidder. Bonds shall BOTH be in the full amount of the Contract amount.

INSURANCE CERTIFICATE: Shall be required per specified requirements per the attached requirements.

*Designated F.O.B. Point:*

*City Architect*

*Jobsite(s)*

*Tax: Federal Excise Exemption*

*Account Number: 41-74-0056 K*

Item Number	Qty	U/OM	Description	Unit Price	Total Price
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{ See Additional Page(s) }

FREIGHT CHARGES \$ \_\_\_\_\_

NAME \_\_\_\_\_

TOTAL BASE BID \$ \_\_\_\_\_  
TO INCLUDE ANY ADDITIONAL PAGES

ADDR1 \_\_\_\_\_

ADDR2 \_\_\_\_\_

ADDR3 \_\_\_\_\_

PAYMENT TERMS: \_\_\_\_\_

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

F.O.B. POINT: \_\_\_\_\_

(Print)

Title

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

(SIGNATURE)

Tele #

The City of Duluth is an Equal Opportunity Employer.

(In words - See Additional Page(s) as required)



The Contractor is requested to furnish the information listed below:

**PLUMBING SUB CONTRACTOR:**

_____	List the name of the proposed
plumbing sub-contractor and amount.	

**HVAC SUBCONTRACTOR:**

_____	List the name of the proposed HVAC
sub-contractor and amount.	

**ELECTRICAL SUB CONTRACTOR:**

_____	List the name of the proposed
electrical sub-contractor and amount.	

Initial: \_\_\_\_\_

CITY OF DULUTH  
Date: April 16, 2012  
Project #: 12-09DS  
Bid #:

Page 3 of 5

Item Number	Qty	U/OM	Description	Unit Price	Total Price
{ See Additional Page(s) }					

UNIT PRICES: Unit prices are in Addition/Deletion to the Lump Sum Bid. Bidder must enter all unit prices. All unit prices to include all labor, material and equipment to furnish and install requested item(s).

Initial: \_\_\_\_\_

Date: April 16, 2012

Project #: 12-09DS

Bid #:

Item Number	Qty	U/OM	Description	Unit Price	Total Price
{ See Additional Page(s) }					

## Completion Time:

The undersigned hereby affirms & agrees, if awarded a contract, to begin work immediately upon receipt of Notice to Proceed and to substantially complete the work within the time schedule indicated in the Special Conditions, \_\_\_\_ Calendar Days.

Security in the sum of \$ \_\_\_\_\_ in the form of \_\_\_\_\_ is submitted herewith in accordance with the Instructions to Bidders, payable without condition to the City of Duluth which is agreed shall be retained as liquidated damages for the delay and extra expense caused the Owner if the undersigned fails to execute the contract and furnish bonds required by the contract documents.

Signed: \_\_\_\_\_ for

\_\_\_\_\_ a partnership (or)

\_\_\_\_\_ a corporation incorporated under the laws of the State of

\_\_\_\_\_.

President: \_\_\_\_\_ Vice President: \_\_\_\_\_

Secretary: \_\_\_\_\_ Treasurer: \_\_\_\_\_

Address (es): \_\_\_\_\_

\_\_\_\_\_, being duly sworn, deposes and says that there are no other persons comprising above company or firm than the above names, and that there are no persons or corporations interested in the forgoing proposals, either as principal or subcontractor, other than the above names; also that the proposals are made without any connection with any person or persons acting in any official capacity whatever for the City of Duluth is directly or indirectly interested therein, or any portion of the profit thereof.

Subscribed and Sworn to before me this \_\_\_\_\_ day of \_\_\_\_\_ A.D., \_\_\_\_\_,

\_\_\_\_\_ Notary Public.

Stamp/Seal

Initial: \_\_\_\_\_

Item Number	Qty	U/OM	Description	Unit Price	Total Price
{ See Additional Page(s) }					

Addendum Receipt Acknowledgments:

Addendum #: \_\_\_\_\_ Dated: \_\_\_\_\_ (initial)

Addendum #: \_\_\_\_\_ Dated: \_\_\_\_\_ (initial)

Addendum #: \_\_\_\_\_ Dated: \_\_\_\_\_ (initial)

Please Note! Please disregard the note on page 1 regarding sales tax for this bid. All applicable sales and/or use tax are to be included in the bid pricing. All bids are to be bid F.O.B. jobsite; the blank on page 1 for freight shall be left blank.

City Project Contact:

Tari Rayala, AIA  
Facility Projects Specialist  
City of Duluth  
1532 West Michigan Street  
Duluth, MN 55806

Office: (218) 730-4434  
Cell: (218) 591-6892  
[trayala@duluthmn.gov](mailto:trayala@duluthmn.gov)

Initial: \_\_\_\_\_

# PURCHASE ORDER TERMS AND CONDITIONS

1. **ACCEPTANCE.** ACCEPTANCE OF THIS ORDER BY SELLER IS EXPRESSLY LIMITED TO THE TERMS AND CONDITIONS CONTAINED IN THIS ORDER. ANY TERM OR CONDITION STATED BY THE SELLER IN ANY PRIOR PROPOSAL OR SELLER'S ACKNOWLEDGEMENT FORM, OR IN OTHERWISE ACKNOWLEDGING OR ACCEPTING THIS ORDER IS DEEMED BY BUYER TO BE A MATERIAL ALTERATION OF THIS ORDER AND IS HEREBY OBJECTED TO BY BUYER. ANY SUCH TERM OR CONDITION SHALL BE TOTALLY INAPPLICABLE TO THIS ORDER UNLESS SPECIFICALLY AGREED TO IN A WRITING SIGNED BY AN AUTHORIZED REPRESENTATIVE OF BUYER. ACCEPTANCE OF THE GOODS OR SERVICES COVERED BY THIS ORDER WILL NOT CONSTITUTE ACCEPTANCE BY BUYER OF SELLER'S TERMS AND CONDITIONS. ANY OF THE FOLLOWING ACTS BY SELLER SHALL CONSTITUTE ACCEPTANCE OF THIS ORDER AND ALL OF ITS TERMS AND CONDITIONS SIGNING AND RETURNING A COPY OF THIS ORDER; DELIVERY OF ANY OF THE GOODS ORDERED; INFORMING THE BUYER IN ANY MANNER OF COMMENCEMENT OF PERFORMANCE; OR RETURNING SELLER'S OWN FORM OF ACKNOWLEDGEMENT.
2. **PRICE.** If price (either fixed price or hourly rate[s] in case of a time and material order) and/or delivery is not specified by Buyer on the face of this order, Seller shall immediately submit its best price, delivery date and/or schedule which shall be subject to Buyer's approval and acceptance. Seller warrants that the prices and other terms for the articles sold to Buyer under this order are not less favorable than those extended to all other customers for the same or like articles in equal or less quantities. In the event Seller reduces its price for such articles during the term of this order, Seller agrees to reduce the prices hereof accordingly. If this order is on a time and material basis, the following shall apply: price shall be (a) material at Seller's cost, less scrap, without any charge for handling or otherwise, plus (b) time at agreed hourly rate(s). If both engineering work and manufacturing work are involved, separate hourly rates shall be specified for each thereof. No overtime shall be employed in the performance of this order without Buyer's prior consent and unless separate overtime hourly rate(s) have been specified and agreed upon. No substantial portion of the order shall be subcontracted by Seller without Buyer's written consent. Seller shall maintain adequate accounting records in accordance with generally accepted accounting practice to substantiate all costs, which records shall be open to examination by Buyer at all reasonable times.
3. **PACKING AND SHIPPING.** If Goods are to be delivered under this order, the cost and fee negotiated for this order are deemed to include all packaging and/or storage cost. All Goods shall be packaged, marked, and otherwise prepared in accordance with good commercial practices to obtain lowest shipping rates. On containers, Seller shall mark handling and loading instructions, shipping information, order number, item and account number, shipment data, and names and addresses of Seller and Buyer. An itemized packing list shall accompany each shipment. Overshipments shall be returned to Seller at Seller's risk and expense. Early shipments may, at option of Buyer, be returned to Seller at Seller's risk and expense or may be retained by Buyer and Buyer shall not be liable for payment until the time originally scheduled hereon.
4. **F.O.B. AND RISK OF LOSS.** Unless otherwise specified on the face of this order, the F.O.B. point shall be Buyer's location designated on the face of this order. If transportation is F.O.B. Seller's location, Seller shall bear all risk of loss or damage to the Goods until delivery of the Goods to the carrier. If transportation is F.O.B. Buyer's location, Seller shall bear all risk of loss or damage to the Goods until delivery of the Goods to Buyer's location.
5. **INVOICING.** All invoices shall be rendered in duplicate unless otherwise specified and shall be rendered within 24 hours after each shipment. Taxes, freight and similar charges shall be shown separately. Each invoice shall be accompanied by bill of lading or express receipt. Payments shall be subject to adjustment for errors, shortages, rejections and other causes. Discount period, if any, shall commence on the date invoice is received or goods are received, whichever is later. Buyer secures blanket coverage on all inbound freight. Invoice charges for additional insurance will not be honored unless otherwise specified.
6. **INSPECTION.** All material and workmanship shall be subject to inspection and test by Buyer, both at plant of Seller and of Buyer. Payment shall be subject to final inspection at Buyer's plant. Buyer shall have the right to reject all goods not conforming to specifications or containing defective material or workmanship. Rejected goods shall be returned at Seller's expense and risk, including transportation both ways, promptly after notification of rejection. Buyer may elect to retain defective goods and to remedy defects and deduct cost of remedying same from amount due Seller. Seller warrants that goods shall be produced under a quality control system that provides at a minimum for the prevention and ready detection of discrepancies and for timely and positive corrective action. Seller warrants that he has or is able to obtain the best facilities necessary to meet the technical and regulatory requirements specified. Seller warrants that quality control records are maintained on file for a minimum of one year from date of shipment or as otherwise specified by contract. Buyer reserves the right, upon 72 hours notice, to audit the Seller's facilities and inspection records in connection with this order.
7. **WARRANTY.** In addition and without prejudice to all other warranties expressed or implied by law, Seller warrants that all material or goods covered by this order shall conform to drawings, specifications and other defects. All warranties, both expressed and implied, also constitute conditions and shall survive inspection, acceptance and payment and shall inure to the benefits of Buyer and its customers. Without limitation of any rights by reason of any breach of warranty or otherwise, material or goods which are not as warranted may at any time be returned to Seller at Seller's expense for credit, correction or replacement as Buyer may direct.
8. **COMPLIANCE WITH LAWS.** Seller shall comply with all federal, state, and local laws, ordinances, rules and regulations in the manufacture and sale of the Goods and performance of the Services, including but not limited to the Occupational Safety and Health Act, the Truth in Negotiation Act, the Resources Conservation and Recovery Act and all applicable requirements of the Fair Labor Standards Act. Seller will defend and hold Buyer harmless from any loss, damages, or costs arising from or caused in any way by any actual or alleged violation of any federal, state, or local law, condition, rule, or regulation, or failure by the Seller to (i) have any chemical substances sold hereunder included in the list of approved chemical substances published by the Environmental Protection Agency pursuant to the Toxic Substances Control Act or (ii) provide a completed Material Safety Data Sheet (OSHA Form 20 equivalent) for any chemical substances sold hereunder as required by any federal, state or local law, ordinance, rule or regulation.
9. **CHANGES.** Buyer may, at any time by written order, make changes in drawings, designs, specifications, method of shipment or packing, time or place of delivery, require additional work, or direct the omission of work covered by this order. If any such change causes an increase or decrease in the price under this order, or in the time required for performance, an equitable adjustment shall be made and this order shall be modified in writing accordingly. Any claim for adjustment under this provision must be asserted within 10 days from date this change is ordered and the amount of such claim must be stated in writing within 30 days thereafter.
10. **BUYER'S PROPERTY, MATERIALS, AND EQUIPMENT.** If Buyer furnishes Seller material or "equipment" ("Equipment" is defined as special dies, molds, jigs, tools, gages, test equipment, masks, etc), or pays for such material or "equipment", title thereto shall remain or vest in Buyer, and Seller shall identify, maintain and preserve such material and "equipment" and shall dispose of it (including scrap) in accordance with Buyer's direction. Such material and "equipment", and whenever practical such individual item thereof shall be plainly marked or otherwise adequately identified by Seller as "property of the City of Duluth" and shall be safely stored separate and apart from Seller's property. Seller shall not substitute any property for Buyer's property. Unless otherwise authorized in writing by Buyer, Seller shall use such material or "equipment" only in the performance of purchase orders for Buyer. Seller shall be responsible for any loss, damage, or destruction to such material or "equipment" but Seller shall not include any insurance costs therefore in the cost charged under this order. Also, the "equipment" required to produce the supplies under this order is for the exclusive use of the City of Duluth and is subject to recall upon written notice.
11. **ASSIGNMENT.** Seller shall not assign this order or any rights under this order without the prior written consent of Buyer, and no purported assignment by Seller shall be binding on Buyer without such written consent.
12. **NOTICE OF LABOR DISPUTES.** Whenever an actual or potential labor dispute delays, or threatens to delay, the timely performance of this order, Seller shall immediately notify Buyer in writing of all relevant information with respect to such dispute.
13. **TERMINATION.** (a) Termination Without Cause. Buyer shall have the right, without cause, at any time to terminate all or any part of the undelivered portion of this order by written notice. If Seller has and desires to assert any claim on account of any such termination, Seller shall submit its termination claims to Buyer, in form and with evidence satisfactory to Buyer, promptly, but no later than 90 days after the effective date of the termination. If Seller fails to submit a termination claim within that time, Buyer shall have no liability to Seller on account of the termination. If Seller's termination claim is not acceptable to Buyer and cannot be settled by negotiation, the claim shall be submitted to arbitration. (b) Termination With Cause. If Seller fails to make any delivery in accordance with the agreed delivery date or schedule or terms or conditions applicable to this order, Buyer shall have the right (in addition to any other right or remedy at law or under this agreement) by written notice to terminate all or any part of the undelivered portion of this order without any liability to Seller on account thereof, in the articles elsewhere on such terms and in such manner as Buyer may deem appropriate and Seller shall be liable to Buyer for all excess costs occasioned Buyer thereby.
14. **PATENTS AND COPYRIGHTS.** Seller shall defend, at its own expense, any suit or claim that may be instituted against Buyer or any customer of Buyer for alleged infringement of patents or copyrights relating to the maintenance, sale, or use of the Goods, except for any such infringement resulting from Seller's compliance with detailed designs provided by Buyer, and Seller shall indemnify Buyer and its customers for all costs and damages arising out of such alleged infringement. Buyer shall have the right, at no additional charge, to use and/or reproduce the Seller's applicable literature, such as operating and maintenance manuals, technical publications, prints, drawings, training manuals, and other similar supporting documentation and sales literature. Seller shall advise Buyer of any updated information relative to the foregoing literature and documentation with timely notification in writing.
15. **PUBLIC LIABILITY INSURANCE.** Seller shall hold Buyer and its customer harmless from all injuries, damages and claims arising from performance of work or services covered by this order. Seller shall maintain such insurance as will protect the Seller, the Buyer and his customer from claims under Worker's Compensation Acts and from all other claims for damages, personal injury, or death to employees of the Seller, the Buyer or his Customer, or any other persons which may arise from performance of work or services covered by this order whether performed by the Seller or any Subcontractor or any one directly or indirectly employed by either of them. Certificates of such insurance shall be filed with the Buyer and shall be subject to Buyer's approval for adequacy of protection.
16. **DELAYS.** Time is of the essence. All actual or potential delays of whatever nature must be reported to the Buyer when and as they occur if the event can be expected to result in a delivery later than that shown on the face of this order. Seller agrees to indemnify Buyer for all losses, costs and damages resulting from Seller's delay or failure to deliver.
17. **GENERAL.** This order is formed under and shall be interpreted according to, and governed by, Minnesota law. No waiver by Buyer of any of its rights or remedies hereunder shall be construed as a waiver of any other rights or remedies.



**CITY OF DULUTH**  
**PERFORMANCE BOND**

KNOW ALL MEN BY

THESE PRESENTS: That we:

\_\_\_\_\_  
(contractor's name)  
(hereinafter called the "Contractor") located at: \_\_\_\_\_

\_\_\_\_\_  
(contractor's address)

and \_\_\_\_\_  
(surety's name)

(a corporation holding a certificate of the Insurance Commissioner of the State of Minnesota showing that it is authorized to contract as a surety, hereinafter called the "Surety") located at:

\_\_\_\_\_  
(surety's address)

are held and firmly bound unto the City of Duluth (hereinafter called the "Owner"), in the penal sum of \_\_\_\_\_

Dollars (\$\_\_\_\_\_) for the payment of which we bind ourselves, our heirs, executors and administrators, successors and assigns, for the faithful performance of a written contract for the purpose of:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

according to plans, profiles, and specifications thereto annexed. A copy of that contract is incorporated herein by reference and is made a part hereof as if fully copied herein.

NOW, THEREFORE, THE CONDITIONS OF THIS OBLIGATION ARE SUCH That,

- A) If the Contractor shall in all respects comply with the terms and conditions of the Contract (which includes the contract documents) and such alterations as may be made in said contract as documents therein provide for, and shall complete the contract in accordance with its terms,
- B) If the Contractor shall indemnify, defend and save harmless the owner from all costs, expenses, damages, injury or conduct, want or care or skill, negligence or default, including patent infringement on the part of the Contractor, agents or employees, in the execution or performance of the contract,
- C) If the Contractor shall indemnify the owner for all costs that may accrue on account of the

enforcing of the terms of the bond, if action is brought on the bond, including reasonable attorney's fees, in any case where such action is successfully maintained,

D) If the Contractor shall comply with all laws pertaining to doing the work under the contract,

Then, this obligation shall be void; the Contractor and Surety jointly and severally agree to pay to the Owner any difference between the sum to which the Contractor will be entitled on the completion of the contract and that which the Owner may be obliged to pay for the completion of the work by contract or otherwise, and any damages, direct or indirect, or consequential, which the Owner may sustain on account of the work, or on account of the failure of the Contractor to properly and in all things, keep and execute all of the provisions of the Contract, provided however that Surety's liability to pay damages is limited to the amount of the Performance Bond as set forth above.

And, the said Contractor and Surety hereby further bind themselves, their successors, executors, administrators and assigns, jointly and severally, that they will employ and fully protect the said Owner against and will pay any and all amounts, damages, costs and judgements which may be recovered against or which the Owner may be called upon to pay to any person or corporation by reason of any damage arising from the performance of said work, repair or maintenance thereof, or the manner of doing the same, or the neglect of the said Contractor or his agents or servants, or the improper performance of the said work by the Contractor or his agents or servants, or the infringements of any patent rights by reason of the use of any material furnished or work done, as aforesaid, or otherwise. For the purpose of this paragraph, a subcontractor shall be deemed to be the agent or employee of the Contractor to the extent of his subcontract.

The Contractor and the Sureties do hereby expressly waive any objection that might be interposed as to the right of the Owner to require a bond containing the foregoing provisions, and they do hereby further expressly waive any defense which they or either and any of them might interpose to an action brought hereon by any person, firm, or corporation, including subcontractors, materialmen and third persons, for work, labor, services, supplies or material performed, rendered or furnished as aforesaid, upon the ground that there is no law authorizing the Owner to require the foregoing provisions to be placed in this bond.

And the Surety, for value received, hereby stipulates and agrees that the obligations of the Surety and this bond shall in no way be impaired or affected by any extension of time, modification, omission, addition or change in or to the contract or the work to be performed thereunder, or by any payment thereunder before the time required therein, or by any waiver of any provision thereof, or by any assignment, subletting or other transfer thereof, or of any part thereof, or of any work to be performed, or of any moneys due or to become due thereunder; and

the said Surety does hereby waive notice of any and all such extensions, modifications, omissions, additions, changes, payments, waivers, assignments, subcontracts and transfers, and hereby stipulates and agrees that any and all things done and omitted to be done by and in relation to executors, administrators, successors, assignees, subcontractors and other transferees, shall have the same effect as to said Surety as though done or omitted to be done by and in relation to the Contractor.

Signed this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_.

\_\_\_\_\_  
Name of Principal

\_\_\_\_\_  
By

\_\_\_\_\_  
Name of Surety

By \_\_\_\_\_  
Attorney-in-Fact



## ACKNOWLEDGEMENTS

State of Minnesota )  
 ) ss. Principal – Individual  
County of St. Louis )

This instrument was acknowledged before me on \_\_\_\_\_  
by \_\_\_\_\_.

Notary Seal

\_\_\_\_\_  
Notary Public

State of Minnesota )  
 ) ss. Principal – Corporate or Partnership  
County of St. Louis )

This instrument was acknowledged before me on \_\_\_\_\_  
by \_\_\_\_\_ as \_\_\_\_\_  
of \_\_\_\_\_.

Notary Seal

\_\_\_\_\_  
Notary Public

State of Minnesota )  
 ) ss. Surety  
County of St. Louis )

Be It Known, That on this \_\_\_\_\_ day of \_\_\_\_\_ A. D., 20\_\_\_\_, came before me personally  
\_\_\_\_\_, to me personally known, who being  
by me duly sworn, did say that he/she is the \_\_\_\_\_(title) of

\_\_\_\_\_  
the above named corporation which executed the foregoing bond as surety; that the seal affixed to the foregoing  
instrument is the corporate seal of said corporation; that said instrument was executed in behalf of said corporation, by  
authority of its Board of Directors; that said corporation hold a certificate of the Insurance Commissioner of the State of  
Minnesota showing that it is authorized to contract as a surety; and said

\_\_\_\_\_  
acknowledged said instrument to be the free act and deed of said corporation.

Notary Seal

\_\_\_\_\_  
Notary Public

### APPROVED AS TO FORM, CORRECTNESS AND VALIDTY HEREOF

Dated this \_\_\_\_\_ day of \_\_\_\_\_, 20 \_\_\_\_

\_\_\_\_\_  
Assistant City Attorney Duluth MN

Dated this \_\_\_\_\_ day of \_\_\_\_\_, 20 \_\_\_\_

\_\_\_\_\_  
Finance Director Duluth MN



**CITY OF DULUTH**  
**PAYMENT BOND**

KNOW ALL MEN BY THESE PRESENTS: That we:

\_\_\_\_\_  
(contractor's name)  
(hereinafter called the "Contractor") located at: \_\_\_\_\_

\_\_\_\_\_  
(contractor's address)

and \_\_\_\_\_  
(surety's name)

(a corporation holding a certificate of the Insurance Commissioner of the State of Minnesota showing that it is authorized to contract as a surety, hereinafter called the "Surety") located at:

\_\_\_\_\_  
(surety's address)

are held and firmly bound unto the City of Duluth (hereinafter called the "Owner"), for the benefit of persons furnishing labor and materials for the contract set forth below, in the penal sum of

\_\_\_\_\_  
Dollars (\$\_\_\_\_\_) for the payment of which we bind ourselves, our heirs, executors and administrators, successors and assigns, for the payment of all labor and materials supplied by any person in the performance of a written contract for the purpose of:

\_\_\_\_\_  
according to plans, profiles, and specifications thereto annexed. A copy of that contract is incorporated herein by reference and is made a part hereof as if fully copied herein.

NOW, THEREFORE, THE CONDITIONS OF THIS OBLIGATION ARE SUCH That,

- A) If the Contractor shall make payments, as they may become due, to all persons supplying "labor and materials," as defined in Minnesota Statutes Section 574.26, used directly or indirectly by the Contractor, or his Subcontractor, in the prosecution of the work provided for in the contract,
- B) If the Contractor shall indemnify the owner or other claimant for all costs that may accrue on account of the enforcing of the terms of the bond, if action is brought on the bond, including reasonable attorney's fees, in any case where such action is successfully maintained,

Then, this obligation shall be void; otherwise it shall remain in full force and effect.

And, the said Contractor and Surety agree that in accordance with Minnesota Statutes Section 574.26 not only said City, but any person furnishing "labor and materials," as defined in Minnesota Statutes 574.26, may sue on this bond for their use on account of any sums due them for anything so furnished.

The Contractor and the Sureties do hereby expressly waive any objection that might be interposed as to the right of the Owner to require a bond containing the foregoing provisions, and they do hereby further expressly waive any defense which they or either and any of them might interpose to an action brought hereon by any person, firm, or corporation, including subcontractors, materialmen and third persons, for work, labor, services, supplies or material performed, rendered or furnished as aforesaid, upon the ground that there is no law authorizing the Owner to require the foregoing provisions to be placed in this bond.

And the Surety, for value received, hereby stipulates and agrees that the obligations of the Surety and this bond shall in no way be impaired or affected by any extension of time, modification, omission, addition or change in or to the contract or the work to be performed thereunder, or by any payment thereunder before the time required therein, or by any waiver of any provision thereof, or by any assignment, subletting or other transfer thereof, or of any part thereof, or of any work to be performed, or of any moneys due or to become due thereunder; and the said Surety does hereby waive notice of any and all such extensions, modifications, omissions, additions, changes, payments, waivers, assignments, subcontracts and transfers, and hereby stipulates and agrees that any and all things done and omitted to be done by and in relation to executors, administrators, successors, assignees, subcontractors and other transferees, shall have the same effect as to said Surety as though done or omitted to be done by and in relation to the Contractor.

Signed this \_\_\_\_ day of \_\_\_\_\_, 20\_\_.

\_\_\_\_\_  
Name of Principal

\_\_\_\_\_  
By

\_\_\_\_\_  
Name of Surety

By \_\_\_\_\_  
Attorney-in-Fact

## ACKNOWLEDGEMENTS

State of Minnesota) ) ss. Principal – Individual  
County of St. Louis)

This instrument was acknowledged before me on \_\_\_\_\_  
by \_\_\_\_\_.

Notary Seal

\_\_\_\_\_  
Notary Public

State of Minnesota) ) ss. Principal – Corporate or Partnership  
County of St. Louis)

This instrument was acknowledged before me on \_\_\_\_\_  
by \_\_\_\_\_ as \_\_\_\_\_  
of \_\_\_\_\_.

Notary Seal

\_\_\_\_\_  
Notary Public

State of Minnesota) ) ss. Surety  
County of St. Louis)

Be It Known, That on this \_\_\_\_\_ day of \_\_\_\_\_ A. D., 20\_\_\_\_, came before me personally  
\_\_\_\_\_, to me personally known, who being  
by me duly sworn, did say that he/she is the \_\_\_\_\_ (title)  
of \_\_\_\_\_

\_\_\_\_\_  
the above named corporation which executed the foregoing bond as surety; that the seal affixed to the foregoing  
instrument is the corporate seal of said corporation; that said instrument was executed in behalf of said corporation, by  
authority of its Board of Directors; that said corporation hold a certificate of the Insurance Commissioner of the State of  
Minnesota showing that it is authorized to contract as a surety; and said \_\_\_\_\_  
acknowledged said instrument to be the free act and deed of said corporation.

Notary Seal

\_\_\_\_\_  
Notary Public

### APPROVED AS TO FORM, CORRECTNESS AND VALIDTY HEREOF

Dated this \_\_\_\_\_ day of \_\_\_\_\_, 20 \_\_\_\_

\_\_\_\_\_  
Assistant City Attorney Duluth MN

Dated this \_\_\_\_\_ day of \_\_\_\_\_, 20 \_\_\_\_

\_\_\_\_\_  
Finance Director Duluth MN

## AFFIDAVIT AND INFORMATION REQUIRED OF BIDDERS

Affidavit of Non-Collusion:

I hereby swear (or affirm) under penalty of perjury:

- 1) That I am the bidder (if the bidder is an individual), a partner in the bidder (if the bidder is a partnership), or an officer or employee of the bidding corporation having authority to sign on its behalf (if the bidder is a corporation);
- 2) That the attached bid or bids have been arrived at by the bidder independently and have been submitted without collusion with and without agreement, understanding, or planned common course of action with any other vendor or materials, supplied, equipment or services described in the invitation to bid, designed to limit independent bidding or competition;
- 3) That the contents of the bid or bids have not been communicated by the bidder or its employees or agents to any person not an employee or agent of the bidder or its surety on any bond furnished with the bid or bids and will not be communicated to any such person prior to the official opening of the bid or bids; and
- 4) That I have fully informed myself regarding the accuracy of the statements made in this affidavit.

Signed: \_\_\_\_\_

Firm Name: \_\_\_\_\_

Subscribed and sworn to me before this \_\_\_\_ day of \_\_\_\_\_, \_\_\_\_\_

NOTARY PUBLIC \_\_\_\_\_

My commission expires: \_\_\_\_\_

Bidder's E.I. Number \_\_\_\_\_

(Number used on employer's quarterly Federal Tax return)

**EQUAL EMPLOYMENT OPPORTUNITY EEO AFFIRMATIVE ACTION  
POLICY STATEMENT & COMPLIANCE CERTIFICATE**

**TO: City of Duluth, MN      12-09DS DULUTH CITY HALL MIS UPGRADES**

**FROM:** \_\_\_\_\_

\_\_\_\_\_  
(FIRM's name, address, telephone number)

**A) Employment:** It is the policy of the above named FIRM to afford equal opportunity for employment to all individuals regardless of race, color, creed, religion, national origin, ancestry, age, sex, marital status, status with respect to public assistance and/or disability. The FIRM will take affirmative action to ensure that we will: (1) recruit, hire, and promote all job classifications without regard to race, color, creed, religion, national origin, ancestry, age, sex, marital status, status with respect to public assistance, and/or disability, except where sex is a bona fide occupational qualification; (2) base decisions on employment so as to further the principle of equal employment opportunity; (3) ensure that promotion decisions are in accord with the principles of equal employment opportunity by imposing only valid requirements for promotional opportunities; (4) ensure that all personnel actions such as compensation, benefits, transfers, layoffs, return from layoff, FIRM sponsored training, education tuition assistance, social and recreational programs will be administered without regard to race, color, creed, religion, national origin, ancestry, age, sex, marital status, status with respect to public assistance, and/or disability. The FIRM also intends full compliance with Veteran affirmative action requirements. Additionally, minority and female employees shall be encouraged to participate in all FIRM activities and refer applicants.

I have designated (name) \_\_\_\_\_ to direct the establishment of and to monitor the implementation of personnel procedures to guide the FIRM's affirmative action program. Where PROJECTS exceed \$500,000, this official shall also serve as the liaison officer that administers the FIRM's "Minority Business Enterprise Program." This official is charged with designing and implementing audit and reporting systems that will keep management informed on a monthly basis of the status of the equal opportunity area.

Supervisors have been made to understand that their work performance is being evaluated on the basis of their equal opportunity efforts and results, as well as other criteria. It shall be the responsibility of the FIRM and its supervisors to take actions to prevent harassment of employees placed through affirmative action efforts.

**B) Reports:** Unless exempted by law and regulation, the FIRM shall make available and file those reports related to equal opportunity as may be required by the City of Duluth and State and Federal compliance agencies. Requirements and Reports are defined in 41CFR60 "Compliance Responsibility for Equal Opportunity" published by the U. S. Department of Labor which is incorporated herein by reference. Additional requirements are defined in various State and Federal Civil Rights Legislation and Rules promulgated thereunder.

**C) Nonsegregated Facilities:** The FIRM certifies that it does not maintain or provide for its employees any segregated facilities at any of its establishments and that it does not permit its employees to perform their services at any location, under its control, where segregated facilities are maintained. The FIRM certifies that it will not maintain or provide for its employees any segregated facilities at any of its establishments and that it will not permit its employees to perform their services at any location, under

its control, where segregated facilities are maintained. The FIRM agrees that a breach of this certification is a violation of the Equal Opportunity Clause in this certificate. As used in this Certification, the term "segregated facilities" means any waiting rooms, work area, rest rooms and wash rooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation for entertainment area, transportation, and housing facilities provided for employees which are segregated by explicit directive or are, in fact, segregated on the basis of race, color, religion, or national origin, because of habit, local custom, or otherwise.

- D) Affirmative Action Compliance Program:** Unless exempted by regulation and law, the FIRM—if the FIRM has 50 or more employees and if the value of current contracts with the City of Duluth exceeds \$50,000—shall prepare and maintain a written affirmative action compliance program that meets the requirement as set forth in 41CFR60.
- E) Non-Compliance:** The FIRM certifies that it is not currently in receipt of any outstanding letters of deficiencies, show cause, probable cause, or other such notification of non-compliance with EEO Laws and Regulations.
- F) Employment Goals - "Construction" Projects:** It shall be the goal of the FIRM if the PROJECT is of a construction nature that in all on-site employment generated that no less than 3% of the on-site workforce will be minority employees and that no less than 7% of the on-site workforce will be female employees. Further, it is the goal of the FIRM if the PROJECT is of a construction nature that in all on-site employment generated that no less than 3% of the work hours generated shall be worked by minority employees and that no less than 7% of the work hours generated shall be worked by female employees.
- G) Subcontractors:** The FIRM will for all its PROJECT subcontractors regardless of tier (unless exempted by law and regulation) that received in excess of \$2,500 require that: (1) the subcontractor shall execute an "EEO Statement and Certification" similar in nature to this "Statement and Certification", (2) said documentation to be maintained on file with the FIRM or subcontractor as may be appropriate.

Executed this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_ by:

---

Printed name and title

---

Signature

**NOTE:** In addition to the various remedies prescribed for violation of Equal Opportunity Laws, the penalty for false statements is prescribed in 18 U.S.C. 1001.

**Withholding Affidavit for Contractors****IC-134**

*This affidavit must be approved by the Minnesota Department of Revenue before the state of Minnesota or any of its subdivisions can make final payment to contractors.*

Please type or print clearly. This will be your mailing label for returning the completed form.

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

Address \_\_\_\_\_

City \_\_\_\_\_

State \_\_\_\_\_

Zip \_\_\_\_\_

Daytime phone \_\_\_\_\_

[ ] \_\_\_\_\_

Total contract amount \_\_\_\_\_

\$ \_\_\_\_\_

Amount still due \_\_\_\_\_

\$ \_\_\_\_\_

Minnesota tax ID number \_\_\_\_\_

Month/year work began \_\_\_\_\_

Month/year work ended \_\_\_\_\_

Project number \_\_\_\_\_

Project location \_\_\_\_\_

Project owner \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

State \_\_\_\_\_

Did you have employees work on this project: ☐ Yes ☐ No If no, who did the work? \_\_\_\_\_

Check the box that describes your involvement in the project and fill in all information requested.

☐ **Sole contractor**☐ **Subcontractor**

Name of contractor who hired you: \_\_\_\_\_

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

☐ **Prime contractor-** If you subcontracted out any work on this project, all of your subcontractors must file their own IC-134 affidavits and have them certified by the Department of Revenue **before** you can file your affidavit. For each subcontractor you had, fill in the information below and attach a copy of each subcontractor's certified IC-134. If you need more space, attach a separate sheet.

Business name \_\_\_\_\_

Address \_\_\_\_\_

Owner/Officer \_\_\_\_\_

*I declare that all information I have filled in on this form is true and complete to the best of my knowledge and belief. I authorize the Department of Revenue to disclose pertinent information relating to this project, including sending copies of this form, to the prime contractor if I am a subcontractor, and to any subcontractors if I am a prime contractor, and to the contracting agency.*

Contractor's signature \_\_\_\_\_

Title \_\_\_\_\_

Date \_\_\_\_\_

**Mail to:** MN Dept. of Revenue, Withholding Division, Mail Station 6610, St. Paul, MN 55146-6610

**Certificate of Compliance**

Based on records of the Minnesota Department of Revenue, I certify that the contractor who has signed this certificate has fulfilled all the requirements of Minnesota Statutes 290.92 and 290.97 concerning the withholding of Minnesota income tax from wages paid to employees relating to contract services with the state of Minnesota and/or its subdivisions.

Department of Revenue approval: \_\_\_\_\_

Date: \_\_\_\_\_

**Ins**



# Instructions for Form IC-134

## Who must file

If you are a prime contractor, a contractor of a subcontractor who did work on a project for the state of Minnesota of any of its local government subdivisions—such as a county, city, or school district—you must file Form IC-134 with the Minnesota Department of Revenue.

This affidavit must be certified and returned before the state or any of its subdivisions can make final payment for your work.

## If you're a prime contractor and a subcontractor on the same project

If you were hired as a subcontractor to do work on a project and you subcontracted all or a part of your portion of the project to another contractor, you are a prime contractor as well. Fill out both the subcontractor and prime contractor areas on a single form.

## When to file

The IC-134 cannot be processed until you finish the work. If you submit the form before the project is completed, it will be returned to you unprocessed.

**If you are a subcontractor or sole contractor**, send in the form when you have completed your part of the project.

**If you are a prime contractor**, send in the form when the entire project is completed and you have received certified affidavits from all of your subcontractors.

## How to file

If you have fulfilled the requirements of Minnesota withholding tax laws, the Department of Revenue will sign your affidavit and return it to you.

If any withholding payments are due to the state, Minnesota law requires certified payments before we approve the IC-134.

Submit the certified affidavit to the government unit for which the work was done to receive your final payment. If you are a subcontractor, submit the certified affidavit to your prime contractor to receive your final payment.

## Where to file

Mail to:

MN Dept. of Revenue  
Withholding Tax Division  
Mail Station 6610  
St. Paul, MN 55416-6610

## Minnesota tax ID number

You must fill in your Minnesota tax ID number on the form. You must have a Minnesota tax ID number if you have employees who work in Minnesota.

If you don't have a Minnesota ID number, you must apply for one. Call (651) 282-5225 or 1-800-657-3605.

If you prefer, you can get an application (Form ABR) from our web site or by calling or writing us.

If you have no employees and did all the work yourself, you do not need a Minnesota tax ID number. If this is the case, fill in your Social Security number in the space for Minnesota tax ID number and explain who did the work.

all the information to determine if you have met all state income tax withholding requirements. If all required information is not provided, the IC-134 will be returned to you for completion.

All information on this affidavit is private by state law. It cannot be given to others without your permission, except to the Internal Revenue Service, other states that guarantee the same privacy, and certain government agencies as provided by law.

## Information and assistance

If you need help or more information to complete this form, call (651) 282-9999 or 1-800-657-3594.

Additional forms are available on our website at [www.taxes.state.mn.us](http://www.taxes.state.mn.us) or by calling (651) 296-4444 OR 1-800-657-3676. You can also write for forms at the following address:

Minnesota Tax Forms  
Mail Station 1421  
St. Paul, MN 55146-1421

TTY users may contact the department through the Minnesota Relay Service at 1-800-627-3529.

We'll provide information in an alternative format upon request to persons with disabilities.

## Use of information

The Department of Revenue needs

**GENERAL CONDITIONS** 4-15-11

**PART I**

**101. DEFINITIONS**

Wherever used in any of the Contract Documents, the following meanings shall be given to the terms herein defined:

- a. The term "Contract" means the Contract executed by the City of Duluth in its capacity as agent for the City of Duluth and the Contractor, of which these GENERAL CONDITIONS form a part.
- b. The term "City" means the City of Duluth, Minnesota, which is authorized to undertake this Contract and within which the Project Area is situated or any employee of the City of Duluth designated by the City of Duluth for the purpose of inspecting, directing, or having in charge the work embraced in this Contract.
- c. The term "Contractor" means the person, firm, or corporation entering into the Contract with the City to construct and install the Improvements embraced in this Contract.
- d. The term "Project Area" means site within which is specified Contract limits of the Improvements contemplated to be constructed in whole or in part under this Contract.
- e. The term "Architect" means the architect or engineer licensed to practice architecture or engineering and serving the City with architectural or engineering services, or his authorized representative or successor.
- f. The term "Change Order" means a written order to the Contractor, signed by the City, issued after execution of the Contract, authorizing and directing a change in the Work or an adjustment in the contract sum or the contract time. The contract sum and the contract time may be changed only by Change Order.
- g. The term "Contract Documents" means and shall include the following: Executed Agreement, Addenda (if any), Invitation for Bids, Instructions to Bidders, Signed Copy of Bid, General Conditions, Special Conditions, Technical Specifications, and Drawings (as listed in the Schedule of Drawings), and all requested submittals such as Certificate of Insurance, performance and payment bonds, EEO Affirmative Action Policy Statement & Compliance Certificate, Certificate of Non-Collusion.
- h. The term "Drawings" means the drawings listed in the Schedule of Drawings.
- i. The term "Field Order" means a written interpretation necessary for the proper execution of the Work, in the form of drawings or otherwise issued to the Contractor by the City or the Architect.
- j. The term "Technical Specifications" means that part of the Contract Documents which describes, outlines and stipulates the quality of the materials to be furnished, the quality of workmanship required, and the methods to be used in carrying out the construction work to be performed under this Contract.
- k. The term "Addenda" or "Addendum" means any changes, revisions or clarifications of the Contract Documents which have been duly issued by the City to prospective Bidders prior to time of receiving Bids.
- l. The term "Work" means all labor necessary to produce the construction required by the Contract Documents, and all materials and equipment incorporated in such construction.

**102. SUPERINTENDENCE BY CONTRACTOR**

- a. Except where the Contractor is an individual and gives his personal superintendence to the work, the Contractor shall provide a competent superintendent, satisfactory to the City and the Architect, on the work at all times during working hours with full authority to act for him. The Contractor shall also provide an adequate staff for the proper coordination and expediting of his work.
- b. The Contractor shall lay out his own work and he shall be responsible for all work executed by him under the Contract. He shall verify all figures and elevations before proceeding with the work and will be held responsible for any error resulting from his failure to do so.

### **103. SUBCONTRACTS**

- a. The Contractor shall not execute an agreement with any subcontractor, or permit any subcontractor to perform any work included in this contract until he has submitted a noncollusion affidavit from the subcontractor in substantially the form attached and has received written approval of such subcontractor from the City.
- b. No proposed subcontractor shall be disapproved by the City except for cause.
- c. The Contractor shall be as fully responsible to the Owner for the acts and omissions of his subcontractors, and of persons either directly or indirectly employed by them, as he is for the acts and omissions of persons directly employed by him.
- d. The Contractor shall cause appropriate provisions to be inserted in all subcontracts relative to the work to require compliance by each subcontractor with the applicable provisions of this Contract.
- e. Nothing contained in this Contract shall create any contractual relationship between the subcontractor and the City.

### **104. OTHER CONTRACTS**

The City may award, or may have awarded, other contracts for additional work, and the Contractor shall cooperate fully with such other Contractors, by scheduling his own work with that to be performed under other Contracts as may be directed by the City. The Contractor shall not commit or permit any act which will interfere with the performance of work by any other Contractor as scheduled.

### **105. FITTING AND COORDINATION OF THE WORK**

The Contractor shall be responsible for the proper fitting of all work and for the coordination of the operations of all trades, subcontractors, or materialmen engaged upon this Contract. He shall be prepared to guarantee to each of his subcontractors the locations and measurements which they may require for the fitting of their work to all surrounding work.

### **106. MUTUAL RESPONSIBILITY OF CONTRACTORS**

If, through acts or neglect on the part of the Contractor, any other Contractor or any subcontractor shall suffer loss or damage on the work, the Contractor shall settle with such other Contractor or subcontractor by agreement or arbitration, if such other Contractor or subcontractor will so settle. If such other Contractor or subcontractor shall assert any claim against the City on account of damage alleged to have been so sustained, the City shall notify this Contractor, who shall defend at his own expense any suit based upon such claim, and, if any judgment or claims against the City shall be allowed, the Contractor shall pay or satisfy such judgment or claim and pay all costs and expenses in connection therewith.

### **107. PROGRESS SCHEDULE**

The Contractor shall submit for approval immediately after execution of the Agreement, a carefully prepared Progress Schedule, showing the proposed dates of starting and of completing each of the various sections of the work, the anticipated monthly payments to become due the Contractor and the accumulated percent of progress each month.

### **108. PAYMENTS**

#### **1) Partial Payments.**

- a. The Contractor shall prepare his requisition of partial payment as of the last day of the month and submit it, with the required number of copies, to the City contracting officer for his approval. The amount of the payment due the Contractor shall be determined by adding to the total value of work completed to date, the value of materials properly stored on the site and deducting (1) five percent (5%) of the total amount, this sum

to be retained until final payment and (2) the amount of all previous payments. The total value of the work completed to date shall be based on the estimated quantities of work completed and on the unit prices contained in the agreement. The value of materials properly stored on site shall be based upon the estimated quantities of such materials and the invoice prices. Copies of all invoices shall be available for the inspection of the Architect and the City.

b. Monthly or partial payments made by the City to the Contractor are moneys advanced for the purpose of assisting the Contractor to expedite the work of construction. The Contractor shall be responsible for the care and protection of all materials and work upon which payments have been made until final acceptance of such work and materials by the City. Such payments shall not constitute a waiver of the right of the City to require the fulfillment of all terms of the Contract and the delivery of all improvements embraced in this Contract complete and satisfactory to the City in all details.

## 2) Final Payment.

a. After final inspection and acceptance by the Architect and the City of all work under the Contract, the Contractor shall prepare his requisition for final payment which shall be based upon the carefully measured and computed quantity of each item of work at the applicable unit prices stipulated in the Agreement. The total amount of the final payment due the Contractor under this Contract shall be the amount computed as described above less all previous payments. Final payment to the Contractor shall be made subject to his furnishing the City with a release in satisfactory form of all claims against the City arising under and by virtue of his contract, other than such claims, if any, as may be specifically excepted by the Contractor from the operation of the release as provided under Section 113 hereof.

b. The City, before paying the final estimate, may require the Contractor to furnish releases or receipts from all subcontractors having performed any work and all persons having supplied materials, equipment (installed on the Project) and services to the Contractor, if the City deems the same necessary in order to protect its interest. The City, however, may if it deems such action advisable make payment in part or in full to the Contractor without requiring the furnishing of such releases or receipts and any payments so made shall in no way impair the obligations of any surety or sureties furnished under this Contract.

c. Withholding of any amount due the City under Section 403, entitled "Liquidated Damages," under SPECIAL CONDITIONS, shall be deducted from the final payment due the Contractor.

## 3) Withholding Payments

The City may withhold from any payment otherwise due the Contractor so much as may be necessary to protect the City and, if it so elects, may also withhold any amounts due from the Contractor to any subcontractors or material dealers for work performed or material furnished by them. The foregoing provisions shall be construed solely for the benefit of the City and will not require the City to determine or adjust any claims or disputes between the Contractor and his subcontractors or material dealers, or to withhold any moneys for their protection unless the City elects to do so. The failure or refusal of the City to withhold any moneys from the Contractor shall in no wise impair the obligations of any surety or sureties under any bond or bonds furnished under this Contract.

## 4) Payments Subject to Submission of Certificates.

Each payment to the Contractor by the City shall be made subject to submissions by the Contractor of all written certifications required of him and his subcontractors by Section II, Part II Supplementary General Conditions for Federally, State of Minnesota, and/or City Assisted Activities.

## 109. CHANGES IN THE WORK

a. The City may make changes in the scope of work required to be performed by the Contractor under the Contract by making additions thereto, or by omitting work therefrom, without invalidating the Contract, and

without relieving the Contractor from any of his obligations under the Contract or any guarantee given by him pursuant to the Contract provisions, and without affecting the validity of the guaranty bonds, and without relieving or releasing the surety or sureties of said bonds. All such work shall be executed under the terms of the original Contract unless is expressly provided otherwise.

b. Except for the purpose of affording protection against any emergency endangering health, life, or property, the Contractor shall make no change in the materials used or in the specified manner of constructing and/or installing the Improvements or supply additional labor, services, or materials beyond that actually required for the execution of the Contract, unless in pursuance of a written order from the City authorizing the Contractor to proceed with the change. No claim for an adjustment of the Contract Price will be valid unless so ordered.

c. If applicable unit prices are contained in the Agreement (established as a result of either a unit price bid or a Supplement Schedule of Unit Prices), the City shall order the Contractor to proceed with desired changes in the work, the value of such changes to be determined by the measured quantities involved and the applicable unit prices specified in the Contract; provided that, in case of a unit price contract the net value of all changes does not increase or decrease the original total amount shown in the Agreement by more than twenty-five percent (25%) in accordance with Section entitled Unit Prices, under INSTRUCTIONS TO BIDDERS.

d. If applicable unit prices are not contained in the Agreement or if the total net change increases or decreases the total Contract Price more than twenty-five (25%), the City shall, before ordering the Contractor to proceed with desired changes, request an itemized proposal from him covering the work involved in the change after which the procedure shall be as follows:

(1) If the proposal is acceptable, the City will prepare the change order in accordance therewith for acceptance by the Contractor.

(2) If the proposal is not acceptable and prompt agreement between the two parties cannot be reached, the City may order the Contractor to proceed with the work on a cost-plus limited basis; provided that this basis shall not apply to costs incurred by Contractor for any work done by any subcontractor, which work may proceed under the basis set forth in sub-subparagraph (3) below. A cost-plus-limited basis is defined as the net cost of the Contractor's labor, materials, and insurance plus fifteen percent (15%) of said net cost to cover overhead and profit, the total cost not to exceed a specified limit.

(3) If the proposal of the Contractor is not acceptable in whole or part because of the proposals of one or more of the subcontractors and prompt agreement between the two parties cannot be reached, the City may order the Contractor to proceed with the work and reimburse Contractor for work done by any subcontractor on the basis of that subcontractor's net cost of labor, materials, and insurance plus twenty percent (20%) of said net cost to cover overhead and profit, the total cost not to exceed a specified limit. Contractor shall supply all data to City which is necessary to determine any such subcontractor's net costs.

e. Each change order shall include in its final form:

(1) A detailed description of the change in the work.

(2) The Contractor's proposal (if any) of a confirmed copy thereof.

(3) A definite statement as to the resulting change in the Contract price and/or time.

(4) The statement that all work involved in the change shall be performed in accordance with the Contract requirements except as modified by the change order.

## **110. CLAIMS FOR EXTRA COST**

a. If the Contractor claims that any instructions by Drawings or otherwise involve extra cost or extension of time, he shall, within ten (10) days after the receipt of such instructions, and in any event, before proceeding to execute the work, submit his protest thereto in writing to the City, stating clearly and in detail the basis of his objections. No such claim will be considered unless so made.

b. Claims for additional compensation for extra work, due to alleged errors in ground elevations, contour lines, or bench marks, will not be recognized unless accompanied by certified survey data, made prior to the time the original ground was disturbed, clearly showing that errors exist which resulted, or would result, in handling

more material, or performing more work, than would be reasonably estimated from the Drawings and maps issued.

c. Any discrepancies which may be discovered between actual conditions and those represented by the documents shall at once be reported to the City and work shall not proceed, except at the Contractor's risk, until written instructions have been received by him from the City.

d. If, on the basis of the available evidence, the City determines that an adjustment of the Contract Price and/or time is justifiable, the procedure shall then be as provided in Section 109 hereof.

#### **111. TERMINATION, DELAYS, AND LIQUIDATED DAMAGES**

##### **a. Termination of Contract.**

If the Contractor refuses or fails to execute the work with such diligence as will insure its completion within the time specified in these Contract Documents, or as modified as provided in these Contract Documents, the City, by written notice to the Contractor, may terminate the Contractor's right to proceed with the work. Upon such termination, the City may take over the work and prosecute the same to completion, by contract or otherwise, and the Contractor and his sureties shall be liable to the City for any additional cost incurred by the City in its completion of the work and they shall also be liable to the City for liquidated damages for any delay in the completion of the work as provided below. If the Contractor's right to proceed is terminated, the City may take possession of and utilize in completing the work such materials, tools, equipment, and plant as may be on the site of the work and necessary therefore.

##### **b. Liquidated Damages for Delays.**

If the work is not completed within the time stipulated in Section 7 (Special Conditions) hereof, including any extensions of time for excusable delays as herein provided, the Contractor shall pay to the City as fixed, agreed, and liquidated damages (it being impossible to determine the actual damages occasioned by the delay) for each calendar day of delay, until the work is completed, the amount as set forth in Section 7 (Special Conditions) hereof and the Contractor and his sureties shall be liable to the City for the amount thereof.

##### **c. Excusable Delays.**

The right of the Contractor to proceed shall not be terminated nor shall the Contractor be charged with liquidated damages for any delays in the completion of the work due: (1) To any acts of the Government, including controls or restrictions upon or requisitioning of materials, equipment, tools, or labor by reason of war, National Defense, or any other national emergency;

(2) To any acts of the City;

(3) To causes not reasonably foreseeable by the parties to this Contract at the time of the execution of the Contract which are beyond the control and without the fault or negligence of the Contractor, including, but not restricted to, acts of God or of the public enemy, acts of another Contractor in their performance of some other contract with the City, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, and weather of unusual severity such as hurricanes, tornadoes, cyclones, and other extreme weather conditions; and

(4) To any delay of any subcontractor occasioned by any of the causes specified in subparagraphs (1), (2) and (3) of this paragraph "c". Provided, however, that the Contractor promptly notify the City in writing within ten (10) days the cause of the delay. Upon receipt of such notification, the City shall ascertain the facts and the cause of the delay. If, upon the basis of facts and the terms of the Contract, the delay is properly excusable, the City shall extend the time for completing the work for a period of time commensurate with the period of excusable delay.

#### **112. ASSIGNMENT OR NOVATION**

The Contractor shall not assign or transfer, whether by an assignment or novation, any of its rights, duties, benefits, obligations, liabilities, or responsibilities under this Contract without the written consent of the City; provided, however, that assignments to banks, trust companies, or other financial institutions may be made

without the consent of the City. No assignment or novation expressly provides that the assignment of any of the Contractor's rights or benefits under the Contract is subject to a prior lien for labor performed, services rendered, and materials, tools, and equipment supplied for the performance of the work under this Contract in favor of all persons, firms, or corporations rendering such labor or services or supplying such materials, tools, or equipment.

### **113. DISPUTES**

a. All disputes arising under this Contract or its interpretation, whether involving law or fact or both, or extra work, and all claims for alleged breach of contract shall, within ten (10) days of the first event giving rise to the dispute, be presented by the Contractor to the City for decision. All papers pertaining to claims shall be filed in quadruplicate. Such notice need not detail the amount of the claim but shall state the facts surrounding the claim in sufficient detail to identify the claim together with its character and scope. In the meantime, the Contractor shall proceed with the work as directed by the City. Any claim not presented within the time limit specified within this paragraph shall be deemed to have been waived, except that if the claim is of a continuing character and notice of the claim is not given within ten (10) days of the first event giving rise to it, the claim will be considered only for a period commencing ten (10) days prior to the receipt by the City of notice thereof.

b. The Contractor shall submit in detail his claim and his proof thereof. Each decision by the City will be in writing and will be mailed to the Contractor by registered or certified mail, return receipt requested, directed to his last known address or actually delivered to Contractor or its managing agent. All interpretations or decisions of the City shall be consistent with the Contract and its intent.

c. If the Contractor does not agree with any decision of the City, he shall in no case allow the dispute to delay the work but shall notify the City promptly that he is proceeding with the work under protest and he may then accept the matter in question from the final release. If the Contractor does not agree with any decision of the City, he may submit the matter to arbitration no later than thirty (30) days after the date on which the Contractor received the City's decision; provided, however, that the City shall not be required to submit to arbitration without its prior written consent; and if the City does consent to arbitration, then the Contractor shall pay all costs of such arbitration.

### **114. TECHNICAL SPECIFICATIONS AND DRAWINGS**

Anything mentioned in the Technical Specifications and not shown on the Drawings or shown on the Drawings and not mentioned in the Technical Specifications, shall be of like effect as if shown on or mentioned in both. In case of difference between Drawings and Technical Specifications, the Technical Specifications shall govern. In case of any discrepancy on Drawings or Technical Specifications, the matter shall be immediately submitted to the City, without whose decision, said discrepancy shall not be adjusted by the Contractor, save only at his own risk and expense.

### **115. SHOP DRAWINGS**

a. All required shop drawings, machinery details, layout drawings, etc. shall be submitted to the Architect or the City, as directed by the City, in two copies for approval sufficiently in advance of requirements to afford ample time for checking, including time for correcting, resubmitting and rechecking if necessary. The Contractor may proceed, only at his own risk, with manufacture or installation of any equipment or work covered by said shop drawings, etc. until they are approved and no claim, by the Contractor, for extension of the Contract time will be granted by reason of his failure in this respect.

b. Any drawing submitted without the Contractor's stamp of approval will not be considered and will be returned to him for proper resubmission. If any drawings show variations from the requirements of the Contract because of standard shop practice or other reason, the Contractor shall make specific mention of such variation in his letter of transmittal in order that, if acceptable, suitable action may be taken for proper

adjustment of contract price and/or time, otherwise the Contractor will not be relieved of the responsibility for executing the work in accordance with the Contract even though the drawings have been approved.

c. If a shop drawing with the Contractor involves only a minor adjustment in the interest of the City not involving a change in Contract price or time, the Architect may approve the drawing. The approval shall be general, shall not relieve the Contractor from his responsibility for adherence to the Contract or for any error in the drawing and shall contain in substance the following: "The modification shown on the attached drawing is approved in the interest of the City to effect an improvement for the Project and is ordered with the understanding that it does not involve any change in the Contract price or time; that it is subject generally to all Contract stipulation and covenants; and that it is without prejudice to any and all rights of the City under the Contract and surety bond or bonds."

#### **116. REQUEST FOR SUPPLEMENTARY INFORMATION**

It shall be the responsibility of the Contractor to make timely requests of the City for any additional information not already in his possession which should be furnished by the City under the terms of this Contract, and which he will require in the planning and execution of the work. Such requests may be submitted in writing from time to time as the need is approached, but each shall be filed in ample time to permit appropriate action to be taken by all parties involved so as to avoid delay. Each request shall be in writing, and list the various items and the latest date by which each will be required by the Contractor. The first list shall be submitted within two (2) weeks after Contract award and shall be as complete as possible at that time. The Contractor shall, if requested, furnish promptly any assistance and information the City may require in responding to these requests of the Contractor. The Contractor shall be fully responsible for any delay in his work or to others arising from his failure to comply fully with the provisions of this Section.

#### **117. MATERIALS AND WORKMANSHIP**

a. Unless otherwise specifically provided for in the Technical Specifications, all workmanship, equipment, materials and articles incorporated in the work shall be new and the best grade of the respective kinds for the purpose. Where equipment, materials, articles or workmanship are referred to in the Technical Specifications as an equal to any particular standard, the City shall decide the question of equality.

b. The Contractor shall furnish to the City for approval the manufacturer's detailed specifications for all machinery, mechanical and other special equipment, which he contemplates installing together with full information as to type, performance characteristics, and all other pertinent information as required, and shall likewise submit for approval as required full information concerning all other materials or articles which he proposes to incorporate in the work. (See Section 118 hereof)

c. Machinery, mechanical and other equipment, materials or articles installed or used without such prior approval shall be at the risk of subsequent rejection.

d. Materials specified by reference to the number or symbol of a specific standard, such as A.S.T.M. Standard, a Federal Specification or other similar standard, shall comply with requirements in the latest revision thereof and any amendment or supplement thereto in effect on the date of the Invitation for Bids, except as limited to type, class or grade, or modified in such reference. The Standards referred to, except as modified in the Technical Specifications shall have full force and effect as though printed therein.

e. The City may require the Contractor to dismiss from the work such employee or employees as the City may deem incompetent, or careless, or insubordinate.

#### **118. SAMPLES, CERTIFICATES AND TESTS**

a. The Contractor shall submit all material or equipment samples, certificates, affidavits, etc. as called for in the Contract Documents or required by the Architect, promptly after award of the Contract and acceptance of the Contractor's Bond. No such material or equipment shall be manufactured or delivered to the site, except at the Contractor's own risk, until the required samples or certificates have been approved in writing by the



City or the Architect. Any delay in the work caused by late or improper submission of samples or certificates for approval shall not be considered just cause for an extension of the contract time. Each sample submitted by the Contractor shall carry a label giving the name of the Contractor, the project for which it is intended, and the name of the producer. The accompanying certificate or letter from the Contractor shall state that the sample complies with Contract requirements, shall give the name and brand of the product, its place of origin, the name and address of the producer and all specifications or other detailed information which will assist the Architect or the City in passing upon the acceptability of the sample promptly. It shall also include the statement that all materials or equipment furnished for use in the project will comply with the samples and/or certified statements.

b. Approval of any materials shall be general only and shall not constitute a waiver of the City's right to demand full compliance with Contract requirements. After actual deliveries, the City or the Architect will have such check tests made as they deem necessary in each instance and may reject materials and equipment and accessories for cause, even though such materials and equipment have been given general approval. If materials, equipment or accessories which fail to meet check tests have been incorporated in the work, the City or the Architect will have the right to cause their removal and replacement by proper materials or to demand and secure such reparation by the Contractor as is equitable.

c. Except as otherwise specifically stated in the Contract, the costs of sampling and testing will be divided as follows:

(1) The Contractor shall furnish without extra cost, including packing and delivery charges, all samples required for testing purposes, except those samples taken on the project by the City or the Architect; (2) The Contractor shall assume all costs of retesting materials which fail to meet Contract requirements;

(3) The Contractor shall assume all costs of testing materials offered in substitution for those found deficient; and

(4) The City will pay for all other testing expenses.

#### **119. CARE OF WORK**

a. The Contractor shall be responsible for all damages to persons or property that occur as a result of his fault or negligence in connection with the prosecution of the work and shall be responsible for the proper care and protection of all work performed until completion and final acceptance, whether or not the same has been covered in whole or in part by payments made by the City.

b. In an emergency affecting the safety of life, limb or property, including adjoining property, the Contractor, without special instructions or authorization from the City is authorized to act at his own discretion to prevent such threatened loss or injury, and he shall so act. He shall likewise act if instructed to do so by the City. Any compensation claimed by the Contractor on account of such emergency work will be determined by the City as provided in Section 109 hereof.

c. The Contractor shall avoid damage as a result of his operations to existing sidewalks, streets, curbs, pavements, utilities (except those which are to be replaced or removed), adjoining property, etc., and he shall at his own expense completely repair any damage thereto caused by his operations.

d. The Contractor shall shore up, brace, underpin, secure and protect as may be necessary all foundations and other parts of existing structures adjacent to, adjoining, and in the vicinity of the site, which may be in any way affected by the excavations or other operations connected with the construction of the Improvements embraced in this Contract. The Contractor shall be responsible for the giving of any and all required notices to any adjacent or adjoining property owner or other party before the commencement of any work. The Contractor shall indemnify and save harmless the City from any damages on account of settlements or the loss of lateral support of adjoining property and from all loss or expense and all damages for which the City may become liable in consequence of such injury or damage to adjoining structures and their premises.

## **120. ACCIDENT PREVENTION**

a. The Contractor shall exercise proper precaution at all times for the protection of persons and property and shall be responsible for all damages to persons or property, either on or off the site, which occur as a result of his fault or negligence in connection with the prosecution of the work. The safety provisions of applicable Federal, State and local laws and ordinances and building and construction codes shall be observed and the Contractor shall take or cause to be taken such additional safety and health measures as the City may determine to be reasonably necessary. Machinery, equipment, and all hazards shall be guarded in accordance with the safety provisions of the A Manual of Accident Prevention in Construction published by the Associated General Contractors of America, Inc., to the extent that such provisions are not in conflict with applicable local laws.

b. The Contractor shall maintain an accurate record of all cases of death, occupational disease, and injury requiring medical attention or causing loss of time from work, arising out of and in the course of employment on work under the Contract. The Contractor shall promptly furnish the Owner with reports concerning these matters.

## **121. SANITARY FACILITIES**

The Contractor shall furnish, install, and maintain ample sanitary facilities for the workmen. As the needs arise a sufficient number of enclosed temporary toilets shall be conveniently placed as required by the sanitary codes of the State and Local Government. Drinking water shall be provided from an approved source, so piped or transported as to keep it safe and fresh and served from single service containers or satisfactory types of sanitary drinking stands or fountains. All such facilities and services shall be furnished in strict accordance with existing and governing health regulations.

## **122. USE OF PREMISES**

a. The Contractor shall confine his equipment, storage of materials, and construction operations to the Contract limits as shown on the Drawings and as prescribed by ordinances or permits, or as may be directed by the City, and shall not unreasonably encumber the site or public rights of way with his materials and construction equipment.

b. The Contractor shall comply with all reasonable instructions of the City and the ordinances and codes of the Local Government regarding signs, advertising, traffic, fires, explosives, danger signals, barricades.

## **123. REMOVAL OF DEBRIS, CLEANING, ETC.**

The Contractor shall, periodically or as directed during the progress of the work, remove and legally dispose of all surplus excavated material and debris, and keep the Project Area and public rights of way reasonably clear. Upon completion of the work, he shall remove all temporary construction facilities, debris and unused materials provided for the work, and put the whole site of the work and public rights of way in a neat and clean condition. Trash burning on the site of the work will be subject to prior approval of the City and existing State and local regulations.

## **124. INSPECTION**

a. All materials and workmanship shall be subject to inspection, examination or test by the City or the Architect at any and all times during manufacture or construction and at any and all places where such manufacture or construction is carried on. The City shall have the right to reject defective or substandard material and workmanship or require its correction. Unacceptable workmanship shall be satisfactorily corrected. Rejected material shall be promptly segregated and removed from the Project Area and replaced with material of specified quality without charge therefor. If the Contractor fails to proceed at once with the correction of rejected workmanship or defective material, the City may contract or otherwise have the defects

remedied or rejected materials removed from the Project Area and charge the cost of the same against any moneys which may be due the Contractor, without prejudice to any other rights or remedies of the City.

b. The Contractor shall furnish promptly all materials reasonably necessary for any tests which may be required. (See Section 118 hereof). All tests by the City will be performed in such a manner as not to delay the work unnecessarily and will be made in accordance with the provisions of the Technical Specifications.

c. The Contractor shall notify the City sufficiently in advance of back-filling or concealing any facilities to permit proper inspection. If any facilities are concealed without approval or consent by the City, the Contractor shall uncover for inspection and recover such facilities all at his own expense, when so requested by the City.

Should it be considered necessary or advisable by the City at any time before final acceptance of the entire work to make an examination of work already completed by uncovering the same, the Contractor shall on request promptly furnish all necessary facilities, labor, and material. If such work is found to be defective in any important or essential respect, due to fault of the Contractor or his subcontractors the Contractor 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, the actual cost of labor and material necessarily involved in the examination and replacement, plus 15 percent of such costs to cover superintendence, general expenses and profit, shall be allowed the Contractor and he shall, in addition, if completion of the work of the entire Contract has been delayed thereby, be granted a suitable extension of time on account of the additional work involved.

d. Inspection of materials and appurtenances to be incorporated in the Improvements embraced in this Contract may be made at the place of production, manufacture or shipment, whenever the quantity justifies it, and such inspection and acceptance, unless otherwise stated in the Technical Specifications, shall be final, except as regards (1) latent defects, (2) departures from specific requirements of the Contract, (3) damage or loss in transit, or (4) fraud or such gross mistakes as amount to fraud. Subject to the requirements contained in the preceding sentence, the inspection of materials as a whole or in part will be made at the Project Site.

e. Neither inspection, testing, approval nor acceptance of the work in whole or in part, by the City or its agents shall relieve the Contractor or his sureties of full responsibility for materials furnished or work performed not in strict accordance with the Contract.

## **125. REVIEW BY THE CITY**

The City, its authorized representatives and agents, and the Architect, shall, at all times have access to and be permitted to observe and review all work, materials, equipment, payrolls, personnel records, employment conditions, and other relevant data and records pertaining to this Contract; provided, however, that all instructions and approvals with respect to work will be given to the Contractor only by the City through its authorized representative or agents.

## **126. FINAL INSPECTION**

When the work embraced in this Contract is substantially completed, the Contractor shall notify the City in writing that the work will be ready for final inspection on a definite date which shall be stated in such notice. The notice shall bear the signed concurrence of the representative of the City having charge of inspection. If the City determines that the status of the Improvements is as represented, it will make the arrangements necessary to have final inspection commenced on the date stated in such notice, or as soon thereafter as is practicable.

## **127. DEDUCTION FOR UNCORRECTED WORK**

If the City deems it not expedient to require the Contractor to correct work not done in accordance with the Contract Documents, an equitable deduction from the Contract Price will be made by agreement between the Contractor and the City and subject to settlement, in case of dispute, as herein provided.

## **128. TIME**

- a. The Contract Time is the period of time allotted in the Contract for completion of the Work. The date of commencement of the Work is the date established in a notice to proceed issued by the City to the Contractor. The Contractor shall begin the Work upon receipt of the notice to proceed.
- b. The term "day" as used herein shall mean calendar day.
- c. If a date of completion is included in the Contract, it shall be the Date of Substantial Completion of the Work, including authorized extensions thereto. The "Date of Substantial Completion of the Work" is the date certified by the City when construction is sufficiently complete, in accordance with the Contract, so the City may occupy the Work for the use for which it is intended.

## **129. INSURANCE**

The Contractor shall carry the following insurance, at his expense and no direct payment for premiums shall be made by the City. Carriage of such insurance shall in no way alleviate the Contractor of his responsibilities under the contract.

- a. The Contractor will be required to carry insurance of the kinds and in the amounts hereinafter specified. The Contractor shall not commence work under the contract until he has obtained all the insurance required by these specifications and until such insurance has been approved by the City Attorney, nor shall the Contractor allow any subcontractor to commence work on his subcontract until all similar insurance required of the subcontractor shall have been so obtained and approved.

### **b. Insurance**

The Contractor shall provide Commercial General Liability in an amount not less than \$1,500,000.00 combined single limit and Automobile Liability Insurance in an amount not less than \$1,500,000.00 combined single limit shall be in a company licensed to do business in Minnesota; and shall provide for the following: Liability for Premises, Operations, Completed Operations, Independent Contractors, and Contractual Liability. Property damage coverage for explosion, collapse, and underground Axcu to be included. City of Duluth shall be named as Additional Insured under the Commercial General Liability policy. Contractor shall also provide evidence of Statutory Worker's Compensation Insurance. Contractor to provide Certificate of Insurance evidencing such coverage with 30-day notice of cancellation, non-renewal, or material change provision included.

### **c. Subcontractor's Insurance**

In the event any work contemplated by the contract is sublet, the Contractor shall have the duty to assure that the subcontractors provide insurance in accord with the minimum requirements hereinabove imposed on the Contractor.

### **d. Proof of Insurance**

The Contractor shall not proceed with the work contemplated in this contract until he has furnished the City Attorney of the City of Duluth with satisfactory proof of the existence and carriage of insurance of the kinds and in the amounts specified.

### **e. Indemnification**

The Contractor shall defend, indemnify and save harmless the City and all of its officers, agents and employees from all suits, actions or claims of any character, name and description brought for on account of any injuries or damages received or sustained by any person, persons or property, by or from the act or acts of said Contractor, or by or in consequence of any negligence in safeguarding the work, or through the use of unacceptable materials in constructing the work, or by or on account of any act or omission, neglect or misconduct of said Contractor, or from any claims or amount arising or recovered under the Workmen's Compensation Law or any other law, by-law, ordinance, order or decree, and so much of the money due the said Contractor under and by virtue of his contract, as shall be considered necessary by the City may be retained for the use of the City or in case no money is due, his surety shall be held until such suit or suits, action or actions, claim or claims, for injuries or damages as aforesaid, shall have been settled and suitable evidence to that effect furnished to the City. The Contractor shall indemnify and save harmless the City from

any and all losses caused by or on account of any claims or amounts recovered for any infringement of patent, trademark, or copyright. The unauthorized use by the Contractor of public or private property for any purpose may be considered an injury or damage to the property so used.

### **130. PATENTS**

The Contractor shall hold and save the City, its officers, employees, representatives and agents, and the Architect, harmless from liability of any nature or kind, including costs and expenses, for, or on account of, any patented or unpatented invention, process, article, or appliance manufactured or used in the performance of the Contract, including its use by the City, unless otherwise specifically stipulated in the Technical Specifications.

### **131. WARRANTY**

No material, supplies, or equipment to be installed or furnished under this Contract shall be purchased subject to any chattel mortgage or under a conditional sale, lease-purchase or other agreement by which an interest therein or in any part thereof is retained by the seller or supplier. The Contractor shall warrant good title to all materials, supplies, and equipment installed or incorporated in the work and upon completion of all work, shall deliver the same together with all improvements and appurtenances constructed or placed thereon by him to the City free from any claims, liens, or charges. Neither the Contractor nor any person, firm or corporation furnishing any material or labor for any work covered by this Contract shall have any right to a lien upon any improvement or appurtenance thereon. Nothing contained in this paragraph, however, shall defeat or impair the right of persons furnishing materials or labor to recover under any bond given by the Contractor for their protection or any rights under any law permitting such persons to look to funds due the Contractor in the hands of the City. The provisions of this paragraph shall be inserted in all subcontracts and material contracts and notices for the work when no formal contract is entered into for such materials.

### **132. GENERAL GUARANTY**

- a. Neither the final certificate of payment nor any provisions in the Contract nor partial or entire use of the improvements embraced in this Contract by the City or the public shall constitute an acceptance of liability in respect to any express warranties or responsibility for faulty materials or workmanship. The Contractor shall promptly remedy any defects in the work and pay for any damage to other work resulting therefrom which subsequently appears. The City will give notice of defective materials and work with reasonable promptness.
- b. If, within one year after the Date of Substantial Completion or within such longer period of time as may be prescribed by law or by the terms of any applicable special guarantee required by the Contract, any of the Work is found to be defective or not in accordance with the specifications of the Contract, the Contractor shall correct it promptly upon receipt of a written notice from the City to do so, unless the City has previously given the Contractor a written acceptance of such condition or work.

### **133. ENVIRONMENTAL CONDITIONS**

Waste Disposal: The SUBRECIPIENT shall comply with the most recent Minnesota Pollution Control Agency (MPCA) waste disposal requirements and include said disposal requirements in the project's base bid specifications. Waste material, including but not limited to: construction/demolition debris, asbestos-containing material, residential lead paint waste, hazardous waste, and above- and under-ground tanks, shall be disposed of at MPCA-permitted landfill sites only. Copies of all notification, shipment, and landfill receipt records shall be maintained in the subrecipient's project file.

Minnesota Pollution Control Agency  
520 Lafayette Rd., St. Paul, MN 55155  
(800) 657-3864

- a. Construction/Demolition Waste.

Construction/demolition debris will be disposed of at a Minnesota Pollution Control Agency (MPCA) permitted landfill site only, with copies of all landfill receipts for said debris maintained in the subrecipient's project file.

*(Solid Waste Management Rules, Chapter 7001 & 7035)*

**b. Asbestos-Containing Waste.**

All asbestos removal and disposal shall be in strict accordance with all applicable permits. The contract bidder shall include the price of all permits, testing, removal, and disposal in the project base bid.

- Project asbestos-containing material removal pursuant to USEPA 40 CFR 61.145 Standard for Demolition and Renovation.

- All asbestos-containing waste material shall be disposed of pursuant to USEPA 40 CFR 61.150 at a MPCA permitted landfill site only, in accordance with the provisions of USEPA 40 CFR 61.154.

- For all asbestos-containing material, a copy of the MPCA Notification of Demolition and Renovation record and all Waste Shipment records shall be maintained in the subrecipient's project file.

**c. Hazardous Waste Material.**

The MPCA shall be contacted for instructions on handling and disposing of materials containing Polychlorinated Biphenyls (PCBs) or any other identified/encountered hazardous materials. A copy of all correspondence and disposal records shall be maintained in the subrecipient's project file.

- MPCA Hazardous Waste Compliance Guide -- October 1989, Revised January 1991

- MPCA Hazardous Waste Fact Sheet Checklist -- August 1993

**d. Above and Below Ground Storage Tanks.**

The MPCA Tanks and Spills Section shall be contacted for instructions on handling or removal of all above- and underground tanks identified/encountered. A copy of all correspondence and disposal records shall be maintained in the subrecipient's project file.

**e. Residential Lead Paint Waste.**

Projects whose activities produce residential lead paint waste are responsible for the management and proper disposal of the waste at an MPCA permitted landfill site only, pursuant to Minn. Stat. sections 116.87, 116.875, 116.88. A copy of the Residential Lead Abatement Notification and Shipping forms shall be maintained in the subrecipient's project file.

**134. CONTRACTOR'S RECORDS**

The contractor agrees that, as provided in Minnesota Statutes 16C.05, Subd. 5, contractor's books, records, documents, and accounting procedures and practices are subject to examination by the city or the state auditor for three years from the date of execution of this contract.

(End of Document)

CITY OF DULUTH - PART II -  
SUPPLEMENTARY GENERAL CONDITIONS FOR FEDERALLY AND/OR CITY ASSISTED ACTIVITIES  
(revised 9/2/09)

The following conditions take precedence over any conflicting conditions in this Contract.

<u>Section</u>	<u>Title</u>
1	Restrictions on Disbursements, Subcontractors Federal Agency Requirements, Separability, Property
2	Miscellaneous Provisions
3	Definitions
4	Environmental Provisions
5	Contract Compliance
6	Records, Reports and Information, Audits and Inspections
7	Conflict of Interest and Lobbying
8	Labor Standards - Physical Improvement Projects
9	Minnesota Department of Transportation Specification 1960 Partial Payments
10	Housing and Urban Development (HUD) Section 4010
11	Equal Opportunity and Affirmative Action
12	Employment Opportunities - "HUD Section 3"
13	Federal Requirements for Minority/Women Business Enterprises Contract Guidance - MPFA
14	Forms

**Section I**

**Restrictions on Disbursements**

No money under this Contract shall be disbursed by the City to any Contractor except pursuant to a written contract which incorporates the applicable PART II, Supplementary General Conditions for Federally and/or City Assisted Activities, and unless the Contractor is in compliance with the Federal Agency requirements with regard to accounting and fiscal matters to the extent they are applicable.

**Subcontractors**

(A) The Contractor shall include in any subcontract the clauses set forth in the PART II, Supplementary General Conditions for Federally and/or City Assisted Activities in their entirety and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts which they may enter into, together with a clause requiring this insertion in any further subcontracts that may in turn be made.

(B) The Contractor shall not subcontract any part of the work covered by this Contract or permit subcontracted work to be further subcontracted without the City's prior written approval of the subcontractors. The City will not approve any subcontractor for work covered by this Contract who is at the time ineligible under the provisions of any applicable regulations issued by a Federal Agency or the Secretary of Labor, United States Department of Labor, to receive an award of such subcontract.

**Federal Agency Requirements**

Unearned payments under this Contract may be suspended or terminated upon refusal to accept any additional conditions that may be imposed by the Federal Agency at any time; or if the grant, if applicable, to the City under which this Contract is made is suspended or terminated.

**Separability**

If any provisions of this Contract is held invalid, the remainder of this Contract shall not be affected thereby if such remainder would then continue to conform to the terms and requirements of applicable law.

**Property**

Acquisition, use, and disposal of all property, materials and goods acquired as a result of activities made possible by this Contract shall be accomplished in accordance with the applicable provisions of Federal Management Circular (FMC)-74-7, as amended.

**Section 2**

**Miscellaneous Provisions**

(A) **Copyrights.** In the event this Contract results in a book or other copyrightable material, the author is free to copyright the work, but Federal Agency and the City reserve a royalty-free, nonexclusive, and irrevocable license to reproduce, publish or otherwise use, all copyrighted material and all material which can be copyrighted.

(B) **Patents.** Any discovery or invention arising out of or developed in the course of work aided by this Contract shall be promptly and fully reported to the Federal Agency and the City for determination by the Federal Agency as to whether patent protection on such invention or discovery shall be sought and how the rights in the invention or discovery, including rights under any patent issued thereon, shall be disposed of and administered in order to protect the public interests.

(C) **Political Activity Prohibited.** None of the funds, materials, property or services provided directly or indirectly under this Contract shall be used in the performance of this Contract on any partisan political activity, or to further the election or defeat of any candidate for public office.

(D) **Lobbying Prohibited.** None of the funds under this Contract shall be used for publicity or propaganda purposes designed to support or defeat legislation pending before the Congress or the City.

