Date: June 30, 017 **Date of Issuance:** June 8, 2017

Project Name: DCS CUP Temporary Connections – Nebraska State Penitentiary **Date of Opening:** July 6, 2017

FE Project No.: 162032

NOTICE: This addendum is applicable to the referenced project and is issued to all known planholders prior to receipt of proposals. The information contained herein shall be fully incorporated into the Bid Contract Documents as though originally incorporated. Failure to acknowledge all amendments may be cause for rejection of the bid.

TO: Bidders and Others Concerned

Changes to the Project Manual

1. PROJECT MANUAL: Reissued in its entirety.
2. SECTION 00 00 05, SEAL PAGE: This section has been added in its entirety.
3. SECTION 23 09 05, PLANT INSTRUMENTATION AND CONTROL: This section has been deleted in its entirety.
4. SECTION 23 21 11, PLANT PIPING SYSTEMS: Delete paragraph 1.3.E

Changes to the Drawings

1. DRAWINGS: Reissued in their entirety

Clarifications

1. Questions: Can the steam tap be made below the decking in lieu of the location shown?

   Answer: No

2. Utility connections (steam, condensate, soft water, electrical) may occur at other than normal working hours. All interruptions shall be coordinated with Owner's Representative.

Attachments

1. PROJECT BID DOCS - SPECIFICATIONS
2. PROJECT BID DOCS – DRAWINGS
3. PRE-BID MEETING SIGN-IN SHEET

-- END --

FE# 162032 Addendum No. 1.docx

GENERAL SPECIFICATIONS
FOR

CUP Temporary Connections
Nebraska State Penitentiary
4201 South 14th Street
Lincoln, NE

6/8/2017

Prepared by:

Farris Engineering
12700 West Dodge Road
Omaha, Nebraska 68132
Phone: (402) 330-5900
Fax: (402) 330-5902

Engineering Department
Department of Correctional Services
Folsom & West Prospector Place, P.O. Box 94661
Lincoln, Nebraska 68509-4661
(402) 471-2654

DCS Project # **1602**

TABLE OF CONTENTS

NOTICE TO BIDDERS

The Nebraska Department of Correctional Services will receive sealed bids for the:

CUP Temporary Connections
Nebraska State Penitentiary
4201 South 14th Street
Lincoln, NE

Sealed bids will be received by Jerry L. Pohlmann, Engineering Administrator, in the **Conference Room "E"**, Department of Correctional Services, Bldg. 1 Folsom and West Prospector Place, Lincoln, Nebraska, until:

2:00pm
7/6/2017

and at that time and place will be publicly read aloud.

Mailed bids will be addressed to:

Jerry L. Pohlmann, Engineering Administrator
Department of Correctional Services
Bldg. 1, Folsom and West Prospector Place, Lincoln, NE 68522
OR
P.O. Box 94661 - Lincoln, NE 68509-4661

All bids will be made on printed proposal forms, which are a part of the Contract Documents.

Each bid must be accompanied by a certified check or bid bond in the amount of five (5%) percent of the base bid proposal.

The character and amount of security to be submitted by the contractor for the performance of the contract is stated in the proposed Contract Documents.

Drawings and Specifications may be examined at the following locations:

A & D Technical Supply - 1822 N St, Lincoln, NE 68508
McGraw Hill/Bee Line & Blue, 2507 Ingersoll Ave., Des Moines, IA 50312
Kearney Builders Bureau, C/O Area Chamber of Commerce, 1007 Second Avenue, Kearney Nebraska 68847
Omaha Builders Exchange, 4255 S. 94th Street, Omaha, Nebraska 68127
Hastings Builders Bureau, P.O. Box 1104, 301 S. Burlington, Hastings, Nebraska 68901
Lincoln Builders Bureau, 5910 S. 58th Street; Suite C, Lincoln, Nebraska 68516
Grand Island Plan Service, P.O. Box 1486, 309 West 2nd Street, Grand Island, Nebraska 68801
Construction Market Data Group, 30 Technology Parkway South, Suite 100, Norcross, GA 30092
Department of Correctional Services, Folsom and West Prospector Place; Building 1, Lincoln, NE 68509
Architect, Arch Address L1 Arch Address L2, Arch City, Arch State Arch Zip

The Owner reserves the right to reject any or all bids and to waive any informalities.

No bidder may withdraw his bid within 40 days after the scheduled closing time to receive bids.

Plans and Specifications may be picked up at the Central Office, Department of Correctional Services, Folsom and West Prospector Place, Lincoln Regional Center - Lincoln, Nebraska.

A **Pre-Bid Conference** and walk-through is scheduled for **10:00am, 6/27/2017**. All interested Contractors are to meet at the Power Plant parking lot – **Nebraska State Penitentiary4201 South 14th Street, Lincoln, NE.**

JERRY L. POHLMANN
ENGINEERING ADMINISTRATOR

Bid Time: **2:00pm**

Bid Date: **7/6/2017**

Bid Location: **DCS Engineering**
Conference Room "E", Bldg. 1
Folsom & W. Prospector Place
Lincoln, Nebraska

PROPOSAL

Proposal of hereinafter called the "Bidder" a corporation/ a partnership/ an individual doing business as:

_____
Firm Name

_____
Address

The undersigned, being familiar with local conditions affecting the cost of the work, and the Proposed Contract Documents, including the Advertisement for Bids, Instructions to Bidders, Proposal Form, Contract Form, Form of Contract, Performance Bond, Form of Labor and Materials Bond, General Conditions, Special Conditions, Specifications and Plans, all on file in the office of the Department of Correctional Services, Engineering Division, Lincoln, Nebraska, hereby proposes to furnish all plant, equipment, transportation, materials, tools, labor and skills necessary and required to perform all work as described in the Proposed Contract Documents entitled:

CUP Temporary Connections
Nebraska State Penitentiary
4201 South 14th Street
Lincoln, NE

all in strict accordance with the Proposed Contract Documents including Addenda Numbers _____, _____, and _____ issued and attached thereto.

For all work described in the Specifications and shown on the Plans for the project, I (or/we) agree to perform all the work for the sum of:

BASE BID: Project Name

_____ **(Dollars)** **($ _____)**
(words) (dollars)

ALTERNATE #1: (ADD/DEDUCT)

Item #1: Description

_____ **(Dollars)** **($_____)**
(words) (dollars)

UNIT COST: (ADD/DEDUCT)

Item #1: Description

_____ **(Dollars)** **($_____)**
(words) (dollars)

It is the Owner's intent to award a single prime contract for this project.

Amounts shall be shown in both written form and figures. In case of discrepancy the written figures will govern.

Bidders shall acknowledge the receipt of any and all addenda issued in the space provided above.

The undersigned agrees to commence work within ten (10) calendar days of written notice to proceed and complete all work within _____ calendar days following the Award of the Contract.

The undersigned acknowledges having reviewed provisions outlined for exemption of payment of sales taxes to the State of Nebraska and also understands the requirements for registration of any and all non-resident contractors and sub-contractors with the Nebraska Department of Revenue.

Bid Security is required and accompanies this proposal in the amount of _____, the same being subject to forfeiture in the event of default by the undersigned.

In submitting this bid, it is understood that the right is reserved by the Department of Correctional Services to reject any or all bids and to waive informalities, and it is further understood that this bid may not be withdrawn during the period of forty (40) days following the scheduled closing time for receipt of bids.

By signing this bid proposal, the Contractor certifies that they maintain a drug free workplace environment.

Upon receipt of notice of acceptance of the bid, I (or/we) will execute a formal contract within five days and deliver Surety Bonds as required for faithful performance of this contract.

Date	Firm Name
By (Signature)	Address
Printed Name	Firm's Federal Tax Identification Number
Title	Firm's Telephone Number
	Firm's Fax Number

INSTRUCTIONS TO BIDDERS

INDEX

INSTRUCTIONS TO BIDDERS

1. BID SECURITY

Each proposal must be accompanied by bid security, (bid bond or a certified check), in the sum of five (5%) percent of the proposal, as a guarantee of good faith, drawn on a solvent bank and made payable to the order of the Department of Correctional Services, State of Nebraska, which will be retained by and may be forfeited to the Department of Correctional Services, State of Nebraska, as liquidated damage if such proposal is accepted, the Contract awarded, and the bidder or bidders fail to enter into a contract in form prescribed, with a satisfactory surety bond, within ten (10) days after such award is made.

The bid deposit of all except the three (3) lowest bidders may be returned within three (3) days after the opening of bids. The bid deposit of the three lowest bidders may be returned within 48 hours after the executed contract and required bonds have been finally approved by the Owner.

2. WORKING CONDITIONS

Bidders are required to inform themselves fully on the conditions relating to construction and labor under which the work shall be or is now being performed, and the Contractor must employ, so far as possible, such methods and means in the carrying out of his work as will not cause any interruption or interference with any other Contractor.

3. EXEMPTION FROM PAYMENT OF THE FEDERAL TAX ON THE TRANSPORTATION OF PROPERTY

The Contractor is authorized to ship all property necessary for the work to the Department of Correctional Services, State of Nebraska, in the care of the Contractor and exempt from the payment of the Federal Tax on the transportation of property.

This authority is issued with the distinct understanding that the State will receive benefit from the exemption from payment of that tax, that the tax is not included in the Contractor's bid and also that all transportation charges shall be paid by the Contractor.

4. INTERPRETATION OF CONTRACT

If any person contemplating submitting a bid for the proposed contract is in doubt as to the true meaning of any part of the plans, specifications, or other proposed contract documents, he may submit to the Engineer a written request for an interpretation thereof. The person submitting the request will be responsible for its prompt delivery. Any interpretation of the proposed documents will be made only by Addendum duly issued and a copy of such Addendum will be mailed or delivered to each person receiving a set of such documents. The Department of Correctional Services will not be responsible for any other explanation or interpretations of the proposed documents. All Addenda so issued shall become part of the contract documents.

5. PROPOSAL FORM

All proposals must be made on forms furnished by the Department of Correctional Services, State of Nebraska, and must be legibly written in ink or by typewriter. No alterations in proposal by erasure or interlineations will be permitted. All blanks must be completed.

No bidder may submit more than one proposal. Two proposals under different names will not be received from one firm or corporation.

6. FILING OF PROPOSALS

Each proposal must be submitted in a sealed envelope with the following information on the outside: Bidder's name, address, name of the project, letting date and time, and the word "PROPOSAL". The

bid security must be submitted in a separate sealed envelope with the following information on the outside: Bidder's name, address, name of the project and the words "BID SECURITY". If the proposal is mailed, the two separate envelopes shall be placed in a mailing envelope, sealed and addressed to the Owner. The mailing envelope must have the following information on the outside: Bidder's name, address, name of the project, bidding date and time, and the words **"PROPOSAL AND BID SECURITY"**.

Each proposal must be filed with the Department of Correctional Services, State of Nebraska, located at Lincoln, Nebraska prior to the time set for the opening of bids. No bid will be considered which has not been filed with the Department of Correctional Services before the time set in the advertisement.

7. SIGNATURE OF BIDDERS

Each proposal must be signed in ink with the full name of each person, firm or corporation interested in it, together with their business address or place of residence.

Bids that are signed for a partnership should be signed in the firm name by at least one of the partners or in the firm name by an attorney-in-fact. If signed by an attorney-in-fact, there should be attached to the bid a power of attorney evidencing authority to sign the bid, executed by the partners.
Bids which are signed for a corporation should have the correct corporate name thereof and the signature of the president or other authorized officer of the corporation manually written below the corporation name following the words: "By _____".

8. WITHDRAWAL OF BIDS

Any bidder may withdraw his bid at any time prior to the scheduled time for receipt of bids. No bids may be withdrawn for at least 40 days after the scheduled closing time of the receipt of bids.

9. ACCEPTANCE OF BIDS

The Department of Correctional Services, State of Nebraska, reserves the right to waive any informalities in bids received and to accept or reject any or all bids.

10. ALTERNATE PROPOSALS

All alternate proposals, when requested in the Proposal Form, shall be subject to the Owner's acceptance or rejection until 40 days after the Contractor has in writing informed the Department of Correctional Services he is withdrawing the alternate proposals.

11. QUALIFICATION OF BIDDERS

The Department of Correctional Services, State of Nebraska, will not award the Contract to any bidder who does not furnish upon request, satisfactory evidence that he has the necessary ability and experience in work of this character, and necessary financial resources, facilities, and plant to enable him to prosecute the same successfully and promptly and complete it within the time required in the contract.

12. BASIS OF AWARD OF CONTRACT

The State and the Department of Correctional Services reserves the right to make awards in a manner deemed in the best interest of the Department.

Preference may be given to resident bidders in accordance with Section 73-101.01 and 73-101.02 of Revised Nebraska Statutes.

13. WHEN AWARD EFFECTIVE

The Contract shall be deemed as having been awarded when formal written notice of award shall have been duly served upon the intended awardee (i.e., the bidder to whom the Owner contemplates awarding the contract) by the Department of Correctional Services.

14. FORMAL CONTRACT AND CONTRACT SECURITY

The successful bidder or bidders will be required to enter into a formal contract with the Department of Correctional Services, State of Nebraska. Form of contract shall be that included in the attached documents.

The successful bidder or bidders shall simultaneously with his delivery of the executed contract furnish a Performance Bond and a Labor and Material Payment Bond in an amount at least equal to 100 percent of the contract price as security for the faithful performance of this contract and for the payment of all persons performing labor and furnishing material in connection with this contract. The bond to be executed by an acceptable surety company or companies authorized to execute surety bonds in the State of Nebraska. Form of Bond shall be that included in the attached documents or A.I.A. Document A311.

15. POWER OF ATTORNEY

Attorneys-in-fact who sign Bid Bonds, Performance Bonds, or Labor and Materials Payment Bonds must file with each bond a certified and effectively dated copy of their power of attorney.

16. TIME OF COMPLETION

The Contractor shall commence work under the contract on the earliest possible date after signing of the contract by both parties and shall fully complete all work there under within the time limit designated in the contract.

17. NUMBER OF COUNTERPARTS OF CONTRACT AND BOND REQUIRED

There shall be executed three (3) counterparts of the Surety Bonds and three (3) counterparts of the contract.

18. NON-RESIDENT CONTRACTORS - REGISTRATION

Non-resident firms shall comply with the registration requirements and payment of fees to the Tax Commissioner of the State of Nebraska as defined in Sections 77-3101 through 77-3112, Revised Statutes of Nebraska.

19. LAWS AND REGULATIONS

The Bidder's attention is directed to the fact that all applicable state laws, municipal ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the project shall apply to the Contract throughout, and they will be deemed to be included in the Contract the same as though therein written out in full.

20. OBLIGATION OF BIDDER

At the time of the opening of bids, each Bidder will be presumed to have inspected the site and to have read and to be thoroughly familiar with the Drawings, Specifications, and other Contract Documents including all Addenda. The failure or omission of any Bidder to examine any form, instrument or document shall in no way relieve any Bidder from any obligation in respect of his/her bid.

21. OPEN COMPETITION

Whenever in these specifications a material or article is specified by using the specific description or name of a proprietary product or the name of a manufacturer or vendor, rather than by using descriptive detail of substance and function, any article which the Agency decides will perform the duties imposed adequately and to the same effectiveness, will be acceptable as a substitute in lieu of the material or article so specified.

22. PLANS AND CONTRACT DOCUMENTS

Plans and Specifications (including Instructions to Bidders, General Conditions, and Special Provisions), and the Forms of Proposal, Contract and Bond, and all made a part of this Contract, are on file in the office of the Agency and/or Architect and may be seen there. They may also be seen at designated location noted in the "Notice to Bidders" letter within this document. Copies may also be obtained from the Agency.

23. EXEMPTION FROM PAYMENT OF NEBRASKA SALES/USE TAX (IF USED)

The Contractor is exempt from payment of the Nebraska Sales/Use Tax under the regulations of the Nebraska Department of Revenue Act of 1967. The Agency will issue and Appointment of Purchasing Agent Form and Exemption Certificates to the Contractor to be used for this project.

Bid Time: **2:00pm**

Bid Date: **7/6/2017**

Bid Location: **DCS Engineering**
Conference Room "E", Bldg. 1
Folsom & W. Prospector Place
Lincoln, Nebraska

PROPOSAL

Proposal of hereinafter called the "Bidder" a corporation/ a partnership/ an individual doing business as:

_____
Firm Name

_____
Address

The undersigned, being familiar with local conditions affecting the cost of the work, and the Proposed Contract Documents, including the Advertisement for Bids, Instructions to Bidders, Proposal Form, Contract Form, Form of Contract, Performance Bond, Form of Labor and Materials Bond, General Conditions, Special Conditions, Specifications and Plans, all on file in the office of the Department of Correctional Services, Engineering Division, Lincoln, Nebraska, hereby proposes to furnish all plant, equipment, transportation, materials, tools, labor and skills necessary and required to perform all work as described in the Proposed Contract Documents entitled:

CUP Temporary Connections
Nebraska State Penitentiary
4201 South 14th Street
Lincoln, NE

all in strict accordance with the Proposed Contract Documents including Addenda Numbers _____, _____, and _____ issued and attached thereto.

For all work described in the Specifications and shown on the Plans for the project, I (or/we) agree to perform all the work for the sum of:

BASE BID: Project Name

_____ **(Dollars)** **($ _____)**
(words) (dollars)

ALTERNATE #1: (ADD/DEDUCT)

Item #1: Description

_____ **(Dollars)** **($_____)**
(words) (dollars)

UNIT COST: (ADD/DEDUCT)

Item #1: Description

_____ **(Dollars)** **($_____)**
(words) (dollars)

It is the Owner's intent to award a single prime contract for this project.

Amounts shall be shown in both written form and figures. In case of discrepancy the written figures will govern.

Bidders shall acknowledge the receipt of any and all addenda issued in the space provided above.

The undersigned agrees to commence work within ten (10) calendar days of written notice to proceed and complete all work within _____ calendar days following the Award of the Contract.

The undersigned acknowledges having reviewed provisions outlined for exemption of payment of sales taxes to the State of Nebraska and also understands the requirements for registration of any and all non-resident contractors and sub-contractors with the Nebraska Department of Revenue.

Bid Security is required and accompanies this proposal in the amount of _____, the same being subject to forfeiture in the event of default by the undersigned.

In submitting this bid, it is understood that the right is reserved by the Department of Correctional Services to reject any or all bids and to waive informalities, and it is further understood that this bid may not be withdrawn during the period of forty (40) days following the scheduled closing time for receipt of bids.

By signing this bid proposal, the Contractor certifies that they maintain a drug free workplace environment.

Upon receipt of notice of acceptance of the bid, I (or/we) will execute a formal contract within five days and deliver Surety Bonds as required for faithful performance of this contract.

_____	_____
Date	Firm Name
_____	_____
By	Address
_____	_____
Title	Firm's Federal Tax Identification Number
	_____
	Firm's Telephone Number
	_____
	Firm's Fax Number

CONSTRUCTION CONTRACT

This Agreement (#_____) made and entered into as of the _____ day of _____, 2012 by and between:

hereinafter called the "Contractor", and the Department of Correctional Services, hereinafter called the "Owner".

ARTICLE I. - SCOPE OF WORK

The Contractor shall furnish all the materials and perform all of the work shown on the Drawings and described in the Specifications entitled:

CUP Temporary Connections
Nebraska State Penitentiary
Lincoln, NE
PROJECT # : 1602

prepared by**: Farris Engineering and the Department of Correctional Services - Engineering Department** acting as, and in these contract documents entitled, the Agency representative, and the Contractor shall do everything required by this agreement and the contract documents.

ARTICLE II. - TIME OF COMMENCEMENT AND COMPLETION

The work to be performed under this contract shall be commenced within the time specified in the contract documents and shall be completed in _____ calendar days following award of the contract.
Contractor and Owner agree that **final completion** of all work, including **final invoicing**, shall be completed by _____.

ARTICLE III. - CONTRACT SUM

The Owner shall pay the Contractor for the performance of the work, subject to additions and deductions by change order as provided in the general conditions in current funds the contract sum as follows:

BASE BID: Project Name

_____ **(Dollars)** **($ _____)**
(words) (dollars)

ALTERNATE #1: (ADD/DEDUCT)
Item #1: Description

_____ **(Dollars)** **($_____)**
(words) (dollars)

UNIT COST: (ADD/DEDUCT)
Item #1: Description

_____ **(Dollars)** **($_____)**
(words) (dollars)

It is the Owner's intent to award a single prime contract for this project.

ARTICLE IV. - PROGRESS AND FINAL PAYMENTS

Based on application for payment submitted to the Owner by the Contractor, the Owner shall make progress payments on account of the Contract sum to the Contractor as specified in the General Conditions.

The Owner shall make final payment 45 days after completion of the work, provided the contract be then fully performed, subject to the provisions of the General Conditions.

ARTICLE V. - CONTRACT DOCUMENTS

The contract documents shall consist of the following components:

1. Advertisement of Bids
2. Instructions to Bidders
3. The Accepted Proposal
4. General Conditions
5. Special Conditions and Specifications
6. Plans and Drawings
7. This Instrument
8. Performance and Labor and Material Bond
9. Addenda Added

This instrument, together with the component documents hereinabove mentioned, form the contract, and they are as fully a part of the contract as if hereto attached or herein repeated.

ARTICLE VI. - MISCELLANEOUS PROVISIONS

There shall be no discrimination against any employee who is employed in the work covered by this contract, or against any applicant for such employment because of age, color, national origin, race, religion, sex, or physical handicap.

Continuation of this Contract is contingent upon the appropriation of the necessary funds and the Department may terminate this Contract due to lack of funds upon three (3) business day notice to the other party.

By signing this contract, the Contractor certifies that they maintain a drug free workplace.

IN WITNESS WHEREOF, the parties hereto have caused this instrument to be executed in three (3) counterparts as of the day and year above written.

_____
CONTRACTOR

_____
SIGNATURE DATE

_____
PRINTED NAME TITLE

_____
ADDRESS

_____
ADDRESS

_____
FIRM'S FEDERAL TAX IDENTIFICATION NUMBER

_____
PHONE NUMBER FAX NUMBER

Seal, of any

ATTEST: _____
SECRETARY

DEPARTMENT OF CORRECTIONAL SERVICES

_____
SCOTT R. FRAKES, DIRECTOR
DEPARTMENT OF CORRECTIONAL SERVICES

FORM OF CONTRACT PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS, that we the undersigned

of _____ (hereinafter called the "Principal") a corporation, partnership, individual duly authorized by law to do business as a construction contractor in the State of_____ and _____ of _____ (hereinafter called the "Surety"), a corporation, duly authorized to do surety business under the laws of the State of _____ are held hereby bound unto _____(hereinafter called the "Obligee") in the penal sum of _____ Dollars($_____), lawful money of the United States, for the payment of which well and truly to be made unto said Obligee, we bind ourselves, our heirs, executors, administrators, successors and assigns, jointly, severally, formly by these presents, as follows:

The conditions of this obligation are such that, whereas on the _____ day of _____ , 20 ___, the said Principal entered into a written agreement with said Obligee for the construction of

Project Name / Description:_____
Project Location:_____

As set forth in detail in the Advertisement for Bids, General Conditions, Information for Bidders, Proposal, Specifications, and other related contract documents referred to in said agreement, all of which are hereby made a part hereof as if written herein at length.

NOW THEREFORE, if the said Principal shall well and truly perform and complete said project in strict accordance with said Agreement, Advertisement for Bids, General Conditions, Information for Bidders, Proposal, Specifications, and other related contract documents, shall comply with all the requirements of the laws of the State Nebraska, shall pay as they become due all just claims for work or labor performed and materials furnished in connection with said agreement, and shall defend, indemnify and save harmless said Obligee against any and all liens, encumbrances, damages, claims, demands, expenses, costs and charges of every kind, including patent infringement claims except as otherwise provided in said Specifications and other contract documents, arising out of or in relation to the performance of said work and the provisions of said Agreement, then these presents shall be void; otherwise they shall remain in full force and effect.

This obligation is made for the use of said Obligee and also for the use and benefit of all persons who may perform any work or labor or furnish any material in the execution of said agreement and may be sued on thereby in the name of any such party claiming the benefits hereof.

The said surety, for the value received, hereby stipulates and agrees that no change, extensions of time, alteration or addition to the terms of the Agreement or to the work to be performed thereunder or the Specifications accompanying the same, shall be in any wise effect its obligations on this Bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the Agreement or to the work or to the Specifications.

IN TESTIMONY WHEREOF, the parties hereunto have caused the execution hereof in one original counterpart as of _____ day of _____ , 20_____

(Seal) _____
Principal

Attest: _____ By:_____
Title

(Seal) _____
Surety

Attest: _____ By: _____
Title

Nebraska Department of REVENUE

Nebraska Resale or Exempt Sale Certificate

for Sales Tax Exemption

• Read instructions on reverse side/see note below

RESET FORM

FORM 13

NAME AND MAILING ADDRESS OF PURCHASER	NAME AND MAILING ADDRESS OF SELLER
Name	Name
Street or Other Mailing Address	Street or Other Mailing Address
City State Zip Code	City State Zip Code

Check Type of Certificate

☐ Single Purchase ☐ Blanket If blanket is checked, this certificate is valid until revoked in writing by the purchaser.

I hereby certify that the purchase, lease, or rental by the above purchaser is exempt from the Nebraska sales tax for the following reason:

Check One ☐ Purchase for Resale (Complete Section A) ☐ Exempt Purchase (Complete Section B) ☐ Contractor (Complete Section C)

SECTION A — Nebraska Resale Certificate

Description of Item or Service Purchased

I hereby certify that the purchase, lease, or rental of _____ from the above seller is exempt from the Nebraska sales tax as a purchase for resale, rental, or lease in the normal course of our business, either in the form or condition in which purchased, or as an ingredient or component part of other property to be resold.

I further certify that we are engaged in business as a: ☐ Wholesaler ☐ Retailer ☐ Manufacturer ☐ Lessor

of Description of Product Sold, Leased, or Rented _____

If None, State Reason

and hold Nebraska Sales Tax Permit Number 01- _____

or Foreign State Sales Tax Number _____ State _____

SECTION B — Nebraska Exempt Sale Certificate

The basis for this exemption is exemption category _____ (Insert appropriate category as described on reverse of this form.)

If exemption category 2 or 5 is claimed, enter the following information:

Description of Item(s) Purchased _____ Intended Use of Item(s) Purchased _____

If exemption categories 3 or 4 are claimed, enter the Nebraska Exemption Certificate number. 05- _____

If exemption category 6 is claimed, seller must enter the following information and sign this form below:

Description of Item(s) Sold _____ Date of Seller's Original Purchase _____ Was Tax Paid when Purchased by Seller? ☐ YES ☐ NO Was Item Depreciable? ☐ YES ☐ NO

SECTION C — For Contractors Only

1. Purchases of Building Materials or Fixtures:

☐ As an Option 1 or Option 3 contractor, I hereby certify that purchases of building materials and fixtures from the above seller are exempt from Nebraska sales tax. My Nebraska Sales or Consumer's Use Tax Permit Number is: 01- _____

2. Purchases Made Under Purchasing Agent Appointment on behalf of _____ (exempt entity):

☐ Pursuant to an **attached** Purchasing Agent Appointment and Delegation of Authority for Sales and Use Tax, Form 17, I hereby certify that purchases of building materials, and fixtures are exempt from Nebraska sales tax.

Any purchaser, or their agent, or other person who completes this certificate for any purchase which is other than for resale, lease, or rental in the regular course of the purchaser's business, or is not otherwise exempted from the sales and use tax under Neb. Rev. Stat. §§77-2701 through 77-27,135, shall in addition to any tax, interest, or penalty otherwise imposed, be subject to a penalty of $100 or ten times the tax, whichever amount is larger, for each instance of presentation and misuse. With regard to a blanket certificate, this penalty shall apply to each purchase made during the period the blanket certificate is in effect. Under penalties of law, I declare that I am authorized to sign this certificate, and to the best of my knowledge and belief, it is correct and complete.

sign here ▶ _____ Authorized Signature _____ Title _____ Date

NOTE: **Sellers must keep this certificate as part of their records. DO NOT SEND TO THE NEBRASKA DEPARTMENT OF REVENUE. Incomplete certificates cannot be accepted.**

www.revenue.ne.gov, (800) 742-7474 (toll free in NE and IA), (402) 471-5729

6-134-1970 Rev. 3-2009
Supersedes 6-134-1970 Rev. 10-2007

INSTRUCTIONS

WHO MAY ISSUE A RESALE CERTIFICATE. Form 13, Section A, is to be issued by persons or organizations making purchases of property or taxable services in the **normal** course of their business for the purpose of resale either in the form or condition in which it was purchased, or as an ingredient or component part of other property.

WHO MAY ISSUE AN EXEMPT SALE CERTIFICATE. Form 13, Section B can only be issued by persons or organizations exempt from payment of the Nebraska sales tax by qualifying for one of the six enumerated **Categories of Exemption** (see below). Nonprofit organizations that have a 501(c) designation and are exempt from federal and state income tax are **not** automatically exempt from sales tax. Only the entities listed in the referenced regulations are exempt from paying Nebraska sales tax on their purchases when the exemption certificate is properly completed and provided to the seller. Organizations claiming a sales tax exemption may do so only on items purchased for their own use. For health care organizations, the exemption is limited to the specific level of health care they are licensed for. The exemption is not issued to the entire organization when multiple levels of health care or other activities are provided or owned by the organization. Items purchased by an exempt organization that will be resold must be supported by a properly completed Nebraska Resale Certificate, Form 13, Section A.

Indicate the category which properly reflects the basis for your exemption. Place the corresponding number in the space provided in Section B. If category 2 through 6 is the basis for exemption, you must complete the information requested in Section B.

Nebraska Sales and Use Tax Reg-1-013, Sale for Resale – Resale Certificate, and Reg-1-014, Exempt Sale Certificate, provide additional information on the proper issuance and use of this certificate. These and other regulations referred to in these instructions are available on our Web site: **www.revenue.ne.gov/legal/regs/slstaxregs**.

Use Form 13E for purchases of energy sources which qualify for exemption. Use Form 13ME for purchases of mobility enhancing equipment on a motor vehicle.

CONTRACTORS. Form 13, Section C, Part 1, must be completed by contractors operating under Option 1 or Option 3 to document their tax-free purchase of building materials or fixtures from their suppliers. Section C, Part 2, may be completed to exempt the purchase of building materials or fixtures pursuant to a Purchasing Agent Appointment, Form 17. See the contractor information guides on our Web site **www.revenue.ne.gov** for additional information.

WHERE TO FILE. Form 13 is given to the seller at the time of the purchase of the property or service or when sales tax is due. The certificate must be retained with the seller's records for audit purposes. Do not send to the Department of Revenue.

SALES TAX NUMBER. A purchaser who completes Section A and is engaged in business as a wholesaler or manufacturer is not required to provide an identification number. Out-of-state purchasers can provide their home state sales tax number. Section B does not require an identification number when exemption category 1, 2, or 5 is indicated.

PROPERLY COMPLETED CERTIFICATE. A purchaser must complete a certificate before issuing it to the seller. To properly complete the certificate, the purchaser must include: (1) identification of the purchaser and seller, (2) a statement whether the certificate is for a single purchase or is a blanket certificate, (3) a statement of basis for exemption including completion of all information for the basis chosen, (4) the signature of an authorized person, and (5) the date the certificate was issued.

PENALTIES. Any purchaser who gives a Form 13 to a seller for any purchase which is other than for resale, lease, or rental in the **normal** course of the purchaser's business, or is not otherwise exempted from sales and use tax under the Nebraska Revenue Act, shall be subject to a penalty of $100 or ten times the tax, whichever amount is larger, for each instance of presentation and misuse.

Any purchaser, or their agent, who fraudulently signs a Form 13 may be found guilty of a Class IV misdemeanor.

CATEGORIES OF EXEMPTION

1. Purchases made directly by certain governmental agencies identified in Nebraska Sales and Use Tax Reg-1-012, Exemptions; Reg-1-072, United States Government and Federal Corporations; and Reg-1-093, Governmental Units, are exempt from sales tax. A list of specific governmental units are provided in the above regulations. Governmental units are not assigned exemption numbers.

   Sales to the United States government, its agencies, and corporations wholly owned by the United States government are exempt from sales tax. However, sales to institutions chartered or created under federal authority, but which are not directly operated and controlled by the United States government for the benefit of the public, generally are taxable. Construction projects for federal agencies have specific requirements, see Reg-1-017 Contractors.

   Purchases that are **not** exempt from Nebraska sales and use tax include, but are not limited to, governmental units of other states, sanitary and improvement districts, urban renewal authorities, rural water districts, railroad transportation safety districts, and county historical or agricultural societies.

2. Purchases when the intended use renders it exempt as set out in paragraph 012.02D of Reg-1-012, Exemptions. Complete the description of the item purchased and the intended use as required on the front of Form 13. Sellers of **repair parts** for agricultural machinery and equipment cannot accept a Form 13 to exempt such sales from tax.

3. Purchases made by organizations that have been issued a Nebraska Exempt Organization - Certificate of Exemption are exempt from sales tax. Reg-1-090, Nonprofit Organizations; Reg-1-091, Religious Organizations; and Reg-1-092, Educational Institutions, identify such organizations. These organizations will be issued a Nebraska state exemption identification number. This exemption number must be entered in Section B of the Form 13.

4. Purchases of common or contract carrier vehicles and repair and replacement parts for such vehicles.

5. Purchases of manufacturing machinery or equipment by a taxpayer engaged in business as a manufacturer for use predominantly in manufacturing. This includes the installation, repair, or maintenance of such qualified manufacturing machinery or equipment (see Revenue Ruling 01-08-2).

6. A sale that qualifies as an occasional sale, such as a sale of depreciable machinery and equipment productively used by the seller for more than one year and the seller previously paid tax on the item. The **seller** must sign and give the exemption certificate to the purchaser. The certificate must be retained by the purchaser for audit purposes (see Reg-1-014, Exempt Sale Certificate).

STATE OF NEBRASKA ACH ENROLLMENT FORM

Mail or Fax to: State Accounting - Operations
Attn: Dee Ward
PO Box 94664
Lincoln, NE 68509-4664
Phone: 402-471-0603
Fax: 402-471-0887

☐ New ☐ Change

Email questions only to: Dee.Ward@nebraska.gov

(Please do not Email this form. Thank you.)

If you have any questions when completing this form, please contact the State Treasurer's Office:

State Treasurer
Attn: Treasury Management
Rm. 2005, State Capitol
Lincoln, NE 68509
Phone: 402-471-2455
Fax: 402-471-0816

Version 10.14.2010

☑ CTX or CCD+

The information below should be completed by the vendor. If the vendor has any questions, please contact the State Accounting Division at 402-471-0604 or 402-471-2581.

It is the Financial Institution's responsibility to assure the accuracy of the following banking information. If there are any questions, please contact the State Treasurer's Office at 402-471-2455.

Vendor Information

Name: _____
(as shown on your Income Tax Return)

Business Name: _____
(If different from above)

Remit to Address: _____

_____

Federal Tax ID #: _____

Contact Person: _____

Phone #: _____

Fax #: _____

Email: _____

(Email address will be used for notification of ACH payment)

This authorization may be used for (check one)...

☐ All payments by the State of Nebraska

OR

☐ Only payments listed below (list the State Agency):

_____

Financial Institution Information

Name: _____

Address: _____

_____

ACH Coordinator: _____

Phone #: _____

Fax #: _____

Nine Digit Routing Transit #: _____

Depositor Account #: _____

Depositor Account Title: _____

Type of Account: ☐ Checking ☐ Savings

☐ Check here if the bank is outside of the United States.

☐ Check here if the following must be discussed with your entity: There are new processing requirements for electronic vendor payments that are being sent to a financial institution outside of the United States. If our payments to you are being forwarded from a U.S. financial institution to a financial institution in another country, please advise (identify who within your company).