(E) **Prohibition of and Elimination of Lead-Based Paint Hazard.** Notwithstanding any other provision, the Agency and Contractor agree to comply with the regulation issued by the Secretary of Housing and Urban Development set forth in 37 F. R. 22732-3 and all applicable rules and orders issued thereunder which prohibit the use of lead-based paint in residential structures undergoing Federally assisted construction or rehabilitation and require the elimination of lead-based paint hazards. Every contract or subcontract, including paint, pursuant to which such Federally assisted construction or rehabilitation is performed shall include appropriate provisions prohibiting the use of lead-based paint.

(F) **Architectural Barriers Act.** The design for and construction of any facility funded in whole or in part by this Contract shall be in conformance with the American Standard Specification for Making Buildings and Facilities Accessible and Usable by the Physically Handicapped, Number A-117.1-1971, as modified.

(G) **Relocation and Acquisition.** Any relocation or acquisition resulting from activities funded in whole or in part by this Contract shall be in conformance with the provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (40 U.S.C. 4601) and the implementing regulations 24CFR Part 42.

(H) **Prohibition Against Payments of Bonus or Commission.** The assistance provided under this Contract shall not be used in the payment of any bonus or commission for the purpose of obtaining Federal Agency approval for such assistance, or Federal Agency approval of applications for additional assistance, or any other approval or concurrence of a Federal Agency required under this Contract, Federal Law or Federal Regulations thereto; provided, however, that reasonable fees or bonafide technical, consultant, managerial or other such services, other than actual solicitation, are not hereby prohibited if otherwise eligible as project costs.

(I) **Hatch Act.** Where applicable, the Contractor will comply with the provisions of the Hatch Act which limits the political activity of the Contractor's employees.

### **Section 3**

#### **Definitions**

(A) City means the City of Duluth, Contracting Officer, or other persons authorized to act on behalf of the City of Duluth.

(B) Contracting Officer is the delegated representative of the City who has the responsibility for administering the Project.

(C) Contractor means an entity, whether public or private, which furnishes (other than standard commercial supplies, office space or printing services) to the City, products, services or supplies as described in this project Contract.

(D) Federal Agency means the United States, the District of Columbia, and any executive department, independent establishment, administrative agency, or instrumentality of the United States or of the District of Columbia, including any corporation, all or substantially all of the stock of which is beneficially owned by the United States, by the District of Columbia, or by any of the foregoing departments, establishments, agencies, and instrumentalities. The term Federal Agency shall also include the person or persons authorized to act on behalf of said Federal Agency.

(E) Project means the activities to be undertaken by the Contractor as described in this Contract, which from time to time may be amended by mutual consent of the City and Contractor.

(F) Subcontractor means an entity, regardless of tier, which has entered into an agreement with the Contractor or another Subcontractor, to undertake certain Project activities as described in that agreement.

(G) The term labor standards, as used in the Contract, means the requirements of the Davis-Bacon Act, the Contract Work Hours and Safety Standards Act (other than those relating to safety and health), the Copeland Act, and the prevailing wage provisions of the other statutes listed in 20 CFR 5.1.

(H) Work means all labor necessary to produce the construction required by the Contract Documents, all materials and equipment incorporated or to be incorporated in such construction, products, services, or supplies required by the Contract Documents, or any other requirements set forth in the Contract.

(I) Additional Definitions, that are applicable to the Labor Standards provisions - Section 8 - of this Contract can be found in 29CFR5.2 as published by the U.S. Department of Labor and said definitions are hereby incorporated by reference into the provisions of this Contract.

### **Section 4**

#### **Environmental Provisions**

(A) The Contractor agrees to follow the regulations, requirements, policies, goals and procedures set forth by the Council on Environmental Quality (CEQ) under provisions of the National Environmental Policy Act (NEPA) (Pub. L 91-190, 42 U.S.C. 4321 et seq.), Executive Order 11514, and 40 CFR Part 1500.

(B) **Historic Properties.** The Contractor agrees to follow the regulations, requirements, policies, goals, and procedures set forth under provisions of the National Historic Preservation Act of 1966 (Pub. L. 89-665); Preservation of Historic and Archeological Data Act of 1974 (Pub. L. 93-291); Executive Order 11593; 36 CFR , Part 800 and applicable State legislation or regulations.

(C) **Coastal Zones and Wetlands.** The Contractor agrees to follow the regulations, requirements, policies, goals and procedures set forth under provisions of the Coastal Zone Management Act of 1972 (Pub. L. 92-583) and applicable State legislation or regulations.

(D) **Noise.** The Contractor agrees to comply with provisions set forth in the U.S. Department of Housing and Urban Development Handbook 1390.2, Noise Abatement and Control, Department Policy, Responsibility and Standards, 1971.

(E) **Flood Plain.** The Contractor agrees to comply with the provisions set forth in the Flood Disaster Protection Act of 1973 (Pub. L. 93-234) and implementing regulations; Title 24, Chapter X, Subchapter B, National Flood Insurance Program, Executive Order 11296, and Executive Order 11988 relating to the evaluation of flood hazards.

(F) **Air Quality.** The Contractor agrees to comply with provisions set forth in the Clean Air Act (Pub. L. 90-148) and Clean Air Act Amendments of 1970 (Pub. L. 91-604); and applicable U.S. Environmental Protection Agency implementing regulations.

(G) **Water Quality.** The Contractor agrees to comply with the provisions set forth in the Federal Water Pollution Control Act (Pub. L. 92-500) and applicable U.S. Environmental Protection Agency implementing regulations, and Executive Order 11288 relating to the prevention, control, and abatement of water pollution.

(H) **Wildlife.** The Contractor agrees to comply with the provisions of the Fish and Wildlife Coordination Act (Pub. L. 85-264).

### **Section 5**

#### **Contract Compliance**

(A) In the event of the Contractor's noncompliance with the provisions of this Contract or with any of the said regulations, the City may withhold payment(s) until evidence of compliance by the Contractor has been demonstrated, or the Contract may be canceled, terminated or suspended in whole or in part and the Contractor may be declared ineligible for further City contracts.

(B) In the event the Contract is terminated or canceled as a result of noncompliance with any of the provisions of this Contract, the City may subject to bids the remainder of the Project for which this Contract was made. The City shall have the right upon termination or suspension to withhold all further payments under this Contract to the Contractor. Upon the award of a new contract for the remainder of the Project, the City shall pay to the Contractor an amount no more than the balance remaining due to the Contractor less the sum of the costs incurred by the City which are necessary in preparing the new bid specifications. In the event the amount paid the Contractor prior to the date of termination or cancellation exceeds the full amount of this Contract less the cost of the new contract and the additional costs mentioned above, the Contractor agrees to reimburse the City for such excess amount within ninety days after the new contract is awarded by the above procedures.

(C) Provisions contained in subparagraph (A) and (B) above shall not be interpreted as precluding any authorized Federal, State, or County governmental unit from exercising their legal administrative or other responsibilities in respect to the enforcement by said governmental units of laws or regulations concerning activities of the Contractor.

### **Section 6**

#### **Records**

(A) **Establishment and Maintenance of Records.** Records shall be maintained in accordance with requirements prescribed by the Federal Agency or the City with respect to all matters covered by this Contract. Except as otherwise authorized by the Federal Agency, such records shall be maintained for a period of three years after receipt of final payment under this Contract.



(B) **Documentation of Costs.** All costs shall be supported by properly executed payrolls, time records, invoices, contracts, or vouchers, or other official documentation evidencing in proper detail the nature and propriety of the charges. All checks, payrolls, invoices, contracts, vouchers, orders, or other accounting documents pertaining in whole or in part to this Contract shall be clearly identified and readily accessible.

#### **Reports and Information**

At such times and in such forms as the Federal Agency or the City may require, there shall be furnished to the Federal Agency or the City such statements, records, data and information as the Federal Agency or the City may request pertaining to matters covered by this Contract.

#### **Audits and Inspection**

At any time during normal business hours and as often as the City, the Federal Agency and/or the Comptroller General of the United States may deem necessary, there shall be made available to the City, the Federal Agency and/or representatives of the Comptroller General for examination of all its records with respect to all matters covered by this Contract and will permit the City, the Federal Agency and/or representative of the Comptroller General to audit, examine and make excerpts or transcripts from such records, and to make audits of all contracts, invoices, materials, payrolls, records of personnel, conditions of employment, and other data relating to all matters covered by this Contract.

### **Section 7**

#### **Conflict of Interest and Lobbying**

(A) **Interest of Members, Officers, or Employees of the City, Members of Local Governing Body, or Other Public Officials.** No member, officer, or employee of the City, or its designees or agents, or member of the governing body of the City, during his/her tenure of for one year thereafter, shall have any interest, direct or indirect in any contract or subcontract, or the proceeds thereof, for work to be performed in connection with the Project assisted under this Contract. Any contract in which any of the above indicated individuals becomes directly or indirectly, interested, personally or as a member of a firm, or as an officer, director, or stockholder of a corporation, shall be and become absolutely void; and any money which shall have been paid on such contract by the City may be recovered back from any or all persons interested therein, by a joint action or several actions.

(B) The Contractor agrees that he will incorporate into every contract required to be in writing the following provisions: **Interest of Contractors and Employees** - The Contractor covenants that he presently has no interest and shall not acquire any interest, direct or indirect, in the Project which would conflict in any manner or degree with the performance of this Contract, and no person having any conflicting interest shall be employed. Any interest on the part of the Contractor or his employees must be disclosed to the Federal Agency and the City. Provided, however, that this paragraph shall be interpreted in such a manner so as not to unreasonably impede any statutory requirements that opportunity be provided for employment of and participation by certain residents of a designated geographical area, if applicable.

(C) **Interest of Member or of Delegate to Congress.** No member of or Delegate to Congress, or Resident Commissioner, shall be admitted to any share or part of this Contract or to any benefit that may arise therefrom, but this provision shall not be construed to extend to this Contract if made with a corporation for its general benefit.

(D) The Contractor by signing this document certifies, to the best of his or her knowledge and belief, that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the Contractor, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the Contractor shall complete and submit Standard Form -LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

The above certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1332, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

(E) The parties to this Contract certify and agree that they are under no contractual or other disability which would prevent them from complying with the terms of this Contract.

### **Section 8**

#### **Labor Standards - Physical Improvement Projects**

Where applicable, there shall be included in all construction, rehabilitation, alteration or repair contracts with private entities made possible by or resulting from this Contract, the following Labor Standards provisions;

#### **(A) General Requirements.**

(1) **Subcontracts.** The Contractor shall include in any subcontract the clauses set forth in Section 8, **Labor Standards**, in their entirety and also a clause requiring the subcontractors to include these clauses in any lower tier subcontract which they may enter into, together with a clause requiring this insertion in any further subcontracts that may in turn be made.

(2) The transporting of materials and supplies to or from the site of the Project or Program to which this Contract pertains by the Employees of the Contractor or of any subcontractor, and the manufacturing or furnishing of materials, articles, supplies, or equipment on the site of the Project or Program to which this Contract pertains by persons employed by the Contractor or by any subcontractor, shall for the purpose of this Contract, and without limiting the generality of the foregoing provisions of this Contract, be deemed to be work to which these **Labor Standards** provisions are applicable.

(3) No person under the age of eighteen years shall be employed on work covered by this Contract.

(4) In connection with the performance of work under this Contract, the Contractor agrees not to employ any person undergoing sentence of imprisonment except as provided by Public Law 89-176, September 10, 1955 (18 U.S.C. 4082 (c) (2)) and Executive Order 11755, December 29, 1973.

(5) The Contractor will permit authorized representatives of the Federal Agency and the City to interview employees during working hours on the job.

(6) No employee to whom the wage, salary, or other **Labor Standards** provisions of this Contract are applicable shall be discharged or in any other manner discriminated against by the Contractor or any subcontractor because such employee has filed any complaint or instituted or caused to be instituted any proceeding or has testified or is about to testify in any proceeding under or relating to the Labor Standards applicable under this Contract to his employer.

(B) **Safety Standards.** No Contractor or subcontractor contracting for any part of a construction contract shall require any laborer or mechanic, including apprentices and trainees, employed in the performance of the Contract to work in surroundings or under working conditions which are unsanitary, hazardous or dangerous to his

health or safety, as determined under construction safety and health standards promulgated by the Secretary of Labor. The Contractor or subcontractor comply with all the rules, regulations, and relevant orders, promulgated by the Secretary of Labor pursuant to Public Law 91-54.

(C) **Davis-Bacon Act - 29 CFR 5.5**

Refer to Section 10, Page 9

Housing and Urban Development (HUD) form-4010 (07/2003) Ref Handbook 1344.1

**City of Duluth "Mini Davis-Bacon"**

(D) **City of Duluth - Minimum Wage Ordinance 8940, as Amended.**

(1) On a project (as defined below) funded in whole or in part by federal and/or state funds, these local provisions shall prevail in those instances where the requirements of the local provisions are equal to or greater than similar minimum labor standards provisions as set forth in applicable federal and/or state laws and regulations.

(2) In all contracts in excess of \$2,000 for projects (as defined below), the Contractor's particular attention is called to Ordinance 8940, effective June 8, 1989, respectively coded as Article IV of Chapter 2 of the Duluth City Code, and entitled "An Ordinance Pertaining to Wages and Working Hours of Persons on Public Works in the City of Duluth", as set forth below:

(3) **Definitions.**

For the purposes of this section the following words and phrases shall have the meanings respectively ascribed to them in this section:

(a) Basic hourly rate. - The hourly wage paid to any employee.

(b) Prevailing wage rate. - The basic hourly rate plus fringe benefits prevailing in the city of Duluth as determined by the United States secretary of labor pursuant to the Davis-Bacon act, as amended; provided that whenever employer and employee organizations employing and representing a majority of a class of workers in a particular industry within the city jointly certify that the prevailing basic hourly rate plus fringe benefits of such workers differs from the amount determined by the secretary of labor, the certified rate shall be considered to be the prevailing wage rate for such class of workers in that industry.

(c) Fringe benefits. - Employer contribution for health and welfare benefits, vacation benefits, pension benefits, and all other economic benefits other than the basic hourly rate.

(d) Apprentice. - An employee who is working under a training program which is approved either by the U.S. Department of Labor Bureau of Apprenticeship & Training or the Minnesota Director of Voluntary Apprenticeship; see apprentice ratios on page 22 and HUD 4010 in Section 10..

(e) Trainee. - An employee registered with the U. S. Department of Labor Employment & Training Administration; see HUD 4010 in Section 10.

(e) Project. - Erection, construction, demolition, painting, remodeling or repairing of any public building, highway, sidewalk, bridge, water or gas line, sewer and sewage treatment facility or other public work performed under contract with the city.

(f) Labor, mechanic. - All persons utilized, employed or working on a project who are doing work usually done by mechanics and laborers, including proprietors, partners, and members of cooperatives.

(4) **Wage Rates and Hours for City of Duluth Projects.**

(a) Any contract which provides for a project of estimated total cost of over \$2,000.00 shall contain a stipulation that no laborer, mechanic or apprentice-trainee employed directly upon the project work site by the contractor or any subcontractor shall be permitted or required to work at a rate of pay less than the prevailing wage rate; nor shall any such employee be permitted or required to work more than 8 hours in any work day or 40 hours in any work week unless he is paid at a rate of at least 1½ times the basic hourly rate for all hours in excess of 8 per day or after 40 per week and unless he receives fringe benefits that are at least equal to those in the prevailing wage rate; provided that whenever employer and employee organizations employing and representing a majority of a class of workers in a particular industry within the city jointly certify that the maximum number of hours that such persons may work under existing labor agreements before overtime wages must be paid differs from the hours specified in this paragraph, the maximum number of hours specified in such labor agreements shall be substituted for those specified above in applying the provisions of this paragraph to such workers.

(b) The word "or" in the state statute and the City of Duluth Code refers to the number of hours worked in any one week or, in the alternative, the number of hours worked in any one day in the week (the days in one week being totaled for reporting purposes); the law requires use of the alternative which results in the higher number of overtime hours for each employee whose time is being reported. All hours exceeding 40 per week are subject to overtime in addition to the daily overtime requirements.

**EXCEPTIONS:** Federal government funding only and HUD (Housing and Urban Development) funding - see point "e"

In summary, if a project is solely funded with City of Duluth monies, the City allows the employees to work four ten-hour days and be paid at the regular hourly rate for those ten hours; exceeding hours must be paid at the overtime rate. An employer may not withhold overtime payment exclusively until 40 hours per week have been worked. Daily overtime must be paid as it is earned.

● **The base workweek hours must be clearly indicated on each payroll. Employees may be assigned a different workweek; however, that must be clearly marked beside the employees' names.**

The following are examples of how these rules apply to different situations.

TT refers to the total time worked on the day or in the week

RT refers to the hours worked at the regular rate of pay (straight time)

OT refers to the hours worked for which overtime must be paid

State Funded with or without federal funding Projects								City-only Funded Projects (4 ten-hour days)							
	Mon	Tues	Wed	Thurs	Fri	Sat	Total		Mon	Tues	Wed	Thurs	Fri	Sat	Total
TT	10	10	10	10	0	6	46		10	10	10	10	0	6	46
RT	8	8	8	8	0	6	38		10	10	10	10	0	0	40
OT	2	2	2	2	0	0	8		0	0	0	0	0	6	6

State Funded with or without federal funding Projects								City-only Funded Projects (4 ten-hour days)							
	Mon	Tues	Wed	Thurs	Fri	Sat	Total		Mon	Tues	Wed	Thurs	Fri	Sat	Total
TT	0	10	10	0	7	0	27		10	0	12	0	0	0	32
RT	0	8	8	0	7	0	23		10	0	10	10	0	0	30
OT	0	2	2	0	0	0	4		0	0	2	0	0	0	2

(c) **Overtime Calculations**

Minnesota Statutes Chapter 177.42, subd 4 specifies that the prevailing hours of labor may not be more than eight hours per day or more than 40 hours per week (as stated above in (b), the City of Duluth does allow for ten hours per day/40 hours per week with City funding *only*).

Minnesota Statutes Chapter 177.42, subd 5 defines the hourly basic rate as the hourly wage paid to any employee. (subd 6): The prevailing wage rate means the hourly basic rate of pay plus the contribution for health and welfare benefits, vacation benefits, pension benefits, and any other economic benefit paid to the largest number of workers engaged in the same class of labor within the area...

Minnesota Statutes Chapter 177.43, subd 1 (1) ...employees are permitted to work more hours than the prevailing hours of labor [being] paid for all hours in excess of the prevailing hours at a rate of at least 1-½ times the hourly basic rate of pay. (2) A laborer or mechanic may not be paid a lesser rate of wages than the prevailing wage rate in the same or most similar trade or occupation in the area.

An employer may pay a lower hourly rate and higher fringe benefit rate--to a bona fide plan--than stated in the wage decision providing the total of the two rates is equal to or greater than the total in the wage decision.

**Overtime Calculation with Fringe Benefits Paid to Bona Fide Plans**

For overtime purposes, an employer paying higher fringe benefits to a bona fide plan and paying a lower hourly rate **MUST** calculate the overtime on the higher hourly rate as stated in the contract's wage decision.

**Overtime Calculation with Cash Payment of Fringe Benefits**

When the fringe benefit is paid directly to an employee, the prevailing base rate and the fringe benefit rate for a specific classification are totaled to arrive at the hourly rate. *Overtime is calculated (1.5 x) the base rate with the fringe benefit amount added to that rate: base rate x 1.5 + fringe benefit rate = overtime rate.*

(d) A contractor shall not reduce a worker's private, regular rate of pay when the wage rate certified by the U. S. Department of Labor or the Minnesota Department of Labor & Industry is less than the worker's normal hourly wage [Minnesota Statute 181.03 subdivision 1(2)].

(e) **Regular Time & Overtime Definitions**

- **State of Minnesota** funded projects with or without federal funding *only allow for five eight-hour days per week at regular time*. Overtime is calculated at a rate not less than time and one-half (1.5) of the prevailing base rate as stated in the wage decision--OR the base rate the employee is being paid if it is higher than the required base rate--plus the straight time fringe benefit amount.
- **City of Duluth** funded projects do permit four ten-hour work days at regular time--see point 4-a, b for stipulations. Overtime is calculated at a rate not less than time and one-half (1.5) of the prevailing base rate as stated in the wage decision--OR the base rate the employee is being paid if it is higher than the required base rate--plus the straight time fringe benefit amount.
- **Federal** funded only projects allow overtime pay for hours worked in excess of 40 in a workweek at a rate not less than time and one-half (1.5) of the prevailing base rate as stated in the wage decision--OR the base rate the employee is being paid if it is higher than the required base rate--plus the straight time fringe benefit amount.
- **HUD** funded projects allow overtime pay for hours worked in excess of 40 in a workweek at a rate not less than time and one-half (1.5) of the prevailing base rate as stated in the wage decision--OR the base rate the employee is being paid if it is higher than the required base rate--plus the straight time fringe benefit amount.

(f) The minimum hourly prevailing wages are contained in each project specification. When both federal (general decision rates from the U. S. Department of Labor) and State of Minnesota prevailing wages for state funded construction projects from the Minnesota Department of Labor and Industry are used, the prime contractor and all subcontractors including trucking operations, are required to pay the higher of the two wages for all laborers and mechanics [MnDOT Contract Administration Manual, Section 5-591.320].

(g) The prime contractor and any lower-tier subcontractor shall review all wage decisions and compensate a worker according to the type of work performed and at the rate that is the greatest.

(h) State of Minnesota prevailing wages typically list two rates for each classification with two effective dates. Should any City of Duluth contract continue to and past the second effective date, that rate and fringe benefit will be in effect through the remainder of the project.

(i) All contracts for city projects shall have applicable schedules of prevailing wage rates set forth in the contract. Schedules of applicable prevailing wage rates shall be present on all project job sites and shall either be posted on the site or be on the person of any supervisor in charge of the job site.

(j) Employees on projects shall be paid at least **weekly**. Fringe benefits shall be paid either in cash or to an employee benefit plan that has been approved by the U.S. Department of Labor.

**■ The fringe benefit package is an integral portion of the prevailing wage. Should the prime contractor become delinquent with any fringe benefit plan administrator's requirements for monthly payment, an estimated amount due that plan plus penalties will be withheld from the monthly estimate(s). This also pertains to subcontractors; their fringe plan payment delinquency will affect the monthly estimate(s) in the same manner.** See MnDOT Specification 1906 on page eight.

See Statement of Compliance and Certified Payroll Report requirements in Section 10, HUD 4010 and web sites in Section 14, Forms.

(k) Any contractor or subcontractor working on a project shall furnish the City with **original** certified payroll reports with **original signatures** relating to the project. Such certified payroll reports shall be **submitted weekly** on U.S. Department of Labor standard forms (WH-347) or their equivalent--using the same format--to the City of Duluth Labor Standards representative. All City of Duluth funded projects must have the base workweek hours indicated on the

certified payroll form and/or beside each employee's name (should some employees be working different base workweeks).

(l) No contractor or subcontractor working on a project shall evade or attempt to evade the provisions of this section through the use of non-recognized training programs. The only employees involved in training programs that shall be allowed to work on projects covered by this section shall be apprentice-trainees as defined by this article.

(m) Any person violating the provisions of this section shall be guilty of a misdemeanor with each day of violation constituting a separate offense. In addition, if the prevailing wage rate and accompanying fringe benefit rate is not paid to employees working on a project, the City of Duluth may withhold contract payments to the prime contractor until such deficiencies are corrected. Should fringe benefits be paid to authorized Plans, the payments must be made within the demands of those Plans. Delinquencies may result in withholding of project funds to the prime contractor.

(n) This section shall not apply to contracts for projects where the total cost of the project is less than \$2,000.00; nor to materialmen who do no more than deliver materials to the work site, except that this section shall apply to employees who deliver asphalt, concrete or mineral aggregate such as sand, gravel or stone where such material is incorporated into the project by depositing the material substantially in place, either directly or through spreaders, from the transporting vehicle.

(5) **Helpers**

A helper may perform work only if the helper classification is specified and defined in the federal wage decision and/or State of Minnesota wage decision incorporated into the project contract. Without such a helper classification, the contractor must assign a job classification that is the "same or most similar" [Minnesota Statute 177.44, subdivision 1] and compensate the helper for the actual work performed regardless of the helper's skill level.

(5) **Apprentice Ratios**

Journeyworkers must be on site with the apprentices and their hours must match.

**FUNDING SOURCE:**

**City of Duluth and State of Minnesota with or without Federal funding**

(i) Apprentices are not permitted to work alone under any circumstances.

(ii) Working foremen are acceptable as a journeyworker PROVIDING he/she is in the same classification.

» Example: carpenter foreman and carpenter apprentice

- Ratios are determined by the trade's labor agreement.
- In the absence of ratio language, the following State of Minnesota apprenticeship ratios will be applied:  
(apprentice:journeyworker) 1:1 2:4 3:7 4:10, etc.
- Employees working in excess of the allowable ratio must be paid the full journeyworker compensation.
- Out-of-ratio apprentices will be calculated beginning with the **apprentice at the highest level of training** and, then, to less senior apprentices in their rank order.
- Should two or more out-of-ratio apprentices have the same level of training, whomever was on the work site first will receive journeyworker pay; if the apprentices at the same level of training began work on the project site at the same time, hours worked out-of-ratio for which restitution is due will be divided among those apprentices.

Examples:

Four apprentices working unsupervised are on site. [4:0]

Ratio calls for four apprentices and ten journeyworkers [4:10]

Correction: all apprentices will receive the full journeyworker compensation as apprentices are not permitted to work alone.

Three apprentices and two journeyworkers are on site. [3:2]

Ratio calls for three apprentices and seven journeyworkers [3:7]

Two journeyworkers may accompany only one apprentice; therefore, the two highest level apprentices are paid the full journeyworker compensation.

Even though this particular job has three apprentices—the second journeyworker is a mute point; a third journeyworker would also be a mute point in this example.

Correction: the two highest level apprentices are paid the full journeyworker compensation and the third lower level apprentice is considered in ratio.

**H U D (CDBG) and Federal funding only**

- Apprentices are not permitted to work alone unless the U. S. Department of Labor-approved agreement allows that practice.
- Working foremen are acceptable as a journeyworker PROVIDING he/she is in the same classification.  
» Example: electrician foreman and electrician apprentice
- Ratios are determined by the trade's U. S. Department of Labor-approved agreement.
- In the event of the absence of ratio language in the applicable agreement, the Minnesota Department of Labor ratio of one apprentice for the first journeyworker and one apprentice for each three journeyworkers thereafter will be applied, (i.e., 1:1, 2:4, 3:7, 4:10, etc.).
- **The legal apprentices are those who first came to work on the job site;** in the event that all apprentices begin work on the project site at the same time, hours worked out-of-ratio for which restitution is due will be divided among the apprentices.
- Time cards will be required to substantiate the start times.
- Employees working in excess of the allowable ratio—or for which U. S. Department of Labor-apprentice agreement/certificate is not provided—must be paid the full journeyworker compensation.

Examples:

Four apprentices and one journeyworker are on site. [4:1]

Ratio calls for four apprentices and ten journeyworkers. [4:10]

The first apprentice on site is considered in ratio as one journeyworker may only accompany one apprentice [1:1]; this particular job has four apprentices.

Correction: the second through the fourth apprentices coming on site are paid the full journeyworker compensation.

Six apprentices and two journeyworkers are on site [6:2]

Ratio calls for six apprentices and sixteen journeyworkers [6:16]

The first apprentice on site is considered in ratio as two journeyworkers may only accompany one apprentice; this particular job has six apprentices—the second journeyworker is a mute point.

Correction: the second through sixth apprentices coming on site are paid the full journeyworker compensation.

(6) **Poster Boards**

The prime contractor must construct and display a poster board, which contains all required posters, is legible and is accessible to all workers from the first day of work until the project is 100% complete. Prime contractors are not allowed to place a poster board at an off-site facility location.

(7) **Trucking Issues**

a) For the purpose of sections seven and eight, the term “owner” includes all persons having an ownership interest in the trucking entity or a partnership interest in the trucking entity and has a legal and rightful title to the vehicle(s) or has an approved lease on the vehicle(s). “Operate” means the owner either physically drives the vehicle or hires another to physically drive the vehicle, yet maintains the right to direct the day-to-day operations of the vehicle.

b) **Trucking Operations Definitions:**

**Independent Trucking Operator:** an individual or partnership who owns or holds a vehicle under lease and who contracts that vehicle and the owner’s services to an entity which provides construction services to a public works project. The individual owns or leases and drives the equipment, is responsible for the maintenance of the equipment, bears all operating costs, determines the details and means of performing the services, and enters into a legally binding agreement that specifies the relationship to be that of an independent contractor and not that of an employee.

**Multiple Truck Operations:** any legal business entity that owns more than one vehicle and hires the vehicles out for services to brokers or contractors on public works projects. The owners of a trucking firm may either drive the vehicles or hire employees to drive the vehicles. Employee drivers are subject to the appropriate prevailing wage rate. The owner driving a vehicle is obligated to account for the value of his/her services as a driver at the appropriate prevailing wage.

**Partnerships:** a legal business entity where two or more individuals hold vehicles under lease and contract those vehicles and their services to an entity which provides construction services to a public works project. The partners own or lease the equipment, are responsible for maintenance and all operating costs, drive the equipment, determine the details and means of performing the services, and enter a legally binding agreement that specifies the relationship to be that of a partner and not that of an employee. All partners are subject to the appropriate prevailing wage.

**Corporation:** any legal business entity that owns or leases vehicles to provide construction services to public works projects. All individuals are employees of the corporation and subject to the appropriate prevailing wage regardless of title or position.

**Broker:** an individual or firm who (activities include, but are not limited to):

- contracts to **provide** trucking services [equipment and driver] in the construction industry to users of such services, such as prime contractors and various subcontractors of the prime;
- contracts to **obtain** services from other trucking operations and dispatches them to various assignments;
- receives payment from the users (such as prime contractors and various subcontractors) in consideration for the trucking services provided; and
- makes payment to the providers (trucking operations so **contracted** with) for their services.

(8) **Specific documentation from trucking operations.**

**Independent Trucking Operators**

The owner/operator of a truck must submit a copy of his/her commercial driver’s license (CDL), cab card, and insurance certificate for each truck the owner/operator drives on each construction project *before commencing work on that project*. These documents must be sent to the prime contractor who will then forward the material to Labor Standards, Engineering Division at the City of Duluth.

**Multiple Truck Operators**

Weekly certified payrolls and payment of corresponding prevailing wages plus the fringe benefit package will be required for each project where trucks are operating. This covers the owner plus all employees performing work on the project.

**Partnerships**

Weekly certified payrolls and payment of corresponding prevailing wages plus fringe benefit packages will be required for each project where trucks are operating. This covers all partners of the organization who perform work on the project.

Each partner performing work on a project must submit a copy of his/her commercial driver’s license (CDL), cab card, and insurance certificate for the truck being operated with that weekly certified payroll. It is not necessary to repeat such supporting documentation until a different truck is used and/or certificates or licenses have expired.

*Employees* of the partnership are always reported on a weekly certified payroll and paid the appropriate prevailing wage plus fringe benefit package for the work being performed.

**Corporations**

All persons employed by the corporation are subject to receive payment of the prevailing wage plus the fringe benefit package for the work performed on a project regardless of title or position. Weekly certified payrolls must be submitted for all work performed on the project.

**Brokers**

**Truck ownership** and a **bonafide contract** between the broker and another trucking operation, a prime contractor, or a subcontractor must be identified. Paperwork must be submitted with the month end trucking report to the City of Duluth Labor Standards representative - Engineering. Certified payrolls are not required when the above documentation is provided and approved.

(10) **Month End Trucking Report - ONLY REQUIRED WITH STATE OF MINNESOTA FUNDING**

The Minnesota Department of Transportation Month End Trucking Report (Mn/DOT TP-90550 7-05) and Minnesota Department of Transportation Month End Trucking Report Statement of Compliance (Mn/DOT TP-90551 7-05) are *only required on state funded projects*.

A guide for completing the forms including definitions and the reports, themselves, may be downloaded from:

[www.dot.state.mn.us/const/labor/truckinginfo.html](http://www.dot.state.mn.us/const/labor/truckinginfo.html)

Payment to the prime contractor may be withheld until documentation is received and approved.

(11) **Truck Rental Rates - ONLY REQUIRED WITH STATE OF MINNESOTA FUNDING**

Truck rental rates are listed in the prevailing wage section of the project specifications/contract.

(12) **Minnesota Rules 5200.1105 and 5200.1106**

These rules are incorporated into this supplementary general conditions by reference and are found on this web site:

[www.revisor.leg.state.mn.us/rules/?id=5200](http://www.revisor.leg.state.mn.us/rules/?id=5200)

(13) **Truck Axles**

Per Minnesota Rules 5200.1100 Master Job Classifications, a truck “unit” refers to all axles including the steering axle.

A tag axle is also counted as one of the axles.

Examples: four rear axles plus one steering axle = five axles total

one rear axle plus one steering axle = two axles total

(14) **Non-Compliance and Enforcement**

- a) The prime contractor shall be liable for any unpaid wages to its workers or those of its lower-tier subcontractors, trucking companies/Multiple Truck Owners (MTO's) and/or Independent Truck Owner/Operator (ITOs) [MnDOT Standard Specifications for Construction, Section 1801].
- b) See Section 9, MnDOT Specification 1906 Partial Payments.

(15) **IC-134 form - Withholding Affidavit for Contractors**

The IC-134 form will be required from all Multiple Truck Operators, Partnerships, and Corporations performing trucking services on a project before the retainage or all remaining funds can be released. Web site for completing form online: [www.mndor.state.mn.us](http://www.mndor.state.mn.us)  
The form, itself, is found at: [www.taxes.state.mn.us/forms/ic134.pdf](http://www.taxes.state.mn.us/forms/ic134.pdf)

(16) **Owners, Supervisors, Foremen listed on certified payrolls.**

All persons working on a City of Duluth project including owners, partners, supervisors, salaried persons, and working foremen who perform laborer and/or mechanic work shall be reported on the weekly certified payroll reports including all data required of any laborer or mechanic. (ordinance 8731, 6/24/85)

(17) **Supporting documentation.**

At his/her discretion, the City of Duluth Labor Standards representative may demand proof of payment of the prevailing wage which may include copies of a payroll register, itemized time sheet and matching cancelled check, or any other supporting documents as stipulated. Payment to the prime contractor may be withheld until documentation is received and approved.

(18) **Kickbacks from Public Works employees prohibited.**

No contractor working on a project or other person shall, by force intimidation, or threat of termination of employment, cause any employee working on a project to give up any part of the compensation to which he is entitled under his contract of employment.

**Section 9**

**Minnesota Department of Transportation Specification 1906 Partial Payments  
Process For "Withholding Contract Monies" and "Default and Termination of a Contract" 11/5/04**

Mn/DOT Specification 1906 Partial Payments describes the Commissioner's authority to withhold funds to protect the Department's interests. In addition, Specification 1808 Default and Termination of a Contract describes the Commissioner's authority to take the prosecution of the work out of the hands of the Contractor.

Additionally, on projects funded in whole or part with federal funds and in accordance with the Required Contract Provisions Federal-Aid Construction Contracts Form – 1273, Section IV, Subpart 6, "Withholding", incorporated into federal aid contracts, the Contracting Officer may, after written notice to the Contractor, take such action as may be necessary to cause the suspension of any further payment, advance or guarantee of funds until such violations have ceased.

However, the Department must give the Contractor, and it's Sureties due notice prior to exercising these authorities. The withholding of contract funds, in accordance with Specification 1906 or the Required Contract Provisions Federal-Aid Construction Contracts Form – 1273, Section IV, Subpart 6, "Withholding", should be implemented as soon as a possible prevailing wage violation is recognized. However, Default and Termination of a Contract, in accordance with Specification 1808, should only be exercised as a "last resort" if the Contractor is not willing to comply.

**Definitions**

(Mn/DOT Standard Specifications for Construction 2000 Edition, Section 1103)

Commissioner: The Commissioner of the Minnesota Department of Transportation, or the chief executive of the department or agency constituted for administration of Contract work with its jurisdiction.

Contractor: The individual, firm or corporation Contracting for and undertaking prosecution of the prescribed work; the party of the second part to the Contract, acting directly or through a duly authorized representative.

Department: The Department of Transportation or the State of Minnesota, or the political subdivision, governmental body, board, commission, office, department, division, or agency constituted for administration of the Contract work within its jurisdiction.

**(Form 1273 - 29 CFR, Part 5.1, Definitions)**

Contracting Officer: The individual, a duly appointed successor or authorized representative who is designated and authorized to enter into Contracts on behalf of the Federal Agency and/or the City of Duluth.

**Important Considerations**

1. Upon completion of the work under a contract, the department should consider issuing the final voucher as soon as possible. Failure to finalize a contract expeditiously could result in subsequent claims that would prevent the department from finalizing the contract. However, before the issuance of the final voucher, the department must be able to ensure that the terms of the contract have been satisfied. Failure on the part of the department to ensure compliance could result in the Mn/DOT state aid division retaining funds from the department in accordance with *Minnesota Rules 8820.3000, subpart 5*.
2. On every contract, the department should withhold the final retainage in accordance with the following guidelines: (1) if the total amount of the contract is \$1,000,000 or more, the department should retain funds not more than \$50,000, (2) if the total amount of the contract is less than \$1,000,000, the department should retain 5% of the total contract, (3) retainage should be withheld until the department can ensure that the contractor has met the terms of the contract or until the finalization of the contract.
3. This guide specifies that the department verbally notify the bonding company early in the process. Generally, as a "rule of thumb", notifying the bonding company is usually the "last resort". However, the justification for the early notification is related to the language found in *Minnesota statute 574.31, subdivision 2*, which summarizes that if an individual or the department does not submit a claim on the payment bond within 120 days after the completion of work under the contract, the claim can be denied.

The following are general guidelines that should be followed prior to placing a Contractor in default:

- Step 1: Upon verbal or written notification that a possible prevailing wage violation exists, the Department should give written notice to the Contractor regarding the nature of the claim, along with the Department's intent to withhold monies until the claim is investigated and determined to be in compliance. Additionally, the Department should inform the Contractor that the bonding company has been verbally notified of the claim. Please be aware, the Department should ensure employee confidentiality at all times.  
Upon a preliminary determination surrounding the financial extent of the claim, the Department should consider retaining a "reasonable" portion of one or more partial estimates in accordance with Mn/DOT's 2000 Standard Specifications for Construction, Section 1906; or on federal aid contracts, in accordance with the Required Contract Provisions Federal-Aid Construction Contracts Form – 1273, Section IV, Subpart 6, "Withholding".  
If it is determined that the claim is valid, the Department should schedule a meeting with the Contractor and attempt to resolve the matter. If the claim is determined to be invalid, the Department should release any partial estimates that may have been held as a result of the claim. However, the Department should continue to withhold the final retainage in accordance with the above-mentioned: *Important Considerations, 2*.
- Step 4: If resolution cannot be obtained through a meeting, the Department should order the Contractor, in writing, to complete their obligations under the contract. The letter should clearly state the circumstances under which the Department has deemed that the Contractor has not met the terms of the contract.

- Additionally, the Department should include a reasonable deadline for this obligation to be completed. A copy of this letter should be forwarded to the Surety, District State Aid Engineer (DSAE), Labor Compliance Unit and the Department's Attorney.
- Step 5: In the event that the Contractor does not respond to the Department's written order, the Department should send a similar letter, requesting that the Contractor respond immediately, in writing, regarding the Contractor's intention to comply or not comply with the order. A copy of this letter should be forwarded to the Surety, District State Aid Engineer (DSAE), Labor Compliance Unit and the Department's Attorney.
- Step 6: If the Department still does not get a proper response from the Contractor, the Department should write another letter, addressed to both the Contractor and the Surety, specifying all the facts of the alleged breach, demanding that the Contractor, or its Surety, respond satisfactorily within 10 days or the Department may exercise its authority to Default and Terminate the Contract in accordance within/DOT's 2000 Specifications for Construction, Section 1808. It's important to provide sufficient detail so that the Surety understands the situation. This notification should be sent by certified mail. A copy of this letter should be forwarded to the Surety, District State Aid Engineer (DSAE), Labor Compliance Unit and the Department's Attorney.
- Step 7: If the Contractor or Surety is unresponsive after 10 days, the Department should consult with their attorney to consider proceeding with Default and Termination of the Contract.
- Step 8: Upon termination of the contract, the Department provides a written order to the Surety, requiring the Surety to bring resolution to the prevailing wage violation.
- Step 9: The Department places the Contractor on a Non-Responsible Bidder's List and rejects any future awards.

## Section 10

### Federal Labor Standards Provisions / U.S. Department of Housing and Urban Development Office of Labor Relations

Previous editions are obsolete

HUD-4010 (06/2009) ref. Handbook 1344.1

#### Applicability

The Project or Program to which the construction work covered by this contract pertains is being assisted by the United States of America and the following Federal Labor Standards Provisions are included in this Contract pursuant to the provisions applicable to such Federal assistance.

**A. 1. (i) Minimum Wages.** All laborers and mechanics employed or working upon the site of the work, will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR Part 3), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics. Contributions made or costs reasonably anticipated for bona fide fringe benefits under Section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of 29 CFR 5.5(a)(1)(iv); also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs, which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period.

Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under 29 CFR 5.5(a)(1)(ii) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible, place where it can be easily seen by the workers.

(ii) (a) Any class of laborers or mechanics which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. HUD shall approve an additional classification and wage rate and fringe benefits therefor only when the following criteria have been met:

- (1) The work to be performed by the classification requested is not performed by a classification in the wage determination; and
- (2) The classification is utilized in the area by the construction industry; and
- (3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(b) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and HUD or its designee agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by HUD or its designee to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, D.C. 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise HUD or its designee or will notify HUD or its designee within the 30-day period that additional time is necessary. (Approved by the Office of Management and Budget under OMB control number 1215-0140.)

(c) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and HUD or its designee do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), HUD or its designee shall refer the questions, including the views of all interested parties and the recommendation of HUD or its designee, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise HUD or its designee or will notify HUD or its designee within the 30-day period that additional time is necessary. (Approved by the Office of Management and Budget under OMB Control Number 1215-0140.)

(d) The wage rate (including fringe benefits where appropriate) determined pursuant to subparagraphs (1)(ii)(b) or (c) of this paragraph, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(iv) If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program. (Approved by the Office of Management and Budget under OMB Control Number 1215-0140.)

**2. Withholding.** HUD or its designee shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the contractor under this contract or any other Federal contract with the same prime contractor, or any other Federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee or helper, employed or working on the site of the work, all or part of



the wages required by the contract, HUD or its designee may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased. HUD or its designee may, after written notice to the contractor, disburse such amounts withheld for and on account of the contractor or subcontractor to the respective employees to whom they are due. The Comptroller General shall make such disbursements in the case of direct Davis-Bacon Act contracts.

**3. (i) Payrolls and basic records.** Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in Section 1(b)(2)(B) of the Davis-bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5 (a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in Section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs. (Approved by the Office of Management and Budget under OMB Control Numbers 1215-0140 and 1215-0017.)

**(ii) (a)** The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to HUD or its designee if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit the payrolls to the applicant sponsor, or owner, as the case may be, for transmission to HUD or its designee. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i) except that full social security numbers and home addresses shall not be included on weekly transmittals. **Instead, the payrolls shall only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number).** The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at <http://www.dol.gov/esa/whd/forms/wh347instr.htm> or its successor site.

The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to HUD or its designee if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit the payrolls to the applicant sponsor, or owner, as the case may be, for transmission to HUD or its designee, the contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this subparagraph for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to HUD or its designee. (Approved by the Office of Management and Budget under OMB Control Number 1215-0149.)

**(b)** Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

**(1)** That the payroll for the payroll period contains the information required to be provided under 29 CFR 5.5 (a)(3)(ii), the appropriate information is being maintained under 29 CFR 5.5(a)(3)(i), and that such information is correct and complete;

**(2)** That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in 29 CFR Part 3;

**(3)** That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

**(c)** The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by subparagraph A.3.(ii)(b).

**(d)** The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under Section 1001 of Title 18 and Section 231 of Title 31 of the United States Code.

**(iii)** The contractor or subcontractor shall make the records required under subparagraph A.3.(i) available for inspection, copying, or transcription by authorized representatives of HUD or its designee or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, HUD or its designee may, after written notice to the contractor, sponsor, applicant or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

#### **4. Apprentices and Trainees**

**(i) Apprentices.** Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

**(ii) Trainees.** Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of



progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

**(iii) Equal employment opportunity.** The utilization of apprentices, trainees and journeymen under 29 CFR Part 5 shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR Part 30.

**5. Compliance with Copeland Act requirements.** The contractor shall comply with the requirements of 29 CFR Part 3 which are incorporated by reference in this contract.

**6. Subcontracts.** The contractor or subcontractor will insert in any subcontracts the clauses contained in subparagraphs 1 through 11 in this paragraph A and such other clauses as HUD or its designee may by appropriate instructions require, and a copy of the applicable prevailing wage decision, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in this paragraph.

**7. Contract termination; debarment.** A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

**8. Compliance with Davis-Bacon and Related Act Requirements.** All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR Parts 1, 3, and 5 are herein incorporated by reference in this contract

**9. Disputes concerning labor standards.** Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR Parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and HUD or its designee, the U.S. Department of Labor, or the employees or their representatives.

**10. (i) Certification of Eligibility.** By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of Section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1) or to be awarded HUD contracts or participate in HUD programs pursuant to 24 CFR Part 24.

**(ii)** No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of Section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1) or to be awarded HUD contracts or participate in HUD programs pursuant to 24 CFR Part 24.

**(iii)** The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001. Additionally, U.S. Criminal Code, Section 1 01 0, Title 18, U.S.C., "Federal Housing Administration transactions", provides in part: "Whoever, for the purpose of . . . influencing in any way the action of such Administration..... makes, utters or publishes any statement knowing the same to be false..... shall be fined not more than \$5,000 or imprisoned not more than two years, or both."

**11. Complaints, Proceedings, or Testimony by Employees.** No laborer or mechanic to whom the wage, salary, or other labor standards provisions of this Contract are applicable shall be discharged or in any other manner discriminated against by the Contractor or any subcontractor because such employee has filed any complaint or instituted or caused to be instituted any proceeding or has testified or is about to testify in any proceeding under or relating to the labor standards applicable under this Contract to his employer.

**B. Contract Work Hours and Safety Standards Act.** The provisions of this paragraph B are applicable where the amount of the prime contract exceeds \$100,000. As used in this paragraph, the terms "laborers" and "mechanics" include watchmen and guards.

**(1) Overtime requirements.** No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which the individual is employed on such work to work in excess of 40 hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of 40 hours in such workweek.

**(2) Violation; liability for unpaid wages; liquidated damages.** In the event of any violation of the clause set forth in subparagraph (1) of this paragraph, the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in subparagraph (1) of this paragraph, in the sum of \$10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of 40 hours without payment of the overtime wages required by the clause set forth in sub paragraph (1) of this paragraph.

**(3) Withholding for unpaid wages and liquidated damages.** HUD or its designee shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contract, or any other Federally-assisted contract subject to the Contract Work Hours and Safety Standards Act which is held by the same prime contractor such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in subparagraph (2) of this paragraph.

**(4) Subcontracts.** The contractor or subcontractor shall insert in any subcontracts the clauses set forth in subparagraph (1) through (4) of this paragraph and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in subparagraphs (1) through (4) of this paragraph.

**C. Health and Safety.** The provisions of this paragraph C are applicable where the amount of the prime contract exceeds \$100,000.

**(1)** No laborer or mechanic shall be required to work in surroundings or under working conditions which are unsanitary, hazardous, or dangerous to his health and safety as determined under construction safety and health standards promulgated by the Secretary of Labor by regulation.

(2) The Contractor shall comply with all regulations issued by the Secretary of Labor pursuant to Title 29 Part 1926 and failure to comply may result in imposition of sanctions pursuant to the Contract Work Hours and Safety Standards Act, (Public Law 91-54, 83 Stat 96). 40 USC 3701 et seq.

(3) The contractor shall include the provisions of this paragraph in every subcontract so that such provisions will be binding on each subcontractor. The contractor shall take such action with respect to any subcontractor as the Secretary of Housing and Urban Development or the Secretary of Labor shall direct as a means of enforcing such provisions.

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## **Section 11**

### **Equal Opportunity Laws and Regulations**

(A) In addition to Contract specifications set forth below, the Contractor shall conduct and administer this Contract in compliance with:

- (1) Title VI of the Civil Rights Act of 1964 (Pub. L. 88-352) and implementing regulations issued at 24 CFR Part 1;
- (2) Title VIII of the Civil Rights Act of 1968 (Pub. L. 90-284), as amended, and implementing regulations;
- (3) Section 109 of the Housing and Community Development Act of 1974, as amended; and the regulations issued pursuant thereto (24 CFR Section 570.601);
- (4) Section 3 of the Housing and Urban Development Act of 1968, as amended, and implementing regulations of 24 CFR Part 135;
- (5) Executive Order 11246, as amended by Executive Order 11375 and 12086 and implementing regulations at 41 CFR Chapter 60;
- (6) Executive Order 11063, as amended by Executive Order 12259 and implementing regulations at 24 CFR Part 107;
- (7) Section 504 of the Rehabilitation Act of 1973 (Pub. L. 93-112), as amended, and implementing regulations when published for effect;
- (8) The Age Discrimination Act of 1975, as amended, (Pub. L. 94-135) and implementing regulations when published for effect;
- (9) The Minnesota Human Rights Act of 1974, as amended (Chapter 363).

### **Equal Opportunity and Affirmative Action**

(A) Contractors and Subcontractors that have a work force in excess of fifty (50) employees and a contract in excess of \$50,000.00 shall prepare and maintain an appropriate affirmative action plan in accordance with the provisions of 41 CFR 60 "Compliance Responsibility for Equal Opportunity".

(B) **Non-segregated Facilities.** The Contractor shall certify that he does not maintain or provide for his employees any segregated facilities at any of his establishments, and that he does not permit his employees to perform their services at any location, under his control, where segregated facilities are maintained. The Contractor covenants that he will not maintain or provide for his employees any segregated facilities at any of his establishments, and he will not permit his employees to perform their services at any location, under his control, where segregated facilities are maintained. As used in this paragraph the term "segregated facilities" means any waiting rooms, work areas, rest rooms and wash rooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or facilities provided for employees which are segregated by explicit directive or are in fact segregated on the basis of race, color, creed, religion, national origin, ancestry, age, marital status, status with respect to public assistance, and/or disability because of habit, local custom, or otherwise.

### **General Provisions Against Discrimination**

(A) In all hiring or employment made possible by or resulting from this Contract, there:

- (1) will not be any discrimination against any employee or applicant for employment because of race, color, creed, religion, national origin, ancestry, age, sex, marital status, status with respect to public assistance, and/or disability.
- (2) affirmative action will be taken to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, creed, religion, national origin, ancestry, age, sex, marital status, status with respect to public assistance, and/or disability. This requirement shall apply to, but not be limited to, the following: employment, upgrading, demotion or transfer; recruitment or recruitment advertising; lay-off or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. There shall be posted in conspicuous places available to employees and applicants for employment, notices setting forth the provisions of this clause. All solicitations or advertisements for employees shall state that all qualified applicants will receive consideration for employment without regard to race, color, creed, religion, national origin, ancestry, age, sex, marital status, status with respect to public assistance, and/or disability.

(B) No person in the United States shall, on the grounds of race, color, creed, religion, national origin, age, sex, marital status, status with respect to public assistance, and/or disability, be excluded from participation in, be denied the benefits of, or be subject to discrimination under any program or activity made possible by or resulting from this Contract. The Contractor and each employer will comply with all requirements imposed by or pursuant to the regulations of the Federal Agency effectuating Title VI of the Civil Rights Act of 1966. The Contractor will note this requirement in all solicitations or advertisements for employees. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.

(C) The Contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice advising the labor union or workers' representative of the Contractor's commitments under these provisions, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

(D) The Contractor hereby agrees that he will incorporate into any contract for construction work, or modification thereof, as defined in the regulations of the Secretary of Labor at 41 CFR Chapter 60, which is paid for in whole or in part with funds obtained pursuant to this Contract, the equal opportunity clause which is a part of these Contract Documents.

(E) The Contractor further agrees that he will be bound by the equal opportunity clause and other provisions of 41 CFR Chapter 60, with respect to his own employment practices when he participates in federally assisted construction work: **Provided:** That of the Contractor so participating is a State or Local Government, the above equal opportunity clause is not applicable to any agency, instrumentality, or subdivision of such government which does not participate in work on or under the Contract. Also, the Contractor will make his files available to inspection by appropriate government agencies and shall furnish those reports as may be required by said agencies.

(F) The Contractor agrees that he will assist and cooperate actively with the Federal Agency and the Secretary of Labor in obtaining the compliance of subcontractors with the equal opportunity clause and the rules, regulations, and relevant orders of the Secretary of Labor, that he will furnish the Federal Agency and the Secretary of Labor such information as they may require for the supervision of such compliance, and that he will otherwise assist the Federal Agency in the discharge of its primary responsibility for securing compliance.

(G) The Contractor further agrees that he will refrain from entering into any contract or any contract modification subject to Executive Order 11246 of September 24, 1965, with a subcontractor debarred from, or who has not demonstrated eligibility for, Government contracts and federally assisted construction contracts pursuant to the Executive Order. In addition, the Contractor agrees that if he fails or refuses to comply with these undertakings, the City or the Federal Agency may take any or all of the following actions: Terminate or suspend in whole or in part this Contract; refrain from extending any further assistance to the Contractor under the Project with respect to which the failure or refusal occurred until satisfactory assurance of future compliance has been received from such Contractor and refer the case to the Department of Justice for appropriate legal proceedings.

**Affirmative Action - "Construction Contracts" over \$10,000**

Notice of Requirement for Affirmative Action to Ensure Equal Employment Opportunity  
(Executive Order 11246)

1. The Offeror's or Bidder's attention is called to the "Equal Opportunity Clause" and the "Standard Federal Equal Employment Opportunity Construction Contract Specifications" set forth herein.

2. The goals and timetables for minority and female participation, expressed in percentage terms for the Contractor's aggregate workforce in each trade on all construction work in the covered area, are as follows:

<u>Timetables</u>	<u>Goals for minority participation (percent)</u>	<u>Goals for female participation (percent)</u>
From April 1, 1980 until revised	3.0	6.9

These goals are applicable to all the Contractor's construction work (whether or not it is Federal or federally assisted) performed in the covered area.

The Contractor's compliance with the Executive Order and the regulations in 41 CFR Part 60-4 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative action obligations required by the specifications set forth in 41 CFR 60-4.3 (a), and its efforts to meet the goals established for the geographical area where the contract resulting from this solicitation is to be performed. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade, and the contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor or from project to project for the sole purpose of meeting the Contractor's goals shall be a violation of the contract, the Executive Order and the regulations in 41 CFR Part 60-4. Compliance with the goals will be measured against the total work hours performed.

3. The Contractor shall provide written notification to the City and to the Director of the Office of Federal Contract Compliance Programs; U.S. Department of Labor, ESA/OFCCP, 16<sup>th</sup> Floor, 230 South Dearborn Street, Chicago, Illinois, 60604, within 10 working days of award of any construction subcontract and/or subcontract in excess of \$10,000 at any tier for construction work under the contract resulting from this solicitation. The notification shall list the name, address and telephone number of the contractor and/or subcontractor; employer identification number; estimated dollar amount of the prime contract; estimated dollar amount of the subcontract; estimated starting and completion dates of the subcontract; and the geographical area in which the contract is to be performed.

4. As used in this Notice, and in the Contract, the "covered area" is all work under a contract currently held with the City of Duluth, Minnesota.

**Standard Federal Equal Employment Opportunity**  
**Construction Contract Specifications (Executive Order 11246)**

1. As used in these specifications:

- a) "Director" means Director, Office of Federal Contract Compliance Programs, United States Department of Labor; or any person to whom the Director delegates authority;
- b) "Employer identification number" means the Federal Social Security number used on the Employer's Quarterly Federal Tax Return, U.S. Treasury Department Form 941.
- c) "Minority" includes:
  - (iii) Black (all persons having origins in any of the Black African racial groups not of Hispanic origin);
  - (iv) Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American or other Spanish Culture or origin, regardless of race);
  - (v) Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands); and
  - (vi) American Indian or Alaskan Native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).

2. Whenever the Contractor, or any Subcontractor at any tier, subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of \$10,000 the provisions of these specifications and the Notice which contains the applicable goals for minority and female participation and which is set forth in the solicitations from which this contract resulted.

3. If the Contractor is participating (pursuant to 41 CFR 60-4.5) in a Hometown Plan approved by the U.S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the Plan area (including goals and timetables) shall be in accordance with that Plan for those trades which have unions participating in the Plan. Contractors must be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each Contractor or Subcontractor participating in an approved Plan is individually required to comply with its obligations under the EEO clause, and to make a good faith effort to achieve each goal under the Plan in each trade in which it has employees. The overall good faith performance by other Contractors or Subcontractors toward a goal in approved Plan does not excuse any covered Contractor's or Subcontractor's failure to take good faith efforts to achieve the Plan goals and timetables.

4. The Contractor shall implement the specific affirmative action standards provided in paragraphs 7a through p of these specifications. The goals set forth in the solicitation from which this contract resulted are expressed as percentages of the total hours of employment and training of minority and female utilization the Contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. The Contractor is expected to make substantially uniform progress toward its goals in each craft during the period specified.

5. Neither the provisions of any collective bargaining agreement, nor the failure by a union with whom the Contractor has a collective bargaining agreement, to refer either minorities or women shall excuse the Contractor's obligations under these specifications, Executive Order 11246, or the regulations promulgated pursuant thereto.

6. In order for the non-working training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees must be employed by the Contractor during the training period, and the Contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U.S. Department of Labor.

7. The Contractor shall take specific affirmative actions to ensure equal employment opportunity. The evaluation of the Contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. The Contractor shall document these efforts fully, and shall implement affirmative action steps at least as extensive as the following:

a. Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites, and in all facilities at which the Contractor's employees are assigned to work. The Contractor, where possible, will assign two or more women to each construction project. The Contractor shall specifically ensure that all foremen, superintendents, and other on-site supervisory personnel are aware of and carry out the Contractor's obligation to maintain such a working environment, with specific attention to minority or female individuals working at such sites or in such facilities.

b. Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when the Contractor or its unions have employment opportunities available, and maintain a record of the organizations' responses.

c. Maintain a current file of the names, addresses and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the Contractor by the union or, if referred, not employed by the Contractor, this shall be documented in the file with the reason therefor, along with whatever additional actions the Contractor may have taken.

d. Provide immediate written notification to the Director when the union or unions with which the Contractor has a collective bargaining agreement has not referred to the Contractor a minority person or woman sent by the Contractor, or when the Contractor has other information that the union referral process has impeded the Contractor's efforts to meet its obligations.

e. Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the Contractor's employment needs, especially those programs funded or approved by the Department of Labor. The Contractor shall provide notices of these programs to the sources compiled under 7b above.

f. Disseminate the Contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the Contractor in meeting its EEO obligations; by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc.; by specific review of the policy with all management personnel and with all minority and female employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.

g. Review, at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination or other employment decisions including specific review of these items with onsite supervisory personnel such as Superintendents, General Foremen, etc., prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.

h. Disseminate the Contractor's EEO policy externally by including it any advertising in the news media, specifically including minority and female news media, and providing written notification to and discussing the Contractor's EEO policy with other Contractors and Subcontractors with whom the Contractor does or anticipates doing business.

i. Direct its recruitment efforts, both oral and written, to minority, female and community organizations, to schools with minority and female students and to minority and female recruitments and training organizations serving the Contractor's recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, the Contractor shall send written notification to organizations such as the above, describing the openings, screening procedures, and tests to be used in the selection process.

j. Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer and vacation employment to minority and female youth both on the site and in other areas of a Contractor's work force.

k. Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR Part 60-3.

l. Conduct, at least annually, an inventory and evaluation at least of all minority and female personnel for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., such opportunities.

m. Ensure that seniority practices, job classifications, work assignments and other personnel practices, do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that the EEO policy and the Contractor's obligations under these specifications are being carried out.

n. Ensure that all facilities and company activities are nonsegregated except that separate or single-user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.

o. Document and maintain a record of all solicitations of officers for subcontracts from minority and female construction contractors and suppliers, including circulation of solicitations to minority and female contractor associations and other business associations.

p. Conduct a review, at least annually, of all supervisor's adherence to and performance under the Contractor's EEO policies and affirmative action obligations.

8. Contractors are encouraged to participate in voluntary associations which assist in fulfilling one or more of their affirmative action obligations (7a through p). The efforts of a contractor association, joint contractor-union, contractor-community, or other similar group of which the contractor is a member and participant, may be asserted as fulfilling any one or more of its obligations under 7a through p of these Specifications provided that the contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in the Contractor's minority and female workforce participation, makes a good faith effort to meet its individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the Contractor. The obligation to comply, however, is the Contractor's and failure of such a group to fulfill an obligation shall not be a defense for the Contractor's noncompliance.

9. A single goal for minorities and a separate single goal for women have been established. The Contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and non-minority. Consequently, the Contractor may be in violation of the Executive Order if a particular group is employed in a substantially disparate manner (for example, even though the Contractor has achieved its goals for women generally, the Contractor may be violation of the Executive Order if a specific minority group of women is underutilized).

10. The Contractor shall not use the goals and timetables or affirmative action standards to discriminate against any person because of race, color, creed, religion, national origin, sex, ancestry, age, marital status, status with respect to public assistance and/or disability.

11. The Contractor shall not enter into any Subcontract with any person or firm debarred from Government contracts pursuant to Executive Order 11246.

12. The Contractor shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, including suspension, termination and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations, by the Office of Federal Contract Compliance Programs. Any Contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246, as amended.

13. The Contractor, in fulfilling its obligations under these specifications, shall implement specific affirmative action steps, at least as extensive as those standards prescribed in paragraph 7 of these specifications, so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the Contractor fails to comply with the requirements of the Executive Order, the implementing regulations, or these specifications, the Director shall proceed in accordance with 41 CFR 60-4.8.

14. The Contractor shall designate a responsible official to monitor all employment related activity to ensure that the company EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the Government and to keep records. Records shall at least include for each employee the name, address, telephone numbers, construction trade, union affiliation if any, employee identification number when assigned, social security number, race, sex, status (e.g., mechanic, apprentice, trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, contractors shall not be required to maintain separate records.

15. Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon the application of requirements for the hiring of local or other area residents (e.g., those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).

**Affirmative Action for Handicapped Workers**

(applies to contracts in excess of \$2,500)

(A) The Contractor will not discriminate against any employee or applicant for employment because of physical or mental handicap in regard to any position for which the employee or applicant is qualified. The Contractor agrees to take affirmative action to employ, advance in employment and otherwise treat qualified handicapped individuals without discrimination based upon their physical or mental handicap in all employment practices such as the following: Employment, upgrading, demotion or transfer, recruitment, advertising, layoff or termination, rates of pay or other forms of compensation, and selection for training, including apprenticeship.

(B) The Contractor agrees to comply with the rules, regulations, and relevant orders of the Secretary of Labor issued pursuant to the Act.

(C) In the event of the Contractor's noncompliance with the requirements of this clause, actions for noncompliance may be taken in accordance with the rules, regulations and relevant orders of the Secretary of Labor issued pursuant to the Act.

(D) The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices in a form to be prescribed by the Director, provided by or through the contracting officer. Such notices shall state the Contractor's obligation under the law to take affirmative action to employ and advance in employment qualified handicapped employees and applicants for employment, and the rights of applicants and employees.

(E) The Contractor will notify each labor union or representative of workers with which it has a collective bargaining agreement or other contract understanding, that the Contractor is bound by the terms of Section 503 of the Rehabilitation Act of 1973, and is committed to take affirmative action to employ and advance in employment physically and mentally handicapped individuals.

(F) The Contractor will include the provisions of this clause in every subcontract or purchase order of \$2,500 or more unless exempted by rules, regulations, or orders of the Secretary issued pursuant to Section 503 of the Act, so that such provisions will be binding upon each subcontractor or vendor. The Contractor will take such action with respect to any subcontract or purchase order as the Director of the Office of Federal Contract Compliance Programs may direct to enforce such provisions, including action for noncompliance.

**Affirmative Action for Disabled Veterans and Veterans of the Vietnam Era**

(applies to contracts in excess of \$10,000)

(A) The Contractor will not discriminate against any employee or applicant for employment because he or she is a disabled veteran or veteran of the Vietnam era in regard to any position for which the employee or applicant for employment is qualified. The Contractor agrees to take affirmative action to employ, advance in employment and otherwise treat qualified disabled veterans and veterans of the Vietnam era without discrimination based upon their disability or veterans status in all employment practices such as the following: Employment, upgrading, demotion or transfer, recruitment, advertising, layoff or termination, rates of pay or other forms of compensation, and selection for training, including apprenticeship.

(B) The Contractor agrees that all suitable employment openings of the Contractor which exist at the time of the execution of this contract and those which occur during the performance of this contract, including those not generated by this contract and including those occurring at an establishment of the Contractor other than the one wherein the contract is being performed but excluding those of independently operated corporate affiliates, shall be listed at an appropriate local office of the State employment service system wherein the opening occurs. The Contractor further agrees to provide such reports to such local office regarding employment openings and hires as may be required.

State and local government agencies holding Federal contracts of \$10,000 or more shall also list all their suitable openings with the appropriate office of the State employment service, but are not required to provide those reports set forth in paragraphs (D) and (E).

(C) Listing of employment openings with the employment service system pursuant to this clause shall be made at least concurrently with the use of any other recruitment source or effort and shall involve the normal obligations which attach to the placing of a bona fide job order, including the acceptance of referrals of veterans and non-veterans. The listing of employment openings does not require the hiring of any particular job applicant or from any particular group of job applicants, and nothing herein is intended to relieve the Contractor from any requirements in Executive Orders or regulations regarding nondiscrimination in employment.

(D) The reports required by paragraph (B) of this clause shall include, but not be limited to, periodic reports which shall be filed at least quarterly with the appropriate local office or, where the Contractor has more than hiring location in a State, with the central office of that State employment service. Such reports shall indicate for each hiring location (1) the number of individuals hired during the reporting period, (2) the number of non-disabled veterans of the Vietnam era hired, (3) the number of disabled veterans of the Vietnam era hired, and (4) the total number of disabled veterans hired. The reports should include covered veterans hired for on-the-job training under 38 U.S.C. 1787. The Contractor shall maintain at each hiring location copies of the reports submitted until the expiration of one year after final payment under the contract, during which time these reports and related documentation shall be made available, upon request, for examination by any authorized representatives of the contracting officer of the Secretary of Labor. Documentation would include personnel records respecting job openings, recruitment and placement.

(E) Whenever the Contractor becomes contractually bound to the listing provisions of this clause, it shall advise the employment service system in each State where it has establishments of the name and location of each hiring location in the State. As long as the Contractor is contractually bound to these provisions, and has so advised the State system, there is no need to advise the State system of subsequent contracts. The Contractor may advise the State system when it is no longer bound by this contract clause.

(F) This clause does not apply to the listing of employment openings which occur and are filled outside of the 50 States, the District of Columbia, Puerto Rico, Guam, and the Virgin Islands.

(G) The provisions of paragraphs (B), (C), (D), and (E) of this clause do not apply to openings which the Contractor proposes to fill from within his own organization or to fill pursuant to a customary and traditional employer-union hiring arrangement for that opening.

(H) As used in this clause:

(1) "All suitable employment openings" includes, but is not limited to, openings which occur in the following job categories: Production and non-production; plant and office; laborers and mechanics; supervisory and non-supervisory; technical; and executive, administrative, and professional openings as are compensated on a salary basis of less than \$25,000 per year. This term includes full-time employment, temporary employment of more than 3 days' duration, and part-time employment. It does not include openings which the Contractor proposes to fill from within his own organization or to fill pursuant to a customary and traditional employer-union hiring arrangement nor openings in an educational institution which are restricted to students of that institution. Under the most compelling circumstances an

employment opening may not be suitable for listing, including such situations where the needs of the Government cannot reasonably be otherwise supplied, where listing would be contrary to national security, or where the requirement of listing would otherwise not be for the best interest of the Government.

(2) "Appropriate office of the State employment service system" means the local office of the Federal-State national system of public employment offices with assigned responsibility for serving the area where the employment opening is to be filled, including the District of Columbia, Guam, Puerto Rico, and the Virgin Islands.

(3) "Openings which the Contractor proposes to fill from within his own organization" means employment openings for which no consideration will be given to persons outside the Contractor's organization (including any affiliates, subsidiaries, and the parent companies) and includes any openings which the Contractor proposes to fill from regularly established "recall" lists.

(4) "Openings which the Contractor proposes to fill pursuant to a customary and traditional employer-union hiring arrangement" means employment openings which the Contractor proposes to fill from union halls, which is part of the customary and traditional hiring relationship which exists between the Contractor and representatives of his employees.

(I) The Contractor agrees to comply with the rules, regulations, and relevant orders of the Secretary of Labor issued pursuant to the Act.

(J) In the event of the Contractor's noncompliance with the requirements of this clause, actions for noncompliance may be taken in accordance with the rules, regulations and relevant orders of the Secretary of Labor issued pursuant to the Act.

(K) The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices in a form to be prescribed by the Director, provided by or through the contracting officer. Such notices shall state the Contractor's obligation under the law to take affirmative action to employ and advance in employment qualified disabled veterans and veterans of the Vietnam era for employment, and the rights of applicants and employees.

(L) The Contractor will notify each labor union representative of workers with which it has a collective bargaining agreement or other contract understanding, that the Contractor is bound by the terms of the Vietnam Era Veterans Readjustment Assistance Act, and is committed to take affirmative action to employ and advance qualified disabled veterans and veterans of the Vietnam era..

(M) The Contractor will include the provisions of this clause in every subcontract or purchase order of \$10,000 or more unless exempted by rules, regulations, or orders of the Secretary issued pursuant to the Act, so that such provisions will be binding upon each subcontractor or vendor. The Contractor will take such action with respect to any subcontract or purchase order as the Director of the Office of Federal Contract Compliance Programs may direct to enforce such provisions, including action for noncompliance.

## **Section 12**

### **Employment Opportunities - "HUD Section 3"**

#### **General**

These requirements apply to the City of Duluth contracts receiving assistance under the U.S. Department of Housing and Urban Development (HUD) Community Development Block Grant (CDBG) Program.

#### **Type of Covered Projects**

24CFR570.607 (b) of the HUD CDBG Program Regulations state in part "... that employment and other economic opportunities arising in connection with housing rehabilitation, housing construction, or other public construction projects shall to the greatest extent feasible, and consistent with existing Federal, State, and local laws and regulations be given to low- and very low-income persons.

#### **Thresholds**

In accordance with the provisions of 24CFR135.3(a) (3) (ii) (A), the requirements of this Section apply to those recipients as defined at 24CFR135.5 when the amount of this contract exceeds \$200,000.

In addition, in accordance with the provisions of 24CFR135.3 (a) (3) (ii) (B), the requirements of this Section apply to any contractor or subcontractor whose contract exceeds \$100,000 as a result of assistance provided under this contract.

#### **Requirements (Section 3 Clause)**

(A) The work to be performed under this contract is subject to the requirements of Section 3 of the Housing and Urban Development Act of 1968, as amended, 12 U.S.C. 1701u (section 3). The purpose of Section 3 is to ensure that employment and other economic opportunities generated by HUD assistance or HUD-assisted projects covered by section 3, shall, to the greatest extent feasible, be directed to low- and very low-income persons, particularly persons who are recipients of HUD assistance for housing.

(B) The parties to this contract agree to comply with HUD's regulations in 24 CFR part 135, which implement section 3. As evidenced by their execution of this contract, the parties to this contract certify that they are under no contractual or other impediment that would prevent them from complying with the part 135 regulations.

(C) The contractor agrees to send to each labor organization or representative of workers with which the contractor has a collective bargaining agreement, or other understanding, if any, a notice advising the labor organization or workers' representative of the contractor's commitments under this section 3 clause, and will post copies of the notice in conspicuous places at the work site where both employees and applicants for training and employment positions can see the notice. The notice shall describe the section 3 preference, shall set forth minimum number and job titles subject to hire, availability of apprenticeship and training positions, the qualifications for each; and the name and location of the person(s) taking applications for each of the positions; and the anticipated date the work shall begin.

(D) The Contractor agrees to include this section 3 clause in every subcontract subject to compliance with regulations in 24 CFR part 135, and agrees to take appropriate action, as provided in an applicable provision of the subcontract or in this section 3 clause, upon a finding that the subcontractor is in violation of the regulations in 24 CFR part 135. The contractor will not subcontract with any subcontractor where the contractor has notice or knowledge that the subcontractor has been found in violation of the regulations in 24 CFR part 135.

(E) The contractor will certify that any vacant employment positions, including training positions, that are filled (1) after the contractor is selected but before the contract is executed, and (2) with persons other than those to whom the regulations of 24 CFR part 135 require employment opportunities to be directed, were not filled to circumvent the contractor's obligation under 24 CFR part 135.

(F) Noncompliance with HUD's regulations in 24 CFR part 135 may result in sanctions, termination of this contract for default, and debarment or suspension from future HUD-assisted contracts.

**Section 13**  
**Federal Requirements for Minority/Women Business Enterprises Contract Guidance - MPFA**  
**General**

Municipalities that receive loan funding must comply with Federal requirements concerning utilization of Minority Business Enterprises (MBE) and Women's Business Enterprises (WBE). These requirements are designed to encourage the prime contractors to utilize MBEs and WBEs whenever procurement opportunities occur.

**Regulation**

40 C.F.R. Section 35.3145(d) Application of other Federal Authorities, M/WBE Requirements

Executive Orders No. 11625, 12138 and 12432 - Promoting the use of M/WBEs

Section 129 of Public Law 100-590 - Small Business Administration Reauthorization and Amendment Act of 1988

Regulations detailed in the EPA's *Cross-Cutting Federal Authorities - Clean Water Act State Revolving Fund Program and Safe Drinking Water Act State Revolving Fund Program*

**Implementation**

The "fair share" target percentage participation proposed for this project is 3.5 percent (3.5%) for MBE and 11.5 percent (11.5%) for WBE.

If the Contractor intends to let any subcontractors for a portion of the work, the Contractor shall take affirmative steps to assure that minority and women businesses are utilized when possible as sources of supplies, equipment, construction and services. Affirmative steps shall include the following:

- a) Include qualified minority businesses on solicitation lists.
- b) Assure that minority businesses are solicited whenever they are potential sources.
- c) When economically feasible, divide total requirements into smaller tasks or quantities so as to permit maximum small and minority business participation.
- d) Where the requirement permits, establish delivery schedules, which will encourage participation by minority businesses.
- e) Use the services and assistance of the Office of Minority Business Enterprise of the Department of Commerce.

The low bidder will be required to submit to the City of Duluth documentation of his good faith efforts to meet the targeted goals of utilizing MBEs and WBEs.

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**Section 14 - Forms**

**Minnesota Department of Transportation and City of Duluth, Minnesota  
funded certified payroll forms**

- Statement of Compliance Form  
[www.dot.state.mn.us/const/labor/lcuforms.html](http://www.dot.state.mn.us/const/labor/lcuforms.html)
- Certified Payroll Form  
[www.dol.gov/esa/forms/whd/WH347.pdf](http://www.dol.gov/esa/forms/whd/WH347.pdf)

**U. S. Department of Housing and Urban Development and federal  
government funded certified payroll forms**

- Statement of Compliance Form & Certified Payroll Forms  
[www.dol.gov/esa/forms/whd/WH347.pdf](http://www.dol.gov/esa/forms/whd/WH347.pdf)
- Fringe Benefit Form - use the second page of the MnDOT Statement of Compliance (form 21658 3/01)  
[www.dot.state.mn.us/const/labor/lcuforms.html](http://www.dot.state.mn.us/const/labor/lcuforms.html)

**Minnesota Department of Transportation Trucking Requirements**

- Month End Trucking Report
- Month End Trucking Report Statement of Compliance
- Definitions and instructions: [www.dot.state.mn.us/const/labor/lcuforms.html](http://www.dot.state.mn.us/const/labor/lcuforms.html)

# City of Duluth

## Indemnification & Insurance Requirements

(Updated February 16, 2011)

### INDEMNIFICATION CLAUSE

The Contractor will defend, indemnify and save the City harmless from all costs, charges, damages, and loss of any kind that may grow out of the matter covered by this contract. Said obligation does not include indemnification of the City for claims of liability arising out of the sole negligent or intentional acts or omissions of City but shall include but not be limited to the obligation to defend, indemnify and save harmless the City in all cases where claims of liability against the City arise out of acts or omissions of City which are derivative of the negligence or intentional acts or omissions of Contractor such as, and including but not limited to, the failure to supervise, the failure to warn, the failure to prevent such act or omission by Contractor and any other such source of liability. In addition, Contractor will comply with all local, state and federal laws, rules and regulations applicable to this contract and to the work to be done and things to be supplied hereunder.

### INSURANCE

- a. Contractor shall provide the following minimum amounts of insurance from insurance companies authorized to do business in the state of Minnesota, which insurance shall indemnify Contractor and City from all liability described in the paragraph above, subject to provisions of subparagraph below.
  - (1) Worker's compensation in accordance with the laws of the state of Minnesota.
  - (2) Public Liability and Automobile Liability Insurance with limits not less than **\$1,500,00** Single Limit, and twice the limits provided when a claim arises out of the release or threatened release of a hazardous substance; shall be in a company approved by the city of Duluth; and shall provide for the following: Liability for Premises, Operations, Completed Operations, Independent Contractors, and Contractual Liability.
  - (3) City of Duluth shall be named as **Additional Insured** under the Public Liability, Excess/Umbrella Liability\* and Automobile Liability, or as an alternate, Contractor may provide Owners-Contractors Protective policy, naming itself and the City of Duluth. Contractor shall also provide evidence of Statutory Minnesota Worker's Compensation Insurance. Contractor to provide Certificate of Insurance evidencing such coverage with 30-days notice of cancellation, non-renewal or material change provisions included. The City of Duluth does not represent or guarantee that these types or limits of coverage are adequate to protect the Contractor's interests and liabilities.

*\*An umbrella policy with a "following form" provision is acceptable if written verification is provided that the underlying policy names the City of Duluth as an additional insured.*



- (4) If a certificate of insurance is provided, the form of the certificate shall contain an unconditional requirement that the insurer notify the City without fail not less than 30 days prior to any cancellation, non-renewal or modification of the policy or coverages evidenced by said certificate and shall further provide that failure to give such notice to City will render any such change or changes in said policy or coverages ineffective as against the City.
- (5) **The use of an “Acord” form as a certificate of insurance shall be accompanied by two forms – 1) ISO Additional Insured Endorsement (CG-2010 pre-2004) and 2) Notice of Cancellation Endorsement (IL 7002) or equivalent, as approved by the Duluth City Attorney’s Office.**
- b. The insurance required herein shall be maintained in full force and effect during the life of this Agreement and shall protect Contractor, its employees, agents and representatives from claims and damages including but not limited to personal injury and death and any act or failure to act by Contractor, its employees, agents and representatives in the negligent performance of work covered by this Agreement.
- c. Certificates showing that Contractor is carrying the above described insurance in the specified amounts shall be furnished to the City prior to the execution of this Contract and a certificate showing continued maintenance of such insurance shall be on file with the City during the term of this Contract.
- d. The City shall be named as an additional insured on each liability policy other than the workers’ compensation policies of the Contractor.
- e. The certificates shall provide that the policies shall not be changed or canceled during the life of this Contract without at least 30 days advanced notice being given to the City.
- f. Contractor shall be required to provide insurance meeting the requirements of this Paragraph unless Contractor successfully demonstrates to the satisfaction of the City Attorney, in the exercise of his or her discretion, that such insurance is not reasonably available in the market. If Contractor demonstrates to the satisfaction of the City Attorney that such insurance is not reasonably available, the City attorney may approve an alternative form of insurance which is reasonably available in the market which he or she deems to provide the highest level of insurance protection to the City which is reasonably available.