The State of Nebraska will provide the remittance information via email if an email address was provided above. If no email address was provided it is the responsibility of the vendor to obtain the ACH payment related remittance information by requesting it from their financial institution. The State of Nebraska will continue to send the payment related remittance information through the ACH network in the payment addenda record(s). ACH Rules state the financial institution is required to provide this information to the vendor by the opening of business on the second banking day following the settlement date of the payment. Please contact the ACH department at your financial institution regarding the services your bank provides to obtain the payment information.

(Please Print or Type - Signature Required)

Vendor Signature: _____

Name: _____

Title: _____

Date: _____

(Please Print or Type - Authorized Bank Signature Required for verification of bank routing numbers.)

Authorized Bank Signature: _____

Name: _____

Title: _____

Date: _____

NEBRASKA
DEPT OF CORRECTIONAL SERVICES

Personal Information for Security Check

As part of maintaining a safe and secure environment the NDCS may conduct security checks prior to and periodically throughout an individual's employment or affiliation with the NDCS. A conviction does not automatically bar an individual from entering a facility or from employment. Each case will be considered individually. **All information on this document is required.** If you omit any information from this form you may be disqualified from entrance to a facility or employment. **PLEASE READ FULLY AND PRINT LEGIBLY IN INK.**

Please check the appropriate reason for requesting entrance into a facility.

List position title and facility: _____

☐ Contractor ☐ NDCS Employment ☐ Volunteer ☐ Clergy ☐ Intern ☐ Temp/SOS ☐ PREA

_____	___/___/___	___ ___ ___ - ___ ___ - ___ ___ ___ ___
PRINT NAME (Last Name, First Name, Middle Initial)	Date of Birth Month/Day/Year	Social Security Number

_____
Other Names Used (e.g. aliases, former names, etc.)

_____ / _____	_____	___/___/___
Driver's License Number / State If no driver's license, please enter your state ID.	State ID number	Expiration Date

_____	____	____	___ . ___	___ lbs.	_____	_____
Place of Birth (City, State or Country)	Sex	Race	Height	Weight	Eyes	Hair

List all previous states or countries of residence: _____

Current address:

_____	_____	_____	_____
Street Address	City	State	Zip

Please provide your current phone numbers and e-mail addresses (business and personal):

Home: (_____) _____ E-mail addresses: _____

Cell: (_____) _____ _____

Other: (_____) _____ _____

Are you currently or have you ever been in contact with any Nebraska Department of Correctional Services inmate (current or former) by way of phone, facility visit, or email? Yes_____ No _____
If yes, state name, facility, and relationship to you _____

Are you or have you ever been affiliated with a gang/security threat group(s)? Yes_____ No _____
If yes, state group name and your affiliation _____

I hereby certify that all information I have entered on this form is accurate and complete. I understand and agree that the NDCS may use information on this form to conduct security checks prior to and periodically throughout my employment or affiliation with the NDCS. I understand that failure to disclose or fully disclose the requested information may be grounds for disqualification of my application or termination of my employment.

_____ _____
Signature Date

3. Have you ever engaged in sexual abuse in prison, jail, lockup, community confinement facility (a locked facility, part or a juvenile facility, or other institution? ☐ Yes ☐ No If yes, please provide an explanation: _____

4. Have you ever been convicted of engaging or attempting to engage in sexual activity in the community facilitated by force, overt or implied threats of force, or coercion, or if the victim did not consent or was unable to consent or refuse? ☐ Yes ☐ No
If yes, please provide an explanation: _____

5. Have you ever been civilly or administratively adjudicated to have engaged in the activity described in question 1 or 2?
☐ Yes ☐ No If yes, please provide an explanation: _____

6. Have you ever had any substantiated allegations of sexual harassment made against you in a prison, jail, lockup, community confinement facility or other institution? ☐ Yes ☐ No If yes, please provide an explanation: _____

7. Have you ever had any substantiated allegations of sexual harassment made against you in the community? ☐ Yes ☐ No
If yes, please provide an explanation: _____

8. Are you currently or have you ever been affiliated with a gang/security threat group? ☐ Yes ☐ No If yes, provide name of group and your affiliation:

9. Are you or have you ever been the subject of a protection order? ☐Yes ☐No If yes, please provide the jurisdiction, dates and explanation: _____

10. Have you ever been convicted of a crime involving the use or attempted use of force or a weapon against a current or former spouse, child, person for whom you were or are a guardian, person with whom you share a child, live-in girlfriend or boyfriend, or a person similarly situated to a spouse, child or person for whom you were or are the guardian? This includes disorderly conduct, stalking, harassment, or similar charge. ☐ Yes ☐ No If yes, please provide the jurisdiction, dates and explanation: _____

I hereby certify that all information I have entered on this form is accurate and complete. I understand and agree that the NDCS may use information on this form to conduct security checks prior to and periodically throughout my employment or affiliation with the NDCS. I understand that failure to disclose or fully disclose the requested information may be grounds for disqualification of my application or termination of my employment.

_____ _____

Signature Date

SPECIFICATIONS

GENERAL CONDITIONS

(Rev.2-4-2013)

INDEX

GENERAL CONDITIONS

1. DEFINITIONS

The Department of Correctional Services, sometimes referred to as the "Owner", or "Agency", the "Architect", and the "Contractor", are those named as such in the Contract Documents.

The Department of Correctional Services is the Department of Correctional Services of the State of Nebraska.

The "Architect" is the consulting architect or engineer that the Agency may have employed to perform professional services required for the planning and construction of this project.

The Authorized Agent is the Chief of the Engineering Section of the Nebraska Department of Correctional Services. He may act personally or by and through such assistants as may be duly authorized to act for him; but whenever in these conditions the word "Authorized Agent" is used, it shall be understood as referring to the Engineer appointed by the Department of Correctional Services and not to any assistant.

The term "the work" or "Work of the Contractor" includes labor or materials or both, equipment, transportation, and other facilities necessary to complete the Contract.

The term "Subcontractor" as employed herein, includes any person, firm or corporation having a direct contract with the Contractor to supply labor or materials or both for work of the contractor, but does not include those who merely furnish material or materials not worked to a special design according to the plans and specifications of this work.

The term "Surety" includes any person, firm or corporation that has executed, as surety, the Contractor's performance bond securing the performance of the Contract.

The words "Plans" and "Drawings" are used synonymously in this Contract.

Wherever the word "Approved", "Approval", "As selected", appear in the specifications, it shall mean the approval of selection by the Architect or Authorized Agent.

2. DEFINITION OF NOTICE

Wherein any of the contract documents there is any provision in respect to the giving of notice, such notice shall be deemed to have been given; as to the Department of Correctional Services, when written notice shall be delivered to the Authorized Agent of the Department of Correctional Services, or shall have been placed in the United States Mails addressed to the Authorized Agent of the Department of Correctional Services, as to the Contractor, when written notice shall be delivered to the chief representative of the Contractor at the site of the project or by mailing such written notice in the United States Mail addressed to the Contractor at the place stated as the address of his permanent place of business in the Proposal Form; as to the Surety on the performance bond, when a written notice is placed in the United States Mails, addressed to the Surety at the home office of such Surety or to its agent or agents who executed such performance bond in behalf of such surety.

3. AUTHORITY OF THE CONSULTANT OR AGENT

The Department may for professional services required for certain projects employ consulting architects or engineers -- in these documents referred to as the Architect. The Department on certain other projects may direct that the professional services be performed by the authorized agent of the Department under the direction of the Architect. It will be clearly stated in the Advertisement for Bids, Special Conditions, and Contract, whether professional services are being performed by an Architect.
The Architect or Authorized Agent who has prepared the plans and specifications shall make written interpretations of them. He shall approve all samples of material which are specified to be submitted

for approval, approve the use of any equipment offered in lieu of that mentioned in the specifications and shall check and approve all shop drawings and details. He shall make periodic inspections of the project work and shall decide the quantity of the work and material incorporated therein. He shall decide all questions which may arise as to the fulfillment of the Contract by the Contractor.

4. CONTRACTOR'S SUPERINTENDENT

The Contractor shall keep on his/her work, during its progress, a competent superintendent and any necessary assistants, all satisfactory to the Authorized Agent. The Superintendent shall not be changed except with the consent of the Authorized Agent, unless the Superintendent proves to be unsatisfactory to the contractor and ceases to be in his employ. The Superintendent shall represent the Contractor in his absence and all directions given by him shall be as binding as if given to the Contractor. Important directions shall be confirmed in writing to the Contractor. Other directions shall be so confirmed on written request in each case.

5. PLANS AND SPECIFICATIONS - CORRELATION

The work shall be executed in strict conformity with the plans and specifications.

Plans, drawings and specifications are cooperative and supplementary. Portions of the work which can best be illustrated by the plans and drawings may not be included in the specifications and portions of the work best described by the specifications may not be depicted on the plans or drawings. All items necessary to construct or erect a complete improvement, project, building or structure shall be furnished whether called for in the specifications or shown on the plans and drawings. Special conditions shall take priority over General Conditions: Detailed Specifications shall take priority over General Specifications and large scale drawings shall take priority over small scale drawings. In case of disagreement between the plans, drawings and specifications, or within any document itself, the better quality or greater quantity of work shall be estimated and the matter drawn to the Authorized Agent's attention for decision.

6. SHOP DRAWINGS

All work on which shop drawings are required must be in strict accordance with such drawings when approved and no work for which shop drawings are required is to be begun until after the approval of said drawings. FIVE COPIES of each shop drawing shall be submitted to the Architect or Authorized Agent.

All shop drawings must be checked and completed in every respect, numbered consecutively, have the name of the project printed thereon, and each lot must be submitted accompanied by a letter of transmission referring to the number of drawings and the name of the project for identification and especially drawing the Architect's or Agent's attention to any modification of plans and specifications that may have been made.

The Contractor shall make any corrections required by the Architect and file with him FIVE corrected sets for approval.

After the shop drawings have been approved, any portion of shop drawings which modify the plans shall be rejected as soon as such modification is discovered unless said modification has been specifically pointed out to the Architect as stipulated above and specific approval secured.

The approval of such shop drawings will be only general in character and shall in no way relieve the Contractor from responsibility for the accuracy of the shop drawings or for proper fitting and construction of the work, or from the necessity of furnishing any materials and workmanship required by the drawings and specifications which may not be indicated on shop drawings when approved.

7. MATERIALS - TESTS AND STANDARDS

Samples of materials selected by the Authorized Agent to be tested must be furnished by the Contractor. The State Roads Department Testing Laboratory will perform all tests at no cost to the Contractor. Where not otherwise specified, all materials shall meet the A.S.T.M. Standard or tentative specifications for that material. The Contractor, when requested, shall furnish a sample of all material which shall be kept on the job as basis for comparison of material incorporated in the job.

8. OBSOLETE EQUIPMENT

It is important that the Department of Correctional Services be protected as far as possible against the discontinuance of the make of equipment to be purchased, and that repair parts, services of expert factory representatives be available if desired. Under these conditions, the Contractor shall not furnish equipment made by firms in the hands of receivers or equipment not currently in production by the manufacturers.

9. PATENTS

The Contractor and his Surety shall hold and save harmless the Department of Correctional Services, its officers, agents, servants, and employees from liability of any nature or kind including costs and expenses, for or on account of any patented invention, articles or appliances manufactured or used in the performance of this Contract unless otherwise specifically stipulated in this contract.

10. OTHER CONTRACTS

The Department of Correctional Services may award contracts for additional work and the Contractor shall fully cooperate with such other contractors and carefully fit his own work to that provided under other contracts as may be directed by the Authorized Agent. The Contractor shall not commit or permit any act which will interfere with the performance of work by any other contractor.

11. ASSIGNMENT OF CONTRACT

The Contractor shall not assign this Contract or any part hereof without the written consent of the Department of Correctional Services. No assignment of this contract shall be valid unless it shall contain a provision that the funds to be paid to the Assignee under the Assignment are subject to a prior lien for services rendered or materials supplied for the performance of work called for in said contract in favor of all persons, firms, or corporations rendering such services or supplying such materials.

12. SUBCONTRACTING

The Contractor shall be fully responsible to the Department of Correctional Services for the acts and omissions of his subcontractors and of persons either directly or indirectly employed by them.

Nothing contained in the Contract shall create any Contractual relation between any subcontractor and the Department of Correctional Services.

The attention of the Contractor and subcontractors is called to the Contract Documents which are a part of this contract.

The Contractor must notify the Department of Correctional Services of each subcontract he intends to award, giving:

Name of subcontractor
Branch of work concerned
Total price of subcontract

No part of this Contract shall be sublet without prior approval of the Department of Correctional Services.

13. CONTRACTOR'S INSURANCE

The Contractor shall not commence work under this Contract until he/she has obtained all the insurance required hereunder and such insurance has been approved by the Owner nor shall the Contractor allow any subcontractor to commence work on his subcontract until all similar insurance required of the subcontractor has been obtained and approved by the Owner (or Contractor). Approval of the insurance by the Owner shall not relieve or decrease the liability of the Contractor hereunder.

If by the terms of any insurance a mandatory deductible is required, or if the Contractor elects to increase the mandatory deductible amount, the Contractor shall be responsible for payment of the amount of the deductible in the event of a paid claim.

(a) WORKER'S COMPENSATION INSURANCE

The Contractor shall take out and maintain during the life of this Contract the statutory Worker's Compensation and Employer's Liability Insurance for all of his employees to be engaged in work on the project under this Contract and, in case any such work is sublet, the Contractor shall require the subcontractor similarly to provide Worker's Compensation and Employer's Liability Insurance for all of the latter's employees to be engaged in such work. This policy shall be written to meet the statutory requirements for the state in which the work is to be performed, including Occupational Disease. Where applicable, this policy shall provide USL&H coverage. This policy shall include a waiver of subrogation in favor of the Owner. The amounts of such insurance shall not be less than the limits stated hereinafter.

(b) COMMERCIAL GENERAL LIABILITY INSURANCE AND COMMERCIAL AUTOMOBILE LIABILITY INSURANCE

The Contractor shall take out and maintain during the life of this Contract such Commercial General Liability Insurance and Commercial Automobile Liability Insurance as shall protect him and any subcontractor performing work covered by this Contract from claims for damages for bodily injury, including death, as well as from claims for property damage, which may arise from operations under this Contract, whether such operation be by himself or by any subcontractor or by anyone directly or indirectly employed by either of them, and the amounts of such insurance shall not be less than limits stated hereinafter.

The Commercial General Liability Insurance shall be written on an occurrence basis, and provide Premises/Operations, Products/Completed Operations, Independent Contractors, Personal Injury and Contractual Liability coverages. The policy shall include the Owner, and others as required by the Contract Documents, as an Additional Insured. This policy shall be primary, and any insurance or self-insurance carried by the Owner shall be considered excess and non-contributory. The Commercial Automobile Liability Insurance shall be written to cover all Owned, Non-owned and Hired vehicles.

(c) INSURANCE-BUILDER'S RISK

Unless otherwise provided, the Contractor shall purchase and maintain Builder's Risk Insurance for the entire value of the project and work site, from a company or companies lawfully authorized and licensed to do business in the jurisdiction in which the Project is located. This insurance shall be written to cover all risks of direct physical loss, and shall include interests of the Owner, the Contractor, and Sub-contractors in the Work. A loss insured under this insurance shall be adjusted with the Owner and made payable to the Owner as fiduciary for the insured, as their interests may appear.

(d) INSURANCE COVERAGE AMOUNTS REQUIRED

1.	Workers' Compensation and Employer's Liability	
	Coverage A	Statutory
	Coverage B	
	Bodily Injury by Accident	$100,000 each accident
	Bodily Injury by Disease	$500,000 policy limit
	Bodily Injury by Disease	$100,000 each employee
2.	Commercial General Liability	
	General Aggregate	$2,000,000
	Products/Completed Operations Aggregate	$2,000,000
	Personal/Advertising Injury	$1,000,000 any one person
	Bodily Injury/Property Damage	$1,000,000 per occurrence
	Fire Damage	$50,000 any one fire
	Medical Payments	$5,000 any one person
3.	Commercial Automobile Liability	
	Bodily Injury/Property Damage	$1,000,000 combined single limit
4.	Umbrella/Excess Liability	
	Over primary insurance	$1,000,000 per occurrence
5.	Builder's Risk	100% of work completed values.

14. EVIDENCE OF COVERAGE

The Contractor shall furnish the Owner with documentary evidence of insurance coverage which should be in the form of certificates submitted in duplicate. These certificates shall include the name of the company, serial number of the policy, effective dates, dates of expiration, and amounts and types of coverage afforded.

The following clauses or endorsements must be added to the certificates for the respective types of insurance. If the clause or endorsement is placed on the reverse side of such certificate, it should be followed by the signature of the official of the company who signs the certificate. All certificates must contain the following two clauses of endorsement;

"The insurance contract referred to herein provides complete coverage within the limits stated for the type of insurance mentioned covering all the insured's operations in connection with the insured's contract on the_____."

"Said insurance contract also provides that it cannot be canceled by the insurer in less than ten days after the insured has been given written notice of such cancellation."

15. PROTECTION OF PERSONS AND PROPERTY

The Contractor shall take all reasonable and proper precautions to protect persons and property from injury or damage resulting from his or her operation under this Contract. The requirements of the Nebraska Safety Codes adopted by the Nebraska State Department of Labor shall be applicable.

The Contractor shall protect all existing buildings, roadways, landscaping, and utilities against damage or interruption of services. It shall be the responsibility of the Contractor to correct health or safety hazards and repair property damage that results from their work. Such corrections shall be performed to restore conditions to at least the quality that existed at the time of commencement of this Work.

16. PROSECUTION OF THE WORK AND COMPLETION DATE

The work embraced in this contract shall be started on the earliest possible date after the signing of contract by both parties, and shall be carried on regularly and uninterruptedly thereafter, with such forces and by such means as will insure final completion of the entire contract on or before the completion date set in the documents. The time of beginning, rate of progress and time of completion are essential conditions of the contract.

The Contractor expressly agrees that in undertaking to complete the work within the Contract period fixed in the Contract Documents, he/she has taken into consideration and made allowances for all delays and hindrances incidental to such work, whether growing out of delays in securing materials or workmen, or otherwise.

Should the Contractor be delayed in the prosecution and completion of the work by any cause beyond his control, he/she may have no claim or right of action for damages from the Owner for any such cause or delay unless the cause or delay is the result of active interference by the Owner. The Contractor will in such case be granted an extension of time specified for completion of the work as the Owner may award in writing on account of such delay, provided, however, that claim for extension of time is made by the Contractor to the Owner, through the Engineer, in writing, within two weeks from the time when such alleged cause for delay shall occur. The Owner reserves the right to withhold granting of any time extensions until the stipulated contract period is about to expire.

The Owner, at his own discretion, may waive the above requirements and grant extensions of time for any reason he deems valid. Time extension will not be granted for rain, wind, flood, or other natural phenomenon of normal intensity for the locality where the work is performed.

An extension of the contract period may be granted by the Owner for any of the following reasons:

1) Additional work resulting from modification of the plan for the project.
2) Delays caused by the Owner.
3) Other reasons beyond the control of the Contractor in which the Owner's judgment would justify such extension.

No extension of the Contract period will be allowed for variation between contract quantities and actual quantities which cannot be predetermined and which amount to less than twenty-five percent (25%) of the contract quantities.

17. SURVEY STAKES AND LEVELS

The Contractor, unless otherwise specified, will stake out the project work and shall furnish and maintain the batter boards, level, etc.

The Contractor must carefully preserve bench marks and reference points established by the Architect or Authorized Agent; in case of their destruction, he/she will replace them and be responsible for any mistakes that may be caused by their loss or disturbance.

18. USE OF JOB SITE

The Contractor shall confine his/her equipment, apparatus, the storage of materials, and operations of his workmen to limits indicated by law, ordinance, permits, or directions of the Department of Correctional Services and shall not unnecessarily encumber the premises with his materials.

The Contractor shall not load or permit any part of a structure to be loaded with a weight that will endanger its safety. The Contractor shall enforce the Authorized Agent's instructions regarding signs, advertisement, fires, and smoke.

19. LABOR

All labor shall be performed in the best and most workmanlike manner by mechanics skilled in their respective trades. The standards of the work required throughout shall be of such grade as will bring results of the first class only.

Mechanics, whose work is unsatisfactory to the Architect or Agent or are considered by either to be unskilled or otherwise objectionable, shall be instantly dismissed from the work upon notice from the Authorized Agent.

Contractor and subcontractor employed upon the work shall and will be required to conform to the Labor Laws of the State of Nebraska, and the various acts amendatory and supplementary thereto; and to all other laws, ordinances, and legal requirements applicable thereto.

20. PERMITS

The Contractor is required to make application for and obtain all necessary permits required prior to start of construction. Inspection of projects by these agencies such as the State Electrical Inspector shall be permitted as necessary to insure compliance with applicable regulations.

21. INSPECTION

The Department of Correctional Services through its authorized representatives and agents shall be permitted to inspect all work, materials, payrolls, records of personnel, invoices of materials, and other relevant data and records.

The Owner and Architect/Engineer shall at all times have access to the work and the premises used by the Contractor and to all places of manufacture where materials are being made for use under this contract, and shall have full facilities for determining that such materials are being made strictly in accordance with the plans and specifications.

22. DEFECTIVE WORK OR MATERIAL

Work or material not in accordance with the Plans and Specifications, or in any way defective shall be removed at once on order of the Architect or Authorized Agent. The Contractor shall replace or rebuild at his own expense with satisfactory material and in a workmanlike manner any work so removed and shall reimburse the Department of Correctional Services for any expense that it is put to by reason of extra work, and shall reimburse any other contractor who may incur expense caused by removal of the defective work.

23. TERMINATION FOR BREACH

In event that any of the provisions of this Contract are violated by the Contractor or any of his subcontractors, the Department of Correctional Services may serve written notice upon the Contractor and the Surety of its intention to terminate the Contract, and unless within ten (10) days after the serving of such notice upon the Contractor such violation shall cease and satisfactory arrangements for correction be made, the Contract shall, upon the expiration of said ten (10) days cease and terminate. In the event of any such termination, the Department of Correctional Services shall immediately serve notice thereof upon the Surety and The Contractor. The Owner may take over the work and prosecute the same to completion of Contract for the account and at the expense of the Contractor, and the Contractor and his Surety shall be liable to the Department of Correctional Services for any excess cost occasioned the Department of Correctional Services thereby and in such event the Department of Correctional Services may take possession of and utilize in completing the work, such materials, appliances, and plant as may be on the site of the work and necessary therefore. Neither the Owner nor any member or employee thereof shall be in any way liable or accountable to the Contractor or his/her surety for the method by which the completion of the said work, or any portion thereof, may be accomplished or for the price paid therefore.

24. TERMINATION DUE TO INSUFFICIENT FUNDING

The Owner may, at any time, terminate the Contract for insufficient appropriation or allocation of funds. Upon receipt of written notice from the Owner of such termination for insufficient appropriation or allocation of funds, the Contractor shall:

1) cease operations as directed by the Owner in the notice;

2) take actions necessary, or as the Owner may direct, for the protection and preservation of the Work; and

3) except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

In case of such termination for insufficient appropriation or allocation of funds, the Contractor shall be entitled to receive payment for Work executed, and reasonable costs incurred as a direct result of such termination. HOWEVER, IN NO CASE shall the Contractor receive payment for any Work not executed, and the Contractor shall NOT receive payment for overhead and profit on the Work not executed.

25. CONSTRUCTION REPORTS - PAYMENT ESTIMATES

The Contractor shall submit to the Owner schedules of costs and quantities of materials and of other items, which schedule shall be in such form and shall be supported as to correctness by such of the estimates upon which they are based as the owner may require.

The Contractor shall submit to the Owner the following records on forms to be supplies by the Contractor (Notice – AIA Document forms shall be the latest edition):

(a) AIA Document G702, Application and Certification for Payment
(b) AIA Document G703, Continuation Sheet (Schedule of Values)

26. PAYMENT

So long as the work herein contracted for is carried on in accordance with the provisions of the contract, the Contractor will, on or before the 25th day of each month, make an approximate estimate of the value of the work performed during the month and the materials suitably stored on the work site. After each such estimate shall have been approved by the Authorized Agent, the Department of Correctional Services will pay to the Contractor in State Warrants, ninety percent (90%) of the amount thereof. The Department of Correctional Services may at all times reserve and retain out of said payments, all such sums as it may be authorized to reserve or retain. At any time, prior to final payment, the total payment to the Contractor shall not exceed ninety percent (90%) of the estimated value of the work performed and materials stored at the site.

The Contractor shall pay:
(1) For all transportation and utility services not later than the 20th day of the calendar month following that in which such services are rendered
(2) For all articles, tools, and other expendable equipment to the extent of at least 90% of cost thereof, not later than the 20th of the calendar month following that in which such materials, tools, and equipment are delivered at the site of the project, and the balance of the cost thereof not later than the 30th day following the completion of that part of the work in which such materials, tools, and equipment are incorporated or used
(3) To each of his subcontractors not later than the 5th day following each payment to the Contractor, the respective amounts allowed the Contractor on account of the work performed by his subcontractors, to the extent of each such subcontractor's interest therein.

27. EXTRA, ADDITIONAL OR OMITTED WORK - PAYMENT FOR

The Department of Correctional Services shall have the right at any time and without notice to the Sureties, to alter and modify the Plans and Specifications in any particular, thus making specific changes in connections with the construction, details, or execution of the work. All changes in plans and specifications will be made by the Department of Correctional Services in writing. The Contractor shall make such alterations as may thus be ordered by the Architect or Authorized Agent and in case these changes increase or decrease the amount of work to be done under this contract, equitable amounts in price will be added to or deducted from the contract price. The amount of such increase or decrease shall be agreed upon between the Owner and the Contractor BEFORE changes are made.

When directed in writing by the Owner or Architect/Engineer, the Contractor shall furnish material and do extra work not otherwise provided for by the terms of this contract, but which may be connected with or necessary to the proper completion of the work. Such material and work shall be furnished and done as part of this contract and subject to its provisions. The payment for any such work shall be determined by agreement between the Owner and the Contractor before the extra work is done, either on the basis of a unit price, or a lump sum price, or on a cost-plus-limited basis and not to exceed the specified limit.

The payment for extra, additional or omitted work to be performed by the Contractor or subcontractors using their own forces shall be as follows: For all labor and foreman in direct charge of the specific operations, including liability and worker's compensation, the Contractor shall receive the wage rate agreed upon in writing before starting such work, for each hour that said labor, teams and foreman are actually engaged in such work, to which shall be added an amount for profit and overhead combined equal to 10% of the sum thereof. The wages of any foreman or time keeper, who is employed partly on "cost-plus" work and partly on other work, shall be prorated between the two classes of work according to the number of employees employed on each class of work as show by the payroll.

For all materials being permanently incorporated or installed into the Work, the Contractor shall receive the actual cost of such material delivered to the Work, including freight and handling charges as show by original receipted bills, to which cost shall be added a sum equal to an amount of 10% thereof for profit and overhead combined as agreed to in advance by the Owner.

If it is necessary for the Contractor to rent equipment in the performance of such work, he will be allowed the actual rental price paid, if reasonable, for the actual time that such equipment is in use on the work and to which sum 10% shall be added for profit and overhead combined.

For contractors and subcontractors, prices submitted by their respective subcontractors for labor, materials, rentals, overhead and profit may be marked up a maximum of 5%.

No claims for extra work will be allowed unless accompanied by a written Change Order from the Consultant or Architect/Engineer and approved by the Department of Correctional Services authorizing such extra work and defining the agreed basis for payment. Change Orders shall be documented on AIA Form G701 prepared by the Consultant or Architect/Engineer.

The Contractor shall, immediately after completing extra work, file with the Architect/Engineer, in writing, all claims for extra work performed. If the Contractor fails to make such claims within 30 days, Contractor's right to extra pay for such work shall be deemed to have been waived and forfeited and he or she shall not be entitled to any payment on account of such extra work.

28. CONTRACTOR'S PAYMENT FOR LABOR AND MATERIALS

The Contractor shall pay for all labor and materials used or furnished in the performance of this contract. Before final payment, the Contractor must certify that all bills for labor and materials have been paid. In event he is requested and fails to furnish satisfactory evidence, the Department of Correctional Services may withhold any payments until it is satisfied that all such claims have been paid.

29. OWNER'S RIGHT TO WITHHOLD CERTAIN AMOUNTS AND MAKE APPLICATION THEREOF

In addition to the payment to be retained by the Department of Correctional Services under preceding

provisions of these General Conditions, the Department of Correctional Services may withhold a sufficient amount of any payment other-wise due to the Contractor to cover:
(a) Payments that may be earned or due for just claims for labor or materials furnished in and about the performance of the work on the project under this contract
(b) For defective work not remedied
(c) For failure of the Contractor to make proper payments to his subcontractor.

The Department of Correctional Services shall disburse and shall have the right to act as agent for the Contractor in disbursing such funds as have been withheld pursuant to this paragraph to the party or parties who are entitled to payment therefrom. The Department of Correctional Services will render to the Contractor a proper accounting of all such funds disbursed in behalf of the Contractor.

30. CLEAN UP

On or before the completion of the work, the contractor shall clean all parts of the work under this contract. The Contractor shall remove all rubbish and all materials, tools, and equipment from the construction site, leaving the site of the work in as good condition as it was at the beginning of the work.
The Contractor shall each day clean up and remove from the project the rubbish resulting from his work, and shall at completion of his own work remove all construction materials and leave the project clean.

31. FINAL INSPECTION

When the work has been substantially completed, the Contractor shall notify the Architect or Authorized Agent, in writing, that the work will be ready for final inspection and test on a definite date which shall be stated in such notice. The notice shall be given at least ten (10) days in advance of said date.

After the final inspection has been made, the Architect or Authorized Agent shall present to the Contractor and the Agency a report ("punch list") listing all deficiencies found in the inspection of the Contractor's work.

The Contractor shall immediately make the required corrections and the work necessary to remove the deficiencies reported. When the deficiencies have been removed, the Contractor shall in writing request a re-inspection of the work.

32. FINAL PAYMENT

As soon as practicable after the completion and acceptance of the work and submittal of all guarantees, warranties, operating manuals, etc., required by the contract documents, the Architect or Authorized Agent shall prepare a final payment statement showing the final payment amount due. After approval by the Contractor and the Department of Correctional Services, the final payment voucher shall be processed for payment.

33. GUARANTEE OF WORK

a) Except as otherwise specified, all work shall be guaranteed by the Contractor against defects resulting from the use of inferior materials, equipment or workmanship for one year from the date of final completion of the Contract.

b) If, within any guarantee period, repairs or changes are required in connection with the guaranteed work, which, in the opinion of the Architect are rendered necessary as the result of the use of materials, equipment, or workmanship which are inferior, defective, or not in accordance with the Contract, the Contractor shall, promptly upon receipt of notice from the Owner, and with out expense to the Owner:

1) Place in satisfactory condition in every particular all of such guaranteed work, correct all defects therein, and

2) Make good all damages to the building or project work, or equipment or contents thereof, which, in the opinion of the Architect is the result of the use of materials, equipment, or not in accordance with the terms of the contract; and
3) Make good any work or materials, or the equipment and contents of said building or project work disturbed in fulfilling any such guarantee.

c) In any case where fulfilling the requirements of the contract or of any guarantee embraced in or required thereby, the Contractor disturbs any work guaranteed under another contract, he shall restore such disturbed work to a condition satisfactory to the Owner and guarantee such restored work to the same extent as it was guaranteed under such other contract.

d) If the Contractor, after notice, fails to proceed promptly to comply with the terms of the guarantee, the Owner may have defects corrected and the Contractor and his Surety shall be liable for all expense incurred.

e) All special guarantees applicable to definite parts of the work that may be required by the Contract Documents shall be subject to the terms of this paragraph during the first year of the life of such guarantee.

34. UNEMPLOYMENT COMPENSATION FUND

The Contractor shall make payments to the Unemployment Compensation Fund of the State of Nebraska all contributions and interest due under the provisions of Section 48-601 to 48-669, Revised Reissue Statute of Nebraska, on wages paid to individuals employed in the performance of this contract as required by Section 48-657, Revised Reissue Statute of Nebraska.

Under the requirements of Section 48-657, Revised Reissue Statute of Nebraska, the Department of Correctional Services cannot make payment to the Contractor on the final three percent (3%) of the contract without first receiving from the Contractor a written clearance from the Commissioner of Labor certifying that all payments then due of contributions or interest which may have arisen under such contract have been made by the contractor or his subcontractor to the Unemployment Compensation Fund.

35. NON-DISCRIMINATION IN EMPLOYMENT

Contractor hereby covenants and agrees that in performance of this contract, neither he/she nor any of his subcontractors shall discriminate against any of his or their employees, or on any applications for employment with his/her or their firms with respect to the employees' or applicants' hire, tenure, terms, conditions, or privileges of employment because of the employees' or applicants' race, color, age, religion, sex, disability, or national origin.

36. OCCUPANCY OF NEW WORK

The Agency may, at its own discretion, after substantial completion of the project has been approved by the Architect or Authorized Agent, occupy all or part of the project. At the time of occupancy the Agency will assume all or the fair proportionate share of utility costs for operating the project unless prior written agreements state otherwise. Contractor will maintain all insurance requirements until final payment is approved by Agency.

37. PROJECT CLOSEOUT

Maintenance an Operation Manuals: Prior to approval of final payment for the work, the Contractor shall submit four (4) bound copies of maintenance and operation manuals presenting full details and explanation of maintenance and operation requirements for equipment, materials, etc. Contractor shall be responsible for replacing any item in the work which requires particular care and/or maintenance but is not included in the bound copies and is inadvertently damaged by the Agency through lack of proper information.

Guarantee - Warranty: Prior to approval or final payment for the work, the Contractor shall submit four (4) bound copies of all guarantees and warranties required by the Specifications which exceed the general one (1) year warranty required by the Contract Documents.

38. DRUG-FREE WORKPLACE

By signing the bid proposal or contract, the Contractor certifies that they maintain a drug free workplace environment.

39. PRECONSTRUCTION CONFERENCE

A preconstruction conference shall be scheduled before starting construction, no later than 15 days after the date of the Agreement. It shall be held at the project site, or other convenient location. The meeting shall review responsibilities and personnel assignments of the Owner, Contractor, and the Consultant.

Authorized representatives of the Owner, Contractor, and the Consultant shall attend the preconstruction conference, as will the Contractor's superintendent, major subcontractors, manufacturers, suppliers, and other parties integral to the completion of the Work. All participants shall be familiar with the project and authorized to make decisions for the entities they represent.

The preconstruction conference will include discussion of items necessary for project progress and successful completion, such as: Construction scheduling; critical work sequencing; designation of responsible personnel; procedures for processing field decisions and change orders; procedures for processing Applications for Payment; distribution of Contract Documents; submission of Shop Drawings and product data a samples; preparation of record documents; use of the premises; parking availability; office, work, and storage areas; equipment deliveries and priorities; safety and first aid procedures; security; housekeeping; working hours; and other matters deemed important by the Owner.

40. WORK ELIGIBILITY STATUS OF EMPLOYEES

The Contractor is required and hereby agrees to use a federal immigration verification system to determine the work eligibility status of new employees physically performing services within the State of Nebraska. A federal immigration verification system means the electronic verification of the work authorization program authorized by the Illegal Immigration Reform and Immigrant Responsibility Act of 1996, 8 U.S.C. 1324a, known as the E-Verify Program, or an equivalent federal program designated by the United States Department of Homeland Security or other federal agency authorized to verify the work eligibility status of a newly hired employee.

If the Contractor is an individual or sole proprietorship, the following applies:

1. The Contractor must complete the United States Citizenship Attestation Form, available on the Department of Administration Services website at www.das.state.ne.us.
2. If the Contractor indicates on such attestation form that he or she is a qualified alien, the Contractor agrees to provide the US Citizenship and Immigration Services documentation required to verify the Contractor's lawful presence in the United States using the Systematic Alien Verification for Entitlements (SAVE) Program.
3. The Contractor understands and agrees that lawful presence in the United States is required and the Contractor may be disqualified or the contract terminated if such lawful presence cannot be verified as required by the Neb. Rev. Stat. §4-108 and §4-114.