Procedure verified by:

\_\_\_\_\_  
Don Douglas, Claims Adjuster  
Duluth City Attorney’s Office

Date \_\_\_\_\_

PRE-2004 CG 2010

- A. **Section II - Who Is an Insured** is amended to include as an insured the person or organization shown in the Schedule, but only with respect to liability arising out of your ongoing operations performed for that insured.

\*\*\*\*\*

NOTICE OF CANCELLATIONS ENDORSEMENT IL-7002 (10-90)

All Coverage Parts included in this policy are subject to the following condition: If we cancel this policy for any reason other than non-payment of premium, we will mail advance notice to the person(s) or organization(s) as shown in the Schedule.

Schedule	
Person or Organization (Name and Address)	Advance Notice (Days)
City of Duluth Purchasing Division Room 100 City Hall 411 West First Street Duluth, MN 55802	30

PROJECT LABOR AGREEMENT

NO STRIKE, NO LOCKOUT

**PUBLIC SECTOR**

**CITY OF DULUTH**

**&**

**(Name of Contractor)**

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## **AGREEMENT**

This Project Labor Agreement (hereinafter, the “Agreement”), is entered into effective the \_\_\_\_\_ day of \_\_\_\_\_, 2009, by and between the various contractors engaged in the construction of facilities to be known as the (Project). The parties to this Agreement are the Building and Construction Trades Council, on behalf of its affiliated Local Unions (hereinafter “Union” or “Unions”), the City of Duluth (hereinafter “Owner”) and Contractor (hereinafter “Construction Manager/General Manager,” “Contractor,” and “Contractors”).

It is understood by the parties to this Agreement that it is the policy of the Owner that the construction work covered by this Agreement shall be contracted to Contractors who agree to be bound by the terms of this Agreement. Therefore, the Union agrees that other Contractors may execute the Agreement for the purpose of covering that work. The Construction Manager/General Contractor shall monitor compliance with this Agreement by all Contractors who through their execution of this Agreement, together with their subcontractors, have become bound hereto.

The term “Contractor” shall include all Contractors and subcontractors of whatever tier engaged in on-site construction work within the scope of this Agreement.

The Union and all signatory Contractors agree to abide by the terms and conditions contained in this Agreement with respect to the administration of the Agreement by the Owner and the performance of the construction by the Contractor of the Project. This Agreement represents the complete understanding of the parties, and it is further understood that no Contractor party is required to sign any other agreement as a condition of performing work within the scope of this Agreement. No practice, understanding or agreement between a Contractor and a Union party which is not explicitly set forth in this Agreement shall be binding on any other party unless endorsed in writing by the Project Contractor.

## **ARTICLE I - PURPOSE**

The (Project), an undertaking of the Owner, is a public project which will employ numbers of skilled and unskilled workers. Construction of the Project will entail utilization of the construction industry in an area having multiple labor contracts and employer associations. Consequently, conflicts within labor-management relations could cause delay or disruption of the efficient completion of the .project unless maximum cooperation of all segments of the construction industry is obtained. This Agreement is to establish as the minimum standards on the Project the hours and working conditions as those prevailing for the largest number of workers engaged in the same classes of work within the area.

It is in the public interest that the Project progress and be completed in an expeditious and efficient manner, free of disruption or delay of any kind. Therefore, it is essential to secure optimum productivity and to eliminate any delays in the work. In recognition of the special needs of this Project and to maintain a spirit of harmony, labor-management peace and stability during the term of this Project Labor Agreement, the parties agree to establish effective and binding methods for the settlement of all misunderstandings, disputes or grievances which may arise. Therefore, the Unions agree not to engage in any strike, slowdown or interruption of work and the Contractor agrees not to engage in any lockout.

## **ARTICLE II - SCOPE OF THE AGREEMENT**

Section 1. This Agreement, hereinafter designated as the “Project Labor Agreement” or “Agreement,” shall apply and is limited to all construction work included in all Bid Categories for the (Project), under the direction of the signatory Contractors and performed by those Contractor(s) of whatever tier which have contracts awarded for such work on and after the effective date of this Agreement with regard to the Project.

Such Project is generally described as the construction of:  
(Project)

Section 2. It is agreed that all direct subcontractors of a Contractor, of whatever tier, who have been awarded contracts for work covered by this Agreement on or after the effective date of this Agreement shall be required to accept and be bound by the terms and conditions of the Project Labor Agreement.

Section 3. The provisions of this Project Labor Agreement shall apply to all craft employees represented by any Union listed in Schedule A hereto attached and shall not apply to other field personnel or managerial or supervisory employees as defined by the National Labor Relations Act.

Section 4. All employees covered by this Agreement shall be classified in accordance with work performed and paid the base hourly wage rates for those classifications as specified in the attached Schedule A.

Section 5. The Contractors agree to pay contributions to the established employee benefit funds in the amounts designated in the appropriate Schedule A.

Contractors that are not signatory to a collective bargaining agreement beyond the scope of this Agreement (“PLA contractor”) may select to participate in the legally established industry health reimbursement arrangement (“HRA”) plan, in lieu of contributing to the respective bona fide benefit funds as designated in Schedule A. The amount of the contribution is based on the difference between the contribution amount of the bona fide Schedule A benefit funds and the cost of the PLA contractor's bona fide non-discretionary plans. Contributions must be made on behalf of named employees. Participating contractors will submit to the Trustees of the HRA trust and plan a copy of their plan, summary plan description, and the premium structure for workers covered under the PLA contractor's bona fide, non-discretionary plans. The value of the PLA contractor's benefit plans are subject to confirmation by the Trustees of the HRA trust and plan. This may include an independent audit according to a policy as established by the Trustees. Contractors are required to submit certified payroll reports to the Trustees or authorized administrator in order to confirm compliance with the terms of the HRA trust and plan.

The Contractors adopt and agree to be bound by the written terms of the legally-established Trust Agreements (or in lieu thereof, the aforementioned HRA plan and trust including any policies) specifying the detailed basis on which payments are to be made into, and benefits paid out of, such Trust Funds. The Contractors authorize the parties to such Trust Agreements to appoint trustees and successor trustees to administer the Trust funds and hereby ratify and accept the Trustees so appointed as if made by the Contractors.

Section 6. In the event of any conflict between any provisions of this Agreement and in the Local Area Agreements, the terms of this Agreement will be applied. In other words, where a subject covered by the provisions of this Project Labor Agreement is also covered by the Local Area Agreement the provisions of this Project Labor Agreement shall prevail. Where a subject is covered by the Local Area Agreement and not covered by this Project Labor Agreement, the Local Area Agreement provisions shall prevail.

Section 7. This Agreement shall only be binding on the signatory parties hereto and shall not apply to the parents, affiliates, subsidiaries, or other ventures of any such party.

Section 8. This Agreement shall be limited to work historically recognized as construction work. Nothing contained herein shall be construed to prohibit, restrict, or interfere with the performance of any other operation, work or function which may occur in or around the Project site or be associated with the development of the Project, or with the ongoing operations of the Owner.

Section 9. It is understood that the liability of any Contractor and the liability of the separate Unions under this Agreement shall be several and not joint. The Union agrees that this Agreement does not have the effect of creating any joint employment status between or among Owner and any Contractor.

Section 10. All workers delivering fill, sand, gravel, crushed rock, transit/concrete mix, asphalt or other similar materials and all workers removing any materials from the construction site as required by the specifications are subject to the provisions of the Minnesota state



prevailing wage law and are entitled to the appropriate area standard wage. For purposes of this contract, such materials are for specified future use and per Minnesota state prevailing wage law delivery and pickup of the above-listed materials constitutes incorporation.

### **ARTICLE III - UNION RECOGNITION AND REPRESENTATION**

Section 1. The Contractor recognizes the Union as the sole and exclusive bargaining representative of all craft employees working on facilities within the scope of this Agreement.

Section 2. Authorized representatives of the Union shall have access to the Project, provided they do not interfere with the work of employees and further provided that such representatives fully comply with the posted visitor and security and safety rules of the Project.

### **ARTICLE IV - LABOR HARMONY CLAUSE**

The contractor shall furnish labor that can work in harmony with all other elements of labor employed on that (Project) and shall submit a labor harmony plan to demonstrate how this will be done. "Harmony" shall include the provision of labor that will not, either directly or indirectly, cause or give rise to any work disruptions, slow downs, picketing, stoppages, or any violence or harm to any person or property while performing any work, or activities incidental thereto at the (project). The labor harmony plan should include the company's labor management policies, collective bargaining agreements if any and their expiration dates, past labor relations history, a listing of activities anticipated under this contract that may potentially cause friction with on-site workers, and procedures the company will undertake to eliminate this friction.

The contractor agrees that it shall require every lower-tier subcontractor to provide labor that will work in harmony with all other elements of labor employed in the work, and will include the provisions contained in the paragraph above, in every lower-tier subcontract let for work under this contract.

The requirement to provide labor that can work in harmony with all other elements of labor employed in the work throughout the contract performance is a material element of this contract. Failure by the contractor or any of its lower tier subcontractors to comply with this requirement shall be deemed a material breach of the contract which will subject the contractor to all rights and remedies the city of Duluth may have, including without limitation the right to terminate the contract.

## **ARTICLE V - WORK STOPPAGES AND LOCKOUTS**

Section 1. There shall be no strike, picketing, work stoppages, slowdowns or other disruptive, activity for any reason by the Union or employees against any Contractor covered under this Agreement, and there shall be no lockout by the Contractor. Failure of any Union or employee to cross any picket line established by any union, signatory or non-signatory, or any other organization, at or in proximity to the Project site is a violation of this Article.

Section 2. Any party alleging a breach of Section 1, of Article IV shall have the right to petition a court for temporary and permanent injunctive relief. The moving party need not show the existence of irreparable harm, and shall be required to post bond only to secure payment of court costs and attorney fees as may be awarded by the court.

## **ARTICLE VI - DISPUTES AND GRIEVANCES**

Section 1. This Agreement is intended to provide close cooperation between management and labor. The Construction Manager/General Contractor and the Building and Construction Trades Council shall each assign a representative to this Project for the purpose of assisting the Local Unions, together with the Contractor, to complete the construction of the Project economically, efficiently, continuously and without interruption, delays or work stoppages.

Each Contractor shall hold a pre-job conference with the Union and Construction Manager/General Contractor to clear up any project question and work assignments in which there is thought to be a difference in opinion. Every effort will be made to hold such conference well in advance of actual work performance.

Section 2. The Contractor, Union, and employees collectively and individually, realize the importance to all parties to maintain continuous and uninterrupted performance of the work of the Project, and agree to resolve disputes over grievances in accordance with the arbitration provisions set forth in the Local Area Agreements in effect with the Unions listed in Schedule A attached hereto.

## **ARTICLE VII - JURISDICTIONAL DISPUTES**

Section 1. There will be no strikes, work stoppages, slowdowns, or other disruptive activity arising out of any jurisdictional dispute. Pending the resolution of the dispute, the work shall continue uninterrupted as assigned by the Contractor.

Section 2. Building construction work shall be assigned by the Contractor in accordance with the procedural rules of the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry (hereinafter the "Plan"). Any jurisdictional dispute over the Contractor's assignment of work shall be settled in accordance with the provisions of the Plan.

Section 3. Where a jurisdictional dispute involves the International Brotherhood of Teamsters, it shall be referred for resolution to that International Union and the disputing International Union. The resolution of the dispute shall be reduced to writing, signed by the authorized representative of the International Unions and the Contractor. The assignments made by the Contractor shall be followed until such time as the dispute is resolved in accordance with this Section.

## **ARTICLE VIII - NO DISCRIMINATION**

Section 1. The Contractor and Union agree that they will not discriminate against any employee or applicant for employment because of his or her membership or nonmembership in a Union or based upon race, color, religion, sex, national origin or age in any manner prohibited by law or regulation.

Section 2. Any complaints regarding application of the provisions of Section 1 should be brought to the immediate attention of the involved Contractor for consideration and resolution.

Section 3. The use of the masculine or feminine gender in this Agreement shall be construed as including both genders.

## **ARTICLE IX - SAVINGS AND SEPARABILITY**

It is not the intention of the parties to violate any laws governing the subject matter of this Agreement. The parties hereto agree that in the event any provisions of the Agreement are finally held determined to be illegal or void as being in contravention of any applicable law, the remainder of the Agreement shall remain in full force and effect unless the part or parts so found to be void are wholly inseparable from the remaining portions of this Agreement. Further, the contractor and Union agree that if and when any and all provisions of this Agreement are finally held or determined to be illegal or void by Court of competent jurisdiction, the parties will promptly enter into negotiations concerning the substance affected by such decision for the purpose of achieving conformity with the requirements of an applicable law and the intent of the parties hereto.

## **ARTICLE X DURATION OF THE AGREEMENT**

The Project Labor Agreement shall be effective the \_\_\_\_\_ day of \_\_\_\_\_, 2008, and shall continue in effect for the duration of the Project construction work described in Article II hereof. Construction of any phase, portion, section or segment of the project shall be deemed complete when such phase, portion, section or segment has been turned over to the Owner and has received the final acceptance from the Owner's representative.

Since there are provisions herein for no strikes or lockouts in the event any changes are negotiated and implemented under a Local Area Agreement during the term of this Agreement, the Contractor agrees that, except as specified herein, such changes shall be recognized and shall apply retroactively to the termination date in the particular Local Agreement involved. Each Contractor which has a Local Agreement with a Union at the time that its contract at the project

commences shall continue it in effect with each said Union so long as the Contractor remains on the project. In the event any such Local Area Agreement expires, the Contractor shall abide by all of the terms of the expired Local Agreement until agreement is reached on a new Local Agreement, with any changes being subject to the provisions of this Agreement.

The Union agrees that there will be no strikes, work stoppages, sympathy actions, picketing, slowdowns or other disruptive activity affecting the Project by any Union involved in the negotiation of a Local Area Agreement nor shall there be any lockout on this Project affecting the Union during the course of such negotiations.

IN WITNESS WHEREOF the parties have entered into this Agreement to be effective as of the day and year above written.

DULUTH BUILDING AND  
CONSTRUCTION TRADES COUNCIL

By: \_\_\_\_\_

Its \_\_\_\_\_  
(Printed Name/Title)

Date: \_\_\_\_\_

CONTRACTOR

By: \_\_\_\_\_

Its \_\_\_\_\_  
(Printed Name/Title)

Date: \_\_\_\_\_

CITY OF DULUTH

By: \_\_\_\_\_  
Mayor

Attest:  
\_\_\_\_\_  
City Clerk

Date: \_\_\_\_\_

\_\_\_\_\_  
City Auditor

Date: \_\_\_\_\_

\_\_\_\_\_  
Assistant City Attorney

Date: \_\_\_\_\_

## **SCHEDULE “A”**

- A1 Asbestos Workers Local 49
- A-2 Boilermakers Local 647
- A-3 BAC Local 1 Chapter 3 Duluth & Iron Range
- A-4 Carpenters Local 361
- A-5 Cements Masons/Plasterers Local 633
- A-6 Elevator Constructors Local 9
- A-7 IBEW Local 242
- A-8 Iron Workers Local 512
- A-9 Laborers Local 1091
- A-10 Millwrights & Machinery Erectors Local 1348
- A-11 Operating Engineers Local 49
- A-12 Painters & Allied Trades Local 106
- A-13 Plumbers & Fitters Local 11
- A-14 Roofers Local 96
- A-15 Sheet Metal Workers Local 10
- A-16 Sprinkler Fitters Local 669
- A-17 Teamsters Local 346

**SECTION 01 11 00 SUMMARY OF THE WORK****PART 1 - GENERAL****1.01 SCOPE OF WORK**

- A. The Conditions of the Contract and the provisions of Division 01 apply to all work of this Section.

**1.02 DEFINITIONS**

- A. The word "Owner" as the same may be used herein refers to the City of Duluth.
- B. The word "Contractor" refers to a party or parties entering into a contract with the City of Duluth.
- C. The word "Work" refers to the specified undertaking, including the labor, materials, apparatus, equipment, etc., required in that connection.
- D. The words "Architect/Engineer" refers to Architectural Resources, Inc. 126 East Superior Street, Duluth, Minnesota 55802. (218-727- 8481)

**1.03 - GENERAL**

- A. All Articles in these General Requirements (Division 01) are applicable to all Divisions and Sections of the work included herein. The Conditions of the Contract, General and Supplementary General Conditions, and these General Requirements shall apply with equal force and effect to the Contractor and subcontractors engaged in this work.
- B. Sequence of operations or place of commencement may be determined by the Architect/Engineer as deemed to best serve the needs and convenience of the Owner, or as necessity of occasion requires.
- C. The Architect and his representatives, and designated representatives of the Owner shall have access to the construction site at all times. Contractor shall give Architect sufficient advance notice of when work specifically requiring Architects approval will be done to avoid delaying the work.

**1.04 SPECIAL SITE CONDITIONS**

- A. Confine all operations, equipment, apparatus and storage of materials to the immediate area of work to the greatest possible extent. Contractor shall ascertain, observe and comply with all rules and regulations in effect on the project site, including, but not limited to parking and traffic regulations, use of walks, security restrictions and hours of allowable ingress and egress.
- B. Information pertaining to existing conditions that appear on the drawings, are based on available records. While such data has been collected with reasonable care, there is no expressed or implied guarantee that conditions so indicated are entirely representative of those actually existing or that unlooked for developments may not occur. They are merely provided to assist the Contractor in the investigation of conditions.

**1.05 INSPECTION OF SURFACES**

- A. Contractor shall obtain complete data at the site and inspect surfaces that are to receive the work before proceeding with fabricating, assembling, fitting or erecting his work.



- B. The Contractor shall notify the Architect/Engineer in writing in case of discrepancies between existing work and drawings, and defects in such surfaces that are to receive the contractor's work. The Architect/Engineer will direct such work or surfaces to be remedied.
- C. Starting of work implies acceptance of the work of others. Removal and replacement of work applied to defective surfaces, in order to correct defects, shall be done at the expense of the contractor who applied work to defective surfaces.

#### **1.06 CUTTING AND PATCHING**

- A. The Contractor shall do all cutting or fitting of the work as required to make its several parts fit together, or to receive the work of others, as shown or reasonably implied by the drawings or specifications, or as may be directed by the Architect/Engineer. Holes cut in exterior walls shall be waterproofed.
- B. The Contractor who cuts shall also be responsible for patching. Where cutting and patching is required, the Contractor shall hire individuals skilled in such work to do cutting and patching.
- C. Contractor shall not endanger any work by cutting, digging or otherwise and shall not cut or alter the work of others without their consent.
- D. Wherever any material, finish, or equipment is damaged, the repair or replacement shall be accomplished by the trade skilled in that particular work and the cost shall be charged to the party responsible for the damage.

#### **1.07 MANUFACTURER'S DIRECTIONS**

- A. Contractor shall apply, install, connect, erect, use, clean and condition manufactured articles, materials, and equipment as recommended by the manufacturer.
- B. Where specific installation instructions are given in this specification it shall be understood that these instructions are based on the installation system of one of the specified manufacturer's and the minimum standards required by the Architect.
- C. Bidders shall verify the material and installation requirements of the specific specified manufacturer they intend to use to verify if the specific manufacturer's requirements are more or less stringent than those considered the minimum by the Architect. Standards which are below the minimum of those established by the Architect shall be brought into conformance with the minimum standards of the Architect. Standards of a specific manufacturer that are above those established by the Architect as the minimum shall be installed to the requirements of the specific manufacturer.

#### **1.08 PROTECTION IN GENERAL**

- A. Structures and equipment shall be constructed, installed and operated with guards, controls, and other devices in conformance with applicable safety regulations.
- B. The Contractor/General Trade shall:
  - 1. Provide, erect and maintain all required planking, barricades, guard rails, temporary walkways, etc., of sufficient size and strength necessary for protection of stored material and equipment; paved surfaces, walks, curbs, gutters, and drives; streets adjacent to or within project area; adjoining property and the new building as well as to prevent accidents to the public and the

workmen at the job site.

2. Notify owners of corporate or private property if their property interferes with the work so that arrangements for proper protection can be made.
3. Provide temporary protection around openings through floors and roofs, including elevator openings, stair wells, and edge of slabs.
4. Provide and maintain proper shoring and bracing for existing underground utilities, sewers, etc., encountered during excavation work, to protect them from collapse or other type of damage until such time as they are to be removed, incorporated into the new work, or can be properly backfilled upon completion of new work.
5. Provide protection against rain, snow, wind, ice, storms or heat so as to maintain all work, materials, apparatus, and fixtures, incorporated in the work or stored on the site, free from injury or damage. At the end of the day's work, cover all new work likely to be damaged. Remove snow and ice as necessary for safety and proper execution of the work.
6. Protect building and foundations from damage at all times from rain, ground water and back-up from drains or sewers. Provide all equipment and enclosures as necessary to provide this protection.
7. Damaged property shall be repaired or replaced in order to return it to its original condition. Damaged lawns shall be replaced with sod.
8. Protect materials, work and equipment, as specified in 5 above until construction proceeds to a point where they can be moved into the building and the building will provide this protection. Protect work outside of the building lines such as trenches and open excavations, as specified above.
9. Take any and all necessary precautions to protect Owner's property as well as adjacent property, including trees, shrubs, buildings, sanitary and storm sewers, water piping, gas piping, electric conduit or cable, etc., from any and all damage which may result due to work on this project.
10. Repair work outside of property line in accordance with the requirements of the authority having jurisdiction.
11. Repair any work, damaged by failure to provide proper and adequate protection, to its original state, to the satisfaction of the Owner or remove and replace with new work at the contractor's expense.

#### **1.09 TREE PROTECTION**

- A. Protect trees and shrubs from damage unless specifically noted to be removed. Protection shall be placed before any work is started at the site and shall be maintained in good repair until the work is completed. Trees which are to remain shall not be used for crane stays, guy anchors or other fastenings. Do not light fires, store materials, pile debris or park motorized equipment within the spread of the branches of any tree.

- B. Protection shall consist of boxing or fencing as described herein unless indicated otherwise on the drawings.
  - 1. Trees with low hanging branches and shrubbery shall be fenced around the outer perimeter of the spread of the branches with standard 48" high snow fence mounted on steel posts spaced six feet on center.
- C. If any tree which is to remain is severely injured or should die because of contract operations, replace it with the same caliper and species. If a replacement is not available, reimburse the Owner in an amount equal to two hundred dollars for each inch of diameter of the tree injured or lost.

#### **1.10 CLEANING**

- A. The Contractor shall be responsible for all cleaning required within the technical sections of the specifications governing work under the Contractor's jurisdiction as well as for keeping all work areas, passageways, ramps, stairs and all other areas of the premises free of rubbish, debris and scrap which may be caused by the Contractor's operations or that of the subcontractors.
  - 1. Remove rubbish, debris and scrap promptly upon its accumulation and in no event later than the end of each week.
  - 2. Combustible waste shall be removed immediately or stored in fire resistive containers until disposed of in an approved manner.
  - 3. No burning of rubbish or debris will be allowed at the site. Rubbish, debris and scrap shall not be thrown through any window or other opening, or dropped from any great height; it shall be conducted to the ground, to waiting truck(s) or removable container(s) by means of approved chutes or other means of controlled conveyance.
  - 4. Form and scrap lumber shall have all nails withdrawn or bent over; shall be neatly stacked, placed in trash bins, or removed from the premises.
  - 5. Spillages of oil, grease or other liquids which could cause a slippery or otherwise hazardous situation or stain a finished surface, shall be cleaned up immediately.
  - 6. Dust, dirt or other foreign matter shall be removed completely from all internal surfaces of all mechanical and electrical units, cabinets, ducts, pipes, etc.
  - 7. Dirt, soil, fingerprints, stains and the like shall be completely removed from all exposed finished surfaces.
- B. Contractor/General Trade shall wash all glass immediately prior to the occupancy of this project. Work shall include the removal of labels, paint splattering, glazing compound and sealant. Surfaces shall include mirrors and both sides of all glass in windows, borrowed lights, partitions, doors and side lights.
- C. Broken scratched or otherwise damaged glass shall be removed and replaced with new.

- D. In addition to the above, the Contractor/General Trade shall be responsible for the general "broom" cleaning of the premises and for expediting all of the cleaning, washing, waxing and polishing required within the technical sections of the specifications governing work under his contract. The Contractor/General Trade shall also perform "Final" cleaning of all exposed surfaces to remove all foreign matter, spots, soil, construction dust, etc., so as to put the project in a complete and finished condition ready for acceptance and use intended.
- E. If rubbish and debris is not removed, or surfaces cleaned as specified above, the Owner reserves the right to have said work done by others and the related cost(s) will be deducted from monies due the Contractor.

### **1.11 PARKING**

- A. Construction personnel shall confine parking of private vehicles to within the area of the project limits or to those parking spaces available on public streets or as directed by Owner.

### **1.12 STORMWATER MANAGEMENT & EROSION CONTROL**

- A. In accordance with good soil conservation practices, the Contractor/General Trade shall be governed by the following:
  - 1. The Contractor hereby covenants to maintain all project grounds, public streets and associated areas, including fill areas in a manner consistent with the general policy to conserve soil and soil resources and to control and prevent soil erosion and to control and prevent siltation into lakes, rivers and streams. This clause is to be liberally construed to further the above stated objectives. The following shall include, but not limit areas in which control is to be exercised.
    - a. Minimum Stripping: Strive to limit stripping of sod and vegetation to a period that will expose bare soil to least possibility of erosion that construction requirements will allow.
    - b. Stockpiling: Material shall be stored in a manner that will not result in runoff of stockpiled material into streets or drainage facilities in the event of rain.
    - c. Stormwater Runoff and Erodible Materials: Take positive measures to prevent soil erosion from the construction area and areas disturbed by construction activities by employing such means as: mulches, intercepting embankments, settling basins, ditch checks, riprap, erosion mats, or other temporary erosion control devices or methods.

### **1.13 SUBSTITUTION OF MATERIALS**

- A. Whenever a material, article or piece of equipment is identified on the drawings or in the specification by reference to manufacturers or vendors name, trade name, catalog number, etc., it is intended merely to establish a standard; and any material, article, or equipment of other manufacturers and vendors which will perform adequately the duties imposed by the general design will be considered equally accepted provided the material, article or equipment so proposed is, in the opinion of the Architect/Engineer, or equal in substance and function. It shall not be purchased or installed by the Contractor without the Architect/Engineer's written approval.
- B. It is the intent of these specifications to permit the use of materials of any manufacturer so long as they are fully consistent, in the opinion of the Architect/Engineer, with the quality and performance requirements of the job. It shall be understood that named material or equipment (including manufacture, brand, model, type etc.) has been used to indicate the quality level which is required by

the design. Materials or equipment items of other manufacture may be used only upon the following conditions:

1. That, in the opinion of the Architect/Engineer, the proposed material or equipment item is fully equal (in design, materials, construction, workmanship, performance, finish, etc.) to the named item. No compromise in quality level, however small, is acceptable.
  2. That in substituting materials or equipment, Contractor assumes responsibility for any changes in system or for modifications required in adjacent or related work to accommodate such substitution, despite the Architect/Engineer approval and all costs growing out of the approval of "or equal" items shall be the responsibility of the Contractor. None of the extra costs resulting from such approval shall devolve upon the Owner, the Architect/Engineer or any other separate Contractor.
  3. It shall be understood that the use of materials or equipment other than those specified, or approved equal by the Architect/Engineer, shall constitute a violation of contract and that the Architect/ Engineer shall have the right to require the removal of such materials or equipment and their replacement with the specified materials or equipment at the Contractor's expense.
- C. Manufacturer's and suppliers seeking approval of their products during the bidding phase shall submit requests to the Architect/Engineer in the following manner:
1. Submit two (2) copies of all requested material to the Architect seven (7) days prior to bid closing. Any material received by the Architect less than seven (7) working days prior to bid closing will not be considered and will not be recorded by addendum and thereby is not approved. Submittal shall include a self - addressed, stamped envelope of sufficient size to hold one (1) copy of all submitted material and enough postage to insure its return. NOTE: Requests for approval submitted by FAX will not be acknowledged or considered by the Architect for any approval.
  2. Submit a "Request for Approval" letter which shall state the name and location of the project; the name, address, phone number, fax number of the supplier or manufacturer and the name of the person representing the product. Letter shall further state the name and model number of the product being requested "or equal".
  3. Submit product literature on the proposed "or equal" product. Literature shall contain sufficient data, tests, and manufacturing information to allow the Architect to judge if the product will be considered equal. Literature containing more than one product shall be appropriately marked to indicate which of the several products the supplier is intending to substitute for the specified material. Any material not so marked will not be considered by the Architect for prior approval.
  4. Approval of a product as "or equal" prior to bid closing will not relieve the successful bidder of complying will with Paragraph B above.
  5. All products approved prior to bid closing will be so noted by addendum.
  6. All prior approvals shall comply with the conditions of subparagraphs 1, 2 & 3 above or the manufacturer or suppliers submittal will not be considered by the Architect. Manufacturer's or suppliers who submit for approval via the Architects FAX machine will be rejected without any consideration by the Architect.

- D. No request for approval of "or equal" materials will be entertained except from the prime contractor after contracts have been awarded. Such request will only be considered under the following conditions:
1. Failure of the supplier/subcontractor of the specified material to comply with the specifications and job requirements.
  2. An excessively long delivery date of the specified material which will cause a delay in the job.
  3. Cost of the specified material is substantially more than an equal product, and this cost savings will be passed on to the Owner in the form of a credit.

**END OF SECTION**

**SECTION 01 23 00 ALTERNATES****PART 1 - GENERAL****1.01 SCOPE OF WORK**

- A. The Conditions of the Contract and the provisions of Division 01 apply to all work of this Section.

**1.02 ALTERNATE BIDS**

- A. Bidder shall carefully read requests for alternate bids and thoroughly examine the drawings and specifications to determine the extent the various changes and conditions will affect the bid.
- B. Spaces are provided in the bid form for requested alternate bids.
- C. Bidder shall state the amount to be deducted from or added to the Base Bid for making the changes, including all incidentals, omissions, additions and adjustments as may be necessary or required by such changes. If there is no difference in price, bidder shall insert the words "No Change".
- D. Alternate Bids will be accepted in any order which best serves the interest of the Owner. A contract, if awarded, will be awarded based on the lowest combination of Base Bid and Alternative Bids which produce a Contract Sum within the funds available.
- E. The following descriptions of the Alternates describe the extent of the work in general and are not intended to be a complete tabulation of the work which may be affected by the Alternates. Bidders shall carefully examine the Contract Documents and satisfy themselves as to the exact extent of the Work affected by the Alternates.

**1.03 SUBMITTALS**

- A. All Alternates described in this Section shall be reflected on the Bid Form submitted by bidders. However, do not submit Alternates other than described in this Section, except as provided for in "Substitutions of Materials" under Section 01 11 00.
- B. Subcontractors shall include bids for alternates which pertain to their Bid Package scope of work along with Base Bids.
- C. Any deductive costs to the Contractor due to the inclusion of alternates shall be included in the amount to be deducted from the Contract Sum, so that all deductive costs will accrue to the Owner due to the inclusion of the deductive alternates.
- D. Taxes (federal, state or municipal) which are applicable to work involved in alternates shall be included in the amounts bid as well as costs, if any, for increasing coverage of required bonds.

**1.04 COORDINATION**

- A. If the Owner elects to proceed on the basis of one or more of the described Alternates, make all modifications to the Work required in furnishing and installing the selected Alternate or Alternates to the approval of the Architect and at no additional cost to the Owner other than as proposed on the Bid Form.

- B. Immediately after award of the Contract, thoroughly and clearly advise all necessary personnel and suppliers as to the nature and extent of Alternates selected by the Owner. Use all means necessary to alert those personnel suppliers involved as to all changes in the Work caused by the Owner's selection or rejection of Alternates.
- C. Coordinate pertinent related work and modify surrounding work as required to properly integrate the work under each alternate, and to provide the complete construction required by Contract Documents.

**1.05 ALTERNATE BIDS**

- A. A listing of alternate bids is as follows:

ADD Alternate #1: Secondary Air Conditioning Unit for MIS Room

**END OF SECTION**



**SECTION 01 32 23 - FIELD ENGINEERING****PART 1 - GENERAL****1.01 SCOPE OF WORK**

- A. The Conditions of the Contract and the provisions of Division 01 apply to all work of this Section.

**1.02 SITE CONDITIONS**

- A. Contractor shall become acquainted with the location of underground services, utilities, structures, etc., which may be encountered or be affected by the Contractor's work, and shall be responsible for any damage caused by neglect to provide proper precautions or protection.
- B. Existing pipes, electrical work and all other utilities encountered, which may interfere with new work, shall be rerouted, capped, cut off or replaced by the trades having jurisdiction.

**1.03 LAYOUT**

- A. The Contractor shall immediately upon entering the site for purpose of beginning work, locate general reference points and take such action as is necessary to prevent their destruction. The Contractor shall lay out the work and be responsible for all lines, elevations and measurements of the building and other work executed by the Contractor under the contract. The Contractor must exercise proper precaution to verify figures on the drawings before laying out work and will be held responsible for any error resulting from failure to exercise such precaution.
- B. Using datum furnished by the Owner, the lot lines and present levels have been established as shown on the Site Plan. Other grades, lines, levels and bench marks shall be established and maintained by the contractor, who shall be responsible for them.
- C. As work progresses, the Contractor shall lay out on forms and floor, the locations of all partitions, walls and fix column center lines as a guide to all trades.
- D. The Contractor shall make provision to preserve property line stakes, bench marks or datum point. If any are lost, displaced or disturbed through neglect of the contractor, contractor's agents or employees, the Contractor shall pay the cost of restoration.
- E. Contractor shall verify grades, lines, levels, locations, and dimensions as shown on drawings and report any errors or inconsistencies to the Architect/Engineer before commencing work. Starting of work by the Contractor shall imply acceptance of existing conditions.

**END OF SECTION**

**SECTION 01 33 00 SUBMITTALS****PART 1 - GENERAL****1.01 SCOPE OF WORK**

- A. The Conditions of the Contract and the provisions of Division 01 apply to all work of this Section.
- B. Provide submittals as noted in each Section of this Specification.
- C. Allow for at least two weeks review of submittals to avoid delay of the Work.
- D. Include with submittal preparation, field verifications of measurements, field construction criteria, verification of catalog numbers and similar data, and coordination of Work requirements and Contract Documents.
- E. Requirements of this section are intended to supplement the City of Duluth requirements and not supersede them. If conflicts arise contact the Architect for clarification.

**1.02 SCHEDULE OF VALUES**

- A. At the time the Contractor submits his signed Contract and list of subcontractors, he shall submit a schedule of values prepared in such a manner that each major item of work and each subcontracted item of work is shown as a single line item.
- B. The value of the work shall generally be itemized by specification section. When an item of work may be furnished by one Subcontractor or material supplier and installed by the Trade Contractor or another subcontractor, separate items shall be included for the value of the material or equipment furnished to the site and the value of its site handling costs and installation.
- C. Items of a general or temporary nature, such as bond premiums or temporary heat, shall be itemized in sufficient detail so that payment may be made as the item of work is completed.
- D. Each item in the Schedule of Values shall contain its proper share of overhead and profit.
- E. Prepare schedule of values on AIA Document G703, Certificate For Payment, Continuation Sheet.
- F. Scheduling of values will be used as a basis for reviewing the Contractors Applications for Payment.

**1.03 CONSTRUCTION SCHEDULE**

- A. At the preconstruction meeting contractor shall present a Contractors Construction Schedule for the Work. The Schedule shall not exceed time limits current under the Contract Documents, shall be revised at appropriate intervals as required by the conditions of the Work and Project, shall be related to the entire project to the extent required by the Contract Documents, and shall provide for expeditious and practicable execution of the Work.
- B. The Contractor shall prepare and keep current, for the Architect's approval, a schedule of submittals which is coordinated with the Contractor's construction schedule and allows the Architect reasonable time to review submittals.

**1.04 SHOP DRAWINGS, SAMPLE SUBMITTALS**

- A. Shop drawings shall consist of drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are prepared by the Contractor or any subcontractor, manufacturer, supplier or distributor, and which illustrate some portion of the work.
- B. Samples shall consist of physical examples furnished by the Contractor in sufficient size and quantity to illustrate materials, equipment or workmanship, and to establish standards by which work will be judged.
- C. Prior to submitting samples and shop drawings to the Architect, Contractor shall review and stamp them with his shop drawing review stamp. Shop drawings shall be signed by the person who reviewed them. By stamping and signing shop drawings and samples the Contractor affirms that he has reviewed and coordinated each shop drawing and sample with the requirements of the contract documents. He further represents that he has, or will, verify all field measurements, field construction criteria and similar data. Shop drawings and samples not so noted and stamped will be returned to the Contractor without being examined by the Architect/Engineer.
- D. Submit five (5) copies of all shop drawings for General Construction Divisions 2 through 14 and six (6) copies for Mechanical/Electrical Construction Division 15 and 16 for distribution as follows by the Architect:
  - 1. 1 set for the Architect.
  - 2. 1 set of Mechanical/Electrical for the Engineer.
  - 3. 1 set for the Owner.
  - 4. 3 sets for the Contractor distributed as follows:
    - a. 1 set for job site.
    - b. 1 set for contractors office.
    - c. 1 set for the supplier.
- E. Submit two (2) of each sample requested. Samples shall be of adequate size to show quality, type, color range, finish and texture. Label each sample stating material, type, color, thickness, size, project name and contractor's name. Submit transmittal letter requesting approval along with samples. One (1) set of approved samples shall become the property of the Architect. The other shall be kept at the job site until substantial completion and then turned over to the Owner.

#### **1.05 OPERATING AND MAINTENANCE INSTRUCTIONS**

- A. Contractor shall provide the Architect with three sets of the following, covering each and every item of equipment and devices furnished or erected by the Contractor prior to "Substantial Completion":
  - 1. Catalog data or literature.
  - 2. Manufacturer's operating instructions.
  - 3. Manufacturer's maintenance instructions.
  - 4. Installation instructions.
  - 5. Parts list (including name and address of nearest vendor).
- B. These materials shall be submitted in 3-ring loose leaf binders on 8-1/2" x 11" paper with the entire contents indexed and thumb-tabbed.
- C. The correct model number shall be checked off in ink where the literature covers more than one model number.

- D. For items assembled by the Contractor for special functions, the Contractor shall write up and provide duplicate operating and maintenance instructions.
- E. The manual shall contain narrative of the control cycle for the control equipment.
- F. Provide field instruction to Owner's personnel as required to fully instruct them in correct operation and maintenance procedures for all mechanical and electrical equipment.

#### **1.06 WARRANTIES AND BONDS**

- A. Assemble and submit to the Owners representative warranties, bonds and service and maintenance contracts as specified in the respective sections of the specifications. The table of contents for this submittal shall include the product or work item; the firm, with the name of the principal, address and telephone number; scope; date of beginning of warranty, bond or service and maintenance contract; duration; information for the Owner's personnel providing the proper procedure in case of failure and instances which might affect the validity of the warranty or bond.
- B. The beginning date of the warranty will be the date of substantial completion or a later date when the work is finally accepted.
- C. Prime Contractors shall guarantee and make good without cost to the Owner any defects, settlements, shrinkages or other faults in work arising from improper materials or workmanship on his part which may appear within one (1) year after the acceptance of the work (except for specified guarantees for another length of time specified elsewhere). The Contractor shall, immediately upon notification by the Architect, proceed at his own expense to replace and repair such work together with any damages to finish, fixtures, equipment, furnishings that may result due to defective work or faults. Any payments for this work shall not relieve him in any way from his responsibility. In case the Contractor fails to do work so ordered, the Owner may have work done, charge the cost thereof against monies retained as provided for in the agreement. If said retained monies are insufficient to pay such cost or if no money is available, the Contractor and his sureties agree to pay the Owner the cost of such work. Nothing herein intends or implies that guarantee shall apply to work which has been abused or neglected by the Owner.

#### **1.07 TEST REPORTS**

- A. Reports of inspections, tests and approvals required by the Contract Documents shall be submitted directly to the Architect in duplicate.

**END OF SECTION**

**SECTION 02 40 00 DEMOLITION****PART 1 - GENERAL****1.01 SCOPE OF WORK**

- A. The Conditions of the Contract and the Provisions of Division 01 apply to all work of this Section.
- B. The work in this section includes all labor, materials, equipment and services to do all demolition necessary to the construction for a complete job in accordance with the drawings and as specified herein.
- C. Removal of mechanical and electrical work in connection with this work is included in the Mechanical and Electrical Sections of the Specifications except as noted otherwise in this section.

**1.02 PROTECTION**

- A. Do all demolition in a careful and workmanlike manner so as not to impair the strength and safety of the existing building.
- B. Do all shoring, blocking and underpinning in a secure manner to provide adequate support for all loads imposed.
- C. Do all cutting carefully to minimize the amount of patching required.
- D. Provide and install dust partitions consisting of frame construction covered with polyethylene. Make all joints tight with contact tape and sill sealer to prevent dust from demolition operations from spreading into the occupied areas of the adjoining building.
- E. It is the responsibility of this contractor to protect the existing building against damage from the elements or other causes due to his operations while this work is in progress.
- F. The contractor shall control dust to limit impacts on abject data equipment.
- G. The general contractor shall do all necessary patching of floors, walls, ceilings, etc., which have been disturbed, modified or changed by the work. Dumpster location to be coordinated with the Owner.
- H. All debris from wrecking operations shall not be left to accumulate and shall be removed from the site immediately.

**1.03 DEMOLITION**

- A. Refer to all drawings for demolition items. All notes are general and do not relieve the contractor from removing and patching all work required or necessary for a complete job.
- B. A general listing of demolition items follows:
  - 1. Removal of existing masonry and stud partition walls.
  - 2. Removal of existing fumed soffits.
  - 3. Removal of existing trim and finishes.
  - 4. Removal of existing lay-in acoustic ceiling.
  - 5. Remove existing raised floor.

**END OF SECTION**

**SECTION 05 50 00 - MISCELLANEOUS METAL****PART 1 - GENERAL****1.01 SCOPE OF WORK**

- A. The Conditions of the Contract and the Provisions of Division 01 apply to all work of this Section.
- B. Furnish all labor, materials and equipment to install all miscellaneous metal work indicated or required for a complete installation of all work under this contract.
- C. All items furnished shall be supplied with all devices required for properly and permanently securing them in their appropriate location.
- D. Items identified on the drawings or listed in this specification as Miscellaneous Metal are intended only as a guide to the Contractor, but this shall in no way relieve the Contractor of the responsibility to include all items required. The Contractor is cautioned to thoroughly examine all drawings for all items of Miscellaneous Metal work required under this contract.
- E. Unless otherwise indicated, all work shall be in accordance with the best recommendations of the Architectural Metal Handbook.
- F. All steel angles, channels, etc., where indicated as to size on the architectural drawings, shall be included in Miscellaneous Metal.
- G. Related Work Specified Elsewhere:
  - 1. Painting - Section 09 90 00

**1.02 REFERENCES**

- A. ASTM A36      Structural Steel

**1.03 SUBMITTALS**

- A. Shop Drawings: Prepare and submit shop drawings to Architect for approval in accordance with the requirements of Division 01. Shop Drawings shall include placing plans and detailed drawings of each item. For stock items requiring no modification or special fabrication to fit the requirements of this job manufacturer's literature and installation instructions will be accepted in lieu of shop drawings. No materials shall be fabricated until such drawings have been approved by the Architect.

**1.04 DELIVERY, STORAGE AND HANDLING**

- A. Deliver materials to site at such intervals to insure uninterrupted progress of work.
- B. Store steel members off ground using pallets, platforms or other supports. Protect steel members and packaged materials from erosion and deterioration.
- C. Do not store material on structure in a manner that might cause distortion or damage to members or supporting structures. Repair or replace damaged materials or structures as directed.

- D. Store materials to permit easy access for inspection and identification.

## **PART 2 - PRODUCTS**

### **2.01 MATERIALS**

- A. All materials shall be free from defects impairing strength, durability, appearance, and of the best commercial quality for the purposes indicated. Structural proportions shall be such as to withstand safely all strains and stresses to which they will be normally subjected.
- B. Casting shall be true to pattern and free from scratches, blemishes, sharp edges and other defects which may be objectionable.
- C. Structural steel shapes and plates shall conform to ASTM A36. All accessories and connections for steel, unless otherwise indicated, shall be of steel.
- D. Materials for other miscellaneous metal items shall be as specified.

### **2.02 FABRICATION**

- A. Insofar as possible, all work shall be shop fitted and assembled ready for erection. Work shall be executed in strict accordance with approved shop drawings.
- B. Shop connections, unless otherwise indicated, shall be welded. All welding shall conform to the current edition of the "Standard Code for Welding in Building Construction" of the American Welding Society. All welds shall be of adequate strength and durability, with all exposed welds ground flush with the base metal and finished clean and smooth.
- C. Field Connections, unless otherwise indicated, shall be made with steel bolts or machine screws of adequate size. Provide any necessary reinforcing plates at connections or fittings.

### **2.03 PAINTING**

- A. Do not paint anchors to be set in concrete. Paint all other items with one shop applied coat of rust-inhibitive red oxide paint.

### **2.10 STEEL PIPE RAIL**

Steel Rail locally fabricated, for use with stairs, ladders, and on walls at ramps and other locations. If a large job they should be specified with the stairs in Section 05 51 11.

- A. Steel pipe railing shall be 1-1/2" diameter steel tube, with an actual outside diameter of 1-1/2".
- B. Rails shall be all welded construction or have concealed fasteners. All welds shall be ground smooth.
- C. Rails mounted on walls shall have end extensions as shown on drawings and shall return to the wall with a 90° elbow, and terminate with a capped end.

**2.05 RAILING WALL BRACKETS**

Railing wall brackets for use with steel pipe rails. These brackets are to be painted with the rail

- A. Railing wall brackets shall be cast malleable iron with a curved top to accept a pipe rail. Wall brackets shall have a 3" extension from the wall, Julius Blum & Co., Inc. No. 306 or approved equal.
- B. Provide wall brackets to support the rail a maximum of 4'-0" on center.

**PART 3 - EXECUTION****3.01 ERECTION - GENERAL**

- A. All steel construction shall be erected square, plumb, straight and true, accurately fitting and with tight joints and intersections, by mechanics experienced in erecting structural steel.
- B. Holes in concrete or masonry, required for mounting structural steel construction and other miscellaneous metal items, shall not be larger than necessary to insert the required anchoring devices. ALL HOLES SHALL BE DRILLED.
- C. Clean all items as required to receive finish paint.

**3.02 INSTALLATION - RAILINGS**

- A. Railings shall be installed level, plumb and parallel to line connecting stair nosing with bolts, screws or other appropriate fastener for the substrate attaching to.

**END OF SECTION**



**SECTION 06 10 00 - ROUGH CARPENTRY****PART 1 - GENERAL****1.01 SCOPE OF WORK**

- A. The Conditions of the Contract and the provisions of Division 01 apply to all work of this Section.
- B. This Section includes all labor, materials, equipment and services necessary to furnish and install all Rough Carpentry as shown on the drawings and specified herein.
- C. The Contractor shall install the following materials which are furnished under other Sections of the specification, anchoring and securing same as required:
  - 1. Temporary Enclosures
  - 2. Building Insulation - Section 07 21 00
  - 3. Fire Stopping - Section 07 84 00
  - 4. Hollow Metal Doors & Frames - Section 08 11 00
  - 5. Wood Doors - Section 08 14 00
  - 6. Finish Hardware - Section 08 71 00
- D. This Contractor shall install miscellaneous blocking as required by other trades for the installation of their work, including but not limited to the following:
  - 1. Single-Ply Roofing - Section 07 53 10
  - 2. Adhered Roofing - Section 07 53 20
  - 3. Wood Blocking in Metal Stud Partitions for fixtures, access doors, railings, etc.

**1.02 DELIVERY, STORAGE AND HANDLING**

- A. All lumber shall be delivered, piled and handled so as to protect it from damage. Lumber shall not be delivered to the site unduly long before it is required in the normal progress of the work. All lumber shall be protected and kept under cover and off the ground ( minimum 5-1/2" above the ground and 3-1/2" above any other surface) both in transit and at the job site.

**PART 2 - PRODUCTS****2.01 LUMBER, GRADES AND SPECIES**

- A. Lumber grades shall conform to the grading rules of the manufacturer's association under whose rules the lumber is produced. Lumber shall bear the grade and trade mark of the association under whose rules it is produced, and a mark of mill identification.
- B. Lumber shall be sound, thoroughly seasoned and well manufactured. Materials shall be free of warp that cannot be corrected in the normal process of bridging or nailing. All woodwork exposed to view in finished or unfinished areas shall be dressed. Lumber shall be air dried or kiln dried to an average moisture content not exceeding 15%.
- C. Lumber shall be of the grade and species listed below:
  - 1. Lumber for Blocking - No. 3 Pine

## **2.02 PRESERVATIVE TREATED LUMBER**

- A. All lumber for curbs, blocking, nailers, etc., in contact with concrete, masonry or roofing materials shall be preservative treated. Preservative shall be ACQ preservative or approved equal, applied by the pressure method in a closed retort. Minimum net retention shall be not less than .25 lb. per cubic foot. Lumber shall be fabricated insofar as possible before treating. Lumber cut after treating shall have the cut surface well brushed with same preservative. Furnish Architect with certificate from treating plant stating size and quantity of lumber treated, type and amount of treatment.

## **2.03 FIRE TREATMENT FOR WOOD PRODUCTS**

- A. All fire retardant treated wood and plywood shall be treated to a Flame Spread and smoke Developed Rating of less than 25 when tested in an extended 30 minute tunnel test in accordance with ASTM E84, NFPA 255 or UL 723.
- B. All lumber must be kiln dried to a maximum moisture content of 19 percent after treatment. All plywood must be kiln dried to a maximum moisture content of 15 percent after treatment.
- C. All fire retardant wood must meet Interior type A Requirements in AWP standard C-20 for lumber and C-27 for plywood.
- D. The fire retardant chemicals used to treat the lumber shall be free of halogens, sulfates, ammonium phosphate and formaldehyde.
- E. Fire treatment for lumber and plywood shall be as manufactured by one of the following or approved equal:
  - 1. Hickson Corporation - Dricon
  - 2. Hoover Treated Wood Products, Inc. - Pyro-Guard
  - 3. Chemical Specialties, Inc. - D-Blaze
  - 4. Fibertech - "GAIA Process"

## **2.04 HARDWARE**

- A. This contractor shall furnish and install all nails, spikes, screws, bolts and other similar items of rough hardware required in the progress of his work and shall install all items of finish hardware furnished by others.
  - 1. Anchors for fastening to concrete, masonry and plaster board shall be as manufactured by Hilti, Rawl, Sanko or approved equal. Fasteners shall be size and type required for each particular application.
  - 2. For anchoring in preservative treated blocking, roofing or waterproofing fasteners shall be stainless steel or hot-dip zinc coated.

**PART 3 - EXECUTION****3.01 INSTALLATION - GENERAL**

- A. All finished work shall be scribed and coped as required for an accurate fit and erected plumb, true square and in accordance with the drawings. Correlate location of nailers, blocking grounds and similar supports to allow proper attachment or other work. All work shall be secured in place with screws or nails as required. Countersink and fill all nail and screw heads exposed to view.
- B. This Contractor shall furnish and install all nails, spikes, screws, bolts and other similar items of rough hardware required in the progress of his work and shall install all items of finish hardware furnished by others.
- C. As finish hardware is delivered, this Contractor shall check all items against approved hardware listing and assume full responsibility for same until completion of building. He shall inspect the work of other trades which are to receive hardware and report in writing any defects found in same before installing. Installation of any hardware by this contractor shall imply his acceptance of the work of others.
- D. Metal knobs and handles shall be protected with a wrapping of tough paper or cloth until building is completed, at which time all hardware shall be checked and placed in perfect working order. All keys shall be properly marked and delivered to the building.

**END OF SECTION**

**SECTION 06 20 00 - FINISH CARPENTRY****PART 1 - GENERAL****1.01 SCOPE OF WORK**

- A. The Conditions of the Contract and the Provisions of Division 01 apply to all work of this Section.
- B. This Section includes all labor, materials, equipment and services necessary to furnish all wood molding materials in accordance with the drawings, schedules and this specification.
- C. Related Work Specified Elsewhere:
  - 1. Rough Carpentry - Section 06 10 00
  - 2. Painting - Section 09 90 00

**1.02 SUBMITTALS**

- A. Submit shop drawings for approval in accordance with the General Conditions. Shop drawings shall show profile and size of all fabrications and moulding shapes.
- B. Submit samples of wood moulding shapes showing character of selected wood.

**1.03 QUALITY ASSURANCE**

- A. All work under this Section shall be prepared in accordance with the latest edition of the Architectural Woodwork Institute - Quality Standards and Specifications.

**1.04 DELIVERY, STORAGE AND HANDLING**

- A. Moldings shall not be delivered to the site until the building is fully enclosed and temperature and humidity levels are established close to that of the finished operating building.
- B. All items shall be stored on skids off the floor and covered to prevent damage.

**PART 2 - PRODUCTS****2.01 STANDING AND RUNNING TRIM - CHAIR RAIL, HANDRAIL, RAIL CAP**

- A. Wood moulding and trim shall be furnished in sizes and shapes shown on drawings.
- B. Moldings shall match the existing building standard for species and grain pattern.
- C. All items of standing trim shall be furnished in one piece, no splicing permitted. All items of running trim shall be furnished in the longest lengths possible.
- D. All end pieces of standing trim, flat stock, exposed to view, shall have the end finished with a veneer of similar wood.

## **2.02 MEDIUM DENSITY OVERLAY (MDO) - SOFFITS**

- A. MDO of soffits shall be constructed of a Medium density overlay applied to plywood with Douglas Fir/Hemlock construction. It shall be manufactured with a 1 step layup with a waterproof glue bond and meeting APA PS 1-07 specifications. Provide MDO on two (2) faces, thickness per drawings.

## **PART 3 - EXECUTION**

### **3.01 INSTALLATION**

- A. All finished work shall be scribed and coped as required for an accurate fit and erected plumb, true, square and in accordance with the drawings. Correlate location of nailers, blocking grounds and similar supports to allow proper attachment of other work. All work shall be secured in place with screws or nails as required. Countersink and fill all nail and screw heads exposed to view.
- B. This Contractor shall furnish and install all nails, spikes, screws, bolts and other similar items of rough hardware required in the progress of his work and shall install all items of finish hardware furnished by others.
- C. Install moldings to the following standards:
  - 1. Moldings to receive transparent finish shall be selected for compatibility of grain and color.
  - 2. No warped or twisted moulding shall be allowed.
  - 3. All moldings to be set plumb, level and true.
  - 4. All joints to be staggered with adjacent members on multi-member cornices.
  - 5. Moldings and trim shall be installed in maximum lengths possible to minimize joints.
  - 6. All field joints to be tightly fitted and flush.
  - 7. Field joints in running trim to be diagonal ("scarfed") joints.
  - 8. Exposed ends of running trim shall have profiled or self mitered returns.
  - 9. All exposed fastenings (nails or trim head screws) shall be deep set.
  - 10. Miters on large members (4" or larger) shall be doweled or splined and glued.
  - 11. Blind nailing and concealed type fasteners to be used whenever possible.
  - 12. Cope or miter inside corners where applicable, to produce tight fitting joints.
  - 13. Miter outside joints to produce tight fitting joints.
- D. Unexposed sides and edges of paneling and mouldings shall be primed or sealed as specified under Section 09 90 00.

### **3.02 INSTALLATION - MDO**

- A. MDO shall be blind fastened from the back side through each stud with screws. Screws shall be of length to not penetrate the exposed surface.
- B. All butt joints shall occur at a stud and the end of each piece shall be attached to the stud. Provide paint grade caulk to seal seam. Strike smooth to minimize appearance.
- C. MDO shall be finished as specified in Section 09 90 00.

**END OF SECTION**

SECTION 07 54 23 THERMOPLASTIC POLYOLEFIN (TPO) ROOFING

## PART 1 - GENERAL

## 1.01 SCOPE OF WORK

- A. The Conditions of the Contract and the Provisions of Division 01 apply to all work of this Section.
- B. The work in this Section includes all labor, materials and equipment necessary to tie into an existing Adhered Membrane Roofing System in accordance with the drawings and as specified herein.
- C. Related work specified elsewhere:
  - 1. Rough carpentry - Section 06 10 00
  - 2. Sheet Metal - Section 07 62 00
  - 3. Caulking & Sealants - Section 07 90 00

## 1.02 SYSTEM DESCRIPTION

- A. This specification is intended to exceed minimum standards required to maintain the existing roof system warranty and is not to be construed as contrary thereto. If the roofer has reason to believe that this specification as written, does not comply with requirements for this roof system warranty, he shall notify the Architect in writing before submitting his bid, stating also in which particulars the specifications should be changed. Architect will issue necessary Addendum. If roofer fails to notify Architect, he will be required to comply with all specification requirements, plus any additional work necessary to maintain roof system guarantee at no change in contract price.

## 1.03 SUBMITTALS

- A. Shop Drawings - Submit shop drawings for approval. Shop drawings will be required for final inspection of the Warranted roof. Shop drawings shall include outline of roof and roof size, locations and type of penetrations, perimeter and penetration detail, special details and all seam locations.
- B. Manufacturer's Technical Data - Submit the manufacturer's technical data to the Architect in duplicate before starting roofing work. Data shall include recommendations for delivery, storage and handling of materials, preparation of the substrate and installation instructions.
- C. Approval of Roofing Contractor - Submit the roofing manufacturer's written approval and certification of the roofing contractor to the Architect in duplicate before starting any roofing work.
- D. Submit shop drawings of tapered insulation, curbs, rails or other system accessories.

## 1.04 QUALITY ASSURANCE

- A. All roofing work shall be performed in accordance with this specification. No work shall be done without the approval of the Architect or Construction Representative. Roofing Contractor shall give at least one day notice, to the Construction Representative, of the intent to commence roofing, and a similar notice of commencement thereafter, if work is interrupted.

- B. Roofing and Flashing shall be applied only by manufacturer's authorized roofing applicator familiar with the project and in strict compliance with the manufacturer's instructions. Manufacturer's agent or representative shall inspect site prior to beginning work and at completion of all work to insure compliance with the manufacturer's instructions.
- C. Qualifications - The work of this Section shall be done by a Roofing Contractor approved and certified by the existing roofing manufacturer with a minimum of five years experience with an approved roofing membrane. Work shall be performed in strict conformance with the applicable provisions of the elastic sheet roofing manufacturer's current published specifications, application instructions, recommended details and standards of practice.

#### 1.05 DELIVERY, STORAGE AND HANDLING

- A. Materials shall be delivered in their original, unopened containers, clearly labeled with manufacturer's name, brand name, and such identifying numbers as are appropriate. Adhesives shall be stored between 60 degrees F. and 80 degrees F. Should they be exposed to lower temperatures, restore to room temperature for three to five days prior to use.

#### 1.06 GUARANTEE

- A. Upon completion of the installation, an inspection shall be made by a representative of the manufacturer in order to ascertain that the Roofing System has been installed according to published specification and details.
- B. The existing Firestone warranty shall not be diminished due to this work.

### PART 2 - PRODUCTS

#### 2.01 ROOFING MATERIALS

- A. TPO MEMBRANE ROOFING
  - 1. Fabric-Reinforced Thermoplastic Polyolefin Sheet ASTM D 6878, internally fabric or scrim reinforced, uniform, flexible TPO sheet.
    - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      - 1. Firestone Building Products Company.
    - b. Thickness: 60 mils (1.5 mm), nominal.
    - c. Exposed Face Color: White.
- B. AUXILIARY MEMBRANE ROOFING MATERIALS
  - 1. General: Auxiliary membrane roofing materials recommended by roofing system manufacturer for intended use, and compatible with membrane roofing.
    - a. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.
    - b. Adhesives and sealants that are not on the exterior side of weather barrier shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
      - 1. Plastic Foam Adhesives: 50 g/L.
      - 2. Gypsum Board and Panel Adhesives: 50 g/L.

3. Multipurpose Construction Adhesives: 70 g/L.
  4. Fiberglass Adhesives: 80 g/L.
  5. Contact Adhesive: 80 g/L.
  6. Other Adhesives: 250 g/L.
  7. Single-Ply Roof Membrane Sealants: 450 g/L.
  8. Nonmembrane Roof Sealants: 300 g/L.
  9. Sealant Primers for Nonporous Substrates: 250 g/L.
  10. Sealant Primers for Porous Substrates: 775 g/L.
2. Sheet Flashing: Manufacturer's standard unreinforced thermoplastic polyolefin sheet flashing, 55 mils (1.4 mm) thick, minimum, of same color as sheet membrane.
  3. Bonding Adhesive: Manufacturer's standard, water based.
  4. Slip Sheet: Manufacturer's standard, of thickness required for application.
  5. Metal Termination Bars: Manufacturer's standard, predrilled stainless-steel or aluminum bars, approximately 1 by 1/8 inch (25 by 3 mm) thick, with anchors.
  6. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening membrane to substrate, and acceptable to membrane roofing system manufacturer.
  7. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, and other accessories.

C. VAPOR RETARDER

1. Glass-Fiber Felts: AASTM D 2178, Type IV, asphalt impregnated.

D. ROOF INSULATION

1. General: Preformed roof insulation boards manufactured or approved by TPO membrane roofing manufacturer, selected from manufacturer's standard sizes suitable for application, of thicknesses indicated (and that produce FM Approvals-approved roof insulation).
2. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class 1, Grade 2 felt or glass-fiber mat facer on both major surfaces.
3. Cellulosic-Fiber Board Insulation: ASTM C 208, Type II, Grade 2, fibrous-felted, rigid insulation boards of wood fiver or other cellulosic-fiber and water-resistant binders, asphalt impregnated, chemically treated for deterioration.
4. Tapered Insulation: Provide factory-tapered insulation boards fabricated to slope of 1/4 inch per 12 inches (1:48) unless otherwise indicated.
5. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.



E. INSULATION ACCESSORIES

1. General: Furnish roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with membrane roofing.
2. Cover Board: ASTM C208, Type II, Grade 2, Cellulosic-fiber insulation board, ½ inch (13 mm) thick.

F. ASPHALT MATERIALS

1. Roofing Asphalt: ASTM D 312, Type III or Type IV.
2. Asphalt Primer: ASTM D 41.

G. EQUIPMENT SUPPORTS

1. Equipment Supports: Provide metal equipment supports, internally reinforced as required to meet superimposed live and dead loads, as specified, including equipment loads and other construction to be supported. Fabricate with welded corner joints and integral formed mounting flange at perimeter bottom. Coordinate dimensions with supported equipment, rough-in information, or Shop Drawings.
  - a. Fabricate roof curbs in thickness or weight needed to comply with performance requirements, but not less than that listed below for each application and metal.
    1. Galvanized Steel: 0.0635 inch thick (16 gauge).
  - b. Manufacturer installed wood-nailers at tops or sides of equipment supports as indicated on the drawings.
  - c. Metal Counterflashing Unit: Manufacturer's standard removable counterflashing, fabricated of same metal and finish as equipment support.
  - d. Fabricate units to minimum height of 16 inches unless otherwise indicated.
  - e. Comply with manufacturer's instructions and recommendations for installation, as applicable to project conditions and supporting substrate, including anchorage, joint sealers, flashing and trim for the proper and permanent installation of roof accessories, with provisions for thermal/structural movement to provide watertight installation.
    1. Anchor component parts securely in place, providing for necessary thermal and structural movement, in accordance with manufacturer's standard practice.
    2. Install work watertight, without waves, warps, buckles, fastening stress, or distortion of roof accessories or adjacent roofing materials.
    3. All accessories or other items essential to installation, whether specifically indicated or not, shall be provided and of the same materials as item to which applied.
    4. Apply bituminous coating or other permanent separation materials on concealed surfaces in direct contact with substrate materials which are incompatible or could result in corrosion or deterioration of either the material or the finish.

## PART 3 - EXECUTION

## 3.01 INSPECTION OF SURFACES

- A. The roofer and if necessary, a manufacturer's representative of the roofing system used, shall carefully inspect all surfaces over which his materials are to be applied and report any unsatisfactory conditions to the Architect and Construction Representative in writing. The Architect will cause unsatisfactory conditions to the Architect and Construction Representative in writing. The Architect will cause unsatisfactory conditions of the structural deck and parapet walls to be remedied.
- B. The roof deck and other surfaces to receive Sheet Roofing shall be clean, dry, free of fins, sharp edges, loose and foreign materials, oil, grease, debris, nails and other gross irregularities, before new roofing materials are applied.
- C. The beginning of any roofing work by the roofer will imply his acceptance of the substrate surfaces as satisfactory to receive his materials.

## 3.02 SURFACE PREPARATION

- A. Remove minimum existing TPO roofing, insulation and underlayment as required to perform work in accordance with the drawings.
- B. This contractor shall be aware that the existing building is occupied and is subject to damage should leaking occur. Roofer shall only remove as much roofing as can be replaced with new in a days work. Whenever roofing work is stopped edges of the new roof shall be sealed against water penetration where it intersects the existing roof and parapets.

## 3.03 SUBSTRATE BOARD

- A. Install substrate board with long joints in continuous straight lines, perpendicular to roof slopes with en joints staggered between rows. Tightly butt substrate boards together.
- B. Fasten substrate board to top flanges of steel deck to resist uplift pressure at corners, perimeter, and field of roof according to roofing system manufacturer's written instructions.

## 3.04 VAPOR-RETARDER INSTALLATION

- A. Built-up Vapor Retarder: Install two glass-fiver felt piles lapping each felt 19nicnhes (5483 mm) over preceding felt. Embed each felt in a solid mopping of hot roofing asphalt. Glaze-coat completed surface with hot roofing asphalt. Apply hot roofing asphalt within plus or minus 25 deg F (14deg C) of equiviscous temperature.
- B. Completely seal vapor retarder at terminations, obstructions, and penetrations to prevent air movement into membrane roofing system.

## 3.05 INSULATION INSTALATION

- A. Coordinate installing roof system components so insulation is not exposed to precipitation or left exposed at the end of the workday.

- B. Comply with roofing system manufacturer's written instructions for installing roof insulation.
- C. Install tapered insulation under area of roofing to conform to existing slopes.

### 3.07 BASE FLASHING INSTALLATION

- A. Install sheet flashings and preformed flashing accessories and adhere to substrates according to membrane roofing system manufacturer's written instructions.
- B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate and allow to partially dry. Do not apply to seam area of flashing.
- C. Flash penetrations and field-formed inside and outside corners with cured and uncured sheet flashing.
- D. Clean seam areas, overlap, and firmly roll sheet flashings into the adhesive. Hot-air weld side and end laps to ensure a watertight seam installation.

### 3.08 FIELD QUALITY CONTROL

- A. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion.
- B. Repair or remove and replace components of membrane roofing system where inspections indicate that they do not comply with specified requirements.
- C. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

### 3.09 PROTECTING AND CLEANING

- A. Protect membrane roofing system from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.
- B. Correct deficiencies in or remove membrane roofing system that does not comply with requirements, repair substrates, and repair or reinstall membrane roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
- C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

**END OF SECTION**

**SECTION 07 62 00 - SHEET METAL****PART 1 - GENERAL****1.01 SCOPE OF WORK**

- A. The Conditions of the Contract and the Provisions of Division 01 apply to all work of this Section.
- B. This Section includes all labor, materials, equipment and services necessary to furnish and install all sheet metal work in accordance with the drawings and this specification. Furnish all labor and materials to complete all sheet metal work indicated or required for a complete installation of all work under this contract. All items furnished shall be supplied with all devices required for properly and permanently securing them in their appropriate location. Items identified on the drawings or listed in this specification as sheet metal are indicated only as a guide to the Contractor, but this shall in no way relieve the Contractor of the responsibility to include all items required. The Contractor is cautioned to thoroughly examine all drawings for all items of work required under this contract.
- C. Related Work Specified Elsewhere:
  - 1. Unit Masonry - Section 04 20 00
  - 2. Rough Carpentry - Section 06 10 00
  - 3. Loose Laid Roofing System - Section 07 53 00
  - 4. Caulking & Sealants - Section 07 90 00

**1.02 REFERENCE STANDARDS**

- A. ASTM E111 - Galvanized Metal Modulus of Elasticity
- B. ASTM 370 - Metal Minimum Yield
- C. ASTM E228 - Metal Thermal Expansion
- D. ASTM D522 - Coating 2T Bend
- E. ASTM D2244 - Coating Color Stability
- F. ASTM D659 - Coating Chalking

**1.03 SUBMITTALS**

- A. Prepare and submit shop drawings to Architect for approval in accordance with the General Conditions. Shop drawings shall show layout, joining profiles and anchorage.
- B. Submit color samples, on metal, of all finished metal items exposed to view for selection by the Architect. Colors shall be standard manufacturers Kynar 500 colors.
- C. Submit Certificates of Production from the metal coating fabricator stating that the paint coating system used on the metal fabricated for this project is 70% Kynar 500.

**1.04 DELIVERY, STORAGE AND HANDLING**

- A. Material shall be delivered to the site formed and ready for installation. Finished surfaces shall be covered with a strippable film protective coating which shall be removed immediately after installation.
- B. Delivery of material shall be made only after suitable facilities for its storage and protection are available on the site.

### **1.05 WARRANTY**

- A. Material supplier shall furnish a written 20 year non-prorated warranty covering face, chalking and film integrity. Warranty shall include labor and materials through the 20th year.

## **PART 2 - PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Manufacturers shall be one of the following or approved equal:
  - 1. Berridge Manufacturing Company
  - 2. Peterson Aluminum Corp.
  - 3. Metal Sales Manufacturing Corp.
  - 4. Vincent Metals
  - 5. AEP Span
  - 6. Copper Sales, Inc.
  - 7. McElroy Metal, Inc.

### **2.02 MATERIALS - COPING & EXPOSED METALS**

- A. Coping and other metals exposed to view shall be 24 gauge hot dipped galvanized steel, G-90 commercial quality, extra smooth primed and finished one side with 70% Kynar 500 Based Fluoropolymer Coating 1.0 +/- 0.1 mil total dryfilm thickness. A wash coat of .3 - .4 mil dryfilm thickness shall be applied to the reverse side.

### **2.03 FABRICATION - GENERAL**

- A. Form all work true to detail with clean, straight sharply defined profiles as shown on the drawings. Profiles shall match exactly at connections. Corners shall be mitered and intersecting pieces shall be closely fitted. All exposed edges shall be beaded or returned for strength and appearance.
- B. Provide all necessary ribs, cleats and reinforcements to make all sections rigid and substantial. These items shall be of the same material as the exposed metal. Make proper allowances for expansion.

### **2.04 FABRICATION - COUNTERFLASHING**

- A. Metal counterflashing shall be the type of flashing secured with self taping screws with neoprene washers fabricated to the size and configuration shown on drawings.
- B. Counterflashing shall be held in place with fasteners spaced 12 inches on center.
- C. Special pieces of metal flashing shall be built-up in the shop for corners so that no joint will occur within 12" of the corner. Corners shall be made up with locked and soldered joints.

### **2.05 ACCESSORIES**

- A. Provide touch-up paint and color matched nails and rivets as required for this installation.
- B. Mastic for sealing joints, etc. shall be asphaltic bituminous type mastic or as recommended by the metal manufacturer.

**PART 3 - EXECUTION**

**3.01 INSTALLATION - COPING AND EXPOSED METAL**

- A. Install sheet metal coping and other metal exposed to view as shown on drawings using recognized sheet metal practices as per the Sheet Metal and Air Conditioning Contractors National Association, Inc. - Architectural Sheet Metal Manual.
- B. Joints in counter flashing shall be set in mastic and butted to allow for expansion. Joint shall be covered with a 6" wide cleat.
- C. After metal counter flashing is in place, remove strippable film protection.

**END OF SECTION**

**SECTION 07 84 00 - FIRE STOPPING****PART 1 - GENERAL****1.01 SCOPE OF WORK**

- A. The Conditions of the Contract and the Provisions of Division 01 apply to all work of this Section.
- B. This section includes all labor, materials, equipment and services necessary to furnish and install fire stopping and accessory items necessary for the proper installation of Underwriters Laboratory (or other approved listing agency) Rated Firestop Systems and Devices as specified herein and as shown on the drawings.
- C. Products furnished under this section shall be installed by trades performing poke through work which penetrates fire rated construction or termination of fire rated construction as follows:
  - 1. Termination of fire rated partitions to structural decks or walls: Section 06 10 00 - Rough Carpentry.
  - 2. Seal openings in fire rated construction for piping, ductwork: Division 23 - Mechanical.
  - 3. Seal openings in fire rated construction for conduit, cable, cable trays: Division 26 - Electrical.
  - 4. Existing piping, ductwork, conduit, cable, cable trays, etc., which remain in place where new fire rated walls or partitions are built around them: Section 06 10 00 - Rough Carpentry.
- D. Related work specified elsewhere:
  - 1. Rough Carpentry - Section 06 10 00
  - 2. Caulking & Sealants - Section 07 90 00
  - 3. Painting - Section 09 90 00
  - 4. Mechanical – Division 15
  - 5. Electrical - Division 16

**1.02 SYSTEM DESCRIPTION**

- A. Provide fire safing/poke-through protection for fire-rated construction terminations.
- B. Seal empty holes and penetrations at floors, fire rated walls and smoke barrier walls.
- C. Seal holes accommodating penetrating items such as cables, cable trays, and conduits.
- D. Seal penetration system used to maintain the integrity of time rated construction by providing a sealant against the spread of heat, flame and smoke.
- E. Systems shall be UL Classified or Listed by Warnock Hersey International for the appropriate required time rating.

### **1.03 REFERENCE STANDARDS**

- A. ASTM E814 - Fire Tests of Through-Penetration Firestops
- B. ASTM E119 - Fire Tests of Building Construction Materials
- C. ASTM E84 - Surface Burning Characteristics of Building Materials
- D. UL 723 - Standard Test Method for Surface Burning Characteristics of Building Materials
- E. UL 1479 - Fire Tests of Through-Penetration Firestops
- F. UL 263 - Fire Tests of Building Construction Materials
- G. UL Fire Resistance Directory - Through-Penetration Firestops Systems (XHEZ), and Fill, Void or Cavity Materials (XHHW)
- H. NFPA 70 - National Electric Code
- I. NFPA 101 - Life Safety Code
- J. NFPA 255 - Method of Testing of Surface Burning Characteristics of Building Materials

### **1.04 SUBMITTALS**

- A. Prepare and submit shop drawings to the Architect for approval in accordance with the requirements of Division 01. For manufacturer's standard items requiring no special fabrication or modification manufacturer's literature appropriately marked will be accepted in lieu of shop drawings.
- B. Submit manufacturer's installation instructions and drawings as per the requirements of Division 01.
- C. Submit manufacturer's letter of certification and/or certified laboratory test reports stating that products to be used meet or exceed the fire rating requirements specified.

### **1.05 QUALITY ASSURANCE**

- A. Fire stopping compounds shall not contain asbestos, halogens, or volatile solvents or require special application to protect plastic pipe from fire stopping compound.
- B. Fire resistant firestop materials shall be fire tested and rated in accordance with ASTM E119 and E84, including hose stream test. Fire tests shall be conducted at a minimum 0.01 inches H<sub>2</sub>O Positive Pressure. Materials shall have a F Rating equal to the surrounding assembly or as specified by governing code agency.
- C. Materials shall meet the requirements of NFPA 101 - Life Safety Code and NFPA 70 - National Electric Code.

### **1.06 DELIVERY STORAGE AND HANDLING**

- A. All materials shall be delivered to the site in original unopened containers and shall bear full product identification including approved listing laboratory classification marking.
- B. Materials shall be stored in an enclosed shelter protected from damage and exposure to the elements. Storage conditions shall be in compliance with the specific instructions of the manufacturer for each material used.
- C. Damaged or deteriorated material shall be removed from the site and shall not be used.



**1.07 PROJECT/SITE CONDITIONS**

- A. Fire stopping materials shall be installed when temperature ranges are within the limits of the manufacturer's suggested temperature limits. Following the installation of fire stopping materials temperatures shall be maintained for a period of not less than 24 hours.

**PART 2 - PRODUCTS****2.01 MANUFACTURERS**

- A. Fire stopping and fire safing products shall be UL or Warnock Hersey Rated Systems as manufactured by one of the following or approved equal:
  - 1. Rectorseal Corporation, Metacaulk
  - 2. 3M
  - 3. Isolatek International, Cafco
  - 4. The General Electric Company
  - 5. Nelson Firestop Products
  - 6. Hilti Construction Chemicals
  - 7. Tremco Construction Division
  - 8. United States Gypsum Company

**2.02 MATERIALS**

- A. All fire stopping sealants shall be thixotropic so as not to slump or sag and shall be trowelable. Fire stopping sealants shall be intumescent and shall be free of asbestos, halogens, and volatile solvents.
- B. Fire stopping materials shall be paintable or capable of receiving finish materials in those areas which are exposed to view and which are scheduled to receive finishes.
- C. Furnish all accessories, sleeves, supporting devices, etc. as required to provide a fire rated fire stop at each penetration or gap in fire rated construction.

**2.03 THROUGH PENETRATION FIRESTOPPING OF FIRE-RATED CONSTRUCTION**

- A. Systems or devices listed in the UL Fire Resistance Directory under categories XHRC and XHEZ may be used, providing that it conforms to the construction type, penetrant type, annular space requirements and fire rating involved in each separate instance, and that the system be symmetrical for wall applications.
- B. System shall withstand the passage of cold smoke either as an inherent property of the system, or by use of a separate product included as part of the UL system or device, and designed to perform this function.

**2.04 SMOKE-STOPPING AT SMOKE PARTITIONS**

- A. Through-penetration and construction-gap smoke stopping may be accomplished with any system complying with the requirements for fire-stopping in fire-rated construction is acceptable provided the system includes the specified smoke seal or will provide a smoke seal. The length of time of the fire resistance may be disregarded.

**PART 3 - EXECUTION**

**3.01 PREPARATION**

- A. Prepare substrate surfaces to insure proper and adequate support for the specified UL rated Fire Stop System. Install fire-rated partitions and floors with penetration hole to receive fire stop system. Install penetrating item with adequate support in accordance with required annular spacing.
- B. Clean all penetration holes and penetrating item surfaces of foreign materials including loose debris, dirt, oil, grease, wax and/or old caulking before sealant is applied.
- C. field measure and verify dimensions as required.
- D. Protect adjacent areas or surfaces from damage as a result of the work of this Section.

**3.02 INSTALLATION**

- A. Installation of fire stopping materials shall be in exact accordance with the manufacturer's latest published instructions, requirements, specifications details and approved shop drawings.
- B. Installation shall be in accordance with the appropriate UL Fire Resistance Directory or Listing with the appropriate Warnock Hersey International Listing.
- C. Seal holes or voids made by penetrating items to ensure an effective fire and smoke barrier.
- D. Seal intersections and penetrations of floors, ceilings, walls and columns.
- E. Seal around cutouts for lights, cabinets, pipes, plumbing, HVAC ducts and electrical boxes, etc.
- F. Where floor openings are four inches or more in width and subject to traffic or loading, install cover plate systems capable of supporting same loading as floor.
- G. Coordinate and cooperate with adjacent, contiguous and related materials trades to insure a proper and timely installation.

**3.03 FIELD QUALITY CONTROL**

- A. Examine finished penetrations to ensure proper installation before concealing or enclosing any areas or work. If required, notify Building Official of completed work prior to enclosure of penetrations.
- B. Keep areas of work accessible until inspection by applicable code authorities.
- C. Correct unacceptable work and provide further inspection to verify compliance with requirements.