END OF GENERAL CONDITIONS

SUPPLEMENTAL CONDITIONS

INDEX

SUPPLEMENTAL CONDITIONS

1. GENERAL

A. The work required under this contract consists of furnishing all labor, materials, and equipment and necessary to complete the:

CUP Temporary Connections
Nebraska State Penitentiary
4201 South 14th Street
Lincoln, NE

2. PRE-BID CONFERENCE, FIELD VERIFICATION, AND SECURITY REQUIREMENTS

A. It shall be the Contractor's responsibility to visit the job site so he/she may ascertain all existing conditions which may affect the work under this contract. **A Pre-Bid Conference is scheduled for, 10:00am, 6/27/2017 at Nebraska State Penitentiary; 4201 South 14th Street, Lincoln, NE.** No additional compensation will be granted for additional work required by this Contractor for his failure to visit the job site and determine existing conditions.

B. The Contractor shall use every possible precaution to prevent injuries to trees, shrubbery, lawns, and pavement, on or adjacent to the site of the work. All damage done to existing structures and landscaping shall be repaired to "as was" condition by this Contractor. All lawns disturbed shall be properly backfilled and seeded.

C. The Contractor shall acquaint himself of all security measures required while working on the grounds at **Nebraska State Penitentiary; 4201 South 14th Street; Lincoln, NE**. Questions regarding security requirements will be answered during the Pre-Bid Conference and the Pre-Construction Conference.

A security check shall be conducted on all contractor personnel and temporary ID cards will be prepared for all approved personnel. All Contractor's and Sub-contractor's employees working on the site are required to fill out the *Personal Information for Security Check* form. Please refer to sample form on page PSC-1. A waiting period of 14 working days for the temporary ID cards may be anticipated. The temporary ID cards will be available at the institution and distributed to the Contractor's personnel while on the grounds. ID cards shall be turned into a designated collection point whenever personnel leave the institution.

Delivery personnel (i.e., ready mix drivers, truck drivers, etc.) shall be exempt from this requirement.

D. The Owner will be occupying the areas to be worked in under this project. Therefore, it is of the utmost importance to schedule work properly and employ so far as possible such methods and means in the carrying out of this work as will not cause any interruption or inconvenience to the Owner and the use of the facility.

E. The Contractor shall coordinate all work with **Nathan Bornemeier,** (Engineering Division) **(402) 479-5861.**, and **Rodney Riche,** (Plant Manager), **(402) 471-3161**.

F. The Contractor shall at all times keep the building free from rubbish, etc., and at the completion of the job, remove all debris caused by this work from the grounds. He/she shall leave all floors clean and shall clean all glass, removing all paint, varnish, and putty from same, both inside and out, and leave the building for occupancy.

G. The Contractor shall at all times protect the building and its contents from damage from rain water, and all other water. He/she shall provide equipment and enclosures to provide this protection. The Contractor shall construct and maintain all necessary temporary drainage and building free of water. The Contractor shall at all times provide protection against weather, rain, wind, storms, frost or heat--so as to maintain all work, materials, apparatus, and fixtures free from injury or damage. At the end of the day's work, all new work likely to be damaged shall be covered.

H. Contractor employee parking will be designated by facility staff.

3. RULES AND REGULATIONS

A. All work shall be performed or installed in strict accordance with all applicable rules and regulations of city, state, and federal governments, and all local utility companies or other authorities having lawful jurisdiction. The Contractor shall be responsible for such compliance. All work shall conform to the National Electrical Code, National Plumbing Code, all National Fire Protection Association Standards, and all Nebraska State Fire Marshal Regulations.

B. The Contractor shall comply with all local requirements in regard to obtaining the necessary permits, licenses, fees and inspection. All permits, licenses, fees, and inspections shall be obtained and paid for by the Contractor.

4. COOPERATION OF CONTRACTORS & SUB-CONTRACTORS:

A. The Contractor shall afford other contractors and sub-contractors reasonable opportunities for making measurements, for the introduction and storage of their materials and equipment and for the timely execution of their work.

B. The following regulations will govern the activities of the Contractor’s personnel while working on the project.

1. It is the Contractor's responsibility to employ persons who will abide by these regulations. The immediate removal of any violator will be requested.

2. The Contractor shall at all times enforce strict discipline and good order among his employees, and shall not employ on the work any unfit person or anyone not skilled in the work assigned to him.

5. DRAWINGS AND SPECIFICATIONS

A. Contractors shall abide by and comply with the true intent of the Drawings and Specifications and not take advantage of any unintentional error or omissions, but shall fully complete every part in accordance with the true intent and meaning of the Drawings and Specifications as decided by the Owner and as hereinafter described. All cases of doubt or discrepancy shall be submitted to the Owner and his determinations shall be final and binding.

B. If work is shown or specified in a manner, which in the Contractor's opinion, is contrary to good practice or recognized procedures, the Contractor shall advise the Owner of his opinion and request clarification before proceeding. If the Contractor fails to so advise the Owner of his opinion, no excuse will thereafter be considered for failure to produce satisfactory work.

C. All repeated features throughout must be constructed alike, although drawn in detail only once, and all indications of materials, etc., shall be understood to apply to all similar features throughout.

D. Wherever work is specified to be done "as directed", the Contractor must obtain specific directions from the Owner before undertaking such work.

In case of failure to do so, the Contractor, (if the Owner so requests), must take down such work and reconstruct it in accordance with the instructions given.

6. SHOP DRAWINGS

A. The Contractor shall submit to the Architect five (5) sets of shop drawings for approval prior to installation.

7. CUTTING AND PATCHING

A. Cutting and patching must be held to an absolute minimum. Where cutting of construction is unavoidable and is required by a Contractor or trade to perform his work, the patching shall be done at the expense of the Contractor. Patched surfaces shall match adjacent surfaces in material, texture, finish and color.

8. SALVAGE

A. The Owner reserves the right to keep all salvageable materials. Any materials or rubble not retained by the Owner shall be removed from the construction site and disposed of by the Contractor.

9. UTILITIES

A. Water for use during construction can be obtained at a location designated by the Owner. Care must be exercised to avoid leakage or spillage within the building.

B. Electrical power for use during construction can be obtained from the building's electrical system. When new electrical panels are installed, the power shall be interrupted as little as possible. Any temporary hook-ups shall be maintained in a safe manner.

C. Toilet facilities for use by construction personnel shall be designated by the Owner. The Contractor shall keep all toilet facilities in a clean manner.

D. The Contractor may use an on-site telephone designated by the Owner. The contractor's designated representative

10. ASBESTOS CONTROL

A. All products and materials used by the Contractor shall be asbestos-free.

11. ELECTRONIC TRANSFER FORM – FOR PAYMENTS EXCEEDING $25,000

A. In order to make payments more efficiently and less costly, all payments in excess of $25,000 shall be made electronically effective January 1, 2008. For all contracts in excess of $25,000, the Contractor shall complete the "State Treasurer ACH Enrollment Form" (page ET-1) including all required signatures and return it to:

DCS Accounting
Department of Correctional Services
P.O. Box 94661
Lincoln, NE 68509-4661

The electronic version of the ACH Form can be found on the following website:
http://www.das.state.ne.us/accounting/forms/achenrol.pdf

B. The ACH form only needs to be submitted in the event the Contractor does not already have an ACH established and on file with the State of Nebraska.

12. **TOBACCO POLICY**

A. The Tobacco Policy prohibits the use of tobacco or tobacco-related products in or on any Department of Correctional Services' owned, leased or controlled property. This policy also prohibits the possession of tobacco or tobacco-related products on Department of Correctional Services' owned, leased or controlled property, except that these products may be secured in personal vehicles on said property. This policy applies to all staff, inmates, visitors and contractors.

13. **ALTERNATIVES**

A. An Alternate is an amount proposed by Bidders and slated on the Bid Form that will be added to or deducted from Base Bid amount if the Owner decides to accept a corresponding change in either scope of work or in products, materials equipment, systems or installation methods described in Contract Documents.

B. Coordinate related work and modify or adjust adjacent work as required to ensure that work affected by each accepted alternate is complete and fully integrated into the project.

C. Immediately following award of Contract, prepare and distribute to each party involved, notification of the status of each alternate. Indicate whether alternates have been accepted, rejected or deferred for consideration at a later date. Include a complete description of negotiated modifications to alternates, if any.

D. Include as part of each alternate, miscellaneous devices, appurtenances and similar items incidental to or required for a complete installation whether or not mentioned as part of the alternate.

E. Alternatives shall be as noted on the drawings.

14. **INFORMATION TECHNOLOGY TECHNICAL REQUIREMENTS**

1. COMPLIANCE

A. All equipment used must comply with Nebraska Information Technology Commission (NITC) and Nebraska Office of the Chief Information Officer (OCIO) Standards and Guidelines. The Standards and Guidelines are available at http://www.nitc.ne.gov/standards/ . Specific standards include:

1. 2-201 - Technology Access Clause
2. 8-101 - Information Security Standard
3. 8-102 - Data Security Standard
4. 8-301 - Password Standard
5. 8-303 - Remote Access Standard
6. 8-304 - Remote Administration of Internal Device Standard
7. All NDCS computing resources must comply with AR 104.06 – Computer and Telephone Equipment Usage. AR 104.06 available upon request.

2. NETWORK REQUIREMENTS

A. NDCS will provide the following to the contractor:

1. 10/100/1000 Mb data switch ports on existing equipment in controlled communications rooms. (All NDCS network equipment is plugged into UPS equipment and monitored 24X7)
2. VLAN and IP/subnet information for contractor’s equipment.
3. DHCP, DNS and NTP.
4. PoE IEEE 802.af and/or 802.at upon request.

3. WHEN REQUIRED

A. Contractor shall provide the following at a minimum:

1. Network horizontal cabling from contractor's equipment to NDCS network. The current standard for NDCS is blue Cat6 and plenum where required. The NDCS IT Manager must approve all network cabling to ensure industry and facility standards and codes are followed. After the contract is awarded, the contractor will perform a site survey to determine where all new equipment will be installed and how to route cabling to the nearest existing telecommunications room. The contractor will communicate with facility maintenance departments for installation of all conduit for Cat6 cabling and power.

B. Prior to installation the contractor will provide the following information:

1. Network diagrams or schematics that show logical or physical connectivity of system.
2. Port requirements – speed and duplex.
3. Firewall rule sets and other special network requirements.
4. Other LAN and WAN requirements – bandwidth or protocols.

C. Client-Server requirements

1. The contractor must identify if software will be installed on existing State workstations or if the contractor will be supplying new workstations. The contractor will need to identify if their application is web-based or a separate Windows-based application.
2. As of this time, any new software installed on State workstations will need to be compatible with Windows 7, 64 bit and Internet Explorer 10. If special client configurations or plugins are required, the contractor must specify.
3. If new servers are required for the project, the physical location for these servers must be identified. If a server is serving multiple sites, it is recommended to be place a Virtual Server at the State of Nebraska Data Center for Enterprise Services. If a server is placed at each site, it will need to be a rack mounted server (as opposed to a desktop computer) and it will need a proper housing such as a rack in a communications room that has proper environmental controls, power and cooling.
4. The contractor shall maintain the entire program system and components for the life of the contract. Any Server(s) provided by the contractor will be utilized for control system only.

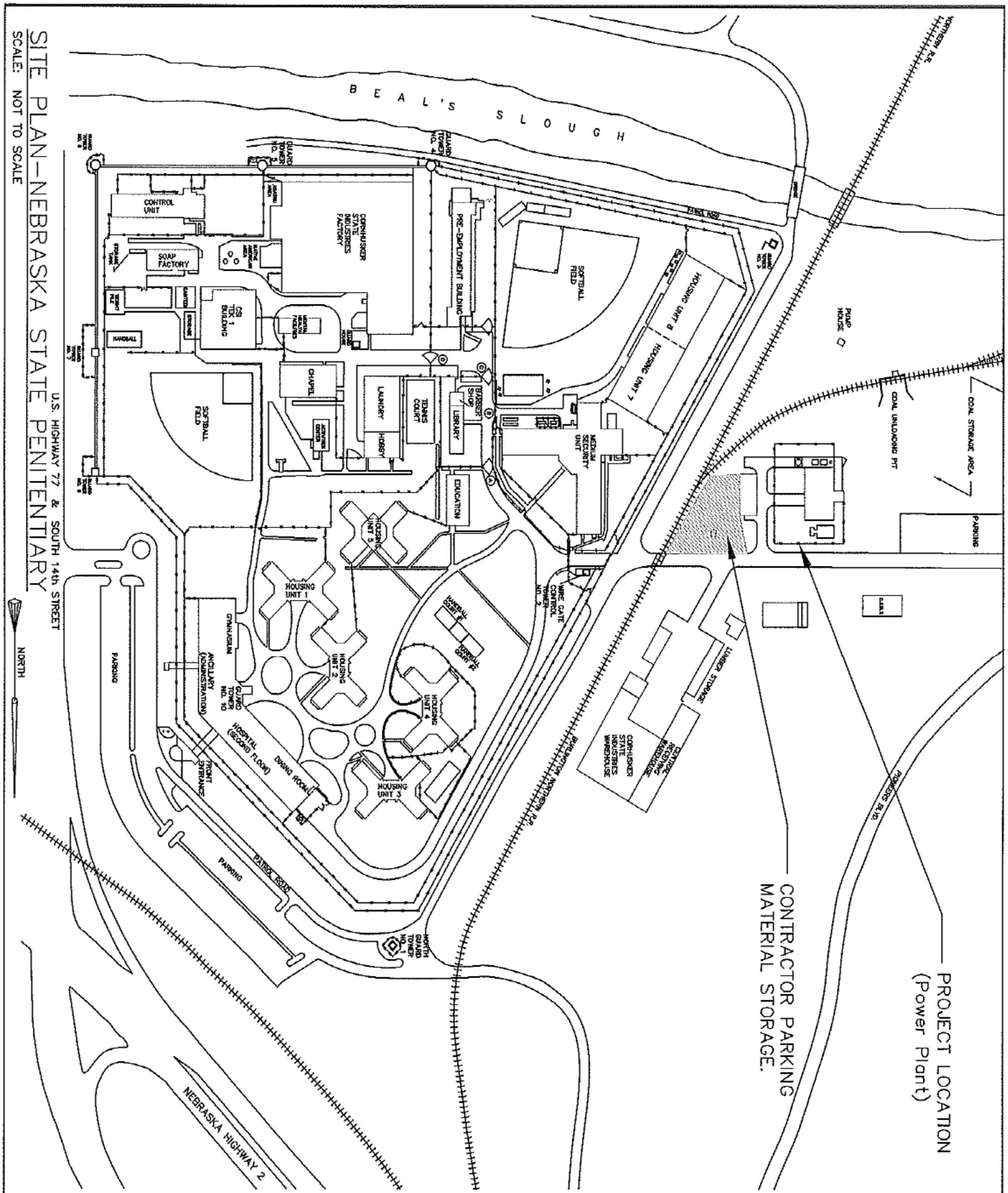
D. Remote Access (VPN)

1. NDCS will provide the contractor with a maximum of three individual VPN accounts upon request. The VPN system for the State of Nebraska is provided by the Nebraska Office of the Chief Information Officer (OCIO).

2. The contractor notifies the NDCS project manager of the need for remote access. NDCS will give the OCIO VPN form to the contractor and they will return one completed form for each person who needs access. The form will be signed by the NDCS project manager for authorization, and then the form will be given to NDCS IT to review network policies. Once approved by NDCS IT, the form will be submitted to the OCIO. When the account is ready, NDCS IT will send connection instructions to the contractor directly.

15. **RECORD DRAWINGS**

A. At the completion of all work and prior to final payment, the Contractor shall deliver to the Architect or Authorized Agent a complete set of record “as-built” drawings. These as-built drawings, also known as “redlines”, shall clearly illustrate all field changes differing from the original bidding documents, as prepared by the Architect or Authorized Agent. The as-built drawings shall depict all changes completed by the Contractor and all sub-contractors, and shall include accurate dimensions, sizes, variations and appurtenances. The intent of the as-built drawings is to provide the Owner with a set of record documents accurately reflecting the installed conditions. Final payment to the Contractor will not be processed until accurate as-built drawings have been submitted and approved by the Architect or Authorized Agent.



PROJECT: CUP Temporary Connection

FACILITY: NEBRASKA STATE PENITENTIARY

Issue Date: 6/8/2017
Scale: N.T.S.
Proj. No:

Proj. Mngr.
Drawn: Nate Bornemeier
Chk'd:
Approved: Jerry Pohlmann

REVISIONS:

DRAWING NO: **VM-1**

ENGINEERING DIVISION
Double "Y" Building, Building #1
Lincoln Regional Center Campus
Folsom & West Prospector Place
P.O. Box 94661
Lincoln, Nebraska 68509-4661
Phone: (402) 479-5715
Fax: (402) 479-5842
E-Mail: jerod.beach@nebraska.gov

Nebraska Department of Correctional Services

I, Gregory T. Kronaizl, am the Coordinating Professional on DCS CUP Temporary Connection – Nebraska State Penitentiary.

I hereby certify that the portion of this technical submission described below was prepared by me or under my direct supervision and responsible charge. I am a duly registered engineer under the laws of the State of Nebraska.

Gregory T. Kronaizl E-5523
Name (Printed) Registration Number

Drawings covered by this Seal:
GI101, GI102, ME101, M-501

Sections covered by this Seal:
00, 09, 23, 32, 40

Date Issued: June 30, 2017

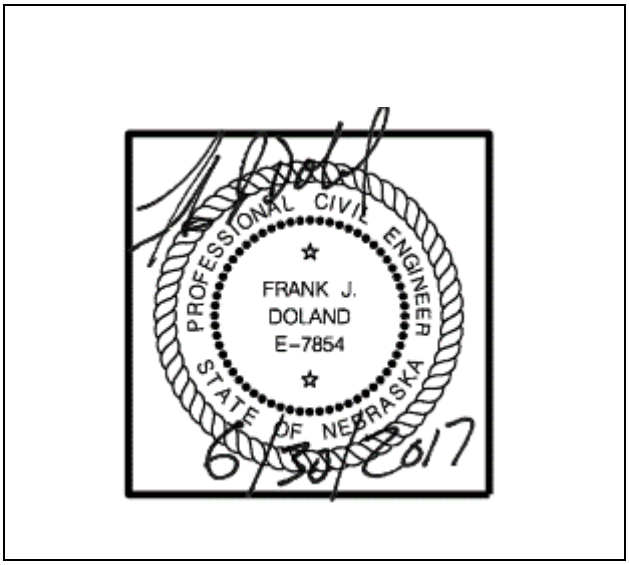
I hereby certify that the portion of this technical submission described below was prepared by me or under my direct supervision and responsible charge. I am a duly registered engineer under the laws of the State of Nebraska.

Dennis C. Lux E-7734
Name (Printed) Registration Number

Drawings covered by this Seal:

Sections covered by this Seal:
26

Date Issued: June 30, 2017



I hereby certify that the portion of this technical submission described below was prepared by me or under my direct supervision and responsible charge. I am a duly registered architect under the laws of the State of Nebraska.

Frank Doland	E-7854
Name (Printed)	Registration Number

Drawings covered by this Seal:
C-101, C-102, C-103, C-104, C-105, C-106

Sections covered by this Seal:

Date Issued: June 30, 2017

SECTION 09 91 00

PAINTING

GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SCOPE

A. Work required under this Section includes all labor, materials, tools and equipment necessary to complete all work relative to furnishing and application of all painting as shown on the drawings or described in the specifications. Work within this Section shall be completely coordinated with work of other trades.

B. Although such work is not specifically shown or specified, furnish and install all supplementary or miscellaneous items, appurtenances, devices and coatings incidental to or necessary for a sound, secure and complete installation.

1.3 EXTENT OF WORK

A. Without imposing restrictions or limitations to the extent of work intended, work to be performed under this section includes, but is not limited to, the following:

1. Surfaces behind portable objects and surface mounted articles readily detachable by removal of fasteners, such as screws and bolts.

2. New factory finished piping surfaces that require identification or color coding and factory finished surfaces that are damaged during performance of the work.

3. Interior Painting - Includes new or existing surfaces of the building and appurtenances as indicated. Where a space or surface is indicated to be painted, include the following items, unless indicated otherwise.

    a. Interior face of exposed metal roof decking, existing roof beams and areas where identified on plans.

    b. Field painting of all ferrous metal work and miscellaneous metal called out on plans.

    c. All other areas and items noted on plans or in other sections of the specifications.

4. Mechanical and Electrical Painting - Includes field coating of interior and exterior new surfaces not factory pre-painted.

a. Painting includes field painting exposed bare and covered pipes, (including color coding for piping and utility connections), hangers, exposed steel and iron work, and primed metal surfaces of mechanical equipment. Mechanical work and equipment exposed in the interior finished work shall be painted to match adjacent surfaces.

b. Where a space or surface is indicated to be painted, include the following items unless indicated otherwise to be prefinished with a finished color. Exposed piping, supports, hangers; miscellaneous metalwork and insulation coverings.

B. Painting Excluded - Do not paint the following unless indicated otherwise.

1. Surfaces concealed and made inaccessible by panelboards, machinery, and equipment fixed in place.

2. Surfaces in concealed spaces. Concealed spaces are defined as enclosed spaces above suspended ceilings, furred spaces, attic spaces, crawl spaces, foundation spaces, furred areas, utility tunnels, enclosed duct shafts and chases.

3. Machinery and mechanical equipment.

4. Electrical basket type cable trays and electrical conduits.

5. Copper, stainless steel, aluminum, brass, bronze, chromium plated, anodized aluminum, pre - finished painted metal and lead except existing coated surfaces.

6. New zinc - coated, aluminum, and copper surfaces under insulation. (Insulation shall be painted).

7. New aluminum jacket on piping

8. New interior ferrous piping under insulation. (Insulation shall be painted).

1.4 RELATED WORK SPECIFIED ELSEWHERE

A. Pre - Finished Mechanical Items are specified elsewhere in Divisions 23.

B. Pre - Finished Electrical Items and Fixtures are specified elsewhere in Division 26.

1.5 CODES, SPECIFICATIONS AND STANDARDS

A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in the text by basic designation only. Any material or operation specified by reference to the published specifications of a manufacturer or other referenced specification or standard shall comply with the requirements of the latest edition. In case of a conflict between a referenced specification or standard and these project specifications the more stringent requirement shall govern.

B. Comply with the applicable provisions of the following codes, specifications and standards to the extent indicated by reference thereto.

1. American Conference of Governmental Industrial Hygienists - ACGIH 0100Doc “Documentation of the Threshold Limit Values and Biological Exposure Indices”.

2. American Society of Mechanical Engineers - ASME A13.1 “Scheme for the Identification of Piping Systems”.

3. American Society of Testing and Materials - ASTM C 669 “Glazing Compounds for Back Bedding and Face Glazing of Metal Sash”.

4. American Society of Testing and Materials - ASTM D 235 “Mineral Spirits (Petroleum Spirits) (Hydrocarbon Dry Cleaning Solvent)”.

5. American Society of Testing and Materials - ASTM D 523 “Standard Test Method for Specular Gloss”.

6. American Society of Testing and Materials - ASTM D 4214 “Standard Test Method for Evaluating the Degree of Chalking of Exterior Paint Films”.

7. American Society of Testing and Materials - ASTM D 4263 “Indicating Moisture in Concrete by the Plastic Sheet Method”.

8. American Society of Testing and Materials - ASTM D 4444 “Use and Calibration of Hand-Held Moisture Meters”.

9. American Society of Testing and Materials - ASTM E 84 “Standard Test Method for Surface Burning Characteristics of Building Materials”.

10. American Society of Testing and Materials - ASTM E 2129 “Standard Practice for Data Collection for Sustainability Assessment of Building Products”.

11. American Society of Testing and Materials - ASTM F 1869 “Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride”.

12. International Building Code - IBC 2012.

13. Master Painters Institute - MPI “Architectural Painting Specification Manual”.

14. Master Painters Institute - MPI “Maintenance Repainting Manual”.

15. Master Painters Institute - MPI 42 “Latex Stucco and Masonry Textured Coating”.

16. NACE International “The National Association of Corrosion Engineers” - National Fire Protection Association - NFPA 101 “Life Safety Code”.

17. NACE International “The National Association of Corrosion Engineers” - NACE No. 1 / SSPC - SP5 “White Metal Blast Cleaning”.

18. NACE International “The National Association of Corrosion Engineers” - NACE No. 2 / SSPC - SP 10 “White Metal Blast Cleaning”.

19. NACE International “The National Association of Corrosion Engineers” - NACE No. 3 / SSPC SP - 6 “Commercial Blast Cleaning”.

20. NACE International “The National Association of Corrosion Engineers” - NACE No. 5 / SSPC SP - 12 “Surface Preparation and Cleaning of Metals by Waterjetting Prior to Recoating”.

21. The Society For Protective Coatings - SSPC PA 1 “Shop, Field, and Maintenance

Painting".

22. The Society For Protective Coatings - SSPC PA Guide 3 "A Guide to Safety in Paint Application".

23. The Society For Protective Coatings - SSPC QP 1 "Standard Procedure for Evaluating Painting Contractors (Field Application to Complex Industrial Structures)".

24. The Society For Protective Coatings - SSPC SP 1 "Solvent Cleaning".

25. The Society For Protective Coatings - SSPC SP 2 "Hand Tool Cleaning".

26. The Society For Protective Coatings - SSPC SP 3 "Power Tool Cleaning".

27. The Society For Protective Coatings - SSPC SP 5 "White Metal Blast Cleaning".

28. The Society For Protective Coatings - SSPC SP 6 "Commercial Blast Cleaning".

29. The Society For Protective Coatings - SSPC SP 7 "Brush-Off Blast Cleaning".

30. The Society For Protective Coatings - SSPC SP 10 "Near-White Blast Cleaning".

31. The Society For Protective Coatings - SSPC SP 11 "Hand Tool Cleaning".

32. The Society For Protective Coatings - SSPC SP 12 "Surface Preparation and Cleaning of Metals by Waterjetting Prior to Recoating".

33. The Society For Protective Coatings - SSPC VIS 1"Guide and Reference Photographs for Steel Surfaces Prepared by Dry Abrasive Blast Cleaning".

34. The Society For Protective Coatings - SSPC VIS 3 "Visual Standard for Power-and Hand-Tool Cleaned Steel".

35. The Society For Protective Coatings - SSPC VIS 4 "Guide and Reference Photographs for Steel Surfaces Prepared by Waterjetting".

36. U.S. Army Corps of Engineers - USACE EM 385-1-1 "Safety -- Safety and Health Requirements".

37. U.S. Department of Labor Occupational Safety & Health Administration - OSHA 29 CFR 1910.1000 "Toxic and Hazardous Substances, Air Contaminants".

38. U.S. General Services Administration - GSA FED - STD - 313 (Rev D; Am 1) "Material Safety Data, Transportation Data and Disposal Data for Hazardous Materials Furnished to Government Activities".

1.6 DEFINITIONS AND ABBREVIATIONS

A. Coating: A film or thin layer applied to a base material called a substrate. A coating may be a metal, alloy, paint, or solid / liquid suspensions on various substrates (metals, plastics, wood, paper, leather, cloth, etc.). They may be applied by electrolysis, vapor deposition, vacuum, or mechanical means such as brushing, spraying, calendering, and roller coating. A coating may be applied for aesthetic or protective purposes or both. The term "coating" as used herein includes fillers, primers, sealers, emulsions, oils, alkyds, latex, enamels, stains, varnishes, sealers, epoxies,

thinners and other applied coatings, whether used as primer, intermediate, or finish coat. The terms paint and coating are used interchangeably.

B. DFT or dft: Dry film thickness, the film thickness of the fully cured, dry paint or coating.

C. DSD: Degree of Surface Degradation, the Master Painters Institute MPI system of defining degree of surface degradation. Five (5) levels are generically defined under the Assessment sections in the MPI Maintenance Repainting Manual.

D. EPP: Environmentally Preferred Products, a standard for determining environmental preferability in support of Executive Order 13101.

E. EXT: MPI short term designation for an exterior coating system.

F. INT: MPI short term designation for an interior coating system.

G. micron / microns: The metric measurement for 0.001 mm or one / one - thousandth of a millimeter.

H. mil / mils: The English measurement for 0.001 in or one / one - thousandth of an inch, equal to 25.4 microns or 0.0254 millimeter.

I. mm: The metric measurement for millimeter, 0.001 meter or one / one - thousandth of a meter.

J. MPI Gloss Levels: MPI system of defining gloss. Seven (7) gloss levels (G1 to G7) are generically defined under the Evaluation sections of the MPI Manuals. Traditionally, Flat refers to G1 / G2, Eggshell refers to G3, Semigloss refers to G5, and Gloss refers to G6. Gloss levels are defined by MPI as follows:

GLOSS LEVELS
Gloss is tested in accordance with ASTM D 523

GLOSS LEVEL	DESCRIPTION	UNITS @ 60 DEGREES	UNITS @ 85 DEGREES
G1	Matte or Flat	0 to 5	10 maximum
GI	Velvet	0 to 10	10 to 35
G3	Eggshell	10 to 25	10 to 35
G4	Satin	20 to 35	35 minimum
G5	Semi - Gloss	35 to 70	
G6	Gloss	70 to 80	
G7	High Gloss		

K. MPI System Number: The MPI coating system number in each Division found in either the MPI Architectural Painting Specification Manual or the Maintenance Repainting Manual and defined as an exterior (EXT / REX) or interior system (INT / RIN). The Division number follows the CSI Master Format.

L. Paint: Terms "paint" and "painting" refer to all applied coatings. See Coating definition.

M. REX: MPI short term designation for an exterior coating system used in re - painting projects or over existing coating systems.

N. RIN: MPI short term designation for an interior coating system used in re - painting projects or over existing coating systems.

1.7 COORDINATION OF PAINTING REQUIREMENTS

A. The painting subcontractor shall examine other Sections of the Specifications and shall thoroughly familiarize themselves with all their provisions regarding their painting requirements. Except as otherwise specified, surfaces left unfinished by the requirements of other Sections shall be painted or finished as a requirement of this section.

B. Painting and finishing work called for under other Sections of the Specifications is included under those Sections.

C. Prime Coat Coordination: Provide finish coats which are compatible with prime paints used. Review other sections of these specifications in which prime paints are to be provided to ensure compatibility of total coating system for various substrates. Upon request from other trades, furnish information on characteristics of finish materials proposed for use, to ensure compatible prime coats are used. Provide barrier coats over incompatible primers or remove and reprime as required at no additional cost to Owner. Notify Architect in writing of any anticipated problems using specified coating systems with substrates primed by others.

1.8 REGULATORY REQUIREMENTS

A. Environmental Protection: In addition to requirements specified elsewhere for environmental protection, provide coating materials that conform to the restrictions of the local Air Pollution Control District and regional jurisdiction. Notify Owner's Representative of any paint specified herein which fails to conform.

1. Lead Content: Do not use coatings having a lead content over 0.06 percent by weight of non - volatile content.

2. Chromate Content: Do not use coatings containing zinc - chromate or strontium - chromate.

3. Asbestos Content: Materials shall not contain asbestos.

4. Mercury Content: Materials shall not contain mercury or mercury compounds.

5. Silica: Abrasive blast media shall not contain free crystilline silica.

6. Human Carcinogens: Materials shall not contain ACGIH 0100Doc confirmed human carcinogens (A1) or suspected human carcinogens (A2).

1.9 SUBMITTALS

A. Product Data: Provide primers and undercoat paint produced by the same (Single - Source) manufacturer as the finish coats. This submittal shall include the name of the corresponding specified item, the full identifying product names and catalog numbers of each of the products substituted therefore, together with the following detail information attested to by a Chemist or Officer of the manufacturer:
1. Spreading rate
2. Dry mil thickness
3. Non - volatile percent by weight
4. Dust free time
5. Recoat time
6. Chemistry of product
7. Indicate VOC content.

B. Shop Drawings for Piping Identification: Submit color and stencil codes to be used.

C. Submit a specification manual containing the full line of manufacturer's products.

D. Certificates: Submit Applicator's Qualifications.

E. Certifications by the manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOCs).

F. Provide test reports for materials used indicating fire hazard classification as determined by ASTM E 84. Materials shall meet requirements established in NFPA Number 101, Life Safety Code & International Building Code. Generally, all paint used must maintain a Class "A" fire rating on non-combustible substrates.

G. Manufacturer's Instructions: Submit Application instructions for each product specified.

H. Mixing: Detailed mixing instructions, minimum and maximum application temperature and humidity, potlife, and curing and drying times between coats for each product specified.

I. Manufacturer's Material Safety Data Sheets: Submit manufacturer's Material Safety Data Sheets for coatings, solvents, and other potentially hazardous materials, as defined in Federal Standard 313.

J. Owner's Representative reserves option to require additional samples or physical liquid samples, or other materials. If required, liquid sample amounts shall not exceed one pint each.

K. Submit three (3) color sample cards for each color selected. Prepare sample cards with number of coats as specified for substrate where color is used. Step all samples to show coats.

1.10 APPLICATOR'S QUALIFICATIONS

A. Contractor Qualification: Key personnel shall have successfully performed surface preparation and application of coatings on similar projects.

1.11 PRODUCT, DELIVERY, STORAGE AND HANDLING

A. Deliver materials in original unopened containers.

B. Label each container with following information:

1. Name or title of material

2. Manufacturer's stock number and date of manufacture

3. Manufacturer's name

4. Contents by volume, for major pigment and vehicle constituents

5. Thinning instructions

6. Application instructions

7. Color name and number. Corresponding to Color Schedule found elsewhere in Division

09.

C. Protect from freezing or damage.

D. Store all materials in a single place designated by the General Contractor. Keep storage neat and clean. Make good all damage thereto or to surroundings. Remove rags and waste from building daily. Take precautions to avoid danger of fire. Post "No Smoking" signs in storage areas.

E. Maintain storage for paint materials in conformity with fire codes and authorities having jurisdiction. Protect floor from any spilled materials.

F. Paints and thinners shall be stored in accordance with the manufacturer's written directions, and as a minimum, stored off the ground, under cover, with sufficient ventilation to prevent the buildup of flammable vapors, and at temperatures between 40 to 95 degrees F. Do not store paint, polyurethane, varnish, or wood stain products with materials that have a high capacity to adsorb VOC emissions. Do not store paint in occupied spaces.

1.12 SAFETY AND HEALTH

A. Apply coating materials using safety methods and equipment in accordance with the following: Work shall comply with applicable Federal, State, and local laws and regulations, and with the Accident Prevention Plan, including the Activity Hazard Analysis as specified in and in Appendix A of EM 385 - 1 - 1. The Activity Hazard Analysis shall include analyses of the potential impact of painting operations on painting personnel and on others involved in and adjacent to the work zone.

B. Safety methods used during coating application shall comply with the requirements of SSPC PA Guide 3.

C. Toxic Materials To protect personnel from overexposure to toxic materials, conform to the most stringent guidance of:

1. The applicable manufacturer's Material Safety Data Sheets (MSDS) or local regulation.
2. OSHA 29 CFR 1910.1000.
3. ACGIH 0100Doc, threshold limit values.

1.13 ENVIRONMENTAL / PROJECT CONDITIONS

A. Comply, at minimum, with manufacturer recommendations for space ventilation during and after installation. Isolate area of application from rest of building when applying high - emission paints or coatings.

B. Coatings - Do not apply coating when air or substrate conditions are:

1. Less than 5 degrees F above dew point;
2. Below 50 degrees F or above 95 degrees F unless specifically pre - approved in writing by the Owner’s Representative and the product manufacturer. Under no circumstances shall application conditions exceed manufacturer recommendations.

3. Where temperatures fall below 50 degrees F or above 95 degrees F within 48 hours after the surface has been painted.

4. Damp, or during cold, rainy or frosty weather. Avoid painting surfaces exposed to hot sun.

C. Protection During Cleaning: Personnel engaged in solvent - cleaning of galvanized metal and aluminum, or cleaning concrete, masonry, or portland cement plaster with 5 to 10 percent solution of hydrochloric acid, shall wear the appropriate personal protective equipment to prevent skin and eye contact and fumes inhalation. Ventilate all work areas properly.