**3.04 CLEANING**

- A. Materials used in fire stopping shall be water or silicone based for easy cleaning.
- B. Immediately remove spots, smears, stains, residues and adhesives from the work of this Section and/or upon adjacent areas or surfaces which result from the work of this Section.

- C. Upon the completion of the work of this Section, dispose of debris, trash, containers, residue, remnants and scraps which result from the work of this Section in accordance with all local, state and federal regulations.
- D. Cleaning material shall be free of volatile solvents. Leave work area in clean and satisfactory condition.

**3.05 PROTECTION**

- A. After installation and until Owner's acceptance, protect Rated Fire Stop Systems from damage.
- B. Any damaged materials shall be removed and replaced with new undamaged materials prior to final acceptance.

**3.06 SCHEDULE**

- A. Install fire stopping materials at all penetrations and terminations of the following wall and floor types:
  - 1. Masonry - 1 Hour
  - 2. Gypsum Drywall/Steel Studs - 1 Hour
  - 3. Concrete Floor Slab - 1 Hour

**END OF SECTION**

**SECTION 07 90 00 CAULKING & SEALANTS****PART 1 - GENERAL****1.01 SCOPE OF WORK**

- A. The Conditions of the Contract and the Provisions of Division 01 apply to all work of this Section.
- B. Furnish all labor, material, equipment, scaffolding and appliances required to complete all caulking, and related work as specified herein and as shown on the drawings.
- C. Acoustical caulking for sound insulated Gypsum Drywall partitions shall be furnished and installed under Section 09 20 00.
- D. Firestopping and smoke caulking for terminations of, or penetrations through fire rated construction shall be furnished and installed under Section 07 84 00.
- E. Sealant for roofing terminations shall be furnished and installed under Section 07 53 00.
- F. Caulking and sealants specified under this Section shall be installed at the intersection of all dissimilar materials not mechanically or adhesively attached to each other, at the expansion and contraction joints of similar or dissimilar materials, and where it is necessary to provide a smooth transition between materials of differing shapes. The following list of areas to be caulked or sealed is intended as a general guide to this Contractor and does not relieve the contractor of providing caulking to all areas shown on the drawings and that fit the above definition:

- 1. Non-sag Urethane:

- a. Around the frames of Doors, Windows & Louvers - each exposed side.
  - b. All other Joints noted on Drawings as "Caulk" or "Sealant".
  - c. All joints which meet the definition of paragraph "F" above.

**1.02 REFERENCES**

- A. Non-sag Urethane:

- 1. ASTM C920, Type S, Grade NS, Class 25
  - 2. Fed Spec TT-S-00230C, Type II, Class A

**1.03 SUBMITTALS**

- A. Submit manufacturer's product specifications, handling, installation and curing instructions for each type of sealant to be used in accordance the requirements of Division 01.
- B. Submit sample of joint sub-caulking to be used.
- C. Submit color sample of each type of sealant for selection by the Architect. Colors will be selected from the manufacturer's standard line of colors.

**1.04 DELIVERY STORAGE AND HANDLING**

- A. All materials shall be delivered to the site in their original, unopened containers, clearly labeled with manufacturer's name, brand name, and such identifying numbers as are appropriate.

- B. Store caulking materials in a dry, heated space. Maintain temperature at approximately 70°F.

## 1.05 WARRANTY

- A. The Contractor shall, and by acceptance of this contract does, warranty that all work executed under this section will be free from defects due to materials and workmanship for a period of five (5) years from the date of "Substantial Completion" and at his own expense, repair and replace all such work found to be defective during the term specified.

## PART 2 - PRODUCTS

### 2.01 CAULKING MATERIALS

- A. Non-sag Urethane - Caulking compound shall be one-part polyurethane caulking compound, that meets or exceeds the requirements of Fed. Spec. TT-S-00230C. Compound shall be as recommended by the manufacturer for use without a paint finish and shall form a tough elastic film on the surface, but remain plastic underneath. It shall contain no ingredients which will stain masonry or corrode metals. Color of compound shall be as selected by the Architect. At the contractors option he may use two-part caulking compound of the same materials as those specified herein. Caulking compound shall be one of the following or approved equal:

1. Mameco International - Vulkem 116 or 227
2. Sika Chemical Co. - Sika-Flex 1a or 2c NS
3. Sonneborne - Sonolastic NP1 or NP2
4. Tremco - Dymonic or Dymeric
5. Pecora - Dynatrol I or Dynatrol II
6. PRC - Permapol RC1 or Permapol RC2

### 2.02 CAULKING ACCESSORIES

- A. Primer - Shall be colorless primer made by manufacturer of sealant and shall be specifically designed as prime coating for the caulking or sealant compound furnished.
- B. Cleaning Fluid - Cleaning fluid shall be methyl ethyl keytone (MEK), methyl isobutyl keytone (MIBK) or similar solvent material which will not etch or mar metal finishes, shall be the product of a nationally recognized manufacturer, and shall be of type expressly recommended for use with the caulking or sealant compound used.
- C. Bond Breaker - Bond breaker shall be polyethylene tape, or other approved materials or coated materials providing a bond breaker on the exposed side with a non-smear adhesive on the contact side.
- D. Joint Sub-Caulking - Shall be non-staining, resilient closed cell polyethylene foam rod stock, size to be under at least 25% compression when finally positioned in the joint. Sub-caulking shall be one of the following or approved equal:
1. Dow Chemical - Etha-Foam
  2. Williams Products - Expand-O Foam
  3. Grace Co. - Foam Joint Filler
  4. Sonneborn - Sonofoam Closed Cell Backer Rod

**PART 3 - EXECUTION****3.01 EXAMINATION OF SURFACES**

- A. Examine all other work and surfaces to receive the work of this section, and report to the General Contractor all conditions not acceptable. Do not seal joints until they are in compliance with specifications and drawings. Commencement of work will constitute acceptance of all such conditions and surfaces to receive work of this section and lead to a waiver of any subsequent claims to the contrary.

**3.02 PREPARATION**

- A. Allow a minimum 28 days curing period for concrete, mortar or grout prior to caulking.
- B. Protect areas adjacent to joints as necessary from smear or stain and to facilitate tooling of sealant.
- C. Thoroughly clean all joints, removing all foreign matter such as dust, oil, grease, asphalt, tar, wax, rust, water, surface dirt and frost, and properly prepare surface to receive the sealant.
- D. Porous materials such as concrete, masonry or stone shall be cleaned where necessary by grinding, sand or water blast-cleaning, mechanical abrading, chemical washing or combination of these methods as required to provide a dry, clean, sound base surface for sealant adhesion.
  - 1. Masonry surfaces to be contacted by sealant shall be made free of sanded surfaces or applied coatings that could be detrimental to sealant bond.
  - 2. Loose particles present or resulting from grinding, abrading or blasting shall be removed by blowing out joints with compressed air (oil free) prior to application of primer or sealant.
- E. Non-porous surfaces, such as metal shall be cleaned of scale, rust and any coatings either mechanically or chemically as required to provide a dry, clean, sound base surface for sealant adhesion.
  - 1. Metal surfaces treated with methacrylate lacquer, bituminous paints or similar protective coatings shall have such coating removed by a solvent that leaves no residue. Previously applied primer must adhere permanently or be entirely removed.
  - 2. Solvent shall be used with clean white cloths or lintless paper towels and wiped dry with clean, dry white cloths or lintless paper towels. Do not allow solvent to air dry without wiping.
  - 3. Joint areas protected with masking tape or strippable films shall be cleaned as above after removal of tape or film.
- F. In general, use primer only where recommended by sealant manufacturer. Primer shall be applied in strict accordance with manufacturer's printed recommendations and instructions and shall be used as it comes from the container.
- G. For all control joints, sealant bond is considered critical and a primer shall be used. Joint primer shall be brush applied to both faces of the joint created and allowed to cure as recommended by the sealant manufacturer.
- H. Do no priming or caulking of joints with surfaces in less than a dry condition.

### **3.03 APPLICATION - NON-SAG URETHANE**

- A. Depth of sealant at the center of its cross section shall be uniform and approximately one half width of sealant with no depth less than one third the width. Depth of sealant at bond interface shall be uniform and approximately equal to width of sealant with no depth less than three quarters the width, except where a bond breaker is used. Backing shall be subcaulking material, or bond breaker where subcaulking material is not to be utilized.
- B. Whenever mortar joints are to be surface caulked, such as those at ends of lintels, sealant shall be provided with proper backing to obtain the reduced depth of the sealant required at the center of its cross section. Use one-half round joint subcaulking material with non-smear continuous adhesive on its flat face.
- C. Apply sealant in strict accordance with the manufacturer's directions. Apply sealant uniformly with manually operated or air operated air caulking guns, using proper size and shape nozzle tip appropriate for the joint to be treated. Use sufficient pressure to fill all voids and joints solid. Fill joints from the deepest point to the surface by holding the properly sized nozzle against the back of the joint. Work sealant if needed to insure all air is removed.
- D. Tool sealant immediately following gunning. Apply pressure to make intimate contact with the joint faces and achieve a slightly concave joint surface. Caulked joints on flush surfaces shall be neatly finished with a beading tool to a uniform appearance. Remove excess caulking and leave surface neat, smooth, clean and flush at all edges.
- E. Where appearance is considered critical, masking tape shall be applied in continuous strips in alignment with joint edge before applying sealant. Surface of tooled sealant shall be dusted with sand to dull its sheen, or otherwise treated so as to harmonize with the surrounding work in color and texture. This must be done before sealant has developed a skin coat. Carefully remove masking tape immediately upon completion of such operations and clean as required.
- F. Caulking and sealing shall be done only when the temperature is above 40°F. Caulking may be applied in temperatures as low as 20°F if the substrates are completely dry, free of moisture, and clean as described above, and, the caulking materials have been stored at 60°F or above just prior to installation.
- G. Upon completion of caulking work, all joints shall be neat and watertight with sealant material securely bonded to side of joints and unbonded to backing.
- H. Protect newly applied sealant until cured.

### **3.04 CLEANING**

- A. During and upon completion of all caulking and sealant work, remove all excess sealant, smears and related stains or soiling from adjacent surfaces. Methods are subject to the architect's approval. Use of acidic base materials will not be permitted.
- B. On nonporous surfaces, immediately remove excess sealant with solvent moistened cloth.
- C. On porous surfaces allow sealant to cure overnight, then remove by light wire brushing or sanding.
- D. All finished work shall be left in a neat, clean condition.

**END OF SECTION**

**SECTION 08 11 00 METAL DOORS & FRAMES****PART 1 - GENERAL****1.01 SCOPE OF WORK**

- A. The Conditions of the Contract and the Provisions of Division 01 apply to all work of this Section.
- B. This Section includes all labor, material, equipment and services necessary to furnish and install all hollow metal doors and frames and related items to complete the work indicated on the drawings and described in the specifications.
- C. Related Work Specified Elsewhere:
  - 1. Rough Carpentry - Section 06 10 00
  - 2. Wood Doors - Section 08 14 00
  - 3. Finish Hardware - Section 08 71 00
  - 4. Gypsum Drywall - Section 09 20 00
  - 5. Painting - Section 09 90 00

**1.02 REFERENCE STANDARDS**

- |                        |  |
|------------------------|--|
| A. ANSI/SD1-100-91     | Specifications for Steel Doors & Frames                            |
| B. ASTM E152-73        | Fire Test of Door Assemblies                                       |
| C. ANSI A115           | Door & Frame Preparation for Hardware                              |
| D. ANSI A156.7         | Standard Template Hinge Dimensions                                 |
| E. UL 63               | Standard for Fire Door Frames                                      |
| F. ASHRAE STANDARD 90P | Energy Conservation in New Building Design                         |
| G. ANSI A224.1         | Criteria for Prime Painted Steel Surfaces for Steel Doors & Frames |

**1.03 SUBMITTALS**

- A. Prepare and submit shop drawings to the Architect for approval in accordance with the requirements of Division 01.
- B. Shop drawings shall include an itemized listing of all openings, elevations of all frame types, and details of all frame sections.
- C. No material shall be fabricated until such drawings have been approved by the Architect.

**1.04 QUALITY ASSURANCE**

- A. Labeled doors and frames, as called for in the Door Schedule, shall have a physical label affixed to the fire door and frame at an authorized facility as evidence of compliance with procedures of the labeling agency.
- B. All labeled doors shall carry U.L. approved label or equal.



- C. While the Door Schedule is intended to cover all doors and sidelights, furnish all frames, door openings and sidelights, as indicated in the Contract Documents, whether listed in the door schedule or not. If there are any omissions or errors in the door schedule, bring it to the attention of the Architect prior to bid opening for clarification or instructions. No extras are allowed for omissions, changes, or corrections necessary to facilitate a complete installation.

#### **1.05 DELIVERY, STORAGE AND HANDLING**

- A. All doors shall be packaged in full cartons securely banded to the doors.
- B. Metal doors and frames shall be handled and stored in a manner that will prevent rusting, distortion or damage of any kind. They shall be stored upright in a protected area on wood runners or skids at least 4 inches high or in a manner that will prevent rust or damage.
- C. Doors and frames shall be stored in a protective shelter, or under properly vented covers. The use of non-vented plastic or canvas shelters that can create a humidity chamber shall be avoided.
- D. If the wrapper on the door becomes wet it shall be removed immediately.
- E. A 1/4 inch space shall be maintained between the doors during storage.

### **PART 2 - PRODUCTS**

#### **2.01 MANUFACTURERS**

- A. Doors and frames shall be by one of the following manufacturer's:
1. American-Standard, Steelcraft
  2. Amweld Building Products Div., American Welding & Mfg. Co.
  3. Ceco Corp.
  4. Curries Mfg. Inc.
  5. Fenestra Corporation
  6. Kewanee
  7. Pioneer Industries Div., Core Ind., Inc.
  8. Republic Builders Products Corp.

#### **2.02 MATERIALS**

- A. All material for doors and frames shall be cold rolled steel free from scale, pitting, rust or other defects which would impair strength, durability or appearance. All steels used to manufacture door faces shall meet the stretcher level standard for flatness. Steel shall conform to the following:
1. Cold Rolled Steel - ASTM A366 or ASTM A620 and A568.
  2. Hot Rolled, Pickled and Oil Steel - ASTM A569 and A568.
  3. Electrolytically deposited zinc coated steel for anchors and accessories shall comply with ASTM A591 and A568, minimum weight class "B", 0.075 oz/sq ft.
- B. Doors and frames shall be provided in the following gauges:
1. Interior Frames - 16 gauge
  2. Interior Doors - 18 gauge

**2.03 HOLLOW METAL DOORS**

- A. Construction - Doors shall be 1-3/4" thick, seamless flush doors of 16 gauge steel face constructed to Steel Door Institute Standard 100-91, Grades II & III, Model 2. Edge seams shall be welded and ground smooth for a seamless appearance, fillers or putty will not be permitted. Tops of all exterior doors shall have a flush type top.
- B. Core Doors:
1. Core Interior Doors - shall be small cell honeycomb core with face panels laminated to it.
- C. All doors shall be internally reinforced for the hardware to be applied as per the Hardware Schedule in Section 08 71 00. Hinge reinforcements shall be an internal 14 gauge continuous channel with screw preps minimum of 10 gauge equivalent. All reinforcements required to adapt hardware to metal doors and frames shall be supplied by the door supplier and/or manufacturer. Reinforcements shall be as per Table V of the ANSI/SDI-100-91 manual.
- D. Doors shall conform to the following nominal design clearances:
1. The nominal clearance between the door and frame head and jambs shall be 1/8" in the case of both single and pairs of doors.
  2. The nominal clearance between the meeting edges of pairs of doors can range from 1/8" to 1/4" (1/8" required for fire rated doors).
  3. The nominal clearance at the bottom shall be 3/4".
  4. The nominal clearance between the face of the door and doorstep shall be 1/16".
  5. All clearances are subject to a tolerance of " 1/32".

**2.04 METAL FRAMES**

- A. Construction - All frame sections shall be fabricated to the profiles indicated. All frames shall be one piece all angles, returns and miters continuously electric welded and ground smooth. All corners shall be full miters, including stops. Butting of stops, or the use of tenons will not be permitted.
- B. Reinforcements: Frames shall be reinforced as per Table V of the ANSI/SDI-100-91 manual. Hardware templates and hardware listings will be furnished by the hardware contractor under Section 08 71 00 (Finish Hardware).
- C. Anchorage:
1. Provide 12 gauge angle clips at bottom of all frames, with punched holes for securing to floor construction.
  2. Provide anchors of the type best suited for location, not over 32" apart on all jambs. Anchors shall provide sufficient anchorage to the wall in accordance with ANSI/SDI 119 Test compliance level A of one million cycles or as shown on the drawings for specific wall conditions.
  3. Provide formed spreader bars to hold unsupported ends of frame in alignment during shipping storage and construction.
- D. Accessories:
1. Provide 3 rubber door silencers for strike jambs of each frame. Glynn Johnson GJ-64 or equal.
  2. Provide mortar-tight full enclosure steel cover boxes over all mortises.

**2.05 FINISH**

- A. Doors and frames shall be thoroughly cleaned, and chemically treated to insure maximum paint adhesion. All surfaces of the door and frame exposed to view shall receive a shop applied coat of rust inhibiting primer either air dried or baked on. Prime finish shall meet the requirements of ANSI A224.1 "Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces".

**2.06 HARDWARE PREPARATION**

- A. Reinforce, drill and tap doors and frames to receive mortised hinges, locks, latches, flush bolts, concealed closers and other hardware as required. Preparation shall be in accordance with ANSI A115 where applicable.
- B. Field drilling and/or tapping for surface applied hardware shall be by Section 06 10 00.
- C. Reinforcing shall be as noted in Table V of the ANSI/SDI-100-91 manual.
- D. Hardware locations shall be as per Table VI of the ANSI/SDI-100-91 manual. Items not shown in Table VI shall be located according to the manufacturer's directions.

**PART 3 - EXECUTION**

**3.01 INSTALLATION - FRAMES**

- A. Install frames plumb, rigid and in true alignment; properly brace until built-in. Any frames not plumb and in true alignment will be rejected and shall be replaced by the Contractor.
- B. Fill all metal frames at masonry walls with mortar, solid and full, including the frame of the head. Strike the exposed joints between frames and masonry to crisp, smooth and even joints on rake out for caulking where same is indicated.

**3.02 INSTALLATION - DOORS**

- A. Install doors plumb and in true alignment in the prepared openings and fasten them to achieve the maximum operational effectiveness and appearance of the unit.

**END OF SECTION**

**SECTION 08 14 33 STILE AND RAIL WOOD DOORS****PART 1 - GENERAL****1.01 SCOPE OF WORK**

- A. The Conditions of the Contract and the Provisions of Division 01 apply to all work of this Section.
- B. Work under this Section includes all labor, materials, services and equipment necessary to furnish and install all wood doors in accordance with the drawings, schedules and this specification.
- C. Related Work Specified Elsewhere:
  - 1. Rough Carpentry - Section 06 10 00
  - 2. Metal Doors & Frames - Section 08 11 00
  - 3. Finish Hardware - Section 08 71 00
  - 4. Painting - Section 09 90 00

**1.02 REFERENCE STANDARDS**

- A. WDMA I.S. 6A - Window and Door Manufacturers Association (WDMA)
- B. AWS - Quality Standards of the Architectural Woodwork Institute (AWI). Section 9, Stile and Rail doors.
- C. NFPA 80 - Fire Doors and Windows
- D. NFPA 252 - Standard Methods of Fire Tests for Door Assemblies
- E. Underwriters' Laboratories - UL 10B (neutral pressure) and UL 10C (positive pressure) - Fire Tests of Door Assemblies
- F. ITS (Warnock Hersey) - Certification Listings for Fire Doors

**1.03 SUBMITTALS**

- A. Product Data: Submit door manufacturer's product construction data, hardware attachment performance data, specifications and installation instructions for each type of wood door, including details of core, raised panel and edge construction, trim for lite openings and similar components.
- B. Specific Product Warranty: The door shall be warranted by the manufacturer to be free of manufacturing defects for the life of the original, interior-use, installation. Warranty shall provide for repair or replacement of the door as originally furnished. Manufacturer shall elect to repair or replace defective door(s), and will assume reasonable costs associated with same. Manufacturer may, per its discretion, elect to use either its own or third party resources to resolve warranty claims.
- C. Shop Drawings: Provide the following information:
  - 1. Door type.
  - 2. Door size.
  - 3. Fire Rating.
    - a. Neutral pressure - UL 10B/UBC-43-2 or UBC- 7-2-94.
    - b. Positive pressure - UL 10C/UBC-7-2-97.
  - 4. Hardware types and locations.
  - 5. Panel Configuration
  - 6. Lite opening size and location.

7. Prefinish system type and approved color(s).

D. Samples:

1. Color samples for factory prefinishing. Manufacturer must submit samples of not less than 4" x 6" size on representative veneer or paintable surface, with sample date indicated.
2. Construction samples. Corner sections with door faces, raised panels, sticking profile, edges, and core representative of the specified door type(s). Corner samples to be not less than 12" x 12".

**1.04 QUALITY ASSURANCE**

- A. Manufacturer: Company specializing in manufacturing products specified in Section 08210 with a minimum of five years documented experience. All doors must be supplied through one Company.
- B. Quality Standard: Doors to comply with WDMA I.S. 6A (Window and Door Manufacturers Association).
- C. Fire Ratings Compliance: Fire-rated wood doors to comply with building code standards having local jurisdiction. Doors to be installed in accordance with NFPA-80.
1. Neutral Pressure Testing - UBC 43-2 or UBC-7-2-94; or UL10B.
  2. Positive Pressure Testing UBC 7-2-97 or UL10C.
- D. Label Certification: All doors requiring fire-rating will carry either UL or ITS (Warnock Hersey) label. Manufacturer's certification labels may be used for door size variations if approved by AHJ (Authority Having Jurisdiction).

**1.05 DELIVERY/STORAGE/HANDLING:**

- A. Store and protect doors in accordance with manufacturer's recommendations and WDMA. Following are general guidelines. For more specific information refer to WDMA's Appendix Section "Care and Installation at Job Site."
1. Store doors flat and off the floor on a level surface in a dry, well-ventilated building. Do not store on edge. Protect doors from dirt, water and abuse.
  2. Certain wood species are light sensitive. Protect doors from exposure to light (artificial or natural) after delivery.
  3. Do not subject interior doors to extremes in either heat or humidity. HVAC systems should be operational and balanced, providing a temperature range of 50 to 80 degrees Fahrenheit and 25% to 55% relative humidity.
  4. When handling doors, always lift and carry. Do not drag across other doors or surfaces. Handle with clean hands or gloves.
  5. Each door will be marked on top rail with opening number.

**1.06 GUARANTEE**

- A. Doors shall be guaranteed in accordance with the Manufacturers Standard Guarantee for life of door.

**PART 2 - PRODUCTS**

**2.01 MANUFACTURERS**

- A. Stile and Rail Doors shall be manufactured by Algoma Hardwoods, Inc., Eggers Industries, Industrial Millwork/Lag Design, The Maiman Company, Woodtech or approved equal.

**2.02 MATERIALS – STILE AND RAIL PANEL DOORS****A. NON-FIRE-RATED DOORS –**

General Grade Specification – Refer to WDMA I.S. 6A for more specific grade definitions. All Stile and Rail Doors shall be premium grade.

1. Construct using WDMA I.S. 6A construction, using Hot Press method for laminating door materials. Door construction of stiles and rails must include crossbanding between core material and face veneers. Edge banding and sticking profile must be solid lumber (veneered profile is not acceptable).
2. Core material for Stile and Rail Components
  - a. Structural Composite Lumber Core (SCLC) is an engineered hardwood composite sometimes referred to as LSL (Laminated Strand Lumber). The material complies with WDMA minimum performance levels for interior applications with screw holding power of 540 lbs., average modulus of rupture of 4,000 psi, average modulus of elasticity of 600,000 psi and density of 38 lbs per cubic foot.
3. Stiles (Vertical Edges) - Stiles are hardwood, one piece.
  - a. Matching - Same species as face veneer.
4. Rails (Horizontal Edges) - Rails are low density lumber or structural composite lumber (SCL) as specified in core section. SCL must meet the minimum requirements of WDMA.
5. Sticking – Sticking shall be solid lumber. Profile to match existing historic doors as approved by Architect.
6. Veneers - Veneers must be a minimum of 1/16" thick.
  - a. Veneer Grade Specified: "A"
  - b. Veneer Cut Specified: Rift
  - c. Veneer Species Specified: White Oak
  - d. Veneer Match Specified: Random
  - e. Veneer Assembly Specified: Center
7. Assembly of Stile and Rail Components – Stiles, rails, and mullions must be joined with both ½" wooden dowels and cope and stick joints and bonded with glue. Doweled butt joints or cope and stick only joints are not allowed.
8. Panel Construction — Flat panels.
9. Panel Thickness - Minimum panel thickness is required for raised and flat panels. Minimum thickness as listed based on door thickness.
 

Door Thickness	1-3/4"
Flat Panel	5/8"
10. Transom and Side Panels — Fabricate panels with same construction, exposed surfaces, and finish specified for associated doors.

**2.03 DOOR FABRICATION**

- A. FACTORY-PREFIT AND BEVEL DOORS (3°) to suit frame sizes indicated, with 1/4" prefit in width, + 0"/- 1/32", tolerances. Prefit top of door 1/8" +1/16"/-0", and undercut as designated by floor condition. For fire-rated doors comply with NFPA 80 for prefits and undercuts.

- B. FACTORY PRE-MACHINE DOORS FOR HARDWARE that is not surface applied. Locations and hole patterns to comply with specified hardware requirements as per NFPA 80 standards for doors specified; and to maintain door manufacturer's warranty.
  - 1. Specific locations for hardware will be coordinated between frame and door manufacturers.
  - 2. Specific hardware preps will be per hardware schedule(s) provided. Hardware preps to be neatly and cleanly squared as required per hardware templates.
  - 3. Metal astragals and channels to be supplied where fire-ratings will not allow metal-free edge(s).
- C. FACTORY PREPARATION FOR LIGHT OPENINGS AND LOUVERS - Cut and trim openings through doors to comply with NFPA 80 requirements where indicated, and to maintain door manufacturer's warranty.
  - 1. Wood beads and wood louvers to be compatible with face veneer. Profiles and installation per door manufacturer's standard(s).

## **2.04 FINISHING**

- A. Factory Finishing – All doors (including beading and mouldings) to be finished at the factory, with system meeting performance properties equivalent to AWS system 11 catalyzed polyurethane per AWS Section 5. Factory pre-finished doors to be individually protected with either transparent or opaque (cherry, mahogany, teak, walnut) poly-wrap at the factory. Final color, build, and sheen to be approved by architect based on actual review samples.
- B. FINISH TYPE
  - 1. Transparent Stain - Transparent finishes provide a clear protective coating over the wood, allowing the natural color and grain of the selected wood species to provide the appearance desired by the specifier and owner using manufacturer's standard finish options, color to be selected by Architect. Color to match existing doors – custom color as required.

## **PART 3 - EXECUTION**

### **3.01 INSTALLATION**

- A. Hang doors in adequately braced and nailed or otherwise secured square and plumb frames with clearances of not more than 1/8 inch at each side and head; clearance at bottom 1/2 inch or as required for floor covering, carpeting or thresholds. After fitting hardware, remove same until all surfaces cut for hardware and ends and edges are sealed. Hang doors in perfect operating condition.

### **3.02 EXAMINATION**

- A. Confirm that frames comply with type, size, location and swing requirements and that they are installed plumb and square.
- B. Inspect doors for any damage, manufacturing defects or prefinish inconsistency, e.g. wrong color or poor finish.
- C. If frames and doors pass inspections (see A and B above), proceed to installation. If there are any issues in either frames or doors, do not proceed to installation. Contact appropriate supplier to correct unsatisfactory conditions, and proceed with installation only after corrections have been made.

### **3.03 INSTALLATION**

- A. Installation of wood doors to comply with WDMA IS 1A, specific door manufacturer's specific instructions, and NFPA 80.

**3.04 ADJUSTING AND PROTECTING**

- A. After installation of door in frame, operate door to ensure that the door swings freely and that all hardware functions correctly. If not, make adjustments as required to provide an operable opening.
- B. If required, protect doors following installation from damage that may occur as a result of project completion.

**END OF SECTION**



**SECTION 08 31 13 - ACCESS DOORS****PART 1 - GENERAL****1.01 SCOPE OF WORK**

- A. The Conditions of the Contract and the Provisions of Division 01 apply to all work of this Section.
- B. This Section include all materials, equipment and services necessary to furnish access doors as shown on drawings and specified herein.
- C. Materials furnished under this Section shall be installed under Section 09 20 00 Gypsum Drywall System, for access doors in drywall.

**1.02 SYSTEM DESCRIPTION**

- A. Lockable, non-rated flush access doors for walls, ceilings and pipe chases.

**1.03 SUBMITTALS**

- A. Prepare and submit shop drawings to the Architect for approval in accordance with the requirements of Division 01. For manufacturer's standard items requiring no special modifications or fabrication manufacturer's literature, appropriately marked, will be accepted in lieu of shop drawings. No material shall be ordered until such drawings have been approved.

**PART 2 - PRODUCTS****2.01 MANUFACTURERS**

- A. Access doors shall be as manufactured by one of the following or approved equal:
  - 1. J.L. Industries, 4450 W. 78th St. Circle, Bloomington, Mn. 55435; (612) 835-6850
  - 2. Larsen's Manufacturing Co., 7421 Commerce Lane N.E., Minneapolis, Mn. 55432, (612) 571-1181.
  - 3. Nystrom, Inc., 1701 Madison Street N.E.; Minneapolis, Mn. 55413, 800-547-2635.

**2.02 NON-RATED FLUSH ACCESS DOORS**

- A. Access doors for drywall partitions shall be as indicated on the drawings with a galvanized steel drywall bead with a textured surface to allow joint compound to be applied to conceal the flange, as follows:
  - 1. Frame - 16 gauge steel.
  - 2. Door - 14 gauge steel.
  - 3. Finish - Baked on primer.
  - 4. Hinge - Concealed spring hinge to allow 175 degree opening.
  - 5. Latch - Flush screwdriver operated stainless steel cam latch.
  - 6. Lock - Cylinder lock with 2 keys.
  - 7. Gasket - UL listed smoke seal.

B. Access doors shall be as manufactured by one of the following or approved equal:

1. J.L. Industries - Model WB
2. Larsen's, Inc. - Model L-DWC
3. Nystrom, Inc. - WB

**PART 3 - EXECUTION**

**3.01 INSTALLATION**

A. Install access doors in locations shown on drawings in strict accordance with manufacturer's instructions.

**END OF SECTION**

**SECTION 08 71 00 FINISH HARDWARE****PART 1 - GENERAL****1.01 SCOPE OF WORK**

- A. The Conditions of the Contract and the Provisions of Division 01 apply to all work of this Section.
- B. This Section shall include all material as shown or called for on the drawings and as specified herein, delivered to the job site.
- C. Where hardware is to be applied to material of other trades requiring special mortising, tapping, reinforcing or similar work, the supplier shall furnish templates or said hardware in sufficient time so that these materials may be fabricated and installed in the normal progress of the work.
- D. Material specified under this Section shall be installed under Section 06 10 00 (Rough Carpentry). This supplier shall furnish complete and detailed instructions regarding installation and adjustment of all items specified herein.
- E. Related work specified elsewhere:
  - 1. Metal Doors & Frames - Section 08 11 00
  - 2. Stile and Rail Wood Doors - Section 08 14 33

**1.02 SUBMITTALS**

- A. Prepare and submit shop drawings to the Architect for approval in accordance with the requirements of Division 01. Submit a complete schedule of all hardware indicating identical hardware group numbers as listed herein. Architect's approval of schedule is limited to approval of products and does not relieve hardware contractor of responsibility to furnish hardware in all quantities required in accordance with the plans and specifications and to suit the function of each door.

**1.03 QUALITY ASSURANCE**

- A. Comply with applicable Fire and Building Codes and Underwriter's Laboratories, Inc., Building Materials List.
- B. While Hardware Schedule is intended to cover all doors and other movable parts of the building and establish a type and standard of quality, examine plans and specifications and furnish proper hardware for all openings whether listed or not. If there are any omissions in hardware groups call them to the attention of the Architect prior to bid opening for instructions; otherwise list will be considered complete. No extras will be allowed for omissions, changes, or corrections necessary to facilitate proper installation.

**1.04 DELIVERY, STORAGE AND HANDLING**

- A. All items shall be properly and carefully packed to guard against damage in transit. Each set shall be packed separately and shall be clearly marked to show its contents and the door opening in the building for which it is intended.
- B. Store material in dry, protected areas.

**1.05 GUARANTEE**

- A. Per General Conditions, guarantee all hardware work for two (2) years. Closers for ten (10) years.

- B. The guarantees for above noted items shall be in writing by an accredited representative of the manufacturer and shall be delivered to the Architect for checking and transmittal to the Owner. Guarantees shall include a statement that accredited representatives have checked installation and have found it correct. Period of guarantee shall begin from the date of substantial completion.
- C. Hardware proving to be defective as to materials or construction within its above mentioned guarantee period shall be replaced at the hardware supplier's expense including labor for removal and reinstallation.
- D. The hardware supplier shall deliver to the Architect for transmittal to Owner three (3) sets of wrenches and/or other tools necessary for the maintenance of finish hardware, including locks, door closers, etc.

## PART 2 - PRODUCTS

### 2.01 MANUFACTURERS

- A. Hinges - Stanley, Hager, McKinney, Bommer, P.B.B.
- B. Locksets - Corbin/Ruswin
- C. Exit Devices - Von Duprin, Precision, Corbin/Ruswin, American Device, Yale
- D. Door Closers - LCN, Norton, Yale, Dorma
- E. Door Stops & Holders - Glynn Johnson (GJ), Ives, Quality, Hager, Door Controls Int'l.
- F. Smoke Gaskets - Reese, Pemko, National Guard Products, Ultra Industries
- G. Electronic Strike - HES
- H. Flush Bolts - Ives, DCI, Glynn-Johnson
- I. Electronic Strike - HES
- J. Astragal - Reese, Pemko

### 2.02 HINGES

- A. The following is a table of hinge types in manufacturers' catalog number, which are considered equal:

	Stanley	Hager	McKinney	Bommer	P.B.B.
Type 1	FBB199	SL BB1199	T4A3386	BB5005	4B21/4B51
Type 2	FBB168	BB1168	T4A3786	BB5004	4B81
Type 3	FBB179	BB1279	TA2714	BB5000	BB81
Type 4	F179	BB 1279T2714	5000	PB81	

B. Hinge types shall be furnished as follows:

1. All exterior doors - Type 1
2. All interior openings over 40" wide and all vestibule doors - Type 2
3. All interior doors 36" through 40" wide without closer and interior doors up to 40" wide with a closer - Type 3.
4. All interior doors through 36" wide without a closer - Type 4.

C. Hinge quantities and sizes shall be as follows:

1. Two hinges for doors 60" in height and under.
2. Three hinges for doors 61" through 89" in height.
3. Four hinges for doors 90" through 120" in height.
4. Provide one additional hinge for every additional 30" in height over 120".
5. Dutch doors - 4 hinges.

D. Furnish size as follows unless otherwise noted in groups:

1. 1-3/4" Interior Doors 4-1/2" x 4-1/2"
2. 1-3/4" Exterior Doors 4-1/2" x 4-1/2"
3. Provide proper hinge width to clear trim and allow full 180 degree swing.

E. All Hinges shall have flat button tips, unless otherwise noted in hardware group. All Hinges shall be modern Slim Line type.

F. Hinges for all lockable doors opening outward shall have non-removable pin (NRP). All other hinges shall have non-rising pins.

## 2.03 LOCKSETS

A. Approved locks shall be of quality and design as follows:

1. Corbin/Ruswin - ML2000 Series – Princeton PSM

Function to be as per schedules.

2. 2 3/4" backset.
3. Provide wrought boxes and strikes with proper lip length to protect trim, frame, or inactive leaf. Where required, provide open back and protected back strikes to allow practical and secure operations.
4. Furnish abrasive coating on outside levers that lead to loading platforms, stages, mechanical and electrical rooms, stairs other than exit stairs, and other hazardous locations.

## 2.04 EXIT DEVICES

A. All Exit Devices shall be the product of one manufacturer. Functions shall be as noted on the schedule. Exit devices shall be as manufactured by one of the following or approved equal:

1. Von Duprin - 99 Series
2. Precision - Apex Series
3. Corbin/Ruswin - ED9000 Series
4. Yale - 7000 Series
5. Sargent - 80 Series

- B. Furnish exit device types and functions as specified in the hardware schedule.
- C. Lever handles supplied with exit devices shall match the design specified for locks and latches.

## **2.05 DOOR CLOSERS**

- A. Closers shall be of rack and pinion construction with rack and pinion of heat treated steel and with cast hydraulic iron case. Closing the doors shall be controlled by two independent valves. Closers shall have fully adjustable back check by means of third valve. All closers shall be complete with spring power adjustment.
- B. All closers to be surface applied complete with a rectangular cover.
- C. Closers shall be as manufactured by one of the following or approved equal:
  - 1. LCN - 4040
- D. This Contractor is responsible for correct sizing and mounting application of closers as recommended by manufacturer.

## **2.06 DOOR STOPS**

- A. Wall door stops shall be as manufactured by one of the following or approved equal:
  - 1. Glynn-Johnson - 50W or 60W
  - 2. Ives - 407 or 4071/2
  - 3. Quality - W307TB or W302TB
  - 4. Hager - 232W or 236W
  - 5. Door Controls Int'l - 3210T or 3211T
- B. Furnish wall stops in all locations requiring stops as noted in the hardware schedule unless there is casework or other obstructions that will prevent the use of wall stops, floor stops shall be used in these locations.

## **2.07 SMOKE GASKETS**

- A. Smoke seals for labeled doors shall be Polyprene compound, self adhering type; as manufactured by one of the following or approved equal:
  - 1. Reese - 797
  - 2. Pemko - PK55
  - 3. National Guard Products - 2525
  - 4. Ultra Industries - WS280

## **2.08 ELECTRIC POSWER TRANSFERS, POWER SUPPLY AND ELECTRIC STRIKES**

- A. Acceptable manufacturer and respective catalog number:
  - 1. Power Transfer - Von Duprin EPT-10
  - 2. Electric Strikes - HES 1006 Series

**2.09 FLUSH BOLTS**

- A. Manual flush bolt for non-rated doors shall be as manufactured by one of the following or approved equal:
1. Glynn-Johnson - FB6W Manual Flush Bolts
  2. Ives - 358
  3. Door Controls Int'l. - 790F

**2.10 ASTRAGALS**

- A. Meeting Stile Astragals, Acceptable manufacturers and respective catalog numbers:
1. Reese 183 SP
  2. Pemko 3576
- B. Where specified in the hardware groups, furnish the above products unless otherwise detailed.

**2.11 KEYING**

- A. System – All locks and cylinders shall be keyed to the existing Grand Master Key System.
- B. Quantity – Provide two (2) Grand Master Keys, two (2) Master Keys for each Master Key set, and two (2) Change Keys for each lock or cylinder.
- C. Meeting – The hardware supplier shall prepare a preliminary keying schedule, and then meet with the Owner, if required, to review the proposed key schedule and make any changes required in order to accommodate the Owner's requirements.
- D. Delivery of Keys – Master Keys and grand master Keys shall be sent to the Owner via Registered Mail, or otherwise as required by the Owner, to the individual and address that the Owner specifies at the keying meeting.

**2.12 FINISHES**

- A. Unless otherwise noted, all finishes shall be as follows:

Hinges, interior	US 10 BHMA 612
Locksets	US 10 BHMA 612
Exit Device	US 10 BHMA 612
Door Closers	US 10 BHMA 612
Door Stops	US 10 BHMA 612
Miscellaneous	US 10 BHMA 612

**PART 3 - EXECUTION****3.01 INSTALLATION**

- A. Hardware shall be installed as per manufacturer's instructions.
- B. Furnish hardware with all necessary screws, bolts or other fastenings of suitable size and type to anchor hardware in position for heavy use and long life. Fastenings shall be furnished where necessary with expansion shields, bolts, toggle bolts, anchors according to the material to which it is applied and as recommended by manufacturer subject to approval by Architect.

### 3.02 SCHEDULES

A. Install hardware as per following schedule:

#### GROUP 1

Doors – 002 - All hardware US 32D or compatible

Hinges	
Exit Device	Von Duprin EL 9975L
	Trim 996-M
Closer	LCN 4040
Smoke Gasket	
Power Transfer	Von Duprin EPT - 10
Power Supply	Von Duprin PS 914-900-2RS
Stop	
Card Reader (by others)	

#### GROUP 2

Doors - 003- All hardware US 32D or compatible

Hinges	
Exit Device	Von Duprin EL 9927L
	Trim 996-R/V
Closer	LCN 4040
Power Transfer	Von Duprin EPT - 10
Power Supply	Von Duprin PS 914-900-2RS
Manual Flush Bolts	
Smoke Gasket	
Stop (2)	
Card Reader (by others)	
Astragal	

#### GROUP 3

Doors – 207B and 401

Hinges	
Lockset	Corbin ML 2057
Closer	LCN 4040
Smoke Gasket	
Stop	
Electric Strike	HES 1006-KM
Card Reader (by others)	

#### GROUP 4

Doors – Existing Data Closets (See drawings)

Electric Strike	HES 1006-KM
Remainder of hardware is existing.	

**END OF SECTION**



**SECTION 09 20 00 GYPSUM DRYWALL****PART 1 - GENERAL****1.01 SCOPE OF WORK**

- A. The Conditions of the Contract and the Provision of Division 01 apply to all work of this section.
- B. The work required under this Section shall include all labor, materials, services and equipment necessary to furnish and install all gypsum drywall, metal framing studs, accessories and to do all drywall taping. All work shall be in accordance with the drawings and as specified herein.
- C. Related Materials Specified Elsewhere:
  - 1. Rough Carpentry - Section 06 10 00
  - 2. Caulking & Sealants - Section 07 90 00
  - 3. Metal Doors & Frames - Section 08 11 00
  - 4. Painting - Section 09 90 00

**1.02 REFERENCE STANDARDS**

- |                    |   |
|--------------------|---|
| A. ASTM C36 Type X | Gypsum Wallboard  |
| B. ASTM C475       | Joint Compound  |
| C. ASTM C1047      | Accessories   |
| D. ASTM C645       | Steel Studs   |
| E. ASTM C525       | Galvanized Coating  |
| F. ASTM C1002      | Screws  |
| G. ASTM E 413      | Standard Classification for Rating Sound Insulation   |
| H. ASTM E 90       | Standard Method for Laboratory Measurement of Airborne-Sound Transmission Loss of Building Partitions |
| I. ASTM C79 Type X | Exterior Gypsum Sheathing   |

**1.03 DELIVERY STORAGE AND HANDLING**

- A. All materials shall be delivered to the site in their original unopened packages and stored in an enclosed shelter providing protection from damage and exposure to the elements. Damaged or deteriorated materials shall be removed from the job site.
- B. Gypsum wallboard shall be stored on edge, long dimension.

**1.04 SCHEDULING**

- A. Gypsum wall board shall not be installed or finished until temperatures within the building can be maintained within the 55 degree to 70 degree range. Adequate ventilation shall be provided to carry off excess moisture.

**PART 2 - PRODUCTS****2.01 MANUFACTURERS**

- A. Gypsum drywall, accessories and framing systems shall be by United States Gypsum, Gold Bond, Georgia Pacific or approved equal.

## **2.02 GYPSUM DRYWALL**

- A. Gypsum Drywall - 5/8" or as shown on drawings gypsum wallboard, type X designation, with tapered edge. Gypsum Drywall shall be as manufactured by one of the following or approved equal:
1. United States Gypsum - Firecode C
  2. Gold Bond - Fire-Shield; conforming to ASTM C36 type X
  3. Georgia Pacific - Fire-Stop Gypsum Board

## **2.03 NON-LOAD BEARING STEEL FRAMING**

- A. Metal Studs - 20 gauge, galvanized steel, 1-5/8", 3-5/8" & 6" as shown on drawings.
- B. Stud Track - 20 gauge, galvanized steel, 1-5/8", 3-5/8" & 6" as shown on drawings.

## **2.04 ACCESSORIES**

- A. Drywall Screws - Type "S" self drilling screws as follows:
1. 3/8" long for fastening studs to track.
  2. 1-1/8" long for fastening wallboard to studs, 3" for double layer attachment.
- B. Corner Bead - 1-1/4" x 1-1/4" galvanized steel with perforated flanges, conforming to ASTM C1047.
- C. Casing Bead - Galvanized steel for 5/8" wallboard or as required, type that requires joint treatment, conforming to ASTM C1047. Casing bead shall be part of the total drywall system as manufactured by one of the following or equal:
1. Gold Bond - No. 100 casing bead
  2. United States Gypsum - 200 Series, No. 200-A-J
- D. Control Joint - Control joint shall be a vinyl extrusion conforming to ASTM C1047 or roll formed zinc. Control joint shall be as manufactured by one of the following or approved equal:
1. Gold Bond - E-Z Strip Expansion Joint
  2. United States Gypsum - Sheetrock Zinc Control Joint No. 093
- E. Acoustical Sealant - one part, butyl, non-drying, non-hardening, non-migrating, permanently flexible acoustical sealant. Sealant shall be as manufactured by one of the following or approved equal:
1. Ohio Sealants Inc. - Sound Sealant Rubber Base
  2. Pecora - Acoustical Sealant
  3. Tremco -Acoustical Sealant
- F. Sound Insulation - Fiberglass batts, unfaced, friction fit, conforming to ASTM C665, ASTM E 90, "Standard Method for Laboratory Measurement of Airborne-Sound Transmission Loss of Building Partitions," ASTM E 413, "Standard Classification for Rating Sound Insulation", Type I, 3-1/2" minimum thickness. Sound insulation shall be as manufactured by one of the following or approved equal:
1. Owens Corning - Noise Barrier Batts
  2. Schuller - Sound Control Batts
  3. Certainteed - Sound Control Batts
  4. Johns Manville - Sound Control Batts

**2.05 TAPING & FINISHING MATERIALS**

- A. Joint Tape - Center creased for folding with edges of each side buffed for better bonding.
- B. Joint Compound - Pre-mixed, vinyl based, all purpose compound.

**PART 3 - EXECUTION****3.01 EXAMINATION OF SURFACES**

- A. This Contractor shall thoroughly examine all surfaces which are to receive his materials and report any defects in same to the Architect in writing. The Architect will cause defects to be corrected. Starting of any work will imply acceptance, by this Contractor, of the surfaces as suitable to receive his materials.
- B. All work shall be accomplished with mechanics thoroughly skilled in the application of the specified materials and workmanship shall be the very best of which they are capable. Any directions furnished by the manufacturer regarding the installation of his materials shall be faithfully followed.
- C. Maintain a uniform room temperature between 55°F. and 70°F. in cold weather during application and until completely dry or occupied. Provide adequate ventilation.
- D. All gypsum drywall surfaces shall be taped, sanded and left in a condition suitable for a painters finish.

**3.02 INSTALLATION - STUDS**

- A. Interior Partition Studs:
  - 1. Align floor and ceiling tracks to assure plumb partition. Secure track to floor and ceiling with fasteners located 16" on center. At ceiling, track shall extend to steel deck, or concrete pan deck.
  - 2. Position studs in track 16" on center by rotating into place for a friction fit.
  - 3. Studs adjacent to door and window frames, partition intersections and corners shall be secured to track with a 3/8" type "S" pan head screw through each flange of stud and track.
  - 4. Provide a double stud at each door jamb.

**3.03 INSTALLATION - WALLBOARD PARTITIONS**

- A. Gypsum wallboard shall be cut by scoring and breaking, or by sawing, working from the face side. Where board meets projecting surfaces, it shall be scribed neatly.
- B. Gypsum boards of maximum practical length shall be used so that an absolute minimum number of joints occur. Boards shall be brought into contact with each other but not be forced into place.
- C. Wallboard joints at openings shall be located so that no end joint will align with edges of opening. End joints shall be staggered, and joints on opposite sides of a partition shall not occur on the same stud. Wallboard joints shall not occur within 12" of the corners of door frames.
- D. Wallboard shall be installed with its long dimension parallel to studs. Butt joints shall be located over center of studs. Joints on opposite sides of partitions shall not occur on the same stud. End joints shall be staggered. Wallboard shall be attached to studs with 1- 1/8" self-drilling drywalls screws, spaced 12" on center in the field of the board; 8" on center at butt joints, and not less than 3/8" from edges.

- E. Corner beads shall be installed at all outside corners. Casing beads shall be installed where wallboard surface butts against other material.
- F. Gypsum wallboard installer shall cut and fit wallboard around all ductwork that passes through wallboard.
- G. Install acoustical sealant in locations as follows:
  - 1. Bottom of Partitions - Apply a round bead of sealant at each side stud track before setting gypsum board. Set gypsum board into sealant to form complete contact with adjacent materials.
  - 2. Top and Sides of Partitions Abutting Existing Construction or Non-acoustical New Construction - After gypsum board is installed apply acoustical sealant to provide full contact with adjacent existing surfaces at each side of the partition.
  - 3. Cut Outs - Backs of electrical boxes, pipes, ducts, and other equipment penetrating the wall surface shall be buttered with sealant and perimeter edges of all items sealed with sealant.
- H. Install acoustical insulation in partitions as shown on the drawings. Extend insulation full thickness over the entire area to be insulated. Fit insulation between framing members. Cut and fit tightly around obstructions and fill voids with insulation to insure a snug fit. Fill cracks and voids around outlet boxes and other built-in wall accessories.

### 3.04 CONTROL JOINTS

- A. Gypsum panel surfaces shall be isolated with control joints or other means where:
  - 1. Partition, furring or column fireproofing abuts a structural element (except floor) or dissimilar wall or ceiling.
  - 2. Ceiling or soffit abuts a structural element, dissimilar wall or partition or other vertical penetration.
  - 3. Construction changes within the plane of partition or ceiling.
  - 4. Partition or furring run exceeds thirty feet.
  - 5. Ceiling dimensions exceed fifty feet in either direction with perimeter relief, thirty feet without relief.
  - 6. Exterior soffits exceed thirty feet in either direction.
  - 7. Where wings of "L", "U" and "T" shaped ceiling areas are joined.
  - 8. Where expansion or control joints occur in the exterior wall.
- B. Where gypsum board systems abut dissimilar materials, gypsum board shall be isolated by installing a casing bead within a 1/4" of the dissimilar material and sealing the joint with either acoustical sealant as specified above for sound insulated partitions or caulking as specified under Section 07900.
- C. Ceiling height door frames may be used as control joints. Less than ceiling height frames shall have control joints extending to the ceiling from both corners. Window openings shall be treated similar to doors with joint extending to the floor as well as the ceiling. Control joints in gypsum board to gypsum board configurations shall be formed using expansion joint formers as specified above. Joints shall be caulked with sound sealant or caulking as specified in Section 07900 as appropriate to the condition.
- D. Control joints in fire rated construction shall be formed with double studs and expansion joint former and backed with safing insulation as specified under Section 07270.

### 3.05 JOINT AND CORNER FINISHING

- A. Joint compound shall be thoroughly mixed in accordance with manufacturer's printed instructions.

- B. Uniform thin layer, approximately 4" wide, shall be applied over joint. Center tape over joints and embed in the compound leaving sufficient compound under tape to provide bond. Apply first layer of compound to screw head dimples.
- C. After compound is thoroughly dry, tape shall be covered with layer of compound spread over tape approximately 3" on each side of tape and feathered out at the edges. Apply second layer of compound to screw head dimples. Apply first layer of compound to corner beads.
- D. After compound is thoroughly dry, apply final layer of compound over tape slightly crowned over joint and edges feathered out approximately 3" beyond preceding coat. Apply final layer of compound to screw head dimples. Apply final layer to corner beads, feathered out on both sides approximately 9" from exposed metal nose. Apply smooth feathered layer at casing beads.
- E. Sand, where necessary, following application of each layer of compound. Take care not to roughen paper surface of wallboard. All wallboard and treated areas shall be smooth and ready for decoration.

**END OF SECTION**

**SECTION 09 23 12 - PLASTER PATCHING****PART 1 - GENERAL****1.01 SCOPE OF WORK**

- A. The Conditions of the Contract and the provisions of Division 01 apply to all work of this Section.
- B. This Section includes all labor, materials, equipment and services necessary to furnish and install all plaster patching and associated metal framing as shown on the drawings and specified herein.
- C. Related Work Specified Elsewhere:
  - 1. Gypsum Drywall - Section 09 20 00
  - 2. Painting - Section 09 90 00

**1.02 REFERENCES**

- A. ASTM C35 - Inorganic Aggregates for use in Gypsum Plaster
- B. ASTM C587 - Gypsum Veneer Plaster

**1.03 SUBMITTALS**

- A. Submit manufacturer's installation instructions for each product specified.

**1.04 QUALITY ASSURANCE**

- A. Prior to starting any work this Contractor shall do a sample wall area to show the texture of the new plaster system to show how the installer will match the new finish to the existing finish. Sample shall be done in a area of new work that is adjacent to the existing plaster.
- B. Do not start any work until this sample wall has been approved by the Architect. All work shall match the approved sample.

**1.05 DELIVERY, STORAGE AND HANDLING**

- A. All materials shall be shipped to the job site in manufacturer's original packaging showing the manufacturer's name and product brand name.
- B. Store materials inside and protected from damage by the elements. Protect metal framing and accessories from bending.

**PART 2 - PRODUCTS****2.01 MANUFACTURERS**

- A. Gypsum plaster and associated accessories shall be as manufactured by one of the following or approved equal:
  - 1. Gold Bond
  - 2. United States Gypsum

## **2.02 PLASTER**

- A. Gypsum Plaster - shall be a single layer application veneer plaster complying with ASTM C587. Veneer plaster shall be as manufactured by one of the following or approved equal:
  - 1. Gold Bond - Uni-Kal Veneer Plaster
  - 2. United States Gypsum - Diamond Interior Plaster Finish
- B. Base Plaster - Base plaster for areas of the existing plaster that need to be patched shall be gypsum base plaster conforming to ASTM C587. Base plaster for patching shall be as manufactured by one of the following or approved equal:
  - 1. Gold Bond - Kal-Kote Base Plaster
  - 2. United States Gypsum - Custom Veneer Basecoat Plaster
- C. Sand - sand for texturing the veneer plaster shall comply with ASTM C35.
- D. Water - potable

## **2.03 ACCESSORIES**

- A. Corner Bead - formed steel nose with 1-1/8 inch expanded metal flanges, galvanized, complying with ASTM C1047.
- B. Casing Bead - J shaped steel bead as required for base thickness with an expanded metal flange.

## **2.04 MIXES**

- A. Veneer plaster shall be mixed in strict accordance with the manufacturer's directions and in accordance with ASTM C842. Sand shall be added to the mix as required to obtain a finish that matches the finish of the existing walls.

# **PART 3 - EXECUTION**

## **3.01 INSTALLATION - GENERAL**

- A. Install plaster in strict accordance with the manufacturer's instructions.

## **3.02 PLASTER PATCHING**

- A. Existing plaster areas that are disturbed by the construction operations shall be patched to match existing surfaces.
- B. Install Diamond Metal Lath as per manufacturer's instructions as required to existing framing members or existing metal lath.
- C. Install Base Plaster as per manufacturer's instructions to the thickness required to match the existing surface. Apply scratch (first) coat with sufficient material and pressure to form good full keys on metal lath and good bond to other bases, and then cross rake. Apply brown (second) coat after scratch coat has set firm and hard. Bring out to grounds and straighten to conform to the existing surface with rod and darby without the use of additional water. Leave rough to receive finish coat as specified below.

**3.03 VENEER PLASTER INSTALLATION**

- A. When joint treatment has set and is dry, apply a thin tight scratch coat over the entire working area. Immediately double back with material from the same batch to a nominal 1/16 inch to 1/32 inch thickness.
- B. Texture finish coat as required to match the existing plaster surfaces and the approved sample.
- C. Point around trim and other work. Cut out and patch defective and damaged plaster. Patch plaster to match existing work in texture and finish.

**3.04 CLEAN UP**

- A. At the completion of the finish plaster work, clean all plaster from beads, screeds, metal base and metal trim, leaving work ready for decoration. Decoration shall be by Section 09 90 00.
- B. Remove all plaster rubbish, excess material, scaffolding, tools and equipment from the building, leaving floors broom clean.

**END OF SECTION**



**SECTION 09 51 00 ACOUSTICAL CEILINGS****PART 1 - GENERAL****1.01 SCOPE OF WORK**

- A. The Conditions of the Contract and the Provision of Division 01 apply to all work of this Section.
- B. This Section includes all labor, materials, equipment and services necessary to install all acoustical tile panels and suspension system as shown or called for on the drawings and schedules and as specified herein.
- C. Refer to electrical and mechanical drawings for location of mechanical and electrical fixtures in ceiling areas.

**1.02 REFERENCES**

- |                         |  |
|-------------------------|--|
| A. ASTM E84, 0-25       | Flame Spread                                     |
| B. ASTM E111            | Fire Rating                                      |
| C. FED. SPEC. SS-S-118B | Flame Spread                                     |
| D. ASTM C635            | Metal Suspension Systems                         |
| E. ASTM C636            | Installation of Mechanical<br>Suspension Systems |

**1.03 SYSTEM DESCRIPTION**

- A. Lay-in ceiling system shall be 2 x 2 mineral fiber tile, with reveal edge in a metal grid.

**1.04 SEQUENCING AND SCHEDULING**

- A. Do not install acoustical and gypsum board materials until proper temperature and humidity conditions can be maintained before, during and after installation. Interior concrete work, masonry, plastering and other wet operations shall be complete and dry. Windows and doors shall be in place and glazed, and the permanent heating and ventilating systems shall be installed and operating where necessary.

**1.05 EXTRA MATERIALS**

- A. Furnish one (1) carton of each type of ceiling tile on the job for the Owner at the completion of the building.

**PART 2 - PRODUCTS****2.01 MATERIALS - CEILINGS**

- A. Ceiling tile for lay-in ceilings shall be fire rated 24" x 24" fissured ceiling tile with a reveal edge as manufactured by one of the following or approved equal:
  - 1. USG Interiors – Eclipse Climaplus 76775
- B. Panels shall meet the requirements of Class A (Federal Specification SS-S-118B) and a flame spread classification of 0-25 (ASTM E-84).

## **2.02 SUSPENSION SYSTEM**

- A. Ceiling suspension system for non-rated ceilings shall be double web, direct hung 15/16" ceiling grid. Provide grid system for 24" x 24" and 24" x 48" lay-in tile as shown on the drawings. Finish to be baked enamel to match ceiling tile.
- 1. Donn - DX Snap-Grid System

## **2.03 HOLD DOWN CLIPS**

- A. Furnish and install ceiling hold down clips for all lay-in ceilings that are installed in Vestibules or within ten feet of an exterior door.

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION OF SURFACES**

- A. Examine work of others to support suspension system and surfaces to receive acoustical materials before commencing work. Do not proceed until conditions which would result in a less than first class installation are satisfactorily corrected.
- B. Commencing work shall be construed as acceptance of the supports or surfaces by this contractor as satisfactory to receive his work.

### **3.02 WORKMANSHIP**

- A. Cooperate with mechanical and electrical contractors in locating and spacing fixtures, diffusers and similar items located in ceiling.
- B. Lay out pattern in accordance with reflected ceiling plans. Where not otherwise indicated, lay out in such a manner that margins on opposite sides of rooms are equal and greater than 1/2 tile in width.
- C. Main runners shall be hung by securely tied wire hangers and be accurately leveled. Hangers shall be spaced 4' o.c. according to system used. Hangers runners and cross tees shall be spaced to prevent deflection in excess of 1/360 of the span of the cross tee or runner. Extra hangers shall be provided at or near light fixtures supported by the grid system. Installation shall be made in accordance with job conditions recommended in the current bulletin of the Acoustical Materials Association.
- D. Suspension systems shall not be supported from electrical conduit or mechanical ducts, pipes or equipment. Where spans exceed the recommended or specified spans, furnish larger main runner channels or additional reinforcing members, hangers, stiffening or bracing as necessary to support the loads without exceeding the specified allowable deflection. No swing hangers will be permitted.

### **3.03 INSTALLATION**

- A. Install main runners and cross tees to form required grid pattern. Install edge moldings at walls and vertical projections through ceiling. Suspension system shall be installed level, true to plane, at the required elevation and pattern with finished surfaces undamaged.
- B. Install acoustical tile panels in suspension systems strictly according to the manufacturer's recommendations. Check level of system during installation, and maintain a level and true plane.
- C. Install hold down clips in all Vestibule ceilings or within ten feet of an exterior door.

**3.04 INSTALLATION - PERIMETER TRIM**

- A. Installer to verify actual field dimensions prior to installation and that there is adequate support for the system.
- B. Perimeter trim shall be installed only after major above ceiling work is complete and ceiling suspension grid is complete.
- C. Install trim in strict accordance with the manufacturer's instructions and approved shop drawings.
- D. Snap attach splice plates to join perimeter trim.
- E. Attach grid clips to perimeter trim then attach to each main runner and cross tee that intersects the perimeter trim. Set screw for firm attachment.
- F. Maximum deflection not to exceed 1/360 of the span.

**3.01 CLEANING**

- A. Following installation, clean adhesive, dirt, finger marks and other discolored spots from the surface of the units in a manner and with the materials recommended by the manufacturer. Replace dirty, discolored, damaged and improperly applied units.

**END OF SECTION**

**SECTION 09 65 00 RESILIENT FLOORING****PART 1 - GENERAL****1.01 SCOPE OF WORK**

- A. The Conditions of the Contract and the Provision of Division 01 apply to all work of this Section.
- B. This Section includes all labor, materials, equipment and services necessary to furnish and install all resilient flooring required to complete the work in accordance with the drawings, schedules and this specification.

**1.02 REFERENCE STANDARDS**

- A. ASTM E-648 Class 1      Radiant Flooring Panel
- B. ASTM E-84 Class A      Flame Spread
- C. ASTM E-662              Smoke Density

**1.03 SUBMITTALS**

- A. Submit samples of each type, color and pattern of resilient flooring. Architect will select colors from standard stock colors.
- B. Allow for one color for each type floor tile to be used throughout the project.
- C. Allow for one color of base to be used throughout the project.

**1.04 DELIVERY STORAGE AND HANDLING**

- A. Deliver all materials to the site in original manufacturer's unopened containers, with labels showing manufacturers name and product contained therein.
- B. Store materials in a protected area, sufficiently heated to prevent adhesives from freezing.

**PART 2 - PRODUCTS****2.01 MANUFACTURERS**

- A. Vinyl Composition Tile - Armstrong, Tarkett, Flextile, Mannington or approved equal.
- B. Rubber Base - Roppe, Johnsonite, VPI, Mercer Products Company, Inc. or approved equal
- C. Rubber Stair Treads
- D. Accessories - Armstrong, Tarkett, Mercer Products Company, Inc. or approved equal.

**2.02 MATERIALS - VINYL TILE & RUBBER BASE**

- A. Vinyl composition tile shall be 12" x 12" x 1/8" thick tile with color mottling continuous through tile. Tile shall conform to ASTM E-84 Class A rating and shall have a static load limit of 50 P.S.I. Tile shall be one of the following or approved equal:
  - 1. Armstrong - Imperial Texture Excelon
  - 2. Tarket Expressions
  - 3. Flextile - Flex-Thru Canada Classic

4. Mannington - Essentials

B. Rubber base shall rubber topset type 1/8" thick with round top and coved bottom with preformed corners. Base height shall be 4". Base shall be as manufactured by one of the following or approved equal:

1. Roppe
2. Johnsonite
3. VPI
4. Mercer Products Company, Inc.

**2.03 MATERIALS – RUBBER STAIR TREADS**

A. Rubber Stair Treads shall be rope #94, raised square design. Color as selected from standard color samples. Stair Tread shall be as manufactured by Roppe or approved equal.

**2.04 ADHESIVES**

A. Adhesives for all floor tile and base materials shall be as recommended by the tile manufacturer for this installation.

**2.05 ACCESSORIES**

A. Provide transition strips between changes in floor materials as follows:

1. Carpet to vinyl tile: Snap "T" and single leg track Mercer Products Company #940 T and #970 track.

**PART 3 - EXECUTION**

**3.01 EXAMINATION OF SURFACES**

A. This contractor shall thoroughly inspect all surfaces which are to receive his materials and shall notify the Architect, in writing, of any defects found in same. He shall not start until such defects have been corrected. Starting of any work by this Contractor will imply his acceptance of the surfaces as suitable for the application of his materials.

**3.02 SURFACE PREPARATION**

- A. Sand all sub-surfaces to loosen any dirt and other foreign materials, then vacuum surface of subfloor to remove all dust, loose dirt and other foreign materials.
- B. Patch all minor cracks, voids and other minor imperfections with a non-waterbase high strength patching material such as Ardex No. 15.

**3.03 INSTALLATION - VINYL COMPOSITION TILE**

- A. Do not install materials on concrete or masonry while any dampness remains therein. No material shall be applied until temperature in the building has been held at a minimum of 70 degrees F for 24 hours previous to the installation and this temperature maintained during the installation.
- B. Fill holes, cracks or areas that don't meet the floor leveling standard with non-shrink concrete underlayment. Remove all grease, dirt and other foreign particles which would prevent good adhesion.

- C. Install tile in strict accordance with manufacturer's directions. Lay all tile in a straight line without offsets in joints. All joints shall be tightly closed and even with no raised corners or edges. Tile shall be laid with grain lines staggered, alternating direction, running perpendicular to adjoining or adjacent tile. Scribe and fit tile accurately at walls and pipes etc., so as to leave no cracks for dirt. Do not use excess cement and immediately remove any surplus which appears as material is worked into position.

### **3.04 INSTALLATION – RUBBER BASE**

- A. Install base in strict accordance with the manufacturer's instructions. Base shall be tight to the floor, level at the top and neatly scribed at splices.

### **3.05 INSTALLATION – RUBBER STAIR TREADS**

- A. Install rubber stair tread in strict accordance with the manufacturer's instructions.

### **3.06 CLEANING AND PROTECTION**

- A. At the completion of the work, all resilient flooring and base shall be cleaned and all adhesive, dirt or other foreign substances removed. Spots shall be removed with a putty knife, steel wool or a moist cloth and mild soap. The use of solvents or wet mopping will not be permitted.
- B. All work shall be adequately protected from damage from any cause after it has been installed. All damaged work shall be removed and replaced by new and all work shall be delivered in perfect condition.

### **3.07 ADJUSTMENTS**

- A. This Contractor shall inspect, and make necessary adjustments within thirty (30) days after floor tile has been cleaned. All tile that have not seated in a level plane with surrounding tile shall have heat applied locally and shall be quickly rolled to the surrounding level of floor tile. All tile showing broken corners or fracture lines across their surfaces shall be carefully removed and replaced with new tile of same color and thickness.

**END OF SECTION**

**SECTION 09 90 00 - PAINTING****PART 1 - GENERAL****1.01 SCOPE OF WORK**

- A. The Conditions of the Contract and the Provision of Division 01 apply to all work of this Section.
- B. The work to be done under this Section includes all materials, labor, equipment, and services necessary to, and reasonable applicable to, providing and applying all paints, varnishes, coatings or other related materials specifically called for in this specification or in the drawings.
- C. The purpose of this painting specifications is to clearly indicate the surfaces to be painted or coated, the types and qualities of paints or coatings to be applied and the amount of material to be applied for each coat.
- D. No finish work is required by this Contractor on the following items; however, he shall be required to protect same from damage as specified herein:
  - 1. Finish hardware items, except those primed.
  - 2. Items of brass, bronze, chrome plating, stainless steel.
  - 3. All other finish materials not requiring a painter's finish, as resilient flooring, acoustical materials, casework etc.

**1.02 SUBMITTALS**

- A. This Contractor shall submit for Architect approval a list of all materials with identifying numbers of coats he proposes to use on this project. This list is to be submitted at least 10 days prior to the application of any paint or coating. Architect approval is required before delivery of any paint or coating to project site. This will in no way take precedence over paragraph on substitutions, 1.03.
- B. At the time contractor furnishes material listing to Architect he shall also submit color chip samples of all products he intends to use on this project.
- C. As requested by the Architect, submit duplicate samples of all painted, varnished, stained, or other specified finishes for approval before starting any work.
- D. Architect will furnish this contractor a set of color chips and a schedule locating all color placement, from samples furnished by contractor.

**1.03 SUBSTITUTIONS**

- A. The materials or products specified herein and indicated on drawings or finish schedules by trade name shall be provided as detailed.
- B. This contractor shall submit his bid based on specified materials of approved manufacturer listed in Paragraph 2.01.

- C. Equal quality products of other manufacturers will be considered for approval if the request is submitted within 30 days after painting contract award. This written request must include all necessary supporting information and data for Architect to determine equal quality characteristics. Submit through general contractor for Architect approval.
- D. After Architect approval of material, there shall be no substitutions.

#### **1.04 DELIVERY STORAGE AND HANDLING**

- A. All materials shall be delivered to the building in the original containers, with labels intact and seals unbroken. No materials other than those specified shall be delivered to the building. All material shall be used strictly in accordance with manufacturer's directions.
- B. Storage of Painting Materials:
  - 1. General contractors will assign a lockable area or room for storing all this contractor's supplies and equipment.
  - 2. All job site tinting, mixing, and thinning required or approved by Architect must be done in this area.
  - 3. This contractor must use adequate means and take all precautions to prevent fire, explosions and other damage caused by his materials and equipment.
  - 4. This contractor must use adequate means and take all precautions to protect floors and other surfaces of this area from damage. (Mechanical and Electrical work in particular).
  - 5. All rags and paint or solvent must be stored in closed metal containers at all times.

### **PART 2 - PRODUCTS**

#### **2.01 MANUFACTURERS**

- A. Except as otherwise specified or detailed herein, or specifically approved by the Architect in writing, the paints or coatings used on this project are to be equal quality and type products of the following manufacturers:
  - 1. PPG Industries, Inc (Pittsburgh Paints)
  - 2. Pratt-Lambert Inc.
  - 3. Benjamin Moore & Co.
  - 4. Muralo
  - 5. Sherwin Williams
- B. The finish schedule will list for specifying purposes, the factory number and brand name of PPG Industries.
- C. Only top quality materials are to be used on this project. Where a question of quality occurs, the painting contractor will submit an affidavit from the material manufacturer stating the quality range of the project to be used, as compared to other quality products made by that manufacturer.
- D. All materials not specified but required for successful application of any specified paint or coating must



be of the brand and type recommended by the approved paint or coating manufacturer. The approved manufacturer's complete coating system will be used on this project, with no substitutions. When materials of manufacturer are specified and these have been discontinued by the manufacturer - only substitutions as recommended by that approved paint or coatings manufacturer will be acceptable to the Architect.

- E. Surface preparation cleaners and degreasers shall be as manufactured by Great Lakes Laboratories, Inc.; 12780 Wayne Road, Livonia, Mi 48150, (313) 525-8300.

## 2.02 SCHEDULE OF FINISHES

### A. Interior Ferrous Metals

1 Coat	PPG Speedhide Water Base Inhibitive Metal Primer	6-712
2 Coats	PPG Pitt-Tech One Pack Acrylic DTM Enamel	90-400 Series

### B. Interior Gypsum Board (Paint)

1 Coat	PPG Speedhide Quick Drying Latex Primer-Sealer	6-2
2 Coats	PPG Speedhide Eggshell Latex Enamel	6-411 Series

### C. Exposed Metal Deck, Joists, adjacent ductwork and conduit

1 Coat	PPG Speedhide Water Base Inhibitive Metal Primer (no primer required on factory primed decking, joists and beams)	6-712
2 Coats	PPG Speedhide Eggshell Latex Enamel	6-411 Series

### D. Interior Millwork (Natural Finish)

1 Coat	PPG Rez Wood Stain
1 Coat	PPG Speedhide 6-10 Sanding Sealer
1 Coat	PPG Rez 77-9 Satin Varnish

### E. Existing Previously Painted Plaster and Drywall

Prepare existing surfaces as specified in Article 3.02 below.		
2 Coats	PPG Speedhide Eggshell Latex Enamel	6-411 Series

## 2.03 MIXING & TINTING

- A. Job site tinting of finish coats is to be done only when approved by Architect.
- B. All tinting colors are to be of type recommended by manufacturer of paint or coating whose products are used on this project.
- C. Thinning is to be done only when specifically allowed by manufacturer and never to exceed his directions.
- D. All tinting, thinning and mixing must be done in room designated for the storing and mixing of paint.

## **2.04 SURFACE PREPARATION PRODUCTS**

- A. General Cleaning Solution: Great Lakes Laboratories, Inc. - No Rinse Repaint Cleaner
  - 1. One-step Cleaning of: Aluminum, Vinyl, Steel, Wood Siding, Decking, Bar Joists, Block Walls, Interior Walls, Woodwork, Galvanized Steel.
  - 2. Solvent replacement for cleaning metal surfaces before painting.
- B. Heavy Duty Cleaning Solution: Great Lakes Laboratories, Inc. - Extra Muscle Repaint Cleaner
  - 1. Removing chalk from painted siding.
  - 2. Solvent replacement used in place of trichlor, lacquer thinner, mineral spirits, and other solvents for cleaning metal surfaces.
  - 3. Paint and stain remover, concentrate will soften and remove many water-borne paints and stains.
- C. Degreasing: Great Lakes Laboratories, Inc. - All Purpose Repaint Degreaser
  - 1. Cleaning and degreasing metal, offers short term rust inhibition.
  - 2. Non-emulsifying feature will float oily contaminants to the surface of collected solutions. The oil can be skimmed off and the cleaning solution can be reused or sewered.
- D. Cleaning & Etching: Great Lakes Laboratories, Inc. - Clean & Etch
  - 1. For one-step cleaning and etching of concrete, steel and galvanized.
  - 2. Derusts steel and iron and removes corrosion from aluminum.
  - 3. Prepares galvanized surfaces for application of paint.

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION OF SURFACES**

- A. Before starting any work, this Contractor shall examine all surfaces which are to receive his materials and report all defects found in same to the Architect in writing. The starting of any work by this Contractor will imply his acceptance of the surfaces as suitable for the application of his materials.
- B. An exception to "A" above will be allowed if this contractor wishes to perform a test application to a questionable surface. If the surface fails to hold paint material, Architect shall be notified in writing and no additional material applied until defective surfaces have been corrected.

**3.02 PREPARATION OF SURFACES****A. ALL SURFACES**

1. All surfaces to which paint is applied shall be clean and dry. No painting will be permitted in dusty rooms, and, if required by the Architect, the painter shall sprinkle floors to lay the dust. No painting or varnishing shall be done on interior work unless the temperature is above 60°F.
2. All surfaces must be free of foreign matter before applying any paint or coating. Removal of foreign matter from painting surfaces left by other trades shall be the responsibility of the General Contractor.

**B. NEW UNPAINTED METALS**

1. All bare metal surfaces (unprimed from the fabricator) shall be thoroughly washed with Great Lakes Laboratories, Inc. - All Purpose Prepaint Degreaser and wiped clean with rags before priming.
2. Before painting, all metal surfaces shall be thoroughly cleaned of all dirt, oil, rust, scale and other foreign materials by the use of sandpaper, steel scrappers, or wire brushes as necessary.
3. Metal door frames are to have countersunk screws filled and sanded smooth before prime coat or under coat is applied.
4. Galvanized steel surface requiring painting must be cleaned with Great Lakes Laboratories, Inc. - Clean and Etch to remove all traces of grease or oil before priming as per specifications.

**C. NEW PLASTER, DRYWALL, MASONITE OR HARDBOARD**

1. Faces to be coated must be dry and clean, free of dirt, oil and grease. Cracks, gouges or other surface imperfections shall be repaired by spackling or puttying, depending on the surface. Allow spackling to dry thoroughly before spot priming.
2. Remove oil or grease with Extra Muscle Prepaint Cleaner. Remove dirt and grime with No Rinse Prepaint Cleaner.
3. If surface to be coated is slick or shiny, use medium sandpaper or liquid deglossing compound to remove the shine. Wipe thoroughly with clean rags to be sure the surface is clean.
4. Plaster surfaces shall be allowed to dry for at least thirty (30) days prior to painting.

**D. NEW INTERIOR WOOD SURFACES TO BE STAINED**

1. Surfaces to be coated must be dry and clean, free of dirt, oil and grease. Small cracks, gouges, nail holes or other surface imperfections shall be filled with stainable wood filler.
2. All surfaces shall be sanded to a smooth finish.

E. PREVIOUSLY PAINTED PLASTER

1. Precautions should be taken when patching cracks in old plaster that has been repainted. The texture of the patch should match the adjacent surface to prevent a darker or lighter color from appearing in the finished coat. If the adjacent surface is smooth, sand the patch to a comparable smoothness. If the wall is textured, roughen the surface to approximate the previous painted appearance. Feather all edges of the patch to blend in with the surrounding surfaces.
2. The patched areas shall be thoroughly dry before priming.
3. Before repainting the entire wall, the patched areas shall be spot coated over the primer, using the same paint as the finish coat.

F. PREVIOUSLY PAINTED MATERIALS

1. Remove all oil, grease or similar contaminants with No Rinse Prepaint Cleaner, Extra Muscle Prepaint Cleaner or All Purpose Prepaint Degreaser as required. Follow their label directions. Let surface dry before painting.
2. Clean thoroughly, remove corrosive deposits and rust by scraping, sanding or other suitable means and allow to dry. Dust thoroughly to get surface clean. Spot prime all bare metals with primer prior to painting.
3. Dull all glossy areas with sandpaper or use a liquid deglossing compound and wipe clean.
4. Galvanized Metals - Wash all previously painted galvanized surfaces with Clean & Etch to remove grease and deposits. If the galvanized surface is broken and rust is evident, remove rust to the bare metal by wire brushing, sanding or blasting. Clean thoroughly and spot prime with rust inhibitive primer. When spots have dried, prime with galvanized steel primer.

**3.03 PROTECTION**

- A. Lay drop cloths in all areas where painting is being done to protect floors and other work from damage. Remove all electric outlet plates, fixture canopies, surface hardware and other similar items before painting is begun and replace same after completion. Where it becomes necessary, in order to execute the work under this section, to remove the protective coverings placed by other trades, this Contractor shall replace same afterward in a proper manner. Any work of other trades, damaged in executing the work under this section, shall be replaced or restored to the original condition at this Contractor's expense. Special precautions shall be taken to protect all network/data equipment from paint overspray and drips.

**3.04 WORKMANSHIP**

- A. Paint or coatings are to be applied under conditions conducive to good results. It is necessary for this contractor to honor the individual requirements of each material used, as to digestion time, pot life, application temperature limits, humidity limits where applicable, and manufacturer's directions.

- B. If this contractor finds that problems are arising in connection with the application of the paint to a surface so as to prevent him from doing a good workmanlike job, painting on that area should be stopped immediately. The supplier of the paint should then be contacted to see what can be done to rectify the conditions.

Plaster, mortar, concrete block, concrete or any other masonry related surface shall not be painted if its moisture content exceeds 12%. If moisture content is between 8% and 12%, prime with Alkali Resistant Primer in place of specified primer.

- C. All pipes, insulated pipes, ductwork and equipment in exposed areas shall be painted.
- D. All doors to be painted must have at least two coats of finish paint after doors have been fitted. Doors shall be removed from frame during application.
- E. Where open cabinets and shelves occur, room finish on walls shall not be omitted except in back of permanent cabinets with closed backs.
- F. The contractor must furnish all required ladders, stages, scaffolds, etc., and they must be in safe condition, having adequate strength to support maximum work load.
- G. Scaffolds, ladders, etc., must not be left up where they would interfere with other workmen, when not in daily use.

### 3.05 APPLICATION

- A. Final coat of paint or coating must have visual evidence of solid hiding and uniform appearance.
- B. There shall be no visible evidence of runs, sags, curtains or other evidence of poor application.
- C. All coats shall be thoroughly dry before applying succeeding coats, unless specifically exempted by material manufacturer.
- D. Make edges of paint or coating adjoining other materials or colors, sharp and clean, with no overlapping.
- E. When paint or coating is brush applied, proper skill must be used to avoid all signs of lapping and excess paint from edge of roller. When cutting in with a brush is required, these areas must be of same texture, color and hiding as adjacent areas, to assure good appearance.
- F. When paint or coating is applied by spray, it must be done before the installation of fixtures hardware, flooring and other finish items unless thoroughly protected. It shall be applied only by skilled painters, to assure a uniform finish with no evidence of poor or improper application.
- G. Block filler when applied to concrete or lightweight block must retain no block surface texture, only pattern from brush or roller and shall have no pinholes.
- H. Exposed piping, conduit, wiremold, ductwork, hangers and related or similar materials shall be painted the color and texture of the wall or ceiling adjacent. The purpose is to visually hide the exposed material. Then adjacent surfaces are unpainted, match the general color. Exception: where special pipe color coding is specified.

- I. Each coat of paint or coating shall be of visible difference from preceding coat.
- J. Each coat of paint or a coating shall be inspected by Architect or his representative before next coat is applied. Only after inspection and approval will credit be given for that coat.
- K. Each coat of paint to be applied uniformly with proper spreading rate listed by the approved paint manufacturer.
- L. Spot painting to correct soiled or damaged paint surfaces will be allowed only when touch-up spot is blended into surrounding finish and is invisible to normal viewing. Otherwise, re-coat entire section to corners or visible stopping point.
- M. Contractor shall note that this project calls for complete painting of all work requiring paint on interior of building and as called for in the Room Finish Schedule. In areas where patching of walls are indicated, paint the complete wall from corner to corner or visible stopping point. Colors of paint shall match existing in that area.

### **3.06 MECHANICAL AND ELECTRICAL INSTALLATIONS**

- A. All exposed radiators, radiator covers or enclosures, exposed heating pipes or similar items subjected to excessive heat, shall be painted with two coats of heat resistant paint or radiator paint. Where color must match adjacent surfaces and a wall paint is specified for use on radiators or piping, only a flat oil paint or eggshell enamel shall be used and coats shall be as thin as possible to minimize blistering and flaking. Heat shall not be turned on full until the finish is thoroughly hardened.
- B. All exposed piping covering and mechanical insulations shall be given two coats of interior paint to match adjacent surfaces. Add to each coat a fungicidal agent which will render the fabric mildew-proof, but not adversely affect the color, texture or durability of the paint.
- C. All other exposed Mechanical or Electrical ducts, pipes, conduits or equipment shall be primed and painted two coats of paint. In finished spaces, the color shall be neutral gray or color selected by the Architect.

### **3.07 CLEANING-UP**

- A. Upon completion of his work this contractor shall clean off all paint where it has spilled, splashed or splattered on floors, walls, woodwork, fixtures, glass, hardware, etc., and leave the entire building in perfect condition thoroughly cleaned and ready to use.
- B. This contractor must leave premises clean and free from all rubbish and accumulated material left from his work.

**END OF SECTION**

SECTION 21 05 01 - GENERAL PROVISIONS - FIRE SUPPRESSION

## PART 1 - GENERAL

## 1.01 WORK INCLUDED

- A. The work described under Section 23 05 01, General Mechanical Requirements - HVAC, shall apply to this Section as applicable to Division 21 work.

## 1.02 RELATED SECTIONS

- A. Refer to requirements of Section 23 05 01, General Mechanical Requirements - HVAC, as they apply to Division 21 work.
- B. The following reference standards shall apply to all Division 21 work:
  - 1. State and Local Codes
  - 2. FM
  - 3. NFPA
  - 4. IBC and State Amendments
  - 5. IFC and State Amendments
  - 6. UL
  - 7. ASME
  - 8. ASTM
  - 9. ANSI
  - 10. Insurance Service Office
  - 11. State Fire Marshal

## PART 2 - PRODUCTS (Not Applicable)

## PART 3 - EXECUTION

## 3.01 GENERAL

- A. Refer to requirements of Section 23 05 01, General Mechanical Requirements - HVAC, as they apply to Division 21 work.

END OF SECTION

SECTION 22 05 01 - GENERAL PLUMBING REQUIREMENTS

## PART 1 - GENERAL

## 1.01 WORK INCLUDED

- A. The work described under Section 23 05 01, General Mechanical Requirements - HVAC, shall apply to this Section as applicable to Division 22 work.

## 1.02 RELATED SECTIONS &amp; REFERENCES

- A. Refer to requirements of Section 23 05 01, General Mechanical Requirements - HVAC, as they apply to Division 22 work.
- B. The following reference standards shall apply to all Division 22 work:
  - 1. Energy Policy Act of 1992
  - 2. NEMA
  - 3. UL
  - 4. ANSI
  - 5. ASTM
  - 6. NFPA
  - 7. MF-1
  - 8. AGA
  - 9. ASSE
  - 10. PDI
  - 11. CISPI
  - 12. ADA
  - 13. NSF
  - 14. Minnesota State Plumbing Code
  - 15. Local Code

## PART 2 - PRODUCTS (Not Applicable)

## PART 3 - EXECUTION

## 3.01 GENERAL

- A. Refer to requirements of Section 23 05 01, General Mechanical Requirements - HVAC, as they apply to Division 22 work.

END OF SECTION



SECTION 22 05 23 - GENERAL DUTY VALVES FOR PLUMBING

## PART 1 - GENERAL

## 1.01 RELATED SECTIONS

- A. 22 05 01 - General Plumbing Requirements
- B. 22 05 19 - Meters & Gauges for Plumbing Piping
- C. 22 05 53 - Identification for Plumbing Piping and Equipment
- D. 22 11 16 - Domestic Water Piping

## 1.02 DESCRIPTION OF WORK

- A. Furnish and install valves as indicated on drawings and/or specified in this Section.

## 1.03 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of valves, of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Valve Types: Provide valves of same type by same manufacturer.

## 1.04 SUBMITTALS

- A. Shop Drawings: Submit shop drawings, including installation instructions for each type of valve. Include pressure drop curve or chart for each type and size of valve. Submit valve schedule showing manufacturer's figure number, size, location and valve features for each required valve.
- B. Maintenance Data: Submit maintenance data and spare parts lists for each type of valve. Include this data, product data and shop drawings in maintenance manual.

## PART 2 - PRODUCTS

## 2.01 VALVES

- A. Ball Valves - Apollo, Hammond, Milwaukee, Nibco, Watts Regulator

## 2.02 BALL VALVES

- A. All Sizes: 150 psi SWP, 600 psi WOG, bronze body, standard port, bronze trim, 2-piece construction, TFE seats and seals. Stainless steel trim and seats if used in steam applications.

## PART 3 - EXECUTION

## 3.01 INSTALLATION

- A. General: Except as otherwise indicated, comply with the following requirements:
  - 1. Install valves where required for proper operation of piping and equipment, including valves in

branch lines where necessary to isolate sections of piping. Locate valves so as to be accessible and so that separate support can be provided when necessary.

2. Install valves with stems pointed up, in vertical position where possible, but in no case with stems pointed downward from horizontal plane unless unavoidable. Install valve drains with hose-end adapter for each valve that must be installed with stem below horizontal plane.
- B. Insulation: Where insulation is indicated, install extended-stem valves, arranged in proper manner to receive insulation.
- C. Selection of Valve Ends (Pipe Connections): Except as otherwise indicated, select and install valves with the following ends or types of pipe/tube connections:
1. Tube Size 2" and Smaller: Soldered-joint valves.
  2. Pipe Size 2" and Smaller: One of the following, at Installer's option: threaded valves, butt-welding valves, socket-welding valves, flanged valves, flangeless valves, single flanged valves.
- D. Valve System: Select and install valves with outside screw and yoke stems, except provide inside screw non-rising stem valves where headroom prevents full opening of os&y valves.
- E. Non-Metallic Disc: Limit selection and installation of valves with non-metallic discs to locations indicated and where foreign material in piping system can be expected to prevent tight shutoff of metal seated valves.
- F. Renewable Seats: Select and install valves with renewable seats, except where otherwise indicated.

### 3.02 ADJUSTING & CLEANING

- A. Valve Adjustment: After piping systems have been tested and put into service, but before final testing, adjusting and balancing, inspect each valve for possible leaks. Adjust or replace packing to stop leaks, replace valve if leak persists.
- B. Cleaning: Clean factory-finished surfaces. Repair any marred or scratched surfaces with manufacturer's touch-up paint.

END OF SECTION

SECTION 22 05 29 - HANGERS & SUPPORTS FOR PLUMBING PIPING & EQUIPMENT

## PART 1 - GENERAL

## 1.01 RELATED SECTIONS

- A. 22 05 01 - General Plumbing Requirements
- B. 22 07 00 - Plumbing Insulation
- C. 22 11 16 - Domestic Water Piping
- D. 22 14 13 – Storm Water Piping

## 1.02 DESCRIPTION OF WORK

- A. Furnish and install hangers and supports required by this Section as indicated on drawings and/or specified in this Section.

## 1.03 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of supports and anchors, of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

## 1.04 SUBMITTALS

- A. Shop Drawings: Submit shop drawings, including installation instructions for each type of support and anchor.
- B. Maintenance Data: Submit maintenance data and parts lists for each type of support and anchor. Include this data, product data and shop drawings in maintenance manual.

## PART 2 - PRODUCTS

## 2.01 ACCEPTABLE MANUFACTURERS

- A. Hangers: B-Line, Anvil, Carpenter and Patterson
- B. Pipe Riser Clamps: Grinnell, B-Line
- C. Powder-Drive Fasteners: Hilti

## 2.02 HORIZONTAL-PIPING HANGERS &amp; SUPPORTS

- A. Except as otherwise indicated, provide factory-fabricated horizontal-piping hangers and supports complying with MSS SP-58, selected by Installer to suit horizontal-piping systems, in accordance with MSS SP-69 and manufacturer's published product information. Use only one type by one manufacturer for each piping service. Select size of hangers and supports to exactly fit pipe size for bare piping, and to exactly fit around piping insulation with saddle or shield for insulated piping. Provide copper-plated hangers and supports for copper-piping systems.

### 2.03 VERTICAL-PIPING CLAMPS

- A. Except as otherwise indicated, provide factory-fabricated vertical-piping clamps complying with MSS SP-58, selected by Installer to suit vertical piping systems, in accordance with MSS SP-69 and manufacturer's published product information. Select size of vertical piping clamps to exactly fit pipe size of bare pipe. Provide copper-plated clamps for copper-piping systems.

### 2.04 HANGER-ROD ATTACHMENTS

- A. Except as otherwise indicated, provide factory-fabricated hanger-rod attachments complying with MSS SP-58, selected by Installer to suit horizontal-piping hangers and building attachments, in accordance with MSS SP-69 and manufacturer's published product information. Use only one type by one manufacturer for each piping service. Select size of hanger-rod attachments to suit hanger rods. Provide copper-plated hanger-rod attachments for copper-piping systems.

### 2.05 BUILDING ATTACHMENTS

- A. Except as otherwise indicated, provide factory-fabricated building attachments complying with MSS SP-58, selected by Installer to suit building substrate conditions, in accordance with MSS SP-69 and manufacturer's published product information. Select size of building attachments to suit hanger rods. Provide copper-plated building attachments for copper-piping systems.

## PART 3 - EXECUTION

### 3.01 INSPECTION

- A. Examine areas and conditions under which supports and anchors are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

### 3.02 PREPARATION

- A. Proceed with installation of hangers, supports and anchors only after required building structural work has been completed in areas where the work is to be installed. Correct inadequacies including (but not limited to) proper placement of inserts, anchors and other building structural attachments.

### 3.03 INSTALLATION OF BUILDING ATTACHMENTS

- A. Install building attachments at required locations within concrete or on structural steel for proper piping support. Space attachments within maximum piping span length indicated in MSS SP-69. Install additional concentrated loads, including valves, flanges, guides, strainers, expansion joints and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten insert securely to forms. Where concrete with compressive strength less than 2500 psi is indicated, install reinforcing bars through openings at top of inserts.

### 3.04 INSTALLATION OF HANGERS & SUPPORTS

- A. Install hangers, supports, clamps and attachments to support piping properly from building structure; comply with MSS SP-69 and SP-89. Arrange for grouping of parallel runs of horizontal piping to be supported together on trapeze type hangers where possible. Install supports with maximum spacings

## HANGERS &amp; SUPPORTS FOR PLUMBING PIPING &amp; EQUIPMENT

complying with MSS SP-69. Where piping of various sizes is to be supported together by trapeze hangers, space hangers for smallest pipe size or install intermediate supports for smaller diameter pipe. Do not use wire or perforated metal to support piping, and do not support piping from other piping.

- B. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers and other accessories. Except as otherwise indicated for exposed continuous pipe runs, install hangers and supports of same type and style as installed for adjacent similar piping.
- C. Prevent electrolysis in support of copper tubing by use of hangers and supports which are copper plated, or by other recognized industry methods.
- D. Install powder-actuated drive-pin fasteners 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. Do not use in lightweight concrete slabs or in concrete slabs less than 4" (100mm) thick.
- E. Install mechanical-anchor fasteners in concrete after concrete is placed and completely cured. Install according to fastener manufacturer's written instructions. Do not use in lightweight concrete slabs or in concrete slabs less than 4" (100mm) thick.
- F. Provisions for Movement:
  - 1. Install hangers and supports to allow controlled movement of piping systems and to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends and similar units.
  - 2. Load Distribution: Install hangers and supports so that piping live and dead loading and stresses from movement will not be transmitted to connected equipment.
  - 3. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes, and so that maximum pipe deflections allowed by ANSI B31 Pressure Piping Codes are not exceeded.
- G. Insulated Piping: Comply with the following installation requirements:
  - 1. Clamps: Attach clamps, including spacers (if any), to piping with clamps projecting through insulation; do not exceed pipe stresses allowed by ANSI B31.
  - 2. Shields: Where low-compressive-strength insulation or vapor barriers are indicated on cold or chilled water piping, install coated protective shields. For pipe 8" and over, install wood insulation saddles.
  - 3. Saddles: Where insulation without vapor barrier is indicated, install protection saddles.
- H. Horizontal Pipe Supports, Spacing and Loading, Saddle Length:

Pipe Size	Max. Span / Feet		Min. Rod Diameter	
	copper	steel*	copper	steel
Up to 1-1/4"	6	5	3/8	3/8
1-1/2" to 2"	8	10	3/8	3/8

SECTION 22 05 29  
HANGERS & SUPPORTS FOR PLUMBING PIPING & EQUIPMENT

11-047

\*Denotes maximum span unless 10-foot lengths of pipe are used then 10-foot span allowed.

Cut bolts, grind sharp edges and corners.

3.05 ADJUSTING & CLEANING

- A. Hanger Adjustments: Adjust hangers so as to distribute loads equally on attachments.
- B. Support Adjustment: Provide grout under supports so as to bring piping and equipment to proper level and elevations.
- C. Cleaning: Clean factory-finished surfaces. Repair any marred or scratched surfaces with manufacturer's touch-up paint.

END OF SECTION

SECTION 22 05 53 - IDENTIFICATION FOR PLUMBING PIPING & EQUIPMENT

## PART 1 - GENERAL

## 1.01 RELATED SECTIONS

- A. 22 05 01 - General Plumbing Requirements
- B. 22 07 00 - Plumbing Insulation
- C. 22 11 16 - Domestic Water Piping
- D. 22 13 19 - Sanitary Waste Piping Specialties

## 1.02 DESCRIPTION OF WORK

- A. Furnish and install identification as specified.

## 1.03 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of identification devices of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

## 1.04 SUBMITTALS

- A. Schedules: Submit valve schedule for each piping system, typewritten and reproduced on 8-1/2" x 11" bond paper. Tabulate valve number, piping system, system abbreviation (as shown on tag), location of valve (room or space), and variations for identification (if any). Mark valves which are intended for emergency shutoff and similar special uses, by special "flags," in copies for maintenance manuals.

## PART 2 - PRODUCTS

## 2.01 ACCEPTABLE MANUFACTURERS

- A. Paint - Benjamin Moore, Devoe, Pratt and Lambert, Rust-O-Leum
- B. Pipe Labels - Seton, Brady

## 2.02 PAINTED IDENTIFICATION MATERIALS

- A. This Contractor shall be responsible for preparing and painting items described in this Section.

## 2.03 PIPE IDENTIFICATION

- A. Snap-On Type: Provide manufacturer's standard preprinted, semi-rigid, snap-on, color-coded pipe markers, complying with ANSI A13.1.
- B. Pressure-Sensitive Type: Provide manufacturer's standard preprinted, permanent adhesive, color-coded, pressure-sensitive vinyl pipe markers, complying the ANSI A13.1.

## 2.04 VALVE TAGS

- A. Brass Valve Tags: Provide 19-gage polished brass valve tags with stamp-engraved piping system abbreviation in 1/4" high letters and sequenced valve numbers 1/2" high, and with 5/32" hole for fastener.
1. Provide 2" diameter tags except as otherwise indicated.
  2. Provide size and shape as specified or scheduled for each piping system.
  3. Fill tag engraving with black enamel.

### PART 3 - EXECUTION

#### 3.01 GENERAL INSTALLATION REQUIREMENTS

- A. Coordination: Where identification is to be applied to surfaces which require insulation, painting or other covering or finish, including valve tags in finished mechanical spaces, install identification after completion of covering and painting. Install identification prior to installation of acoustical ceilings and similar removable concealment.

#### 3.02 PIPING SYSTEM IDENTIFICATION

- A. Install pipe markers of one of the following types on each system indicated to receive identification and include arrows to show normal direction of flow.
1. Stenciled markers, including color-coded background band or rectangle, and contrasting lettering of black or white. Extend color band or rectangle 2" beyond ends of lettering.
  2. Stenciled markers, with lettering color complying with ANSI A13.1.
  3. Plastic pipe markers, with application system as indicated under "Materials" in this Section. Install on pipe insulation segment where required for hot non-insulated pipes.
  4. Stenciled markers, black or white for best contrast, wherever continuous color-coded painting of piping is provided.
- B. Locate pipe markers and color bands as follows wherever piping is exposed to view in occupied spaces, machine rooms, accessible maintenance spaces (shafts, tunnels, plenums) and exterior non-concealed locations.
1. Near each valve and control device.
  2. Near each branch, excluding short takeoffs for fixtures and terminal units; mark each pipe at branch where there could be question of flow pattern.
  3. Near locations where pipes pass through walls or floors/ceilings or enter non-accessible enclosures.
  4. At access doors, manholes and similar access points which permit view of concealed piping.
  5. Near major equipment items and other points of origination and termination.
  6. Spaced intermediately at maximum spacing of 50' along each piping run, except reduce spacing to 25' in congested areas of piping and equipment.



7. On piping above removable acoustical ceilings, except omit intermediately spaced markers.

C. Pipe Identification:

<u>Function</u>	<u>Stencil Working</u>
Domestic Cold Water	CW

### 3.03 VALVE IDENTIFICATION

- A. Provide valve tag on every valve, cock and control device in each piping system; exclude check valves, valves within factory-fabricated equipment units, plumbing fixture faucets, convenience and lawn-watering hose bibs, and shutoff valves at plumbing fixtures, HVAC terminal devices and similar rough-in connections of end-use fixtures and units.
1. Tagging Schedule: Comply with requirements of "Valve Tagging Schedule" at end of this Section.
- B. Mount valve schedule frames and schedules in machine rooms where indicated or, if not otherwise indicated, where directed by Architect/Engineer.
1. Where more than one major machine room is shown for project, install mounted valve schedule in each major machine room, and repeat only main valves which are to be operated in conjunction with operations of more than single machine room.

### 3.04 ADJUSTING & CLEANING

- A. Adjusting: Relocate any mechanical identification device which has become visually blocked by work of this Division or other divisions.
- B. Cleaning: Clean face of identification devices and glass frames of valve charts.

### 3.05 EXTRA STOCK

- A. Furnish minimum of 5% extra stock of each mechanical identification material required, including additional numbered valve tags (not less than 3) for each piping system, additional piping system identification markers, and additional plastic laminate engraving blanks of assorted sizes.
1. Where stenciled markers are provided, clean and retain stencils after completion of stenciling and include used stencils in extra stock, along with required stock of stenciling paints and applicators.

END OF SECTION

SECTION 22 07 00 - PLUMBING INSULATION

## PART 1 - GENERAL

## 1.01 RELATED SECTIONS

- A. 22 05 01 - General Plumbing Requirements
- B. 22 05 29 - Hangers & Supports for Plumbing Piping & Equipment
- C. 22 05 53 - Identification for Plumbing Piping & Equipment
- D. 22 11 16 - Domestic Water Piping

## 1.02 DESCRIPTION OF WORK

- A. Furnish and install insulation as indicated on drawings and schedules and by requirements of this Section.
- B. Types of mechanical insulation specified in this Section include the following:
  - 1. Piping System Insulation:
    - a. Fiberglass.

## 1.03 QUALITY ASSURANCE

- A. Flame/Smoke Ratings: Provide composite mechanical insulation (insulation, jackets, coverings, sealers, mastics and adhesives) with flame-spread index of 25 or less, and smoke-developed index of 50 or less, as tested by ASTM E84 (NFPA 255) method. In addition, the products, when tested, shall not drip flame particles; and flame shall not be progressive.

## 1.04 SUBMITTALS

- A. Shop Drawings: Submit shop drawings and installation instructions for each type of mechanical insulation. Submit schedule showing manufacturer's product number, k-value, thickness and furnished accessories for each mechanical system requiring insulation. also furnish necessary test data certified by an independent testing laboratory.
- B. Maintenance Data: Submit maintenance data and replacement material lists for each type of mechanical insulation. Include this data and product data in maintenance manual.

## 1.05 DELIVERY, STORAGE &amp; HANDLING

- A. Deliver insulation, coverings, cements, adhesives and coatings to site in containers with manufacturer's stamp or label, affixed showing fire hazard indexes of products.
- B. Protect insulation against dirt, water and chemical and mechanical damage. Do not install damaged or wet insulation; remove from project site.

## PART 2 - PRODUCTS

## 2.01 ACCEPTABLE MANUFACTURERS

- A. Armstrong World Industries, Inc.; CertainTeed Corp.; Knauf; Manville Products Corp.; Owens-Corning Fiberglass Corp.; Pittsburgh Corning Corp.; Plumberex.

## 2.02 PIPING INSULATION MATERIALS

- A. Fiberglass Piping Insulation: ASTM C547, Class 1, unless otherwise indicated.
- B. Jackets for Piping Insulation: ASTM C921, Type I, for piping with temperatures below ambient; Type II, for piping with temperatures above ambient. Type I may be used for all piping at Installer's option.
  - 1. Encase pipe and pipe fittings insulation exposed and as indicated with one-piece premolded PVC jacket, fitting covers, fastened as per manufacturer's recommendations.
- C. Staples, Bands, Wires and Cement: As recommended by insulation manufacturer for applications indicated.
- D. Adhesives, Sealers and Protective Finishes: As recommended by insulation manufacturer for applications indicated.

## PART 3 - EXECUTION

### 3.01 INSPECTION

- A. Examine areas and conditions under which mechanical insulation is to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

### 3.02 PLUMBING PIPING SYSTEM INSULATION

- A. Insulation Omitted: Omit insulation on chrome-plated exposed piping (except for handicapped fixtures), air chambers, unions, strainers, check valves, balance cocks, flow regulators, drain lines from water coolers, drainage piping located in crawl spaces or tunnels, buried piping, fire protection piping, and preinsulated equipment.
- B. Cold Piping:
  - 1. Application Requirements: Insulate the following cold plumbing piping systems:
    - a. Potable cold water piping.
    - b. Waste piping from panel to connection to existing.
  - 2. Insulate each piping system specified above with one of the following types and thicknesses of insulation:
    - a. Fiberglass: Minimum R4.

### 3.03 INSTALLATION OF PIPING INSULATION

- A. Install insulation products in accordance with manufacturer's written instructions and in accordance with

recognized industry practices to ensure that insulation serves its intended purpose.

- B. Install insulation on pipe systems subsequent to installation of heat tracing, painting, testing and acceptance of tests.
- C. Install insulation materials with smooth and even surfaces. Insulate each continuous run of piping with full-length units of insulation, with single cut piece to complete run. Do not use cut pieces or scraps abutting each other.
- D. Clean and dry pipe surfaces prior to insulating. Butt insulation joints firmly together to ensure complete and tight fit over surfaces to be covered.
- E. Maintain integrity of vapor-barrier jackets on pipe insulation, and protect to prevent puncture or other damage.
- F. Cover valves, fittings and similar items in each piping system with equivalent thickness and composition of insulation as applied to adjoining pipe run. Install factory molded, precut or job fabricated units (at Installer's option) except where specific form or type is indicated.
- G. Extend piping insulation without interruption through walls, floors and similar piping penetrations except where otherwise indicated.
- H. Butt pipe insulation against pipe hanger insulation inserts. For cold piping apply wet coat of vapor-barrier lap cement on butt joints and seal joints with 3" wide vapor-barrier tape or band.

#### 3.04 EXISTING INSULATION REPAIR

- A. Repair damaged sections of existing mechanical insulation, both previously damaged or damaged during this construction period. Use insulation of same thickness as existing insulation, install new jacket lapping and sealed over existing.

#### 3.05 PROTECTION & REPLACEMENT

- A. Replace damaged insulation which cannot be repaired satisfactorily, including units with vapor barrier damage and moisture saturated units.
- B. Protection: Insulation Installer shall advise Contractor of required protection for insulation work during remainder of construction period, to avoid damage and deterioration.

END OF SECTION

SECTION 22 11 16 - DOMESTIC WATER PIPING

## PART 1 - GENERAL

## 1.01 RELATED SECTIONS

- A. 22 05 01 - General Plumbing Requirements
- B. 22 05 23 - General Duty Valves for Plumbing
- C. 22 05 29 - Hangers & Supports for Plumbing Piping & Equipment
- D. 22 05 53 - Identification for Plumbing Piping & Equipment
- E. 22 07 00 - Plumbing Insulation
- F. 22 11 19 - Domestic Water Piping Specialties

## 1.02 DESCRIPTION OF WORK

- A. Furnish and install domestic water system as indicated on drawings and schedules and by requirements of this Section.

## 1.03 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of potable water system products, of types, materials and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Installer's Qualifications: Firm with at least 5 years of successful installation experience on projects with potable water systems work similar to that required for project.
  - 1. To assure uniformity and compatibility of piping components in grooved piping systems, all grooved products utilized shall be supplied by a single manufacturer. Grooving tools shall be supplied from the same manufacturer as the grooved components.
- C. Plumbing Code Compliance: Comply with applicable portions of State Plumbing Code pertaining to selection and installation of plumbing materials and products.
- D. Water Purveyor Compliance: Comply with requirements of Purveyor supplying water to project, obtain required permits and inspections.

## 1.04 SUBMITTALS

- A. Record Drawings: At project closeout, submit record drawings of installed potable water systems piping and piping products.
  - 1. Grooved joint couplings and fittings shall be shown on drawings and product submittals and shall be specifically identified with the applicable Victaulic style or series number.
- B. Maintenance Data: Submit maintenance data and parts lists for potable water systems materials and products. Include this data, product data, shop drawings and record drawings in maintenance manual.

## PART 2 - PRODUCTS

## 2.01 MATERIALS & PRODUCTS

- A. Provide piping materials and factory-fabricated piping products of sizes, types, pressure ratings, temperature ratings and capacities as indicated. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements. Provide materials and products complying with State Plumbing Code where applicable. Provide sizes and types matching piping and equipment connections; provide fittings of materials which match pipe materials used in potable water systems. Where more than one type of materials or products are indicated, selection is Installer's option.
- B. No copper press fittings, similar to ProPress, will be allowed.

## 2.02 BASIC PIPES & PIPE FITTINGS (DOMESTIC WATER)

- A. Interior Water Piping:
  - 1. All Sizes: Copper tube; Type L, hard-drawn temper; wrought-copper fittings, lead-free solder joints.
  - 2. 1/2" to 1-1/2": Copper tube, Type L, hard-drawn tempered, push-to-connect fittings and push-to-connect joints.
    - a. ASME B16.18 cast copper alloy or ASME B16.22 wrought copper fittings with stainless steel teeth and EPDM synthetic rubber O-ring seal in each end (UL/ULC classified in accordance with ASNI/NSF-61 for domestic water service), with push-to-connect ends instead of solder joint ends. Victaulic PermaLynx<sup>TM</sup>.

## PART 3 - EXECUTION

### 3.01 INSPECTION

- A. Examine areas and conditions under which potable water systems are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

### 3.02 INSTALLATION OF POTABLE WATER DISTRIBUTION PIPING

- A. Install piping with 1/32" per foot (1/4%) downward slope towards drain point.
- B. Locate groups of pipes parallel to each other, spaced to permit applying full insulation and servicing of valves.
- C. Copper, Push-to-Connect Joints: Install in accordance with manufacturer's latest recommendations. Follow the latest published literature as provided by Victaulic. Pipe ends shall be cleaned, free from indentations, projections, burrs, and foreign matter. Use a tube preparation tool as supplied by Victaulic to clean. Apply installation mark in accordance with Victaulic instructions. Push copper tube into fittings to installation depth mark, per Victaulic installation instructions. Keep fittings free of dirt and oil; use only on potable water or oil-free compressed air systems.
- D. Copper Tube: Install in accordance with recommended procedures of the Copper Development

Association.

### 3.03 EQUIPMENT CONNECTIONS

- A. Piping Runouts to Fixtures: Provide cold water piping runouts to fixtures of sizes indicated but in no case smaller than required by State Plumbing Code.
- B. Mechanical Equipment Connections: Connect cold water piping system to mechanical equipment as indicated and comply with equipment manufacturer's installation instructions. Provide shutoff valve and union for each connection, provide drain valve on drain connection.

### 3.04 PIPING TESTS

- A. Domestic: Test potable water piping with hydraulic pressure of 125 psig for a period of two hours.

### 3.05 ADJUSTING & CLEANING

- A. Cleaning, Flushing and Inspecting: Clean, flush and inspect potable water systems.
- B. Disinfection: Disinfect potable water system in accordance with State Plumbing Code.

END OF SECTION

SECTION 22 11 19 - DOMESTIC WATER PIPING SPECIALTIES

## PART 1 - GENERAL

## 1.01 RELATED SECTIONS

- A. 22 05 01 - General Plumbing Requirements
- B. 22 05 23 - General Duty Valves for Plumbing
- C. 22 07 00 - Plumbing Insulation
- D. 22 11 16 - Domestic Water Piping

## 1.02 DESCRIPTION OF WORK

- B. Types of piping specialties specified in this Section include the following:
  - 1. Dielectric unions.

## PART 2 - PRODUCTS

## 2.01 ACCEPTABLE MANUFACTURERS OR PRIOR APPROVED EQUAL

- A. Unions - Grinnell, Mueller
- B. Dielectric Unions - EPCO, B&K Industries

## 2.02 PIPING SPECIALTIES

- A. Provide factory-fabricated piping specialties recommended by manufacturer for use in service indicated. Provide piping specialties of types and pressure ratings indicated for each service, or if not indicated, provide proper selection as determined by Installer to comply with installation requirements. Provide sizes as indicated, and connections, which properly mate with pipe, tube and equipment connections. Where more than one type is indicated, selection is Installer's option.

## 2.03 DIELECTRIC UNIONS

- A. Provide standard products recommended by manufacturer for use in service indicated, which effectively isolate ferrous from non-ferrous piping (electrical conductance), prevent galvanic action, and stop corrosion.

## PART 3 - EXECUTION

## 3.01 INSTALLATION OF PIPING SPECIALTIES

- A. Dielectric Unions: Install at each piping joint between ferrous and non-ferrous piping. Comply with manufacturer's installation instructions.

END OF SECTION



SECTION 22 13 16 - SANITARY WASTE & VENT PIPING

## PART 1 - GENERAL

## 1.01 RELATED SECTIONS

- A. 22 05 01 - General Plumbing Requirements
- B. 22 05 23 - General Duty Valves for Plumbing
- C. 22 05 29 - Hangers & Supports for Plumbing Piping & Equipment

## 1.02 DESCRIPTION OF WORK

- A. Install soil and waste systems work as indicated on drawings and schedules and by requirements of this Section.

## 1.03 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of soil and waste system products of types, materials and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Installer's Qualifications: Firm with at least 5 years of successful installation experience on projects with soil and waste system work similar to that required for project.
- C. Plumbing Code Compliance: Comply with applicable portions of State Code pertaining to plumbing materials construction and installation of products.

## 1.04 SUBMITTALS

- A. Record Drawings: At project closeout, submit record drawings of installed soil and waste systems.
- B. Maintenance Data: Submit maintenance data and parts lists for soil and waste system materials and products. Include this data and record drawings in maintenance manual.

## PART 2 - PRODUCTS

## 2.01 MATERIALS &amp; PRODUCTS

- A. Provide piping materials and factory-fabricated piping products of sizes, types, pressure ratings and capacities as indicated. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements. Provide sizes and types matching piping and equipment connections; provide fittings of materials which match pipe materials used in soil and waste systems. Where more than one type of materials or products is indicated, selection is Installer's option.

## 2.02 BASIC PIPES &amp; PIPE FITTINGS

- A. Above Ground Soil, Waste and Vent Piping:
  - 1. Tube Size 8" and Smaller: Copper tube; Type DWV; cast-bronze fittings, drainage pattern, solder joint.

2. Pipe Size 15" and Smaller: Cast-iron, hub-and-spigot soil pipe; service weight; cast-iron, hub-and-spigot soil pipe fittings, compression gasket joints.
3. Pipe Size 15" and Smaller: Hubless cast-iron soil pipe; service weight; hubless cast-iron soil pipe fittings, hubless joints.

### PART 3 - EXECUTION

#### 3.01 INSPECTION

- A. Examine substrates and conditions under which soil and waste systems are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

#### 3.02 INSTALLATION OF ABOVE GROUND PIPING

- A. Install soil and waste piping in accordance with State Plumbing Code.

#### 3.03 EQUIPMENT CONNECTIONS

- A. Piping Runouts to Fixtures: Provide soil and waste piping runouts to plumbing fixtures and drains, with approved trap, of sizes indicated; but in no case smaller than required by State Plumbing Code.
- B. Locate piping runouts as close as possible to bottom of floor slab supporting fixtures or drains.

#### 3.04 FIELD QUALITY CONTROL

- A. Piping Tests: Test soil and waste systems in accordance with requirements of State Plumbing Code.

#### 3.05 ADJUSTING & CLEANING

- A. Clean, flush and inspect soil and waste piping in accordance with State Plumbing Code.

#### 3.06 PROTECTION

- A. Protect drains during remainder of construction period to avoid clogging with construction materials and debris and to prevent damage from traffic and construction work.

END OF SECTION

SECTION 22 42 00 - PLUMBING FIXTURES

## PART 1 - GENERAL

## 1.01 RELATED SECTIONS

- A. 22 05 01 - General Plumbing Requirements
- B. 22 05 23 - General Duty Valves for Plumbing
- C. 22 05 29 - Hangers & Supports for Plumbing Piping & Equipment
- D. 22 05 53 - Identification for Plumbing Piping & Equipment
- E. 22 11 16 - Domestic Water Piping
- F. 22 11 19 - Domestic Water Piping Specialties

## 1.02 SCOPE OF WORK

- A. Install plumbing fixtures as indicated on drawings and schedules and requirements of this Section.
- B. Types of plumbing fixtures specified in this Section include the following: wall faucet.

## 1.03 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of plumbing fixtures of type, style and configuration required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Plumbing Fixture Standards: Comply with applicable portions of State Plumbing Code pertaining to materials and installation of plumbing fixtures.

## 1.04 SUBMITTALS

- A. Shop Drawings: Submit manufacturer's assembly-type shop drawings indicating dimensions, roughing-in requirements, required clearances and methods of assembly of components and anchorages.
- B. Maintenance Data: Submit maintenance data and parts lists for each type of plumbing fixture and accessory; including "troubleshooting" maintenance guide. Include this data, product data and shop drawings in maintenance manual.

## 1.05 DELIVERY, STORAGE &amp; HANDLING

- A. Deliver plumbing fixtures individually wrapped in factory-fabricated containers.
- B. Handle plumbing fixtures carefully to prevent breakage, chipping and scoring fixture finish. Do not install damaged plumbing fixtures; replace and return damaged units to equipment manufacturer.

## PART 2 – PRODUCTS

## 2.01 ACCEPTABLE MANUFACTURERS

- A. Wall Hydrants/Sill Cocks: Jay R. Smith; Mifab; Wade; Watts Drainage; Woodford; Zurn

## 2.02 PLUMBING FIXTURES

- A. Provide factory-fabricated fixtures of type, style and material indicated. For each type fixture, provide fixture manufacturer's standard trim, carrier, seats and valves as indicated by their published product information; either as designed and constructed, or as recommended by manufacturer, and as required for complete installation. Where more than one type is indicated, selection is Installer's option; but, all fixtures of same type must be furnished by single manufacturer. Where type is not otherwise indicated, provide fixtures complying with governing regulations.

## 2.03 MATERIALS

- A. Unless otherwise specified, comply with applicable Federal Specification WW-P-541/Series sections pertaining to plumbing fixtures, fittings, trim, metals and finishes. Comply with requirements of WW-P-541/specification relative to quality of ware, glazing, enamel, composition and finish of metals, air gaps and vacuum breakers, even though some plumbing fixtures specified in this Section are not described in WW-P-541.
- B. Provide materials which have been selected for their surface flatness and smoothness. Exposed surfaces which exhibit pitting, seam marks, roller marks, foundry sand holes, stains, decoloration or other surface imperfections on finished units are not acceptable.
- C. Where fittings, trim and accessories are exposed or semi-exposed, provide bright chrome-plated or polished stainless steel units. Provide copper or brass where not exposed.

## 2.04 PLUMBING FIXTURES, TRIM & ACCESSORIES

- A. Water Outlets: At locations where water is supplied, provide commercial quality faucets, valves or dispensing devices, of type and size indicated, and as required to operate as indicated. Include manual shutoff valves and connecting stem pipes to permit outlet servicing without shutdown of water supply piping systems.
  - 1. Vacuum Breakers: Provide with flush valves where required by governing regulations, including locations where water outlets are equipped for hose attachment.
- B. Comply with additional fixture requirements contained in fixture schedule attached to this Section.
- C. Fixture Schedule: Sample manufacturer given with required options.

P-7 Freezeless Wall Hydrant: Woodford #26 with field-testable hose connection backflow preventer.

## PART 3 - EXECUTION

### 3.01 INSPECTION

- A. Examine roughing-in work of potable water and waste piping systems to verify actual locations of piping connections prior to installing fixtures. Also examine floors and substrates, and conditions under which fixture work is to be accomplished. Correct any incorrect locations of piping and other unsatisfactory conditions for installation of plumbing fixtures. Do not proceed with work until unsatisfactory

conditions have been corrected in manner acceptable to Installer.

### 3.02 INSTALLATION OF PLUMBING FIXTURES

- A. Install plumbing fixtures of types indicated where shown and at indicated heights; in accordance with fixture manufacturer's written instructions, roughing-in drawings, and with recognized industry practices. Ensure that plumbing fixtures comply with requirements and serve intended purposes. Comply with applicable requirements of State Plumbing Code pertaining to installation of plumbing fixtures.
- B. Fasten plumbing fixtures securely to indicated supports or building structure; and ensure that fixtures are level and plumb. Secure plumbing supplies behind or within wall construction so as to be rigid and not subject to pull or push movement.
- C. Protect installed fixtures from damage during remainder of construction period.

### 3.03 FIELD QUALITY CONTROL

- A. Upon completion of installation of plumbing fixtures and after units are water pressurized, test fixtures to demonstrate capability and compliance with requirements. When possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise, remove and replace with new units and proceed with retesting.
- B. Inspect each installed unit for damage to finish. If feasible, restore and match finish to original at site; otherwise, remove fixture and replace with new unit. Feasibility and match to be judged by Architect-/Engineer. Remove cracked or dented units and replace with new units.

### 3.04 ADJUSTING & CLEANING

- A. Clean plumbing fixtures, trim and strainers of dirt and debris upon completion of installation.
- B. Adjust water pressure at faucets to provide proper flow stream and specified gpm.
- C. Adjust or replace washers to prevent leaks at faucets and stops.

END OF SECTION

SECTION 23 05 01 - GENERAL MECHANICAL REQUIREMENTS

## PART 1 - GENERAL

## 1.01 RELATED SECTIONS

- A. This Section pertains to all work under Divisions 21, 22, and 23 and applicable provisions of Division 01.
- B. The methods and materials described within this Section are basic to the entire project and shall be considered as minimum requirements for all sections unless specifically stated otherwise.

## 1.02 SCOPE OF WORK

- A. The work to be done under this specification includes the furnishing of all labor, materials, equipment and services necessary for the proper completion of all mechanical work. The omission of express reference to any parts necessary for or reasonably incidental to the complete installation shall not be construed as releasing the Contractor from furnishing such parts. All material and equipment shall be new and undamaged.

## 1.03 CODES, REGULATIONS &amp; STANDARDS

- A. All work under this Division shall be in strict conformance with the applicable parts of the following codes, laws, rules, regulations and applicable standards of technical societies where referenced hereinafter. References to standards, codes, regulations, etc., shall mean the latest edition of such publications adopted and published at date of the invitation to submit proposals.

Americans with Disabilities Act  
American National Standard Institute (ANSI)  
National Electric Code (NEC)  
National Fire Protection Association (NFPA)  
Local Utilities Regulations  
Local Codes, Rules and Regulations  
Standards of the American Society of Testing Materials (ASTM)  
American Gas Association (AGA)  
Occupational Safety and Health Act (OSHA)  
International Building Code  
State Plumbing Code  
International Mechanical Code, Minnesota Amendments  
State Energy Code  
Underwriters' Laboratories

## 1.04 INSPECTION OF SITE

- A. The Contractor is urged to examine the site and familiarize himself with existing conditions on the premises and surrounding area. No extras will be authorized because of the Contractor's misunderstanding as to work required in order to comply with these plans and specifications, or his lack of knowledge of conditions in connection with the work. Information received by the Contractor from telephone conversations shall not be construed as relieving the Contractor from actually visiting the site

and making his own analysis of conditions.

#### 1.05 RECORD DOCUMENTS

- A. Refer to the Division 01 70 00 Section: PROJECT CLOSEOUT for requirements. The following paragraphs supplement the requirements of Division 01.
- B. Mark drawings to indicate revisions to piping and ductwork, size and location both exterior and interior; including locations of coils, dampers and other control devices, filters, boxes, and similar units requiring periodic maintenance or repair; actual equipment locations, dimensioned for column lines; actual inverts and locations of underground piping; concealed equipment, dimensioned to column lines; mains and branches of piping systems, with valves and control devices located and numbered, concealed unions located, and with items requiring maintenance located (i.e., traps, strainers, expansion compensators, tanks, etc.); Change Orders; concealed control system devices.
- C. Mark specifications to indicate approved substitutions; Change Orders; actual equipment and materials used.

#### 1.06 WORKMANSHIP

- A. All work shall be installed and completed by workmen skilled in their trade and shall be installed in a practical and efficient workmanlike manner and in strict accordance with the best practice of the trade.

#### 1.07 MECHANICAL SUBMITTALS

- A. Refer to the Instructions To Bidders, Conditions of the Contract (General and Supplementary) and Division 01 33 00 Section: SUBMITTALS for submittal definitions, requirements and procedures.
- B. Refer to Division 21, 22, and 23 sections for submittal requirements.
- C. The approval of the submittals is general and does not relieve the Contractor from the responsibility for adherence to the specifications, nor shall it relieve him of the responsibility for any error which may exist. Dimensions and quantities are the responsibility of the Contractor.

#### 1.08 MANUFACTURER'S DIRECTIONS

- A. Materials and equipment shall be installed in accordance with the manufacturer's directions unless specifically designated herein.

#### 1.09 ACCESSIBILITY

- A. Install equipment and materials to provide required access for servicing and maintenance. Coordinate the final location of concealed equipment and devices requiring access with final location of required access panels and doors. Allow ample space for removal of all parts that require replacement or servicing.
- B. Extend all grease fittings to an accessible location.

#### 1.10 ROUGH-IN

- A. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected. Refer to equipment specifications for rough-in requirements.

#### 1.11 MECHANICAL INSTALLATIONS

- A. Coordinate mechanical equipment and materials installation with other building components.
- B. Verify all dimensions by field measurements.
- C. Arrange for chases, slots and openings in other building components to allow for mechanical installations.
- D. Coordinate the installation of required supporting devices and sleeves to be set in poured-in-place concrete and other structural components as they are constructed.
- E. Sequence, coordinate and integrate installations of mechanical materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning prior to closing-in the building.
- F. Coordinate the cutting and patching of building components to accommodate the installation of mechanical equipment and materials.
- G. Where mounting heights are not detailed or dimensioned, install mechanical services and overhead equipment to provide the maximum headroom possible.
- H. Install mechanical equipment to facilitate maintenance and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations.
- I. Coordinate the installation of mechanical materials and equipment above ceilings with suspension system, light fixtures and other installations.
- J. Coordinate connection of mechanical systems with exterior underground services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.

#### 1.12 NAMEPLATE DATA

- A. Provide permanent operational data nameplate on each item of power-operated mechanical equipment, indicating manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested compliances, and similar essential data. Locate nameplates in an accessible location.

#### 1.13 OPERATION & MAINTENANCE DATA

- A. Refer to the Division 01 33 00 Section: SUBMITTALS for procedures and requirements for preparation and submittal of maintenance manuals.



- B. In addition to the information required by Division 01 for maintenance data, include the following information:
  - 1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests and complete nomenclature and commercial numbers of all replaceable parts.
  - 2. Manufacturer's printed operating procedures to include startup, break-in, routine and normal operating instructions; regulation, control, stopping, shutdown and emergency instructions; and summer and winter operating instructions.
  - 3. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair and reassembly; aligning and adjusting instructions.
  - 4. Servicing instructions and lubrication charts and schedules.

#### 1.14 WARRANTIES

- A. Refer to the Division 01 33 00 Section: SUBMITTALS for procedures and submittal requirements for warranties. Refer to individual equipment specifications for warranty requirements.
- B. Compile and assemble the warranties specified in Divisions 21, 22, and 23 into a separated set of vinyl covered, three ring binders, tabulated and indexed for easy reference.
- C. Provide complete warranty information for each item to include product or equipment to include date of beginning of warranty or bond; duration of warranty or bond; and names, addresses and telephone numbers and procedures for filing a claim and obtaining warranty services.

#### 1.15 CLEANING

- A. Refer to the Division 01 11 00 Section: SUMMARY OF THE WORK for general requirements for final cleaning.
- B. Refer to Division 23 05 93 Section: TESTING, ADJUSTING AND BALANCING for requirements for cleaning filters, strainers and mechanical systems prior to final acceptance.

#### 1.16 PROJECT CLOSEOUT

- A. Refer to the Division 01 70 00 Section: PROJECT CLOSEOUT for procedures and requirements for project closeout.

#### 1.17 EXISTING CONDITIONS & SERVICES

- A. When encountered in work, protect, brace, support existing active services included but not restricted to sewers, gas, electric and other systems where required for proper execution of work. If existing active services are encountered that require relocation, make request in writing for determination. Do not proceed with work until written directions are received. Do not prevent or disturb operation of active services that are to remain.

- B. When encountered in work, remove, cap or plug inactive services. Notify utility companies or municipal agencies having jurisdiction; protect or remove these services as directed.
- C. Where work makes temporary shutdown of services unavoidable, shut down at night, or at such times as approved by Engineer, which will cause least interference with established operating routine. Arrange to work continuously, including overtime, if required, to make necessary connections to existing work.

#### 1.18 PERMITS, LICENSES & FEES

- A. The Contractor shall obtain and pay for all construction permits, notices, inspection fees, licenses, etc., necessary for the performance to the work included in this contract; and he shall observe any requirements stipulated thereon.

#### 1.19 FIRE & SAFETY PRECAUTIONS

- A. Take all necessary precautions for safety of employees and public. Comply with applicable provisions of Federal, State and Local laws, ordinances and requirements. Erect and properly maintain necessary safeguards for said protection as required by conditions and progress of job and post danger signs warning against hazards of construction. All employees shall be notified of potentially hazardous materials according to "Right to Know" statutes.

#### 1.20 REFERENCES

AFI	Air Filter Institute
AGA	American Gas Association
AIEE	American Institute of Electrical Engineers
ANSI	American National Standards Institute
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society of Testing Materials
AWWA	American Water Works Association
CMA	Convactor Manufacturers Association
CSD	Commodity Standards Division, US Dept. of Commerce
HPACCNA	Heating, Piping and Air Conditioning Contractors National Association
IBR	Institute of Boiler and Radiator Manufacturers
IUHA	Industrial Unit Heater Association
MSS	Manufacturers Standardization Society of the Valve and Fittings Industry
NAFM	National Association of Fan Underwriters
NBFU	National Board of Fire Underwriters
NEC	National Electric Code (NFPA Pamphlet #70)
NEMA	National Electric Manufacturers Association
SBI	Steel Boiler Institute
SMACNA	Sheetmetal and Air Conditioning Contractors National Association
UL	Underwriters' Laboratories, Inc.

#### 1.21 ABBREVIATIONS

a-c	alternating current	ID	inside diameter
AFF	above finish floor		

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AFG	above finish grade	in or "	inch
amp	ampere	ips	intermediate-pressure
atm	atmospheric	ips	iron pipe size
boiler hp	boiler horsepower	kw	kilowatt
bhp	brake horsepower	kwhr	kilowatt/hour
BTU	British thermal unit	lb	pound
BTUH	BTU per hour	lin ft / LF	linear foot
C	degree Centigrade	max	maximum
cfm	cubic feet per minute	M&E	Mechanical and Electrical
c.i.	cast iron	M&ER	M&E Requirements
c-p	chrome-plated	MBH	thousand BTU/hour
cu in	cubic inch	MCF	1000 cubic feet
cu ft/CF	cubic foot	min	minimum
cu yd	cubic yard	m-p	medium-pressure
db	decibel	o.a.	outside air
d-c	direct current	o.c.	center to center or on center
deg	degree	od / OD	outside diameter
dia	diameter	os&y	outside screw & yoke
dif	diffuser	oz	ounce
edr/EDR	equivalent direction radiation	prv	pressure reducing valve
exh	exhaust	psi	pounds/square inch
F	degree Fahrenheit	PVC	Polyvinyl Chloride
FD	Fire Department	R.A.	return air
FD	floor drain	RAG	return air grille
fpm	feet per minute	reg	register
F & T	float & thermostatic	rpm	revolutions/minute
ft or '	foot	sec	second
gal	gallon	sq ft	square foot
gph	gallons per hour	sq in	square inch
gpm	gallons per minute	sp	static pressure
Hg	Mercury	swp	steam working pressure
h-p	high-pressure	std	standard
hp	horsepower	tdh	total dynamic head
hr	hour	temp	temperature
Hs	sensible heat gain	wwp	water working pressure

1.22 STREET, SIDEWALK, CURB & LAWN REPAIR

- A. Each Contractor will be responsible for the replacement of existing street pavement, curbs, sidewalks, lawn, etc., removed by him or damaged by him in the course of the work. Pavement repairs shall be done as required by the Owner, state or city; and the Contractors shall make the necessary arrangements to perform such repairs and shall pay all costs in connection with same unless work is to be reconstructed under the General Contract.

1.23 ROOF CURBS & FLASHINGS

- A. The General Contractor will provide roof curbs except where noted otherwise and do all flashing for pipes, ducts, ventilators at the time the roofing material is installed. Seal flashing by this Contractor.

## 1.24 FLOOR, WALL &amp; CEILING ESCUTCHEON PLATES

- A. Where uncovered exposed pipes pass through walls, floors or ceilings, they shall be fitted with wall, floor or ceiling plates. Wherever projecting sleeves occur, the plates shall have a raised hood design to cover the sleeve. Plates shall be set tight against wall or floor.

## 1.25 WELDING

- A. When required, all welding shall be done by certified welders and licensed fitters who are trained in electric-arc and/or gas welding and experienced in the welding positions and materials required. On all arc-welded joints, a minimum of two passes must be made.

## 1.26 PROTECTIVE GUARDS

- A. Provide guards to enclose belts, pulleys, sheaves, gears and couplings of galvanized expanded or perforated sheet steel with angle frame and angle or channel mounting supports. Make guard easily removable for access.

## 1.27 CUTTING &amp; PATCHING

- A. Each Contractor shall perform all cutting necessary to perform his work and shall patch damaged work. However, special permission shall be obtained from the Architect before cutting structural members or finished materials. All patching shall be performed in such manner as to leave no visible trace and to return the part affected to the condition of undisturbed work. Patch with similar material as existing. Paint to match. Exterior surfaces to be watertight.
- B. Provide dust barriers as needed to prevent the spreading of dust to adjoining areas.

## 1.28 DEMOLITION

- A. When removing existing equipment as shown and as noted, including but not limited to fin-tube radiation, plumbing fixtures, ductwork, temperature controls, electrical wiring and any other demolition work; all piping, wiring, ductwork and any other connections shall be capped off below floors, under floors, inside walls or above ceilings. The floors, walls and/or ceilings shall be patched to match the existing conditions and finishes by the Mechanical Contractor.

## 1.29 CORE DRILLING WALLS/FLOORS

- A. Contractor shall provide all holes through walls, floors and ceilings necessary for the installation of new piping. All holes shall be core drilled and of sufficient size to allow the pipe to pass through the opening.
- B. All exposed pipes passing through these openings shall be covered with escutcheon plates on both sides unless the openings are sized for a snug fit around the pipe or the openings are reduced by using grout or other cement type closing materials approved by the Engineer. The grout shall be troweled smooth on both sides of the wall and primed for painting.

## 1.30 CLEANING

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- A. Upon completion of work, all rubbish must be cleared away; all fixtures, piping, hangers and trim shall be thoroughly cleaned and ready for use. All ventilating, air conditioning and terminal heating equipment enclosures shall be cleaned with a vacuum cleaner.

END OF SECTION

SECTION 23 05 13 - MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

## PART 1 - GENERAL

## 1.01 DESCRIPTION OF WORK

- A. This Section includes the electrical requirements for all motors, starters and disconnects furnished with mechanical HVAC equipment. See the Equipment Schedule and other sections of these specifications for specific sizes and electrical characteristics.

## 1.02 QUALITY ASSURANCE

- A. Coordination with Electrical Work: Wherever possible, match elements of electrical provisions of mechanical work with similar elements of electrical work specified in Division 16 sections. Comply with applicable requirements of Division 16 sections for electrical work of this Section which is not otherwise specified.
- B. Standards: For electrical equipment and products, comply with applicable NEMA standards and refer to NEMA standards for definitions of terminology herein. Comply with National Electrical Code (NFPA 70) for workmanship and installation requirements.

## PART 2 - PRODUCTS

## 2.01 MOTORS

- A. Motor Characteristics: Except where more stringent requirements are indicated and except where required item of mechanical equipment cannot be obtained with fully complying motor, comply with the following requirements for motors of mechanical work:
- B. Temperature Rating: Rated for 40°C environment with maximum 50°C temperature rise for continuous duty at full load (Class A Insulation).
- C. Starting Capability: Provide each motor capable of making starts as frequently as indicated by automatic control system, and not less than five starts per hour for manually controlled motors.
- D. Phases and Current Characteristics: Coordinate current characteristics with power specified in Division 16 sections, and with individual equipment requirements specified in other Division 15 requirements. Do not purchase motors until power characteristics available at locations of motors have been confirmed, and until rotation directions have been confirmed.
- E. Service Factor: 1.15 for polyphase motors and 1.35 for single phase motors.
- F. Motor Construction: Provide general purpose, continuous duty motors, Design "B" except "C" where required for high starting torque.
  - 1. Frames: NEMA #56.
  - 2. Bearings: Ball or roller bearings with inner and outer shaft seals, regreasable except permanently sealed where motor is normally inaccessible for regular maintenance. Where belt drives and other

drives produce lateral or axial thrust in motor, provide bearings designed to resist thrust loading. Refer to individual sections of Division 15 for fractional-hp light-duty motors where sleeve-type bearings are permitted.

3. Enclosure Type: Except as otherwise indicated, provide open dripproof motors for indoor use where satisfactorily housed or remotely located during operation, and provide guarded dripproof motors where exposed to contact by employees or building occupants. Provide weather-protected Type I for outdoor use, Type II where not housed. Refer to individual sections of Division 15 for other enclosure requirements.
  4. Overload Protection: Provide built-in thermal overload protection and, where indicated, provide internal sensing device suitable for signaling and stopping motor at starter.
  5. Noise Rating: Provide "Quiet" rating on motors.
  6. Efficiency: Where motors are indicated to be "Energy Efficient," provide motors having NEMA premium efficiency as scheduled in accordance with IEEE Standard 112, test method B.
  7. Power Factor - Equal to .95
- G. Nameplate: Provide metal nameplate on each motor, indicating full identification of manufacturer, ratings, characteristics, construction, special features and similar information.

## 2.02 STARTERS, ELECTRICAL DEVICES & WIRING

- A. See the Equipment Schedule for requirements.
- B. All electrical items shall be UL listed.

## 2.03 EQUIPMENT FABRICATION

- A. Fabricate mechanical equipment for secure mounting of motors and other electrical items included in work. Provide either permanent alignment of motors with equipment, or adjustable mounting as applicable for belt drives, gear drives, special couplings and similar indirect coupling of equipment. Provide safe, secure, durable and removable guards for motor drives, arranged for lubrication and similar running-maintenance without removal of guards.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

- A. Install motors on motor mounting systems in accordance with motor manufacturer's instructions, securely anchored to resist torque, drive thrusts, and other external forces inherent in mechanical work. Secure sheaves and other drive units to motor shafts with keys and Allen set screws, except motors of 1/3 hp and less may be secured with Allen set screws on flat surface on shaft. Unless otherwise indicated, set motor shafts parallel with machine shafts.
  - B. All electrical work subcontracted or performed by this Contractor shall comply with Division 16 requirements.
- END OF SECTION

SECTION 23 05 16 - EXPANSION FITTINGS & LOOPS FOR HVAC PIPING

## PART 1 - GENERAL

## 1.01 RELATED SECTIONS

- A. 23 05 01 - General Mechanical Requirements
- B. 23 05 29 - Hangers & Supports for HVAC Piping & Equipment
- C. 23 05 48 - Vibration & seismic Controls for HVAC Piping & Equipment
- D. 23 21 13 - Hydronic Piping

## 1.02 SCOPE OF WORK

- A. Install expansion fittings and loops as shown on drawings and as specified in this section.

## 1.03 SUBMITTALS

- A. Shop Drawings - Assembly-type shop drawings for each type of expansion compensation product, indicating dimensions, weights, required clearances and methods of assembly of components.
- B. Maintenance data for expansion joints for inclusion in Operation and Maintenance Manuals specified in Division 01 and Division 15 Section "Basic Mechanical Requirements."

## PART 2 - PRODUCTS

## 2.01 APPROVED MANUFACTURERS

- A. Expansion-Compensators: Adscos Manufacturing Corp.; Hyspan Precision Products, Inc.; Keflex, Inc.; Metraflex Co.; Senior Flexonics, Inc., Expansion Joint Div.
- B. Pipe Alignment Guides: Adscos Manufacturing Corp.; Advanced Thermal Systems, Inc.; Anvil International; B-Line Systems, Inc.; Hyspan Precision Products, Inc.; Keflex, Inc.; Metraflex Co.

## 2.02 EXPANSION COMPENSATE

- A. Schedule 40 carbon steel elbows, stainless steel hose and braid, carbon steel end fittings.

## 2.03 PIPE ALIGNMENT GUIDES

- A. Factory-Fabricated Cast Semisteel or Heavy Fabricated Steel, consisting of bolted two-section outer cylinder and base. Include two-section guiding spider that bolts tightly to the pipe.
  - 1. Alignment Guide Lengths: As required for indicated travel.

## 2.04 MISCELLANEOUS MATERIALS

- A. Structural Steel: ASTM A36/A36M, steel plates, shapes, and bars, black and galvanized.
- B. Bolts and Nuts: ASTM B18.10 or ASTM A183, steel, hex-head, track bolts and nuts.



- C. Washers: ASTM F844, steel, plain, flat washers.
- D. Powder-Actuated Fasteners: Attachments with pull-out and shear capacities appropriate for supported loads and building materials where used.
- E. Concrete: Portland-cement mix, 3000 psi (20.7 MPa).
  - 1. Cement: ASTM C150, Type I.
  - 2. Fine Aggregate: ASTM C33, sand.
  - 3. Coarse Aggregate: ASTM C33, crushed gravel.
  - 4. Water: Potable.
- F. Grout: ASTM C1107, Grade B, nonshrink, nonmetallic.
  - 1. Characteristics include post-hardening volume-adjusting dry hydraulic-cement-type grout that is nonstaining, noncorrosive, nongaseous and is recommended for both interior and exterior applications.
  - 2. Design Mix: 5000 psi (34.5 MPa), 28-day compressive strength.
  - 3. Water: Potable.
  - 4. Packaging: Premixed and factory-packaged.

### PART 3 - EXECUTION

#### 3.01 EXAMINATION

- A. Examine Substrates and Conditions under which pipe expansion joints, pipe alignment guides and pipe anchors are to be installed. Do not proceed until unsatisfactory conditions have been corrected.

#### 3.02 PIPE EXPANSION INSTALLATION

- A. Install Pipe Expansion Compensators according to manufacturer's written instructions.

#### 3.03 PIPE ALIGNMENT GUIDE INSTALLATION

- A. Install Pipe Alignment Guides on piping elsewhere as indicated.
- B. Secure Pipe Alignment Guides to building substrate.

#### 3.04 PIPE ANCHOR INSTALLATION

- A. Install Pipe Anchors at proper locations to prevent stresses from exceeding those permitted by ASME B31.9 and to prevent transfer of loading and stresses to connected equipment.
- B. Fabricate and Install Anchors by welding steel shapes, plates and bars to piping and to structure. Comply with ASME B31.9 and with AWS D1.1.
- C. Construction Concrete Pipe Anchors of poured-in-place concrete of dimensions indicated.

- D. Where Pipe Expansion Joints are indicated, install pipe anchors according to expansion unit manufacturer's written instructions to control movement to compensators.
- E. Pipe Anchor Spacings: Where not otherwise indicated, install pipe anchors at ends of principal pipe runs, at intermediate points in pipe runs between expansion loops and bends. Preset anchors as required to accommodate both expansion and contraction of piping.
- F. Use Grout to form flat bearing surfaces for pipe expansion joints, pipe alignment guides, and pipe anchors that are installed on or in concrete.

END OF SECTION

SECTION 23 05 19 - METERS & GAUGES FOR HVAC PIPING, DUCTWORK & EQUIPMENT

## PART 1 - GENERAL

## 1.01 RELATED SECTIONS

- A. 23 05 01 - General Mechanical Requirements
- B. 23 05 53 - Identification for HVAC Piping & Equipment
- C. 23 21 13 - Hydronic Piping

## 1.02 SCOPE OF WORK

- A. Install meters and gauges as required by this Section is indicated on drawings and/or specified in this section.

## 1.03 SUBMITTALS

- A. Shop Drawings: Submit shop drawings, including installation instructions for each type of meter and gauge. Include scale range, ratings and calibrated performance curves.
- B. Maintenance Data: Submit maintenance data and spare parts lists for each type of meter and gauge. Include this data and product data in Maintenance Manual.

## PART 2 - PRODUCTS

## 2.01 APPROVED MANUFACTURERS

- A. Thermometers - Terice, Ashcroft, Crosby, Marsh, US Gauge, Weiss

## 2.02 LIQUID-IN-GLASS THERMOMETERS

- A. Provide glass thermometers of materials, capacities and ranges indicated, designed and constructed for use in service indicated.
- B. Case: Die-cast aluminum finished in baked epoxy enamel, clear acrylic plastic front, spring secured, 9" long.
- C. Adjustable Joint: Die-cast aluminum, finished to match case, 180° adjustment in vertical plane, 360° adjustment in horizontal plane, with locking device.
- D. Tube and Capillary: Mercury filled, magnifying lens, 1% scale range accuracy, shock mounted.
- E. Scale: Satin faced, non-reflective aluminum, permanently etched markings.
- F. Stem: Copper-plated steel, aluminum or brass, for separable socket, length to suit installation.
- G. Range: Conform to the following:
  - 1. Hot Water: 30° - 240°F with 2°F scale divisions (0° - 160°C with 2°C scale divisions).

PART 3 - EXECUTION

3.01 INSPECTION

- A. Examine areas and conditions under which meters and gauges are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.02 INSTALLATION OF TEMPERATURE GAUGES

- A. Install temperature gauges in vertical upright position and tilted so as to be easily read by observer standing on floor.
- B. Locations. Install in the following locations and elsewhere as indicated:
  - 1. At inlet and outlet of chilled water air conditioner.
  - 2. At inlet and outlet of each hydronic chiller inside.
  - 3. Any locations where a temperature change occurs, install on both sides of unit.

3.03 CONNECTIONS

- A. The drawings indicate the general arrangement of piping, fittings and specialties.
- B. Install meters and gauges adjacent to machines and equipment to allow servicing and maintenance.

3.04 ADJUSTING & CLEANING

- A. Adjusting: Adjust faces of meters and gauges to proper angle for best visibility.
- B. Cleaning: Clean windows of meters and gauges and factory-finished surfaces. Replace cracked or broken windows, repair any scratched or marred surfaces with manufacturer's touch-up paint.
- C. Calibrate Meters according to manufacturer's written instructions, after installation.

END OF SECTION

SECTION 23 05 23 - VALVES FOR HVAC PIPING

## PART 1 - GENERAL

## 1.01 RELATED SECTIONS

- A. 23 05 01 - General Mechanical Requirements
- B. 23 05 53 - Identification for HVAC Piping & Equipment

## 1.02 SCOPE OF WORK

- A. Install valves as required by this Section as indicated on drawings and/or specified in this section.

## 1.03 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of valves, of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Valve Types: Provide valves of same type by same manufacturer.

## 1.04 SUBMITTALS

- A. Shop Drawings: Submit shop drawings, including installation instructions for each type of valve. Include pressure drop curve or chart for each type and size of valve. Submit valve schedule showing manufacturer's figure number, size, location and valve features for each required valve.
- B. Maintenance Data: Submit maintenance data and spare parts lists for each type of valve. Include this data, product data and shop drawings in maintenance manual.

## PART 2 - PRODUCTS

## 2.01 APPROVED MANUFACTURERS

- A. Ball Valves - Apollo, Hammond, Milwaukee, Nibco, Watts Regulator

## 2.02 BALL VALVES

- A. All Sizes: 150 psi SWP, 600 psi WOG, bronze body, standard port, bronze trim, 2-piece construction, TFE seats and seals. Stainless steel trim and seats if used in steam applications.

## 2.03 CHECK VALVES

- A. 2" and Smaller: Class 125, bronze body, horizontal swing, regrinding type, Y-pattern, renewable disc.
- B. 2-1/2" and Larger: Class 125, iron body, bolted bonnet, horizontal swing, renewable seat and disc, flanged ends.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

- A. General: Except as otherwise indicated, comply with the following requirements:
  - 1. Install valves where required for proper operation of piping and equipment, including valves in branch lines where necessary to isolate sections of piping. Locate valves so as to be accessible and so that separate support can be provided when necessary.
  - 2. Install valves with stems pointed up, in vertical position where possible, but in no case with stems pointed downward from horizontal plane unless unavoidable. Install valve drains with hose-end adapter for each valve that must be installed with stem below horizontal plane.
- B. Insulation: Where insulation is indicated, install extended-stem valves, arranged in proper manner to receive insulation.
- C. Selection of Valve Ends (Pipe Connections): Except as otherwise indicated, select and install valves with the following ends or types of pipe/tube connections:
  - 1. Tube Size 2" and Smaller: Soldered-joint valves.
  - 2. Pipe Size 2" and Smaller: One of the following, at Installer's option: threaded valves, butt-welding valves, socket-welding valves, flanged valves, flangeless valves, single flanged valves.
  - 3. Pipe Size 2-1/2" and Larger: One of the following, at Installer's option: butt-welding valves, socket-welding valves, flanged valves, wafer valves, single flanged valves, hub-and-spigot valves, mechanical joint end valves.
- D. Valve System: Select and install valves with outside screw and yoke stems, except provide inside screw non-rising stem valves where headroom prevents full opening of os&y valves.
- E. Non-Metallic Disc: Limit selection and installation of valves with non-metallic discs to locations indicated and where foreign material in piping system can be expected to prevent tight shutoff of metal seated valves.
- F. Renewable Seats: Select and install valves with renewable seats, except where otherwise indicated.
- G. Fluid Control: Except as otherwise indicated, install gate and ball valves to comply with ANSI B31.9. When balancing is indicated, install calibrated circuit setters.
- H. Installation of Check Valves:
  - 1. Swing Check Valves: Install in horizontal position with hinge pin horizontally perpendicular to center line of pipe. Install for proper direction of flow.

### 3.02 ADJUSTING & CLEANING

- A. Valve Adjustment: After piping systems have been tested and put into service, but before final testing, adjusting and balancing, inspect each valve for possible leaks. Adjust or replace packing to stop leaks, replace valve if leak persists.

- B. Cleaning: Clean factory-finished surfaces. Repair any marred or scratched surfaces with manufacturer's touch-up paint.

END OF SECTION

SECTION 23 05 29 - HANGERS & SUPPORTS FOR HVAC PIPING & EQUIPMENT

## PART 1 - GENERAL

## 1.01 RELATED SECTIONS

- A. 23 05 01 - General Mechanical Requirements
- B. 23 21 13 - Hydronic Piping
- C. 23 31 13 - Metal Ductwork

## 1.02 SCOPE OF WORK

- A. Install hangers and supports required by this Section as indicated on drawings and/or specified in this section.

## 1.03 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of supports and anchors, of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

## 1.04 SUBMITTALS

- A. Shop Drawings: Submit shop drawings, including installation instructions for each type of support and anchor.
- B. Maintenance Data: Submit maintenance data and parts lists for each type of support and anchor. Include this data, product data and shop drawings in maintenance manual.

## PART 2 - PRODUCTS

## 2.01 APPROVED MANUFACTURERS

- A. Expansion Anchors - Hilti
- B. Hangers - B-Line, Anvil, Carpenter and Patterson
- C. Pipe Riser Clamps - Grinnell, Anvil
- D. Powder Drive Fasteners - Hilti
- E. Seals - Thunderline

## 2.02 EXPANSION ANCHORS

- A. Anchors shall be stud or shell type. Stud type shall meet ASTM A108, ASTM B633 and FF-S-325. Shell type shall meet ASTM B633.

## 2.03 HORIZONTAL-PIPING HANGERS &amp; SUPPORTS



- A. Except as otherwise indicated, provide factory-fabricated horizontal-piping hangers and supports complying with MSS SP-58, selected by Installer to suit horizontal-piping systems, in accordance with MSS SP-69 and manufacturer's published product information. Use only one type by one manufacturer for each piping service. Select size of hangers and supports to exactly fit pipe size for bare piping, and to exactly fit around piping insulation with saddle or shield for insulated piping. Provide copper-plated hangers and supports for copper-piping systems.

#### 2.04 VERTICAL-PIPING CLAMPS

- A. Except as otherwise indicated, provide factory-fabricated vertical-piping clamps complying with MSS SP-58, selected by Installer to suit vertical piping systems, in accordance with MSS SP-69 and manufacturer's published product information. Select size of vertical piping clamps to exactly fit pipe size of bare pipe. Provide copper-plated clamps for copper-piping systems.

#### 2.05 HANGER-ROD ATTACHMENTS

- A. Except as otherwise indicated, provide factory-fabricated hanger-rod attachments complying with MSS SP-58, selected by Installer to suit horizontal-piping hangers and building attachments, in accordance with MSS SP-69 and manufacturer's published product information. Use only one type by one manufacturer for each piping service. Select size of hanger-rod attachments to suit hanger rods. Provide copper-plated hanger-rod attachments for copper-piping systems.

#### 2.06 BUILDING ATTACHMENTS

- A. Except as otherwise indicated, provide factory-fabricated building attachments complying with MSS SP-58, selected by Installer to suit building substrate conditions, in accordance with MSS SP-69 and manufacturer's published product information. Select size of building attachments to suit hanger rods. Provide copper-plated building attachments for copper-piping systems.

#### 2.07 SPRING HANGERS & SUPPORTS

- A. Except as otherwise indicated, provide factory-fabricated spring hangers and supports complying with MSS SP-58, selected by Installer to suit piping system, in accordance with MSS SP-69 and manufacturer's published product information. Use only one type by one manufacturer for each piping service. Select spring hangers and supports to suit pipe size and loading.

#### 2.08 MISCELLANEOUS MATERIALS

- A. Provide products complying with NEMA Std ML 1.
- B. Powder Driven Fasteners - Fasteners shall be plated in accordance with QQ-2-325-C.
- C. Sleeves - Pipe sleeves shall be standard weight black steel.

### PART 3 - EXECUTION

#### 3.01 INSPECTION

- A. Examine areas and conditions under which supports and anchors are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

### 3.02 PREPARATION

- A. Proceed with installation of hangers, supports and anchors only after required building structural work has been completed in areas where the work is to be installed. Correct inadequacies including (but not limited to) proper placement of inserts, anchors and other building structural attachments.

### 3.03 INSTALLATION OF BUILDING ATTACHMENTS

- A. Install building attachments at required locations within concrete or on structural steel for proper piping support. Space attachments within maximum piping span length indicated in MSS SP-69. Install additional concentrated loads, including valves, flanges, guides, strainers, expansion joints and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten insert securely to forms. Where concrete with compressive strength less than 2500 psi is indicated, install reinforcing bars through openings at top of inserts.

### 3.04 INSTALLATION OF HANGERS & SUPPORTS

- A. Install hangers, supports, clamps and attachments to support piping properly from building structure; comply with MSS SP-69 and SP-89. Arrange for grouping of parallel runs of horizontal piping to be supported together on trapeze type hangers where possible. Install supports with maximum spacings complying with MSS SP-69. Where piping of various sizes is to be supported together by trapeze hangers, space hangers for smallest pipe size or install intermediate supports for smaller diameter pipe. Do not use wire or perforated metal to support piping, and do not support piping from other piping.
- B. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers and other accessories. Except as otherwise indicated for exposed continuous pipe runs, install hangers and supports of same type and style as installed for adjacent similar piping.
- C. Support fire-water piping independently of other piping.
- D. Prevent electrolysis in support of copper tubing by use of hangers and supports which are copper plated, or by other recognized industry methods.
- E. Install powder-actuated drive-pin fasteners 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. Do not use in lightweight concrete slabs or in concrete slabs less than 4" (100mm) thick.
- F. Install mechanical-anchor fasteners in concrete after concrete is placed and completely cured. Install according to fastener manufacturer's written instructions. Do not use in lightweight concrete slabs or in concrete slabs less than 4" (100mm) thick.
- G. Provisions for Movement:
  - 1. Install hangers and supports to allow controlled movement of piping systems and to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion

- loops, expansion bends and similar units.
2. Load Distribution: Install hangers and supports so that piping live and dead loading and stresses from movement will not be transmitted to connected equipment.
  3. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes, and so that maximum pipe deflections allowed by ANSI B31 Pressure Piping Codes are not exceeded.

H. Insulated Piping: Comply with the following installation requirements:

1. Clamps: Attach clamps, including spacers (if any), to piping with clamps projecting through insulation; do not exceed pipe stresses allowed by ANSI B31.
2. Shields: Where low-compressive-strength insulation or vapor barriers are indicated on cold or chilled water piping, install coated protective shields. For pipe 8" and over, install wood insulation saddles.
3. Saddles: Where insulation without vapor barrier is indicated, install protection saddles.

I. Horizontal Pipe Supports, Spacing and Loading, Saddle Length:

Pipe Size	Max. Span / Feet		Min. Rod Diameter	
	copper	steel*	copper	steel
Up to 3/4"	6	6	3/8	3/8
1"	6	8	3/8	3/8
1-1/4" to 2"	8	10	3/8	3/8
2-1/2" to 3"	9	10	1/2	1/2

\*Denotes maximum span unless 10-foot lengths of pipe are used then 10-foot span allowed.  
Cut bolts, grind sharp edges and corners.

3.05 ADJUSTING & CLEANING

- A. Hanger Adjustments: Adjust hangers so as to distribute loads equally on attachments.
- B. Support Adjustment: Provide grout under supports so as to bring piping and equipment to proper level and elevations.
- C. Cleaning: Clean factory-finished surfaces. Repair any marred or scratched surfaces with manufacturer's touch-up paint.

END OF SECTION

SECTION 23 05 48 - VIBRATION & SEISMIC CONTROLS FOR HVAC PIPING & EQUIPMENT

## PART 1 - GENERAL

## 1.01 RELATED SECTIONS

- A. 23 05 01 - General Mechanical Requirements
- B. 23 21 13 - Hydronic Piping

## 1.02 SCOPE OF WORK

- A. Install vibration isolation as required by this Section and as indicated on the drawings and schedules and/or specified in this section.

## 1.03 QUALITY ASSURANCE

- A. Product Qualification: Provide each type of vibration isolation unit produced by specialized manufacturer, with not less than 5 years of successful experience in production of units similar to those required for project.

## PART 2 - PRODUCTS

## 2.01 APPROVED MANUFACTURERS

- A. Flexible Pipe Connectors - Gustin-Bacon, Matra-Flex, Minnesota Flexile, Twin City Hose

## 2.02 ISOLATION MATERIALS &amp; SUPPORT UNITS

- A. Flexible Duct Connectors: Laminated flexible sheet of cotton duct and sheet elastomer (butyl, neoprene or vinyl), reinforced with steel wire mesh where required for strength to withstand duct pressure indicated. Form connectors with full-faced flanges and accordion bellows to perform as flexible isolation unit, and of manufacturer's standard length for each size unless otherwise indicated. Equip each unit with galvanized steel retaining rings for airtight connection with ductwork.
- B. Flexible Pipe Connectors:
  - 1. For non-ferrous piping, provide bronze hose covered with bronze wire braid with copper tube ends or bronze flanged ends, braze-welded to hose.
  - 2. For ferrous piping, provide stainless steel hose covered with stainless steel wire braid with NPT steel nipples or 150 psi ANSI flanges, welded to hose.
  - 3. Rubber Flexible Pipe Connectors: Provide of rubber and butyl construction with integral full-face duct and butyl flanges, internally steel wire reinforced, and furnished complete with steel retaining rings. Select with temperature and pressure ratings to suit intended service.

## PART 3 - EXECUTION

## 3.01 APPLICATIONS

- A. Apply types of vibration isolation materials and units indicated at locations shown or scheduled. Selection is installer's option where more than one type is indicated.
- B. Flexible Duct Connectors: Install at the following ductwork connections:
  - 1. Connections with vibration isolation-mounted air handling equipment.
  - 2. Connections with fixed wall louvers for air intake and exhausts.
  - 3. Where ductwork, 1.0 sq.ft. and greater, changes directions in critical locations.
- C. Flexible Pipe Connectors: Install in piping systems at the following locations:
  - 1. Connections, 3/4" pipe size and larger, with vibration-isolation-mounted equipment.