D. Personnel Protection During Coating Applications: Personnel painting with high - build glaze coating systems shall wear the appropriate personal protective equipment to prevent skin or eye contact or inhalation. Ensure employees use and maintain solvent - resistant, personal protective equipment for the whole body. Emergency eye wash and water supplies shall be available near the work area for emergency flushing of the eyes and body. Coating applications shall be performed only in areas with good ventilation. Smoking will not be permitted in the area where coating is being applied. Wall and room temperature at the time of coating application and curing shall be in accordance with the manufacturer's instructions.

E. Protection During Application of Polyurethane Paints: Mix and apply polyurethane paints only in specifically designated areas with local exhaust ventilation and other environmental control measures as recommended on the basis of an on - site industrial hygiene survey. Supply and use air respirators in closed areas where adequate ventilation cannot be obtained.

F. Post - Application: Vacate space for as long as possible after application. Wait a minimum of 48 hours before occupying freshly painted rooms. Maintain one of the following ventilation conditions during the curing period, or for 72 hours after application:

1. Supply 100 percent outside air 24 hours a day.

2. Supply airflow at a rate of 6 air changes per hour, when outside temperatures are between 55 degrees F and 85 degrees F and humidity is between 30 percent and 60 percent.

3. Supply airflow at a rate of 1.5 air changes per hour, when outside air conditions are not within the range stipulated above.

G. Avoid painting near temporary heaters which might discolor paint.

H. Painting Contractor shall apply all materials under adequate illumination. Contractor shall assure adequate illumination exists in all areas where painting operations are in progress.

I. The painting Contractor is responsible for inspecting the work of others prior to the application of any paint or finishing material. If any surface to be finished cannot be put in proper condition for finishing by customary cleaning, sanding and puttying operations, the painting Contractor will immediately notify the General Contractor and the Owner’s Representative, in writing, and shall not proceed with this work until conditions have been corrected and are acceptable.

J. Commencing of work in a specific area constitutes acceptance of surfaces, and responsibility for satisfactory work.

K. Painting Contractor shall provide wet paint signs as required.

L. Paint exposed surfaces whether or not colors are designated in "schedules," except where a surface or material is specifically indicated not to be painted or is to remain natural. Where an item or surface is not specifically mentioned, paint the same as similar adjacent materials or surfaces. If color or finish is not designated, the Architect will select from standard colors or finishes available.

M. Owner's Representative and Architect approval is required **PRIOR** to application of each coat. If this requirement is not met then additional coats shall be required at no additional cost to the Owner, until notification has been given and approved.

N. The minimum numbers of paint coats are specified in the Paint Schedule found elsewhere in this section. The application of additional coats to provide a total color and sheen uniformity on all surfaces shall be provided at no additional cost to the Owner. The painting Contractor shall not be entitled to payment in excess of the amount agreed upon in their contract for any extra work over and above that specified unless authorized in writing by a Change Order.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Paint systems specified herein shall be manufacturers top - of - the - line products and shall be subject to compliance with specifications. Paint products specified in Paint Schedule are products of Diamond Vogel. Comparable products of the following manufacturers are approved for use:

1. Benjamin Moore
2. Pittsburg Paints
3. Pratt & Lambert
4. Sherwin Williams

B. Paint of other manufacturers will not be approved.

2.2 PAINT MATERIALS

A. Solvents (for cleaning and product reducing) shall be pure and of highest quality, and shall be approved by the Architect. They shall bear identifying labels on the containers, with the manufacturer's instructions printed thereon.

B. Paint shall arrive on the job ready - mixed, except for tinting of undercoats.

C. All thinning and tinting material shall be as recommended by the manufacturer for the particular material thinned or tinted.

2.3 APPLICATION EQUIPMENT

A. Application equipment is not required to be new, but shall be adequate and commensurate for the work and workmanship required herein.

2.4 ACCESSORY MATERIALS

A. Provide all required ladders, scaffolding, drop cloths, maskings, scrapers, tools, sandpaper, duster, cleaning solvents and waste, as required to perform the work and achieve the results herein specified.

PART 3 - EXECUTION

3.1 PROTECTION OF AREAS AND SPACES NOT TO BE PAINTED

A. Prior to surface preparation and coating applications, remove, mask, or otherwise protect, hardware, hardware accessories, machined surfaces, radiator covers, plates, lighting fixtures,

public and private property, and other such items not to be coated that are in contact with surfaces to be coated. Following completion of painting, workmen skilled in the trades involved shall reinstall removed items. Restore surfaces contaminated by coating materials, to original condition and repair damaged items.

3.2 SURFACE PREPARATION GENERAL

A. Remove dirt, splinters, loose particles, grease, oil, [disintegrated coatings,] and other foreign matter and substances deleterious to coating performance as specified for each substrate before application of paint or surface treatments. Oil and grease shall be removed prior to mechanical cleaning. Cleaning shall be programmed so that dust and other contaminants will not fall on wet, newly painted surfaces. Exposed ferrous metals such as nail heads on or in contact with surfaces to be painted with water - thinned paints, shall be spot - primed with a suitable corrosion - inhibitive primer capable of preventing flash rusting and compatible with the coating specified for the adjacent areas.

1. Assure that surfaces are clean and dry.
2. Assure that surfaces are free of foreign material which will affect adhesion or appearance.
3. Remove mildew and neutralize surface.
4. Correct efflorescence before painting.

3.3 FERROUS METAL SURFACES AND HOLLOW METAL

A. All ferrous metal shall, at a minimum, be cleaned in accordance with The Society for Protective Coatings (formerly Steel Structures Painting Council), Surface Preparation Level 1 - Solvent Cleaning (SSPC SP 1) preparation procedures and methods.

B. Ferrous metal shall be cleaned to the minimum requirements of the The Society for Protective Coatings (formerly Steel Structures Painting Council), Surface Preparation levels and the NACE International "The National Association of Corrosion Engineers" Surface Preparation levels as listed in the following table:

MINIMUM SURFACE PREPARATION BASED ON TYPE OF COATING AND ENVIRONMENT *		
COATING TYPE	**INTERIOR ENVIRONMENTS**	**EXTERIOR ENVIRONMENTS**
Drying Oil	SSPC SP 2	SSPC SP 3
Alkyd	SSPC SP 6 / NACE 3 SSPC SP3 For Localized Areas	SSPC SP 11
Latex	SSPC SP 6 / NACE 3	SSPC SP 11
Vinyl Lacquer	SSPC SP 10 / NACE 2	
Epoxy	SSPC SP 6 / NACE 3	SSPC SP 6 / NACE 3
Chlorinated Rubber	SSPC SP 10 / NACE 2	
Polyurethane	SSPC SP 10 / NACE 2	
Organic Zinc	SSPC SP 6 / NACE 3	SSPC SP 6 / NACE 3

* Where conflicts exist between manufacturer's written requirements and those listed in this table, the higher level of cleaning method shall be followed.

3.4 GALVANIZED METAL SURFACES

A. New Galvanized surfaces should be weathered a minimum of 6 months prior to painting. New Galvanized Surfaces shall be cleaned chemically or etched after the weathering prior to coatings being applied.

3.5 NON - FERROUS METALLIC SURFACES

A. Aluminum and aluminum - alloy, lead, copper, and other nonferrous metal surfaces: Surface Cleaning: Brush - Off Blast Cleaning clean in accordance with The Society for Protective Coatings (formerly Steel Structures Painting Council), Surface Preparation Level 7 (SSPC SP 7) - 1 mil profile depth.

3.6 WORKMANSHIP

A. Employ only skilled mechanics. Application to interior wall and ceiling surfaces may be by brush or roller. Spray application will be permitted only upon approval from Architect.

B. Keep equipment in proper condition to provide a job commensurate with intent of specification.

C. Mix, and apply materials as recommended by manufacturer.

D. Tint priming and undercoats to approximate shade of final coat, except for vivid colors. These, if suggested by manufacturer, shall be applied over a pure white base coat of like material.

E. Maintain a rough schedule showing when painter expects to complete respective coats of paint for various areas. Keep schedule current as job progress dictates.

F. Do not apply succeeding coats until the Architect and Owner's Representative has been notified and has had an opportunity to observe previous coat.

G. Protect painted surfaces and all adjacent work and materials by suitable covering during progress of work.

H. Evenly spread and smoothly flow on all materials for full, smooth, cover.

I. Provide complete coverage and hide. All paint systems are to "cover" to provide total color and sheen uniformity. When color or undercoats show through, apply additional coats until paint film is of uniform finish and color, at no additional cost to Owner.

J. Assure that all coats are thoroughly dry before applying succeeding coats.

K. Unless otherwise indicated, do not paint items which have a complete factory finish. A factory prime coat does not qualify as a complete factory finish.

L. Do not paint moving parts of valves, operating units, mechanical and electrical parts, such as valve and damper operators, sending devices, and motor and fan shafts.

M. Do not paint over code labels, such as UL, FM, or equipment identification, or rating plates, etc. unless there is a removable film over the label prior to painting.

N. Touch up suction or hot spots on concrete and concrete masonry before applying succeeding coats.

O. Follow manufacturers label instructions exactly.

P. Schedule and coordinate work with other trades.

3.7 CLEANUP

A. Protect adjacent work, whether to be painted or not, against damage by painting and finishing work. Leave all such work undamaged. Clean, repair or replace, and repaint, damaged work as

directed by Architect.

B. Remove temporary protective wrappings, provided by others for protection of their work, after completion of painting operations. Upon completion of work, clean all window glass and other paint spattered surfaces. Remove spattered paint by proper methods of washing and scraping. Use care not to damage finished surfaces. Remove any surplus materials, scaffolding and debris, leave areas broom clean.

3.8 WASTE MANAGEMENT

A. Do not use kerosene or any such organic solvents to clean up water based paints. Properly dispose of paints or solvents in designated containers. Close and seal partially used containers of paint to maintain quality as necessary for reuse. Store in protected, well - ventilated, fire - safe area at moderate temperature. Place materials defined as hazardous or toxic waste in designated containers.

3.9 COLOR SCHEDULE

A. Apply paint in colors, textures, and patterns of wall coating systems as selected by the Architect and in accordance with SCHEDULE OF FINISHES found elsewhere in Division 9. Colors of finish coats shall be as indicated or specified. Where not indicated or specified, colors shall be selected by the Owner’s Representative. Manufacturers' names and color identification are used for the purpose of color identification only. Named products are acceptable for use only if they conform to specified requirements. Products of other manufacturers are acceptable if the colors approximate colors indicated and the product conforms to specified requirements. Tint each coat progressively darker to enable confirmation of the number of coats.

3.10 PIPING AND UTILITY CONNECTIONS COLOR CODING SCHEDULE

A. General Contractor and Paint Contractor shall verify color coding schedule with Owner’s Representative prior to painting of piping and utility connections.

B. In addition to color coding Contractor shall provide piping and utility labeling in accordance with the following requirements:

1. Option #1: Provide plastic labels with lettering and arrows as found in Division 23 of the Specifications.

2. Option #2: Provide 2 inch high stenciled letters using stencil paint, clearly designating service for each connection. Place stenciling in clearly visible locations. Stencil arrow - shaped markings on piping to indicate direction of flow using black stencil paint.

3.11 PAINT SCHEDULE: GENERAL

A. The schedule shown hereinafter is not intended as a listing of surfaces to be painted; it indicates only the type and minimum number of coats of paint to be applied to those surfaces which are to be painted. All surfaces painted shall have total color and sheen uniformity.

B. General: Provide the following paint systems for the various substrates indicated.

3.12 PAINT SCHEDULE: EXTERIOR

A. Ferrous Metal: Primer is not required on shop primed items. (All new or damaged surface painted exterior Metals including Piping Supports; Piping; Miscellaneous Steel; Etc. all of which are

Specified or Designated on Drawings to be Painted)

1. Aliphatic Polyurethane: Minimum 2 finish coats over a primer with total dry film thickness not less than 11 mils excluding primer.

    a. Primer: Synthetic Rust Inhibiting Lead and Chromate Free Primer with a minimum solids by weight of 67 percent and solids by volume of 42 percent with a total dry film thickness to develop a dry mil thickness of not less than 2 mils. (AZ - Cote - All)

    b. First Coat: Self priming 2 component high build epoxy with a minimum solids by weight of 87.2 percent and solids by volume of 81 percent to develop a dry mil thickness of not less than 5 mils. (Mult-E-Poxy 180)

    c. Finish Coat: Two component, aliphatic polyurethane with a minimum solids by weight of 75 percent and solids by volume of 62 percent to develop a dry mil thickness of not less than 6 mils. (Pinnacle 330HS)

3.13 PAINT SCHEDULE: INTERIOR

A. Ferrous Metal: Primer is not required on shop primed items. (All Interior Metals including - Existing Steel Painted Steel Surfaces Damaged; Miscellaneous Steel; Etc. all of which are Specified or Designated on Drawings to be Painted)

1. Aliphatic Polyurethane: Minimum 2 finish coats over a primer with total dry film thickness not less than 11 mils excluding primer.

    a. Primer: Synthetic Rust Inhibiting Lead and Chromate Free Primer with a minimum solids by weight of 67 percent and solids by volume of 42 percent with a total dry film thickness to develop a dry mil thickness of not less than 2 mils. (AZ - Cote - All)

    b. First Coat: Self priming 2 component high build epoxy with a minimum solids by weight of 87.2 percent and solids by volume of 81 percent to develop a dry mil thickness of not less than 5 mils. (Mult - E - Poxy 180)

    c. Finish Coat: Two component, aliphatic polyurethane with a minimum solids by weight of 75 percent and solids by volume of 62 percent to develop a dry mil thickness of not less than 6 mils. (Pinnacle 330HS)

B. Aluminum and Zinc - Coated Steel Metal: (All Interior Aluminum and Zinc - Coated Steel Metals; Etc. all of which are Specified or Designated on Drawings to be Painted)

1. Aliphatic Polyurethane: Minimum 2 finish coats with total dry film thickness not less than 11 mils and to provide total color and sheen uniformity.

    a. First Coat: Self priming 2 component high build epoxy with a minimum solids by weight of 87.2 percent and solids by volume of 81 percent to develop a dry mil thickness of not less than 5 mils. (Mult - E - Poxy 180)

    b. Finish Coat: Two component, aliphatic polyurethane with a minimum solids by weight of 75 percent and solids by volume of 62 percent to develop a dry mil thickness of not less than 6 mils. (Pinnacle 330HS)

C. Metal Piping, Fittings, Appurtenances and Valves: Primer is not required on shop primed items. (All non - insulated ferrous, nonferrous, and insulation jacket on piping, utility piping, piping, fittings, hangers not galvanized or factory pre - painted, appurtenances and valves, Etc.) (Piping includes - Chilled Water, Condensing Water, Steam, Condensate, Refrigerant Relief and Roof Drains).

1. Interior Semi - gloss Latex Enamel: An interior latex semi gloss enamel formulated for wash ability and durability with a minimum solids by weight of 45 percent and solids by volume of 36 percent. Minimum 2 finish coats with a total dry film thickness of not less than 3 mils excluding primer and to provide total color and sheen uniformity.

   a. Primer on Galvanized Piping: 100 percent Acrylic Latex Maintenance Primer with a minimum solids by weight of 53 percent and solids by volume of 39 percent with a total dry film thickness to develop a dry mil thickness of not less than 2 mils. (MC - V - Cote 200)

   b. Primer on Copper, Cast Iron, Black Iron, Aluminum and any other Metals: Synthetic Rust Inhibiting Lead and Chromate Free Primer with a minimum solids by weight of 67 percent and solids by volume of 42 percent with a total dry film thickness to develop a dry mil thickness of not less than 2 mils. (AZ - Cote - All)

   c. Primer on PVC or Insulated Jacket Piping: None Required.

   d. First Coat: Interior Semi - Gloss Latex Enamel. (DS - Permacryl)

   e. Finish Coat: Interior Semi - Gloss Latex Enamel. (DS - Permacryl)

D. Metal Deck Ceiling Systems: (Dryfall) Identified on Drawings as “CP - 1”.

1. Alkyd, Low Odor Dryfall: Alkyd low odor hi - hide eggshell dryfall for fast drying with a minimum solids by weight of 73 percent and solids by volume of 48 percent. Minimum finish coat with total dry film thickness to develop a dry mil thickness of not less than 2 mils and to provide total color and sheen uniformity.

   a. Finish Coat: Alkyd Low Odor Dryfall (V - Tech 355)

END OF SECTION

SECTION 23 00 00

MECHANICAL GENERAL PROVISIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 WORK INCLUDED

A. Furnishing and installing new piping, pipe fittings, pipe insulation, supports, valves, and miscellaneous general construction as shown on project drawings.

B. Painting:

1. This Contractor shall touch up paint on areas where his work has damaged existing or new painted equipment or building systems. Refer to Division 9 Section for painting requirements.

2. Contractor shall paint all new ferrous piping and miscellaneous piping components with the exception of items provided with galvanized or factory finish paint system.

C. This section applies to all Division 23 (Mechanical) work.

D. The general provisions of the Contract, apply to all Division 23 Mechanical work.

E. Each specification section within their respective division shall be coordinated with all other sections in that division for related work.

F. The project documents contemplate the complete installation of the systems described herein, or shown on the drawings, so that at the conclusion of the construction, the systems will be turned over to the Owner complete and ready for safe, efficient operation.

G. The Contractor shall be obliged to furnish and install all such items normally included on systems of this type, which while not mentioned directly herein are obviously essential to the installation and operation of the systems, and which are normally furnished on installations of this type.

1.3 QUALITY ASSURANCE

A. Contractor shall comply with all state, and local codes and ordinances.

B. Contractor shall make application for, obtain and pay for all required permits and certificates of inspection of the work.

C. All equipment, materials, and installation procedures shall comply with standards listed within each Division 23 Mechanical Section.

D. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected. Notify Owner's Representative immediately upon conflicts between contract documents and site conditions to allow assessment of required resolution to the issue.

E. Install equipment and materials to provide required access for servicing and maintenance.

1.4 FEES, PERMITS, LICENSES, UTILITY CONNECTION CHARGES, AND UTILITY COST.

A. The Contractor shall obtain and pay for all fees, permits, licenses, utility connection charges (water, sanitary sewer, storm sewer and gas as applicable).

B. The Contractor shall maintain all necessary barricades, construction fence, signal lights and other means to guard against danger due to construction activities and use all proper means for the safety of the public.

C. The Contractor shall furnish to the Owner copies of all fees, permits and licenses required for all mechanical work herein specified before any mechanical work is started.

1.5 ELECTRICAL COORDINATION

A. General: Mechanical Contractor shall coordinate with other subcontractors, and Electrical Contractor for proper electrical power characteristics to all mechanical equipment which require electrical power connection. Unless specifically shown otherwise Contractor shall provide all power connections required to provide power to the equipment and Mechanical Contractor shall provide all equipment and electrical wiring required for all start-stop control and safety interlock functions required for all equipment.

B. Types of work, normally recognized as electrical but provided as mechanical, specified or partially specified in this section, include but are not necessarily limited to the following:

1. Motors for mechanical equipment.

2. Furnish and install all electrical control circuit conduits and wiring and control devices required to perform the equipment control functions as specified in Division 22 and 23, including float control switches, flow control switches, and similar mechanical-electrical devices provided for mechanical systems.

3. All electrical equipment provided and the wiring and installation of electrical equipment shall be in accordance with the requirements of this Section and Division 26 Sections.

C. Immersion thermostats, remote bulb thermostats, motor valves, controls, etc., which are an integral part of the mechanical equipment or directly attached to ducts, piping, equipment, etc., shall be set in place under mechanical contract. Motor driven units which are controlled from line voltage manual operating or start-stop switches or automatic controls such as line voltage thermostats, float switches or time switches which operate at line voltage shall be wired for both power and control circuit under the electrical contract.

1.6 FIRE BARRIER PENETRATIONS

A. All cracks, voids, or holes for the passing of mechanical and electrical items through floors and fire rated walls or ceilings with or without fire rating of one (1) hour or more shall be sealed with a fire barrier caulk.

B. Fire barrier caulking system shall be equal to "3M" CP 25 caulk or 303 putty.

C. Fire barrier caulking system shall be installed in accordance with the manufacturers' recommendation to maintain a fire rating of three (3) hours minimum.

1.7 CLEANING AND PROTECTION

A. General: During handling and installation of work at project site, each contractor shall clean and protect work in progress and adjoining work on a basis of perpetual maintenance. Apply suitable protective covering on newly installed work where reasonably required to ensure freedom from damage or deterioration at time of substantial completion; otherwise, clean and perform maintenance on newly installed work as frequently as necessary through remainder of construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

1.8 PROJECT CLOSEOUT

A. Closeout Equipment/Systems Operations: Sequence operations properly so that work of project will not be damaged or endangered. Coordinate with seasonal requirements. Operate each item of equipment and each system in a test run of appropriate duration with the Owner's operating personnel present, to demonstrate sustained, satisfactory performance. Adjust and correct operations as required for proper performance. Clean and lubricate each system, and replace dirty filters, excessively worn parts and similar expendable items of the work.

B. Operating Instructions: Refer to other specifications sections for requirements.

1. Prepare and submit four (4) copies of operation and maintenance instructions for all mechanical equipment furnished one (1) week prior to training.

1.9 FINAL COMPLETION

A. The Mechanical Contractors shall not call for a final completion check until the entire Mechanical and Electrical Equipment and Systems have been installed, adjusted, balanced and in full and complete satisfactory.

1.10 GUARANTEE

A. The one (1) year guarantee period shall not start until the project is fully completed and the Contractor has received the Final Payment and Certification of Completion.

B. All equipment and all work shall be fully guaranteed, parts, and labor, for one full year from the date of the Certificate of Completion. Repairs made during this period must be fully guaranteed for an additional one (1) year period from the date of repairs.

C. The Division 23 Mechanical Contractor has the full responsibility to guarantee all Contractor-furnished equipment and work and shall assume full responsibility to repair any Contractor-furnished equipment at his cost that the manufacturer refuses to guarantee.

D. The Owner has the right to order repairs to any equipment or work provided hereon and to charge the Contractor for same if repairs are not made by the Contractor within a reasonable period of time not to exceed 24 hours during an emergency or 72 hours on a non-critical item.

1.11 AUTOCAD DRAWING FILE REQUESTS

A. As an instrument of service to aid in Shop Drawing Submittals, Farris Engineering (FE) will provide AutoCAD drawing files upon request. The files will be sent upon return receipt of the "Request for Drawings" agreement signed by an Officer of the requesting firm. FE does not assure that the drawings represent all changes, addenda items, change orders or modifications that may have occurred. The drawings are simply a tool for use in producing shop drawing submittals.

B. The drawing files will be "cleaned-up" by having the FE logo, Professional Engineer seal and all extraneous notes and details removed. FE must be compensated for this additional service by the requesting firm. A minimum fee of $400.00 for up to eight (8) sheets and $50.00 per sheet for each additional requested drawing will be invoiced to the requesting firm once the signed agreement is received.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION

SECTION 23 05 00

BASIC MECHANICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. Related Sections: The following sections contain requirements that relate to this section.

1. Division 23 "23 00 00 Mechanical General Requirements".
2. Division 23 "23 05 53 Identification for Piping and Equipment".
3. Division 23 "23 21 11 Plant Piping Systems".

1.2 WORK INCLUDED

A. Extent of basic mechanical materials and methods work required by this section is indicated on drawings and schedules, and/or specified in other Division 23 Sections.

B. All new and existing pipe systems and prime painted equipment to be painted by General Contractor.

1. Touchup paint surface of new factory finished mechanical items damaged during construction.

1.3 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of basic mechanical materials of types and sizes required, whose products have been in satisfactory use in similar service for not less than five (5) years.

B. Codes and Standards:

1. Welding: Quality welding procedures, welders and operators in accordance with ASME B31.1, or ASME B31.9 - Standard Code for Pressure Piping, Power Piping, and The American Welding Society Welding Handbook, AWS D1.1 "Structural Welding Code - Steel", as applicable, for shop and project site welding of piping work.

2. Brazing: Certify brazing procedures, brazers, and operators in accordance with ASME Boiler and Pressure Vessel Code, Section IX, for shop and job-site brazing of piping work.

3. MSS Compliance: Mark valves in accordance with MSS-25 "Standard Marking System for Valves, Fittings, Flanges and Unions".

4. ANSI Compliance: For face-to-face and end-to-end dimensions of flanged- or welded-end valve bodies, comply with ANSI B16.10 "Face-to-Face and End-to-End Dimensions of Ferrous Valves".

5. MSS Standard Compliance: Provide pipe hangers and supports of which materials, design, and manufacture comply with MSS SP-58.

1.4 SUBMITTALS

C. Product Data: Submit manufacturer's technical product data, including installation instructions for each type of basic mechanical material.

1. Transition fittings.
2. Dielectric fittings.
3. Mechanical sleeve seals.

D. Welding Certificates.

PART 2 - PRODUCTS

2.1 MATERIAL SPECIFICATIONS

A. Piping Materials: Provide pipe and tube of type, joint type, grade, size and weight (wall thickness or Class) indicated for each service. Where type, grade or class is not indicated, provide proper selection as determined by Installer for installation requirements, and comply with governing regulations and industry standards.

B. Pipe/Tube Fittings: Provide factory-fabricated fittings of type, materials, grade, class and pressure rating indicated for each service and pipe size. Provide sizes and types matching pipe, tube, valve or equipment connection in each case. Where not otherwise indicated, comply with governing regulations and industry standards for selections, and with pipe manufacturer's recommendations where applicable.

2.2 MISCELLANEOUS PIPING MATERIALS/PRODUCTS

A. Welding Materials: Except as otherwise indicated, provide welding materials as determined by Installer to comply with installation requirements.

1. Comply with Section II, Part C, ASME Boiler and Pressure Vessel Code for welding materials.

2. Backing weld rings shall be C1010 low carbon steel.

B. Soldering Materials: Except as otherwise indicated, provide soldering materials as determined by Installer to comply with installation requirements.

1. Tin-Antimony Solder: ASTM B 32, Grade 95TA.
2. Silver-Lead Solder: ASTM B 32, Grade 96TS.

C. Brazing Materials: Except as otherwise indicated, provide brazing materials as determined by Installer to comply with installation requirements.

1. Comply with SFA-5.8, Section II, ASME Boiler and Pressure Vessel Code for brazing filler metal materials.

D. Gaskets for Flanged Joints: ANSI B16.21; full-faced for cast- iron and flat faced flanges; raised-face for steel and other flanges, unless otherwise indicated.

E. Piping Connectors for Dissimilar Non-Pressure Pipe: Elastomeric annular ring insert, or elastomeric flexible coupling secured at each end with stainless steel clamps, sized for exact fit to pipe ends and subject to approval by plumbing code.

1. Manufacturer: Subject to compliance with requirements, provide piping connectors of the following:

a. Fernco, Inc.

2.3 VALVE FEATURES, GENERAL

A. Valve Design: Refer to Division 23 Section "PLANT PIPING SYSTEMS" for valve specifications.

B. Pressure and Temperature Ratings: As scheduled and required to suit system pressures and temperatures.

C. Sizes: Same size as upstream pipe, unless otherwise indicated.

D. Operators: Provide the following special operator features:

1. Handwheels, fastened to valve stem, for valves other than quarter turn.

2. Lever handles, on quarter-turn valves 6-inch and smaller, except for plug valves.

3. Chain-wheel operators, for valves 2-1/2-inch and larger, install 72-inches or higher above finished floor elevation. Extend chains to an elevation of 5-feet-0-inch above finished floor elevation.

4. Gear drive operators, on quarter-turn valves 8-inch and larger. Provide extended operator where indicated for buried or recessed locations.

E. Extended Stems: Where insulation is indicated or specified, provide extended stems arranged to receive insulation.

F. Bypass and Drain Connections: Comply with MSS SP-45 bypass and drain connections.

G. End Connections: As indicated in the valve specifications.

1. Threads: Comply with ANSI B1.20.1.

2. Flanges: Comply with ANSI B16.1 for cast iron, ANSI B16.5 for steel, and ANSI B16.24 for bronze valves.

3. Solder-Joint: Comply with ANSI B16.18.

a. Caution: Where soldered end connections are used, use solder having a melting point below 840°F for gate, globe, and check valves; below 421°F for ball valves.

2.4 PIPING SPECIALTIES

A. General: 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.

2.5 PIPE ESCUTCHEONS

A. General: Provide pipe escutcheons as specified herein with inside diameter closely fitting pipe outside diameter, or outside of pipe insulation where pipe is insulated. Select outside diameter of escutcheon to completely cover pipe penetration hole in floors, walls, or ceilings; and pipe sleeve extension, if any. Furnish pipe escutcheons with nickel or chrome finish for occupied areas, prime paint finish for unoccupied areas.

B. Pipe Escutcheons for Moist Areas: For waterproof floors, and areas where water and condensation can be expected to accumulate, provide cast brass or sheet brass escutcheons, solid or split hinged.

C. Pipe Escutcheons for Dry Areas: Provide sheet steel escutcheons, solid or split hinged.

D. Manufacturer: Subject to compliance with requirements, provide pipe escutcheons of one (1) of the following:

1. Chicago Specialty Mfg. Co.
2. Producers Specialty & Mfg. Corp.
3. Sanitary - Dash Mfg. Co.

2.6 LOW PRESSURE Y-TYPE PIPELINE STRAINERS

A. General: Provide strainers full line size of connecting piping, with ends matching piping system materials. Select strainers for 125 PSI working pressure, with Type 304 stainless steel screens.

2.7 MECHANICAL SLEEVE SEALS

A. General: Modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between pipe and sleeve, connected with bolts and pressure plates which cause rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation. Provide stainless steel nuts and bolts.

B. Manufacturer: Subject to compliance with requirements, provide mechanical sleeve seals of one (1) of the following:

1. Calprico
2. Flexicraft
3. Metraflex Co.
4. Thunderline Corp.

2.8 FABRICATED PIPING SPECIALTIES

A. Drip Pans: Provide drip pans fabricated from corrosion-resistant sheet metal with watertight joints, and with edges turned up 2-1/2-inches. Reinforce top, either by structural angles or by rolling top over 1/4-inch steel rod. Provide hole, gasket, and flange at low point for watertight joint and 1-inch drain line connection.

B. Pipe Sleeves: Provide pipe sleeves of one of the following:

1. Steel-Pipe: Fabricate from Schedule 40 galvanized steel pipe; remove burrs.
2. Iron-Pipe: Fabricate from cast-iron or ductile-iron pipe; remove burrs.

C. Sleeve Seals: Provide sleeve seals for sleeves located in foundation walls below grade, or in exterior walls, of one (1) of the following:

1. Mechanical Sleeve Seals: Installed between sleeve and pipe.

PART 3 - EXECUTION

3.1 PIPE AND PIPE FITTINGS INSTALLATION

A. General: Install pipes and pipe fittings in accordance with recognized industry practices which will achieve permanently-leakproof piping systems, capable of performing each indicated service without piping failure. Install each run with minimum joints and couplings, but with adequate and accessible unions for disassembly and maintenance/replacement of valves and equipment. Reduce sizes (where indicated) by use of reducing fittings. Align piping accurately at connections, within 1/16-inch misalignment tolerance.

1. Comply with ASME B31.9 Code for Pressure Piping in Buildings.

B. Locate piping runs, except as otherwise indicated, vertically and horizontally (pitched to drain) and avoid diagonal runs wherever possible. Orient horizontal runs parallel with walls and column lines. Locate runs as shown or described by diagrams, details and notations or, if not otherwise indicated, run piping in shortest route which does not obstruct usable space or block access for servicing building and its equipment. Hold piping close to walls, overhead construction, columns and other structural and permanent-enclosure elements of building; limit clearance to 1/2-inch where furring is shown for enclosure or concealment of piping, but allow for insulation thickness, if any. Where possible, locate insulated piping for 1-inch clearance outside insulation. Wherever possible in finished and occupied spaces, conceal piping from view, by locating in column enclosures, in hollow wall construction or above suspended ceilings; do not encase horizontal runs in solid partitions, except as indicated.

C. Electrical Equipment Spaces: Do not run piping through transformer vaults and other electrical or electronic equipment spaces and enclosures unless approved in writing by the Owner. Install drip pan under piping that must be run through electrical spaces.

3.2 PIPING SYSTEM JOINTS

A. General: Provide joints of type indicated in each piping system.

B. Thread pipe in accordance with ANSI B2.1; cut threads full and clean using sharp dies. Ream threaded ends to remove burrs and restore full inside diameter. Apply pipe joint compound, or pipe joint tape (Teflon) where recommended by pipe/fitting manufacturer, on male threads at each joint and tighten joint to leave not more than three (3) threads exposed.

C. Braze copper tube-and-fitting joints where indicated, in accordance with ANSI B31.1.

D. Solder copper tube-and-fitting joints where indicated, in accordance with recognized industry practice. Cut tube ends squarely, ream to full inside diameter, and clean outside of tube ends and inside of fittings. Apply solder flux to joint areas of both tubes and fittings. Insert tube full depth into fitting, and solder in manner which will draw solder full depth and circumference of joint. Wipe excess solder from joint before it hardens.

E. Weld pipe joints in accordance with ASME code for pressure piping, B31.1 or with recognized industry practice and as follows:

1. Weld pipe joints only when ambient temperature is above 0°F where possible.

2. Bevel pipe ends at a 37.5°angle where possible, smooth rough cuts, and clean to remove slag, metal particles and dirt.

3. Use pipe clamps or tack-weld joints with 1-inch long welds; 4 welds for pipe sizes to 10-inch, 8 welds for pipe sizes 12-inch thru 20-inch.

4. Build up welds with stringer-bead pass, followed by hot pass, followed by cover or filler pass. Eliminate valleys at center and edges of each weld. Weld by procedures which will ensure elimination of unsound or unfused metal, cracks, oxidation, blow-holes and non-metallic inclusions.

5. Do not weld-out piping system imperfections by tack- welding procedures; refabricate to comply with requirements.

6. At Installer's option, install forged branch-connection fittings wherever branch pipe of size smaller than main pipe is indicated; or install regular "Tee" fitting. Comply with Division 23 Section “Plant Piping”.

F. Flanged Joints: Match flanges within piping system, and at connections with valves and equipment. Clean flange faces and install gaskets. Tighten bolts to provide uniform compression of gaskets.

G. Dielectric Insulated Joints: Match insulating kits with piping system and properly install according to manufacturer's written instructions and recommendations.

H. Hubless Cast-Iron Joints: Comply with coupling manufacturer's installation instructions.

3.3 CLEANING, FLUSHING, INSPECTING OF PIPING SYSTEM

A. General: Clean exterior surfaces of installed piping systems of superfluous materials, and prepare for application of specified coatings (if any). Flush out piping systems with clean water before proceeding with required tests. Inspect each run of each system for completion of joints, supports and accessory items.

1. Inspect pressure piping in accordance with procedures of ASME B31.9.

B. Disinfect water mains and water service piping in accordance with AWWA C601.

3.4 PIPING TESTS

A. Test pressure piping in accordance with ASME B31.9.

B. General: Provide temporary equipment for testing, including pump and gages. Test piping system before insulation is installed wherever feasible, and remove control devices before testing. Test each natural section of each piping system independently but do not use piping system valves to isolate sections where test pressure exceeds valve pressure rating. Fill each section with water and pressurize for indicated pressure and time.

1. Required test period is two (2) hours.

2. Test long runs of Schedule 40 pipe at 150 PSI, except where fittings are a lower Class or pressure rating.

3. Test each piping system at 150% of operating pressure indicated, but not less than 25 PSI test pressure.

4. Observe each test section for leakage at end of test period. Test fails if leakage is observed or if pressure drop exceeds 5% of test pressure.

C. Repair piping systems sections which fail required piping test, by disassembly and re-installation, using new materials to extent required to overcome leakage. Do not use chemicals, stop-leak compounds, mastics, or other temporary repair methods.