### 3.02 INSTALLATION

- A. Except as otherwise indicated, comply with manufacturer's instructions for installation and load application to vibration isolation materials and units. Adjust to ensure that units do not exceed rated operating deflections or bottom out under loading, and are not short-circuited by other contacts or bearing points. Remove space blocks and similar devices (if any) intended for temporary protection against overloading during installation.
- B. Anchor and attach units to substrate and equipment as required for secure operation and to prevent displacement by normal forces and as indicated.
- C. Adjust leveling devices as required to distribute loading uniformly onto isolators. Shim units as required where leveling devices cannot be used to distribute loading properly.
- D. Locate isolation hangers as near overhead support structure as possible.
- E. Weld riser isolator units in place as required to prevent displacement from loading and operations.
- F. Flexible Pipe Connectors: Install on equipment side of shutoff valves, horizontally and parallel to equipment shafts wherever possible

END OF SECTION

SECTION 23 05 53 - IDENTIFICATION FOR HVAC PIPING & EQUIPMENT

## PART 1 - GENERAL

## 1.01 RELATED SECTIONS

- A. 23 05 01 - General Mechanical Requirements
- B. 23 05 23 - Valves for HVAC Piping
- C. 23 21 13 - Hydronic Piping
- D. 23 31 13 - Metal Ductwork

## 1.02 SCOPE OF WORK

- A. Install identification as required by this Section.

## 1.03 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of identification devices of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

## 1.04 SUBMITTALS

- A. Schedules: Submit valve schedule for each piping system, typewritten and reproduced on 8-1/2" x 11" bond paper. Tabulate valve number, piping system, system abbreviation (as shown on tag), location of valve (room or space), and variations for identification (if any). Mark valves which are intended for emergency shutoff and similar special uses, by special "flags," in copies for maintenance manuals.
- B. Maintenance Data: Include product data and schedules in maintenance manuals.

## PART 2 - PRODUCTS

## 2.01 ACCEPTABLE MANUFACTURERS

- A. Paint - Benjamin Moore, Devoe, Pratt & Lambert, Rust-O-Leum
- B. Pipe Labels - Seton, Brady

## 2.02 PAINTED IDENTIFICATION MATERIALS

- A. This Contractor shall be responsible for preparing and painting items described in this section.

## 2.03 PIPE IDENTIFICATION

- A. Snap-On Type: Provide manufacturer's standard preprinted, semi-rigid, snap-on, color-coded pipe markers, complying with ANSI A13.1.
- B. Pressure-Sensitive Type: Provide manufacturer's standard preprinted, permanent adhesive, color-coded, pressure-sensitive vinyl pipe markers, complying the ANSI A13.1.

#### 2.04 DUCT IDENTIFICATION

- A. Provide manufacturer's standard laminated plastic, color-coded duct markers that comply with ASME A13.1.
  - 1. Green: cold air.
  - 2. Yellow: hot air.
  - 3. Yellow/Green: supply air.
  - 4. Blue: exhaust, outside, return and mixed air.
  - 5. For hazardous exhausts, use colors and designs recommended by ANSI A13.1.
- B. Nomenclature: Include the following:
  - 1. Direction of air flow.
  - 2. Duct service (supply, return, exhaust, etc.).
  - 3. Duct origin (from).
  - 4. Duct destination (to).
  - 5. Design cfm.

#### 2.05 CEILING MARKERS

- A. Provide marking tacks with covering for ink notation.

#### 2.06 VALVE TAGS

- A. Brass Valve Tags: Provide 19-gage polished brass valve tags with stamp-engraved piping system abbreviation in 1/4" high letters and sequenced valve numbers 1/2" high, and with 5/32" hole for fastener.
  - 1. Provide 2" diameter tags except as otherwise indicated.
  - 2. Provide size and shape as specified or scheduled for each piping system.

### PART 3 - EXECUTION

#### 3.01 GENERAL INSTALLATION REQUIREMENTS

- A. Coordination: Where identification is to be applied to surfaces which require insulation, painting or other covering or finish, including valve tags in finished mechanical spaces, install identification after completion of covering and painting. Install identification prior to installation of acoustical ceilings and similar removable concealment.

#### 3.02 DUCTWORK IDENTIFICATION

- A. Identify air supply, return, exhaust, intake and relief ductwork with duct markers; or provide stenciled signs and arrows, showing ductwork service and direction of flow, in black or white (whichever provides most contrast with ductwork color).
- B. Location: In each space where ductwork is exposed, or concealed only by removable ceiling system,

locate signs near points where ductwork originates or continues into concealed enclosures (shaft, underground or similar concealment), and at 50' spacings along exposed runs.

- C. Access Doors: Provide duct markers or stenciled signs on each access door in ductwork and housings, indicating purpose of access (to what equipment) and other maintenance and operating instructions, and appropriate safety and procedural information.
- D. Concealed Doors: Where access doors are concealed above acoustical ceilings or similar concealment, plasticized tags may be installed for identification in lieu of specified signs, at Installer's option.

### 3.03 PIPING SYSTEM IDENTIFICATION

- A. Install pipe markers of one of the following types on each system indicated to receive identification and include arrows to show normal direction of flow.
  - 1. Stenciled markers, including color-coded background band or rectangle, and contrasting lettering of black or white. Extend color band or rectangle 2" beyond ends of lettering.
  - 2. Stenciled markers, with lettering color complying with ANSI A13.1.
  - 3. Plastic pipe markers, with application system as indicated under "Materials" in this Section. Install on pipe insulation segment where required for hot non-insulated pipes.
  - 4. Stenciled markers, black or white for best contrast, wherever continuous color-coded painting of piping is provided.
- B. Locate pipe markers and color bands as follows wherever piping is exposed to view in occupied spaces, machine rooms, accessible maintenance spaces (shafts, tunnels, plenums) and exterior non-concealed locations.
  - 1. Near each valve and control device.
  - 2. Near each branch, excluding short takeoffs for fixtures and terminal units; mark each pipe at branch where there could be question of flow pattern.
  - 3. Near locations where pipes pass through walls or floors/ceilings or enter non-accessible enclosures.
  - 4. At access doors, manholes and similar access points which permit view of concealed piping.
  - 5. Near major equipment items and other points of origination and termination.
  - 6. Spaced intermediately at maximum spacing of 50' along each piping run, except reduce spacing to 25' in congested areas of piping and equipment.
  - 7. On piping above removable acoustical ceilings, except omit intermediately spaced markers.
- C. Pipe Identification:

Function

Stencil Working



Chilled Water Supply  
Chilled Water Return  
Refrigerant Liquid  
Refrigerant Gas

CHS  
CHR  
REF LIQ  
REF GAS

### 3.04 VALVE IDENTIFICATION

- A. Provide valve tag on every valve, cock and control device in each piping system; exclude check valves, valves within factory-fabricated equipment units, plumbing fixture faucets, convenience and lawn-watering hose bibs, and shutoff valves at plumbing fixtures, HVAC terminal devices and similar rough-in connections of end-use fixtures and units.
  - 1. Tagging Schedule: Comply with requirements of "Valve Tagging Schedule" at end of this Section.
- B. Mount valve schedule frames and schedules in machine rooms where indicated or, if not otherwise indicated, where directed by Architect/Engineer.
  - 1. Where more than one major machine room is shown for project, install mounted valve schedule in each major machine room, and repeat only main valves which are to be operated in conjunction with operations of more than single machine room.

### 3.05 MECHANICAL EQUIPMENT IDENTIFICATION

- A. Install engraved plastic laminate sign or plastic equipment marker on or near each major item of mechanical equipment and each operational device, as specified herein if not otherwise specified for each item or device. Provide signs for the following general categories of equipment and operational devices:
  - 1. Main control and operating valves, including safety devices and hazardous units such as gas outlets.
  - 2. Meters, gages, thermometers and similar units.
  - 3. Fuel-burning units including boilers, furnaces, heaters, stills and absorption units.
  - 4. Pumps, compressors, chillers, condensers and similar motor-driven units.
  - 5. Heat exchangers, coils, evaporators, cooling towers, heat recovery units and similar equipment.
  - 6. Fans, blowers, primary balancing dampers and mixing boxes.
  - 7. Packaged HVAC central-station and zone-type units.
  - 8. Tanks and pressure vessels.
  - 9. Strainers, filters, humidifiers, water treatment systems and similar equipment.

### 3.06 ADJUSTING & CLEANING

- A. Adjusting: Relocate any mechanical identification device which has become visually blocked by work of this Division or other divisions.
- B. Cleaning: Clean face of identification devices and glass frames of valve charts.

### 3.07 EXTRA STOCK

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- A. Furnish minimum of 5% extra stock of each mechanical identification material required, including additional numbered valve tags (not less than 3) for each piping system, additional piping system identification markers, and additional plastic laminate engraving blanks of assorted sizes.
  - 1. Where stenciled markers are provided, clean and retain stencils after completion of stenciling and include used stencils in extra stock, along with required stock of stenciling paints and applicators.

END OF SECTION

SECTION 23 05 93 - TESTING, ADJUSTING & BALANCING FOR HVAC

## PART 1 - GENERAL

## 1.01 SCOPE OF WORK

- A. Extent of testing, adjusting and balancing work required by this Section is indicated on drawings and schedules, and by requirements of this Section, and is defined to include, and is limited to air terminals and air outlets, inlets, reliefs and returns, and hydronic systems. The work consists of conducting tests, preparing and submitting reports, and recommending modifications to work as required by contract documents.
- B. Component types of testing, adjusting and balancing specified in this Section includes the following as applied to mechanical equipment:
  - 1. Ductwork systems.
  - 2. Chiller.

## 1.02 QUALITY ASSURANCE

- A. Tester's Qualifications: A firm certified by TABB or NEBB in those testing and balancing disciplines similar to those required for this project, who is not Installer of system to be tested and is otherwise independent of project.
- B. NEBB Compliance: Comply with the "Procedural Standards for Testing, Adjusting and Balancing of Environmental Systems" as applicable to mechanical air and hydronic distribution systems and associated equipment and apparatus as specified by the Certified Balancing Bureau.
- C. Industry Standards: Comply with ASHRAE recommendations pertaining to measurements, instruments and testing, adjusting and balancing, except as otherwise indicated.

## 1.03 SUBMITTALS

- A. Submit certified test reports, signed by Test and Balance Supervisor who perform TAB work.
  - 1. Include identification and types of instruments used, and their most recent calibration date with submission of final test report.
- B. Maintenance Data: Include in maintenance manuals copies of certified test reports.

## 1.04 JOB CONDITIONS

- A. Do not proceed with testing, adjusting and balancing work until work has been completed and is operable. Ensure that there is no latent residual work still to be completed on the tested equipment.
- B. Do not proceed until work scheduled for testing, adjusting and balancing is clean and free from debris, dirt and discarded building materials.

## PART 2 - PRODUCTS

## 2.01 PATCHING MATERIALS

- A. Except as otherwise indicated, use same products as used by original Installer for patching holes in insulation, ductwork and housing which have been cut or drilled for test purposes, including access for test instruments, attaching jigs, and similar purposes.
  - 1. At Tester's option, plastic plugs with retainers may be used to patch drilled holes in ductwork and housing.

## 2.02 TEST INSTRUMENTS

- A. Utilize test instruments and equipment for TAB work required, of type, precision and capacity as recommended in the following TAB standards:
  - 1. Balancing Bureau's Procedural Standards for Testing, Adjusting and Balancing of Environmental Systems.
- B. The Contractor shall employ manufactured enclosure type cones, capable of air volume direct readings, for all diffuser air flow measurements.

# PART 3 - EXECUTION

## 3.01 FIELD WORK

- A. Examine installed work and conditions under which testing is to be done to ensure that work has been completed, cleaned and is operable. Do not proceed with TAB work until unsatisfactory conditions have been corrected in manner acceptable to Tester.
- B. Test, adjust and balance environmental systems and components, as indicated, in accordance with procedures outlined in applicable standards.
- C. Test, adjust and balance system during summer season for air conditioning systems and during winter season for heating systems, including at least period of operation at outside condition within 5°F (3°C) wet bulb temperature of maximum summer design condition, and within 10°F (6°C) dry bulb temperature of minimum winter design condition. When seasonal operation does not permit measuring final temperatures, then take final temperature readings when seasonal operation does permit.
- D. Patch holes in insulation, ductwork and housings, which have been cut or drilled for test purposes, in manner recommended by original Installer.

## 3.02 REPORTS

- A. Prepare report of test results, including instrumentation calibration reports, in format recommended by applicable standards.
- B. Prepare report of recommendations for correcting unsatisfactory mechanical performances when system cannot be successfully balanced; including, where necessary, modifications which exceed requirements of contract documents for mechanical work.

## 3.03 FINAL TESTS, INSPECTION &amp; ACCEPTANCE

- A. Retests: If random tests elicit a measured flow deviation of 10% or more from that recorded in Certified Report listings, at 10% or more of the rechecked selections, report shall be automatically rejected. In the event report is rejected, systems shall be readjusted and tested, new data recorded, new Certified Reports submitted, and new inspection tests made, at no additional cost to the Engineer. Retainage time referred to in paragraph 3.5 of this Section shall be based on date of final acceptance of Certified Report.
- B. Marking of Settings: Following final acceptance of Certified Reports by the Engineer, settings of valves, splitters, dampers and other adjustment devices shall be permanently marked by the Contractor so that adjustment can be restored if disturbed at any time. Devices shall not be marked until after final acceptance.

END OF SECTION

SECTION 23 07 13 - DUCT INSULATION

## PART 1 - GENERAL

## 1.01 RELATED SECTIONS

- A. 23 05 01 - General Mechanical Requirements
- B. 23 31 13 - Metal Ductwork

## 1.02 SCOPE OF WORK

- A. Install insulation required by this Section is indicated on drawings and schedules and by requirements of this Section.
- B. Types of mechanical insulation specified in this Section include the following:
  - 1. Ductwork System Insulation:
    - a. Fiberglass.

## 1.03 QUALITY ASSURANCE

- A. Flame/Smoke Ratings: Provide composite mechanical insulation (insulation, jackets, coverings, sealers, mastics and adhesives) with flame-spread index of 25 or less, and smoke-developed index of 50 or less, as tested by ASTM E84 (NFPA 255) method. In addition, the products, when tested, shall not drip flame particles; and flame shall not be progressive.

## 1.04 SUBMITTALS

- A. Shop Drawings: Submit shop drawings and installation instructions for each type of mechanical insulation. Submit schedule showing manufacturer's product number, k-value, thickness and furnished accessories for each mechanical system requiring insulation. also furnish necessary test data certified by an independent testing laboratory.
- B. Maintenance Data: Submit maintenance data and replacement material lists for each type of mechanical insulation. Include this data and product data in maintenance manual.

## 1.05 DELIVERY, STORAGE &amp; HANDLING

- A. Deliver insulation, coverings, cements, adhesives and coatings to site in containers with manufacturer's stamp or label, affixed showing fire hazard indexes of products.
- B. Protect insulation against dirt, water and chemical and mechanical damage. Do not install damaged or wet insulation; remove from project site.

## PART 2 - PRODUCTS

## 2.01 ACCEPTABLE MANUFACTURERS

- A. Armstrong; CertainTeed; Knauf; Johns-Manville; Owens-Corning Fiberglass Corp.; Pittsburgh Corning

Corp.

## 2.02 DUCTWORK INSULATION MATERIALS

- A. Rigid Fiberglass Ductwork Insulation: Class 1, Standard 2# Density.
- B. Flexible Fiberglass Ductwork Insulation: Type I, Class B-6, Standard 3/4# Density.
- C. Jackets for Ductwork Insulation: ASTM C921, Type I, for ductwork with temperatures below ambient; Type II, for ductwork with temperatures above ambient.
- D. Ductwork Insulation Accessories: Provide staples, bands, wires, tape, anchors, corner angles and similar accessories as recommended by insulation manufacturer for applications indicated.
- E. Ductwork Insulation Compounds: Provide cements, adhesives, coatings, sealers, protective finishes and similar compounds as recommended by insulation manufacturer for applications indicated.

## PART 3 - EXECUTION

### 3.01 INSPECTION

- A. Examine areas and conditions under which mechanical insulation is to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

### 3.02 DUCTWORK SYSTEM INSULATION

- A. Insulation Omitted: Do not insulate fibrous glass ductwork or lined ductwork.
- B. Ductwork:
  - 1. Application Requirements: Insulate the following ductwork:
    - a. Supply ductwork between fan discharge or HVAC unit discharge and room terminal outlets.
  - 2. Insulate each ductwork system specified above with one of the following types and thicknesses of insulation:
    - a. Flexible Fiberglass: Minimum R4, application limited to concealed locations.
    - b. No insulation required where exposed in space.

### 3.03 INSTALLATION OF DUCTWORK INSULATION

- A. Install insulation products in accordance with manufacturer's written instructions and in accordance with recognized industry practices to ensure that insulation serves its intended purpose.
- B. Install insulation materials with smooth and even surfaces.
- C. Clean and dry ductwork prior to insulating. Butt insulation joints firmly together to ensure complete and tight fit over surfaces to be covered.

- D. Maintain integrity of vapor barrier on ductwork insulation and protect it to prevent puncture and other damage.
- E. Extend ductwork insulation without interruption through walls, floors and similar ductwork penetrations except where otherwise indicated.
- F. Corner Angles. Except for oven and hood exhaust duct insulation, install corner angles on external corners of insulation on ductwork in exposed finished spaces before covering with jacketing.

#### 3.04 PROTECTION & REPLACEMENT

- A. Replace damaged insulation which cannot be repaired satisfactorily, including units with vapor barrier damage and moisture saturated units.
- B. Protection: Insulation Installer shall advise Contractor of required protection for insulation work during remainder of construction period, to avoid damage and deterioration.

END OF SECTION



SECTION 23 07 19 - HVAC PIPING INSULATION

## PART 1 - GENERAL

## 1.01 RELATED SECTIONS

- A. 23 05 01 - General Mechanical Requirements
- B. 23 21 13 - Hydronic Piping
- C. 23 23 00 - Refrigerant Piping

## 1.02 SCOPE OF WORK

- A. Install insulation required by this Section is indicated on drawings and schedules and by requirements of this Section.
- B. Types of mechanical insulation specified in this Section include the following:
  - 1. Piping System Insulation:
    - a. Fiberglass.
    - b. Flexible Unicellular.

## 1.03 QUALITY ASSURANCE

- A. Flame/Smoke Ratings: Provide composite mechanical insulation (insulation, jackets, coverings, sealers, mastics and adhesives) with flame-spread index of 25 or less, and smoke-developed index of 50 or less, as tested by ASTM E84 (NFPA 255) method. In addition, the products, when tested, shall not drip flame particles; and flame shall not be progressive.

## 1.04 SUBMITTALS

- A. Shop Drawings: Submit shop drawings and installation instructions for each type of mechanical insulation. Submit schedule showing manufacturer's product number, k-value, thickness and furnished accessories for each mechanical system requiring insulation. also furnish necessary test data certified by an independent testing laboratory.
- B. Maintenance Data: Submit maintenance data and replacement material lists for each type of mechanical insulation. Include this data and product data in maintenance manual.

## 1.05 DELIVERY, STORAGE &amp; HANDLING

- A. Deliver insulation, coverings, cements, adhesives and coatings to site in containers with manufacturer's stamp or label, affixed showing fire hazard indexes of products.
- B. Protect insulation against dirt, water and chemical and mechanical damage. Do not install damaged or wet insulation; remove from project site.

## PART 2 - PRODUCTS

## 2.01 ACCEPTABLE MANUFACTURERS

- A. Armstrong; CertainTeed; Knauf; Manville; Owens-Corning; Schuller International.

## 2.02 PIPING INSULATION MATERIALS

- A. Fiberglass Piping Insulation: ASTM C547, Class 1, unless otherwise indicated.
- B. Flexible Unicellular Piping Insulation: ASTM C534, Type I.
- C. Jackets for Piping Insulation: ASTM C921, Type I, for piping with temperatures below ambient; Type II, for piping with temperatures above ambient. Type I may be used for all piping at Installer's option.
1. Encase pipe and pipe fittings insulation exposed in room and as indicated with one-piece premolded PVC jacket, fitting covers, fastened as per manufacturer's recommendations.
  2. Encase exterior piping insulation with weatherproof construction with a white finished color to match existing roof.
- D. Staples, Bands, Wires and Cement: As recommended by insulation manufacturer for applications indicated.
- E. Adhesives, Sealers and Protective Finishes: As recommended by insulation manufacturer for applications indicated.

## PART 3 - EXECUTION

### 3.01 INSPECTION

- A. Examine areas and conditions under which mechanical insulation is to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

### 3.02 HVAC PIPING SYSTEM INSULATION

- A. Insulated Omitted: Omit insulation on hot piping above or below radiation element located within heated space; on condensate piping between steam trap and union; and on unions, flanges, strainers, flexible connections and expansion joints.
- B. Sub-Freezing Piping [0 to 39°F (- 18 to 4°C)]:
1. Application Requirements: Insulate the following sub-freezing HVAC piping systems:
    - a. Refrigerant suction lines between evaporators and compressors.
  2. Insulate each piping system specified above with one of the following types and thicknesses of insulation:
    - a. Flexible Unicellular: Minimum R4 with PVC cover, outdoor to have weather protection finish with white color.

C. Cold Piping [40°F (4.4°C) to Ambient]:

1. Application Requirements: Insulate the following cold HVAC piping systems:
  - a. HVAC chilled water supply and return piping.
2. Insulate each piping system specified above with one of the following types and thicknesses of insulation:
  - a. Fiberglass: R4 for pipe sizes up to and including 1-1/2", R6 for 2" and larger. Outdoor pipe shall have weather protection and finish shall be white.

D. Insulation of Piping Exposed to Weather: Protect outdoor insulation from weather by installing outdoor protective finish or jacketing as recommended by the manufacturer.

## 3.03 INSTALLATION OF PIPING INSULATION

- A. Install insulation products in accordance with manufacturer's written instructions and in accordance with recognized industry practices to ensure that insulation serves its intended purpose.
- B. Install insulation on pipe systems subsequent to installation of heat tracing, painting, testing and acceptance of tests.
- C. Install insulation materials with smooth and even surfaces. Insulate each continuous run of piping with full-length units of insulation, with single cut piece to complete run. Do not use cut pieces or scraps abutting each other.
- D. Clean and dry pipe surfaces prior to insulating. Butt insulation joints firmly together to ensure complete and tight fit over surfaces to be covered.
- E. Maintain integrity of vapor-barrier jackets on pipe insulation, and protect to prevent puncture or other damage.
- F. Cover valves, fittings and similar items in each piping system with equivalent thickness and composition of insulation as applied to adjoining pipe run. Install factory molded, precut or job fabricated units (at Installer's option) except where specific form or type is indicated.
- G. Extend piping insulation without interruption through walls, floors and similar piping penetrations except where otherwise indicated.
- H. Butt pipe insulation against pipe hanger insulation inserts. For hot pipes, apply 3" wide vapor-barrier tape or band over the butt joints. For cold piping apply wet coat of vapor-barrier lap cement on butt joints and seal joints with 3" wide vapor-barrier tape or band.

## 3.04 EXISTING INSULATION REPAIR

- A. Repair damaged sections of existing mechanical insulation, both previously damaged or damaged during this construction period. Use insulation of same thickness as existing insulation, install new jacket lapping and sealed over existing.

3.05 PROTECTION & REPLACEMENT

- A. Replace damaged insulation which cannot be repaired satisfactorily, including units with vapor barrier damage and moisture saturated units.
- B. Protection: Insulation Installer shall advise Contractor of required protection for insulation work during remainder of construction period, to avoid damage and deterioration.

END OF SECTION

SECTION 23 21 13 - HYDRONIC PIPING

## PART 1 - GENERAL

## 1.01 RELATED SECTIONS

- A. 23 05 01 - General Mechanical Requirements
- B. 23 05 16 - Expansion Fittings & Loops for HVAC Piping
- C. 23 05 19 - Meters & Gauges for HVAC Piping, Ductwork & Equipment
- D. 23 05 23 - Valves for HVAC Piping
- E. 23 05 29 - Hangers & Supports for HVAC Piping & Equipment
- F. 23 05 53 - Identification for HVAC Piping & Equipment
- G. 23 21 19 - Hydronic Piping Specialties
- H. 23 21 23 - Hydronic Pumps

## 1.02 SCOPE OF WORK

- A. Install hydronic piping systems for hot water heating, chilled water cooling, condenser water, make-up water for these systems, blowdown drain lines, and condensate drain piping as shown on drawings and as specified in this section.

## 1.03 SYSTEM DESCRIPTION

- A. The hydronic piping systems are the "water-side" of an all-water air conditioning system. Hydronic piping systems specified in this Section include 2-pipe, chilled water piping system. These systems are classified by ASHRAE as Low Water Temperature, Forced, Recirculating systems.
- B. 2-Pipe System: The 2-pipe system includes independent chilled water and hot water supply and return piping mains in a closed loop, connecting the chillers to the terminal heat transfer units by means of piping loop. Circulation is accomplished by pumps. Design flow rates and water temperatures are specified in the various equipment specifications and schedules. Control sequences and temperature reset schedules are specified in the temperature control specifications.

## 1.04 SEQUENCING &amp; SCHEDULING

- A. Coordinate the installation of pipe sleeves for foundation wall penetrations.

## PART 2 - PRODUCTS

## 2.01 PIPING &amp; TUBING MATERIALS

- A. Refer to Part 3 Article "PIPE APPLICATIONS" for identification of where the below materials are used.
  - 1. Drawn Temper Copper Tubing: ASTM B88, Type L.
  - 2. Steel Pipe: ASTM A120, Schedule 40, seamless, black steel pipe, plane ends.

## 2.02 FITTINGS

- A. Steel Fittings: ASTM A234, welded.
- B. Wrought-Copper Fittings: ANSI B16.22, streamlined pattern.
- C. Unions: ANSI B16.39, malleable iron, Class 150, hexagonal stock, with ball-and-socket joints, metal-to-metal bronze seating surfaces; female threaded ends. Threads shall conform to ANSI B1.20.1.
- D. Dielectric Unions or Nipples: Threaded or soldered or grooved end connections for the pipe materials in which installed; constructed to isolate dissimilar metals, prevent galvanic action and prevent corrosion, Victaulic Style 47.
- E. Flexible Connectors: Stainless steel bellows with woven flexible bronze wire reinforcing protective jacket; minimum 150 psig working pressure, maximum 250°F operating temperature. Connectors shall have flanged or threaded end connections to match equipment connected; and shall be capable of 3/4" misalignment.

### 2.03 JOINING MATERIALS

- A. Solder Filler Metals: ASTM B32, 95-5 Tin-Antimony, for heating hot water and low pressure steam piping.
- B. Brazing Filler Metals: AWS A5.8, Classification BAg 1 (Silver).
  - 1. WARNING: Some filler metal contain compounds which produce highly toxic fumes when heated. Avoid breathing fumes. Provide adequate ventilation.
- C. Welding Materials: Comply with Section II, Part C, ASME Boiler and Pressure Vessel Code for welding materials appropriate for the wall thickness and chemical analysis of the pipe being welded.
- D. Gasket Material: Thickness, material and type suitable for fluid to be handled, and design temperatures and pressures.
- E. Coupling Gaskets: Grade "EHP" EPDM gasket, -30°F to +230°F temperature rating or Grade "E" EPDM gasket, -30°F to +230°F temperature rating suitable for water service.

## PART 3 - EXECUTION

### 3.01 PIPE APPLICATIONS

- A. Install Type L, drawn copper tubing with wrought copper fittings and solder joints for 2" and smaller, above ground, within building, between panel and A/C cooling unit.
- B. Install steel pipe with welded joints from chiller to panel.
- C. Provide appropriate connections to equipment as required.
- D. Condensate drain piping shall be Type L drawn copper.

## 3.02 PIPING INSTALLATIONS

- A. Locations and Arrangements: Drawings (plans, schematics and diagrams) indicate the general location and arrangement of piping systems. Locations and arrangements of piping take into consideration pipe sizing and friction loss, expansion, pump sizing and other design considerations. So far as practical, install piping as indicated.
- B. Use fittings for all changes in direction and all branch connections.
- C. Install exposed piping at right angles or parallel to building walls. Diagonal runs are not permitted unless expressly indicated.
- D. Conceal all pipe installations in walls, pipe chases, utility spaces, above ceilings, below grade or floors, unless indicated to be exposed to view.
- E. Install piping tight to slabs, beams, joists, columns, walls and other permanent elements of the building. Provide space to permit insulation applications, with 1" clearance outside the insulation. Allow sufficient space above removable ceiling panels to allow for panel removal.
- F. Locate groups of pipes parallel to each other, spaced to permit applying insulation and servicing of valves.
- G. Install drains at low points in mains, risers and branch lines consisting of a tee fitting, 3/4" ball valve, and short 3/4" threaded nipple and cap.
- H. Exterior Wall Penetrations: Seal pipe penetrations through exterior walls using sleeves and mechanical sleeve seals. Pipe sleeves smaller than 6" shall be steel; pipe sleeves 6" and larger shall be sheetmetal.
- I. Fire Barrier Penetrations: Where pipes pass through fire-rated walls, partitions, ceilings and floors, maintain the fire-rated integrity.
- J. Install piping at a uniform grade of 1" in 40' upward in the direction of flow.
- K. Make reductions in pipe sizes using eccentric reducer fitting installed with the level side up.
- L. Install branch connections to mains using tee fittings in main with takeoff out the bottom of the main, except for upfeed risers which shall have takeoff out the top of the main line.
- M. Install unions in pipes 2" and smaller, adjacent to each valve, at final connections each piece of equipment, and elsewhere as indicated. Unions are not required on flanged devices.
- N. Install dielectric unions or waterway fittings to join dissimilar metals.
- O. Install flanges or Victaulic couplings on valves, apparatus and equipment having 3" and larger connections.
- P. Install flexible connectors or Victaulic flexible couplings at inlet and discharge connections to pumps (except inline pumps) and other vibration producing equipment.

- Q. Install strainers on the supply side of each control valve, pressure reducing valve, pressure regulating valve, solenoid valve, inline pump and elsewhere as indicated. Install nipple and ball valve in blowdown connection of strainers 2" and larger.
- R. Anchor piping to ensure proper direction of expansion and contraction. Expansion loops and joints are indicated on the drawings.

### 3.03 PIPE JOINT CONSTRUCTION

- A. Soldered Joints: Comply with the procedures contained in the AWS "Soldering Manual."
- B. Brazed Joints: Comply with the procedures contained in the AWS "Brazing Manual."
  - 1. CAUTION: Remove stems, seats and packing of valves and accessible internal parts at piping specialties before brazing.
  - 2. Fill the pipe and fittings during brazing, with an inert gas (i.e., nitrogen or carbon dioxide) to prevent formation of scale.
  - 3. Heat joints using oxy-acetylene torch. Heat to proper and uniform temperature.
- C. Threaded Joints: Conform to ANSI B1.20.1, tapered pipe threads for field cut threads. Join pipe fittings and valves as follows:
  - 1. Note the internal length of threads in fittings or valve ends, and proximity of internal seat or wall, to determine how far pipe should be threaded into joint.
  - 2. Align threads at point of assembly.
  - 3. Apply appropriate tape or thread compound to the external pipe threads (except where dry seal threading is specified).
  - 4. Assemble joint wrench tight. Wrench on valve shall be on the valve end into which the pipe is being threaded.
    - a. Damaged Threads: Do not use pipe with threads which are corroded or damaged. If a weld opens during cutting or threading operations, that portion of pipe shall not be used.
- D. Welded Joints: Comply with the requirement in ASME Code B31.9 "Building Services Piping."
- E. Flanged Joints: Align flange surfaces parallel. Assembly joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly using torque wrench.

### 3.04 FIELD QUALITY CONTROL

- A. Preparation for Testing: Prepare hydronic piping in accordance with ASME B31.9 and as follows:
  - 1. Leave joints including welds uninsulated and exposed for examination during the test.



2. Provide temporary restraints for expansion joints which cannot sustain the reactions due to test pressure. If temporary restraints are not practical, isolate expansion joints from testing.
3. Flush system with clean water. Clean strainers.
4. Isolate equipment that is not to be subjected to the test pressure from the piping. If a valve is used to isolate the equipment, its closure shall be capable of sealing against the test pressure without damage to the valve. Flanged joints at which blinds are inserted to isolate equipment need not be tested.
5. Install relief valve set at a pressure no more than 1/3 higher than the test pressure, to protect against damage by expansion of liquid or other source of overpressure during the test.

B. Testing: Test hydronic piping as follows:

1. Use ambient temperature water as the testing medium, except where there is a risk of damage due to freezing. Another liquid may be used if it is safe for workmen and compatible with the piping system components.
2. Use vents installed at high points in the system to release trapped air while filling the system. Use drains installed at low points for complete removal of the liquid.
3. Examine system to see that equipment and parts that cannot withstand test pressures are properly isolated. Examine test equipment to ensure that it is tight and that low pressure filling lines are disconnected.
4. Subject piping system to a hydrostatic test pressure which at every point in the system is not less than 1.5 times the design pressure. The test pressure shall not exceed the maximum pressure for any vessel, pump, valve or other component in the system under test. Make a check to verify that the stress due to pressure at the bottom of vertical runs does not exceed either 90% of specified minimum yield strength, or 1.7 times the "SE" value in Appendix A of ASME B31.9, Code for Pressure Piping, Building Services Piping.
5. After the hydrostatic test pressure has been applied for at least 10 minutes, examine piping, joints and connections for leakage. Eliminate leaks by tightening, repairing or replacing components as appropriate, and repeat hydrostatic test until there are no leaks.

### 3.05 ADJUSTING & CLEANING

- A. Clean and flush hydronic piping systems. Remove, clean and replace strainer screens. After cleaning and flushing hydronic piping system, but before balancing, remove disposable fine mesh strainers in pump suction diffusers.
- B. Mark calibrated nameplates of pump discharge valves after hydronic system balancing has been completed, to permanently indicate final balanced position.
- C. Chemical Treatment: Provide a water analysis prepared by the chemical treatment supplier to determine the type and level of chemicals required for prevention of scale and corrosion. Perform initial treatment after completion of system testing.

3.06 COMMISSIONING

- A. Fill system and perform initial chemical treatment.
- B. Check expansion tanks to determine that they are not air bound and that the system is completely full of water.
- C. Before operating the system, perform these steps:
  - 1. Open valves to full open position. Close coil bypass valves.
  - 2. Remove and clean strainers.
  - 3. Check pump for proper direction of correct improper wiring.
  - 4. Set automatic fill valves for required system pressure.
  - 5. Check air vents at high points of systems and bleed air completely (manual type).
  - 6. Set temperature controls so all coils are calling for full flow.
  - 7. Check operation of automatic bypass valves.
  - 8. Check and set operating temperature of chillers to design requirements.
  - 9. Lubricate motors and bearings.

END OF SECTION

SECTION 23 21 19 - HYDRONIC PIPING SPECIALTIES

## PART 1 - GENERAL

## 1.01 RELATED SECTIONS

- A. 23 05 01 - General Mechanical Requirements
- B. 23 05 16 - Expansion Fittings & Loops for HVAC Piping
- C. 23 05 19 - Meters & Gauges for HVAC Piping, Ductwork & Equipment
- D. 23 05 23 - Valves for HVAC Piping
- E. 23 05 29 - Hangers & Supports for HVAC Piping & Equipment
- F. 23 05 53 - Identification for HVAC Piping & Equipment
- G. 23 21 23 - Hydronic Pumps

## 1.02 SCOPE OF WORK

- A. Install hydronic piping specialties for hot water heating, chilled water cooling, condenser water, make-up water for these systems, blowdown drain lines, and condensate drain piping.

## 1.03 SUBMITTALS

- A. Shop drawings, including rated capacities of selected models, weights (shipping, installed and operating), furnished specialties and accessories, and installation instructions for each hydronic specialty and special duty valve specified.
- B. Maintenance data for hydronic specialties and special duty valves, for inclusion in operating and maintenance manual.

## PART 2 - PRODUCTS

## 2.01 APPROVED MANUFACTURERS

- A. Safety Relief Valves: Amtrol; Armstrong; Bell & Gossett; Conbraco; Kunkle; McDonnell and Miller.
- B. Air Vents (manual): Amtrol; Armstrong; Bell & Gossett; Taco.
- C. Air Separators: Amtrol; Armstrong Pumps; Bell & Gossett; Taco.
- D. Compression Tanks: Amtrol; Armstrong Pumps; Bell & Gossett; Taco.
- E. Chemical Feeder: Culligan USA; Vulcan Laboratories, Subsid. of Clow Corp.; York-Shipley, Inc.
- F. Dielectric Unions: Perfection Corp.; Watts Regulator Co.
- G. Glycol Meter: Anton Paar.
- H. City Wall Panel: Motivair, Arctichill.
- I. Y-Pattern Strainers: Armstrong Machine Works; Hoffman Specialty ITT; Fluid Handling Div.;

Gruvlok; Metraflex Co.; Muessco; Spirax Sarco; Trane Co.; Titan FCI; Victaulic Co. of America; Watts Regulator Co.

## 2.02 GENERAL DUTY VALVES

- A. General duty valves (i.e., ball valves) are specified in Section 23 05 23. Special duty valves are specified below by their generic name; refer to Part 3 Article "VALVE APPLICATION" for specific uses and applications for each valve specified.

## 2.03 HYDRONIC SPECIALTIES

- A. Manual Air Vent: Bronze body and non-ferrous internal parts; 150 psig working pressure, 225°F operating temperature; manually operated with screwdriver or thumbscrew; and having 1/8" discharge connection and 1/2" inlet connection.
- B. Diaphragm-Type Compression Tanks: Size and number as indicated; construct of welded carbon steel for 125 psig working pressure, 375°F maximum operating temperature. Separate air charge from system water to maintain design expansion capacity, by means of a flexible diaphragm securely sealed into tank. Provide taps for pressure gage and air charging fitting, and drain fitting. Support vertical tanks with steel legs or base; support horizontal tanks with steel saddles. Tank, with taps and supports, shall be constructed, tested, and labeled in accordance with ASME Pressure Vessel Code, Section VIII, Division 01.
- C. Air Separator: Welded black steel; ASME constructed and labeled for minimum 125 psig water working pressure and 375°F operating temperature; perforated stainless steel air collector tube designed to direct released air into compression tank; tangential inlet and outlet connections; screwed connections up to and including 2" NPS; flanged connections for 1-1/2" NPS and above; threaded blowdown connections; sized as indicated for full system flow capacity.
- D. Chemical Feeder: Bypass type chemical feeders of 5 gallon capacity, welded steel construction; 125 psig working pressure; complete with fill funnel and inlet, outlet, and drain valves.
1. Chemicals shall be specially formulated to prevent accumulation of scale and corrosion in piping system and connected equipment, developed based on a water analysis of make-up water.
- E. Diverting Fittings: Cast-iron body with threaded ends, or wrought copper with solder ends; 125 psig working pressure, 250°F maximum operating temperature. Indicate flow direction on fitting.
- F. Y-Pattern Strainers: 125 psig working pressure, cast-iron body (ASTM A126, Class B), flanged ends for 2-1/2" and larger, threaded connections for 2" and smaller, bolted cover, perforated Type 304 stainless steel basket and bottom drain connection.
- G. Glycol Solution Meter: The meter shall provide the following:
1. Readout in % of Ethylene Glycol.
  2. ± 2% accuracy.
  3. Capable 41°F to 70°F sample water temperature.
  4. Pressure 0 to 145° psi range.

H. City Water Panel:

1. **General:** Provide a self-contained emergency city water panel for automatic cooling operation in the event of a chiller malfunction or alarm. The panel shall be wall mounting and contain all necessary valves, piping, gauges and accessories. The total pressure drop with clean filter shall not exceed 10 psig.
2. **Cabinet:** Cabinet shall be UL listed NEMA 4 or equivalent wall mounting panel and shall house all required components. It shall be fabricated from cold-rolled steel and with hinged, gasketed door and finished in a baked epoxy powder coat, inside and out. There shall be six (6) piping connections; 1" FPT chilled water in/out; 1" FPT city wall in/out; 1-1/4" FPT water to/from equipment.
3. **Valves:** UL listed Solenoid valves shall be 115V and sized for the design water flow with minimum pressure loss. Backflow preventer shall prevent reverse city water flow and check valves shall be installed in chilled water piping. A throttling (gate) valve shall be installed to provide correct chilled water supply to medical equipment.
4. **Gauges:** Dial-type liquid-filled gauges shall be mounted in the front panel of the enclosure. Temperature gauges shall read in F and be connected to dry type thermo-wells in water piping for accurate temperature reading and ease of change-out. Pressure gauges shall be connected by capillary tubing isolated by ball valves for ease of change out.
5. **Electrical Panel:** A UL listed NEMA 4 electrical control panel shall be provided inside the main enclosure, containing fuses, timer/relay and terminal strip for power and controls. Solenoid valves shall be connected inside this connection box to a terminal strip. Automatic change signal shall be provided from the customer equipment. 115/1/60 power supply shall be provided.
6. **Flow Meter:** Flow meter shall be installed on outside of front panel to indicate water flow to equipment. It shall be analog with sliding indicator and selected for minimum pressure drop.

## PART 3 - EXECUTION

## 3.01 VALVE APPLICATIONS

- A. General Duty Valve Applications: The drawings indicate valve types to be used. All valves shall be accessible. Where specific valve types are not indicated, the following requirements apply:
  1. Shutoff Duty: Use ball valves.
  2. Balancing Duty: Circuit setters.
  3. Install shutoff duty valves at each branch connection to supply mains, at supply connection to each piece of equipment, and elsewhere as indicated.
  4. Install balancing valves at each branch connection to return mains, at return connections to each piece of equipment, elsewhere as indicated.
- B. Install circuit setters on the outlet of cooling element and elsewhere as required to facilitate system

balancing.

- C. Install drain valves at low points in mains, risers, branch lines, and elsewhere as required for system drainage.

### 3.02 HYDRONIC SPECIALTIES INSTALLATION

- A. Install manual air vents at high points in the system, at heat transfer coils and elsewhere as required for system air venting.
- B. Install combination air separator/strainer in pump suction lines. Run piping to compression tank with 1/4" per foot (2%) upward slope towards tank. Install blowdown piping with gate valve; extend to nearest drain.
- C. Install shot-type chemical feeders in each hydronic system where indicated; in upright position with top of funnel not more than 48" above floor. Install feeder in bypass line, off main using globe valves on each side of feeder and in the main between bypass connections. Pipe drain, with ball valve, to nearest equipment drain.
- D. Install diaphragm-type compression tanks on floor as indicated. Vent and purge air from hydronic system, charge tank with proper air charge to suit system design requirements.
- E. Install glycol solution meter where shown on plans and as per manufacturer's recommendations. Make all connections.

### 3.03 ADJUSTING & CLEANING

- A. Clean and flush hydronic piping systems. Remove, clean and replace strainer screens. After cleaning and flushing hydronic piping system, but before balancing, remove disposable fine mesh strainers in pump suction diffusers.
- B. Mark calibrated nameplates of pump discharge valves after hydronic system balancing has been completed, to permanently indicate final balanced position.
- C. Chemical Treatment: Provide a water analysis prepared by the chemical treatment supplier to determine the type and level of chemicals required for prevention of scale and corrosion. Perform initial treatment after completion of system testing.

### 3.04 COMMISSIONING

- A. Fill system and perform initial chemical treatment.
- B. Check expansion tanks to determine that they are not air bound and that the system is completely full of water.
- C. Before operating the system, perform these steps:
  - 1. Open valves to full open position. Close coil bypass valves.
  - 2. Remove and clean strainers.

3. Check pump for proper direction of correct improper wiring.
4. Set automatic fill valves for required system pressure.
5. Check air vents at high points of systems and bleed air completely (manual type).
6. Set temperature controls so all coils are calling for full flow.
7. Check operation of automatic bypass valves.
8. Check and set operating temperature of chillers to design requirements.
9. Lubricate motors and bearings.

END OF SECTION

SECTION 23 23 00 - REFRIGERANT PIPING

## PART 1 - GENERAL

## 1.01 RELATED SECTIONS

- A. 23 05 01 - General Mechanical Requirements
- B. 23 05 29 - Hangers & Supports for HVAC Piping & Equipment
- C. 23 05 53 - Identification for HVAC Piping & Equipment

## 1.02 SCOPE OF WORK

- A. Install refrigerant piping and accessories as shown on drawings and as specified in this section.

## 1.03 SUBMITTALS

- A. Shop drawings showing layout of refrigerant piping, specialties and fittings including, but not necessarily limited to, pipe and tube sizes, valve arrangements and locations, slopes of horizontal runs, wall and floor penetrations, and equipment connection details. Show interface and spatial relationship between piping and proximate to equipment.
- B. Maintenance data for refrigerant valves and piping specialties, for inclusion in operating and maintenance manual.

## PART 2 - PRODUCTS

## 2.01 APPROVED MANUFACTURERS

- A. Refrigerant Valves and Specialties: Alco Controls Div, Emerson Electric; Danfoss Electronics, Inc.; EATON Corp, Control Div.; Henry Valve Company; Parker-Hannifin Corp, Refrigeration and Air Conditioning Div.; Sporlan Valve Company.

## 2.02 PIPE &amp; TUBING MATERIALS

- A. Refer to Part 3 Article "PIPE APPLICATION" for identification of systems where the below specified pipe and fitting materials are used.
- B. Copper Tubing: ASTM B280, Type ACR.
- C. Copper Tubing: ASTM B88, Type L, hard-drawn straight lengths, and soft-annealed coils, seamless copper tubing.

## 2.03 FITTINGS

- A. Wrought-Copper Fittings: ANSI B16.22.

## 2.04 JOINING MATERIALS

- A. Brazing Filler Metals: AWS A5.8.



## 2.05 VALVES

- A. Complete valve assembly shall be UL listed and designed to conform to ARI 760.
- B. Globe: 450 psig maximum operating pressure, 275°F maximum operating temperature; cast-bronze body, with cast-bronze or forged-brass wing cap and bolted bonnet; replaceable resilient seat disc; plated steel stem. Valve shall be capable of being repacked under pressure. Valve shall be straight through or angle pattern, with solder-end connections.
- C. Check Valves: 500 psig maximum operating pressure, 275°F maximum operating temperature; bronze body, with removable piston, teflon seat and stainless steel spring; straight through globe design. Valve shall be straight through pattern, with solder-end connections.
- D. Solenoid Valves: 240°F temperature rating, 400 psig working pressure; plated steel, with teflon valve seat, two-way straight through pattern, and solder-end connections. Provide manual operator to open valve. Furnish complete with NEMA 1 solenoid enclosure with 1/2" conduit adapter, and 24V, 60 Hz, normally closed holding coil.
- E. Evaporator Pressure Regulating Valves: Pilot-operated, forged brass or cast bronze; complete with pilot operation, stainless steel bottom spring, pressure gage tappings, 24V DC, 50/60 Hz, standard coil; and wrought copper fittings for solder-end connections.
- F. Thermal Expansion Valves: Thermostatic adjustable, modulating type; size as required for specific evaporator requirements and factory set for proper evaporator superheat requirements. Valves shall have copper fittings for solder-end connections; complete with sensing bulb, a distributor having a side connection for hot gas bypass line and an external equalizer line.

## 2.06 REFRIGERANT PIPING SPECIALTIES

- A. Complete refrigerant piping specialty assembly shall be UL listed and designed to conform to ARI 760.
- B. Strainers: 500 psig maximum working pressure; forged brass body with monel 80-mesh screen and screwed cleanout plug; Y-pattern, with solder-end connections.
- C. Moisture/Liquid Indicators: 500 psig maximum operation pressure, 200°F maximum operating temperature; forged brass body, with replaceable polished optical viewing window and solder-end connections.
- D. Filter-Driers: 500 psig maximum operation pressure; steel shell, flange ring, and spring, ductile iron coverplate with steel capscrews, and wrought copper fittings for solder-end connections. Furnish complete with replaceable filter-drier core kit, including gaskets as follows:
  - 1. Standard capacity desiccant sieves to provide micronic filtration.
  - 2. High capacity desiccant sieves to provide micronic filtration and extra drying capacity.
- E. Suction Line Filter-Drier: 350 psig maximum operation pressure, 225°F maximum operating temperature; steel shell, and wrought copper fittings for solder-end connections. Permanent filter elements shall be molded felt core surrounded by a desiccant, for removal of acids and moisture for

refrigerant vapor.

- F. Suction Line Filters: 500 psig maximum operation pressure, steel shell, flange ring, and spring, ductile iron coverplate with steel capscrews, and wrought copper fittings for solder-end connections. Furnish complete with replaceable filter core kit, including gaskets, as follows:
- G. Flanged Unions: 400 psig maximum working pressure, 330°F maximum operating temperature; two brass tailpiece adapters for solder-end connections to copper tubing; flanges for 7/8" through 1-5/8" unions shall be forged steel, and for 2-1/8" through 3-1/8" shall be ductile iron; four plated steel bolts, with silicon bronze nuts and fiber gasket. Flanges and bolts shall have factory-applied, rust-resistant coating.
- H. Flexible Connectors: 500 psig maximum operating pressure; seamless tin bronze or stainless steel core, high tensile bronze braid covering, solder connections and synthetic covering; dehydrated, pressure tested, minimum 7" in length.

## 2.07 REFRIGERANT

- A. Refrigerant #407C, in accordance with ASHRAE Standard 34.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

- A. Examine rough-in for refrigerant piping systems to verify actual locations of piping connections prior to installation.

### 3.02 PIPE APPLICATIONS

- A. Use Type L or type ACR drawn copper tubing with wrought copper fittings and brazed joints, above ground, within building.
  - 1. Install annealed temper tubing in pipe duct. Vent pipe duct to the outside.
- B. If other than Type ACR tubing is used, clean and protect inside of tubing as specified in Article "CLEANING" below.

### 3.03 PIPING INSTALLATIONS

- A. Install refrigerant piping in accordance with ASHRAE Standard 15 "The Safety Code for Mechanical Refrigeration."
- B. Install piping in as short and direct arrangement as possible to minimize pressure drop.
- C. Install piping for minimum number of joints using as few elbows and other fittings as possible.
- D. Arrange piping to allow normal inspection and servicing of compressor and other equipment. Install valves and specialties in accessible locations to allow for servicing and inspection.

- E. Provide adequate clearance between pipe and adjacent walls and hanger, or between pipes for insulation installation. Use sleeves through floors, walls or ceilings, sized to permit installation of full thickness insulation.
- F. Insulate Suction Lines and Hot Gas Lines: Liquid lines are not required to be insulated except where they are installed adjacent and clamped to suction lines, where both liquid and suction lines shall be insulated as a unit.
  - 1. Do not install insulation until system testing has been completed and all leaks have been eliminated.
- G. Install branch tie-in lines to parallel compressors equal length, and pipe identically and symmetrically.
- H. Install copper tubing in rigid or flexible conduit in locations where copper tubing will be exposed to mechanical injury.
- I. Slope refrigerant piping as follows:
  - 1. Install horizontal suction lines with 1/2" per 10' downward slope to the compressor, with no long traps or deadends which may cause oil to separate from the suction gas and return to the compressor in damaging slugs.
  - 2. Install traps and double risers where indicated and where required to entrain oil in vertical runs.
  - 3. Liquid lines may be installed level.
- J. Use fittings for all changes in direction and all branch connections.
- K. Install exposed piping at right angles or parallel to building walls. Diagonal runs are not permitted unless expressly indicated.
- L. Install piping free of sags or bends and with ample space between piping to permit proper insulation applications.
- M. Conceal all pipe installations in walls, pipe chases, utility spaces, above ceilings, below grade or floors, unless indicated to be exposed to view.
- N. Install piping tight to slabs, beams, joists, columns, walls and other permanent elements of the building. Provide space to permit insulation applications, with 1" clearance outside the insulation. Allow sufficient space above removable ceiling panels to allow for panel removal.
- O. Locate groups of pipes parallel to each other, spaced to permit applying insulation and servicing of valves.
- P. Exterior Wall Penetrations: Seal pipe penetrations through exterior walls using sleeves and mechanical sleeve seals. Pipe sleeves smaller than 6" shall be steel; pipe sleeves 6" and larger shall be sheetmetal.
- Q. Make reductions in pipe sizes using eccentric reducer fittings installed with the level side down.

- R. Install strainers immediately ahead of each expansion valve, solenoid valve, hot gas bypass valve, compressor suction valve, and as required to protect refrigerant piping system components.
- S. Install moisture/liquid indicators in liquid lines between filter/driers and thermostatic expansion valves and in liquid line to receiver.
  - 1. Install moisture/liquid indicators in lines larger than 2-1/8" o.d., using a bypass line.
- T. Install unions to allow removal of solenoid valves, pressure regulating valves, expansion valves and at connections to compressors and evaporators.
- U. Install flexible connectors at the inlet and discharge connection of compressors.

### 3.04 PIPE JOINT CONSTRUCTION

- A. Brazed Joints: Comply with the procedures contained in the AWS "Brazing Manual."
  - 1. WARNING: Some filler metals contain compounds which produce highly toxic fumes when heated. Avoid breathing fumes. Provide adequate ventilation.
  - 2. CAUTION: When solenoid valves are being installed, remove the coil to prevent damage. When sight glasses are being installed, remove the glass. Remove stems, seats and packing of valves, and accessible internal parts of refrigerant specialties before brazing. Do not apply heat near the bulb of the expansion valve.
- B. Fill the pipe and fittings during brazing with an inert gas (i.e., nitrogen or carbon dioxide) to prevent formation of scale.
- C. Heat joints using oxy-acetylene torch. Heat to proper and uniform brazing temperature.

### 3.05 VALVE INSTALLATIONS

- A. Install refrigerant valves where indicated and in accordance with manufacturer's instructions.
- B. Install globe valves on each side of strainers and driers, in liquid and suction lines at evaporators, and elsewhere as indicated.
- C. Install a full-sized, 3-valve bypass around each drier.
- D. Install solenoid valves ahead of each expansion valve and hot-gas bypass valve. Install solenoid valves in horizontal lines with coil at the top.
  - 1. Electrical wiring for solenoid valves is specified in Division 26. Coordinate electrical requirements and connections.
- E. Thermostatic expansion valves may be mounted in any position, as close as possible to the evaporator.
  - 1. Where refrigerant distributors are used, mount the distributor directly on the expansion valve outlet.

2. Install the valve in such a location so that the diaphragm case is warmer than the bulb.
  3. Secure the bulb to a clean, straight, horizontal section of the suction line using two bulb straps. Do not mount bulb in a trap or at the bottom of the line.
  4. Where external equalizer lines are required, make the connection where it will clearly reflect the pressure existing in the suction line at the bulb location.
- F. Install pressure regulating and relieving valves as required by ASHRAE Standard 15.

### 3.06 EQUIPMENT CONNECTIONS

- A. The drawings indicate the general arrangement of piping, fittings and specialties.
- B. Install piping adjacent to machine to allow servicing and maintenance.

### 3.07 FIELD QUALITY CONTROL

- A. Inspect, test and perform corrective action of refrigerant piping in accordance with ASME Code B31.5, Chapter VI.
- B. Repair leaking joints using new materials and retest for leaks.

### 3.08 CLEANING

- A. Before installation of copper tubing other than Type ACR tubing, clean the tubing and fitting using following cleaning procedure:
  1. Remove coarse particles of dirt and dust by drawing a clean, lintless cloth through the tubing by means of a wire or an electrician's tape.
  2. Draw a clean, lintless cloth saturated with trichloroethylene through the tube or pipe. Continue this procedure until cloth is not discolored by dirt.
  3. Draw a clean, lintless cloth saturated with compressor oil, squeezed dry, through the tube or pipe to remove remaining lint. Inspect tube or pipe visually for remaining dirt and lint.
  4. Finally, draw a clean, dry, lintless cloth through the tube or pipe.

### 3.09 ADJUSTING & CLEANING

- A. Verify actual evaporator applications and operating conditions and adjust thermostatic expansion valve to obtain proper evaporator superheat requirements.
- B. Clean and inspect refrigerant piping systems in accordance.
- C. Adjust controls and safeties. Replace damaged or malfunctioning controls and equipment with new materials and products.

## 3.10 COMMISSIONING

- A. Charge system using the following procedures:
  - 1. Install core in filter drier after leak test but before evacuation.
  - 2. Evacuate refrigerant system with vacuum pump; until temperature of 35°F is indicated on vacuum dehydration indicator.
  - 3. During evacuation, apply heat to pockets, elbows and low spots in piping.
  - 4. Maintain vacuum on system for minimum of 5 hours after closing valve between vacuum pump and system.
  - 5. Break vacuum with refrigerant gas, allow pressure to build up to 2 psi.
  - 6. Complete charging of system, using new filter drier core in charging line. Provide full operating charge.
- B. Train Owner's maintenance personnel on procedures and schedules related to startup and shutdown, troubleshooting, servicing and preventative maintenance of refrigerant piping valves and refrigerant piping specialties.
- C. Review data in operating and maintenance manuals.
- D. Schedule training with Owner through the Architect, with at least 7 days advance notice.

END OF SECTION

SECTION 23 25 00 - HVAC WATER TREATMENT

## PART 1 - GENERAL

## 1.01 RELATED SECTIONS

- A. 23 05 01 - General Mechanical Requirements
- B. 23 21 13 - Hydronic Piping
- C. 23 21 19 - Hydronic Piping Specialties

## 1.02 SCOPE OF WORK

- A. Install water treatment equipment for hot water heating system.

## PART 2 - PRODUCTS

## 2.01 APPROVED MANUFACTURERS

- A. Water Treatment Companies - Betz; Dow; Fremont.

## 2.02 CLOSED SYSTEM TYPE

- A. Furnish and install a by-pass type pot feeder to feed chemical treatment into hot water heating and condenser water circulating systems. Feeder shall be 5 gallon size, and shall include a funnel, vent cock, drain cock and shutoff valves at inlet and outlet connections, and be designed to meet the pressure requirements of the system.

## 2.03 CHEMICAL TEST KIT

- A. Furnish basic water test equipment, spare reagents for maintaining control of program standards in the condenser water, chilled water, heating water, and steam systems.
  - 1. Test kits shall include the following:
    - a. Reagents and apparatus for determination of inhibitor level.
    - b. Reagents and apparatus for determination of pH, "P" and "M" alkalinity and chlorides.
    - c. Apparatus for determination of microbiological colony population and biocide effectiveness.
    - d. A hand held conductivity meter shall also be included.

## 2.04 ANTI-FREEZE FLUID - ETHYLENE GLYCOL

- A. Equal to Dowfrost, 40% solution by volume in chilled water heating system.

## PART 3 - EXECUTION

## 3.01 PRE-OPERATIONAL SYSTEM CLEANOUT

- A. Provide liquid pre-cleaning chemical for ease of contractor application and effective system cleaning of all closed system hot water, and related equipment. The cleaning compounds will be used to remove deposition such as pipe dope, oils, loose rust, mill scale and other extraneous materials. Add

recommended dosages of cleaner and circulate throughout the water system. Drain, fill and flush water system until foreign matter is observed and alkalinity of rinse water is equal to make-up water. Provide service visit of company representative to test water chemistry and verify treatment program at job site.

### 3.02 WATER TREATMENT SERVICE PROGRAM

- A. The supplier shall provide from qualified service representatives, 4 service visits, complete with reports at the following times:
  - 1. Visit one: Aid on installation, identification of installation points for equipment, and outline of program with contractor.
  - 2. Visit two: Inspection and testing of cleaned and drained piping, scheduling tentative date for start-up.
  - 3. Visit three: Start-up of system.
  - 4. Visit 4: Training of operators. Call shall include testing all systems, checking chemicals and equipment and completing field test reports. Troubleshooting and training of new operators is always included.

### 3.03 INSTALLATION

- A. Closed Systems:
  - 1. Feeders to be installed with shutoff valves and bypass.
  - 2. Install a sampling connection in the circulating water line including a 1/4 inch ball valve.
  - 3. Install an air vent at outlet of feeder.
  - 4. Provide and install necessary treatment to protect closed systems from corrosion.

### 3.04 CHEMICALS

- A. After piping systems have been cleaned as described in this Section and Section 23 21 13, Hydronic Piping, treat systems with necessary chemicals to protect them from corrosion damage. Notify Owner in writing that this work has been completed and tested, with a copy to Engineer.
- B. Chemicals shall be acceptable to City and State PCA and shall not contain any chromates.
- C. Water Treatment Chemicals – Closed Chilled Water Systems: Furnish recommended formula for scale and corrosion protection for the closed re-circulating system. Formulation shall not contain any ingredients that are harmful to system materials of construction.

### 3.05 ANTI-FREEZE SOLUTION

- A. Furnish and install a sufficient quantity of anti-freeze fluid into the new and existing piping systems, where required, to provide a percent glycol/to percent water solution by volume to match existing percentage.
- B. Thoroughly clean the piping systems before installing glycol fluid.



- C. Use water with low levels (less than 25 ppm of chloride and sulfate, and less than 1 ppm hard water ions ( $\text{Ca}^{++}$ ,  $\text{Mg}^{++}$ )) for filling systems that will contain the water/glycol fluid solution.

### 3.06 THIRD-PARTY VERIFICATION

- A. The glycol and mineral content of the heating water piping systems shall be verified by a third-party contractor and a written report must be provided to the Engineer after the tests have been complete. The third-party cannot be the chemical supplier or the installing Mechanical Contractor.
- B. Verification shall be witnessed and approved by Owner.
- C. Glycol test requirements shall entail the following:
  - 1. Mineral content via argon plasma spectroscopy to determine the level of 21 metals that may be in the samples of the heating piping.
  - 2. Testing for glycol freeze testing and identification of the glycol product as well as glycol percentage in the systems.
- D. Procurement and costs for this third-party test shall be by the Contractor of this bid section.

END OF SECTION

SECTION 23 31 13 - METAL DUCTWORK

## PART 1 - GENERAL

## 1.01 RELATED SECTIONS

- A. 23 05 01 - General Mechanical Requirements
- B. 23 05 29 - Hangers & Supports for HVAC Piping & Equipment
- C. 23 05 53 - Identification for HVAC Piping & Equipment
- D. 23 05 93 - Testing, Adjusting & Balancing for HVAC
- E. 23 07 13 - Duct Insulation
- F. 23 33 00 - Air Duct Accessories

## 1.02 SCOPE OF WORK

- A. Install ductwork as indicated on drawings and as by specified in this section.

## 1.03 SUBMITTALS

- A. Record Drawings: At project closeout, submit record drawings of installed metal ductwork and ductwork products.
- B. Maintenance Data: Submit maintenance data and parts lists for metal ductwork materials and products. Include this data, product data, shop drawings and record drawings in maintenance manual.

## 1.04 DELIVERY, STORAGE &amp; HANDLING

- A. Protection: Protect shop-fabricated and factory-fabricated ductwork, accessories and purchased products from damage during shipping, storage and handling. Prevent end damage and prevent dirt and moisture from entering ducts and fittings.
- B. Storage: Where possible, store ductwork inside and protect from weather. Where necessary to store outside, store above grade and enclose with waterproof wrapping.

## PART 2 - PRODUCTS

## 2.01 DUCTWORK MATERIALS

- A. Exposed Ductwork Materials: Where ductwork is indicated to be exposed to view in occupied spaces, provide materials which are free from visual imperfections including pitting, seam marks, roller marks, stains and discolorations, and other imperfections, including those which would impair painting. All exposed ductwork to be paint grip galvanized.
- B. Sheetmetal: Except as otherwise indicated, fabricate ductwork from galvanized sheet steel complying with ASTM A527, lockforming quality; with G90 zinc coating in accordance with ASTM A525; and mill phosphatized for exposed locations.

## 2.02 MISCELLANEOUS DUCTWORK MATERIALS

- A. Provide miscellaneous materials and products of types and sizes indicated and, where not otherwise indicated, provide type and size required to comply with ductwork system requirements including proper connection of ductwork and equipment.
- B. Duct Sealant: Non-hardening, non-migrating mastic or liquid elastic sealant, type applicable for fabrication/installation detail, as compounded and recommended by manufacturer specifically for sealing joints and seams in ductwork.
- C. Duct Cement: Non-hardening migrating mastic or liquid neoprene-based cement, type applicable for fabrication/installation detail, as compounded and recommended by manufacturer specifically for cementing fitting components, or longitudinal seams in ductwork.
- D. Ductwork Support Materials: Except as otherwise indicated, provide hot-dipped galvanized steel fasteners, anchors, rods, straps, trim and angles for support of ductwork.
  - 1. Except where space is indicated as "High Humidity" area, interior support materials of not less than 1/4" diameter or 3/16" thickness may be plain (not galvanized).
- E. Flexible Ducts: Either spiral-wound spring steel with flameproof vinyl sheathing, or corrugated aluminum; complying with UL 181.
  - 1. Where installed in unconditioned spaces other than return air plenums, provide 1" thick continuous flexible fiberglass sheath with vinyl vapor barrier jacket.

#### 2.03 FABRICATION

- A. Shop fabricate ductwork of gages and reinforcement complying with SMACNAs "HVAC Duct Construction Standards."
- B. Fabricate duct fittings to match adjoining ducts, and to comply with duct requirements as applicable to fittings. Except as otherwise indicated, fabricate elbows with centerline radius equal to associated duct width; and fabricate to include turning vanes in elbows where shorter radius is necessary. Limit angular tapers to 30° for contracting tapers and 20° for expanding tapers.
- C. Fabricate ductwork with accessories installed during fabrication to the greatest extent possible.
- D. Fabricate ductwork with duct liner in each section of duct where indicated. Laminate liner to internal surfaces of duct in accordance with instructions by manufacturers of lining and adhesive, and fasten with mechanical fasteners.

#### 2.04 FACTORY-FABRICATED LOW PRESSURE DUCTWORK

- A. At installer's option, provide factory-fabricated duct and fittings, in lieu of shop-fabricated duct and fittings.
- B. Material: Galvanized sheet steel complying with ASTM A527, lockforming quality, with ASTM A525, G90 zinc coating, mill phosphatized.

- C. Gage: 26-gage minimum for round and oval ducts and fittings, 4" through 24" diameter.
- D. Elbows: One-piece construction of 90° and 45° elbows 14" and smaller. Provide multiple gore construction for larger diameters with standing seam circumferential joint.
- E. Divided Flow Fittings: 90° tees, constructed with saddle tap spot welded and bonded to duct fitting body.

## PART 3 - EXECUTION

### 3.01 INSTALLATION OF METAL DUCTWORK

- A. Assemble and install ductwork in accordance with recognized industry practices which will achieve airtight (3% leakage for systems rated 3" and under; 1% for systems rated over 3") and noiseless (no objectionable noise) systems, capable of performing each indicated service. Install each run with minimum number of joints. Align ductwork accurately at connections, within 1/8" misalignment tolerance and with internal surfaces smooth. Support ducts rigidly with suitable ties, braces, hangers and anchors of type which will hold ducts true-to-shape and to prevent buckling. Support vertical ducts at every floor.
- B. Inserts: Install concrete inserts for support of ductwork in coordination with formwork, as required to avoid delays in work.
- C. Field Fabrication: Complete fabrication of work at project as necessary to match shop-fabricated work and accommodate installation requirements.
- D. Routing: Locate ductwork runs, except as otherwise indicated, vertically and horizontally and avoid diagonal runs wherever possible. Locate runs as indicated by diagrams, details and notations or, if not otherwise indicated, run ductwork in shortest route which does not obstruct useable space or block access for servicing building and its equipment. Hold ducts close to walls, overhead construction, columns and other structural and permanent enclosure elements of building. Limit clearance to 1/2" where furring is shown for enclosure or concealment of ducts, but allow for insulation thickness, if any. Where possible, locate insulated ductwork for 1" clearance outside of insulation. Wherever possible in finished and occupied spaces, conceal ductwork from view by locating in mechanical shafts, hollow wall construction or above suspended ceilings. Do not encase horizontal runs in solid partitions, except as specifically shown. Coordinate layout with suspended ceiling and lighting layouts and similar finished work.
- E. Electrical Equipment Spaces: Do not route ductwork through transformer vaults and their electrical equipment spaces and enclosures.
- F. Penetrations: Where ducts pass through interior partitions and exterior walls, and are exposed to view, conceal space between construction opening and duct or duct insulation with sheetmetal flanges of same gage as duct. Overlap opening on 4 sides by at least 1-1/2". Fasten to duct and substrate.
  - 1. Where ducts pass through fire-rated floors, wall or partitions, provide firestopping between duct and substrate, in accordance with requirements of Division 07 Section "Firestopping."

- G. Coordination: Coordinate duct installation with installation of accessories, dampers, coil frames, equipment, controls and other associated work of ductwork system.
- H. Installation: Install metal ductwork in accordance with SMACNA HVAC Duct Construction Standards.

### 3.02 INSTALLATION OF FLEXIBLE DUCTS

- A. Maximum Length: For any duct run using flexible ductwork, do not exceed 5'0" extended length.
- B. Installation: Install in accordance with Section III of SMACNA's "HVAC Duct Construction Standards, Metal and Flexible."

### 3.03 FIELD QUALITY CONTROL

- A. Leakage Tests: After each duct system which is constructed for duct classes over 3" is completed, test for duct leakage in accordance with SMACNA HVAC Air Duct Leakage Test Manual. Repair leaks and repeat tests until total leakage is less than 1% of system design airflow.

### 3.04 EQUIPMENT CONNECTIONS

- A. Connect metal ductwork to equipment as indicated, provide flexible connection for each ductwork connection to equipment mounted on vibration isolators, and/or equipment containing rotating machinery. Provide access doors as indicated.

### 3.05 ADJUSTING & CLEANING

- A. Clean ductwork internally, unit by unit as it is installed, of dust and debris. Clean external surfaces of foreign substances which might cause corrosive deterioration of metal or, where ductwork is to be painted, might interfere with painting or cause paint deterioration. Documentation of work performed shall comply with ASHRAE 62.1-2004, Section 7.2.4 "Ventilation System Startup."
- B. Temporary Closure: At ends of ducts which are not connected to equipment or air distribution devices at time of ductwork installation, provide temporary closure of polyethylene film or other covering which will prevent entrance of dust and debris until time connections are to be completed.

END OF SECTION

SECTION 23 32 00 - HVAC CLEANING & DECONTAMINATION

## PART 1 - GENERAL

## 1.01 RELATED SECTIONS

- A. 23 05 01 - General Mechanical Requirements
- B. 23 31 13 - Metal Ductwork
- C. 23 54 00 - Furnaces

## 1.02 SCOPE OF WORK

- A. The work of this section includes the removal of dirt, bacteria, fungi, dust and debris that has accumulated inside the ducts and HVAC equipment in the areas identified on the drawings and/or specifications. The following items are to be included:
  - 1. Removal and disposal of visible dirt, debris and other contaminants.
  - 2. Cleaning and decontamination of all existing supply, return ductwork, diffusers, grilles and registers shown on drawings.
  - 3. Cleaning and decontamination of dampers, supply air fans, exhaust air fans and other components of the systems designated.
  - 4. Apply biocide/sanitizer treatment as deemed necessary.
  - 5. Repair and coat damaged mechanical insulation (fiberglass duct liner and duct board) with mechanical insulation repair coating that has an anti-microbial agent as deemed necessary.
  - 6. Verification and updating (if necessary) of as-built or working blueprints.

## 1.03 WORK AREA PREPARATION

- A. Protect all furnishings, equipment, etc., in work area with polyethylene or equivalent.
- B. Seal off ends and openings of any ductwork, not being immediately worked on.
- C. Suitably support and brace any ductwork which will be entered by personnel for decontamination, if deemed necessary by the Engineer.

## PART 2 - PRODUCTS

## 2.01 PATCHING MATERIALS

- A. Pre-manufactured sheetmetal patches that are crossbroke, hemmed and predrilled.
- B. Pre-manufactured access patch (same as above) with pinned/glued liner that has been coated with a mechanical insulation repair coating and is gasketed.
- C. Pre-manufactured access door with locking seal.
- D. Caulk: Use a silicone based product specifically rated for sealing ductwork.
- E. Airtight plugs.

- F. Chemicals for cleaning coils, dampers and fans.
- G. Chemicals for biocide/sanitizing treatments.
- H. Repair coating designed specifically for mechanical insulation. This repair coating shall not affect thermal or acoustical properties of the insulation, must meet NFPA Std. 90A and 90B, must meet State of Washington's TVOC requirements, must have anti-microbial agent that meets the microbiological testing standards of UL 181, ASTM C1071, ASTM G21, ASTM G22.

## 2.02 EQUIPMENT

- A. For HVAC cleaning and decontamination, use the Super Collector vacuum collection system or approved equal. The Super Collector is an HEPA filtered vacuum collector system capable of maintaining up to 1" of static pressure inside the isolated area of ductwork. All operations shall be subject to the approval of the Engineer.
- B. HEPA filtration on all indoor wet/dry vacuums.
- C. Electrical air compressor capable of providing a minimum of 160 psi at 26 CFM.
- D. RBS-1500 rotary brush system for mechanically cleaning all types of ductwork and ventilation shafts or approved equal.

## PART 3 - EXECUTION

### 3.01 CLEANING & DECONTAMINATING DUCTS

- A. Small ducts are those which are not accessible to personnel to enter for cleaning purposes.
- B. The Super Collector cleaning method shall be used in the areas specified.
- C. The Super Collector Cleaning Method:
  - 1. As necessary, provide within the ductwork protective seals of any areas downstream from receiving particulate during the installation of access points.
  - 2. Existing exterior duct insulation and ductwork shall be neatly cut, as required, in order to provide access to facilitate cleaning of the ductwork and components. No access opening shall be larger than 22" x 22".
  - 3. Install the Super Collector unit at a predetermined location and clean the section of the ductwork with the omni-directional air nozzle and the pneumatically powered RBS-1500 rotary brush system as deemed necessary. Large ducts which are crawlable can be hand vacuumed or power brushed and air washed as required. Pre-vacuum diffusers, grilles, and registers in affected ductwork. If necessary, remove, chemically wash/clean and reset. Isolate equipment which generates noise from occupied areas.
  - 4. At the completion of each installation of the Super Collector unit, notify the Engineer for a visual

inspection of the cleaned ductwork. Video borescope is to be provided by cleaning contractor if deemed necessary. Reclean if necessary.

5. Apply biocide/sanitizer treatment. Apply biocide/sanitizer treatment under negative pressure and follow procedures outlined by the manufacturer or methods approved by the Engineer. At the completion of the application, notify the Engineer for final visual inspection.
6. If necessary, coat and repair damaged mechanical insulation by applying Tough-Coat mechanical insulation repair coating following the procedures as outlined by the manufacturer or methods approved by the Engineer. At the completion of the application, notify the Engineer for final visual inspection.
7. Upon approval of the Engineer, neatly patch ductwork in such a manner to prevent any air leakage. When internal insulation has been cut for an access, coat all exposed edges with Tough-Coat mechanical insulation repair coating or foam. Seal access openings with galvanized sheetmetal of the same gauge as existing ductwork, overlapping the opening, zip-screw into place, and silicone seal or gasketed at the seams. Where indicated by Engineer, install pre-manufactured access doors. Cap all 1" holes with airtight plugs.

### 3.02 CLEANING FAN, DAMPER & COIL UNITS

- A. Chemically clean and power wash all coils, dampers and fan units employing the procedure outlined by the Super Collector cleaning method.
- B. Prepare work area, adjacent equipment and surfaces with polyethylene sheeting or equivalent.
- C. Poly and tape all electrical surfaces and fan bearings.
- D. HEPA vacuum all surfaces.
- E. On surfaces with internal insulation, HEPA vacuum surface and repair/coat with Tough-Coat mechanical insulation repair coating as deemed necessary.
- F. On metal surfaces, apply cleaning solution to surface, hand scrub, and rinse with pressure washer.
- G. Start with ceiling, coils, condensate pans, fan inside, fan outside, walls (top to bottom), and floor.
- H. Collect all water with HEPA vacuums.
- I. Once the cleaned surfaces have dried, a visual inspection by the Engineer will be performed.

END OF SECTION



SECTION 23 33 00 - AIR DUCT ACCESSORIES

## PART 1 - GENERAL

## 1.01 RELATED SECTIONS

- A. 23 05 01 - General Mechanical Requirements
- B. 23 05 29 - Hangers & Supports for HVAC Piping & Equipment
- C. 23 05 53 - Identification for HVAC Piping & Equipment
- D. 23 05 93 - Testing, Adjusting & Balancing for HVAC
- E. 23 07 13 - Duct Insulation
- F. 23 31 13 - Metal Ductwork

## 1.02 SCOPE OF WORK

- A. Install ductwork accessories as indicated on drawings and in schedules and by requirements of this Section.

## 1.03 SUBMITTALS

- A. Shop Drawings: Submit manufacturer's assembly-type shop drawings for each type of ductwork accessory showing interfacing requirements with ductwork, method of fastening or support, and methods of assembly of components.
- B. Maintenance Data: Submit manufacturer's maintenance data including parts lists for each type of duct accessory. Include this data, product data and shop drawings in maintenance manual.

## PART 2 - PRODUCTS

## 2.01 APPROVED MANUFACTURERS

- A. Manual Dampers: Air Balance; Cesco; Greenheck; McGrill; Metalaire; Nailor; Penn; Ruskin; Vent Products
- B. Turning Vanes: Anemostat; Ductmate; Durodyne; Metalaire; Nailor; Ward
- C. Duct Access Door: Cesco; Ductmate; Flexmaster; Greenheck; McGrill; Nailor; Ventfabrics; Ward
- D. Flexible Connections: Ductmate; Durodyne; Engineered Flexible Products; Flexaust; Ventfabrics; Ward

## 2.02 DAMPERS

- A. Low Pressure Manual Dampers: Provide dampers of single-blade type or multiblade type, constructed in accordance with SMACNA "HVAC Duct Construction Standards."

## 2.03 TURNING VANES

- A. Fabricated Turning Vanes: Provide fabricated turning vanes and vane runners, constructed in accordance with SMACNA "HVAC Duct Construction Standards."

- B. Manufactured Turning Vanes: Provide turning vanes constructed of 1-1/2" wide curved blades set at 3/4" o.c., supported with bars perpendicular to blades set at 2" o.c., and set into side strips suitable for mounting in ductwork.

#### 2.04 DUCT HARDWARE

- A. Provide duct hardware manufactured by one manufacturer for all items on project for the following:
  - 1. Quadrants Locks: Provide for each damper, quadrant lock device on one end of shaft; and end bearing plate on other end for damper lengths over 12". Provide extended quadrant locks and end extended bearing plates for externally insulated ductwork.

#### 2.05 DUCT ACCESS DOORS

- A. Provide where indicated duct access doors of size indicated.
- B. Construction: Construct of same or greater gage as ductwork served, provide insulated doors for insulated ductwork. Provide flush frames for uninsulated ductwork, extended frames for externally insulated duct. Provide one size hinged, other side with one handle-type latch for doors 12" high and smaller, two handle-type latches for larger doors.

#### 2.06 FLEXIBLE CONNECTIONS

- A. Provide flexible duct connections wherever ductwork connects to vibration isolated equipment. Construct flexible connections of neoprene-coated flameproof fabric crimped into duct flanges for attachment to duct and equipment. Make airtight joint. Provide adequate joint flexibility to allow for thermal, axial, transverse, and torsional movement, and also capable of absorbing vibrations of connected equipment.

### PART 3 - EXECUTION

#### 3.01 INSPECTION

- A. Examine areas and conditions under which ductwork accessories will be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

#### 3.02 INSTALLATION OF DUCTWORK ACCESSORIES

- A. Install ductwork accessories in accordance with manufacturer's installation instructions, with applicable portions of details of construction as shown in SMACNA standards, and in accordance with recognized industry practices to ensure that products serve intended function.
- B. Install turning vanes in square or rectangular 90° elbows in supply, return and exhaust air systems.
- C. Install access doors to open against system air pressure with latches operable from either side, except outside only where duct is too small for person to enter.
- D. Coordinate with other work, including ductwork, as necessary to interface installation of ductwork

accessories properly with other work.

- E. Each damper shall have access panel for maintenance and inspection.

### 3.03 FIELD QUALITY CONTROL

- A. Operate installed ductwork accessories to demonstrate compliance with requirements. Test for air leakage while system is operating. Repair or replace faulty accessories as required to obtain proper operation and leakproof performance.

### 3.04 ADJUSTING & CLEANING

- A. Adjusting: Adjust ductwork accessories for proper settings, install fusible links in fire dampers and adjust for proper action.
- B. Cleaning: Clean factory-finished surfaces. Repair any marred or scratched surfaces with manufacturer's touch-up paint.

END OF SECTION

SECTION 23 37 00 - AIR OUTLETS & INLETS

## PART 1 - GENERAL

## 1.01 RELATED SECTIONS

- A. 23 05 01 - General Mechanical Requirements
- B. 23 05 93 - Testing, Adjusting & Balancing for HVAC
- C. 23 31 13 - Metal Ductwork
- D. 23 33 00 - Air Duct Accessories

## 1.02 SCOPE OF WORK

- A. Install air outlets and inlets as indicated by drawings and schedules and by requirements of this Section.

## 1.03 SUBMITTALS

- A. Shop Drawings: Submit manufacturer's assembly-type shop drawings for each type of air outlet and inlet, indicating materials and methods of assembly of components.
- B. Maintenance Data: Submit maintenance data, including cleaning instructions for finishes, and spare parts lists. Include this data, product data and shop drawings in maintenance manuals.

## 1.04 PRODUCT DELIVERY, STORAGE &amp; HANDLING

- A. Deliver air outlets and inlets wrapped in factory-fabricated fiberboard type containers. Identify on outside of container type of outlet or inlet and location to be installed. Avoid crushing or bending and prevent dirt and debris from entering and settling in devices.
- B. Store air outlets and inlets in original cartons and protect from weather and construction work traffic. Where possible, store indoors; when necessary to store outdoors, store above grade and enclose with waterproof wrapping.

## PART 2 - PRODUCTS

## 2.01 APPROVED MANUFACTURERS

- A. Diffusers/Registers/Grilles: Metalaire, Carnes, Krueger, Nailor, Titus, Tuttle & Bailey, Price

## 2.02 REGISTERS &amp; GRILLES

- A. Except as otherwise indicated, provide manufacturer's standard registers and grilles where shown; of size, shape, capacity and type indicated; constructed of materials and components as indicated; and as required for complete installation.
- B. Performance: Provide registers and grilles that have, as minimum, temperature and velocity traverses, throw and drop, and noise criteria ratings for each size device as listed in manufacturer's current data.
- C. Surface Compatibility: Provide registers and grilles with border styles that are compatible with adjacent

systems, and that are specifically manufactured to fit into construction with accurate fit and adequate support. Refer to general construction drawings and specifications for types of construction which will contain each type of register and grille.

- D. Types: Provide registers and grilles of type, capacity and with accessories and finishes as listed on register and grille schedule.

### PART 3 - EXECUTION

#### 3.01 INSPECTION

- A. Examine areas and conditions under which air outlets and inlets are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected.

#### 3.02 INSTALLATION

- A. Install air outlets and inlets in accordance with manufacturer's written instructions and in accordance with recognized industry practices to insure that products serve intended functions.
- B. Coordinate with other work, including ductwork and duct accessories, as necessary to interface installation of air outlets and inlets with other work.
- C. Locate ceiling air diffusers, registers and grilles as indicated on drawings.
- D. All register, grille, and diffuser connections shall have a minimum 2" collar as required by Code.

END OF SECTION

SECTION 23 62 00 - CONDENSING UNITS

## PART 1 - GENERAL

## 1.01 RELATED SECTIONS

- A. 23 05 01 - General Mechanical Requirements
- B. 23 23 00 - Refrigerant Piping

## 1.02 SCOPE OF WORK

- A. Install air-cooled condensing units as indicated on drawings and in schedules and by requirements of this Section.

## 1.03 SUBMITTALS

- A. Product Data: Submit manufacturer's technical product data, including rated capacities of selected model clearly indicated, weights (shipping, installed and operating), dimensions, required clearances, and methods of assembly of components, furnished specialties and accessories; and installation and startup instructions.
- B. Wiring Diagrams: Submit ladder-type wiring diagrams for power and control wiring required for final installation of condensing units and controls. Clearly differentiate between portions of wiring that are factory installed and portions to be field installed.
- C. Operation and Maintenance Data: Submit maintenance data and parts lists for each condensing unit, control and accessory; including "troubleshooting" maintenance guide; plus servicing, and preventative maintenance procedures and schedule. Include this data and product data in maintenance manual; in accordance with requirements of Division 01.
- D. Shop Drawings - Submit manufacturer's assembly-type shop drawings for each type of support and anchor; indicating dimensions, weights, clearances and methods of assembly of components.

## 1.04 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of condensing units, of types and capacities required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Codes and Standards:
  - 1. Capacity ratings for condensing units shall be in accordance with ARI Standard 360 "Standard for Commercial and Industrial Unitary Air Conditioning Equipment"
  - 2. Refrigeration system of condensing units shall be constructed in accordance with ASHRAE Standard 15 "Safety Code for Mechanical Refrigeration."
  - 3. Condensing units shall meet or exceed the minimum COP/Efficiency levels as prescribed in ASHRAE 90A "Energy Conservation in New Building Design."

4. Construction and testing of water-cooled condensing units shall be in accordance with ASME Boiler and Pressure Vessel Code, Section VIII.
5. Condensing units shall be listed by UL and have UL label affixed.

#### 1.05 DELIVERY, STORAGE & HANDLING

- A. Handle condensing units and components carefully to prevent damage. Follow manufacturer's written instructions for rigging. Replace damaged condensing units or components.
- B. Store condensing units and components in clean, dry place off the ground. Protect from weather, water and physical damage.

#### 1.06 SPECIAL PROJECT WARRANTY

- A. Warranty on Motor/Compressor: Provide written warranty, signed by manufacturer, agreeing to replace/repair, within warranty period, motors/compressors with inadequate or defective materials and workmanship, including leakage, breakage, improper assembly, or failure to perform as required; provided manufacturer's instructions for handling installing, protecting and maintaining units have been adhered to during warranty period. Replacement is limited to component replacement only, and does not include labor for removal and reinstallation.
  1. Warranty Period: 5 years from date of substantial completion.

### PART 2 - PRODUCTS

#### 2.01 APPROVED MANUFACTURERS

- A. Air-Cooled Condensing Units: Liebert

#### 2.02 AIR-COOLED CONDENSING UNITS

- A. Factory-assembled and tested air-cooled condensing units, consisting of casing, compressors, condensers, coils, condenser fans and motors and unit controls. Capacities and electrical characteristics are scheduled on the drawings.
- B. Unit Casings: Designed for outdoor installation and complete with weather protection for components and controls, and complete with removable panels for required access to compressors, controls, condenser fans, motors and drives. Additional features include:
  1. Steel, galvanized or zinc-coated, for exposed casing surfaces, treated and finished with manufacturer's standard paint coating. Custom color shall be white; submit sample for Architect approval.
  2. Lifting lugs to facilitate rigging of units.
  3. Factory-installed metal grilles, for protection of condenser coil during shipping, installation and operation.

4. Hinged and gasketed control panel door.
- C. Compressor: Reciprocating hermetic-type compressor, 1750 RPM, designed for air-cooled condensing, complete with crankcase sight glass, crankcase heater and backseating service access valves on suction and discharge ports. Capacity shall be controlled through cylinder unloading. Additional features include:
1. High-pressure switch.
  2. Lee-Temp receiver and head pressure control valve.
  3. Hot gas bypass system and liquid line solenoid valve.
  4. Compressor of same manufacturer as condensing unit.
  5. Shall be able to operate to -30°F.
- D. Controls: Operating and safety controls shall include high and low pressure cutouts, oil pressure cutout, compressor winding thermostat cutout, 3-leg compressor overload protection and condenser fan motors with thermal and overload cutouts. Control transformer if required shall be 115V. Provide magnetic contactors for compressor and condenser fan motors. Additional features include:
1. Reset relay circuit for manual resetting of cutouts from remote thermostat location.
  2. Automatic non-recycling pumpdown, and timing device to prevent excessive compressor cycling.
  3. Unfused disconnect switch, factory-mounted and wired, for single external electrical power connection.
- E. Condensing Section: Condenser coil shall be seamless copper tubing mechanically bonded to heavy-duty, configurated aluminum fins, with separate and independent refrigeration circuit for each compressor. Units shall include liquid accumulator, receiver and subcooling circuit, and backseating liquid line service access valve. Condenser coils shall be factory tested at 450 psig, vacuum dehydrate, and filled with a holding charge of nitrogen.
- F. Accessories:
1. Refrigerant circuit isolation valves
  2. Single point connection
  3. Ground fault protection
  4. HOV convenience outlet

## PART 3 - EXECUTION

### 3.01 EXAMINATION

- A. Verify roof structure, mounting supports and membrane installation are completed to the proper point to allow installation of roof-mounted units. Do not proceed with work until unsatisfactory conditions have been corrected.

### 3.02 INSTALLATION



- A. Install condensing units in accordance with manufacturer's installation instructions. Install units plumb and level, firmly anchored in locations indicated, and maintain manufacturer's recommended clearances.
- B. Support.
  - 1. Install roof-mounted units on equipment supports. Anchor unit to supports with removable fasteners.
  - 2. Air-Cooled Condensing Units. Connect refrigerant piping to unit; maintain required access to unit.
    - a. Install furnished field-mounted accessories.

### 3.03 FIELD QUALITY CONTROL

- A. Testing: Charge systems with refrigerant and oil, and test for leaks. Repair leaks and replace lost refrigerant and oil.

### 3.04 DEMONSTRATION

- A. Provide services of manufacturer's authorized service representative to provide startup service and to instruct Owner's personnel in operation and maintenance of condensing units.
- B. Start up condensing units in accordance with manufacturer's startup instructions. Test controls and demonstrate compliance with requirements. Replace damaged or malfunctioning controls and equipment.
- C. Train Owner's personnel on startup and shutdown procedures, troubleshooting procedures, servicing and preventive maintenance schedule and procedures. Review with the Owner's personnel the data contained in the operating and maintenance manuals specified in Division 01.
  - 1. Schedule training with Owner, provide at least 7-day prior notice to Engineer.

END OF SECTION

SECTION 23 64 00 - CHILLERS

## PART 1 - GENERAL

## 1.01 RELATED SECTIONS

- A. 23 05 01 - General Mechanical Requirements
- B. 23 05 19 - Meters & Gauges for HVAC Piping
- C. 23 05 23 - Valves for HVAC Piping
- D. 23 21 13 - Hydronic Piping

## 1.02 DESCRIPTION OF WORK

- A. Install chiller as required by this Section is indicated on drawings and schedules and by requirements of this Section.

## 1.03 SUBMITTALS

- A. Product Data: Submit manufacturer's technical product data, including rated capacities for chillers indicated, weights (shipping, installed, and operating), furnished specialties and accessories; and rigging, installation, and startup instructions.
- B. Shop Drawings: Submit manufacturer's assembly-type shop drawings indicating dimensions, weight loadings, required clearances, methods of assembly of components, and location and size of each field connection.
- C. Wiring Diagrams: Submit manufacturer's electrical requirements for power supply wiring to units. Submit manufacturer's ladder-type wiring diagrams for interlock and control wiring. Clearly differentiate between portions of wiring that are factory installed and portions to be field installed.
- D. Maintenance Data: Submit maintenance data and parts list for each chiller, control, and accessory; including "troubleshooting" maintenance guide. Include this data and product data in maintenance manual.

## 1.04 DELIVERY, STORAGE &amp; HANDLING

- A. Handle chillers and components properly to prevent damage, breaking, denting and scoring. Do not install damaged chillers or components; replace with new. Comply with manufacturer's rigging and installation instructions for unloading chillers, and transporting them to final location.
- B. Store chiller and components in clean, dry space. Protect from weather, dirt, fumes, water, construction debris, and physical damage. Storage temperatures for unit controls are not to exceed 185°F (85°C).

## PART 2 - PRODUCTS

## 2.01 APPROVED MANUFACTURERS

- A. Motivair
- B. Arctichill

C. Multistack

2.02 AIR COOLED WATER CHILLERS (Scroll)

A. General – Free Cooling Chiller:

1. Provide, where shown on drawings, air cooled water chillers, suitable for closed loop chilling of a water / glycol solution. The mechanical cooling shall be achieved by the use of hermetically sealed scroll compressors. The chiller shall contain a fully integrated air-cooled condenser, Free Cooling water side economizer system, a chilled water circulation pump, an insulated water storage reservoir, a Free Cooling 3-way valve assembly, PLC controls and an enclosure cabinet that contains the complete chiller. Each chiller shall have capacities as shown on schedules.
2. The chiller shown on the drawings has been coordinated with architectural and structural elements, and with electrical service requirements. If a different unit is submitted, ALL mechanical, electrical, architectural and structural modifications which are required shall be performed under the work of the mechanical section, by the mechanical contractor, under the original contract price. Any alternate submission must be provided with manufacturers catalog demonstrating capacities, dimensions and certifications.
3. Chiller shall be rated in accordance with the latest edition of ARI Standard 590.
4. Unit Cabinet shall be capable of withstanding Federal Test Method Standard No. 141 (method 6061) 500 hour salt spray test.
5. Cooler shall be tested and stamped in accordance with ASME Code for a minimum refrigerant working side pressure of 225 PSIG and a minimum water side pressure of 150 PSIG.
6. Air cooled condenser coils shall be leak tested at minimum 150 PSIG and pressure tested at 425 PSIG.
7. Each chiller shall be factory tested at full and part load conditions-the current draw shall be noted. Results of the test shall be provided to Owner. The chiller shall be tested for refrigerant leaks and shipped with a full charge of R-134a or 410A.
8. Free Cooling Chiller shall be certified by Underwriters Laboratory (UL) or Electrical Testing Laboratories (ETL) and conform to UL Standard 1995.

B. Equipment:

1. **Casing:** The chiller casing shall be built on an epoxy powder coated heavy steel frame; the enclosure shall be high-quality structural sheet metal with hinged control panel door and removable access panels. The enclosure shall be finished in baked power coating with scratch resistance finish. The removable screen panels shall be made of heavy gauge aluminum. The chiller shall be white. All exposed parts of chiller shall be white.
2. **Evaporator:** Evaporator shall be high efficiency brazed plate type. One per sealed refrigeration circuit. Provide ½" insulation over entire surface of the evaporator; maximum insulation k factor shall be 0.28 or better to protect the evaporator.

**3. Condenser:**

- a. Air cooled condenser coils shall have seamless copper tubing expanded into aluminum fins.
- b. Condenser fans motors shall be TEAO rated for outdoor application. The motor shall have a reversed stator and rotor eliminating the traditional shaft. Condenser fan blades shall be designed to maximize airflow and to provide better efficiency over the fan performance curve. Remote Free Cooling coils or condensers coils are not allowed due to space constraints. Fans shall discharge vertically.
- c. Provide decorative grilles to provide protection for coil

**4. Integral Free-Cooling System:** The chiller shall include an integral free-cooling system. The integral free-cooling system shall be completely packaged inside the air-cooled chiller system and shall include all controls and operating components. The controls shall automatically switch the chiller between refrigeration cooling and free-cooling in either the partial free-cooling or full free-cooling when ambient temperature allows. Partial free-cooling shall be achieved whenever the ambient temperature falls below the return water temperature of the chiller. 100% free-cooling shall be achieved whenever the ambient temperature is 20 to 25° F below the chiller set point. System shall be integral to the chiller package and no manual intervention shall be required. Stacking of individual coils (Free Cooling and Condenser) shall not be allowed due to added pressure drop and maintenance restrictions.

**5. Refrigerant Circuits:**

- a. Provide independent refrigerant circuits. Each circuit shall include a liquid line sight glass, liquid line solenoid valve, filter drier, and thermal expansion valve.
- b. Manufacturers with electronic expansion valves may submit an alternate unit with the electronic valves so long as the alternate meets all other requirements of this specification. The alternate must list prices and approximate potential energy savings for units with both respective types of expansion valves.

**6. Controls:**

- a. Electrical control cabinet: The electrical control panel shall be rated for NEMA 4 service. The control panel door shall be fitted with an electrical main, non-fused disconnect switch, interlocked with the door. The panel shall include a control transformer, contactor and manual circuit breaker and / or overload for each compressor, pump and fan motor. All panel wiring shall be in enclosed raceways.
- b. Microprocessor controls and instrumentation: The chiller operation shall be controlled and monitored by the fully integrated, reprogrammable PLC controller. The PLC shall control all functions of the chiller, and shall monitor all operating parameters. An adjustable alarm shall be provided for all critical chiller functions. The alarm points shall be wired to a common alarm relay, and a front panel mounted LCD display. In the event of any alarm condition the microprocessor shall display a code for the alarm condition. The alarm conditions shall be:

1. b Loss of water
2. b Pump overload
3. b High refrigerant head pressure
4. b Low refrigerant suction pressure
5. b Temperature sensor in open or closed circuit
6. b Input voltage out of range
7. b Freeze protection
8. b Memory failure
9. b Electrical line noise
10. b High ambient temperature

Analog display shall include:

- c. Glycerin filled refrigerant suction and discharge pressure gauges.
  - d. High and low pressure switches for each refrigeration circuit.
  - e. Chilled water circulating pump pressure gauge.
  - f. Chiller manufacturer shall provide any controls not explicitly listed above, necessary for proper operation of his system. The mechanical contractor shall provide all field control wiring necessary to interface sensors to the chiller control system. Such wiring will be coordinated with the chiller manufacturer and be in strict accordance with manufacturer's instructions and wiring diagrams.
7. **Compressors:** Provide hermetically sealed scroll compressors, shutoff valves, gauges to monitor suction and discharge pressure (on each refrigerant circuit) and all other controls and components required by the manufacturer for proper operation. Provide rubber in-shear or spring type vibration isolation, for compressors. (4 compressors minimum.)
  8. **Capacity Control:** Unit compressor shall have positive means of capacity control down to a single compressor on multiple compressor units. Hot gas bypass control shall not be used for capacity reduction or for stabilizing compressor performance.
    - a. Capacity modulation shall be accomplished by cycling off compressors and using the chilled water storage reservoir down to 0% load.
  9. **Pump:** The chiller shall be fitted with a close-coupled circulating pump complete with TEFC motor suitable for the specified performance. The pump shall draw chilled water from the evaporator and storage reservoir, and deliver it to the process, with the available pump head as specified. The pump assembly shall be fitted with an (optional) isolation valve & check valve and pressure gauge.
  10. **Storage Reservoir:** A closed water storage reservoir with high-density foam insulation shall be located inside the chiller cabinet. The reservoir shall be welded steel, and suitable for a minimum pressure of 40 PSIG. The reservoir shall be fitted with a manual drain, manual air vent and a safety pressure relief valve.

11. **Variable Frequency Drives:** The fans of each circuit of condenser / Free Cooling circuit shall be controlled by Allen Bradley PowerFlex 400 Adjustable Frequency AC Drive, or approved equal, with standard built in PID loop function for maximized energy efficiency, precise Free Cooling operation and reduced noise under less than full load conditions. Each drive shall be equipped with stand-alone rectifiers for protection against voltage fluctuations and line noise. Drives shall be set to auto-restart in the event of power failure.
12. **3-Way Modulating Valve:**
  - a. The hydraulic glycol loop inside the chiller shall include a motorized 3-way valve for diverting return glycol to either the evaporator or the Free Cooling coil. The 3-way valve shall be insulated (See Insulation specification section 13). The 3-way valve shall include a manual activation handle for service requirements.
  - b. The 3-way valve shall include an automatic exercise timer used to activate the valve on a regular basis for maximized valve life and reliability.
13. **Thermal Insulation:** The thermal insulation shall be made from cross-linked polyolefin foam with a minimum required thickness to prevent thermal loss in the system. The thermal insulation shall be of the same color of the chiller cabinet in order to maintain a uniform appearance of the chiller. The insulation shall be rated for outdoor use and shall not require additional paint or coatings for operation. When submerged in a water test, the insulation shall absorb no more than 3% water after 28 days.
14. **Electrical:** Manufacturer to provide transformer as required. 208V is available. Mechanical responsible for all electrical required if transformer is needed.

### PART 3 - EXECUTION

#### 3.01 INSTALLATION OF CHILLERS

- A. Install chillers in accordance with manufacturer's written instructions. Install units plumb and level, firmly anchored in locations indicated; maintain manufacturer's recommended clearances.
- B. Support: Install roof-mounted units as indicated.
- C. Chilled Water Piping: Refer to Division 23 Section "Hydronic Piping." Connect inlet to evaporator with controller bulb well, shutoff valve, thermometer, strainer, flow switch, flexible pipe connector, pressure gage, and union or flange. Connect outlet to evaporator with shutoff valve, flow switch, balancing valve, thermometer, flexible pipe connection, pressure gage, and union or flange.
- D. Relief Piping: Provide relief piping as indicated from refrigerant pressure relief rupture disc on chiller to atmosphere; size piping as recommended by chiller manufacturer, and terminate with gooseneck facing down.
- E. Electrical Wiring: Install electrical devices furnished by manufacturer but not specified to be factory mounted. Furnish copy of manufacturer's wiring diagram submittal to Electrical Installer.
  1. Verify that electrical wiring installation is in accordance with manufacturer's submittal and

installation requirements of Division 26 sections. Do not proceed with equipment startup until wiring installation is acceptable to manufacturer and equipment installer.

- F. Control: Furnish field-installed automatic temperature control requirements to Control Installer. Field-installed automatic temperature controls are not work of this Section.
- G. Provide services of manufacturer's factory-trained service representative to start up chillers. Include in startup procedures, testing controls, demonstration of compliance with requirements, and replacement of damaged or malfunctioning controls and equipment.
  - 1. Do not place chillers in sustained operation prior to initial balancing of mechanical systems which interface with the chillers.

### 3.02 TRAINING OF OWNER'S PERSONNEL

- A. Provide services of manufacturer's technical representative for two 8-hour days to instruct Owner's personnel in operation and maintenance of chillers.
  - 1. Schedule training with Owner, provide at least 7 days' notice to Contractor and Engineer of training date.

END OF SECTION

SECTION 23 81 19 - AIR CONDITIONER UNITS

## PART 1 - GENERAL

## 1.01 RELATED SECTIONS

- A. 23 05 01 General Mechanical Requirements
- B. 23 05 13 Motor Requirements for HVAC Equipment
- C. 23 05 23 Valves for HVAC Piping
- D. 23 05 29 Hangers and Supports for HVAC Piping & Equipment
- E. 23 05 53 Identification for HVAC Piping & Equipment
- F. 23 07 19 HVAC Piping Insulation
- G. 23 23 00 Refrigerant Piping

## 1.02 SCOPE OF WORK

- A. Extent of air conditioner units work required by this Section is indicated on drawings and schedules and by requirements of this Section. This includes the indoor fan unit and remote condensing unit.

## 1.03 SUBMITTALS

- A. Product Data: Submit manufacturer's technical product data, including rated capacities of selected model clearly indicated, weights, furnished specialties and accessories; and installation and startup instructions.
- B. Shop Drawings: Submit manufacturer's assembly-type shop drawings indicating dimensions, weight loadings, required clearances, and methods of assembly of components.
- C. Maintenance Data: Submit maintenance data and parts lists for each air conditioner unit, control and accessory; including "troubleshooting" maintenance guide. Include this data and product data in maintenance manual; in accordance with requirements of Division 01.

## 1.04 PRODUCT DELIVERY, STORAGE &amp; HANDLING

- A. Handle air conditioner units and components carefully to prevent damage, breaking, denting and scoring. Do not install damaged air conditioner units or components, replace with new.
- B. Store air conditioner units and components in clean, dry place. Protect from weather, dirt, fumes, water, construction debris and physical damage.

## 1.05 WARRANTY

- A. Manufacturer's standard form in which manufacturer agrees to repair or replace components of split-system air conditioning units that fail in materials or workmanship within specified warranty period.
  - 1. One (1) year on parts and five (5) years on compressors from date of substantial completion.

## PART 2 - PRODUCTS

## 2.01 APPROVED MANUFACTURERS



- A. Liebert

2.02 AIR CONDITIONER UNITS (EQUIPMENT #3)

- A. Provide factory-assembled and tested packaged units as indicated, consisting of casing, compressor, evaporator, fans, filters and unit controls. Provide capacities and electrical characteristics as scheduled. Utilize R-407C and DC inverter technology.
- B. Casing: Provide manufacturer's standard casing construction, corrosion-protection coating, and exterior finish. Provide removable panels and/or access doors for inspection and access to internal parts.
- C. Evaporator: Provide type and quantity as listed on the drawings.
- D. Blower: Quiet, direct-drive fan assembly equipped with double inlet blowers, self-aligning sleeve bearings, and lifetime lubrication. Motors shall be permanent-split capacitor, high-efficiency type, equipped with two speeds for airflow modulation.
- E. Filters: Cleanable polypropylene monofilament type over expanded aluminum and aluminum frame. Filter change/removal shall not require shutdown.
- F. Controls: Microprocessor-based, factory wired into the system. Shall be 2-line by 16-character LCD, 8-key keypad for setpoint/program control, fan speed selection, and on/off. Temperature and humidity sensors in wall box and can be located up to 300 feet away.
- G. Additional Features:
1. Condensate pump
  2. Electric reheat – low density – tubular element, 1-stage

2.03 AIR-COOLED REMOTE CONDENSING UNIT (EQUIPMENT #2)

- A. Cabinet and Frame Construction: The frame shall be constructed of heliarc welded tubular steel. It shall be painted using the autophoretic coating process for maximum corrosion protection. The exterior panels shall be insulated with a minimum 1", 1.5# density fiber insulation. The main front panel shall have captive 1/4 turn fasteners.
- B. Filter Chamber: The filter chambers shall be an integral part of the system located within the cabinet serviceable from either end of the unit. The filters shall be rated not less than MERV 7 efficiency.
- C. Fan Section: Electronically Commutated (EC) fans are plug/plenum type, single inlet and shall be dynamically balanced. The drive package shall be direct drive, electronically commutated and variable speed. The fans shall be located to draw air over the A-frame coil to ensure even air distribution and maximum coil performance. Fans shall be capable of being lowered into the raised floor, with minimum floor height of 24".
- D. Liebert iCOM™ Microprocessor Control with Small Graphic Display: the Liebert ICOM unit control shall be factory-set for Intelligent Control which uses "fuzzy logic" and "expert systems" methods. Proportional and Tunable PID shall also be user selectable options. Internal unit component control shall include the following:

1. **System Auto Restart:** The auto restart feature will automatically restart the system after a power failure. Time delay is programmable.
2. **Sequential Load Activation:** On initial startup or restart after power failure, each operational load is sequenced with a minimum of one second delay to minimize total inrush current.
3. **Hot Water Flush Cycles:** Hot water reheat coils and Econ-O-Coils are periodically flushed to prevent a buildup of contaminants.
4. **Predictive Humidity Control:** Calculates the moisture content in the room and prevents unnecessary humidification and dehumidification cycles by responding to changes in dew point temperature.
5. The Liebert iCOM control shall be compatible with Liebert remote monitoring and control devices. Options are available for BMS interface via MODbus, Jbus, BACNet, Profibus and SNMP.
6. The Liebert iCOM control processor shall be microprocessor based with a 128x64 dot matrix graphic front monitor display and control keys for user inputs mounted in an ergonomic, aesthetically pleasing housing. The display and housing shall be viewable while the unit panels are open or closed. The controls shall be menu driven. The display shall be organized into three main sections: User Menus, Service Menus and Advanced Menus. The system shall display user menus for: active alarms, event log, graphic data, unit view/status overview (including the monitoring of room conditions, operational status in % of each function, date and time), total run hours, various sensors, display setup and service contacts. A password shall be required to make system changes within the service menus. Service menus shall include: setpoints, standby settings (lead/lag), timers/sleep mode, alarm setup, sensor calibration, maintenance/wellness settings, options setup, system/network setup, auxiliary boards and diagnostics/service mode. A password shall be required to access the advanced menus which include the factory settings and password menus.
7. **The User Menus shall be defined as follows:**
  - a. **Active Alarms:** Unit memory shall hold the 200 most recent alarms with time and date stamp for each alarm.
  - b. **Event Log:** Unit memory shall hold the 400 most recent events with ID number, time and date stamp for each event.
  - c. **Graphic Data View:** Eight graphic records shall be available: return air temperature, return air humidity, supply air temperature, outdoor temperature and four custom graphs.
  - d. **Unit View – Status Overview:** Simple or Graphical “Unit View” summary displays shall include temperature and humidity values, active functions (and percent of operation) and any alarms of the host unit.
  - e. **Total Run Hours:** Menu shall display accumulative component operating hours for major components including fan motor, humidifier and reheat.
  - f. **Various Sensors:** Menu shall allow setup and display of optional custom sensors. The

control shall include four customer accessible analog inputs for sensors provided by others. The analog inputs shall accept a 4 to 20mA signal. The user shall be able to change the input to 0 to 5VDC or 0 to 10VDC if desired. The gains for each analog input shall be programmable from the front display. The analog inputs shall be able to be monitored from the front display.

- g. **Display Setup:** Customer shall pre-select the desired grouping of display languages at the time of the order from the following choices:

- 1) Group 1 : English, French, Italian, Spanish, German
- 2) Group 2: English, Russian, Greek
- 3) Group 3: English, Japanese, Chinese, Arabic
- 4) Service Contacts: Menu shall allow display of local service contact name and phone number.

8. **The Service Menus shall be defined as follows:**

- a. **Setpoints:** Menu shall allow setpoints within the following ranges:

- 1) Temperature Setpoint 65-85°F (18-29°C)\*
- 2) Temperature Sensitivity + 1-10°F (0.6-5.6°C)
- 3) Humidity Setpoint 20-80% RH\*
- 4) Humidity Sensitivity 1-30% RH
- 5) High Temperature Alarm 35-90°F (2-32°C)
- 6) Low Temperature Alarm 35-90°F (2-32°C)
- 7) High Humidity Alarm 15-85% RH
- 8) Low Humidity Alarm 15-85% RH

\*The microprocessor may be set within these ranges; however, the unit may not be able to control to extreme combinations of temperature and humidity.

- b. **Standby Settings/Lead-Lag:** Menu shall allow planned rotation or emergency rotation of operating and standby units.

- c. **Timers/Sleep Mode:** Menu shall allow various customer settings for turning on/off unit.

- d. **Alarm Setup:** Menu shall allow customer settings for alarm notification (audible/local/remote). The following alarms shall be available:

- 1) High Temperature
- 2) Low Temperature
- 3) High Humidity
- 4) Low Humidity
- 5) Man Fan Overload (Optional)
- 6) Humidifier Problem
- 7) Change Filter
- 8) Fan Failure
- 9) Unit Off

- e. **Audible Alarm:** The audible alarm shall annunciate any alarm that is enabled by the operator.
  - f. **Common Alarm:** A programmable common alarm shall be provided to interface user selected alarms with a remote alarm device.
  - g. **Remote Monitoring:** All alarms shall be communicated to the Liebert monitoring system with the following information: Date and time of occurrence, unit number and present temperature and humidity.
  - h. **Sensor Calibration:** Menu shall allow unit sensors to be calibrated with external sensors.
  - i. **Maintenance/Wellness Settings:** Menu shall allow reporting of potential component problems before they occur.
  - j. **Options Setup:** Menu shall provide operation settings for the installed components.
  - k. **System/Network Setup:** Menu shall allow Unit-to-Unit (U2U) communication and setup for teamwork modes of operation (up to 32 units).
  - l. **Teamwork Modes of Operation:** Saves energy by preventing operation of units in opposite modes multiple units.
  - m. **Auxiliary Boards:** Menu shall allow setup of optional expansion boards.
  - n. **Diagnostics/Service Mode:** The Liebert iCOM control shall be provided with self-diagnostics to aid in troubleshooting. The microcontroller board shall be diagnosed and reported as pass/not pass. Control inputs shall be indicated as on or off at the front display. Control outputs shall be able to be turned on or off from the front display without using jumpers or a service terminal. Each control output shall be indicated by an LED on a circuit board.
9. **Advanced Menus:**
- a. **Factory Settings:** Configuration settings shall be factory-set based on the pre-defined component operation.
  - b. **Change Passwords:** Menu shall allow new passwords to be set or changed.
- E. Chilled Water Control Valve: The water circuit shall include a 2-way modulating valve. The Liebert iCOM positions the valve in response to room conditions. Cooling capacity will be controlled by bypassing chilled water around the coil.
- F. A-Frame Chilled Water Coil:
- 1. The cooling coil shall be of A-frame design.
  - 2. The coil shall be controlled by a 2-way control valve. It shall be constructed of copper tubes and aluminum fins.

3. The water circuit shall be designed to distribute water into the entire coil face area. The entire coil assembly shall be mounted in a stainless steel condensate drain pan.
- G. Flow Switch: The flow switch shall activate the alarm system should the chilled water supply be interrupted. The switch shall be factory mounted and wired.
- H. Variable Speed Drive-Optional: A variable speed drive (VSD) is available to reduce energy consumption. The fan motor speed shall be varied from 100% to 60% of rated speed in response to room conditions. This shall be controlled automatically by the Liebert iCOM control. The variable speed drive option shall be available with an infrared humidifier.
- I. Optional Components: The computer room environmental control system shall be equipped with the following optional components.
  1. **Disconnect Switch-Locking Type**: The manual disconnect switch shall be mounted in the high voltage section of the electrical panel. The switch shall be accessible from the outside of the unit with the door closed, and prevent access to the high voltage electrical components until switched to the "OFF" position.
  2. **High Temp Stat**: The high temp stat shall immediately shut down the environmental control system when activated. The high temp stat shall be mounted in the electrical panel with the sensing element in the return air.
  3. **Condensate Pump, Dual Float**: The pump has capacity of 6 GPM (23 l/m) at 20 ft. head (58 kPa). (Consult factory for 200V or 230V, 50Hz applications.) The pump is complete with integral dual float switch, pump, motor assembly and reservoir. The secondary float shall send a signal to the local alarm and shut down the unit upon high water condition. The unit is shipped loose for field installation on chilled water units that are upflow with bottom return. They are also shipped loose for under floor field installation on CW026-CW060 units with EC fans.
  4. **Smoke Sensor**: The smoke sensor shall immediately shut down the environmental control system and activate the alarm system when activated. The smoke sensor shall be mounted in the electrical panel with the sensing element in the return air compartment.

#### 2.04 CONTROLLER

- A. Provide controller to operate existing Liebert and new air conditioner (Equipment #2). This device to provide interface lockout so only one unit is able to run at a time.

### PART 3 - EXECUTION

#### 3.01 INSPECTION

- A. Examine areas and conditions under which air conditioner units are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

#### 3.02 INSTALLATION OF AIR CONDITIONER UNITS - CONTROLLER

- A. Install air conditioner units in accordance with manufacturer's installation instructions. Install units plumb and level, firmly anchored in locations indicated, and maintain manufacturer's recommended clearances.
- B. Start up air conditioner units in accordance with manufacturer's startup instructions. Test controls and demonstrate with requirements. Replace damaged or malfunctioning controls and equipment.
- C. Install all equipment per manufacturer's recommendations.

END OF SECTION

SECTION 26 05 00 - BASIC MATERIALS & METHODS

## PART 1 - GENERAL

## 1.01 SCOPE OF WORK

- A. The Conditions of the Contract and the Provisions of Division 01 apply to all work of this Section.

## 1.02 DRAWINGS &amp; SPECIFICATIONS

- A. Anything mentioned in the specifications and not shown on the drawings, or shown on the drawings and not mentioned in the specifications, shall be of like effect as if shown on or mentioned in both. In case of any discrepancy in drawings or specifications, the matter shall immediately be submitted to the Architect/Engineer, without whose decision said discrepancy shall not be adjusted by the Contractor except at his own risk. Scale of drawings shall be field verified by Contractor.
- B. The Contractor shall consult the Architectural Drawings for all dimensions, furred spaces, suspended ceilings, etc. The Contractor shall also check the Architectural Drawings verifying the heights of cabinets and counters to place wall outlets over this equipment at the proper heights; location of closets, doors and window frames which may interfere. Particular attention shall also be given to the height and location of convectors and radiators. The Contractor shall check with other trades for interference and shall cooperate to avoid such interferences.
- C. The Contractor shall verify all rough-in locations and requirements with equipment supplier shop drawings prior to installation.

## 1.03 MANUALS, PARTS LISTS &amp; INSTRUCTIONS

- A. Each Contractor shall furnish and turn over to the Engineer two (2) complete sets of manufacturer's instruction manuals. Manuals shall, in addition to one copy of each approved shop drawing, include operation and maintenance instructions for such items of equipment furnished, including assembly drawings and parts lists. Parts lists shall include identification symbols or parts numbers for all replaceable parts and assemblies. The list shall also include the name and address of the nearest supply house carrying spare parts for the equipment. These materials shall be bound in hard covers. Upon approval, these instructions will be turned over to the Owner. The Contractor shall also supervise the initial operation of all equipment and instruct an operator selected by the Owner to thoroughly acquaint him with the best operating and maintenance practice. The Contractor shall have the Owner sign off on all training.

## 1.04 EQUIPMENT ACCESSIBILITY

- A. The Contractor shall locate all apparatus requiring adjustments, cleaning or similar attention so that they will be readily accessible. This shall include access doors and panel of proper size for proper maintenance of various parts. Front top and side clearances to electrical equipment shall be in line with NEC.

## 1.05 FIRE &amp; SAFETY PRECAUTIONS

- A. Each Contractor shall: Take all necessary precautions for safety of employees, employees of Owner and

public; comply with applicable provisions of Federal, State and Local laws, ordinances and requirements; erect and properly maintain necessary safeguards for said protection as required by conditions and progress of job and shall post danger signs warning against hazards of construction. Each Contractor shall exercise extreme care to maintain and exercise adequate fire safety precautions throughout construction. Provide barriers around all excavations and openings where uncontrolled descent could cause injuries.

- B. All cutting, welding or brazing operations carried on in the vicinity of or accessible to combustible material shall be adequately protected to make certain that sparks or hot slag does not reach the combustible material and thus start a fire.
- C. Whenever combustible material has been exposed to molten metal or hot slag from welding or cutting operations, or splatter from electric-arc, a person shall be kept at the place of work for at least one hour after completion to make sure that smoldering fires have not been started.

#### 1.06 GUARANTEES

- A. The Contractor shall assume responsibility for any defects which may develop in any part of the system caused by faulty workmanship, material or equipment and agrees to replace any such workmanship, material or equipment during a period of one year from the date of final acceptance of the work without cost to the Owner. Acceptance of the work shall not waive this guarantee.

### PART 2 - PRODUCTS

#### 2.01 PROTECTION

- A. Materials - The Contractor shall, at all times, protect the materials and equipment to be installed in such a manner that when the installation is completed it will present the same new appearance as when uncased.
- B. This shall be achieved by covering all equipment securely with weatherproofing canvas, by keeping other trades from abusing such material and equipment and by avoiding the final setting of such equipment in location where protection is either difficult or impractical. Any material or equipment damaged as a result of inadequate handling or protection may be ordered taken out and replaced to the satisfaction of the Engineer.
- C. Guards - Provide guards to enclose belts, pulleys, sheaves, gears and couplings, of galvanized expanded or perforated sheet steel with angle frame and angle or channel mounting supports. Make guard easily removable for access. Provide galvanized pipe railing guards where required. Conform to State and Federal codes and regulations.
- D. All materials shall be new, undamaged and shall bear the UL label of approval and shall be listed for use in each specific location unless approval does not apply.
- E. Samples of materials proposed for use shall be presented to the Engineer for his approval when requested.
- F. When two or more items of the same equipment are required, they shall be of the same manufacture.



## 2.02 DEFECTIVE MATERIALS

- A. In the event damaged or defective material is discovered during tests or during the guarantee period, this defective or damaged material shall be replaced at the Contractor's expense. The repair of defective or damaged materials shall be at the decision of the Engineer. Neither final payments nor any provision in the contract nor whole or partial use or occupancy of the premises shall constitute the acceptance of work not done in accordance with the specifications nor relieve the Contractor of liability for faulty materials or workmanship in accordance with the specification or law.

## PART 3 - EXECUTION

### 3.01 MANUFACTURER'S DIRECTIONS

- A. Materials and equipment shall be installed in strict accordance with the manufacturer's directions for installation, connection and startup of factory-assembled units and/or composite parts assembled into a system unless specifically designated herein.

### 3.02 TRENCHING & BACKFILLING

- A. Each Contractor shall perform his own excavation as necessary and required in compliance with the standards of Divisions 31 thru 33 and the additional applicable requirements listed below.
- B. Excavation may be either by hand or by machine. Remove all stones, unsound material and other foreign material from the trench bottom. Provide sheeting and bracing as required to hold walls of excavation. In the event bottoms are carried below grade, backfill to proper grade with sand at no expense to the Owner.
- C. Trenches for electrical conduits and cables shall have a minimum excavation depth to comply with the NEC or as shown on the drawings or called out in the specifications, the deepest depth shall govern, and shall be backfilled with sand or gravel 1/4" maximum dimension surrounding the conduit or cable 3" on all sides and thoroughly tamped in place. Place balance of the trench with excavated material, if sound, in 6" layers. Add berm for settlement. This backfill material shall be free of stones larger than 2". Compact to 95% density of original soil. Use special care in excavating and backfilling under buildings where compaction shall be 98% of original soil. Add moisture if required to secure maximum consolidation.
- D. In the event unsound materials are excavated and cannot be reused for backfilling, the Contractor shall provide and install suitable backfilling materials. Excess material not used in backfilling shall be removed from the site by the Contractor.
- E. Contractor to call Gopher State 1-800-252-1166 before any digging.

### 3.03 EXISTING CONDITIONS & SERVICE INTERRUPTIONS

- A. When encountered in work, protect, brace, support, existing active services including, but not restricted to sewers, gas, electric and other systems where required for proper execution of work. If existing active services are encountered that required relocation, make request in writing for determination. Do not proceed with work until written directions are received. Do not prevent or disturb operation of active services that are to remain.

- B. When encountered in work, remove, cap or plug inactive services. Notify utility companies or municipal agencies having jurisdiction; protect or remove these services which will be shut down only during the time actually required to make necessary connections to existing work.
- C. Where work makes temporary shutdown of services unavoidable, shut down at night, or at such times as approved by Owner, which will cause least interference with established operating routine. Arrange to work continuously, including overtime, if required, to assure that services will be shut down only during the time actually required to make connections to existing work.

### 3.04 TESTS, INSPECTIONS & ADJUSTMENTS

- A. Furnish all items and labor necessary for tests required in this Division. The Contractor shall notify the Engineer a reasonable period ahead of time before the tests are to be made. Concealed work shall remain uncovered until required tests have been completed; but, if necessary, tests on portions of the work may be made and these portions covered up after proving satisfactory. Tests shall be repeated after defects have been eliminated.
- B. Tests will be as prescribed by Local, State or National codes insofar as they apply. Where inspections are made by an enforcing agency, a copy of the Certificate of Compliance of Acceptance shall be forwarded to the Engineer before the final inspection will be made. Tests shall be made at the Contractor's expense. Each portion of work shall be subject to inspection of the Engineer at times he deems necessary for inspection of materials and construction and shall give instructions as he may consider requisite.
- C. Workmanship, materials or equipment, either at the site or intended for it, are subject to inspection and approval of Engineer at any time. Contractor must render such facilities as Engineer requires for inspection whatever they may be. Engineer may reject and require removal from premises any materials or work which he may decide to be contrary to the contract. The Engineer shall have the right to make minor changes as may be considered necessary by job conditions, where no change in cost is involved.
- D. At the time of final inspection of the work under the contract, the work covered by this division shall be complete in every respect and in perfect operating condition. All surplus materials of every kind shall have been removed.
- E. After final inspection is made, the Contractor shall receive a list of items requiring adjustment, correction, replacement or completion. The Contractor shall comply completely with all the listed requirements.
- F. Test for opens, ground and shorts of feeders and branch circuits at time of construction. All equipment shall be left in first-class operating condition. All outlets, switches, light fixtures and devices shall be in first-class working order. Motors shall be tested for rotation at time of connections. Test all alarm systems.
- G. All factory-assembled equipment shall be checked when being installed for loose, missing or broken parts. Any items found loose shall be tightened and items found broken or missing shall be replaced all at no expense to the Owner. Contractor shall obtain and pay for certification by State Electrical Inspector.

- H. Provide training to all Owner personnel on all basic electrical systems. Training shall include review of all installed systems, walk-through of systems, location of main electrical panels and panelboards, and all control panels.
- I. The Contractor shall furnish all instruments, labor, communication devices and expertise needed for conducting and recording tests.
- J. The Engineer may require a factory-trained representative to be on site at final walk-thru and training. The Engineer may require a factory-trained representative to be on site twice during the warranty period.

### 3.05 CUTTING & PATCHING

- A. Each Contractor shall perform all cutting necessary to perform his work and shall patch damaged work. However, special permission shall be obtained from the Architect before cutting structural members or finished materials. All patching shall be performed in such a manner as to leave no visible trace and to return the part affected to the condition of undisturbed work. All conduit holes shall be core drilled in existing construction.

### 3.06 STREET, SIDEWALK & CURB REPAIR

- A. Each Contractor will be responsible for the replacement of existing street pavement, curbs, sidewalks, etc., removed by him or damaged by him in the course of the work. Pavement repairs shall be done as required by the Owner, State or City; and the Contractor shall make the necessary arrangements to perform such repairs and shall pay all costs in connection with same unless such work is to be reconstructed under the General Contract.

### 3.07 ROOF CURBS & FLASHINGS

- A. The Roofing Contractor will provide roof curbs and do all flashing for pipes, ducts and conduits at the time the roofing material is installed providing conduit is in place at time of roofing, otherwise flashing will be responsibility of the Contractor.

### 3.08 PAINTING

- A. Unless otherwise specified, all finished painting will be done by the Painting Contractor. The Contractor shall provide preservation and prime coats. This Contractor shall paint all hangers, straps, braces, supports and equipment requiring same installed by him immediately after installation with Rustoleum paint or equal. If equipment furnished by the Contractor has started to rust or is painted, equipment shall be repainted to the satisfaction of the Engineer.

### 3.09 CLEANING

- A. Upon completion of work, all rubbish must be cleared away; all fixtures, panels, hangers and trim, etc., shall be thoroughly cleaned and ready for use. All fingermarks around access doors and outlet openings shall be cleaned or repainted if the marks cannot be removed by cleaning.

### 3.10 CORE DRILLING WALLS/FLOORS

- A. Contractor shall provide all holes thru walls, floors and ceilings of existing construction necessary for

the installation of new conduits. All holes shall be core drilled and of sufficient size to allow the conduit to pass thru the opening.

- B. All conduit passing thru these openings shall be sized for a snug fit around the conduit, or the openings are to be reduced by using grout or other cement type closing materials approved by the Engineer. The grout shall be troweled smooth on both sides of the wall and primed for painting.
- C. Firestopping - See Firestopping Specifications Section 07 84 00.

3.11 "PROVIDE"

- A. "Provide" means to furnish and install.

END OF SECTION

SECTION 26 05 01 - GENERAL PROVISIONS - ELECTRICAL

## PART 1 - GENERAL

## 1.01 SUMMARY

- A. The Conditions of the Contract and the General Provisions of Division 01 apply to all work of this Section.
- B. The work to be done under this specification includes the furnishing of all labor, materials, equipment and services necessary for the proper completion of all electrical work. Refer to "INDEX SHEET" of this DIVISION 26 - ELECTRICAL for the work included.
- C. The omission of express reference to any parts necessary for or reasonably incidental to the complete installation shall not be construed as releasing the Contractor from furnishing such parts.
- D. Alternate - See SECTION 00 21 13 - INSTRUCTIONS TO BIDDERS.
- E. Unit Prices - Refer to the PROPOSAL FORM - DIVISION 00 for unit prices to be listed in bid for the items of the Electrical Construction.

## 1.02 PERMITS, LICENSES &amp; FEES

- A. The Contractor shall obtain and pay for all permits, notices, inspection fees, licenses, etc., necessary for the performance to the work included in this contract, including plan review costs; and he shall observe any requirements stipulated thereon.

## 1.03 CODES, REGULATIONS &amp; STANDARDS

- A. All work under this division shall be in strict conformance with the applicable parts of the following codes, laws, rules, regulations and applicable standards of technical societies where referenced herein-after. References to standards, codes, regulations, etc., shall mean the latest edition of such publications adopted and published at date of the invitation to submit proposals.

National Electric Code (NEC)  
Regulations of the State Department of Health  
Regulations of the State Industrial Commission  
Rules of the National Board of Fire Underwriters  
Local Codes, Rules and Regulations  
Occupational Safety and Health Act (OSHA)  
State Building Code Division  
Local Electric Utility  
American Disabilities Act (ADA)  
Minnesota Building Codes:  
1300 Building Code  
1302 Construction Approvals  
1303 Minnesota Provisions  
1305 Adoption of IBC  
1306 Special Fire Protection  
1307 Elevators & Related Devices  
1311 Rehabilitation of Existing Buildings  
1315 Electrical Code

1341 Accessibility Code  
1346 Mechanical Code  
1365 Snow Loads  
4715 Plumbing Code  
1323 Commercial Energy Code

#### 1.04 REFERENCES

- A. References to standards, codes, specifications, recommendations shall mean the latest edition of such publications adopted and published at date of invitation to submit proposals. Reference to technical societies, trade organizations, governmental agencies is made in mechanical and electrical work sections in accordance with the following abbreviations:

AGA	American Gas Association
AIEE	American Institute of Electrical Engineers
ANSI	American National Standards Institute
ASHARE	American Society of Heating and Air Conditioning Refrigerating Engineers
ASTM	American Society for Testing Materials
CSD	Commodity Standards Division, US Department of Commerce
NAFM	National Association of Fan Manufacturers
NBFU	National Board of Fire Underwriters
NEC	National Electric Code
NEMA	National Electrical Manufacturers' Association
UL	Underwriters' Laboratories, Inc.

#### 1.05 CONTRACTOR'S QUALIFICATIONS

- A. This Contractor shall be a licensed Class "A" Electrical Contractor in the State. All work shall be installed and completed by electricians skilled in their trade and shall be installed in a practical and workmanlike manner.

#### 1.06 INSPECTION OF THE SITE

- A. The Contractor is urged to examine the site and familiarize himself with existing conditions on the premises and surrounding area. No extras will be authorized because of the Contractor's misunderstanding as to extra work required in order to comply with these plans and specifications, or his lack of knowledge of conditions in connection with the work. Information received by the Contractor from verbal conversations shall not be construed as relieving the Contractor from actually visiting the site and making his own analysis of conditions.

#### 1.07 SHOP SUBMITTALS

- A. This Contractor shall submit for approval at least six (6) copies of shop drawings to the Engineer at least six (6) weeks in advance of ordering date. Shop drawings will be returned without consideration if the following are not included before submittal:
1. A check by this Contractor for space conformance and performance characteristics.
  2. Contractor's stamp or signature.
  3. Identify each item by equipment number (from the drawings) or, in absence of an equipment number, identify by specification section.
  4. Check or underline specific model to be submitted on catalog sheets containing several models.

- B. The Engineer's approval of the shop drawings is general and does not relieve the Contractor from the responsibility for adherence to the specifications, nor shall it relieve him of the responsibility for any error which may exist.
- C. Dimensions and quantities are the responsibility of the Contractor. Submit shop drawings on equipment listed on the equipment schedule of the drawings and the following pertinent to this project:
- |                   |                                      |                         |
|-------------------|--------------------------------------|-------------------------|
| Panelboards       | Communications                       | Main Distribution Board |
| Motor Control     | Firestopping                         |                         |
| Alarm Systems     | Electronic Safety & Security Systems |                         |
| Lighting Fixtures | Wiring Devices                       |                         |
- D. Shop drawings and O&M manuals shall be provided on a CD at the end of the project. The CD shall include the shop drawings, O&M manuals, links to the web sites of all the manufacturers and links to all of the equipment specifications and manuals.

#### 1.08 RECORD DRAWINGS

- A. The Contractor will be provided a clean set of drawings for the purpose of recording conduit routings (underground and concealed) and locations of equipment that deviate from the contract drawings. Additional detail of difficult routing shall be sketched on the record drawings to more clearly show routing around where interference was encountered during construction. Sufficient measurements shall also be recorded on the drawings to locate routings that have been made inaccessible by walls, floors or ceilings. Upon completion of the project, the record set of drawings will be reviewed with the Engineer before delivering to the Owner.
- B. Record Drawings - The Contractor shall update the CAD files of all changes made during construction and provide these files to the Engineer for approval before turning over to the Owner.

#### 1.09 ABBREVIATIONS

- A. Following is a key to abbreviations used in mechanical and electrical work sections:

a-c	alternating current	Ht	total heat gain
AFF	above finish floor	ID	inside diameter
AFG	above finish grade	in or "	inch
amp	ampere	ips	intermediate-pressure
atm	atmosphere	ips	iron pipe size
boiler hp	boiler horsepower	kw	kilowatt
bhp	brake horsepower	kwhr	kilowatt/hour
BTU	British thermal unit	lb	pound
BTUH	BTU per hour	lin ft/LF	linear foot
C	degree Centigrade	max	maximum
cfm	cubic feet/minute	M&E	Mechanical & Electrical
c.i.	cast iron	M&ER	M&E Requirements
c-p	chrome-plated	MBH	thousand BTU/hour
cu in	cubic inch	MCF	1000 cubic feet
cu ft/CF	cubic feet	min	minimum
cu yd	cubic yard	m-p	medium-pressure
db	decibel	o.a.	outside air
d-c	direct-current	o.c.	center to center or on centers
deg	degree	od / OD	outside diameter

dia	diameter	os&y	outside screw and yoke
dif	diffuser	oz	ounce
edr / EDR	equivalent direction radiation	prv	pressure reducing valve
exh	exhaust	psi	pounds/square inch
F	degree Fahrenheit	PVC	Polyvinyl Chloride
FBO	furnished by others	R.A.	return air
FD	Fire Department	RAG	return air grille
FD	floor drain	reg	register
fpm	feet/minute	rpm	revolutions/minute
F & T	float & thermostatic	sec	second
ft or '	foot	sq ft	square foot
gal	gallon	sq in	square inch
gph	gallons/hour	sp	static pressure
gpm	gallons/minute	swp	steam working pressure
Hg	mercury	std	standard
h-p	high-pressure	tdh	total dynamic head
hp	horsepower	temp	temperature
Hs	sensible heat gain	wwp	water working pressure
hr	hour	XFMR	transformer

#### 1.10 STARTER CODE

STARTER CODE	
=====	
A = MAGNETIC STARTER WITH OVERLOADS	
1ST DIGIT	B = MANUAL STARTER WITH OVERLOADS
	C = TWO SPEED MAGNETIC STARTER
	D = ELECTRONIC SOFT START
2ND DIGIT	NO. OF POLES
3RD DIGIT	NEMA STARTER SIZE
4TH DIGIT	QUANTITY OF AUX. INTERLOCKS
=====	
A = STOP - START IN COVER	
B = SELECTOR SWITCH IN COVER "OFF-HIGH-LOW"	
5TH DIGIT	C = SELECTOR SWITCH IN COVER "HAND-OFF-AUTO"
D = PILOT LIGHT IN COVER	
=====	

#### NOTES

1. LOCATE STARTERS ON WALL AT 5'0" UP.
2. LOCATE MAGNETIC STARTERS IN ACCESSIBLE LOCATION FOR SERVICING.



3. THERMOSTATS FURNISHED BY OTHERS UNLESS OTHERWISE SHOWN.
4. ROOF VENTILATOR DISCONNECTS PROVIDED UNDER HOOD WITH FAN.

## PART 2 - PRODUCTS

### 2.01 SUBSTITUTE MATERIALS & EQUIPMENT

- A. Contractor requests for materials and equipment in addition to that specified and not followed by "or equal" shall be considered substitution. Substitute materials and equipment will not be considered unless prior approval has been given by the Engineer. If such approvals are not requested, it shall be assumed materials and equipment specified will be furnished and no further substitution after the bid date will be accepted.
- B. "Or Equal Clause" - It shall be the sole responsibility of the Engineer to determine if materials, methods or procedures are "equal" to that which is specified. All such changes made without such authorization are subject to correction at no additional cost to the Owner. The "Or Equal Clause" in the General Conditions of this specification is not intended to allow the Contractor to redesign the system as specified. The Clause is also not intended to reduce the number of component parts as specified and as shown on the drawings.
- C. Request by the Contractor to use substitute equipment, methods or materials received at the Engineer's office will be considered only if received at least 7 calendar days prior to the Bid Opening date. Requests shall refer specifically to equipment number and/or specification section, and shall include data and drawings to allow the Engineer to compare the request for substitution. If approved, substitution will appear in addendum form. If a personal reply is desired, enclose a stamped, self-addressed envelope.
- D. Contractor shall be completely responsible for costs involved in equipment other than specified model number as to sizes, layout, interference with other equipment, access to appurtenances, changes in other appurtenances and additional work required because of this equipment change.
- E. Equipment called out as "No Substitution" shall be supplied as specified.

### 2.02 SALVAGE MATERIALS

- A. All materials removed by this Contractor shall be reviewed by the Owner. Materials not wanted by the Owner shall become the property of this Contractor and shall be removed by him from the premises. Material the Owner wants to keep shall be stored by him.

### 2.03 EXISTING WIRING & EQUIPMENT

- A. The Contractor shall disconnect all electrical power and controls of existing equipment in the existing building to be relocated. The Contractor shall connect electrical power to all new and relocated Owner's equipment. Existing conduits may be used wherever possible. Wiring to be abandoned shall be disconnected from the power source. In existing walls being removed, the downstream devices to remain shall have new wiring permanently installed for circuit continuity. Electrical Contractor shall disconnect and remove all existing electrical devices and wiring.
- B. Equipment Removal - This Contractor shall disconnect and remove existing light fixtures, electrical equipment, wiring, as indicated on the drawings or required to complete the work and blank off all boxes that are not to be reused. Concealed work not to be reused may be abandoned if disconnected from the electrical system and labeled for future use.

PART 3 - EXECUTION

3.01 EQUIPMENT CONNECTIONS

- A. Unless otherwise specified, each contractor shall make all connections of his trade to all installed equipment whether provided by himself or by other contractors. Each contractor shall leave proper connections for equipment furnished by them including flanges, etc. Connections size shall be as indicated but not smaller than equipment.
- B. Plumbing - All domestic water, waste, vent and soil connections, including traps and fixture shutoffs, shall be made by the Plumbing Contractor.
- C. Steam, Condensate and Heating Water - All steam, condensate and hot water connections, including equipment, unions, traps and shutoffs, shall be made by the Heating Contractor.
- D. Electrical - Unless otherwise specified, the Electrical Contractor shall:
  - 1. Perform all electric power wiring and make all electric power connections to all electrical equipment shown on the Electrical Drawings.
  - 2. Provide and install all starters, disconnects and overload protection. See motor and equipment schedule.
  - 3. Provide and install all control wiring shown only on the electrical drawings. Other control wiring shall be by the Contractor requiring the same.
- E. All Trades -
  - 1. Furnish and set all motors required for their equipment.
  - 2. Submit a complete list and wiring diagrams to the Electrical Contractor and the Architect of all equipment showing the electrical characteristics.

3.02 COORDINATION OF WORK

- A. This Contractor shall coordinate the installation of all electrical equipment and appurtenances required for this project with other contractors to eliminate interferences. Installation shall be as shown on the plans unless the coordination between contractors require minor deviations. These adjustments shall be made at no cost to the Owner. The Engineer shall be kept informed of all such deviations.
- B. Work or Supplies by Others - "Others" includes other contractors or persons outside the specified scope of Electrical Contractor or Electrical Subcontractors; such as General Contractor, Mechanical Contractor or Owner.

3.03 FINAL INSPECTION

- A. When the project is complete and prior to acceptance by the Owner, a final inspection will be held. Before final inspection is made, the work shall be complete in accordance with plans and specifications.
- B. When the Owner is notified in writing that the work is complete, including the items noted on final inspection, a follow-up inspection will be made. The Contractor shall recognize the need for proper procedure and diligence for completing work on time, including prompt attention to finishing and follow-up work.
- C. Final payments will not be made until all corrective work and incomplete work has been properly

finished. Additional corrective work found after the date of final payment will be subject to the provision of guarantees. No reduction in retained percentage will be considered until:

1. The project is completed.
2. Final inspection has been made.
3. Corrective items and deficiencies noted on final inspection complete and finished as far as may be possible within the Contractor's control.
4. Approval received from the Surety.
5. Lien Waivers filed.

### 3.04 INSTRUCTION OF OWNER'S EMPLOYEES

- A. Provide services of competent instructors, who will give full instructions in the care, adjustment and operation of all parts of the electrical system and equipment to the Owner's employees who are to have charge of the equipment.
- B. Each instructor shall be thoroughly familiar with all parts of the installation on which he is to give instructions and shall have full knowledge of the operating theory and practical operation-maintenance work. Factory-trained instructors shall be employed whenever they are available.
- C. Instructions shall be given during the regular work week after the building has been accepted and turned over to the Owner for regular operation. Provide a minimum of one man-week (40 hours) of instructions for electrical equipment and lighting. See individual sections for additional training of special systems.
- D. Document all instruction material, and submit prior to the commencement of training sessions and include with Operation and Maintenance Manuals.
- E. Provide detailed cost breakout of instruction and instructional materials. This breakout shall distinguish between each system and equipment.

### 3.05 CLEANING

- A. The interior and exterior surfaces of electrical equipment enclosures shall be wiped or cleaned with a vacuum two weeks before scheduled use and again immediately prior to final completion.
- B. Accessible elements of disconnecting and protective items shall be cleaned with a vacuum before energizing.
- C. Scratches on painted surfaces shall be touched up with paint of equivalent quality and color.

END OF SECTION

SECTION 26 05 02 - ELECTRICAL DEMOLITION

## PART 1 - GENERAL

## 1.01 SCOPE OF WORK

- A. The Conditions of the Contract and the provisions of Division 01 apply to all work of this section.
- B. The work of this section includes all labor, material, equipment and services to do all demolition necessary to the construction for a complete job in accordance with the drawings and as specified herein.

## 1.02 PROTECTION

- A. Do all demolition in a careful and workmanlike manner as not to impair the strength or safety of the existing building.
- B. Existing conduit and feeders shall be temporarily supported where the existing circuit is to remain connected or be relocated.
- C. Coordinate with General Contractor and other trades during all demolition to avoid loss of services in other areas of the existing building and to prevent the spread of dust and foreign material into the occupied areas of the building.
- D. All debris must not be allowed to accumulate and shall be removed from the site immediately.

## 1.03 DEMOLITION

- A. Refer to all drawings for demolition areas. Visit the site before bidding to determine existing conditions. All notes are general and do not relieve the Contractor from disconnecting, removing and protecting all work required or necessary to complete the new construction.
- B. A general description of demolition items as follows:
  - 1. Lighting - Disconnect and remove all interior lighting including conduit, wiring, boxes, etc., except where existing circuits are to be reused or fixtures are to remain connected.
  - 2. Power - Disconnect and remove all wiring devices and equipment including conduit, wiring, boxes, etc., except where devices are shown to be reused and circuits to remain connected or extended. Panelboards and feeders to be disconnected shall first have the circuits verified by Electrical Contractor to determine if disconnection would create an outage on another floor. Provide temporary wiring and conduit to keep such circuits energized and connect to nearest panelboard spare breakers.
  - 3. Fire Alarm System - Disconnect and remove all existing fire alarm devices as shown or as required to complete the work. Use existing smoke detectors and devices to provide temporary fire alarm smoke detection system during demolition. Devices shall be protected during period of dirt and debris in the area where debris and dust is occurring. At the end of each working day, the Electrical Contractor shall remove dust protection to provide a complete and working early detection system. Provide temporary cabling and connect as necessary. Disconnect and remove existing remote annunciator including wiring, conduit and boxes. Protect existing detector at elevator doors.

END OF SECTION

SECTION 26 05 19 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS & CABLES

## PART 1 - GENERAL

## 1.01 SUMMARY

- A. The Conditions of the Contract and General Provisions of Division 01 apply to all work of this Section.
- B. This Section includes all labor, material, equipment and services necessary to furnish and install wires and cables where shown or indicated on the drawings and specified herein.
- C. All wire and cable shall be new, of the best quality, and of the size, type and number indicated. Conductors shall be of soft annealed copper conforming to the requirements of ASTM specifications, latest edition. Unless otherwise noted, wire shall be rated 600V. All conduits are sized based on copper conductors unless noted on the drawings. Shall be listed or labeled by "UL."
- D. Neutral wire in all cases shall be provided with an outer identification of white or gray distinguishing color and shall be the same size as the phase wires unless otherwise noted. All branch wiring shall be color coded. #12 AWG wire shall be minimum size used throughout unless otherwise indicated on the drawings. All wire #10 AWG or larger and all control wiring shall be stranded.
- E. Electrical wire, cable and connectors shall be for power distribution, lighting circuits, equipment circuits, appliance circuits and motor circuits. All wiring and connectors shall be UL listed and labeled.
- F. Cross lines on the conduit runs indicate the number of wires to be installed. Where two or more neutrals are in one conduit, each shall be individually coded or rung out for identification of the proper circuit. Aluminum conductors shall be used only where shown on the drawings.
- G. Branch Circuit Color Coding -

<u>Color (120/208 volt)</u>	<u>Phase</u>
Black	A or 1
Red	B or 2
Blue	C or 3 (where applicable)
White or Gray	Neutral
Green	Equipment Ground

## PART 2 - PRODUCTS

## 2.01 WIRING

- A. Wiring for branch circuits shall be THWN or THHN; 600 volt, 75°C minimum rating.
- B. Wiring pulled through wiring channels of continuous rows of fluorescent fixtures shall be THHN.
- C. Feeders shall be THWN.
- D. Type AC/MC cable shall be allowed for recessed light fixtures above a ceiling. No direct fixture-to-

fixture connections are allowed.

- E. Compact aluminum conductors shall be allowed for feeders 200 amp and larger. (**Note:** Plans have copper wire sizing unless noted. Contractor to verify AL size and conduit.)
- F. Wiring placed underground shall be Type USE; 600V, 75°C min. (**Note:** Cannot be run inside building.)

## 2.02 CONNECTORS

- A. Joints for wiring sizes #10 and smaller shall be made with insulated, compression, spring-type connectors that exert pressure on the conductors as they are turned into the connector.
- B. #8 and larger connectors shall be solderless type lugs where the tightening screw does not bear directly on the conductor. Mechanical compression type connectors may be used if installed with a tool designed for the purpose by the manufacturer of the connector.
- C. Some of the known manufacturers are, but not limited to, as follows: Anixter, Rome, American, General, Southwire and Triangle, Appleton, Burndy, Panduit, Ideal, 3M, OZ Gedney, T&B.
- D. Mechanical compression-type connectors shall be used on all aluminum conductors. Connectors shall be used with a tool designed for the purpose by the manufacturer of the connector.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

- A. Install all electric wiring as indicated on the drawings in line with NEC, latest edition. Pull all conductors simultaneously when installed in the same raceway.
- B. Install all joints and splices with equal or better mechanical and dielectric strength than the conductors being spliced.
- C. All joint connectors must be compatible with the conductors being used.

### 3.02 FEEDER CIRCUITS

- A. Secondary electrical distribution shall be 120/208V, 3 phase, 4W, for power, lighting and outlets. Furnish and install all feeders from panels to various loads as indicated and specified. Feeders shall be of the types and sizes indicated.

### 3.03 BRANCH CIRCUIT SYSTEMS

- A. Power Circuits - Branch circuits shall be installed from power distribution panels to individual outlets or control equipment as indicated on the plans. Conductors shall be of the size and type noted and installed in conduit of size indicated or required by the number of conductors involved. Each motor shall be supplied by an individual branch circuit from the power distribution center (panelboard) indicated on the plans. Circuit conductors and raceways shall be of the size and type noted on the drawings.
- B. Lighting Circuits - Branch circuit conductors for the general lighting system shall be installed in conduit from the panelboard to outlets and between outlets as indicated on the plans. No wire smaller than #12

SECTION 26 05 19

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS & CABLES

shall be used for any lighting branch circuit. If the single distance from panelboard to first outlet exceeds 50 ft., the minimum size conductor for this run shall be #10. If, in special cases, this distance must be exceeded, larger conductors of sizes noted on the plans shall be installed.

- C. Outlets shall be as specified herein and shall be of a type approved for installation conditions encountered (flush plaster or drywall, masonry construction, concrete slab, surface-mounted boxes or conduit fittings).
- D. Receptacle Circuits - Furnish and install branch circuits to receptacle outlets as noted on the plans. Circuits shall be as indicated in specific areas. No wire smaller than #12 shall be used for any branch circuit supplying convenience outlets.
- E. For excessively long runs (50 ft. or more) from panelboard to first receptacle outlet, minimum size wire shall be #10 with conductors between outlets being #12. Receptacle circuits shall be circuit breaker controlled as indicated on the plans. Receptacles for specific areas shall be of the size and type indicated on the plans and specified herein.

END OF SECTION

SECTION 26 05 26 - GROUNDING & BONDING FOR ELECTRICAL SYSTEMS

## PART 1 - GENERAL

## 1.01 SUMMARY

- A. The Conditions of the Contract and the Provisions of Division 01 apply to all work of this Section.
- B. This Section includes all labor, material, equipment and services necessary to furnish and install all grounding as shown on the drawings and specified herein.

## 1.02 SYSTEM DESCRIPTION

- A. All conduit systems, switchboxes, cabinets, motor frames, switchgear, transformers and all other electrical equipment shall be solidly grounded in strict accordance with the NEC to form a continuous, permanent and effective grounding system.
- B. Grounding shall be connection to building water line if metallic. Alternate grounding as shown on the drawings are reinforcing rods in footings (minimum of 20 lin.ft. of rod). Additional grounds are grounding electrodes, ground rods, loop systems, separately derived grounds and connection to building steel.
- C. Neutrals shall be bonded to the grounding system only at the building service entrance and when establishing a separately derived system such as the secondary side of transformers.

## PART 2 - PRODUCTS

## 2.01 MATERIALS

- A. Manufacturers offering grounding products shall be used wherever possible. All grounding products shall be UL listed and approved.

## 2.02 MANUFACTURERS

- A. Some of the known manufacturers of grounding products are, but not limited to, as follows: Burndy Corp., Crouse Hinds, Gould, Ideal, T&B, Blackburn, Joslyn and Cadweld.

## PART 3 - EXECUTION

## 3.01 INSTALLATION

- A. Grounding shall be coordinated with utility, other contractors and all electrical systems requiring grounding.
- B. Where clean grounds are shown for electric equipment, the grounding conductor shall run separately to the main grounding point.
- C. Where grounding bars or grounding plates are shown, they shall be a minimum of 1/4" thick copper plate with lugs for connection of grounding conductors. They shall be provided with standoff insulators



- so tapped screws may pass through the grounding plate.
- D. Where grounding resistance tests are required, Contractor shall provide all labor and equipment to make the test and provide test reports to the Engineer. Generally, tests will be Fall of potential ground tests.
  - E. Greenfield flexible conduit and Type UA liquid type flexible conduits shall have proper size ground conductor jumper bonded to the rigid conduit system and to the electrical equipment where the flexible conduit is terminated.
  - F. Ground service entrance to cold water piping service on the "street side" of the water meter all in a manner and capacity as prescribed by the NEC and local codes applying. Ground to ground rod from meter socket and connect grounds together. Ground clamps shall be installed in a readily accessible location.
  - G. The ground lugs on all 3-wire ground type receptacles shall be securely connected to the grounding system per the NEC. Additional grounding grids, driven ground rods, etc., shall be as shown on the drawings or specified in the section requiring additional grounding. GFI protection breakers or receptacles shall be used on construction site and where shown on the drawings.
  - H. Special attention of the Contractor is called to metallic building components such as wireways, mechanical piping, building steel (structural and reinforcing) that they must be grounded in an approved manner according to the NEC.
  - I. Provide a #6 grd coordination the entire length of the cable tray system with connections to a ground bar located at the main service and each technology closet.

END OF SECTION

SECTION 26 05 29 - HANGERS & SUPPORTS FOR ELECTRICAL SYSTEMS

## PART 1 - GENERAL

## 1.01 SCOPE OF WORK

- A. The Conditions of the Contract and the Provisions of Division 01 apply to all work of this Section.
- B. This Section includes all labor, materials, equipment and services necessary to furnish and install supporting devices where shown or indicated on the drawings and as specified herein.

## 1.02 SUMMARY

- A. Contractor to provide and install supporting devices for proper installation of electrical raceway systems and other equipment installed under this Division.
- B. Design and construct supporting structures of strength to safely withstand stresses to which they may be subjected and to distribute properly the load and impact over building areas. Conform to applicable technical societies standards, also to codes and regulations of State and Local agencies having jurisdiction.
- C. Equipment Supports - Supports shall be made of durable materials suitable for the application and shall be painted with two coats Rustoleum paint. Where excessively corrosive conditions exist, supports shall be protected by galvanizing or other approved suitable methods.
- D. Perforated iron or tie wires for supporting conduits will not be permitted. The required strength of the support assemblies and size and type of anchors shall be based on the combined weight of the conduit, wiring and hangers. Brackets, braces, reinforcing angles, etc., shall be installed in all partitions, ceilings, etc., not sufficient in themselves to support the electrical apparatus.
- E. Horizontal conduit runs shall be securely fastened to structure or, if suspended, shall be fastened to trapeze type hangers, which in turn shall be securely fastened. Fasteners shall extend into the structural walls and ceilings and not to the surface finish only. Horizontal runs shall be fastened at intervals as required by NEC including the last support to the outlet, junction box or fitting.

## PART 2 - PRODUCTS

## 2.01 MATERIALS

- A. Provide supporting devices to the clevis hangers with rods, clamps, couplings, conduit straps, trapeze hangers, expansion anchors, toggle bolts and formed channels.

## 2.02 MANUFACTURERS

- A. Some of the known manufacturers are, but not limited to, as follows: Ackerman Johnson Fastening Systems, Inc.; Ideal Industries, Inc.; Joslyn Mfg. and Supply Co.; McGraw Edison Co.; Rawlplug Co., Inc.; Star Expansion Co.; Allied Tube and Conduit Corp.; B-Line Systems, Inc.; Greenfield Mfg. Co., Inc.; OZ Gedney Div; General Signal Corp.; Power-Strut Div; Van Huffer Tube Corp.; Unistrut Div; GTE Products Corp.

### 2.03 SLEEVES

- A. Fabricate sheetmetal sleeves from galvanized sheetmetal 3" and smaller - 20 gauge, 4" to 6" - 16 gauge, over 6" - 14 gauge; other sleeves shall be steel pipe Schedule 40, iron pipe ductile or cast iron, PVC Schedule 80 plastic. Provide STI EZ path where firestopping is required.

### 2.04 SEALS

- A. Where sleeves penetrate foundation walls below grade or exterior walls, make watertight with a watertight, non-toxic, UL classified sealing material of rubber, plastic or silicone type material supported and compressed by pressure rings.

### 2.05 FIRESTOP

- A. Where conduits, sleeves, etc., pass through, leave or enter fire-rated spaces; openings around conduits and equipment shall be firestopped. See Spec Section 07 84 00.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

- A. Install hangers, anchors, sleeves and seals as necessary to complete the electrical work in line with NEC and interface the work with other crafts to prevent interference. All supporting devices shall be attached to the building structure for support. Arrange parallel runs to be supported on trapeze hangers when practical.
- B. In pipe shafts, vertical run conduits may be supported at every floor but support intervals must not exceed 20 ft., and conduit must be made up with threaded fittings. If over 10 ft. between supports, exposed conduits 2" and smaller shall be fastened with one hole malleable iron clamps with brass or plated machine screw. Support larger sizes with rods and ring or clevis type hangers. Support multiple runs of conduit on trapeze hangers fastened to the building structure and spaced in line with NEC, latest edition.
- C. Where concrete foundations or pedestals are indicated or required, they shall be a minimum of 3" height and extend a minimum of 2" beyond machine bed plate. Machinery shall be leveled and grouted. Anchor bolts are to be hooked or threaded with nut and plate on embedded end. Floor stands, ceiling or wall mountings shall be constructed of structural steel members and properly braced and fastened to building structure, as approved. Each Contractor shall provide his own concrete. Concrete shall be not less than 4,000# mix.
- D. Light fixtures, conduit, and other electrical equipment shall have its own supports to structural. They shall not be supported by ductwork or other mechanical systems.

END OF SECTION

SECTION 26 05 33 - RACEWAYS & BOXES FOR ELECTRICAL SYSTEMS

## PART 1 - GENERAL

## 1.01 SUMMARY

- A. The Conditions of the Contract and the Provisions of Division 01 apply to all work of this Section.
- B. This Section includes all labor, materials, equipment and services necessary to furnish and install raceways, boxes and fittings where shown or indicated on the drawings and as specified herein.
- C. All wires, conductors and cables shall be installed in ferrous metal conduit unless otherwise indicated. See Section 26 05 19.

## 1.02 RELATED SECTIONS

- A. Divisions 00 and 01 shall be part of this Section.
- B. See power distribution, lighting, special systems, communication, heating and cooling, control and instrumentation sections for additional requirements.

## PART 2 - PRODUCTS

## 2.01 RIGID CONDUIT

- A. Rigid conduit shall be ferrous galvanized inside and out. Fittings shall be ferrous galvanized threaded NEC standard elbows. Crouse Hinds, OZ/Gedney or Appleton condulets. Allied, Triangle, Wheatland or approved equal. Rigid conduit may be used throughout and shall be used as follows:
  - 1. In all structural stub ups or stub downs or out of slabs, where damage is possible.
  - 2. In structural slabs.
  - 3. In slabs on grade.
  - 4. In walls next to earth.
  - 5. Underground runs.
  - 6. Exterior runs.
  - 7. Where voltage exceeds 600V.
  - 8. Where hazardous conditions require.

## 2.02 INTERMEDIATE METAL CONDUIT

- A. Intermediate metal conduit and fittings as outlined in NEC Article 345 shall be ferrous and galvanized inside and out. The conduit shall use only approved ferrous threaded fitting couplings and connectors. Intermediate metal conduit may be used throughout except in the following locations:
  - 1. In wet or damp areas unless fittings are threaded and approved.
  - 2. In masonry load bearing walls unless fittings are threaded and approved.
  - 3. In structure slabs and slabs on grade unless fittings are threaded and approved.
  - 4. Where voltage exceeds 600V.
  - 5. Hazardous areas.

### 2.03 EMT (ELECTRICAL METALLIC TUBING)

- A. EMT may be used throughout except in the following locations:
  - 1. Wet or damp areas.
  - 2. Where subject to mechanical hazards.
  - 3. In poured concrete load bearing walls.
  - 4. In structural slabs.
  - 5. In slabs on grade.
  - 6. In walls next to earth.
  - 7. Underground runs.
  - 8. Exterior runs.
  - 9. Over 4" in size.
- B. EMT shall be Wheatland, Allied, Bridgeport or approved equal. Fittings shall be UL approved, galvanized, set screw type, all steel devices. No indenter type fittings shall be used. Fittings shall be Appleton, T&B, Gedney, Raco or approved equal.

### 2.04 FLEXIBLE METAL CONDUIT

- A. Flexible conduit may be used in dry locations as follows:
  - 1. Fixture connections.
  - 2. In stud walls.
  - 3. In bar joist construction.
- B. Flexible conduit shall not be used where nonflexible conduit is to be installed. See Section 16110 (Rigid Conduit). Flexible conduit shall be Electroflex, Anixter, International or equal. Fittings shall be malleable compression type, all steel devices, as manufactured by Appleton, T&B, Raco, Gedney or approved equal. Fittings shall be as approved by the National Electric Code and of such type as to provide an adequate ground connection.