D. Drain test water from piping systems after testing and repair work has been completed.

3.5 VALVE EXAMINATION

A. Examine valve interior through the end ports for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks used to prevent disc movement during shipping and handling.

B. Actuate valve through an open-close and close-open cycle. Examine functionally significant features, such as guides and seats made accessible by such actuation. Following examination, return the valve closure member to the shipping position.

C. Examine threads on both the valve and the mating pipe for form (i.e., out-of-round or local indentation) and cleanliness.

D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Check gasket material for proper size, material composition suitable for service, and freedom from defects and damage.

E. Prior to valve installation, examine the piping for cleanliness, freedom from foreign materials, and proper alignment.

F. Replace defective valves with new valves.

3.6 VALVE INSTALLATIONS

A. General Application: Use ball, and butterfly valves for shut-off duty; plug, globe, ball, and butterfly for throttling duty. Refer to piping system specification sections for specific valve applications and arrangements.

B. Locate valves for easy access and provide separate support where necessary.

C. Install valves and unions for each fixture and item of equipment in a manner to allow equipment removal without system shut-down. Unions are not required on flanged devices.

D. Install 3-valve bypass around each pressure reducing valve using throttling type valves.

E. Install valves in horizontal piping with stem at or above the center of the pipe, and to allow full stem movement.

F. Installation of Check Valves: Install for proper direction of flow as follows:

1. Swing Check Valves: Install in horizontal position with hinge pin level.
2. Wafer Check Valves: Install between two (2) flanges in horizontal or vertical position.
3. Lift Check Valve: Install in piping line with stem upright and plumb.

G. Installation of Air Vent Valves: Install at all high points.

1. Manual air vents shall be fitted with ball valve accessible from the operating floor and routed to drain.

2. Automatic air vents shall be fitted with isolation valve and routed to drain. Vents located on condenser water piping shall be routed to return to condenser pump basin.

H. Installation of Drain Valves: Install at all low points.

1. Manual drains shall be fitted with ball valve accessible from the operating floor and routed to floor drain.

I. Solder Connections:

1. Cut tube square and to exact lengths.

2. Clean end of tube to depth of valve socket with steel wool, sand cloth, or a steel wire brush to a bright finish. Clean valve socket in same manner.

3. Apply proper soldering flux in an even coat to inside of valve socket and outside of tube.

4. Open gate and globe valves to full open position.

5. Remove the cap and disc holder of swing check valves having composition discs.

6. Insert tube into valve socket, making sure the end rests against the shoulder inside valve. Rotate tube or valve slightly to ensure even distribution of the flux.

7. Apply heat evenly to outside of valve around joint until solder will melt upon contact. Feed solder until it completely fills the joint around tube. Avoid hot spots or overheating valve. Once the solder starts cooling, remove excess amounts around the joint with a cloth or brush.

J. Threaded Connections:

1. Note the internal length of threads in valve ends, and proximity of valve internal seat or wall, to determine how far pipe should be threaded into valve.

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.

K. Flanged Connections:

1. Align flange surfaces parallel.

2. Assemble 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 with a torque wrench.

3. For dead-end service, butterfly valves require flanges both upstream and downstream for proper shutoff and retention.

L. Field Quality Control:

1. Tests: After piping systems have been tested and put into service, but before final adjusting and balancing, inspect valves for leaks. Adjust or replace packing to stop leaks; replace valves if leak persists.

M. Adjusting and Cleaning:

1. Cleaning: Clean mill scale, grease, and protective coatings from exterior of valves and prepare valves to receive finish painting or insulation.

3.7 PIPING SPECIALTIES INSTALLATION

A. Pipe Escutcheons: Install pipe escutcheons on each pipe penetration thru floors, walls, partitions, and ceilings where penetration is exposed to view; and on exterior of building. Secure escutcheon to pipe or insulation so escutcheon covers penetration hole, and is flush with adjoining surface.

B. Y-Type Strainers: Install Y-type strainers full size of pipeline, in accordance with manufacturer's installation instructions. Install pipe nipple and shutoff valve in strainer blow down connection, full size of connection, except for strainers 2-inch and smaller installed ahead of control valves feeding individual terminals. Provide drain line from shutoff valve to plumbing drain, full size of blow down connection.

1. Locate Y-type strainers in supply line ahead of the following equipment, and elsewhere as indicated, if integral strainer is not included in equipment:

a. Temperature control valves.
b. Pressure reducing valves.
c. Temperature or pressure regulating valves.
d. Steam traps serving steam main drops.

3.8 INSTALLATION OF FABRICATED PIPING SPECIALTIES

A. Drip Pans: Locate drip pans under piping passing over or within 3-feet horizontally of electrical equipment, batteries and elsewhere as indicated. Hang from structure with rods and building

attachments, weld rods to sides of drip pan. Brace to prevent sagging or swaying. Connect 1-inch drain line to drain connection, and run to nearest plumbing drain or elsewhere as indicated.

B. Pipe Sleeves: Install pipe sleeves of types indicated where piping passes through walls, floors, ceilings, and roofs. Do not install sleeves through structural members of work, except as detailed on drawings, or as reviewed by Architect/Engineer. Install sleeves accurately centered on pipe runs. Size sleeves so that piping and insulation (if any) will have free movement in sleeve, including allowance for thermal expansion; but not less than two (2) pipe sizes larger than piping run. Where insulation includes vapor-barrier jacket, provide sleeve with sufficient clearance for installation. Install length of sleeve equal to thickness of construction penetrated, and finish flush to surface; except floor sleeves. Extend floor sleeves 2-1/4-inch above level floor finish. Provide temporary support of sleeves during placement of concrete and other work around sleeves, and provide temporary closure to prevent concrete and other materials from entering sleeves.

1. Install iron-pipe sleeves at exterior penetrations, both above and below grade.
2. Install steel-pipe sleeves except as otherwise indicated.

C. Dielectric Unions: Install at each piping joint between ferrous and nonferrous piping. Comply with manufacturer's installation instructions.

D. Mechanical Sleeve Seals: Loosely assemble rubber links around pipe with bolts and pressure plates located under each bolt head and nut. Push into sleeve and center. Tighten bolts until links have expanded to form watertight seal.

END OF SECTION

SECTION 23 05 17

SLEEVES AND SLEEVE SEALS FOR PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Sleeves.
2. Sleeve-seal systems.
3. Grout.

1.3 ACTION SUBMITTALS

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

PART 2 - PRODUCTS

2.1 SLEEVES

A. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, with plain ends.

2.2 SLEEVE-SEAL SYSTEMS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Advance Products & Systems, Inc.
2. CALPICO, Inc.
3. Metraflex Company (The).
4. Pipeline Seal and Insulator, Inc.
5. Proco Products, Inc.
6. Thunderline (Link-Seal).

B. Description: Modular sealing-element unit, designed for field assembly, for filling annular space between piping and sleeve.

1. Sealing Elements: EPDM-rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.

2. Pressure Plates: Composite or Steel Zinc Dichromate.

3. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements.

2.3 GROUT

A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

B. Characteristics: Non-shrink; recommended for interior and exterior applications.

C. Design Mix: 5000-psi, 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION

A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls as indicated.

B. For sleeves that will have sleeve-seal system installed, select sleeves of size large enough to provide 1-inch annular clear space between piping and concrete slabs and walls.

1. Sleeves are not required for core-drilled holes.
2. Cut sleeves to length for mounting flush with both surfaces.

a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level.

3. Using grout, seal the space outside of sleeves in slabs and walls without sleeve-seal system.

C. Install sleeves for pipes passing through interior partitions.

1. Cut sleeves to length for mounting flush with both surfaces.

2. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.

3. Seal annular space between sleeve and piping or piping insulation; use joint sealants appropriate for size, depth, and location of joint. Comply with requirements for sealants specified in Division 07 "Joint Sealants."

D. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in Division 07 "Firestopping."

3.2 SLEEVE-SEAL-SYSTEM INSTALLATION

A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at service piping entries into building.

B. Select type, size, and number of sealing elements required for piping material and size and for sleeve ID or hole size. Position piping in center of sleeve. Center piping in penetration, assemble sleeve-seal system components, and install in annular space between piping and

sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make a watertight seal.

3.3 SLEEVE AND SLEEVE-SEAL SCHEDULE

A. Use sleeves and sleeve seals for the following piping-penetration applications:

1. Exterior Concrete Walls above Grade:

a. Piping Smaller Than NPS 6: Galvanized-steel-pipe sleeves.
b. Piping NPS 6 and Larger: Galvanized-steel-pipe sleeves.

2. Exterior Concrete Walls below Grade:

a. Piping Smaller Than NPS 6: Galvanized-steel-pipe sleeves with sleeve-seal system.

1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.

b. Piping NPS 6 and Larger: Galvanized-steel-pipe sleeves with sleeve-seal system.

1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.

3. Concrete Slabs-on-Grade:

a. Piping Smaller Than NPS 6: Galvanized-steel-pipe sleeves with sleeve-seal system.

1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.

b. Piping NPS 6 and Larger: Galvanized-steel-pipe sleeves with sleeve-seal system.

1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.

4. Concrete Slabs above Grade:

a. Piping Smaller Than NPS 6: Galvanized-steel-pipe sleeves.
b. Piping NPS 6 and Larger: Galvanized-steel-pipe sleeves.

5. Interior Partitions:

a. Piping Smaller Than NPS 6: Galvanized-steel-pipe sleeves.

b. Piping NPS 6 and Larger: Galvanized-steel-pipe sleeves.

END OF SECTION

SECTION 23 05 53

IDENTIFICATION FOR PLANT PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Warning signs and labels.
2. Pipe labels.
3. Stencils.
4. Valve tags.
5. Warning tags.

1.3 SUBMITTALS

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

B. Samples: For color, letter style, and graphic representation required for each identification material and device.

C. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.

D. Valve numbering scheme.

E. Valve Schedules: For each piping system to include in maintenance manuals.

F. Valve Schedules: Submit valve schedule for each piping system, type written and reproduced on 8-1/2" x 11" bond paper or electronic spread sheet using Microsoft Excel®. 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 shut-off and similar special uses, by special "flags", in margin of schedule. Include copies for Maintenance Manuals as specified in Section 23 "MECHANICAL GENERAL PROVISIONS".

G. Maintenance Data: Include product data and schedules in maintenance manuals; in accordance with requirements of General Conditions to Agreement for Construction.

1.4 COORDINATION

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

B. Coordinate installation of identifying devices with locations of access panels and doors.

C. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

A. Metal Labels for Equipment:

1. Material and Thickness: Aluminum, 0.032-inch or anodized aluminum, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.

2. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

3. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

4. Fasteners: Stainless-steel rivets or self-tapping screws.

5. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

B. Plastic Labels for Equipment:

1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.

2. Letter Color: White.

3. Background Color: Black.

4. Maximum Temperature: Able to withstand temperatures up to 160 deg F.

5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

6. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch or viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

7. Fasteners: Stainless-steel rivets or self-tapping screws.

8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

C. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified.

D. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch (A4) bond paper. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.2 WARNING SIGNS AND LABELS

A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.

B. Letter Color: Black.

C. Background Color: Yellow.

D. Maximum Temperature: Able to withstand temperatures up to 160 deg F.

E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

F. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

G. Fasteners: Stainless-steel rivets or self-tapping screws.

H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

I. Label Content: Include caution and warning information, plus emergency notification instructions.

2.3 PIPE LABELS

A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.

B. Pre-tensioned Pipe Labels: Pre-coiled, semi-rigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.

C. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.

D. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions, or as separate unit on each pipe label to indicate flow direction.

2. Lettering Size: At least 1-1/2 inches high.

2.4 STENCILS

A. Stencils: Prepared with letter sizes according to ASME A13.1 for piping; minimum letter height of 1-1/4 inches for ducts; and minimum letter height of 3/4 inch for access panel and door labels, equipment labels, and similar operational instructions.

1. Stencil Material: Fiberboard or metal.

2. Stencil Paint: Exterior, gloss, semi gloss latex enamel unless otherwise indicated. Paint may be in pressurized spray-can form.

3. Identification Paint: Exterior, semi gloss latex enamel in colors according to ASME A13.1 unless otherwise indicated.

2.5 VALVE TAGS

A. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch (13-mm) numbers.

1. Tag Material: Anodized aluminum, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
2. Fasteners: Brass wire-link chain or S-hook.

B. Valve Schedules: For each piping system, on 8-1/2-by-11-inch (A4) bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.

1. Valve-tag schedule shall be included in operation and maintenance data.

2.6 WARNING TAGS

A. Warning Tags: Preprinted or partially preprinted, accident-prevention tags, of plasticized card stock with matte finish suitable for writing.

1. Size: 3 by 5-1/4 inches minimum.

2. Fasteners: Brass grommet and wire.

3. Nomenclature: Large-size primary caption such as "DANGER," "CAUTION," or "DO NOT OPERATE."

4. Color: Yellow background with black lettering.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulates.

3.2 EQUIPMENT LABEL INSTALLATION

A. Install or permanently fasten labels on each major item of mechanical equipment.

B. Locate equipment labels where accessible and visible.

C. Install or permanently fasten labels on each control instrument and sensor.

3.3 PIPE LABEL INSTALLATION

A. Piping Color-Coding: Painting of piping is specified in Division 09 Section "Painting."

B. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:

1. Near each valve and control device.

2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.

3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.

4. At access doors, manholes, and similar access points that permit view of concealed piping.

5. Near major equipment items and other points of origination and termination.

6. Spaced at maximum intervals of 50 feet along each run and at tees, junctions or service entrances. Reduce intervals to 25 feet in areas of congested piping and equipment.

7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.

C. Pipe Label Color Schedule:

1. Chilled-Water Piping:

a. Background Color: Green.
b. Letter Color: White.

2. Condenser-Water Piping:

a. Background Color: White.
b. Letter Color: Black.

3. Refrigerant Piping:

a. Background Color: Red.
b. Letter Color: Black.

3.4 VALVE-TAG INSTALLATION

A. Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units; shutoff valves; faucets; convenience and hose connections; and HVAC terminal devices and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.

B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following subparagraphs:

1. Valve-Tag Size and Shape:

    a. Chilled Water: 1-1/2 inches, round.
    b. Condenser Water: 1-1/2 inches, round.
    c. Refrigerant: 1-1/2 inches, round.
    d. Steam: 1-1/2 inches, round.
    e. Condensate: 1-1/2 inches, round.

2. Valve-Tag Color:

    a. Chilled Water: Green.
    b. Condenser Water: Natural.
    c. Refrigerant: Red.
    d. Steam: Yellow.
    e. Condensate: Yellow.

3. Letter Color:

    a. Chilled Water: White.
    b. Condenser Water: Black.
    c. Refrigerant: Black.
    d. Steam: Black.
    e. Condensate: Black.

3.5 WARNING-TAG INSTALLATION

A. Write required message on, and attach warning tags to, equipment and other items where required.

END OF SECTION

SECTION 23 07 00

MECHANICAL INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION

A. Field-applied insulation for thermal energy plant mechanical systems and piping distribution systems.

B. Refer to pre-purchase equipment shop drawings for additional information regarding field insulation requirements.

1.3 RELATED WORK

A. Division 23 Section, "Basic Requirements and Methods".

B. Pipe Hanging Devices:

1. Division 23 Section, "Plant Piping Systems".

1.4 ACTION SUBMITTALS

A. Product Data for Insulation, Jackets, Adhesive and Cements: Technical information including catalog cuts indicating density, thermal characteristics, jackets, installation instructions, ASTM Specification compliance, flame and smoke rating, samples.

B. Thermal Conductivity Average Maximum in Btu-in/hr-ft^2 at 75°F Mean Temperature:

1. Fiberglass Blanket = 0.30.
2. Fiberglass Preformed Pipe Insulation = 0.26.

C. Bands and Wire Mesh: Size, material and coating.

1.5 INFORMATIONAL SUBMITTALS

A. Qualifications Data: For qualified Installer

B. Material Test Reports: From a qualified test agency acceptable to authorities having jurisdiction indicating, interpreting, and a certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.

C. Field quality control reports.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.

B. Furnish insulation and materials bearing the manufacturer's label. Only mechanics skilled at such work shall apply materials. Insulation and materials shall be by one (1) of the manufacturers listed. Specialty material shall be of the manufacturer indicated or approved equal. Fire and smoke hazard classification ratings on insulation, jacket, and adhesive shall conform to NFPA 255, ASTM E 84, or UL-723 as follows:

1. Flame Spread Index not exceeding 25.
2. Fuel Contributed not exceeding 50.
3. Smoke Developed Index not exceeding 50.

1.7 STORAGE AND HANDLING OF MATERIALS

A. Store materials in clean, dry environment. Pipe covering jackets shall be clean and unmarred. Store adhesives in original containers.

B. Deliver material to job site in original non-broken factory packaging, labeled with manufacturer’s density and thickness.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Mineral Fiber:

a. CertainTeed Manson.
b. Knauf FiberGlass GmbH.
c. Owens-Corning Fiberglass Corp.
d. Schuller International, Inc.

2. Flexible Industrial Blanket:

a. Pyrogel XT-E®, Aspen Aerogels Inc.
b. Cryogel-Z®, Aspen Aerogels Inc.

3. Jacket:

a. Childers
b. Manville Products Inc.
c. Owens-Corning.
d. Pabco Metal Products.
e. R.P.R. Products Inc.

4. Field Applied Removable/Reusable Insulating Jacket:

   a. ACS Industries Inc.
   b. Advance Thermal Corp.
   c. Thermal Ceramics Inc.
   d. Thermal Energy Products Inc.

2.2 RIGID FIBERGLASS (Type **RF-2**)

A. Preformed Pipe Insulation: ASTM C547, Type I 450°F, Type II and Type III 1200°F.

B. Fitting Insulation: ASTM C547, 450°F.

C. Temperature Rating: To 850 °F.

D. Density: 3 lb/cu.ft.

E. Conductivity: Not more than 0.22 Btu-in/hr-sq.ft. °F at 75°F.

2.3 FLEXIBLE INDUSTRIAL BLANKET INSULATION

A. Pyrogel XT-E; High Temperature Applications (Steam and Steam Condensate) (TYPE **FAB-1**):

1. Temperature Rating: To 1200ºF.

2. Density: 12.5 lbs/ft^3.

3. Pyrogel XT-E Tested Property Values (Per TDS):

Test Procedure	Property Results
ASTM C 165 Compressive Strength	Stress at 10% strain = 14.8 psi Stress at 25% strain = 26.6 psi
ASTM C 356 Linear Shrinkage Under Soaking Heat	< 1.3% @ 1200°F
ASTM C 411 Hot Surface Performance	Passed
ASTM C 447 Estimation of Maximum Use Temperature	1200°F
ASTM C 592-04 (Section 11.11, Modified) Heat and Vibration Aging	0.19% mass change after 6 hr vibration
ASTM C 795 Insulation for Use Over Austenitic Stainless Steel	Passed
ASTM C 1101 Classifying the Flexibility of Mineral Fiber Blankets Class:	Resilient Flexible
ASTM C 1104 Water Vapor Sorption	2.25% (by weight)
ASTM C 1338 Fungal Resistance of Insulation Materials	Passed
ASTM C 1511 Liquid Water Retention After Submersion	4% (by weight)
ASTM E 84 Surface Burning Characteristics	Class FSI = 0, SDI = 0
ASTM E 1354 Cone Calorimetry	No ignition at 50 kW/m2
BS EN 13501-1: 2007 Reaction to Fire Performance	Passed Euroclass A2
ISO 1182:1990 Non-Combustibility	Meets criteria outlined in ISO 1182:1990

Thermal Conductivity ASTM – C177
Thermal conductivity measurements taken at a compressive load of 2 psi.

Pyrogel XT-E			
Temperature		Thermal Conductivity	
°F		Btu-in/hr-sqft-°F	
32		0.139	
212		0.159	
392		0.194	
572		0.243	
752		0.319	
932		0.444	
1112		0.627	

ASTM C356 linear Shrinkage Under Soaking Heat

B. Cryogel –Z; Sub-Ambient Temperature Applications (Chilled Water) (TYPE **FAB-2**):

1. Temperature Rating: To 200ºF.
2. Density: 10.0 lbs/ft^3.
3. Cryogel-Z Tested Property Values (Per TDS):

Thermal conductivity measurements taken at a compressive load of 2 psi.

Cryogel Z			
Temperature		Thermal Conductivity	
°F		Btu-in/hr-sqft-°F	
-200		0.096	
-100		0.10	
0		0.11	
75		0.12	
100		0.0.12	
200		0.13	

Thermal Conductivity ASTM – C1728, Type I, Category B.

2.4 MINERAL WOOL INSULATION (Type **MW-11**)

A. ASTM C612, Type III, 450°C (850°F).

B. Maximum Density: 6 lb/cu.ft.

C. Temperature Rating: 450 °F.

2.5 INSULATING AND FINISHING CEMENTS

A. Best grade as recommended by manufacturer for type of insulation system and service conditions. Conform to ASTM C449, Type I or II.

2.6 BANDS

A. Stainless steel or aluminum, 0.015-inch thick and 1/2-inch wide; 16-gage stainless steel wire; hexagonal mesh as required by application. ASTM A167 or B209.

2.7 ALL SERVICE JACKET AND FITTING COVERINGS

A. Puncture resistance rating based on ASTM D781 test method.

B. Permeance ratings based on ASTM E96, Procedure A.

C. Jacket Types:

1. Type **ASJ**: All Service Jacket (ASJ).

   a. Material: Heavy-duty, fire-retardant, glass fiber reinforced material with self-sealing lap.

   b. Factory applied to insulation.

   c. Finish: White vinyl or white kraft suitable for painting.

   d. Permeance: 0.02 perms, maximum.

   e. Vapor Barrier: 0.001-inch aluminum foil adhered to inner surface of jacket.

2. Type **FRK**: Glass Fiber Reinforced (FRK).

   a. Material: Glass fiber reinforced.
   b. Factory applied to insulation.
   c. Finish: White kraft.
   d. Bench Puncture Resistance: 15 units, minimum.
   e. Permeance: 0.01 perms, maximum.
   f. Vapor Barrier: 0.001 inch aluminum foil adhered to inner surface of jacket.

3. Type **AL**: Aluminum (AL).

   a. Material: Aluminum alloy No. 3003 with H-14 temper.

   b. Thickness: 0.016-inch unless otherwise specified.

   c. Surface Finish: Stucco.

   d. Isolating Or Vapor Barrier: Factory-applied on interior.

   e. Fittings: Formed, 2-piece covers of 0.024-inch minimum smooth aluminum.

   f. Ells, sweeps, and bends, of size for which the above two-piece formed jackets are not available, shall be jacketed with factory fabricated, field-assembled, dimpled gore-type aluminum jackets consisting of interlocking segments which, when assembled, form a smooth bend.

4. Type **GF-4**: Glass Fabric (GF).

   a. Material: 20 by 20 mesh glass fabric.

   b. Adhesive: Embed in coat of lagging adhesive, finish with second coat of lagging adhesive.

5. Type **PVC**: Polyvinyl Chloride (PVC).

   a. Heavy PVC Fitting Covers: Factory-fabricated fitting covers manufactured from 30 MIL (0.75mm) thick, high-impact, ultraviolet-resistant PVC conforming to Fed. Spec. L-P-535, Comp. A Type II.

(1) Shapes: 45 and 90 degree, short and long radius elbows, tees, valves, flanges, reducers, end caps.

(2) Adhesive: As recommended by insulation material manufacturer.

2.8 FIELD-APPLIED REMOVABLE/REUSABLE FABRICATED INSULATION BLANKET TYPE COVERING (Type **RB-1**)

A. Field-Removable/Reuseable Fabricated Insulation Covering: Provide factory-fabricated flexible type field-applied insulation covering at main line valves, expansion joints and other devices specified or indicated.

1. Design: Provide custom designed reuseable insulation covers to conform to the shape of the valve or equipment to be insulated. Covers that encapsulate the fitting and conceal its type are not acceptable.

2. Identification: Each cover shall have a permanently attached stainless steel tag secured to the outer surface of the cover for the purpose of identifying the manufacturer and source to reorder.

3. Construction: Insulation covers shall be sewn with two parallel rows of lock stitching (approx. 10 to 14 stitches per inch) approximately 1/4- to 1/2-inches apart. "Hog Ringed" seams are not acceptable. Insulation covers 2-inches thick and above shall be gusseted to insure full insulation thickness throughout.

4. Thermal Requirements: Insulation thickness shall be sufficient to provide a cold face temperature at or below 140°F regardless of the thickness of the adjacent pipe insulation.

5. Thermal Requirements: Jacketing shall be silicone impregnated fiberglass fabric, minimum 16 ounce per square yard containing a minimum of 25 percent silicone by weight. Fabric shall be suitable for use with hydrocarbon, steam to 500°F. Insulation shall be asbestos-free constructed of glass fiber insulating material composed of 100 percent Type E fiberglass, density of 11.5 pounds per cubic foot, alkalinity shall be 0.15 percent or less, conductivity "k" value no more than 0.38 at a mean temperature of 400°F when measured in accordance with ASTM C177.

6. Sewing Thread: Kevlar or Teflon coated fiberglass suitable for the purpose intended.

7. Accessories: Type 304 stainless steel quilting and lacing pins shall be used to secure the insulation with the jacket. Shall be fastened with durable straps and D-rings. Draw cord shall be suitable for 600°F service minimum diameter of 0.125-inch. Tie wire for securing covers shall be minimum No. 16 B&S (0.051-inch diameter) gauge soft annealed Type 302 or 304 stainless steel.

2.9 IDENTIFICATION OF MATERIALS

A. All material incorporated in the job shall be identified on manufacturers' container by name, type and description.

2.10 FLAME AND SMOKE

A. Assembled systems shall meet flame spread 25 and smoke developed 50 ratings as developed under ASTM, NFPA and UL standards and specifications.

PART 3 - EXECUTION

3.1 PREPARATION

A. Apply materials on clean, dry surfaces from which all dirt, loose scale and construction debris has been removed. Verify insulation is dry before and during application and finish systems at operating conditions.

B. Do not install covering before piping and equipment has been tested.

C. Factory pre-fabricated and pre-insulated piping systems shall be supplier responsibility for overall design of expansion and contraction compensation. System shall be provided complete with coupling fittings, insulation kits, and termination fittings all supplied by the piping system supplier. System shall be installed using the least amount of coupling fittings for the installed length.

3.2 INSTALLATION

A. Apply insulation materials thermally and structurally tight, neatly finished at fittings, valves, and at hanger or other penetrations. Provide a smooth finished surface without sags and wrinkles, primed ready to receive specified painting. Insulation exposed to weather shall be weathertight.

B. Use of scrap insulation will not be permitted. Repair or replace any work damaged or deformed.

C. Do not install insulation at anchors or braces until construction of anchor or brace has been inspected by the Owner's Representative.

D. Install in accordance with manufacturer's instructions.

E. Insulated pipes and equipment systems conveying fluids below ambient temperature shall be insulated including fittings, valves, unions, flanges, strainers, flexible connections and expansion joints. Insulation must be applied and sealed prior to system operation allowing for a clean dry surface to place insulation.

F. Glass fiber insulated systems conveying fluids below ambient temperature shall be provided with vapor barrier jackets, factory or field applied secured with sealed longitudinal laps and butt strips. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent surfaces unless otherwise indicated. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.

G. Inserts and Shields:

1. Application: Piping 1.5-inches NPS and larger.

2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts or piping on pipe diameters below 1.5-inch NPS.

    a. 16-gauge sheet metal for pipes 4-inch and larger.
    b. 20-gauge sheet metal for pipes smaller than 4-inch.
    c. Shield length shall be minimum of 12-inches.
    d. Shields shall bear on the lower one-third periphery of the insulated pipe.

3. Insert Location: Between support shield and piping and under the finish jacket.

4. Insert Configuration: Minimum 6-inches long, of the same thickness and contour as adjoining insulation field or factory fabricated.

H. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions.

I. Bevel all ends of insulation and seal with vapor barrier mastic.

J. Hangers, supports, anchors, that are secured directly to cold surfaces shall be insulated and vapor sealed to prevent condensation.

K. Provide vapor barrier jacket on exterior applications.

L. Insulation of cold surfaces where vapor barrier jackets are used, jackets shall be applied with a continuous, unbroken vapor seal (hangers on outside of insulation jacket).

M. On refrigerant suction piping, apply insulation to clean, dry surface of pipe. All fittings, valves, shall be insulated with mitered segments of pipe insulation. Apply adhesive on all butted joints, longitudinal seams, and mitered joints.

N. Apply insulation close to equipment by grooving, scoring, and beveling insulation. Fasten to equipment adhesive, wires or bands.

O. Fill joints, cracks, seams, and depressions with bedding compound to form smooth surface. On cold equipment use vapor barrier cement.

P. Insulated equipment containing fluids below ambient temperature shall be insulated in their entirety of exposed cold surface area such as evaporator areas of water chillers etc.

Q. Bevel and seal insulation around nameplates.

R. Insulate equipment or piping in such a manner to allow maintenance, repair, or cleaning by easily removing and replacing insulation system without damage to insulation.

3.3 PARTS NOT INSULATED

A. Pipe, Valves and Fittings:

1. Gas fuel
2. Flowmeter sensing piping and blowdown
3. Level sensor piping and blowdown
4. Threaded valves
5. Check valves (Threaded)
6. Unions

B. Specialties:

1. Level sensors - piping, valves and blowdown
2. Strainers under 2-1/2 inch pipe size

C. Exceptions: Provide flexible blanket type covering for the following hot applications;

1. Strainers above 3-inch pipe size

2. Isolation valves larger than 2-inch NPT size

3.4 APPLICATION - PIPE, VALVES, AND FITTINGS

A. General:

1. Insulate piping field fabricated supports.

2. Insulate at hanger point protective saddle bearing areas.

3. Terminate insulation and jacket hard and tight at anchor points.

4. Terminate insulation at piping facilities not insulated with a 45 degree chamfered section of insulating and finishing cement covered with jacket.

5. Insulate valves larger than 2-inch with removable blanket type insulation system RB-1, insulate valve bonnet up to valve side of bonnet flange to permit bonnet flange removal without disturbing adjacent pipe insulation. Terminate adjacent pipe insulation with sealed beveled end to provide proper overlap of insulation systems to provide protective covering.

6. Insulate expansion joints with removable type insulation system RB-1. Terminate adjacent pipe insulation with sealed protective covering.

7. Unless otherwise noted, insulate all piping and components in chilled water system.

8. Install jacket smooth, tight and neatly finish all edges.

9. Do not insulate basket removal flanges on strainers. Insulate basket removal flanges on strainers in applications below 120°F to allow flange lid operation and frequent basket removal.

10. Apply insulation to piping with bond adhesive with butt joints and longitudinal seams closed tightly.

11. Laps on factory-applied jackets shall be a minimum of 1.5-inches in width firmly cemented with lap adhesive, or be pressure sealing type lap.

12. Cover joints with factory finished tape minimum 2-inch in width to match jacket firmly cemented with lap adhesive.

13. Install factory molded insulation for fittings for valve insulation.

14. Insulate thermal pipe shields, maintain vapor barrier continuity.

15. Where pipe shields are not used at hangers provide non-compressive insulation extending twice the length of the specified length of pipe shield.

3.5 ALUMINUM JACKET INSTALLATION

A. Field applied aluminum jacket:

1. Pipe: Laps in piping insulation shall be minimum of 1-inch longitudinal and 2-inches circumferential.

2. Equipment: Laps shall be 3-inches minimum longitudinal and circumferential.

3. Laps: Longitudinal piping and screwed or riveted laps on equipment and piping accessories shall be located on side normally concealed from view; on piping exposed to weather, locate lap on bottom of line for weather protection.

4. Longitudinal Edges: 1-inch hemmed.

5. Fastening:

   a. Apply banding at lap, on maximum 8-inch centers and as required to securely hold jacket in place.

   b. Install binding head stainless steel sheet metal screws on 3-inch centers through laps on fittings valves, etc., where banding cannot be used using No. 7 by 3/8-inch screws. Install screws between bands on longitudinal laps where required to prevent gapping in jacket.

   c. Use "Z" hooks at each circumferential lap on vertical runs, and inclined surfaces spaced as necessary to prevent slippage of jacket.

6. Fittings and Irregular Shapes:

   a. Use form covers. Where formed covers not applicable, use neatly cut, lapped pieces, with exposed edges hemmed.

   b. Fasten in accordance with requirements for field-applied aluminum jackets.

7. Aluminum Jackets Exposed To Weather:

   a. Longitudinal laps below center line arranged to prevent entrance of water. All laps against weather.

   b. Circumferential laps shall be tightly banded and caulked with silicone rubber.

3.6 INSULATION APPLICATION SCHEDULE

A. Piping Insulation Application Schedule:

SERVICE	INSULATION	JACKET	THICKNESS
Potable/Non-Potable Water and Storm Water			
Potable Hot Water (140 ºF)	RF-2	ASJ	Refer to Insulation Thickness Schedule
Steam (400˚F)			
Interior	RF-2 or FAB-1	PVC	Refer to Insulation Thickness Schedule
Steam Condensate (200˚F)			
Interior	RF-2 or FAB-1	PVC	Refer to Insulation Thickness Schedule
Steam & Steam Condensate Expansion Joints	RB-1	-------	2-Inch

*PROVIDE PVC JACKET AT EQUIPMENT CONNECTIONS ON HORIZONTAL PIPE INSULATION AND ON VERTICAL PIPE INSULATION TO 10 FEET ABOVE FLOOR.
**PROVIDE ALUMINUM JACKET ON INSULATION EXPOSED TO WEATHER.

3.7 INSULATION THICKNESS SCHEDULE

NOMINAL INSULATION THICKNESS (1) (INCHES)					
NOMINAL PIPE SIZE (INCHES)	HEATING SYSTEMS				
	Steam, Hot Condensate and Flash Steam				
	ABOVE 177°C	122°-177°C	94°-121°C	61°-93°C	41°-60°C
	ABOVE 350°F	251°-350°F	201°-250°F	141°-200°F	105°-140°F
Runouts (2)	1.5	1.5	1.0	1.0	1.0
1 & LESS	2.5	2.0	1.5	1.5	1.0
1 1/4 – 2	2.5	2.5	2.0	1.5	1.0
2 1/2 – 4	3.0	3.0	2.0	1.5	1.0
5 – 6	4.0	3.0	2.0	1.5	1.5
8 & Over	4.0	3.5	3.0	1.5	1.5

NOMINAL PIPE SIZE (INCHES)	COOLING SYSTEMS				
	Chilled Water, Condenser Water, Refrigerant, Brine				
	4.5°-15.5°C	BELOW 4.5°C	----	----	----
	40°-60°F	BELOW 40°F (7)	----	----	----
Runouts (2)	0.75	1.0	----	----	----
1 & Less	0.75	1.0	----	----	----
1 1/4 – 2	1.0	1.5	----	----	----
2 1/2 – 4	1.50	2.0	----	----	----
5 – 6	1.50	2.0	----	----	----
8 & Over	1.50	2.0	----	----	----

NOTES:

(1) FOR PIPES EXPOSED TO OUTSIDE AMBIENT TEMPERATURES, INCREASE THICKNESS BY 0.5-INCHES FROM THAT SCHEDULED.

(2) RUNOUTS TO INDIVIDUAL TERMINAL UNITS (NOT EXCEEDING 2" DIA AND 12'-0" IN LENGTH).

(3) INSULATION THICKNESS SHOWN ARE MINIMUM THICKNESSES AND DO NOT INCLUDE FINISHING OR SEALING COATS.

(4) THICKNESSES ARE BASED ON R VALUES IN THE RANGE OF 3.0 TO 4.6 HR $FT^{2}\text{-}^{0}F$/BTU-IN. FOR R VALUES OUTSIDE THE RANGE, ADJUST THE TABULATED THICKNESS BY THE MULTIPLIER 4.6/R TO THE NEAREST 1/2" ROUNDING UP.

(5) FOR DOMESTIC HOT WATER USE VALVES FOR HEATING SYSTEMS (105° - 140°F) EXCEPT FOR 2 1/2" TO 4" PIPE USE 1.5-INCHES OF INSULATION.

(6) ANSI/ASHRAE/IES STD 90.1-2010– PIPING INSULATION THICKNESSES SCHEDULED ABOVE.

(7) INCLUDES ALL FERROUS CONDENSER WATER PIPING, INSIDE THE BUILDING AND ABOVE ROOF.

PYROGEL XT-E					
NPS	THICKNESS (IN.) VS. TEMPERATURE (ºF)				
(in.)	210ºF	300ºF	390ºF	480ºF	570ºF
1 & Less	0.2	0.2	0.2	0.4	0.4
1-1/2	0.2	0.2	0.4	0.4	0.6
2	0.2	0.2	0.4	0.4	0.6
3	0.2	0.2	0.4	0.4	0.6
4	0.2	0.2	0.4	0.6	0.6
6	0.2	0.4	0.4	0.6	0.8
8	0.2	0.4	0.4	0.6	0.8
10	0.2	0.4	0.6	0.8	1.0
12	0.2	0.4	0.6	0.8	1.0

CRYOGEL-Z					
NPS	THICKNESS (IN.) VS. TEMPERATURE (ºF)				
(in.)	40 TO 60ºF	BELOW 40ºF			
1 & Less	0.4	0.4			
1-1/2	0.4	0.4			
2	0.4	0.4			
3	0.4	0.4			
4	0.4	0.4			
6	0.4	0.4			
8	0.4	0.4			
10	0.4	0.4			
≥12	0.4	0.4			

END OF SECTION

SECTION 23 21 11

PLANT PIPING SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION

A. All plant piping systems except plumbing and sanitary, including piping supports.

1.3 RELATED WORK

A. Division 09, Section “Painting”.

B. Division 23 Section "Basic Mechanical Materials and Methods".

C. Division 23 Section “Identification for Plant Piping and Equipment”.

D. Division 23 Section “Mechanical Insulation”.

E. Division 23 Section “Plant Instrumentation and Controls”.

F. Division 40, Section “Welding General Piping”.

1.4 QUALITY ASSURANCE

A. Mechanics shall be skilled in their work or trade. Welders’ piping shall show evidence of qualification in accordance with the ASME Power Piping Code and the ASME Boiler and Pressure Vessel Code. Certify that each welder has passed American Welding Society (AWS) qualifications tests for welding processes involved, and that certification is current. Each welder shall utilize a stamp to identify all work performed by the welder. The Owner reserves the right to reject any personnel found unqualified in the performance of work for which they are employed.

1.5 SUBMITTALS

A. Submit in accordance with Contract requirements for submittals. Division 01 Section "Submittal Procedure".

B. Piping and Tubing:

1. ASTM material specification number.
2. Grade, class or type, schedule number.
3. Manufacturer.

C. Pipe & Tubing Fittings, Unions, Flanges:

1. ASTM material specification number.
2. ASME standards number.
3. Catalog cuts.
4. Pressure and temperature ratings.

D. Valves - Gate, Globe, Check, Plug, Butterfly, Ball:

1. Catalog cuts showing design and construction.
2. Pressure and temperature ratings.
3. Materials of construction.
4. Accessories including valve actuators, wiring diagrams and control interface points.

E. Strainers/Suction Diffusers:

1. Catalog cuts showing design and construction.
2. Pressure and temperature ratings.
3. Materials of construction.
4. Strainer basket or liner mesh.
5. Pressure loss and flow rate data.

F. Steam Traps:

1. Catalog cuts showing design and construction.
2. Service limitations (maximum pressures and temperatures).
3. Materials of construction.
4. Flow rates at differential pressures shown on drawings.
5. Orifice size for each trap.

G. Pipe Hangers and Supports:

1. Catalog cuts showing design and construction of each factory-fabricated hanger and support.

2. Conformance to MSS standards.

3. Drawings showing arrangements and sizes of components comprising each hanger and support assembly.

4. Maximum load ratings for each hanger and support assembly.

H. Certifications:

1. Welders Qualifications, ASME.
2. Mill certification (test reports).

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

A. All piping shall be stored and kept free of foreign material and shall be internally and externally cleaned of all oil, dirt, rust and foreign material. Deliver and store valves and pipe hangers in shipping containers with labeling in place. Storage must be in dry, protected location.

1.7 INFORMATION ON PRESSURE-TEMPERATURE DESIGN OF PIPING SYSTEMS

A. Steam service pressures shall be controlled at 150 PSI design; 85 PSI operating.

B. Condensate collection and transfer systems are designed for maximum temperatures to 212°F, and pressures to 40 PSI.

C. Drips, drains, blowdown, water sampling, and chemical treatment are designed, and materials and equipment are applied in accordance with the maximum pressure and temperature of the system with which they are associated.

D. Low pressure steam, condensate, vacuum and vents are designed for service pressures and temperatures equivalent to 15 PSI saturated steam.

E. Medium pressure steam, condensate, vacuum and vents are designed for service pressures and temperatures equivalent to 40 PSI saturated steam.

F. High pressure steam, condensate, vacuum and vents are designed for service pressures and temperatures equivalent to 125 PSI saturated steam.

PART 2 - PRODUCTS

2.1 STEAM PIPING

A. Pipe: Steel, seamless, ASTM A53 Grade B or ASTM A106 Grade B, Schedule 40. Standard weight permitted for pipe sizes 12 inches and above.

B. Joints: Butt-welded for pipe sizes 1-1/2 inches and above; threaded, butt-welded, or socket-welded for pipe sizes 1-1/4 inches and below.

C. Fittings:

1. Welded joints: Steel, ASTM A234, Grade B, ASME B16.9, same schedule as adjoining pipe, all elbows long radius.

2. Threaded joints: Forged steel, ASME B16.11, 3,000 PSI class.

3. Socket-welded joints: Forged steel, ASME B16.11, 3,000 PSI class.

D. Unions: On piping 2-inches and under, 3,000 PSI forged steel.

E. Flanges and Bolts: Weld neck, ASME B16.5, forged steel, ASTM A105. Pressure class 150 PSI, except 300 PSI class required adjacent to 250 PSI and 300 PSI class valves.

1. Bolts shall be high strength ASTM A193, Class 2, Grade B8.
2. Nuts shall be ASTM A194, Grade 2H.

F. Gaskets: Non-asbestos, designed for the service conditions. On steam service utilize Flexitallic Flexicarb Type CG, spiral wound, ASME B16.21, and suitable for service or , or approved equivalent.

2.2 STEAM CONDENSATE PIPING

A. Includes all gravity and pumped systems.

B. Pipe: Steel, seamless, ASTM A53 Grade B or ASTM A106 Grade B, Schedule 80.

C. Joints: Butt-welded for pipe sizes 1-1/2-inches and above; threaded or butt-welded, or socket-welded for pipe sizes 1-1/4 inches and below.

D. Fittings:

1. Welded joints: Steel, ASTM A234, Grade B, ASME B16.9, same schedule as adjoining pipe.

2. Threaded joints: Forged steel, ASME B16.11, 3000 PSI class.

3. Socket-welded joints: Forged steel, ASME B16.11, 3000 PSI class.

E. Unions: On piping 50mm (2-inches) and under, 3,000 PSI forged steel.

F. Flanges: Weld neck, ASME B16.5, forged steel ASTM A105, 150 PSI.

1. Bolts: High-strength ASTM A193, Class 2, Grade B8.
2. Nuts: ASTM A194, Grade 2H.

G. Gaskets: Utilize Flexitallic Flexicarb Type CG, ASME B16.21, non-metallic, asbestos free, and suitable for service or approved equivalent.

2.3 FUEL PIPING

A. Includes natural gas fuels. Comply with ASME B31.1.

B. Gas:

1. Piping: Steel, seamless or ERW, ASTM A53 Grade B or ASTM A106 Grade B, Schedule 40.

2. Joints: Butt-welded for pipe sizes 2-1/2 inches and above; socket-welded or butt-welded for pipes sizes 2 inches and below.

3. Fittings:

a. Butt-welded joints: Steel, ASTM A234, Grade B, ASME B16.9, same schedule as adjoining pipe.

b. Socket-welded joints: Forged steel, ASME B16.11, 2000 PSI class.

4. Unions: On piping 2 inches and under, forged steel, 2000 PSI class or 3000 PSI class.

5. Flanges: Weld neck, ASME B16.5, forged steel ASTM A105, 150 PSI.

6. Companion flanges: Flanges and bolting shall conform to ASME B16.5.

7. Gaskets: Non-asbestos, designed for service conditions.

2.4 VENT LINES FROM TANKS AND SAFETY AND RELIEF VALVES (EXCEPT NON-METALLIC TANK SYSTEMS)

A. Pipe: Steel, seamless or ERW, ASTM A53 Grade B or A106 Grade B, Schedule 40. For non-metallic tank system provide Schedule 80 PVC pipe and fittings.

B. Joints: Butt-welded for sizes 2-1/2-inches and above; threaded or butt-welded for pipe sizes 2-inches and below.

C. Fittings:

1. Welded Joints: Steel, ASTM A234 Grade B, ASME B16.9, same schedule as adjoining pipe.

2. Threaded Joints: Cast iron, ASME B16.4, 125 PSI.

D. Unions: Malleable iron, 150 PSI class.

E. Flanges: Weld neck or slip-on, ASME B16.5, forged steel, ASTM A105, 150 PSI.

F. Gaskets: Utilize "Flexitallic" spiral-wound, W.L. Gore and Associates “PTFE”, or approved equivalent.

1. Non-metallic pipe-flange gasket materials; AWWA C110/A21.10, rubber, flat full face, 1/8-inch thick or ASME B16.21 non-metallic and asbestos free unless otherwise indicated.

G. Metal, Pipe-Flange Bolts and Nuts: ASME B18.21, carbon steel unless otherwise indicated.

H. Plastic Pipe Flange, Bolts, Washers, and Nuts: Stainless steel Type 304 unless otherwise indicated.

2.5 MISCELLANEOUS PIPING

A. Instrument and Control Piping (Sensing Point to Transmitter, Controller, or Other Instrument): Construction shall be same as specified for main service except Type 304 or 316 stainless steel tubing, fittings and valves from main service to control or instrument device.

B. Drain Piping (Drain Piping Discharging to Floor Drain-From Drain Valve to Floor Drain):

1. Pipe: Steel, seamless or ERW, ASTM A53 Grade B or ASTM A106 Grade B, Schedule 40.

2. Fittings and Unions: Threaded, 150 PSI malleable iron.

2.6 VALVES

A. Valves for particular services are generally specified as Type Numbers. The Type Numbers are defined below. All valves of the same type shall be the products of a single manufacturer. Comply with MSS SP-45, MSS SP-80 and ASME B31.1. Construct gate and globe valves so that packing can be replaced while the valve is under full working pressure. Design valves for

the service fluids and conditions. Pressure-temperature ratings listed are minimum requirements. Packing and gaskets shall not contain asbestos. Valves, except globe type, shall seal bubble-tight.

B. Valve Type Designations as follows:

1. Gate Valves:

a. GV-1: Cast steel body ASTM A2I6 WCB, rated for 150 psi at 500 °F, 1-1/2 to 13 percent chromium stainless steel flexible wedge and hard faced (stellite) or nickel copper alloy seats, 150 psi ASME flanged ends, OS&Y, rising stem, bolted bonnet.

(1) Provide factory installed globe-valved warm-up bypass when main valve is 3-inch pipe size or greater and serves steam main longer than 20 feet. Conform to MSS SP-45.

(2) Drill and tap bosses for connection of drains. Conform to MSS SP-45.

b. GV-3: Cast iron body ASTM A126 Class B, rated for 125 psi saturated steam, 200 psi WOG, bronze or bronze faced wedge and seats, 125 psi ASME flanged ends, OS&Y, rising stem, bolted bonnet, renewable seat rings.

(1) Provide factory installed globe-valved bypass when main valve is 3-inch pipe size or greater and serves steam main longer than 20 feet. Conform to MSS SP-45.

(2) Drill and tap bosses for connection of drains if valve is in steam service. Conform to MSS SP-45.

c. GV-4: Bronze body ASTM B61, rated for 200 psi saturated steam, 400 psi WOG, bronze wedges and Monel or stainless-steel seats, threaded ends, rising stem, union bonnet.

d. GV-55: Forged steel body ASTM A105, rated for 300 psi at 420 °F minimum, Class 600 psi or Class 800 psi, hardened stainless steel or stellite wedge and seats, threaded ends, OS&Y, rising stem, bolted bonnet.

2. Globe Valves:

a. GLV-1: Cast steel body ASTM A216 WCB, rated for 150 PSI at 500°F, 11-1/2 to 13 percent chromium stainless steel or stellite disc and seat, 150 PSI ASME flanged ends, OS&Y, rising stem, bolted bonnet, renewable seat rings. Drill and tap bosses for connection of drains where shown. Conform to MSS SP-45.

b. GLV-2: Cast iron body ASTM A126 Class B, rated for 250 PSI saturated steam, 500 PSI WOG, bronze or bronze faced disc and seat, 250 PSI ASME flanged ends, OS&Y, rising stem, bolted bonnet, renewable seat rings. Drill and tap bosses for connection of drains where shown. Conform to MSS SP-45.

c. GLV-4: Rated for 200 PSI saturated steam, 400 PSI WOG, ASTM B61 bronze body, hardened stainless steel disc and seat, threaded ends, rising stem, union bonnet, renewable seat rings.

d. GLV-5: Forged steel body ASTM A105, rated for 300 PSI at 420°F minimum, Class 600 PSI or Class 800 PSI, stainless steel disc, satellite seat, threaded ends, OS&Y, rising stem, bolted bonnet.

e. GLV-8: Rated for 125 PSI, 350 °F, Type 316 stainless steel body, stem and wedge, threaded ends.

3. Check Valves:

a. CV-3: Rated for 125 PSI saturated steam, 200 PSI WOG, ASTM A126 Class B cast iron body, bronze or bronze-faced disc and seat, 125 PSI ASME flanged ends, bolted cover, swing-type, renewable disc and seat.

b. CV-4: Rated for 200 PSI saturated steam, 400 PSI WOG, ASTM B61 bronze body, bronze disc, threaded ends, swing-type, regrinding disc.

c. CV-5: Lift-type rated for 300 PSI at 420°F minimum Class 600 PSI or 800 PSI) ASTM A105 forged steel body, hardened stainless steel disc, hard faced seat, bolted cover, threaded ends.

d. CV-6: Rated for 300 psi at 420°F minimum (Class 600 PSI or 800 PSI, ASTM A105 forged steel body, hardened stainless steel disc, hard faced seat, bolted cover, threaded ends, lift-type.

e. CV-7: Silent spring-loaded wafer type, cast iron body ASTM A48 or A126 Class B, rated for 125 PSI water, 250°F.

f. CV-8 Silent spring-loaded wafer type, cast steel ASTM A216 WCB or cast iron ASTM A48 or A126 body, rated for 300 PSI water, 250°F, Buna-N seat, stainless steel trim. Manufacturer: Champion, Metraflex, or approved equivalent.

g. CV-9: Silent spring-loaded wafer type, rated 150 PSI water, 200°F, ASTM A126-B cast iron body, silent spring-loaded dual ASTM B62 bronze disc or 316 stainless steel disc wafer type wafer type, EPDM or Buna-N seat, stainless steel trim and spring. Manufacturer: Champion, APCO, or approved equivalent.

h. CV-10: Silent spring-loaded wafer type, rated 150 PSI water, 200°F, ASTM A126-B cast iron body, silent spring-loaded dual ASTM B62 bronze or 316 stainless steel disc wafer type, EPDM or Buna-N seat, stainless steel trim and spring. Provide epoxy coated internal ferrous surfaces where required by service. Manufacturer: Champion, APCO, or approved equivalent.

i. CV-10: Silent spring-loaded wafer type, rated 150 PSI water, 200 °F, stainless steel body, silent spring-loaded dual 316 stainless steel disc wafer type wafer type, EPDM or Buna-N seat, stainless steel trim and spring. Manufacturer: Champion or approved equivalent.

4. Ball Valves:

a. BV-1: Rated for 150 PSI at 365°F, 600 PSI at 200°F, Type 316 stainless steel body, ball and stem; reinforced TFE seat, stem seal and thrust washer; end entry, threaded ends, one-fourth turn to open. Reduced port permitted for bypass (throttling) service; full port required for all other services. Apollo or approved equivalent.

b. BV-2: Rated for 150 PSI at 365°F, 250 PSI at 250°F, bronze body, reinforced TFE seat, stem seal and thrust washer; end entry, threaded ends, one-fourth turn to open. Reduced port permitted for bypass (throttling) service; full port required for all other services. Apollo or approved equivalent.

c. BV-3: Carbon steel or ASTM B61 bronze body, rated for 200 PSI, 390°F, steam service, full-port on all services except reduced-port on bypass service, carbon steel body, stainless steel ball and stem, Polyfil seat, live-loaded or adjustable stem seal, threaded ends. Manufacturer: American, Apollo Worcester or approved equivalent.

d. BV-4: Carbon steel or ASTM A536 ductile iron body, saturated steam service, rated for 150 PSI, full-port on all services except reduced-port on bypass service, stainless steel ball and stem, Polyfil seat, live-loaded steam seal, ASME flanged ends. Manufacturer: Apollo, Flowtek, or equivalent.

e. BV-5: Three-piece high pressure design carbon steel construction with socket weld ends rated for saturated steam service with a working pressure of 1,000 PSIG (100°F), meeting requirements of WW-V-35C Type II. Provide stainless steel ball and stem, blowout-proof; PTFE seats and seals; 2-inch stem extension; and vinyl-covered stainless-steel lever handle. Ball valve as manufactured by Conbraco Industries, Apollo 83-240-27-04 Series or approved equivalent.

f. BV-6: Two-piece bronze construction with threaded ends rated for saturated steam service with a working pressure of 600 PSIG (100°F), meeting requirements of WW-V-35C Type II. Provide stainless steel ball and stem, blowout-proof PTFE seats and seals; 2-inch stem extension; and vinyl-covered stainless-steel lever handle. Ball valve as manufactured by Conbraco Industries, Apollo 77C-140 Series or approved equivalent.

5. Butterfly Valves:

a. BFV-2: Steam and Condensate Service –

(1) Carbon steel, triple-offset design, lug or flanged type, rated for steam service at 150 psi at 500 °F, stainless steel nitrided disc, stainless steel seat, stainless steel shaft, stainless steel/graphite laminated seal ring, neck extending beyond pipe insulation,

(2) Geared handwheel operator for valves 4 inch NPS pipe size and over, lever operator for valves 3 inch NPS pipe size and under

C. Steam above 15 PSI:

1. Gate valves, 2 inches and under: GV-5.

2. Gate valves, 2-1/2 and above: GV-1.

3. Globe valves, 2 inches and under: GL-1.

4. Butterfly valves, 3 inches and above: BFV-2

5. Ball valves, 2 inches and under BV-3.

D. Steam 15 PSI and under:

1. Gate valves, 2 inches and under: GV-4.

2. Gate valves, 2-1/2 and above: GV-3.

3. Globe valves, 2 inches and under: GL-4.

4. Butterfly valves, 3 inches and above: BFV-2

5. Ball valves, 2 inches and under BV-3.

E. Boiler Feedwater from Pumps to Boilers:

1. Gate valves, 2 inches and under: GV-5.

2. Gate valves, 2-1/2 inches and above: GV-4 or GV-5.

F. Fuel Gas: Main fuel systems.

1. Plug valves, 4 inches and under: PV-1.

2. Ball valves, 2 inches and above: BV-2.

3. Check valves, 2 inches and under: CV-4.

4. Vent cocks, 1/2 inch and under: VC-1.

G. Instrumentation and Control Piping:

1. Ball valves, 2-inches and under: BV-2.

H. Blowdowns, Drains, Flow Sensing Lines:

1. Ball valves, 2-inches and under: BV-3.

2.7 STRAINERS, Y-TYPE

A. Provide as shown on steam and water piping systems.

B. Type: Open-end removable cylindrical screen. Threaded blow-off connection.

C. Construction:

1. Steam Service 61 to 150 PSI: Rated for 150 PSI saturated steam. Rated for 150 PSI ASME flanged ends, cast steel, or 250 PSI ASME flanged ends, cast iron, for pipe sizes above 2 inches. Cast iron or bronze, steel threaded ends, for pipe sizes 2- inches and under.

C. Screen: Monel or stainless steel, free area not less than 2-1/2 times flow area of pipe.

2. For strainers 3-inch pipe size and smaller, diameter of openings shall be 0.033-inch or less on steam service, 0.05-inch or less on water service, 0.01-inch or less on compressed air service.

3. For strainers 4-inch pipe size and greater, diameter of openings shall be 0.05-inch on steam service, 0.094-inch on water service.

4. Provide 80 mesh stainless steel screen liner on all strainers installed upstream of water meters or control valves.

D. Accessories: Ball valve and quick-couple hose connection on all blowoff connections. These items are specified elsewhere in this section.

2. Manufacturer: Eaton Corporation, or equivalent.

2.8 PIPE AND VALVE FLANGE GASKETS

A. Where not otherwise specified provide spiral wound, non-asbestos compressed material gaskets in accordance with ASME B16.21, designed for the system vapor or liquid design temperatures and pressures. Provide “Flexitallic” spiral wound `CG’ Style, Gore Universal Pipe Gasket or Style 800, or approved equivalent for service intended.

2.9 THREAD SEALANTS

A. As recommended by the sealant manufacturer for the service. Utilize Hercules “GRIPP”, or equal, for oil and gas piping.

2.10 PIPE SLEEVES

A. Reference Division 23 Section 23 05 17 “Sleeve and Sleeve Seals for HVAC Piping”.

B. Service: For pipes passing through floors, walls, partitions. Where openings are core drilled, delete requirement for pipe sleeve.

C. Construction: Steel pipe, Schedule 10 minimum.

D. Sleeve Diameter: Not less than 1-inch larger than the diameter of the enclosed pipe and thermal insulation, vapor barrier, and protective covering for insulated pipe; sleeves for uninsulated pipe shall be not less than 1-inch larger than the diameter of the enclosed pipe. Where indicated to be provided with link type seal; provide sleeve diameter as recommended by link seal manufacturer.

E. Fire Seal: Provide fire seal at all penetrations of rated walls and floors.

2.11 HANGERS AND SUPPORTS (PIPE, TUBING, CONDUITS)

A. All systems shall be completely supported. Supports shall be arranged so that all loads due to weight, thermal expansion and pressure are transferred from the supported system to the structure.

B. Standards: Comply with recommendations and requirements of MSS SP-58, MSS SP-69 and ASME B31.1.

2.12 PIPE ANCHORS

A. Construct pipe anchors as shown in details on the drawings. Anchor piping to prevent swaying on horizontal runs.

PART 3 - EXECUTION

3.1 ARRANGEMENT OF PIPING

A. The piping arrangement shown is a design based on equipment selected as the basis of design. The plans show to scale and show practical arrangement. Any modification will be approved and, at no additional cost to the Owner, to adapt piping plans. Accessibility for operation and maintenance must be maintained.

B. All piping shall be installed parallel to walls and column centerlines (unless shown otherwise). Fully coordinate work of each trade to provide the designed systems without interference between systems. All piping shall be accurately cut, true, and beveled for welding. Threaded piping shall be accurately cut, reamed and threaded with sharp dies. Copper piping work shall be performed in accordance with best practices requiring accurately cut clean joints and soldering in accordance with the recommended practices for the material and solder employed.

C. All piping shall be pitched for drainage at a constant slope of 1-inch in 40-feet unless otherwise indicated. Drain, air, gas and blowdown piping shall pitch down in direction of flow. Service water, shall pitch up in direction of flow. Provide valved air vents at top of rise and valved drains at low points.

D. Valves shall be located and stems oriented to permit proper and easy operation and access for maintenance of packing, seat and disc. Valve stems shall not be below centerline of pipe. Refer to plans for stem orientation and as directed by Owner's Representative. Where valves are more than 7-feet above the floor or platform, stems shall be horizontal unless shown otherwise.

E. Bolt flanged or lug-type butterfly valves between pipe flanges using stud bolts recommended by the valve manufacturer for the pressure and type of service.

F. Provide adequate clearance for valve disc to operate without dragging on inside of an adjoining pipe fittings and pipe connections. Demonstrate proper operation to Owner's Representative.

G. Provide valves as necessary to permit maintenance of a device or sub-system without discontinuing service to other elements of that service or system.

H. Provide union adjacent to all threaded end isolation valves.

I. Provide valves as necessary to permit maintenance of a device or sub-system without discontinuing service to other elements of that service or system.

3.2 WELDING

A. The Contractor is entirely responsible for the quality of the welding and shall:

1. Conduct tests of the welding procedures used by his organization, determine the suitability of the procedures used, determine that the welds made will meet the required tests, and also determine that the welding operators have the ability to make sound welds under standard conditions.

2. Comply with ASME B31.1 and AWS B2.1.

3. Perform all welding operations required for construction and installation of the piping systems.

B. Qualification of Welders: Rules of procedure for qualification of all welders and general requirements for fusion welding shall conform with the applicable portions of ASME B31.1, and AWS B2.1, and also as outlined below.

C. Examining Welder: Examine each welder at job site or at approved examining location as approved by Owner's Representative to determine the ability of the welder to meet the qualifications required. Test welders for piping for all positions, including welds with the axis horizontal (not rolled) and with the axis vertical. Each welder shall be allowed to weld only in the position in which he has qualified and shall be required to identify his welds with his specific code marking signifying his name and number assigned.

D. Examination Results: Provide list of names and corresponding code markings. Retest welders who fail to meet the prescribed welding qualifications. Disqualify welders, who fail the second test, for work on the project.

E. Beveling: Field bevels and shop bevels shall be done by mechanical means or by flame cutting. Where beveling is done by flame cutting, surfaces shall be thoroughly cleaned of scale and oxidation just prior to welding. Conform to specified standards.

F. Alignment: Utilize split welding rings or approved alternate method for joints on all pipes above two-inches to assure proper alignment, complete weld penetration, and prevention of weld spatter reaching the interior of the pipe.

G. Erection: Piping shall not be split, bent, flattened, or otherwise damaged either before, during, or after installation. If the pipe temperature falls to 32ºF or lower, the pipe shall be heated to approximately 100ºF for a distance of one foot on each side of the weld before welding, and the weld shall be finished before the pipe cools to 32ºF.

H. Defective Welds: Replace and re-inspect defective welds. Repairing defective welds by adding weld material over the defect or by peening will not be permitted. Welders responsible for defective welds must be re-qualified.

I. Electrodes: Electrodes shall be stored in a dry heated area, and be kept free of moisture and dampness during the fabrication operations. Discard electrodes that have lost part of their coating.

J. Examinations, Inspections, and Test: Refer to Division 40 Section "Welding General Piping."

3.3 PIPING JOINTS

A. All butt-welded piping shall be welded or joined at circumferential joints, flanges shall be weld neck type. Slip-on flanges may be applied upon approval of the Owner's Representative.

B. Companion flanges at equipment or valves shall match flange construction of equipment or valve. Raised face shall be removed at all companion flanges when attached to flanges equipped for flat face construction.

C. Gaskets and bolting shall be applied in accordance with the recommendations of the gasket manufacturer and bolting standards of ASME B31.1. Strains shall be evenly applied without overstress of bolts. Gaskets shall cover entire area of mating faces of flanges.

D. Screw threads shall be made up with piping compound or other sealing method approved to assure tight joints without overrun of thread into fittings. Compound shall be approved for service application.

3.4 BRANCH INTERSECTION CONNECTIONS

A. Factory built reinforced tees are required.

3.5 EXPANSION AND FLEXIBILITY

A. The design includes provision for piping expansion due to pressure, thermal, weight and seismic (where applicable) effects. It is the Contractor's responsibility to avoid reduction in flexibility and increase in stress in piping systems. Major deviation will be shown by submittal for review of scale working drawings and stress calculations for the piping systems. Contractor shall provide any necessary additional construction and materials to limit stresses to safe values as directed by the Engineer and at no additional cost to the Owner.

3.6 SIZE CHANGES

A. Piping size changes shall be accomplished by line reducers, reducing ell, reducing tee. Concentric reduction may be applied in run of piping involving pressure water systems except at pump inlets. Concentric increasers shall be used where flow is in direction of increased size. Eccentric reduction, top flat, at all pump suction reductions; unless, otherwise indicated.

3.7 ADDITIONAL DRIPS AND TRAPS

A. Where additional rises or drops in gas lines are provided, and additional dirt pockets on gas lines.

3.8 MINOR PIPING

A. Minor piping associated with instrumentation and control is generally not shown. Interconnection of sensors, transducers, control devices, instrumentation panels, control panels, is the responsibility of the contractor. Small piping associated with water cooling, drips, drains and other minor piping may not be shown to avoid confusion in the plan presentation but shall be provided as part of contract work.

3.9 INSTALLATION

A. Piping shall be assembly of tees, pipe sections, and flanges. Where branch connection is shown on existing piping use of fabricated steel weld-on outlets in accordance with ASME B31.1 is permitted.

B. Forged steel reinforced welding fittings, standard weight, ASTM A105 Grade 2, may be applied in lieu of tees for all branch outlets less than the full size of the header. Comply with fitting manufacturer's recommendations and requirements of ASME B31.1

C. Provide header and pipe supports and anchor as shown. Where not shown comply with MSS SP58 and 69 standards.

D. Flange bolt position shall conform to required valve, stem, and bypass orientation as shown.

E. All valves must be accessible without the use of ladders; provide chain-wheel assemblies for valves located 7-feet or greater above floor level or operating platform.

F. Provide header and pipe supports and anchor as shown. Where not shown comply with MSS-SP58 and 69 standards. Note dimensions and flange position for conformance to required valve, stem, and bypass orientation.

3.10 INSTALLATION – Y-TYPE STRAINERS ON STEAM SERVICE

A. Install with basket level with the steam pipe so that condensate is not trapped in the strainer.

3.16 INSTALLATION - PIPE SLEEVES AND CORE DRILLINGS

A. Accurately locate and securely fasten sleeves to forms before concrete is poured; install in walls or partitions during the construction of the walls.

B. Sleeve ends shall be flush with finished faces of walls and partitions.

C. Pipe sleeves passing through floors shall project 1-inch minimum above the finished floor surface and the bottom of the sleeve shall be flush with the underside of the floor slab.

D. Provide link seal type seal as indicated on drawings.

3.17 INSTALLATION - SUPPORTS FOR PIPE AND TUBING

A. Coordinate support locations with building and/or structure prior to erection of piping and tubing. Also refer to approved shop drawings of equipment and approved piping. Arrangement of supports shall facilitate operating, servicing and removal of valves, strainers, and piping specialties.

B. Upper attachments to Building Structure:

1. Existing Structural Concrete Construction: As indicated.

2. Steel Deck and Structural Framing: Upper attachments welded or clamped to structural steel members unless otherwise indicated.

C. Expansion Fasteners and Power Set Fasteners: Not allowed.

D. Special Supports:

1. Secure horizontal pipes where necessary to prevent vibration or excess sway.

2. Where hangers cannot be adequately secured as specified, (for example, support for flow metering sensing lines, pneumatic tubing, control piping) special provisions shall be made for hanging and supporting pipe as directed by the Owner's Representative.

3. Pipe supports, hangers, clamps or anchors shall not be attached to equipment unless specifically permitted by the specifications for that equipment or unless Owner's Representative gives written permission. No attachments to pressure vessels permitted.

3.18 CLEANING OF PIPING AFTER INSTALLATION

A. Flush all piping sufficiently to remove all dirt and debris. Fill piping completely. Velocity shall be equivalent to that experienced during normal plant operation at maximum loads. During flushing, all control valves must be left open or disconnected from the system. After cleaning is complete, remove, clean and replace all strainer baskets and elements. Reconnect all equipment. Provide safe points of discharge for debris blown from steam pipes.

3.19 TESTING

A. Testing of piping components is not required prior to installation. Valves and fittings shall be capable of withstanding hydrostatic shell test equal to twice the primary design service pressure except as modified by specifications on fittings, ANSI B16.5. This test capability is a statement of quality of material. Tests of individual items of pipe, fittings or equipment will be required only on instruction of Owner's Representative and at Owner cost.

B. After erection, all piping systems shall be capable of withstanding a hydrostatic test pressure of 1.5 times design pressure, as stipulated in ASME B31.1. Hydrostatic tests will be required on all piping, utilizing water as the test medium. Hydrostatic tests will be required on other piping when operating tests described are unsatisfactory, or when inspection of welds shows poor workmanship and is subject to question by the Owner. When hydrostatic tests show leaks, the Owner will require necessary welding repairs, in accordance with ASME requirements, at the Contractor's cost. Applicable test standards include:

1. ASME B31.1 and B31.9 Building Services Piping as applicable.

a. All piping unless otherwise noted: 125 PSIG; 150 PSIG maximum.

C. Perform operating test as follows:

1. All steam piping prior to insulation shall be subjected to steam at final operating pressure. Inspect all joints for leaks and workmanship. Corrections shall be made as specified.

2. Test LP gas piping at the maximum tank pressure 250 PSIG, with compressed air. Tet joints with sop solution, check thoroughly for leaks.

3. Test boiler feedwater, condensate, and service water and hydronic water systems under service conditions and prove tight.

4. Make corrections and retests to establish systems which have no leaks. Replace or re-cut any defective fittings or defective threads. Back welding of threads will not be permitted.

D. Generally, insulation work should not be performed prior to testing of piping. Contractor may, at own option and hazard, insulate piping prior to test, but any damaged insulation shall be replaced with new quality as specified for original installation at Contractor's cost and time.

END OF SECTION

SECTION 26 05 00

GENERAL ELECTRICAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 RESPONSIBILITIES

A. The Bidding Requirements, Conditions of Contract, General Specifications and General Requirements, and this Division shall be binding on the Contractor and shall apply to all electrical work to be completed under this section.

B. The Contractor shall be responsible for the work from the date of his Contract until its acceptance by the Owner and must make good all damages sustained from whatever cause. He shall use proper care and diligence in bracing and securing all parts of the work and shall in all cases judge as to the amount of protection required.

1.3 ORDINANCES, LAWS AND CODES

A. All work shall conform to the rules and regulations of the National Electrical Code, Local Code, "Occupational Safety and Health Act" and the State Fire Marshall's Office. All certificates of approval shall be delivered to the Architect before final payment will be made.

B. Should any change in the drawings and/or specifications be required to conform to the above mentioned laws and ordinances, the Architect shall be notified by the Bidder prior to the Bid Date, that the necessary changes may be completed. After the Bid Date, all work necessary to meet the requirements shall be at Contractor's expense, with no additional cost to the Owner.

C. The Contractor shall pay all fees, permits or taxes for inspections, etc., in connection with the work under this Contract.

1.4 DATA AND MEASUREMENT

A. The data given herein and on the drawings is as exact as could be secured insofar as building construction and existing conditions are concerned. Extreme accuracy is not guaranteed. The drawings and specifications are intended for the assistance of the Contractor in achieving the end result. Exact locations, measurements, distance, levels, etc., will be governed by conditions at the Job Site.

B. The Contractor shall verify that the size of the equipment supplied by the selected manufacturers does not exceed the available mounting space.

C. The Architect reserves the right to change location or size of conduits, outlets, luminaires or other pieces of equipment as may be necessary to avoid conflicts. No extra compensation will be allowed for such changes unless additional cost to the Contractor is caused.

D. The Bidder shall visit the Project Site that he may have knowledge of conditions at the Job Site and adapt his work to such conditions.

1.5 DRAWINGS AND SPECIFICATIONS

A. Anything mentioned in this specification and not shown on the drawings or vice versa shall be of like effect, as shown or mentioned in both. In any case of discrepancy or differences in the figures, drawings or specifications, the Bidder shall promptly report such discrepancies to the Architect who shall make a decision in writing. Any adjustment by the Contractor without this decision shall be at the expense of the Contractor.

1.6 QUALITY OF WORKMANSHIP

A. The Contractor shall give his personal superintendence and direction to the work. He shall also keep a competent foreman or superintendent on the Project.