### 2.05 LIQUIDTIGHT METAL CONDUIT

- A. Liquidtight metal conduit may be used where flexible metal conduit can be used and shall be used where flexible watertight connections are required to:
  - 1. Motors.
  - 2. Light fixtures.
  - 3. Weatherproof electrical equipment.
  - 4. When shown on the drawings.
- B. Liquidtight conduit by DIST, AFC or Electroflex, or approved equal.

### 2.06 SURFACE RACEWAY

- A. Provide and install where shown on the drawings surface raceway complete with necessary boxes, fittings, closers and other appurtenances to make a complete raceway system. Material shall be surface mounted and run in a neat and orderly fashion being parallel or right angles to fixed walls, doors or other guiding lines of the building. Raceway by Wiremold, Mono Systems or approved equal and shall be

prime coated with manufacturer's standard ivory color.

## 2.07 RIGID NON-METALLIC CONDUIT

- A. Rigid non-metallic conduit may be used in the locations as follows:
  - 1. Direct burial underground installation.
  - 2. Encased or embedded in concrete.
  - 3. In corrosive environments that are called out on the drawings.
- B. Rigid non-metallic conduit shall NOT be used in the locations as follows:
  - 1. Where subject to mechanical hazards.
  - 2. Inside buildings.
  - 3. In hazardous locations.
- C. Rigid non-metallic conduit shall be a minimum of Schedule 40.
- D. Provide Schedule 80 non-metallic conduit under roads and other improved surfaces.
- E. Primer/cleaner shall be used for the gluing of all joints.

## 2.08 FASTENERS, SUPPORTS & HANGERS

- A. See Section ELECTRICAL SUPPORTING DEVICES in this specification.

## 2.09 ALUMINUM CONDUITS & FITTINGS

- A. Aluminum conduits and fittings shall not be used.

## 2.10 OUTLET BOXES

- A. Outlet boxes connected by thinwall conduit (EMT) shall be of the galvanized steel knockout type. Switch and receptacle boxes connected by rigid conduit shall be of the cast type with threaded hubs being part of the box. Each switch or gang of switches, light, power, outlet box in the interior of the building shall be equipped with an outlet box of the appropriate type unless installed in a wireway as shown on the plans.
- B. Boxes of the knockout type shall have plaster ring erected with rim flush with the finished wall where concealed. Boxes shall have the required dimensions to accommodate all conduit and wire entering same. Minimum depth shall be 1-1/2".
- C. Boxes for telephone and data shall be 4-11/16" x 2-1/8" deep unless shown otherwise.

## 2.11 JUNCTION & PULL BOXES

- A. Junction and pull boxes shall be furnished and installed wherever necessary for compliance with specifications; for convenience; for wire arrangement; or for conformance with the NEC. Junction and pull boxes shall be of code grade steel coated on the inside and outside to prevent oxidation, and size shall conform to the NEC standards or larger.

PART 3 - EXECUTION

3.01 PREPARATION MATERIALS & FITTINGS

- A. Cut conduit with hacksaw or approved pipe cutter, ream ends to remove burrs, sharp edges. Do not use running threads. The use of indenter type fittings will not be permitted anywhere in the project. Set screw type steel fittings shall be used with thinwall conduit in all dry locations. Use threaded, watertight fittings with all rigid, heavy wall conduit and intermediate conduit.
- B. Conduits shall have locknuts and bushings where they enter boxes, fittings or cabinets except at threaded hubs. Install fiber type bushings on all conduit terminations larger than 1-1/4" in diameter. Thermoplastic type bushings may be used 1-1/4" and smaller sizes. Provide grounding bushing where required.
- C. Flexible metal conduit and fittings shall be used for flexible connections to motors (36" maximum) and recessed lighting fixtures (48" maximum). Use sealtight conduit in wet locations where flexible conduits are required (3 ft. maximum).
- D. Fittings such as condulets shall be used on feeder conduits 1-1/2" and smaller. Junction and pull boxes shall be used on conduits 2" and above. No condulets shall be used in telephone or TV conduits.
- E. Provide moisture seals where temperature differences occur.

3.02 CONDUIT BENDS

- A. Bends shall be made with care to a radius shown in the NEC.

3.03 ABOVE GROUND INSTALLATION OF CONDUIT

- A. Install all conduits concealed unless indicated. No conduits shall be installed in or under roof insulation unless approved by the Engineer before installation. Do not expose conduit bends at floor or ceiling. Install conduit horizontal only where unavoidable, never diagonally.
- B. Install exposed conduit only after proposed runs have been checked on plans and at site for interference with work of other trades. Wherever possible, locate conduits above piping of other trades. Install exposed conduit in parallel rows neatly racked parallel or perpendicular to walls, ceilings and structural members; keep at least 3/4" from such surfaces.
- C. Locate conduits at least 12" from steam, hot water and other hot surfaces. Provide conduit expansion joints or fittings where conduit crosses building expansion joint, also in straight runs of conduit 200 ft. or longer, and shall be proper size with allowance for building expansion, contraction and settlement. Install approved watertight flashing in all conduit runs penetrating the membrane roof. Provide pipe sleeve curbs where conduits pass through interior floors.
- D. All above ground conduit shall be 1/2" or larger.
- E. All conduit for telecommunications shall be 1-1/4" or larger.

3.04 UNDERGROUND INSTALLATION OF CONDUIT

- A. All ferrous conduits coming in direct contact with the earth or sand bedding shall be coated with bitumastic #50 or similar material for the entire length of the run. Where conduits pass through outside and ground floor slabs, walls, such conduit entrance shall be grouted in and waterproofed inside and out with an approved caulking compound. Conduit in cinder fill shall be encased in a non-cinder concrete envelope at least 2" thick. Where waterproof membranes are installed below slabs, this Contractor shall use care in installing conduit and shall not puncture this membrane.
- B. In concrete construction, maintain a minimum of 3/4" cover over all conduit. Conduit shall be run parallel to the main reinforcement and maximum size in slabs shall be 1" conduit. Conduit in concrete or masonry shall be securely held in place during pouring and construction operations; provide template to hold groups of conduits terminating together, or passing through fire walls or floors. Install conduit with minimum number of joints; join with threaded couplings and fitting; make watertight with compound applied to male thread; make joints butted.
- C. Minimum cover requirements 0 - 600v; see NEC Tables.
- D. Install conduit for site lighting 6" from walks and 24" from curbs.
- E. All underground conduit shall be 1" or larger.
- F. PVC covered steel elbows shall be used in underground PVC runs.

### 3.05 CLEANING OF CONDUIT

- A. Clean conduits with wire brush or other approved means prior to pulling in conductors. Leave 16-gauge nylon pull cord in all empty conduits. Do not pull in conductors under the following conditions:
  - 1. Before conduit and outlet boxes are permanently secured in place.
  - 2. In concealed conduits located in plastered rooms, before brown scratch coat has been applied to walls/ceilings.
  - 3. In concrete floors before slab is poured.

### 3.06 INSTALLATION OF ELECTRICAL BOXES & FITTINGS

- A. Install electrical boxes and fittings as indicated, in accordance with manufacturer's written instructions and applicable requirements of NEC. Draw all locknuts and fittings up tight. Provide bushings.
- B. Where located in suspended ceilings, boxes shall be attached to steel bars of sufficient length to firmly anchor the box to the ceiling supporting members. All outlet boxes shall be rigidly secured in place. Where fixtures shall be used, the outlet boxes shall be equipped with fixture studs. Where boxes are in brick, tile or other masonry which will not be plastered, deep sectional boxes shall be used, and they shall be completely covered with the plates or fixtures. Electricians shall cooperate with the bricklayers so no ragged joints will be exposed.
- C. Surface-mounted boxes shall be fastened to walls by use of plastic anchors and machine screws. Boxes located in between joist construction shall be fastened to the joist by use of metal strut fastened to the joists if fixtures are to be hung from the box.
- D. Coordinate with other crafts to locate boxes and fittings as shown on the drawings. Provide weathertight boxes where shown marked W.P. Close all unused holes in all boxes. Provide access to all boxes and



avoid back-to-back in walls. No aluminum boxes or fittings will be used in concrete. Set boxes plumb and flush with the finished wall where recessed.

- E. Ground all boxes in line with National Electrical Code.

### 3.07 ALIGNMENT & LOCATION OF OUTLETS

- A. The below dimensions are given to assist the Contractor in estimating. The exact location shall be obtained from the Engineer at the time of installation or as shown on the drawings (consult architectural drawings). All measurements shall be taken from the Architect's general construction drawings. Mounting heights of equipment shall be as tabulated below:

1. Wall switches	42" or as noted
2. Thermostats	42" or as noted
3. Convenience receptacles - general wall type	1'6" or as noted
4. Panels	5'0"
5. Telephone/data	1'6" or as noted
6. Pushbutton station	5'0"
7. Disconnect switches	5'0"
8. Outdoor receptacles	4'0" or as noted
9. Motor starter	5'0"
10. Fire alarm stations	42"
11. Fire alarm horns/strobes	90" or as noted

- B. Heights are given from center of outlet or box to finished floor except as noted.
- C. Electrical Contractor to review mechanical and architectural drawings and notify Architect/Engineer where conflicts exist prior to starting work in any given area.
- D. Devices on opposite sides of fire-rated walls shall be spaced accordingly to conform to all applicable codes and maintain fire rating of wall.

END OF SECTION

SECTION 26 05 36 - CABLE TRAYS FOR ELECTRICAL SYSTEMS

## PART 1 - GENERAL

## 1.01 SUMMARY

- A. Except as otherwise indicated, provide metal cable trays of types, classes and sizes indicated with splice hangers and all other necessary accessories. Provide cable trays with rounded edges and smooth surfaces in compliance with applicable standards, and with the following additional construction features.

## PART 2 - PRODUCTS

## 2.01 MATERIALS

- A. Provide a center-hang cable tray system with all the appurtenances necessary for a complete installation.
- B. The cable tray system shall be a continuous, welded-steel, wire-mesh cable management system with safety edges.
- C. Submit shop drawings to the Engineer for review.
- D. Cable tray 12"W x 4" as shown on the drawing.
- E. Install and support tray in accordance with span load criteria of tray manufacturer.
- F. Provide all necessary splices, expansion joints, straight connectors, bends, and fittings.
- G. Cable tray by Mono-Systems, Inc., or equal.
- H. Expansion splices shall allow for 1" of thermal expansion and contraction for every 100' of tray.
- I. Provide cable dropouts at all technology closets and electrical service points.
- J. Some of the known manufacturers are, but not limited to:
  - 1. Cablofil, Betterman
- K. Contractor shall not exceed fill rates of cable tray. Additional cable tray and/or hooks may be required.
- L. Contractor with approval from Engineer may field route cable tray to Contractor's and Owner's advantage.
- M. Contractor shall install the number of feet of cable tray as shown on the drawings. The tray may be rerouted or moved to different areas in the field. Cable tray shall be the last system installed before the ceiling. Coordinate with other trades.
- N. Cables installed in tray shall be bundled by data/fire/controls/other. No power wiring shall be run in cable tray.

## PART 3 - EXECUTION

## 3.01 INSTALLATION

- A. Install all cable trays as indicated on the drawings in line with the NEC and the manufacturer's installation instructions.

END OF SECTION

SECTION 26 05 53 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

## PART 1 - GENERAL

## 1.01 SUMMARY

- A. The Conditions of the Contract and the Provisions of Division 01 apply to all work of this Section.
- B. This Section includes all labor, materials, equipment and services necessary to furnish and install electrical identification where shown or indicated on the drawings and as specified herein.
- C. Electrical identification shall be provided for buried cables, electrical power, control and communication conductors, phase relationships, nameplates, signs.
- D. Samples shall be submitted upon request by the Engineer.

## 1.02 SUBMITTALS

- A. Shop Drawings shall be submitted for approval for equipment as follows:
  - 1. Index of identification labels.
  - 2. Index of nameplates.
- B. Samples of each type of proposed label and/or signs shall be submitted for examination/approval as requested.
- C. Record Drawings - The Contractor shall keep layout plans on the job site, marking all changes made during installation. A set of as-built/record drawings shall be submitted.

## PART 2 - PRODUCTS

## 2.01 MATERIALS

- A. Wire coding shall be insulation colors, painting, taping or precolored manufactured permanent plastic colors.
- B. Branch, feeder and service colors 600 volts and below shall be:
 

<u>Color</u>	<u>Phase</u>
Black	A or 1
Red	B or 2
Blue	C or 3 (where applicable)
White	Neutral
Green	Equipment Ground
- C. Underground plastic tape shall be a minimum of 6" wide and shall be red in color with "Danger: Electrical Cables Buried Beneath" or a standard manufacturer's logo. Tape shall have an embedded continuous metallic strip or core.
- D. Plastic Tags. Manufactured, preprinted, accident prevention and operational tags. Approximately 3x5. Fasten with ty wraps or other nonconductive ties.

- E. Engraved plastic laminate, black face and white letters punched for mechanical fasteners.

### PART 3 - EXECUTION

#### 3.01 NAMEPLATES - PLASTIC LAMINATE

- A. This Contractor shall furnish and install nameplates as herein specified. All nameplates shall be black-white-black laminated 1/8" plastic plates. Letters or numbers shall be cut through the black and into the white of the plate. Inscriptions shall be symmetrical about the centerlines of plates and the plates shall be attached to surface with self-tapping screws.
  - 1. This identification shall indicate main switches, feeder number where feeder serves a number of branch circuit panelboards, or special equipment where this equipment operates from a separate feeder, disconnects and control equipment.
  - 2. All branch circuit panelboards shall be identified as to letter designated on the drawings. Plastic plates as described in the above paragraph shall be used for this purpose and shall be attached to the inside of panelboard trim.
  - 3. Each branch circuit panelboard cabinet shall be furnished with a clear plastic covered, typed circuit schedule mounted in a metal card holder. Each protective device shall be numbered consecutively at the device.
  - 4. All disconnect switches, devices and controls for motors and equipment shall be identified with plastic plates as specified in the first paragraph.
  - 5. Equipment and controls, where remotely located from each other, shall have included in the identification the final room number and unit number of the associated equipment and/or controls. Final room numbers will be furnished by the Owner. Equipment numbers should correspond to numbers for associated equipment.

#### 3.02 IDENTIFICATION

- A. Primary feeders shall be identified at all terminals, junction points, vaults and splices by means of stamped brass or lead tags attached by woven glass or nylon cord. The tags shall be approximately 1-1/2" in diameter and shall have 1/4" high lettering, tags shall read feeder number. Phases shall not be marked on tags. Each single conductor cable in each manhole shall be tagged at least twice. Tagging shall be completed before feeder is energized.
- B. Existing tags shall be removed from existing cable when they are no longer correct.

#### 3.03 UNDERGROUND PLASTIC TAPE

- A. During backfilling of each exterior underground electrical, signal or communication cable, install continuous underground-type plastic line marker located directly over buried line at 12" above the cables. Where multiple small lines are buried in a common trench and do not exceed an overall width of 18", install a single tape.

END OF SECTION

SECTION 26 24 13 - SWITCHBOARDS

## PART 1 - GENERAL

## 1.01 SCOPE

- A. This Section includes the furnishing and installation of all labor, materials, tools, appliances, hardware, junction boxes, and ancillary equipment for and incidental to the delivery, installation, and furnishing of a completely operational switchboard as shown, required, and specified herein.

## 1.02 SUBMITTALS

- A. Shop drawings shall be submitted for approval for:
1. Service and distribution switchboards rated 600V and less. Include the following:
    - a. Include dimensioned plans, elevations, sections, and details, including required clearances and service space around equipment. Show tabulations of installed devices, equipment features, and ratings.
    - b. Provide detail of enclosure types for types other than NEMA 250, Type 1.
    - c. Provide detail of bus configuration, current, and voltage ratings.
    - d. Provide detail of short-circuit current rating of switchboards and overcurrent protective devices.
    - e. Include descriptive documentation of optional barriers specified for electrical insulation and isolation.
    - f. If service entrance equipment, provide detail of utility company's metering provisions with indication of approval by utility company.
  2. Disconnecting and overcurrent protective devices.
    - a. Provide detail of short-circuit current rating of switchboards and overcurrent protective devices.
    - b. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
    - c. Include time-current coordination curves for each type and rating of overcurrent protective device included in switchboards. Include selectable ranges for each type of overcurrent protective device.
  3. Control power.
    - a. Include schematic and wiring diagrams for power, signal, and control wiring.

- B. Operation and Maintenance Data: For switchboards and components to include in emergency, operation, maintenance and warranty data manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:
1. Routine maintenance requirements for switchboards and all installed components.
  2. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.
  3. Time-current coordination curves for each type and rating of overcurrent protective device included in switchboards. Include selectable ranges for each type of overcurrent protective device.

#### 1.03 QUALITY ASSURANCE

- A. The equipment manufacturer shall be regularly engaged in manufacture of power distribution switchboards, of the types and capacities required, and whose products have been in satisfactory use in similar service for not less than 25 years.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70 by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Source Limitations: Obtain switchboards, overcurrent protective devices, components, and accessories from single source from single manufacturer.

#### 1.04 MAINTENANCE

- A. Switchboard manufacturer/vendor shall:
1. Make ordering of new equipment for expansions, replacements, and spare parts available to end user.
  2. Make new replacement parts available for minimum of ten years from date of manufacture.
  3. Provide factory direct technical support hotline 24 hours per day, 7 days per week.
  4. Provide on-site service support within 24 hours anywhere in continental United States.
  5. Offer renewable service contract on yearly basis, to include parts, factory labor, and annual training visits. Make service contracts available up to ten years after date of system commissioning.

### PART 2 - PRODUCTS

#### 2.01 GENERAL INFORMATION

- A. All electrical equipment and material shall be new and bear a recognized testing laboratory's label, where applicable. The type of equipment and/or material shall be designated by the location where it will be installed and so defined by NEMA/NFPA 70 standards.

#### 2.02 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide switchboards by one of the following:
1. Eaton Electrical, Inc.; Cutler-Hammer Business Unit
  2. General Electric Company; GE Consumer & Industrial - Electrical Distribution
  3. Square D; a brand of Schneider Electric

## 2.03 SWITCHBOARD CONSTRUCTION &amp; RATINGS

- A. See drawings for voltage, current, and AIC ratings.
- B. Front-Connected, Front-Accessible ONLY Switchboards:
  - 1. Main Devices: Panel mounted.
  - 2. Branch Devices: Panel mounted.
  - 3. Sections front and rear aligned.
- C. Indoor Enclosures: Steel, NEMA 250, Type 1.
  - 1. Enclosure Finish for Indoor Units: Factory-applied finish in manufacturer's standard gray finish over a rust-inhibiting primer on treated metal surface.
- D. Customer Metering Compartment: A separate customer metering compartment and section with front hinged door, for indicated metering, and current transformers for each meter. Current transformer secondary wiring shall be terminated on shorting-type terminal blocks. Include potential transformers having primary and secondary fuses with disconnecting means and secondary wiring terminated on terminal blocks.
- E. Bus Transition and Incoming Pull Sections as required for underground supply: Matched and aligned with basic switchboard.
- F. Hinged Front Panels: Allow access to circuit breaker, metering, accessory, and blank compartments.
- G. Buses and Connections: Three phase, four wire unless otherwise indicated.
  - 1. Phase- and Neutral-Bus Material: Hard-drawn copper of 98% conductivity.
  - 2. Load Terminals: Insulated, rigidly braced, runback bus extensions, of same material as through buses, equipped with mechanical connectors for outgoing circuit conductors. Provide load terminals for future circuit-breaker positions at full-ampere rating of circuit-breaker position.
  - 3. Ground Bus: UL 891, hard-drawn copper of 98% conductivity, equipped with mechanical connectors for feeder and branch-circuit ground conductors. For busway feeders, extend insulated equipment grounding cable to busway ground connection and support cable at intervals in vertical run.
  - 4. Main Phase Buses and Equipment Ground Buses: Uniform capacity for entire length of switchboard's main and distribution sections. Provide for future extensions from both ends.
  - 5. Neutral Buses: 100% of the ampacity of phase buses unless otherwise indicated, equipped with mechanical connectors for outgoing circuit neutral cables. Brace bus extensions for busway feeder neutral bus.
- H. Future Devices: Equip compartments with mounting brackets, supports, bus connections, and appurtenances at full rating of circuit-breaker compartment.

2.04 DISCONNECTING & OVERCURRENT PROTECTIVE DEVICES

- A. Molded-Case Circuit Breaker (MCCB): Comply with UL 489, with interrupting capacity to meet available fault currents.
1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250A and larger.
  2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
  3. Electronic trip circuit breakers with rms sensing; field-replaceable rating plug or field-replaceable electronic trip; and the following field-adjustable settings:
    - a. Instantaneous trip.
    - b. Long- and short-time pickup levels.
    - c. Long- and short-time time adjustments.
    - d. Ground-fault pickup level, time delay, and  $I^2t$  response.
  4. Current-Limiting Circuit Breakers: Frame sizes 400A and smaller; let-through ratings less than NEMA FU 1, RK-5.
  5. Integrally Fused Circuit Breakers: Thermal-magnetic trip element with integral limiter-style fuse listed for use with circuit breaker; trip activation on fuse opening or on opening of fuse compartment door.
  6. Molded-Case Circuit-Breaker (MCCB) Features and Accessories:
    - a. Standard frame sizes, trip ratings, and number of poles.
    - b. Lugs: Compression style, suitable for number, size, trip ratings, and conductor material.
    - c. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge (HID) lighting circuits.
    - d. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.
    - e. Zone-Selective Interlocking: Integral with electronic trip unit; for interlocking ground-fault protection function.
    - f. Communication Capability: Circuit-breaker-mounted communication module with functions and features compatible with power monitoring and control system specified in Division 26 Section "Electrical Power Monitoring and Control."
    - g. Shunt Trip: 120V trip coil energized from separate circuit, set to trip at 55% of rated voltage.



- h. Under-voltage monitor with contact for monitoring by Building Automation System.
  - I. Auxiliary Contacts: One SPDT switch with "a" and "b" contacts; "a" contacts mimic circuit-breaker contacts, "b" contacts operate in reverse of circuit-breaker contacts.
  - j. Key Interlock Kit: Externally mounted to prohibit circuit-breaker operation; key shall be removable only when circuit breaker is in off position.
- B. Insulated-Case Circuit Breaker (ICCB): 80% rated, sealed, insulated-case power circuit breaker with interrupting capacity rating to meet available fault current.
- 1. Fixed circuit-breaker mounting.
  - 2. Two-step, stored-energy closing.
  - 3. Full function, microprocessor-based trip units with interchangeable rating plug, trip indicators, and the following field-adjustable settings:
    - a. Instantaneous trip.
    - b. Long- and short-time time adjustments.
    - c. Ground-fault pickup level, time delay, and  $I^2t$  response.
  - 4. Zone-Selective Interlocking: Integral with electronic trip unit for interlocking ground-fault protection function.
  - 5. Remote trip indication and control.
  - 6. Communication Capability: Integral communication module with functions and features compatible with power monitoring and control system specified in Division 26 Section "Electrical Power Monitoring and Control."
  - 7. Key Interlock Kit: Externally mounted to prohibit circuit-breaker operation; key shall be removable only when circuit breaker is in off position.
- C. Auxiliary Switches: Factory installed, single pole, double throw, with leads connected to terminal block, and including one set more than quantity required for functional performance indicated.

## 2.05 INSTRUMENTATION (Provide where shown on drawing or called out.)

- A. Instrument Transformers: IEEE C57.13, NEMA EI 21.1, and the following:
- 1. Current Transformers for Neutral and Ground-Fault Current Sensing: Connect secondary wiring to ground overcurrent relays, via shorting terminals, to provide selective tripping of main and tie circuit breaker. Coordinate with feeder circuit-breaker, ground-fault protection.
- B. Multifunction Digital-Metering Monitor: Microprocessor-based unit suitable for three- or four-wire systems and with the following features:
- 1. Switch-selectable digital display of the following values with maximum accuracy tolerances as indicated:

- a. Phase Currents, Each Phase:  $\pm 1\%$
  - b. Phase-to-Phase Voltages, Three Phase:  $\pm 1\%$
  - c. Phase-to-Neutral Voltages, Three Phase:  $\pm 1\%$
  - d. Megawatts:  $\pm 2\%$
  - e. Megavars:  $\pm 2\%$
  - f. Power Factor:  $\pm 2\%$
  - g. Frequency:  $\pm 0.5\%$
  - h. Accumulated Energy, Megawatt Hours:  $\pm 2\%$ ; accumulated values unaffected by power outages up to 72 hours
  - i. Megawatt Demand:  $\pm 2\%$ ; demand interval programmable from 5 to 60 minutes
  - j. Contact devices to operate remote impulse-totalizing demand meter.
  - k. Provide ethernet data connection.
2. Mounting: Display and control unit flush or semi-flush mounted in instrument compartment door.
  3. Connect to data port in room.

## 2.06 ACCESSORY COMPONENTS & FEATURES

- A. Accessory Set: Include tools and miscellaneous items required for overcurrent protective device test, inspection, maintenance, and operation.

## 2.07 IDENTIFICATION

- A. Service Equipment Label: NRTL labeled for use as service equipment for switchboards with one or more service disconnecting and overcurrent protective devices.

# PART 3 - EXECUTION

## 3.01 GENERAL INSTALLATION

- A. Provide all equipment, wiring, conduit, and junction boxes required for the installation of a complete and operating system in accordance with applicable local, state, and national codes, the manufacturer's recommendations, these plans and specifications.

## 3.02 INSTALLATION OF SWITCHBOARDS

- A. Install switchboards and accessories according to NEMA PB 2.1.
- B. Equipment Mounting: Install switchboards on concrete base, 4" (100 mm) nominal thickness. Comply with requirements for concrete base specified in Division 03 Section "Cast-in-Place Concrete."
  1. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18" (450 mm) centers around the full perimeter of concrete base.
  2. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.

3. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
4. Install anchor bolts to elevations required for proper attachment to switchboards.
- C. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from switchboard units and components.
- D. Operating Instructions: Frame and mount the printed basic operating instructions for switchboards, including control and key interlocking sequences and emergency procedures. Fabricate frame of metal and cover instructions with clear acrylic plastic. Mount on front of switchboards.
- E. Install filler plates in unused spaces of panel-mounted sections.
- F. Install overcurrent protective devices, transient voltage suppression devices, and instrumentation.
  1. Set field-adjustable switches and circuit-breaker trip ranges.

### 3.03 IDENTIFICATION

- A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."
- B. Switchboard Nameplates: Label each switchboard compartment with a nameplate complying with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."
- C. Device Nameplates: Label each disconnecting and overcurrent protective device and each meter and control device mounted in compartment doors with a nameplate complying with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."

### 3.04 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
  1. Manufacturer's Field Service: Engage a factory-authorized service representative too inspect components, assemblies, and equipment installation, including connections, and to assist in testing.
- B. Acceptance Testing Preparation:
  1. Test insulation resistance for each switchboard bus, component, connecting supply, feeder, and control circuit.
  2. Test continuity of each circuit.
- C. Tests and Inspections:
  1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
  2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance;

otherwise, replace with new units and retest.

3. Perform the following infrared scan tests and inspections and prepare reports:
    - a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each switchboard. Remove front and rear panels so joints and connections are accessible to portable scanner.
    - b. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each switchboard 11 months after date of Substantial Completion.
    - c. Instruments and Equipment:
      - 1) Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
  4. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Switchboard will be considered defective if it does not pass tests and inspections.
- E. Prepare test and inspection reports, including a certified report that identifies switchboards included and that describes scanning results. Include notation of deficiencies detected, remedial action taken and observations after remedial action.

### 3.07 ADJUSTING

- A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.
- B. Set field-adjustable circuit-breaker trip ranges as specified in Division 26 Section "Overcurrent Protective Device Coordination Study."

### 3.08 PROTECTION

- A. Temporary Heating: Apply temporary heat, to maintain temperature according to manufacturer's written instructions, until switchboard is ready to be energized and placed into service.

### 3.09 DEMONSTRATION

- A. Train Owner's maintenance personnel to adjust, operate, and maintains switchboards, overcurrent protective devices, instrumentation, and accessories, and to use and reprogram microprocessor-based trip, monitoring, and communication units.

### 3.10 DELIVERY, STORAGE & HANDLING

- A. Deliver switchboards in sections or lengths that can be moved past obstructions in delivery path.

### 3.11 PROJECT CONDITIONS

A. Environmental Limitations:

1. Do not deliver or install switchboards until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above switchboards is complete, and temporary HVAC system is operating and maintain ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
2. Rate equipment for continuous operation under the following conditions unless otherwise indicated:
  - a. Ambient Temperature: Not Exceeding 104°F (40°C).
  - b. Altitude: Not exceeding 6600 feet (2000 m).

## 3.12 COORDINATION

- A. Coordinate layout and installation of switchboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

## 3.13 WARRANTY

- A. When warranties are required, verify with Owner's counsel that special warranties stated in this article are not less than remedies available to Owner under prevailing local laws.
- B. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace transient voltage suppression devices that fail in materials or workmanship within specified warranty period.
- C. Warranty Period: Five years from date of Substantial Completion.

END OF SECTION

SECTION 26 24 16 - PANELBOARDS

## PART 1 - GENERAL

## 1.01 SUMMARY

- A. The Conditions of the Contract and the Provisions of Division 01 apply to all work of this Section.
- B. Furnish and install where indicated on the drawings, circuit breaker panelboards in accordance with the following specifications and schedule indicated on the drawings.
- C. Panelboards shall be for power distribution, lighting and appliances as shown on the panelboard schedule. All breakers, spaces, cable connections, box, front and special modifications shall be furnished and connected to make a complete distribution system.
- D. Manufacturers must have built panelboard products of size, type and rating required for a minimum of 5 years. Panels must be UL listed and labeled.

## PART 2 - PRODUCTS

## 2.01 PANELBOARDS

- A. Panelboards shall be circuit breaker panelboards of the double row type and shall be built in strict accordance with the requirements of NEC for panels of this class. The panels shall have main breakers or main lugs with solid neutral for service as shown on panel schedule and be equipped with circuit breakers of the bolted type, style and capacity as listed in the schedule. The panels shall also have spare space for future additions as listed in the schedule. Buss shall be tin-plated AL. Minimum breaker rating 10,000 amps I.C. for 240VAC and 14,000 for 480VAC. See Panel Schedule for other ratings.
- B. Provide SPD in panelboards where shown, see Specification Section SPD. When panel cover is closed, SPD shall not be accessible. See drawings.

## 2.02 CABINETS

- A. The panelboard cabinets shall be constructed of code gauge galvanized steel and of sufficient dimensions to accommodate all connections and in no case smaller than will provide 4" side gutters. The cabinets shall be arranged for flush mounting, or surface mounting, as indicated in the panelboard schedule or shown on the drawings and be complete with card holders, director cards and celluloid protectors on back of flush-mounting doors. All circuits shall be clearly typewritten. The flush-mounting door shall have flush lock and door, and all cabinets of the same type shall be keyed to the same key. Provide ground bar. Cabinets located next to each other shall be of the same size.
- B. Door trim shall be installed by flat oval head screws, into tapped holes in rough-in box flanges. Contractor to drill flanges on job site to ensure plumb, square and true appearance. NQOD/NLAB boxes shall be 20" wide and 5-3/4" deep. Provide full length piano-type hinges.

## 2.03 MANUFACTURERS

- A. Some of the known manufacturers are, but not limited to, as follows: Cutler-Hammer; General Electric

Company; Siemens; Square D Company; or approved equal.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Installation shall comply with NEC.
- B. Provide 1/2" air space behind panels surface mounted to concrete wall construction by use of iron spacers. Securely fasten spacers and panels together.
- C. All lugs, terminals and screws shall be tightened in accordance with manufacturer's torquing requirements.
- D. Provide typewritten circuit directory. Provide Owner with an additional photocopy of all directories. Typewritten directory shall have room numbers of areas served listed. Room numbers shall be obtained from the Owner based upon final room numbering of the building. Plan room numbers shall not be acceptable.
- E. Ground panels and conduits with grounding bushings, jumper, bonding lugs and grounding conductor as approved by NEC or as shown on the drawings.
- F. Provide dead front and close all unused openings.
- G. Label busses by phases and cabinet by letter or number as shown on panel schedule.
- H. Replace any breakers that are faulty.
- I. Provide a 1" conduit stub above the ceiling for every 3 spares and/or spaces in all panels recessed in walls (minimum of 2).
- J. Provide replacement typewritten circuit directories for all existing panels that had circuits changed. Contractor shall provide Owner with photocopies of original and replacement directories. Typewritten directory shall have room numbers of areas served listed. Room numbers shall be obtained from the Owner based upon final room numbering of the building. Plan room numbers shall not be acceptable.
- K. Contractor shall identify the panelboard ID and power origin on each panelboard on the inside of the door.

END OF SECTION

SECTION 26 27 26 - WIRING DEVICES

## PART 1 - GENERAL

## 1.01 SUMMARY

- A. The Conditions of the Contract and the Provisions of Division 01 apply to all work of this Section.
- B. This Section includes all labor, materials, equipment and services necessary to furnish and install wiring devices where shown or indicated on the drawings and as specified herein.
- C. Typical wiring devices are:
  - 1. Receptacles
  - 2. Ground-fault circuit interrupters
  - 3. Switches
  - 4. Wallplates
- D. Colors shall be:
  - 1. Devices - White (Note: must be approved by Architect at shop drawing); provide Red where emergency power
  - 2. Plates - Stainless Steel
- E. Contractor is responsible for matching color of all wiring devices, lighting controls, low voltage and technology.

## PART 2 - PRODUCTS

## 2.01 MANUFACTURERS

- A. Some of the known manufacturers are, but not limited to, as follows: Cooper; Hubbell, Inc.; Leviton Mfg. Co.; Pass and Seymour, Inc.

## 2.02 WALL PLATES

- A. Wall plates shall be stainless steel switch or receptacle plates for indoor use in finished spaces. Configuration to fit the device. Type 430 in non-corrosive locations and Type 302 in corrosive locations (labs).
- A. Wall plates shall be high-performance unbreakable nylon construction for switches and receptacles for indoor use in finished spaces. Configuration to fit the device.

## 2.03 SWITCHES

- A. Switches

Single pole	Cooper 2221
3-way	Cooper 2223



- 4-way Cooper 2224
- B. Rated 120/277V, 20 amp.

#### 2.04 RECEPTACLES

- A. 120V, 15 amp, single phase duplex grounded type - Cooper 5262V.
- B. 120V, 20 amp, single phase duplex grounded type - Cooper 5362V.
- C. GFI - Cooper XGF20V - 20 amp proper rectangular plate. Install where required by code.
- D. Outdoor convenience outlets shall be GFI receptacle as per Receptacles above with Cooper WLRD-1 weatherproof plate for damp locations. Provide Cooper 4966 or equal for wet locations.
- E. Corridor Receptacles (Hospital Grade) - 120V, 20A, single-phase duplex grounding type; Cooper # 8300GY.

#### 2.05 GROUND FAULT PROTECTION

- A. Ground fault protection shall be provided in line with the NEC for construction sites.

### PART 3 - EXECUTION

#### 3.01 GENERAL

- A. Switches shown ganged on drawings shall be installed under one plate, having the number of openings required. Sectional plates shall not be used to make up the required number of gangs. All plates for block or brick walls shall be jumbo size. All plates in one room or space shall be of the same size (i.e., jumbo or standard).
- B. Surface or flush mounted outlet boxes shown in the working areas shall be appropriate steel or cast plates, galvanized or cadmium plated as required to fit the box and the device located in the box.
- C. Coordinate with others such as block work, painting, etc., to interface the wiring devices with other work.
- D. Install wiring devices after wiring has been pulled.
- E. Install wall plates after painting has been completed.
- F. Ground all devices in line with National Electrical Code.
- G. After installation, test the devices for opens, shorts, grounds, improper circuit connectors, and polarity.
- H. All devices shall be marked on the back of the plate in permanent marker and on the front of the plate in "Kroy" tape or similar with the panel and circuit designation.

END OF SECTION

SECTION 26 28 13 - FUSES

## PART 1 - GENERAL

## 1.01 SUMMARY

- A. Fuses
- B. See Equipment Schedule and Switchboard Schedules on drawings.

## PART 2 - PRODUCTS

## 2.01 MANUFACTURERS

- A. Fuses in switchboard, 600 amperes and larger:
  - 1. Bussman Class L, Limitron KTU (or Hi Cap KRP-C)
  - 2. Ferraz Shawmut Class L, Amp Trap A4BY
  - 3. Littelfuse Class L, KLP-C
- B. Fuses for feeder circuits:
  - 1. Bussman Low Peak, LPN-RK (250V) or LPS-RK (600V)
  - 2. Ferraz Shawmut Amp-Trap II, A2D-R (250V) and A6D-R (600V)
  - 3. Littelfuse, Little Peak, LLN-RK (250V) or LLS-RK (600V)
- C. Fuses for motor circuits:
  - 1. Bussman Fusetron, FRN-R (250V), and FRS-R (600V)
  - 2. Ferraz Shawmut Trionic, TR-R (250V) and TRS-R (600V)
  - 3. Littelfuse Slo-Blo, FLN-RL (250V) or FLS-R (600V)
- D. Special application:
  - 1. For in-line fuses and weatherproof assembly, provide Bussman Tron Type HEB fuse holder and Type KTK fuse with 1A0513 boot or equal.
  - 2. For protection of control circuit transformers, provide Bussman Type FNQ time delay fuses or equal.

## 2.02 MATERIALS

- A. All fuses shall be of the same manufacturer.
- B. Fuses in main switchboard, 601 amperes and larger:
  - 1. UL, Class L current limiting, 600V with interrupting ratings of 200,000 amperes.
  - 2. Fuse links to be pure silver or silver plated copper construction.
- C. Fuses for feeder circuits, 600 amperes and less:
  - 1. UL, Class RKf1, current limiting time delay with interrupting ratings of 200,000 amperes.
  - 2. Shall also protect motor loads served from main switchboard.
  - 3. Shall be rejection type.
- D. Fuses for motor circuits, 600 amperes and less:

1. UL, Class RK5, time delay with interrupting ratings of 200,000 amperes.
2. Shall also serve remote fused disconnect switches.
3. Shall be rejection type.

E. Provide one set of spare fuses for each size and type of fuse represented on project.

#### PART 3 - EXECUTION

##### 3.01 INSTALLATION

- A. All fusible switches either separately mounted or panel mounted shall be equipped with fuses as specified herein.
- B. Provide label inside each switch and motor starter cover stating type of fuse required for replacement.
- C. Fuses shall not be installed until equipment is ready to be energized.

END OF SECTION

SECTION 26 28 16 - ENCLOSED SWITCHES & CIRCUIT BREAKERS

## PART 1 - GENERAL

## 1.01 SUMMARY

- A. The Conditions of the Contract and the Provisions of Division 01 apply to all work of this Section.
- B. This Section includes all labor, materials, equipment and services necessary to furnish and install circuit and motor disconnects where shown or indicated on the drawings and as specified herein.
- C. The Contractor shall be responsible for the complete installation of electrical wiring as specified hereinafter and shown on the electrical drawings.
- D. Types of circuit and motor disconnect switches in this Section include the following:
  - 1. Equipment disconnects.
  - 2. Appliance disconnects.
  - 3. Motor-circuit disconnects.
- E. Wires/cables, raceways, and electrical boxes and fittings required in connection with circuit and motor disconnect work are specified in other Division 16 Basic Electrical Materials and Methods sections.

## 1.02 QUALITY ASSURANCE

- A. Manufacturers: Firms regularly engaged in manufacture of circuit and motor disconnect switches of types and capacities required, whose products have been in satisfactory use in similar service for not less than 3 years.
- B. Installer's Qualifications: Firm with at least 3 years of successful installation experience with projects utilizing circuit and motor disconnect work similar to that required for this project.
- C. NEC Compliance: Comply with NEC requirements pertaining to construction installation of electrical circuit and motor disconnect devices.

## 1.03 SUBMITTALS

- A. Submit shop drawings of electrical circuit and motor disconnect switches showing accurately scaled switches, their layouts and proximity to associated equipment.

## 1.04 DISCONNECTS

- A. Disconnects shall be provided for all motors as required by code. Outlets for motors shall be located after the motor location has been determined.
- B. Disconnect switches shall be motor-rated switches, fused unless noted otherwise. Where a disconnect and starter are required or shown in one location, a combination switch and starter may be provided.
- C. All cabinet heaters, unit ventilators and roof exhaust fans shall have disconnects mounted within the unit

enclosures. Disconnects shall usually be provided by the supplier of this equipment (check mechanical specifications and equipment schedules).

- D. Motor disconnects shall have auxiliary pole for control circuit disconnect where required and shall have provision for locking off the switch.

#### 1.05 CIRCUIT DISCONNECTS (SAFETY SWITCHES)

- A. Furnish and install enclosed safety switches where shown on the drawings or otherwise required by Code. Safety switches shall be equipped with low peak or equal and approved type delay fuses of proper current capacity and voltage. Switches shall be Type HD. Type GD shall not be allowed.

#### 1.06 FUSES

- A. Fuses shall be furnished in ratings suitable for the particular application. This rating shall be such as to give protection to cable, motors or other equipment which the fuses are protecting. Disconnects shall be provided with time delay fuses or equal type or as recommended by the equipment manufacturer. Other fuses shall be as specified. Contractor shall field verify all nameplate ratings of equipment installed and provide proper sized fuses.

### PART 2 - PRODUCTS

#### 2.01 EQUIPMENT

- A. All disconnects shall be UL listed and labeled for 250V or 600V as the case may be.

#### 2.02 DISCONNECT SWITCHES

- A. Heavy-Duty Safety Switches: Provide surface-mounted, heavy-duty type, sheet-steel enclosed safety switches of types, sizes, and electrical characteristics indicated; fusible type, rated 600V, 60 Hz, 3 blades, 4 poles, solid neutral; and incorporating quick-make, quick-break type switches; construct so that switch blades are visible in OFF position with door open. Equip with operating handle which is integral part of enclosure base and whose operating position is easily recognizable, and is padlockable in OFF position; construct current carrying parts of high-conductivity copper, with silver-tungsten type switch contacts, and positive pressure type reinforced fuse clips. Provide NEMA Type enclosures as called out. Provide a minimum of NEMA 3R outdoors.

#### 2.03 MANUFACTURERS

- A. Some of the known manufacturers are, but not limited to, as follows: Cutler-Hammer, Inc.; Bussmann; General Electric Co.; Siemens; Square D Company; or approved equal.
- B. See motor and equipment schedules for equipment to be supplied and installed by the Electrical Contractor.

### PART 3 - EXECUTION

#### 3.01 INSTALLATION

- A. Coordinate the location of control and disconnects with others to best use the available space and provide clearances for electrical gear as required by National Electrical Code.
- B. Install disconnect switches for use with motor-driven equipment within sight of the motor and the controller location.
- C. Ground all motor control and disconnects to provide the necessary electrical safety required by NEC.
- D. Install all fuses of the proper size. Verify all nameplate ratings.

### 3.02 FIELD QUALITY CONTROL

- A. Subsequent to completion of installation of electrical disconnect switches, energize circuitry and demonstrate capability and compliance with requirements. Where possible, correct malfunctioning units at project site, then retest to demonstrate compliance; otherwise remove and replace with new units and retest.

END OF SECTION

SECTION 26 29 13 - ENCLOSED CONTROLLERS (MOTOR STARTERS)

## PART 1 - GENERAL

## 1.01 SUMMARY

- A. The Conditions of the Contract and the Provisions of Division 01 apply to all work of this Section.
- B. This Section includes all labor, materials, equipment and services necessary to furnish and install motor starters and control devices where shown or indicated on the drawings and as specified herein.
- C. All controls of a similar type for motors shall be of the same manufacturer, except where a specialty control is required, the controls may be of other manufacture.
- D. All overload heaters shall be sized to suit the motor nameplate current. Three-phase motors shall have three overload devices. Check and record motor current to insure that motor is not overloaded. Submit list of all motor currents and overload relay settings to the Engineer.
- E. Equipment for control of motors shall be located in such a manner as to be accessible and so as to most effectively serve motor. Disconnects shall be provided for all motors where required by code. Outlets for motors shall be located after the motor location has been determined.
- F. Contactors in magnetic starters shall have N.O. interlock for the holding circuit, under voltage protection and provisions for adding two additional interlocks. Overload relays shall be manual reset unless noted otherwise. Remote pushbuttons, controls and starters in finished spaces shall be flush mounted unless otherwise noted. Check with Engineer in case of questions. All starters controlled by automatic devices shall have "Hand-Off-Automatic" switch supplied and connected. All pilot lights shall be long life type. Control circuits shall be separately fused. Provide one pole for each ungrounded conductor.
- G. All cabinet heaters, unit ventilators and roof exhaust fans shall have disconnects mounted within the unit enclosures. Disconnects shall usually be provided by the supplier of this equipment. (Check mechanical specifications and equipment schedules.)
- H. All the special controls, such as unit heater thermostats and aquastats, E-P relays, P-E switches, float switches, ventilating unit control, etc., will be furnished by and installed by the Mechanical Contractor.
- I. Submit shop drawings on all motor starters and control equipment.
- J. All motor starters shall be UL listed and labeled.

## PART 2 - PRODUCTS

## 2.01 MATERIALS

- A. Across the line or reduced voltage start with number of poles and size as shown on the drawings. Enclosures shall be as called out as NEMA type. Coil voltage shall be 120V. (CONTRACTOR NOTE: Where motors operate on 208, 240 or 480 volts, the Contractor shall provide a step down control transformer complete with fuse and shall provide an oversized enclosure to accommodate the control transformer.) Overload protective device shall be resettable. Manual motor starters shall have overload

- and enclosure as called out.
- B. Manufacturers are Allen Bradley, Sq. D, GE, Cutler Hammer or approved equal.
  - C. Fractional horsepower motors shall have fractional horsepower manual starting switch units complete with overload elements and pilot light. For flush units, furnish satin finish stainless steel plates. For surface units, furnish the proper plate.
  - D. All motors 5 HP and over shall have electronic soft starts to limit motor torque upon starting. Square Altistart or equal by GE, Cutler Hammer.
  - E. Contractor shall size starters according to NEC tables. Overloads shall be sized at motor name plate rating.

### PART 3 - EXECUTION

#### 3.01 INSTALLATION

- A. Mount where control will be accessible. Provide overloads in line with motor ampere rating. Ground motors with separate grounding conductors in line with Sections 430 and 250 of NEC.
- B. Install disconnect switches for use with motor-driven equipment within sight of the motor and the controller location.
- C. Ground all motor control and disconnects to provide the necessary electrical safety required by NEC.
- D. Install all overload heaters and fuses of the proper size.
- E. Install controls for motors as shown on motor schedule and plans. (Electrician to provide and install all disconnects, starters and overloads where called for.) Disconnects shall be motor horsepower rated.
- F. Provide and install all conduit, boxes and wire necessary shown on the electrical drawings. All line voltage control wiring shall be #12 THWN stranded or as shown. See "Equipment Schedule" for exact details of necessary control wiring for each unit.

END OF SECTION



SECTION 26 51 00 - LIGHTING

## PART 1 - GENERAL

## 1.01 SCOPE OF WORK

- A. The Conditions of the Contract and the Provisions of Division 01 apply to all work of this Section.
- B. This Section includes all labor, material, equipment and services necessary to furnish and install all lighting as shown on the drawings and specified herein.

## 1.02 SUMMARY

- A. Systems included:

Interior & Exterior Lighting	Lamps & Ballasts
Emergency Lighting	Lighting Controls
Exit Lights	Lighting - Misc.
- B. Provide lighting fixtures of sizes, types and ratings indicated; complete with, but not limited to, housings, lamps, lamp holders, reflectors, energy-efficient ballasts, starters and wiring. Fixtures shall be factory assembled with parts required for a complete installation. Fixtures shall have concealed hinges and catches, with metal parts grounded as common unit and so constructed as to dampen ballast generated sounds.
- C. Wiring - Provide electrical wiring within fixture suitable for connecting to branch circuit wiring.
- D. Samples shall be supplied upon request from Engineer.

## 1.03 SUBMITTALS

- A. Shop Drawings - Submit fixture shop drawings in booklet form with separate sheet for each fixture, assembled in "luminaire type" with proposed fixture and accessories clearly indicated on each sheet.

## 1.04 DELIVERY, STORAGE &amp; HANDLING

- A. Handle lighting fixtures carefully to prevent damage, breaking and scoring. Do not install damaged fixtures or components; replace with new.
- B. Store lighting fixtures in clean, dry place. Protect from weather, dirt, fumes, water, construction debris and physical damage.

## 1.05 QUALITY ASSURANCE

- A. Manufacturers: Firms regularly engaged in manufacture of interior lighting fixtures, of types and ratings required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Installer's Qualifications: Firms with at least 3 years of successful installation experience on projects with interior lighting fixture work similar to that required for project.
- C. Codes and Standards:
  - 1. UL Compliance: Comply with UL standards pertaining to interior lighting fixtures. Provide

interior lighting fixtures and components which are UL listed and labeled.

2. CBM Labels: Provide fluorescent lamp ballasts which comply with Certified Ballast Manufacturers' Association standards and carry the CBM label.
3. Energy Code Compliance: Three lamp fluorescent fixtures, if installed within 10 ft. of each other shall have the single lamps of the two fixtures wired together on one 2 lamp ballast as per Minnesota Energy Code.

## PART 2 - PRODUCTS

### 2.01 FIXTURE SCHEDULE (as indicated on drawings)

## PART 3 - EXECUTION

### 3.01 INSTALLATION

- A. Install interior lighting fixtures at locations and heights as indicated and in accordance with fixture manufacturer's written instructions, applicable requirements of NEC, NECA's "Standard of Installation," NEMA standards and with recognized industry practices to ensure that lighting fixtures fulfill requirements.
- B. Coordinate with other trades as appropriate to properly interface installation of interior lighting fixtures with other work.
- C. Fixtures shall be located approximately as shown on plans. On tile ceilings, fixtures shall be located either in the center of a tile or on the division between two tiles. Fixture shall be located symmetrically in the spaces except where plan indicated a specified lighting purpose can be best accomplished by a non-symmetrically arrangement.
- D. Handling and installation of fixtures shall be done by experienced fixture hangers under the supervision of an experienced foreman. Splices and joints for fixtures shall be made up using insulated "Scotch-Loks" or solderless pressure connections.
- E. Submit design of hangers, method of fastening, other than indicated or specified herein, for review by Architect/Engineer.
- F. Install flush-mounted fixtures to eliminate light leakage between fixture frame and finished surface.
- G. Provide plaster frames for recessed fixtures installed in other than suspended grid type acoustical ceiling systems. Brace frames temporarily to prevent distortion during handling.
- H. Secure fixtures to the structure by means of approved fasteners. Fixtures shall not be secured to the wall or ceiling finish only. Where necessary to give support or ceilings made up of non-structural materials, the fixtures shall be supported from a special brace, such as Unistrut, Globe Strut, etc., secured in turn to structural members. Support will come from the bar joist ceiling when available.
- I. Ensure that pendant fixtures are plumb and level. Provide individually mounted pendant fixtures with stems longer than 2' with twin stem hangers. Provide stem hanger with ball aligners and provisions for minimum 1" vertical adjustment. Mount continuous rows of fixtures with an additional stem hanger than number of fixtures in the row.

- J. Tighten connectors and terminals, including screws and bolts, to comply with tightening torques specified in UL Std 486A and B.
- K. Support surface-mounted fixtures greater than 2' in length at another point in addition to the outlet box fixture stud.
- L. Where existing fixtures are being replaced, the Contractor shall provide all necessary framing, patching and painting necessary to match the existing conditions and be "like new" installation.

### 3.02 ADJUSTING & CLEANING

- A. Before the lighting installation will be inspected, all fixtures must be complete and cleaned immediately prior to time of inspection.
- B. Protect installed fixtures from damage during remainder of construction period.

### 3.03 ORDERING FIXTURES

- A. Before placing orders for fixtures, the Contractor shall verify that fixtures have labels indicating Underwriter's approval. All fluorescent fixtures shall have high power factor, CBMETL certified, sound rated A ballasts, solid state electronic type, except where not available due to the lamp type and wattage. Fixtures shall meet State Energy Code requirements. Ballasts shall have thermal protection.
- B. The Contractor shall furnish and install all incandescent, fluorescent and HID lamps installed in all fixtures.

### 3.04 FIELD QUALITY CONTROL

- A. Upon completion of installation of interior lighting fixtures and after building circuitry has been energized, apply electrical energy to demonstrate capability and compliance with requirements. Where possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise, remove and replace with new units and proceed with retesting.
- B. Coordinate the electrical work with other crafts to prevent interference with ducts, pipes, etc.
- C. See Basic Materials and Methods for wiring. Splices must be made in boxes or channels. No splices shall be made in conduits or other raceways not approved for the purpose.

### 3.05 GROUNDING

- A. Provide equipment grounding connections for interior and exterior lighting fixtures as indicated. Tighten connections to comply with tightening torques specified in UL Std 486A to assure permanent and effective grounds.

### 3.06 FLUORESCENT BALLASTS

- A. All light fixtures with ballasts shall be provided with a ballast disconnect.

END OF SECTION

SECTION 26 51 13 - LAMPS, BALLASTS & ACCESSORIES

## PART 1 - GENERAL

## 1.01 SUMMARY

- A. The Conditions of the Contract and General Requirements apply to all work of this Section.
- B. The Contractor shall furnish and install as indicated on plans or in the specifications all fluorescent and HID lamps complete for all fixtures.

## PART 2 - PRODUCTS

## 2.01 LAMPS

- A. Incandescent lamps shall be inside frosted unless specified otherwise.
- B. T-8 fluorescent lamps shall be 32 watt, rated life 30,000 hours, CRI minimum 85, initial lumens 2950, mean lumens 2700, color 4100°K, lumen maintenance of 95%, Phillips Alto Plus T8, GE ECOLUXXL, Sylvania Octron XPECO or prior approved equal.
- C. Where available, lamps with lengths other than nominal 4 ft shall be of similar product group.
- D. Compact fluorescent lamps shall be single, double or tripe tube type with 4-pin bases for operation on electronic and dimming ballasts. Lamps shall have a minimum CRI of 82 and color of 4100°K; Sylvania, Philips or prior approved equal.

## 2.02 FLUORESCENT BALLASTS

- A. T-8 ballast for on/off operation shall be less than 10% THD, capable of operating the lamp types indicated, solid state electronic type, 1.0 ballast factor or better, program start, normal light output, Universal voltage.

## 2.03 MANUFACTURERS

- A. Lamps - Sylvania, GE, Phillips, or prior approved equal.
- B. Ballasts - Sylvania, Lutron, Advanced, Holophane, GE, Universal or prior approved equal.

## PART 3 - EXECUTION

## 3.01 INSTALLATION

- A. Provide all fluorescent, incandescent, LED and HID lamp wattages and colors as specified under the fixture schedule.
- B. Contractor shall coordinate all ballasts, lamps and dimming equipment prior to shop drawings.

## 3.02 LAMP REPLACEMENT

- A. Replace lamps that fail after Owner's use or acceptance of the project.
  - 1. Lamps that fail within one (1) year.
  - 2. Provide lamp and ballast replacement for manufactured warranty periods in case of lamp/ballast warranties.
  - 3. Warranty all ballasts for five (5) years.
  - 4. Replace and warranty LED systems that fail within five (5) years...or manufacturer warranty, whichever is greater.

END OF SECTION

SECTION 27 05 00 - COMMON WORK RESULTS FOR COMMUNICATIONS

## PART 1 - GENERAL

## 1.01 SCOPE

- A. This Section includes the furnishing and installation of all labor, materials, tools, appliances, hardware, junction boxes, and ancillary equipment for and incidental to the delivery, installation, and furnishing of common work for communication systems. Work includes:
  - 1. Communications equipment coordination and installation.
  - 2. Sleeves for pathways and cables.
  - 3. Sleeve seals.
  - 4. Grout.
  - 5. Common communications installation requirements as shown, required, and specified herein.
- B. This section shall be used in addition to the Division 26 specifications. Installation methods and material specifications of general wiring, grounding, conduit, hangars and supports shall be governed by Division 26 specifications.

## 1.02 SUBMITTALS

- A. Shop drawings shall be submitted for approval for common work as required in respective Division 26 sections.

## 1.03 COORDINATION

- A. Coordinate arrangement, mounting, and support of communications equipment:
  - 1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
  - 2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
  - 3. To allow right-of-way for piping and conduit installed at required slope.
  - 4. So connecting pathways, cables, wireways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment.
- B. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.
- C. Coordinate location of access panels and doors for communications items that are behind finished surfaces or otherwise concealed. Access doors and panels are specified in Division 08 Section "Access Doors and Frames."
- D. Coordinate sleeve selection and application with selection and application of firestopping specified in Section 07 84 00 "Penetration Firestopping."

## PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION

- A. Provide all equipment, wiring, conduit, and junction boxes required for the installation of a complete and operating system in accordance with applicable local, state, and national codes, the manufacturer's recommendations, these plans and specifications.

3.02 EXAMINATION

- A. Examine conditions for compliance with any communication equipment enclosure and ambient-temperature requirements for each component.
- B. Verify that field measurements are as needed to maintain working clearances required by NFPA 70 and manufacturer's written instructions.
- C. Examine walls, floors, roofs, and concrete bases for suitable mounting conditions where components will be installed.
- D. Verify that ground connections are in place and requirements in Division 26 Section "Grounding and Bonding for Electrical Systems" have been met.

3.03 COMMON REQUIREMENTS FOR COMMUNICATIONS INSTALLATION

- A. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.
- B. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.
- C. Equipment: Install to facilitate service maintenance, and repair or replacement of components of both communications equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.
- D. Right-of-Way: Give to piping systems installed at a required slope.

END OF SECTION

SECTION 27 11 53 - HORIZONTAL & BACKBONE CABLING

## PART 1 - GENERAL

## 1.01 SCOPE &amp; RELATED DOCUMENTS

- A. The work covered by this Section of the specifications includes the furnishing of all labor, equipment, materials, and performance of all operations in connection with the installation of the fiberoptic backbone cable system and horizontal UTP cabling system.
- B. The requirements of the Conditions of the Contract, Supplementary Conditions and General Requirements apply to the work specified in this Section.
- C. The complete installation is to conform to the applicable sections of ANSI/EIA/TIA 568/569/606 175B95 Standards, Local Exchange Requirements and National Electrical Code with particular attention to Article 770.
- D. The work covered by this Section of the specifications is to be coordinated with the related work as specified elsewhere under the project specifications.

## 1.02 QUALITY ASSURANCE

- A. Each and all items of the fiberoptic backbone cabling system and horizontal cabling shall be listed as a product of the manufacturer under the appropriate category by Underwriters' Laboratories, Inc. (UL), and shall bear the "UL" label.
- B. The equipment and installation supervision furnished under this specification is to be provided by a manufacturer who has been engaged in production of this type of equipment for at least five (5) years.
- C. The extended product warranty shall ensure against product defects, that all approved cabling components exceed the specifications of TIA/EIA-568B2-1, exceed the attenuation and NEXT requirements of TIA/EIA TSB 67 and ISO/IEC IS 11801 for cabling links/channels, that the installation will exceed the loss and band width requirements of TIA/EIA TSB 67 and ISO/IEC IS 11801 for fiber links/channels, for a twenty-five (25) year period. The warranty shall apply to all passive SCS components. The warranty shall cover the replacement or repair of defective products and labor for the replacement or repair.
- D. The system assurance shall cover the failure of the wiring system to support the application which it was designed to support, as well as additional application(s) introduced in the future by recognized standards or user forums that use the TIA/EIA 568B2-1 component and link/channel specifications for cabling, for a fifteen (15) year period. The system assurance shall cover the replacement or repair of defective products and labor for the replacement or repair.
- E. Upon successful completion of the installation, the customer shall be provided with certificate registering the installation from the manufacturing company.

## 1.03 GENERAL REQUIREMENTS

- A. Submittals:



1. Prior to installation, the Contractor shall submit manufacturer's catalog information.
    - a. Outlets and termination hardware and miscellaneous accessories.
    - b. Cabling in conformance to Article 770 NEC and shall be UL listed.
    - c. Fiber optic backbone cable system.
    - d. Copper backbone cable system.
    - e. MC and TC equipment and cabling.
  2. Shop Drawings:
    - a. Provide terminal labeling made for each cable. Coordinate labeling with the Architect/Engineer/Owner.
    - b. Provide cable listing of cable runs, terminations and interconnections.
    - c. Information shall be in schedule form and scaled drawings and shall include cable standards and technical data.
    - d. Provide telecommunication manuals (2) for installation and instruction for the distribution cabling system.
    - e. Provide record drawings and labeling for the as-built system.
- B. Inside Building Cabling:
1. Telecommunication Contractor shall use cable tray as shown and may use D-rings or J-hooks where necessary to support cables.
  2. The infrastructure cabling contractor must provide support for the cables. The cables must be secured at five foot intervals minimum. D-rings or J-hooks may be used. If the contractor finds it necessary to use additional cable support devices, it will be the contractor's responsibility to install these.
  3. The infrastructure cabling contractor is responsible for all the necessary penetration. All penetrations must have continuous cable tray or conduit running through the penetration.
  4. Category 6 plenum cables must have FEP insulation on all four pairs. Thus use of O2x2O and O3x1" type plenum cabling is not permitted.
  5. The infrastructure cabling contractor must provide blank faceplates over all unused telecommunication receptacle boxes.
  6. The contractor will install a Category 6, four-pair, 24 AWG, cable to each RJ-45 location. However, there will be a separation between voice and data service. Category 6 cables for voice must be color-coded white on each RJ-45 receptacle designated for voice service and be terminated onto 110 punch blocks. These blocks are to be mounted on plywood backboard provided by others.
  7. All data cables must be terminated on rack-mounted, Category 6, RJ-45/8w, modular patch panels. A cable support wire management system must be provided at the back of the patch panels.
  8. All voice cables in the MC must be terminated on rack-mounted, Category 6, RJ-45/8W, modular

patch panels. Voice cables in all TCs shall be terminated on Category 6, 110 blocks.

## PART 2 - PRODUCTS

### 2.01 MATERIALS

- A. Conduits shall be steel and sized as shown on plans and installed as per section of the specifications. Telephone/data wall outlets shall be 4-11/16" square deep box and 1 gang ring and shall be finished with a Panduit Executive Series Vertical Face Plate (number of spaces as required) of same type and design as switch and receptacle plates in the room.

### 2.02 CLOSET CONFIGURATIONS

A. **MC Configurations – Data Center:**

Data -

1. Provide one 19" x 84" freestanding rack for data, mount to floor, Panduit #CMR19X84, Chatsworth # 55053-X03.
2. Provide vertical and horizontal wire management for the 19" rack; 4 horizontal, Panduit #NCMHZ, Chatsworth # 30139-719; 2 vertical, Panduit #WMPVHS45, Chatsworth # 12831-703.
3. Provide one fiber optic rack-mounted enclosure for 54 pair, Panduit #FRME3-FMP6, Leviton OPT-X..

B. **TC1, TC2, TC3, TC4, TC5, TC6 Configurations:**

1. Provide one 19" x 84" freestanding rack for data, mount to floor, Panduit #CMR19X84, Chatsworth # 55053-X03.
2. Provide one fiber optic rack-mounted enclosure for 54 pair, Panduit # FRME3-FMP6, Leviton # OPT-X.

### 2.03 BACKBONES

- A. Fiber optic backbone between MC and TC1, MC and TC2, MC and TC3, MC and TC4, MC and TC5, MC and TC6.
1. Fiber optic backbone cable must be installed in inner duct or in conduit.
  2. 18-strand composite fiber optic cable, consists of 12 strands 50/125 laser-optimized ten-300, 2000 MHZ laser band width, fiber micron multimode, and 6 strands of single mode, tight buffered. General Cable #AP006/BE012/PMU, OCC # DX18-060K-12ALT-6SLX-OFNP, Superior Essex.
  3. Terminate on patch panels in each closet.

### 2.05 PATCH CABLES

- A. Fiber optic patch cords.
  - 1. Multimode (20) orange 15-feet, optic jack to [consult with Owner (SC or LC)].

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Installation shall be in line with manufacturer's requirements for installation and signal transmission.
- B. The Contractor shall wire the building for voice and data service. The installation shall provide a complete turn-key operational wiring system. Any changes or substitutions needed to provide a turn-key system for voice and data as specified shall be borne by the Contractor.
- C. Cables, jumpers, etc., must be installed in a workmanlike manner, subject to approval by the Engineer and District. Unapproved installations will be removed and corrected at the cost of the Contractor.
- D. The Contractor is responsible to provide adequate support to ensure that all cabling runs are neatly bound and secured to the structure. Horizontal cable not in conduit or cable trays must be secured at five foot intervals (at least). D-rings or J-hooks may be used. All telecommunication cables must be supported at intervals of 5 feet maximum. If the Contractor finds it necessary to use additional cable support devices, it will be the Contractor's responsibility to install these. All cables must be supported by cable support devices and not the building structure.
- E. Cable may not rest upon or against lighting fixtures.
- F. Cable may not rest upon dropped ceiling panels or the accompanying support structure.
- G. Cable may not be draped over or fastened to pipes or conduit, except as approved by Engineer and District.
- H. Cable may not be placed within 2 feet of high voltage (220) sources, nor should it come within 2 feet of a 110V electrical panel.
- I. If run as surface mount, low voltage cable must be separated from high voltage (>110V) cable as specified on EIA/TIA 569 standard.
- J. The bend radius of all installed twisted-pair and fiber optic cables may not be less than the minimum radius specified by the cable manufacturer. Cables must be installed in a manner such that normal activities do not reduce any bends below the minimum.
- K. All terminations must meet or exceed the Category rating of the cable to which they are attached.
- L. All RJ-45 terminations must comply with T-568B standard pinning.
- M. All cable must be terminated by the Contractor at the jack location, TC location and MC location.
- N. All multimode fiber optic cable shall be terminated with opti-jack connectors. All single mode fiber optic cable shall be terminated with opti-jack connectors. A single mode connector may only be installed by individuals who have been certified. The system return loss for the single mode fiber optic cable must

- be not less than 30dB.
- O. All materials are to be installed per the manufacturer's specifications and the specifications, whichever is more stringent.
  - P. Should the successful Contractor find it necessary to penetrate any fire walls, it will be the responsibility of that Contractor to provide satisfactory sleeving and fire caulking both inside and outside of that sleeving.
  - Q. Successful Contractor shall furnish two technicians on-site for a minimum of two days during telephone system and network equipment installation.
  - R. Contractor is responsible for verifying all distances. At no time shall any Category 5e run exceed 295 feet. Should a location fail to meet this requirement, Contractor is to contact Engineer immediately.
  - S. A minimum of 12" of slack cable is to be left in each outlet.
  - T. Fiber optic cable can be installed inside the building using same methods as twisted pair; however, the following guidelines must be observed:
    - 1. Do not exceed maximum pulling tension.
    - 2. Do not exceed minimum (installed and long-term) bend radius.
    - 3. Avoid sharp bends and corners.
    - 4. Provide additional crush/mechanical protection in high risk environment.
    - 5. Do not exceed maximum vertical rise specification unless intermediate tension relief is used.
    - 6. Do not deform the cable jacket.
    - 7. Provide services loop (minimum of 5 feet) for each fiber on both ends.

### 3.02 FIRESTOPPING

- A. See Section 07 84 00.

### 3.03 GROUNDING SYSTEM & CONDUCTORS

- A. The Contractor shall provide a #6 AWG stranded copper wire cable between ground bars located at each TC and the building main service ground point. This ground conductor shall be utilized for equipment, termination, equipment rack and computer equipment grounding. Contractor shall provide ground bars as necessary for each closet.
  - 1. Bonding and Grounding - Communication bonding and grounding shall be in accordance with the NEC and NFPA. Horizontal cables shall be grounded in compliance with ANSI/NFPA 70 and local requirements and practices. Horizontal equipment includes cross connect frames, patch panels and racks, active telecommunication equipment and test apparatus and equipment.
  - 2. Telecommunications Bonding Backbone - Provide a telecommunications bonding backbone utilizing a #6 AWG or larger bonding conductor that provides direct bonding between telecommunications closets.

### 3.04 LABELING

- A. **A labeling plan must be submitted to and approved by OWNER prior to installation.** The completed labeling must meet the approval of the Owner. EIA 606 standards are to be met.

3.05 TESTING

- A. A fiber transmission loss test shall be performed after splicing and connections have been completed.
- B. The tests shall be made by the Contractor's Technical Representative. Fiber transmission loss shall be presented to the Engineer in table form in two copies.
- C. Test Equipment - Contractor is responsible for supply all test equipment and personnel to conduct acceptance test. Test equipment shall have the capability to test from 0.1-350 MHZ.
- D. Tests to be Conducted - After terminations are complete, Contractor shall test all installed cable, connectors, and patch cords. Field test equipment with minimum of Level III accuracy shall be used. Channel test shall be performed. Channel link shall not exceed 100 meters (including test cords). Channel performance criteria shall conform to the following requirements defined by ANSI/EIA/TIA 568-A-5 and TSB67:

Frequency	Loss	NEXT	PS NEXT	ELFEXT	PS ELFEXT	Return Loss	Prop Delay	Skew	ACR	PS ACR
1.0	2.0	74.3	72.3	70.0	68.0	21.0	570	25	72.3	70.3
4.0	3.8	65.3	63.3	58.0	56.0	23.4	552	25	61.5	59.5
8.0	5.3	60.8	58.8	51.9	49.9	24.6	547	25	55.4	53.4
10.0	6.0	59.3	57.3	50.0	48.0	25.0	545	25	53.3	51.3
16.0	7.6	56.2	54.2	45.9	43.9	25.0	543	25	48.7	46.7
20.0	8.5	54.8	52.8	44.0	42.0	25.0	542	25	46.3	44.3
25.0	9.5	53.3	51.3	42.0	40.0	24.3	541	25	43.8	41.8
31.25	10.7	51.9	49.9	40.1	38.1	23.6	540	25	41.2	39.2
62.5	15.4	47.4	45.4	34.1	32.1	21.5	539	25	32.0	30.0
100.0	19.8	44.3	42.3	30.0	28.0	20.1	538	25	24.5	22.5
155.0	25.2	41.4	39.4	26.2	24.2	18.8	537	25	16.3	14.3
200.0	29.0	39.8	37.8	24.0	22.0	18.0	537	25	10.8	8.8
250.0	32.8	38.3	36.3	22.0	20.0	17.3	536	25	5.5	3.5
300.0	36.4	37.1	35.1	20.5	18.5	16.8	536	25	0.7	--
350.0	39.8	36.1	34.1	--	--	16.3	536	25	--	--
400.0	43.0	35.3	33.3	--	--	15.9	536	25	--	--
500.0	48.9	33.8	31.8	--	--	15.2	536	25	--	--
550.0	51.8	33.2	31.2	--	--	14.9	536	25	--	--

- E. Tests to be performed included, but are not limited to:

1. Wire map.
2. Length.
3. Attenuation.
4. NEXT (near end cross talk -- to be performed on all Category 6 cables BI-directionally).
5. Return loss.
6. Power sum NEXT.
7. Worst pair-to-pair ELFEXT.

8. Power sum ELFEXT.
  9. Propagation delay.
  10. Delay skew.
- F. Engineer reserves the right to test a random sampling of up to 5% of all cabling upon completion of installation. If these test results are deemed unacceptable, Contractor shall retest and correct all identified cabling.
- G. Contractor shall provide all labor, materials, tools and measurement equipment to conduct testing and these costs shall be included in his bid.
- H. Before final payment is received, the Owner shall receive written certification that the installation meets EIA/TIA 568A standards.

### 3.06 RECORD DRAWINGS

- A. Provide printed copies of all tests performed. Records are to include date of tests, name of person testing and all readings.
- B. Provide cabling records including all cross-connects by cable number and pair number. Provide printed documents as well as on CAD in AutoCAD or DXF format.

PLEASE NOTE - No additional monies will be allowed for lack of information in providing a complete turn-key working system for all system as outlined (i.e., voice, data and video system). All piece parts are to be included. Any discrepancies in the construction documents shall be brought to the attention of the Engineer prior to bid date.

END OF SECTION

SECTION 28 31 12 - FIRE ALARM

## PART 1 - GENERAL

## 1.01 SCOPE OF WORK

- A. The Conditions of the Contract and the Provisions of Division 01 apply to all work of this Section.
- B. This Section includes all labor, materials, equipment and services necessary to furnish and install a fire alarm system where shown or indicated on the drawings and as specified herein.

## 1.02 SUMMARY

- A. Provide and install new and complete fire alarm system in the existing building as shown on the plans and herein specified. The system shall be continuous ringing, supervised, closed circuit, noncoded type and shall be wired, connected and left in first-class operating condition. Existing conduits may be reused at the option of the Contractor. New equipment shall be compatible with existing system.

## 1.03 DESCRIPTION OF SYSTEM

- A. The system shall operate as a low voltage, supervised, zoned, noncoded, automatic fire and smoke detection system, wired as two wire, Class B. The building shall be divided up into fire alarm area zones.
- B. Fire alarm shall meet the requirements of NFPA-72, and all equipment shall be new and UL listed.
- C. Manufacturers must have produced fire alarm systems of the type, size and electrical characteristics specified for a period of not less than 5 years.
- D. Shop drawings of equipment and wiring diagrams will be required.
- E. See Section 26 05 00 - Basic Materials and Methods for manuals of instruction.
- F. Service must be available within 200 miles of the installation.

## 1.04 REFERENCED STANDARDS

- A. National Fire Protection Association (NFPA) #72A Local Protective Signaling System, #72B Auxiliary Protective Signaling System, #72C Remote Station Protective Signaling System and #72E Automatic Fire Detectors. The system shall be listed by Underwriters' Laboratories, Inc.

## 1.05 SUBMITTALS

- A. Shop drawings and operating instructions consisting of catalog information of all components and a complete wiring diagram. The wiring diagram shall be complete with all devices and wiring. The wiring diagram shall be for this project, manufacturer's typical wiring diagram will not be acceptable.
- B. Letter of System Checkout - Provide a letter from the fire alarm system equipment supplier stating that the system has been installed correctly, is working correctly and that the system has been thoroughly

checked out. Copies of such letter shall be included in the Operating and Instructions Manual.

#### 1.06 SYSTEM OPERATION

- A. The activation of any alarm initiating device (manual station, automatic detector or sprinkler flow) shall activate the associated lights of the annunciator; release magnetic door holders, smoke dampers and fire shutters at appropriate zones; shut down air handling unit(s); cause an alarm signal to be transmitted to the fire department; and activate building alarms continuously until silenced manually at the fire alarm control panel.
- B. Trouble, such as a ground or open on any initiating or indicating circuit or failure of the primary power supply, shall sound a trouble alarm and light appropriate trouble lamps. If the trouble alarm is manually silenced, the trouble light shall continue to illuminate until the trouble condition has been corrected.
- C. The actuation of any noncoded station, automatic heat detector or other approved devices shall cause the operation of all the alarm signals of the system including the trouble signal to sound continuously until the actuating device is restored to normal and the panel manually reset. In the event of operating power failure, an open circuit or ground in the system, a trouble signal and trouble lamp shall stay actuated until the system is restored to normal. The trouble signal may be silenced by means of a switch on the control panel door. Upon restoration of the system to normal, the trouble signal shall again sound until the switch is returned to normal position. The system shall operate from one phase of a 3-wire supply while supervisory power shall be taken from the other phase from a disconnect. System shall include contact for future city connection and contacts to shut down ventilating fans.

#### 1.07 DEFINITIONS

- A. "Alarm Initiating Circuit" - Circuit used to connect fire detection type devices to the main fire alarm control panel.
- B. "Alarm Indicating Circuit" - Circuit used to connect audible or visual type alarm devices to the main fire alarm control panel.

### PART 2 - PRODUCTS

#### 2.01 EQUIPMENT

- A. Control Panel – Existing.
- B. Manual Stations - Semi-flush, pull lever, noncoded, single action, with glass rods, readily apparent indication of operation and must be opened to be reset. Resettable only with key.
- C. Smoke Detectors - Photo type, two-wire operation, surface mounted, with visual indication of alarm, twist/lock base assembly, two auxiliary sets of N.O. contacts where required for interlock or auxiliary functions and provisions for reset from the central control panel.
- D. Duct Type Smoke Detectors - Photo type, for mounting directly to the outside of the air duct, compatible for operation from the control panels low voltage power, shall meet NFPA90A requirements, with sampling tubes of the necessary length to span the entire width of the duct, an LED type alarm indicating light, test jack, one set of DPDT alarm operated contacts.



- E. Remote Alarm Lamps - For use with low voltage detectors, brushed stainless steel plate with indicating lamp.
- F. Signaling Devices - Combination visual/audio alarm, flush mounted, red molded coverplate, convex thermoplastic reflective lens, Zenon flashing light, vibrating type horn, polarized for use on a low voltage, supervised type fire alarm system. Provide flush backbox.
  - 1. Exterior horns shall be the same as interior type except weatherproof and no visual signal.
- G. Wire - For all alarm initiating circuits: minimum size #18 AWG, stranded copper conductor with thermoplastic insulation. For all alarm indicating circuits: minimum size #14 AWG, stranded copper conductor with THHN insulation. Larger wire shall be as required for proper system operation and as shown on the plans.

### PART 3 - EXECUTION

#### 3.01 GENERAL

- A. Provide a new fire alarm system as indicated on the plans. Replace all existing fire alarm devices in the existing facility reusing existing conduit wherever possible. The plans show how the original construction plans indicated the system wiring. This information is provided as a guide only. Pull new wire in existing raceway as required or use wiremold as indicated.

#### 3.02 INSTALLATION, CERTIFICATION & GUARANTEE

- A. This Contractor shall furnish and install all wiring, conduit, junction boxes and outlet boxes required for the installation of a complete system. All wiring shall be color coded throughout and shall test free and clear of opens, grounds and crosses between conductors. All wiring shall be #14 AWG stranded, Type THHN, unless otherwise noted; and Electrical Contractor shall furnish and install T&B (or equal) "STA-KON" spade type lugs on all wire ends connected to screw type terminals on fire alarm equipment.
- B. Equipment installation and wiring shall be as described above, as shown on the drawings and in accordance with detailed information furnished by the equipment manufacturer. The manufacturer shall maintain a full time service organization, and supervision of the final connection of the wiring at the control equipment shall be provided. This Contractor shall guarantee all new wiring and equipment free of inherent mechanical and electrical defects for a period of one year from date of installation and final acceptance.
- C. Contractor shall provide written certification and guarantee as specified hereinafter.
- D. Certification shall include, but not be limited to, the following:
  - 1. Check wiring to ensure the proper type and size conductors have been installed and that coding of conductors is continuous throughout the system.
  - 2. Check for proper terminations at all devices, such as manual stations, horns, chimes, heat detectors, smoke detectors, door holders, etc.
  - 3. Check that proper devices are connected to the specified zones and that the zone annunciation is

properly identified.

4. Check each circuit for voltage between any pair of conductors.
  5. Check initiating device circuit with a voltmeter and ohmmeter to ensure all devices are properly connected.
  6. Check load on all signal circuits and check voltage at last device on signal circuit.
  7. Check each zone/device for proper operation of alarm by activating each device on each zone/device.
  8. Check each zone/device for proper operation of trouble circuit by opening the circuit at the last device on the zone/device.
  9. Check operation of all horns, chimes and visual signals; adjust signal volume level as required.
  10. Check operation of city tie Central Station Alarm Company.
  11. Check operation of all annunciators.
- E. Certification shall include a written certified report that the above minimum tests have been performed and shall include all test results.

END OF SECTION