B. All equipment, controls and junction boxes shall be located for ready access, operation, repair or maintenance.

C. Any additional drawings necessary for the prosecution of the work will be furnished by the Architect as promptly as possible. The Contractor shall request any additional instructions needed and shall do no work without drawings and instructions.

D. Any discrepancies between the Mechanical and Electrical Drawings shall be reported to the Engineer prior to the Bid Date.

1.7 GUARANTEE

A. This Contractor shall guarantee all materials, workmanship and the successful operation of all apparatus furnished and installed by him for a period of one (1) year from the date of the final acceptance of the whole work, and shall guarantee to repair or replace at his own expense any part of the apparatus which may show defect during that time, provided such defect is, in the opinion of the Architect, due to imperfect material or workmanship and not to carelessness or improper operation. Guarantee period for the replacement shall begin with the date of replacement.

B. The Owner shall notify the Contractor of any failure of any part or parts which occur during the guarantee period.

C. The Contractor shall also guarantee the systems and the apparatus to be working properly to meet all conditions as specified.

1.8 SHOP DRAWINGS

A. Shop Drawings shall be submitted in accordance with the requirements of Paragraph "Shop Drawings" of the General Conditions. The Contractor shall submit Shop Drawings of all fabricated work and equipment to be purchased. Data shall be sufficiently completed to permit evaluation and comparison with specified equipment and material. Each item shall be prepared as a separate submittal, not grouped or bound with other items.

B. All drawings shall bear the Contractor’s stamp of approval and must be dated.

C. Shop Drawings shall include, but not be limited to the following:

1. Circuit Breakers.
2. Safety Switches.
3. Fuses.

D. A notation shall be made on each item submitted as to its specified use or description of specific location in the work.

E. None of the preceding items shall be purchased, delivered to the site or installed until the item has been properly submitted in writing and reviewed by the Architect.

F. Submittals shall be made even though the item is exactly as specified.

G. Should the Contractor fail to comply with any of the requirements as stated, the Architect reserves the right to select a full line of materials, appliances and equipment, which shall be final and binding upon the Contractor.

1.9 SUBMITTAL DATA

A. Review of submittal data is only for general conformance with the design concept of the Project and general compliance with the information given in the Contract Documents. Any action shown is subject to the requirements of the plans and specifications. Contractor is responsible for: Dimensions, which shall be confirmed and correlated at the job site; fabrication processes and techniques of construction; coordination of his work with that of all other trades and the satisfactory performance of his work.

B. Contractor will be limited to one (1) review on a singular piece of equipment.

C. The listing of a manufacturer as "acceptable" does not imply automatic compliance with Contract Documents. It is the sole responsibility of the Contractor to insure that any price quotations received and submittals made are for equipment/systems, which meet or exceed the specifications included herein.

1.10 EQUAL MANUFACTURERS/EQUIPMENT

A. Any requests for manufacturer/equipment to be considered as equal other than as specified herein shall be submitted to the Engineer not less than 10 days prior to Bid Date.

B. Requests for review shall be sufficiently complete to permit evaluation and comparison with specified equipment and material.

PART 2 - PRODUCTS

2.1 PROTECTION OF LUMINAIRES AND WARES

A. This Contractor shall apply the necessary protective coverage to luminaires and other equipment to prevent scratches and mars to such equipment as a result of falling objects or work of other trades.

2.2 STORAGE

A. This Contractor shall provide and be responsible for safe storage of his materials and such storage shall not interfere with the work of others or progress of the Project in any manner.

2.3 EQUIPMENT ENCLOSURES

A. Provide enclosures, which mate properly with the equipment to be enclosed and are NEMA rated to suit the atmospheric conditions of the equipment surroundings.

B. Equipment in corrosive atmosphere shall be rated NEMA 4X. All NEMA 4X equipment shall be fabricated from suitable non-metallic material or shall be stainless steel. Painted steel is not acceptable for NEMA 4X applications.

PART 3 - EXECUTION

3.1 COORDINATION

A. Before installing any work, this Contractor shall coordinate the electrical work with all other Contractors on the Project and the City/State Code enforcing department.

B. All electrical work shall be installed in proper sequence and so arranged with other trades that there will be no delay in the proper installation and completion of any part or parts of all piping systems and mechanical equipment.

C. This Contractor shall carefully examine the drawings and shall be responsible for the proper fitting of equipment and conduit as indicated without major alteration. If alterations are required, a detailed drawing of the proposed departure due to actual field conditions or other causes shall be submitted to the Architect for approval.

D. Whenever interferences might occur, before installing any of the work in question, the Electrical Contractor shall consult with other Contractors and shall come to an agreement with them as to the exact location and level of his conduit bus duct, luminaires and/or parts of his installation.

E. Multiwire branch circuits as defined by the National Electrical Code (circuits with common neutral) shall not be used. Exception: Where an equipment manufacturer requires a multiwire branch branch circuit for only one utilization equipment and where all ungrounded conductors of that circuit are opened simultaneously by the branch circuit overcurrent device.

F. A cable raceway type wiring method, installed in exposed or concealed locations near metal-corrugated sheet roof decking, shall be installed and supported so the nearest outer surface of the cable raceway is not less than 6-inches from the nearest surface of the roof decking. Exception: Rigid metal conduit and intermediate metal conduit shall not be required to maintain this clearance.

G. All changes in the work of this Contractor, caused by his neglect to follow these instructions, shall be made at this Contractor's expense.

3.2 CONNECTIONS FOR EQUIPMENT

A. Coordinate the hook up of the following equipment with the Contractor required to furnish and install them. See the appropriate sections in the General Construction Work specifications for further information.

Mechanical Equipment

B. Verify fuse and/or circuit breaker requirements for electrical connections to equipment and provide overcurrent devices accordingly.

C. The plans indicate the locations of system devices. The Contract shall include the wiring system required to interconnect the indicated devices to result in a complete, operating system. The interconnecting wiring shall be in conformity with the requirements of the manufacturer of the equipment as well as with other requirements set out herein. The basic wiring method to be employed is indicated herein. The Contractor's Shop Drawing submittal shall indicate the specific routing and type of wireway and the number and type of conductors to be installed.

3.3 WORK IN EXISTING BUILDING

A. Inasmuch as work under this Contract includes adding to in the existing building, it shall be the responsibility of each Bidder to fully inform himself of any and all conditions which influence or are influenced by work contemplated by these specifications and accompanying drawings. The submission of a proposal by any Bidder will be construed as an admission by him that he has examined and is fully familiar with the premises and all conditions thereon and adjacent thereto, and has included in this proposal a proper and adequate amount to cover rearrangement of old work for the proper installation and operation of the new and existing equipment as shown on the drawings specified herein or as required. Such work shall be neatly and properly done.

B. Maintain existing electrical service and feeders to occupied areas and operational facilities, unless otherwise indicated or when authorized otherwise in writing by Owner or Architect. Provide temporary service during interruptions to existing facilities. When necessary, schedule momentary outages for replacing existing wiring systems with new wiring systems. When that "cutting-over" has been successfully accomplished, remove, relocate or abandon existing wiring as indicated.

C. The operation of all special systems within the building shall be maintained, including but not limited to fire alarm, telephone, intercom, communication, data, security, emergency call, etc. Provide temporary connections/equipment as necessary for required sequence of construction. Any necessary momentary outages shall be scheduled with the Owner prior to starting such work.

3.4 TEMPORARY WIRING (Existing Electrical Service)

A. This Contractor shall provide temporary power.

B. Temporary power may be derived from the existing electrical service.

C. All materials for the temporary service and wiring may be used and remains the property of the Electrical Contractor.

D. Temporary wiring materials are not to be installed as part of the permanent wiring system.

E. Wiring need not be installed in conduit, but must be adequately installed and protected from mechanical injury to prevent shock.

F. Permanent wiring including feeders, panels, receptacles, etc., may be used as soon as installed.

G. The Electrical Contractor shall bear all installation costs necessary to connect and disconnect the temporary service.

3.5 CLEANING

A. This Contractor shall at all times keep the premises free of all waste or surplus materials, rubbish and debris which is caused by his employees or resulting from his work.

B. After all equipment and luminaires have been installed and building is ready for occupancy, the Electrical Contractor shall remove all stickers, rust stains, labels, temporary covers, plaster marks, paint spots, etc. All foreign matter shall be vacuumed out of all conduits, panels, motors, devices, switches, luminaires, etc.

C. Identification plates and trims on all equipment shall be free of paint and polished.

D. The Contractor shall leave the electrical portion of the work in a safe clean and very neat condition ready for operation.

3.6 RECORD DRAWINGS

A. The Contractor shall maintain an up-to-date set of plans and specifications on the Job Site. He shall mark all Addendum Items and any field changes on this set and see that a copy of all changes is furnished to the Architect at the end of the Project.

B. The drawings shall also include as-built conditions such as equipment locations, routing of service entrance and major feeders, etc.

3.7 INSTRUCTION IN OPERATION BOOKS AND SPARE PARTS

A. After all tests and adjustments have been made, the Contractor shall furnish the necessary qualified personnel to place the special systems in continuous operation, during which time he shall provide complete Operating and Maintenance Instructions to the Owner's representative with an outline of instructions in written form. These personnel shall reserve adequate time to instruct an Owner's representative on proper operation (including all phases of the system and each of its component parts).

B. Contractor shall furnish Owner with two (2) sets of all operating instructions, maintenance instruction and spare parts lists of all equipment furnished under this Contract. Lists shall include current unit prices and source of supply for each item of operable equipment.

3.8 FIRESTOPPING

A. Openings around electrical penetrations through walls, partitions, floors or ceilings shall be firestopped using listed materials to maintain the fire rating. Installation shall be done in accordance with manufacturer's recommendations. Materials shall be UL Listed and labeled and FM approved for fire ratings consistent with penetrated barriers.

1. Foamed-in-place type firestopping shall only be permitted in concealed-from-view locations. Sealant type firestopping shall be used in exposed-to-view locations.

3.9 TESTS AND ADJUSTMENTS

A. Upon completion of installation of electrical connections, and after circuitry has been energized with rated power source test connections to demonstrate capability and compliance with requirements. Ensure that direction of rotation of each motor fulfills requirement. Correct malfunctioning units at site, then retest to demonstrate compliance.

B. During the progress and after completion of the work included under this specification, the Contractor shall make all required tests at his own expense in the presence of the Architect as required hereinafter and by local ordinances, codes, laws and regulations. Such tests shall be in accordance with other sections of this division. The Architect shall be notified five (5) days in advance as to the time when such tests are to be performed that a representative of the Architect may be present.

END OF SECTION

SECTION 26 05 19

WIRES AND CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Extent of electrical wire and cable work is indicated by drawings and schedules. Wires and cables shall be single, insulated conductors, field-installed in continuous raceways unless specified otherwise.

B. Types of electrical wire, cable and connectors specified in this section include the following:

1. Copper conductors.
2. Tap type connectors.
3. Wirenut connectors.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products of one (1) of the following (for each type of wire, cable and connector):

1. Wire and Cable:

a. Apex Wire and Cable Corp.
b. American Insulated Wire Corp.
c. American Wire and Cable Co.
d. Belden Div; Cooper Industries.
e. Brand-Rex Div; Pyle National Co.
f. Cerro Wire and Cable Corp.
g. Cleveland Insulated Wire Co.
h. General Cable Corporation.
i. Helix Wire Corporation.
j. Houston Wire
k. Indiana Insulated Wire Inc.
l. Laribee Wire Manufacturing Co., Inc.
m. Madison Wire and Cable Corp.
n. Okonite Co.
o. Pirelli Cable Corp.
p. Radix Wire Co.
q. Rome Cable Corp.
r. Southwire Company.
s. Triangle PWC, Inc.

2. Connectors:

a. AMP, Inc.
b. Appleton Electric Co; Emerson Electric Co.
c. Buchanan Co.
d. Burndy Corporation.
e. Brand-Rex Div. Pyle National Co.
f. Electrical Products Div; Midland-Ross Corp.
g. General Electric Co.
h. Gould, Inc.
i. Ideal Industries, Inc.
j. Leviton Mfg Company.
k. 3M Company
l. O-Z/Gedney Co.
m. Southport Industries Inc.
n. Square D Company.
o. Thomas and Betts Corp.

2.2 WIRES, CABLES AND CONNECTORS

A. General: All reference to size in these specifications or on drawings is for copper conductors. Provide electrical wires, cables and connectors of manufacturer's standard materials, as indicated by published product information; designed and constructed as recommended by manufacturer, for a complete installation and for application indicated. Except as otherwise indicated, provide copper conductors with conductivity of not less than 98% at 20°C (68°F).

B. Building Wires: Provide factory-fabricated wires of sizes, ampacity rating, and materials for applications and services indicated. Where not indicated, provide proper wire selection as determined by Installer to comply with project's installation requirements, NEC and NEMA Standards.

C. Cables: Provide UL-type factory-fabricated cables of sizes, ampacity ratings, and materials and jacketing/sheathing as indicated for services indicated. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements, NEC and NEMA Standards.

D. Connectors: Provide UL-type factory-fabricated, metal connectors of sizes, ampacity ratings, materials, types and classes for applications and for services indicated. Where not indicated, provide proper selection as determined by Installer to comply with project's installation requirements, NEC and NEMA Standards.

PART 3 - EXECUTION

3.1 INSTALLATION OF WIRES AND CABLES

A. General: Install electrical cables, wires and wiring connectors as indicated, in compliance with applicable requirements of NEC, NEMA, UL and NECA's "Standard of Installation" and in accordance with recognized industry practices.

B. The normal minimum size shall be 12 AWG. All wire No. 10 and smaller to be solid, all No. 8 and larger shall be stranded.

C. All service entrance, feeder and branch circuit wiring shall be type THHN/THWN.

D. Pull conductors simultaneously where more than one (1) is being installed in same raceway.

E. Use polywater Dyna Blue water based pulling lubricant or equal where necessary.

F. Insulation on conductors shall be permanently marked with wire size, insulation type, voltage range and manufacturer's name. The insulation on conductors shall be color coded as follows:

1. 120/208-volt circuit: Phase A - Black; Phase B - Red; Phase C - Blue.
2. 277/480-volt circuit: Phase A - Brown; Phase B - Orange; Phase C - Yellow.

G. The phase conductors shall be tagged and shall remain the same throughout the circuit.

H. Switch legs shall be color coded to distinguish them from Hot or Phase Conductors.

I. Switch legs occurring in the same box or enclosure shall be color coded separately.

J. Exceptions to the color coding as listed above shall be as follows:

1. Wiring for special systems shall be color coded or labeled as required by the manufacturer.

K. Use pulling means including, fish tape, cable, rope and basket weave wire/cable grips which will not damage cables or raceway.

L. Install exposed cable, parallel and perpendicular to surfaces, or exposed structural members and follow surface contours, where possible.

M. Keep conductor splices to minimum.

N. Install splices and taps which possess equivalent-or-better mechanical strength and insulation ratings than conductors being spliced.

O. Use splice and tap connectors which are compatible with conductor material.

P. All splices and taps shall be made in outlet, junction and pull boxes. Splices on circuit wiring shall be of the pigtail type using solderless connectors. Larger sizes of conductors requiring uninsulated connectors of the bolt type shall be taped with pressure sensitive vinyl tape.

Q. Tighten electrical connectors and terminals, including screws and bolts, in accordance with manufacturer's published torque tightening values. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Standard 486A and B.

3.2 FIELD QUALITY CONTROL

A. Prior to energization of circuitry, check installed wires and cables with megohm meter to determine insulation resistance levels to ensure requirements are fulfilled.

B. Prior to energization, test wires and cables for electrical continuity and for short-circuits.

C. Subsequent to wire and cable hook-ups, energize circuitry and demonstrate functioning in accordance with requirements. Where necessary, correct malfunctioning units and then retest to demonstrate compliance.

END OF SECTION

SECTION 26 05 26

GROUNDING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Extent of grounding work is indicated by drawings, schedules and as specified herein.

B. Types of grounding specified in this section include the following:

1. Solid grounding.

C. Requirements of this section apply to electrical grounding work specified elsewhere in these specifications.

PART 2 - PRODUCTS

2.1 GROUNDING SYSTEMS

A. Materials and Components:

1. General: Except as otherwise indicated, provide electrical grounding systems indicated; with assembly of materials, including, but not limited to, cables/wires, connectors, terminals (solderless lugs) and additional accessories needed for complete installation. Where more than one type unit meets indicated requirements, selection is Installer's option. Where materials or components are not indicated, provide products complying with NEC, UL, IEEE and established industry standards for applications indicated.

B. Conductors: Provide copper electrical grounding conductors for grounding connections matching power supply wiring materials and sized according to NEC. All conduits shall contain a minimum of one (1) separate equipment grounding conductor identified and sized according to NEC.

PART 3 - EXECUTION

3.1 INSPECTION

A. Installer must examine areas and conditions under which electrical grounding connections are to be made and notify Contractor in writing of conditions detrimental to proper completion of work. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to Installer.

3.2 INSTALLATION OF ELECTRICAL GROUNDING

A. General: Install electrical grounding systems where shown, in accordance with applicable portions of NEC, with NECA's "Standard of Installation" and in accordance with recognized industry practices to ensure that products comply with requirements and serve intended functions.

B. Coordinate with other electrical work as necessary to interface installation of electrical grounding system with other work.

END OF SECTION

SECTION 26 05 29

SUPPORTING DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes secure support from the building structure for electrical items by means of hangers, supports, anchors, sleeves, inserts, seals and associated fastenings.

1. Refer to other Division 26 Sections for additional specific support requirements that may be applicable to specific items.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Slotted Metal Angle and U-Channel Systems:

a. Allied Tube & Conduit.
b. American Electric.
c. B-Line Systems, Inc.
d. Cinch Clamp Co., Inc.
e. GS Metals Corp.
f. Haydon Corp.
g. Kin-Line, Inc.
h. Unistrut Diversified Products.

2. Conduit Sealing Bushings:

a. Bridgeport Fittings, Inc.
b. Cooper Industries, Inc.
c. Elliott Electric Mfg. Corp.
d. GS Metals Corp.
e. Killark Electric Mfg. Co.
f. Madison Equipment Co.
g. L.E. Mason Co.
h. O-Z/Gedney.
i. Producto Electric Corp.
j. Raco, Inc.
k. Red Seal Electric Corp.
l. Spring City Electrical Mfg. Co.
m. Thomas & Betts Corp.

2.2 COATINGS

A. Coating: Supports, support hardware, and fasteners shall be protected with zinc coating or with treatment of equivalent corrosion resistance using approved alternative treatment, finish or inherent material characteristic. Products for use outdoors shall be hot-dip galvanized.

2.3 MANUFACTURED SUPPORTING DEVICES

A. Raceway Supports: Clevis hangers, riser clamps, conduit straps, threaded C-clamps with retainers, ceiling trapeze hangers, wall brackets and spring steel clamps.

B. Fasteners: Types, materials and construction features as follows:

1. Expansion Anchors: Carbon steel wedge or sleeve type.

2. Toggle Bolts: All steel springhead type.

C. U-Channel Systems: 16-gage steel channels, with 9/16-inch diameter holes, at a minimum of 8-inches on center, in top surface. Provide fittings and accessories that mate and match the U-channel and are of the same manufacturer.

2.4 FABRICATED SUPPORTING DEVICES

A. General: Shop- or field-fabricated supports or manufactured supports assembled from U-channel components.

B. Steel Brackets: Fabricated of angles, channels and other standard structural shapes. Connect with welds and machine bolts to form rigid supports.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install supporting devices to fasten electrical components securely and permanently in accordance with NEC requirements.

B. Coordinate with the building structural system and with other electrical installation.

C. Raceway Supports: Comply with the NEC and the following requirements:

1. Conform to manufacturer's recommendations for selection and installation of supports.

2. Strength of each support shall be adequate to carry present and future load multiplied by a safety factor of at least four (4). Where this determination results in a safety allowance of less than 200 lbs, provide additional strength until there is a minimum of 200 lbs safety allowance in the strength of each support.

3. Install individual and multiple (trapeze) raceway hangers and riser clamps as necessary to support raceways. Provide U-bolts, clamps, attachments, and other hardware necessary for hanger assembly and for securing hanger rods and conduits.

4. Support parallel runs of horizontal raceways together on trapeze-type hangers.

5. Support individual horizontal raceways by separate pipe hangers.

6. Support exposed and concealed raceway within 1-foot of an unsupported box and access fittings. In horizontal runs, support at the box and access fittings may be omitted where box or access fittings are independently supported and raceway terminals are not made with chase nipples or threadless box connectors.

7. In vertical runs, arrange support so that load produced by the weight of the raceway and the enclosed conductors is carried entirely by the conduit supports with no weight load on raceway terminals.

D. Miscellaneous Supports: Support miscellaneous electrical components as required to produce the same structural safety factors as specified for raceway supports. Install metal channel racks for mounting cabinets, panelboards, disconnects, control enclosures, pull boxes, junction boxes, transformers and other devices.

E. Support sheet metal boxes directly from the building structure or by bar hangers.

F. Fastening: Unless otherwise indicated, fasten electrical items and their supporting hardware securely to the building structure, including but not limited to conduits, raceways, cabinets, panelboards, boxes, disconnect switches and control components in accordance with the following:

1. Fasten by means of wood screws or screw-type nails on wood, toggle bolts on hollow masonry units, concrete inserts or expansion bolts on concrete or solid masonry, and machine screws or welded threaded studs. Do not weld conduit, pipe straps or items other than threaded studs to steel structures. In partitions of light steel construction, use sheet metal screws.

2. Holes cut to depth of more than 1-1/2-inch in reinforced concrete beams or to depth of more than 3/4-inch in concrete shall not cut the main reinforcing bars. Fill holes that are not used.

3. Ensure that the load applied to any fastener does not exceed 25% of the proof test load. Use vibration- and shock-resistant fasteners for attachments to concrete slabs.

END OF SECTION

SECTION 26 05 33

RACEWAYS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. All wiring shall be installed in continuous raceways as specified herein except where specifically noted otherwise.

B. Types of raceways in this section include the following:

1. Rigid metal conduit.

PART 2 - PRODUCTS

2.1 METAL CONDUIT AND TUBING

A. General: Provide metal conduit and fittings of types, grades, sizes and weights (wall thicknesses) for each service indicated. Where types and grades are not indicated, provide proper selection determined by Installer to fulfill wiring requirements and comply with applicable portions of NEC for raceways.

B. Rigid Steel Conduit: Provide rigid steel, zinc-coated, threaded type conforming to ANSI C80.1 and UL 6. Provide zinc coating fused to inside and outside walls.

1. Rigid Metal Conduit Fittings: Rigid metal conduits shall have threaded couplings when installed in concrete or direct burial in the ground. Other installations in dry locations may be threadless rigid fittings.

C. Conduit Bodies: Provide galvanized cast-metal conduit bodies of types, shapes and sizes as required to fulfill job requirements and NEC requirements. Construct conduit bodies with threaded-conduit-entrance ends, removable covers, either cast or of galvanized steel and corrosion-resistant screws.

PART 3 - EXECUTION

3.1 INSTALLATION OF RACEWAYS

A. General: Install raceways as indicated; in accordance with manufacturer's written installation instructions, and in compliance with NEC and NECA's "Standards of Installation". Install units plumb and level and maintain manufacturer's recommended clearances.

B. Coordinate with other work including wires/cables, boxes and panel work, as necessary to interface installation of electrical raceways and components with other work.

3.2 INSTALLATION OF CONDUITS

A. General: All conduits shall be exposed.

1. Mechanically fasten together metal conduits, enclosures, and raceways for conductors to form continuous electrical conductor. Connect to electrical boxes, fittings and cabinets to provide electrical continuity and firm mechanical assembly.

2. Avoid use of dissimilar metals throughout system to eliminate possibility of electrolysis. Where dissimilar metals are in contact, coat surfaces with corrosion inhibiting compound before assembling.

3. Install miscellaneous fittings such as reducers, chase nipples, 3-piece unions, split couplings, and plugs that have been specifically designed and manufactured for their particular application. Install expansion fittings in raceways every 200-feet linear run or wherever structural expansion joints are crossed.

4. Use roughing-in dimensions of electrically operated unit furnished by supplier. Set conduit and boxes for connection to units only after receiving review of dimensions and after checking location with other trades.

B. Conduit Installation: Provide rigid conduit in all locations.

1. Where acceptable to all authorities having jurisdiction, intermediate metal conduit may be used in lieu of rigid steel conduit in non-hazardous locations when in compliance with NEC.

C. Cut conduits straight, properly ream, and cut threads for heavy wall conduit deep and clean. Use temporary closures to prevent foreign matter from entering raceways.

D. Field-bend conduit with benders designed for purpose so as not to distort nor vary internal diameter.

E. Fasten rigid conduit terminations in sheet metal enclosures with locknuts inside and outside enclosure and terminate with bushing.

F. Conduit terminations in wet locations shall be of the threaded hub type fittings UL Listed for use in wet locations.

G. Conduits are not to cross vertical or horizontal openings such as pipe shafts, ventilating duct openings, etc.

H. Keep conduits a minimum distance of 6-inches from parallel runs of flues, hot water pipes or other sources of heat. Wherever possible, install horizontal raceway runs above water and steam piping.

I. Conduit shall be properly supported as specified herein and as required by NEC.

J. Use of running threads at conduit joints and terminations is prohibited. Where required, use 3-piece union or split coupling.

K. Complete installation of electrical raceways before starting installation of cables/wires within raceways.

L. Openings around electrical penetrations through walls, partitions, floors or ceilings shall be firestopped using approved methods to maintain the fire resistance rating.

M. Install conduits as not to damage or run through structural members. Avoid horizontal or cross runs in building partitions or side walls.

N. Exposed Conduits:

1. All exposed conduit shall be installed in a neat manner following the building lines. Horizontal runs shall be close to the ceiling and shall be installed above mechanical piping as much as possible. Single hung conduits shall be supported with strap or rod hangers, wire is not an acceptable hanger. Multiple hung conduits shall be strapped to the channel to hold it in place.

2. Install exposed conduits and extensions from concealed conduit systems neatly, parallel with or at right angles to walls of building.

3. Install exposed conduit work as not to interfere with ceiling inserts, lights or ventilation ducts or outlets.

4. Support exposed conduits by use of hangers, clamps or clips. Support conduits on each side of bends and on spacing not to exceed following: Up to 1-inch: 6-feet-0-inch; 1-1/4-inch and over: 8-feet-0-inch.

5. Run conduits for outlets on waterproof walls exposed. Set anchors for supporting conduit on waterproof wall in waterproof cement.

O. Conduit Fittings:

1. Construct locknuts for securing conduit to metal enclosure with sharp edge for digging into metal, and ridged outside circumference for proper fastening.

2. Plastic insulating bushings for terminating rigid conduits smaller than 1-1/4-inch are to have ribbed sides, with smooth upper edges to prevent injury to cable insulation.

3. Install metallic insulated type bushings for terminating rigid conduits 1-1/4-inch and larger. Bushings are to have flared bottom and ribbed sides. Upper edge to have phenolic insulating ring molded into bushing.

4. Miscellaneous fittings such as reducers, chase nipples, 3-piece unions, split couplings and plugs to be specifically designed for their particular application.

END OF SECTION

SECTION 26 05 34

ELECTRICAL BOXES AND FITTINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Extent of electrical box and associated fitting work is indicated by drawings and schedules.

B. Types of electrical boxes and fittings in this section include the following:

1. Junction boxes.
2. Pull boxes.
3. Bushings.
4. Locknuts.
5. Knockout closures.

PART 2 - PRODUCTS

2.1 FABRICATED MATERIALS

A. Junction and Pull Boxes: Provide galvanized code-gage sheet steel junction and pull boxes, with screw-on covers; of types, shapes and sizes, to suit each respective location and installation; with welded seams and equipped with steel nuts, bolts, screws and washers.

B. Bushings, Knockout Closures and Locknuts: Provide corrosion-resistant box knockout closures, conduit locknuts and conduit bushings, offset connectors, of types and sizes, to suit respective installation requirements and applications.

PART 3 - EXECUTION

3.1 INSTALLATION OF ELECTRICAL BOXES AND FITTINGS

A. General: Install electrical boxes and fittings as indicated, in accordance with manufacturer's written instructions, applicable requirements of NEC and NECA's "Standard of Installation" and in accordance with recognized industry practices to fulfill project requirements.

B. Coordinate installation of electrical boxes and fittings with wire/cable, wiring devices and raceway installation work.

C. Provide weathertight outlets for interior and exterior locations exposed to weather or moisture.

D. Provide knockout closures to cap unused knockout holes where blanks have been removed.

E. Install electrical boxes in those locations, which ensure ready accessibility to enclosed electrical wiring. Junction boxes shall not be installed above non-accessible ceilings.

F. Fasten electrical boxes firmly and rigidly to substrates or structural surfaces to which attached or solidly embed electrical boxes in concrete or masonry. Box support shall be independent of conduit.

G. Provide electrical connections for installed boxes.

H. Subsequent to installation of boxes, protect boxes from construction debris and damage.

3.2 GROUNDING

A. Upon completion of installation work, ground electrical boxes as required by NEC and other Division 26 Sections.

END OF SECTION

SECTION 26 05 53

ELECTRICAL IDENTIFICATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Extent of electrical identification is indicated by drawings and schedules.

B. Types of electrical identification specified in this section include the following:

1. Electrical power, control and communication conductors.
2. Operational instructions and warnings.
3. Danger signs.
4. Equipment/system identification signs.

C. Refer to Division 01 General Requirements Section, Identification Systems, for equipment and system nameplates and performance data; not work of this section.

PART 2 - PRODUCTS

2.1 ELECTRICAL IDENTIFICATION MATERIALS

A. General: Except as otherwise indicated, provide manufacturer's standard products of categories and types required for each application. Where more than one (1) single type is specified for an application, selection is Installer's option, but provide single selection for each application.

B. Plasticized Tags:

1. General: Manufacturer's standard pre-printed or partially pre- printed accident-prevention and operational tags, of plasticized card stock with matte finish suitable for writing, approximately 3-1/4-inch x 5-5/8-inch, with brass grommets and wire fasteners, and with appropriate pre-printed wording including large-size primary working, e.g., DANGER, CAUTION, DO NOT OPERATE.

C. Self-Adhesive Plastic Signs:

1. General: Provide manufacturer's standard, self-adhesive or pressure-sensitive, pre-printed, flexible vinyl signs for operational instructions or warnings; of sizes suitable for application areas and adequate for visibility, with proper wording for each application, e.g., 208V, EXHAUST FAN, RECTIFIER.

a. Colors: Unless otherwise indicated or required by governing regulations, provide orange signs with black lettering.

D. Baked Enamel Danger Signs:

1. General: Provide manufacturer's standard "DANGER" signs of baked enamel finish on 20-gage steel; of standard red, black and white graphics; 14-inch x 10-inch size except where 10-inches x 7-inches is the largest size which can be applied where needed, and except where larger size is needed for adequate vision; with recognized standard explanation wording, e.g., HIGH VOLTAGE, KEEP AWAY, BURIED CABLE, DO NOT TOUCH SWITCH.

E. Engraved Plastic-Laminate Signs:

1. General: Provide engraving stock melamine plastic laminate, complying with FS L-P-387, in sizes and thicknesses indicated, engraved with engraver's standard letter style of sizes and wording indicated, black face and white core (letter color) except as otherwise indicated, punched for mechanical fastening except where adhesive mounting is necessary because of substrate.

a. Thickness: 1/16-inch, for units up to 20 sq. in. or 8-inch length; 1/8-inch for larger units.

b. Fasteners: Self-tapping stainless steel screws, except contact-type permanent adhesive where screws cannot or should not penetrate substrate.

F. Marker Tapes:

1. Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

2.2 LETTERING AND GRAPHICS

A. General: Coordinate names, abbreviations and other designations used in electrical identification work, with corresponding designations shown, specified or scheduled. Provide numbers, lettering and wording as indicated or, if not otherwise indicated, as recommended by manufacturers or as required for proper identification and operation/maintenance of electrical systems and equipment. Comply with ANSI A13.1 pertaining to minimum sizes for letters and numbers.

PART 3 - EXECUTION

3.1 APPLICATION AND INSTALLATION

A. General Installation Requirements:

1. Install electrical identification products as indicated, in accordance with manufacturer's written instructions and requirements of NEC.

2. Coordination: Where identification is to be applied to surfaces, which require finish, install identification after completion of painting.

3. Regulations: Comply with governing regulations and requests of governing authorities for identification of electrical work.

B. Operational Identification and Warnings:

1. General: Wherever reasonably required to ensure safe and efficient operation and maintenance of electrical systems, and electrically connected mechanical systems and general systems and equipment, including prevention of misuse of electrical facilities by unauthorized personnel, install self-adhesive plastic signs or similar equivalent identification, instruction or warnings on switches, outlets and other controls, devices and covers of electrical enclosures. Where detailed instructions or explanations are needed, provide plasticized tags with clearly written messages adequate for intended purposes.

C. Danger Signs:

1. General: In addition to installation of danger signs required by Governing regulations and authorities, install appropriate danger signs at locations indicated and at locations subsequently identified by Installer of electrical work as constituting similar dangers for persons in or about Project.

a. High Voltage: Install danger signs wherever it is possible, under any circumstances, for persons to come into contact with electrical power of voltages higher than 250-volts.

b. Critical Switches/Controls: Install danger signs on switches and similar controls, regardless of whether concealed or locked up, where untimely or inadvertent operation (by anyone) could result in significant danger to persons, or damage to or loss of property.

D. Equipment/System Identification:

1. General: Install engraved plastic-laminate sign on each major unit of electrical equipment in building; including central or master unit of each electrical system including communication/control/signal systems, unless unit is specified with its own self-explanatory identification or signal system. Signs for disconnect switches, motor starters, contactors and similar equipment shall indicate the load served. Except as otherwise indicated, provide single line of text, 1/2-inch high lettering on 1-1/2-inch high sign (2-inch high where two (2) lines are required), white lettering in black field. Provide text matching terminology and numbering of the Contract Documents and shop drawings. Provide signs for each unit of the following categories of electrical work.

a. Disconnect switches.

2. All fused and unfused safety switches shall be provided with an engraved sign stating the following:

a. Name of Equipment.
b. Voltage.
c. Power Source.
d. Example:

Panel A
480Y/277 Volt
Fed from MSB1
Circuit 3

3. Install signs at locations indicated or, where not otherwise indicated, at location for best convenience of viewing without interference with operation and maintenance of equipment. Secure to substrate with fasteners, except use adhesive where fasteners should not or cannot penetrate substrate.

END OF SECTION

SECTION 26 28 13

FUSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Extent of fuse work is indicated by drawings and schedules.

B. Types of fuses specified in this section include the following:

1. Class RK1 time-delay.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Manufacturer: Subject to compliance with requirements, provide products of one (1) of the following:

1. Bussman Div; McGraw-Edison Co.
2. Littelfuse Co.
3. Gould Shawmut.

B. Fuse types listed below are for Bussman Co. Fuses by Littelfuse Co. or Gould Shawmut shall be equal to types indicated.

2.2 FUSES

A. General: Except as otherwise indicated, provide fuses of types, sizes, ratings, and average time/current and peak let-through current characteristics indicated, which comply with manufacturer's standard design, materials and construction in accordance with published product information, and with industry standards and configurations.

B. Class RK1 Time-Delay Fuses: Provide UL Class RK1 time-delay fuses rated 250V (Type LPN-RK) for voltages under 250V and 600V (Type LPS-RK) for voltages 250-600V, 60 Hz, with 200,000 RMS symmetrical interrupting current rating for sizes 100- through 600-amperes.

PART 3 - EXECUTION

3.1 INSTALLATION OF FUSES

A. Install fuses as indicated, in accordance with the manufacturer's written instructions and with recognized industry practices to ensure that protective devices comply with requirements. Comply with NEC and NEMA Standards for installation of fuses.

B. Coordinate with other work, including electrical wiring work, as necessary to interface installation of fuses with other work.

C. Install fuses in fused switches.

D. All fuse sizes shall be coordinated with manufacturer's requirements for each unit of equipment to be connected.

3.2 FIELD QUALITY CONTROL

A. Prior to energization of fusible devices, test devices for continuity of circuitry and for short-circuits. Correct malfunctioning units and then demonstrate compliance with requirements.

END OF SECTION

SECTION 26 28 16

CIRCUIT AND MOTOR DISCONNECTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Extent of circuit and motor disconnect switch work is indicated on drawings and schedules.

B. Types of circuit and motor disconnect switches in this section include the following:

1. Equipment disconnects.

C. Wires/cables, raceways and electrical boxes and fittings required in connection with circuit and motor disconnect work are specified in other Division 26 Sections.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Manufacturer: Subject to compliance with requirements, provide circuit and motor disconnects of one (1) of the following:

1. General Electric Co.
2. Siemens.
3. Square D Company.
4. Cutler-Hammer.

2.2 DISCONNECT SWITCHES

A. Heavy-Duty Disconnect Switches: For switches rated 100-amps or greater provide surface-mounted, heavy-duty type, sheet-steel enclosed switches, of types, sizes and electrical characteristics indicated; rated for system voltage 60 Hz, with required number of poles and solid neutral incorporating quick-make, quick-break type switches. Equip with operating handle which is integral part of enclosure base and whose position is easily recognizable, and is padlockable in OFF and ON position; construct current carrying parts of high-conductivity copper, with silver-tungsten type switch contacts, and positive pressure type reinforced fuse clips where fusing is required. The enclosure shall be NEMA rated to suit the atmospheric conditions of the equipment surroundings and of the manufacturer's standard finish.

B. Motor-circuit disconnect switches must be HP rated.

C. Fuses: Provide fuses for disconnect switches, as noted on the drawings of classes, types and ratings needed to fulfill electrical requirements for service indicated.

PART 3 - EXECUTION

3.1 INSTALLATION OF MOTOR AND CIRCUIT DISCONNECT SWITCHES

A. Install circuit and motor disconnect switches where indicated, complying with manufacturer's written instructions, applicable requirements of NEC, NEMA and NECA's "Standard of Installation" and in accordance with recognized industry practices.

B. Coordinate motor and circuit disconnect switch installation work with electrical raceway work, location of equipment and as necessary for proper interface. Provide U-channel supports from floor and/or structure where required to mount disconnects at free-standing equipment.

3.2 GROUNDING

A. Provide equipment grounding connections, sufficiently tight to assure a permanent and effective ground as required by NEC and in Grounding Section of Division 26.

3.3 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 32 13 13

PORTLAND CEMENT CONCRETE (PCC) PAVEMENT

PART 1 - GENERAL

1.1 PCC

A. Portland Cement Concrete (PCC) pavement shall refer to, but not be limited to, streets, roads, alleys, sidewalks, driveways, bikeways, concrete curbs and medians. All pavements to be replaced or reconstructed under each contract shall be placed at the locations shown on the plans, on an approved subgrade, in accordance with these Standard Specifications and in conformity with the lines, grades, typical cross section, and details shown on the plans and/or as directed by the Owner's Project Manager.

B. Pavement construction and reconstruction shall include all necessary removal of existing headers, pavement, sidewalks and drives; clearing, grubbing and stripping, excavation within the limits of the Work, removal of obstructions, removal and disposal of unsuitable material and debris, borrow excavation, construction of fills and embankments, haul, preparation and compaction of the subgrade; the construction of curbs, base, pavement, driveways, sidewalks; trimming, shaping and finishing of the parking space; excavation of ditches, grading and construction of approaches on intersecting or entering streets, alleys, driveways, and any other items of Work necessary to conform to these Standard Specifications and the lines, grades and cross sections shown on the plans, all as directed by the Owner's Project Manager.

1.2 MATERIALS

A. Portland Cement Concrete (PCC) pavement shall be constructed of the materials as herein specified. All materials used in pavement construction and reconstruction shall be on the latest edition of the Nebraska Department of Roads "Approved Products List" unless otherwise approved by the Engineer.

B. Concrete:

1. Portland Cement Concrete (PCC) Pavement shall be class L-3500 concrete, as defined in the Portland Cement Concrete section of these specifications of the thickness, and with or without reinforcement, as shown on the plans unless otherwise specified.

C. Reinforcement:

1. All reinforcement bars shall conform to the requirements of "Standard Specifications for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement"ASTM A 615, Grade 40 (300) or grade 60 (420). Bars shall be free from excess rust, scale, or other substances, which prevent the bonding of the concrete to the reinforcement. Smooth dowel bars shall be epoxy coated and conform to the requirements of "Structural Steel", ASTM A 36.

D. Reinforcing Bar Supports:

1. Reinforcing bar supports for use in concrete pavement shall be of a design and material satisfactory to the Owner's Project Manager and of sufficient strength to hold the metal reinforcement in place while the concrete is being placed.

E. Metal Dowel or Expansion Bar Sleeve:

1. Metal or plastic sleeves for dowel or expansion bars shall be satisfactory to the Owner's Project Manager and shall be of sufficient size and strength to permit the free sliding of the dowel bar after the concrete is in place.

F. Preformed Expansion Joint Material:

G.

1. Expansion joint material shall conform to "Standard Specifications for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction" (non-extruding and resilient bituminous types) ASTM Designation D 1751. The joint material shall be 1 inch thick unless otherwise specified.

G. Joint Sealer:

1. Joint sealer shall conform to the requirements of ASTM D 6690 Type II, "Standard Specification for Joint Sealant, Hot-Applied Elastomeric-Type, for Portland Cement Concrete Pavement", and shall meet or exceed the testing requirements of ASTM D 5329, "Standard Test Method for Sealants and Fillers, Hot-Applied, for Joints and Cracks in Asphaltic and Portland Cement Concrete Pavement". The flow as specified in ASTM D 5329 shall not exceed 3/4".

H. Curing Compounds:

1. All curing compounds shall be of the white pigmented liquid membrane-forming type and shall conform to "Standard Specifications for Liquid Membrane -Forming Compounds for Curing Concrete", ASTM Designation C 309, Type 2, Class A. Only curing compounds included on the latest edition of the NDOR Approved Products list shall be used unless otherwise approved by the Engineer.

2. All curing compounds shall be ready for use as is without further dilution. The rate of application shall be as recommended by the manufacturer.

I. Metal Keyway:

1. Metal keyway, where shown, shall conform to the gauge and cross section shown in the Plan Details.

1.3 PREPARATION OF SUBGRADE

A. No measurement or direct payment shall be made for preparation of subgrade. The cost of preparation of subgrade shall be considered subsidiary to the other items of Work for which direct payment is made.

B. The subgrade shall be prepared as specified in Chapter 2 of these Standard Specifications. To prevent the absorption of moisture from the newly deposited concrete, the subgrade shall be kept moist by light applications of water until the concrete has been placed.

PART 2 - FORMS

2.1 GENERAL

A. No direct payment shall be made for forms. The cost of form work shall be considered subsidiary

to other items of Work for which direct payment is made.

B. Upon removal of the forms, all honeycombed areas or small defects shall be properly pointed up with an approved grout mix and the concrete previously protected by the forms shall be cured as hereinafter specified or as directed by the Owner's Project Manager.

2.2 RIGID FORMS

A. Forms shall be of an approved steel section with a minimum base width of 6 inches and shall have adequate locking devices. The forms shall have a minimum length of 10 feet for street paving. The forms shall be built straight and true and in conformance with established line and grade. On curves having a radius of less than 150 feet, approved forms may be used. The depth of forms shall equal at least the depth of the concrete to be placed. No built up forms will be permitted without prior approval of the Owner's Project Manager.

B. All forms shall be free from bends and warps at all times. They shall be cleaned thoroughly each time they are used and adequately oiled before concrete is placed against them. The forms shall be set so that they rest firmly throughout their entire length on the thoroughly compacted subgrade. They shall be neatly and tightly joined. They shall be accurately set to line and grade and sufficiently braced to resist the pressure of the concrete. Forms shall be set at least 150 feet ahead of the paving operation.

C. The forms shall not be removed until new concrete is at least twelve (12) hours old unless approved by the Owner's Project Manager. During the operation of form removal, the edges of the concrete shall be cured as hereinafter specified.

D. When concrete pavement is being laid contiguous to previously finished pavement of the same finished grade elevation or contiguous to previously finished independent curb or curb and gutter, such finished pavement or curb may be made to serve as side forms.

E. Upon removal of the forms, all honeycombed areas or small defects shall be pointed up properly with an approved mix grout.

F. For Sidewalks, Driveways, and Bikeways only, the Contractor shall erect substantial forms of a material approved by the Owner's Project Manager. Unless otherwise shown on the plans, sidewalks and bikeways shall be constructed so that, when finished, they shall have a uniform transverse slope toward the curb of two percent (2%).

2.3 SLIP FORMS

A. Slip form equipment shall be provided with traveling side forms and screed of suitable dimensions, shapes, and strength to support the concrete for a sufficient length of time during placement to produce the required cross section. The equipment shall spread, consolidate and screed the freshly placed concrete in such a manner as to provide a dense and homogeneous product.

B. The slip form equipment shall have automatic sensor controls for both line and grade which operate from an offset control line.

C. All curbs shall be constructed using slip form paving equipment, except when specifically authorized by the Owner's Project Manager. At the option of the Contractor and with the approval of the Owner's Project Manager, slip form equipment may be used for construction of concrete sidewalks or bikeways.

2.4 PLACING REINFORCING STEEL / TIE BARS

A. No measurement or direct payment will be made for reinforcing steel or Tie bars. The cost of furnishing and placing reinforcing steel or Tie Bars shall be considered subsidiary to other items of Work for which direct payment is made.

B. All reinforcing steel shall be kept clean and free from foreign material that will prevent the proper bond with the concrete. Reinforcement steel / tie bars shall be placed as shown on the plans or details. Reinforcement steel / tie bars shall be placed between the concrete driveway and the pavement when a commercial drive is being constructed in conjunction with new paving. The length and location of the reinforcement steel / tie bars shall be as shown on the drawings. The Reinforcement steel / tie bars shall project equally into the driveway and pavement section. The reinforcement shall be placed so that the outside longitudinal members will be located no more than 3 inches from the edge of the slab section and the ends of all longitudinal members shall extend to within 2 inches of the ends of the slab sections. All steel reinforcing bars shall be tied securely in place at all points where the bars cross.

2.5 CONCRETE PLACEMENT

A. No measurement or direct payment will be made for placing and finishing the concrete. Placing and finishing the concrete shall be considered subsidiary to other items for which direct payment is made.

B. The concrete shall be deposited uniformly on the prepared subgrades and distributed to the required depth for the entire width by shoveling or other approved methods. The concrete then shall be consolidated thoroughly, using an approved vibrating screed or in a manner approved by the Owner's Project Manager. The concrete shall be so placed that no segregation of the materials occurs. It shall be struck off and finished, as hereinafter provided. Rakes shall not be used in handling concrete.

2.6 VIBRATING

A. No direct measurement or payment shall be made for vibrating or consolidation of the concrete. The cost of vibrating shall be considered subsidiary to other items of Work for which direct payment is made.

B. The concrete shall be well consolidated against the forms. All concrete, whether placed by machine or by hand methods, shall be thoroughly consolidated by means of mechanical vibrators approved by the Owner's Project Manager. The vibrator shall consolidate the full depth and width of the concrete to a uniform mass without segregation and free from excessive surface mortar at a single passage of the machine. Machine mounted vibrators shall be operated only when the machine to which they are attached is moving. The vibrators shall be placed so as to allow a minimum of overlap vibration. The vibration frequency shall be greater than 4,000 impulses per minute. The Contractor shall have a tachometer available to check the speed of the vibrators.

2.7 FINISHING

A. General Finishing:

1. Finishing the concrete pavement shall not be measured and paid for directly. The cost of the finishing will be considered subsidiary to the cost of other Work for which direct payment is made.

2. Whether the consolidation and finishing of the concrete is accomplished by either machine or hand methods, the following requirements shall apply and all equipment used shall meet the approval of the Owner's Project Manager. Unless otherwise provided in the Special Provisions or approved by the Owner's Project Manager, hand finishing as described herein may be employed only in cases of emergency and where mechanical methods are impractical. The consolidation and finishing of concrete sidewalk, bikeway or driveway may be accomplished by either machine or hand methods.

3. In general, the addition of superficial water to the surface of the concrete to assist in finishing operations will not be permitted. However, due to unavoidable delay in finishing or an unusual drying condition, a slight quantity of water may be added to the surface of the concrete as an aid in finishing. If it becomes necessary to sprinkle the surface with water to complete the finishing of the concrete, all mixing operations shall be immediately discontinued until the finishers catch up to a point where extra water for finishing is no longer required. If the application of water to the surface is permitted, it shall be applied in a fog spray by means of an approved orchard-type sprayer. Spray equipment which is attached to the mechanical finisher, or any other paving equipment, will not be permitted. The addition of superficial water to the surface of the concrete shall be at the Contractor's risk. The pavement shall be given a finish by means of a wet burlap drag. The drag shall be pulled in a longitudinal direction only. The drag shall be adequately maintained so that the resultant finish shall be uniform in appearance. On sidewalks and driveways, the final finish shall be obtained with the use of a broom. Brooming shall be transverse to the direction of pedestrian traffic.

4. Prior to the time the concrete takes its initial set, all expansion and construction joints and exposed edges shall be carefully finished with an edger having a radius of not less than 1/4 inch. The edge shall be left smooth and true to line and grade. The Contractor shall provide a suitable work bridge spanning the concrete placement to facilitate the edging.

    a. Machine Finishing:

        (1) The concrete shall be deposited in such a manner that adequate concrete remains ahead of the screed and the finish machine to provide the cross section required. The concrete will then be further consolidated and finished mechanically with a power-driven, self-propelled machine approved by the Owner's Project Manager. The finish machine shall be operated over the entire width of the pavement section and shall achieve uniform consolidation. The tops of the forms and the contact surfaces of the wheels of the finishing machine shall be kept free from concrete and earth.

        (2) The finishing machine shall be kept in good repair at all times and shall operate so as to give the desired finish over the entire surface of the pavement. The forward speed of the finishing machine shall be adjusted to the average progress of the concrete production, in order that the strike-off operation shall be as continuous and uninterrupted as possible.

        (3) After the final pass of the finishing machine, the surface shall be checked and corrected by using approved 10 feet long straight edges and refinished using long handled floats. The use of the long handled floats shall be held to a minimum. The straight edge shall be lapped one-half (½) its length on each successive position.

(4) The Contractor shall furnish and keep in a convenient place a master straight edge, made of 6 inch steel channel, for the purpose of checking all straight edges and the longitudinal float during the progress of the Work. A sufficient number of straight edges shall be kept in readiness so as not to delay the paving operations.

(5) Hand tools that perform the function of the finishing machine shall be immediately available for use in the event of an emergency.

b. Hand Finishing:

(1) After the concrete has been placed and spread, it shall be thoroughly consolidated by the use of approved vibrating screeds and struck off to a uniform height above the finished grade to the true cross section. When a non-vibrating hand screed is used or the pavement design thickness is greater than 6 inches, the concrete shall be consolidated with an approved mechanical vibrator before the concrete is struck off.

(2) The screed used shall be of a design and construction suitable and adequate for the purposes required. It shall be designed to ride on the side forms of the pavement. The screed shall be of metal or steel-shod wood and shall have sufficient strength and stiffness to retain its shape under all working conditions. The working or screeding edge shall be shaped to match the required cross section of the pavement. The screed shall be operated so that when riding on the side forms, the working edge will have an excess of concrete above grade to produce the required cross section after consolidation.

(3) After the concrete has been consolidated and struck off, the surface shall be finished as specified above under machine finishing.

2.8 SURFACE TESTS

A. After the pavement has been set sufficiently to permit foot traffic, the slab will be thoroughly checked by the Owner's Project Manager. All variations in excess of 1/8 inch, measured from the surface of the concrete in place with a 10 foot straight edge or other device used for measuring deviations from a plane, shall be plainly marked. The Contractor shall eliminate such variations. When the surface finish of the pavement has been disturbed by grinding, the surface shall be repaired with the use of an approved sealant. The use of mechanical grinders will be permitted if their use does not, in the opinion of the Owner's Project Manager, damage the pavement.

B. No direct measurement or payment will be made for joints or joint sealant. The cost of jointing and joint sealing shall be considered subsidiary to other items of Work for which direct payment is made.

2.9 TRANSVERSE CONSTRUCTION JOINTS

A. At the end of the day, or in case of an unavoidable interruption of more than thirty (30) minutes, a transverse construction joint shall be placed at the point of the Work stoppage. The joints shall conform to the requirements for construction joints as shown on the plans and as specified herein.

B. Whenever concrete pavement construction is stopped for a period of over 30 minutes, a transverse construction joint shall be formed by finishing the concrete to a bulkhead made of at least 2 inch

material cut to the exact cross section of the pavement slab, as shown on the plans. The bulkhead shall be placed on the subgrade perpendicular to the pavement surface and at right angles to the center line of the roadway. An edging tool shall be used along the bulkhead to make the construction joint a well-defined line. Construction joints shall not be spaced closer than 10 feet. When the placing of concrete is resumed, the bulkhead shall be removed and care shall be taken not to disturb any steel or concrete placed. The new concrete shall be placed directly against the face of the concrete previously placed. The joint shall be formed and finished so the surfaces of the previously placed concrete and new concrete correspond exactly to the cross section and grade shown on the plans.

2.10 EXPANSION JOINTS

A. Transverse:

1. When transverse expansion joints are indicated on the plans, they shall be constructed at the location and in accordance with details shown in the plans. The joint material shall extend entirely through the pavement and shall be placed so the top edge will be 3/8 inch below the surface of the finished pavement and curb.

2. During the placing and the finishing of the concrete pavement, the expansion joint material shall be held securely by means of a special holder approved by the Owner's Project Manager. Extreme care shall be exercised in placing concrete around the joint so the joint will remain in the true position specified herein.

3. After the edges have been rounded, the surface of the pavement across the joint shall be tested with a 10 foot straight edge placed parallel to the center line of the pavement and drawn from the center of the pavement to the edge. Any high spots or depressions shall be eliminated and the edges rounded as hereinbefore specified. Any surplus concrete at the ends of the joints shall be cut away when the forms are removed.

B. Other:

1. Expansion material shall be formed around all objects that project through the pavement unless otherwise directed. When the pavement is placed against buildings, sidewalks and other unyielding objects, 1 inch expansion joint material shall be placed between the object and the new concrete.

2.11 CONTRACTION JOINTS OR PLANES OF WEAKNESS

A. Contraction joints or planes of weakness called for on the plans shall be constructed at the locations indicated and in accordance with details shown on the plans or as directed by the Owner's Project Manager. Maximum joint spacing shall be 15 feet unless otherwise directed by the Owner's Project Manager.

B. All joints shall be made with a motor driven concrete saw to a minimum depth of one-fourth (1/4) the pavement thickness. The sawing shall be accomplished not later than forty-eight (48) hours after concrete placement nor so soon as to cause spalling of top aggregates. When "extra strength" concrete is used, the joints shall be sawed within twenty-four (24) hours after concrete placement. Transverse contraction joints generally shall be sawed within eighteen (18) hours after concrete placement. In any event, the concrete shall be sawed before random cracks develop. The sawing of any joint shall be discontinued if a crack occurs at or near the joint location prior to the time of sawing. Sawing shall be discontinued when a crack develops ahead of the saw.

C. Cracks developed before sawing commences or cracks developing ahead of the saw shall be routed to a depth of 3/8 inch by 3/8 inch in width. The joint between the curb and gutter section and concrete pavement shall be sawed to a depth of 1 inch and sealed.

4.6 JOINT SEALING

A. All expansion and saws joints shall be sealed as provided herein.

B. The joint shall be cleaned by high pressure compressed air or other approved methods to remove all residues. The joint shall be filled from the bottom to the top without formation of voids. The top of the finished joint seal shall be between 1/4 inch and 3/8 inch below the finished surface, unless shown otherwise on the plans. At the time of application of the joint sealant, the joint and pavement shall be dry and acceptable to the Owner's Project Manager. No sealant shall be placed during unsuitable weather or when the atmospheric temperature is below 50°F or when weather conditions indicate that the temperature may fall below 32°F within twenty-four (24) hours.

C. The joint sealing filler shall be melted uniformly and with constant stirring in an asphalt kettle of the double boiler design with oil being used as the heating medium. The material shall be furnished or prepared in pieces of such size and shape that the material can be melted readily to the proper pouring consistency. The Contractor shall obtain from the supplier or from the manufacturer and furnish to the Owner's Project Manager the manufacturer's recommendations for mixing, application and temperature restrictions. These recommendations shall be followed strictly. In no case shall the temperature exceed the maximum recommended by the manufacturer. When proper pouring consistency is attained, the joints shall be filled as shown in the plans, through the use of pressure-type applicator, of a design approved by the Owner's Project Manager and equipped with a nozzle which will fit into the joints.

D. All adjoining surfaces shall be carefully protected during the joint sealing operations, and any stains, marks or damage thereto, as a result of the Contractor's operations, shall be corrected in a manner satisfactory to the Owner's Project Manager.

PART 3 - CURING AND PROTECTION

3.1 CURING

A. No direct measurement or payment shall be made for curing and protection. The cost of curing and protection shall be considered subsidiary to other items of Work for which direct payment is made.

1. Curing With Liquid Membrane Curing Compound:

a. Immediately after the concrete has been finished, the concrete surface and exposed vertical edges shall be sealed with a uniform application, no less than 1 gallon per 200 square feet, of a membrane curing compound as described previously in this chapter. An approved self propelled mechanical power sprayer shall be used to apply the curing compound to the concrete pavement except that approved manual spraying equipment may be employed on narrow or variable width sections where the use of a self-propelled mechanical power sprayer is impractical, and on irregular sections of street returns and alley returns.

2. Curing With Wet Burlap:

a. Immediately after the concrete has been finished, burlap shall be carefully placed

on the concrete and kept moist in a manner which will not damage the pavement surface. The burlap shall be clean, evenly woven, free of encrusted concrete or other contaminating materials, and shall be reasonably free from cuts, tears, broken or missing yarns, and thin, open or weak places.

b. The burlap shall be of sufficient length to cover all exposed surfaces including the vertical edges of the slab. At exposed vertical edges of the slab, earth shall be banked so that the top width of the berm shall be at least 6 inches.

c. The burlap shall be kept continuously saturated with water for at least 72 hours following the placing of the concrete, except that the burlap may be temporarily removed so that joints may be sawed and filled, the surface tested, and any grinding or rubbing necessary may be accomplished. While the pavement is uncovered, it shall be kept wet by sprinkling with water. Concreting operations shall be suspended when water is not available to cure the concrete.

3.2 PROTECTION

A. The Contractor shall provide and maintain substantial barricades, warning signs, and watchmen, when required, to protect the new pavement and Work site from vandalism and property destruction.

B. Any concrete showing injury from vandalism shall be repaired or removed and replaced at the Contractor's expense, to the Owner's Project Manager's satisfaction. No heavy equipment or vehicular traffic shall be allowed on the new construction until the concrete has achieved a compressive strength of 3,000 p.s.i. or seven (7) days have elapsed. A longer period of time may be required if, in the opinion of the Owner's Project Manager, the concrete is not of sufficient strength to support the equipment or vehicles.

3.3 INTEGRAL CURB

A. No direct measurement or payment shall be made for integral curb. The cost of integral curb shall be considered subsidiary to the items for which direct payment is made.

B. When required, integral curb shall be constructed on the edge of the concrete slab in conformance with the plans and typical cross section. The concrete for the integral curb shall be of the same mixture as used in the concrete slab.

C. The finish machine screed template should preferably leave enough concrete at the curb location to eliminate further carry-back and handling of the concrete. The steel curb template shall be an integral part of the finish machine with a self-contained vibrator for the curb section.

D. When authorized by the Owner's Project Manager, the curb may be placed immediately after the concrete in the pavement has been placed and finished, but before the concrete develops its initial set, by means of a curb machine equipped with a steel template and self-contained vibrator. Hand placement methods shall be finished with the aid of a metal mule template. This method shall be used only where specifically authorized by the Owner's Project Manager.

PART 4 - BASIS OF PAYMENT

4.1 GENERAL

A. Such payment shall be full compensation for all preparation of subgrade, forms or slip forming,

curb and gutter, integral curb, materials, labor, tools, equipment, jointing, finishing, curing, sawing, sealing, backfilling, guarantee, cleanup and incidentals necessary to complete the Work.

B. Curb drops shall be constructed at locations shown on the plans or as directed by the Owner's Project Manager for the future construction or reconstruction of driveways or access ramps. No direct payment will be made for the Work of constructing curb drops. The cost of curb drops shall be considered subsidiary to the items for which direct payment is made.

C. Portland Cement Concrete (PCC) Pavement:

1. Plain (non-reinforced) concrete pavement of the various thicknesses called for in the proposal, constructed in conformance with these Standard Specifications and accepted by the Owner's Project Manager, shall be measured and paid for at the contract unit price bid per square yard for PORTLAND CEMENT CONCRETE (PCC) PAVEMENT, __". The final measure shall be for pavement only, excluding curb and gutter.

D. Portland Cement Concrete (PCC) Pavement With Integral Curb:

1. The pavement of the dimensions and thickness called for on the plans, constructed in conformance with the Specifications and accepted by the Owner's Project Manager, shall be measured and paid for at the contract unit price per square yard for PCC PAVEMENT WITH INTEGRAL CURB, __". The final measure shall be for pavement with integral curb and measured from back of curb to back of curb.

E. Reinforced Portland Cement Concrete (RPCC) Pavement:

1. Reinforced concrete pavement of the various thicknesses called for in the proposal, constructed in conformance with these Standard Specifications and accepted by the Owner's Project Manager, shall be measured and paid for at the contract unit price bid per square yard for REINFORCED PORTLAND CEMENT CONCRETE (RPCC) PAVEMENT, __".

F. Concrete Sidewalk; Concrete Driveway; Concrete Bikeway:

1. CONCRETE SIDEWALK, __" THICK; CONCRETE DRIVEWAY, __" THICK; CONCRETE BIKEWAY, __ " THICK, that has been completed in conformance with the Plans and Standard Specifications and accepted by the Owner's Project Manager shall be measured and paid for at the contract unit price bid per square foot. Sidewalks or bikeways constructed through future driveway locations shall be constructed to the minimum driveway thickness, and shall be measured and paid for at the appropriate unit price bid for Concrete Driveway.

G. Combined Curb And Gutter, Concrete Barrier Curb, or Concrete Median Curb:

1. COMBINED CURB AND GUTTER, CONCRETE BARRIER CURB, or CONCRETE MEDIAN CURB, completed in conformance with the plans and Standard Specifications and accepted by the Owner's Project Manager, shall be measured along the face of the curb through all inlets.

2. Payment shall be made at the contract unit price bid per linear foot for each type and size constructed.

H. Concrete Header:

1. Concrete headers shall be placed at the ends of all streets and intersections when the extended street or side streets are unpaved. Concrete headers constructed in accordance with plan details and accepted by the Owner's Project Manager shall be paid for at the contract unit price bid per linear foot for INSTALL CONCRETE HEADER or REMOVE CONCRETE HEADER.

I. Concrete Median Nose:

1. CONCRETE MEDIAN NOSE completed in conformance with the plans and Standard Specifications and accepted by the Owner's Project Manager, shall be paid for at the contract unit price bid per each.

J. Concrete Median Surfacing, 4" Thick:

1. CONCRETE MEDIAN SURFACING, 4" THICK, completed in conformance with the plans and Standard Specifications and accepted by the Owner's Project Manager, shall be measured and paid for at the contract unit price bid per square foot.

K. Tack-On Median:

1. TACK-ON MEDIAN, completed in conformance with the plans and Standard Specifications and accepted by the Owner's Project Manager, shall be measured and paid for at the contract unit price bid per square foot.

PART 5 - ALLEY PAVEMENT AND ALLEY RETURNS

5.1 GENERAL

A. The finishing of concrete alley pavement and concrete alley returns shall proceed, in general, in accordance with the methods specified above under "Hand Finishing", with the modification that after the required strike off and consolidation, the surface shall be floated longitudinally with a wooden float.

B. Where walls of buildings or other obstructions exist immediately adjacent to alley lines and against which the new pavement must be placed, necessary modifications of the methods specified in this section will be approved by the Owner's Project Manager. No essential requirements, however, relating to quality of workmanship or trueness to grade and cross sections shall be waived. In general, a temporary screed strip shall be set to the proper grade, parallel to the alley line and approximately 1 foot there from, and a somewhat shorter screed shall be used.

C. As soon as the necessary screeding has been completed, the screed strip shall be immediately removed and the space filled with fresh concrete. Final finishing shall then be completed as specified under machine finish of these Standard Specifications. All jointing, jointing patterns and typical sections shall conform to the project details.

5.2 BASIS OF PAYMENT

A. Alley pavement of the various thicknesses called for in the proposals, constructed in conformance with these Standard Specifications and accepted by the Owner's Project Manager, shall be measured and paid for at the contract unit price bid per square yard for PORTLAND CEMENT

CONCRETE (PCC) ALLEY PAVEMENT, __". Such payment shall be full compensation for all preparation of subgrade, forms or slip forming, curb and gutter, integral curb, materials, labor, tools, equipment, jointing, finishing, curing, sawing, sealing, backfilling, guarantee, cleanup and incidentals necessary to complete the Work.

PART 6 - ACCESS RAMPS

6.1 GENERAL

A. Access ramps shall be constructed at the locations shown on the plans or as directed by the Owner's Project Manager. All ramps shall be a minimum of 6 inches thick. All curb ramps shall be constructed with DETECTABLE WARNING PANEL material in accordance with the Plans.

6.2 BASIS OF PAYMENT

A. Access ramps shall be measured and paid for at the appropriate unit price bid for CONCRETE SIDEWALK, 6" THICK or CONCRETE BIKEWAY, 6" THICK. Such payment shall be full compensation for all preparation of subgrade, forms or slip forming, curb and gutter, integral curb, materials, labor, tools, equipment, jointing, finishing, curing, sawing, sealing, backfilling, guarantee, cleanup and incidentals necessary to complete the Work.

B. DETECTABLE WARNING PANELS material shall be paid for by the square foot of material in place.

6.3 SUBSTANTIAL COMPLETION

A. All projects involving items of paving shall be considered substantially complete when all items of Work shown on the proposal or called for in any other area of the Contract documents are completed to the satisfaction of the Owner's Project Manager. Such items shall include but will not be limited to: curb and gutter, Asphaltic Concrete pavement/Portland Cement Concrete (PCC) pavement, streets, roads, driveways, sidewalks, alleys, bikeways, concrete curbs, medians, adjustment of manholes, valve boxes, water stop boxes, backfilling, park spacing, joint sealing, and pavement markings.

B. Liquidated damages shall continue to accrue until such time as the Work is deemed to be substantially completed by the Owner's Project Manager. However, the Contractor may submit a written request to the Owner's Project Manager for approval to suspend such liquidated damages to allow additional time for completion of such minor items of the Work as seeding, sodding, and survey monuments. Granting the request for additional time by the Owner's Project Manager shall not relieve the Contractor of the Contractor's responsibilities for completion of those items for which the suspension is requested.

END OF SECTION

SECTION 32 13 14

PORTLAND CEMENT CONCRETE (PCC)

PART 1 - GENERAL

1.1 PCC

A. Portland Cement Concrete (PCC) shall consist of an intimate mixture of Portland Cement, aggregate, and water. All Portland Cement Concrete (PCC) shall be air entrained and contain a NDOR approved water reducing admixture at the manufacturers recommended dosage rate. Portland Cement used in all concrete mixtures except L-5500, LB-3500, LB-2750 and PR shall be modified with Class F Fly Ash as described below and as indicated in Table 3.01 B. Depending on the application, other constituents or admixtures may be used with permission from the Engineer. Materials not on the latest edition of the Nebraska Department of Roads (NDOR) "Approved Products List" shall not be used without permission from the Engineer. The constituents of Portland Cement Concrete and their mixing, handling, and proportioning shall conform to ASTM Designation C 94 except as modified herein.

PART 2 - MATERIALS

2.1 CEMENT

A. Portland Cement shall be a recognized standard hydraulic cement composed primarily of hydraulic calcium silicates conforming to the requirements of ASTM Designation C 150 for Type I, II, or III cement and shall contain no more than 0.60 percent equivalent alkali. Equivalent alkali is defined as the sum of the sodium oxide (Na_2O) and the potassium oxide (K_2O) calculated as sodium oxide (equivalent alkali as $Na_2O = Na_2O + 0.658(K_2O)$). Certified mill tests shall be furnished to the Owner's Project Manager. Different brands of cement, or the same brand from different mills, shall not be mixed during storage. Neither shall they be used alternately in any one concrete placement without permission from the Engineer. Contractors or Subcontractors supplying concrete shall notify the Owner's Project Manager when changing to different cement.

B. The cement shall be protected from damage due to moisture. Cement so damaged will be rejected. Cement shall not be in storage at the concrete plant longer than ninety (90) days without retesting. The temperature of the cement when used shall be less than 180°F.

2.2 FLY ASH MODIFIED PORTLAND CEMENT CONCRETE (PCC)

A. Portland Cement Concrete (PCC) mixes for pavement, driveways, curb, median, and sidewalk shall be modified by the use of Type IPF cement, as specified below. Type IPF cement shall be Portland cement which is pre-blended or inter-ground by the cement manufacturer with 25 +/- 2 percent Class F fly ash and shall conform to the requirements of ASTM C 595. No additional fly ash may be added at the concrete plant.

2.3 FLY ASH MODIFIED PORTLAND CEMENT CONCRETE (PCC) (Continued)

A. An NDOR approved water-reducing admixture shall be used in all fly ash modified concrete mixes at the dosage rate recommended by the manufacturer. The water-cement ratio of all fly ash modified concrete shall not exceed the maximum limit for the various classes of concrete as shown in Table 3.01 B.

B. Fly ash shall conform to the requirements of Class F pozzolan of ASTM Designation C 618, except that the maximum loss on ignition for Class F pozzolan shall be six percent (6.0%). Additionally, Class F pozzolans shall have a maximum allowable free carbon content not to exceed three percent (3.0%). Class F fly ash shall not contain more than one and five-tenths percent (1.50%) of available alkalies as Na_2O. Fly ash such as is produced in furnace operations utilizing liming materials or soda ash (sodium carbonate) as an additive will not be acceptable. Certified mill tests shall be provided to the Owner's Project Manager.

C. Only brands of Type IPF Cement which are on the latest edition of the Nebraska Department of Roads Approved Products List shall be approved for use in concrete in City projects.

D. Type IPF cement shall not be used in mix designations LB-2750, LB-3500, L-5500 and PR without permission from the City Engineer.

2.4 AGGREGATE

A. General:

1. Only aggregates that have been approved by the Nebraska Department of Roads and used for similar Work and have satisfactory service records will be allowed for use on City projects unless approved by the City Engineer.

2. Mineral aggregates shall be crushed rock, broken stone, gravel, sand-gravel, coarse sand, fine sand, or a mixture of these materials composed of clean, hard, durable, and un-coated particles. Crushed rock shall be crushed limestone, dolomite, granite, quartzite, or other ledge rock.

3. Dolomite as herein defined is a magnesium limestone containing calcium carbonate and magnesium carbonate in approximately a 4 to 3 ratio.

4. The calcium carbonate content of limestone shall be at least 80 percent computed as CaCO3 from the value determined for CaO.

5. Aggregates shall be free from injurious quantities of dust, soft or flaky particles, loams, alkali, organic matter, paper, wood, or other deleterious matter as determined by the Owner's Project Manager.

6. The use of aggregate obtained from any reclaiming or recycling process shall not be allowed without permission from the Owner's Project Manager.

7. The gradations shown for the aggregate represent limits which shall determine suitability for use from any source of supply. The gradations from any one source shall be uniform and not subject to the extreme percentages of gradation specified below. The aggregate from different sources of supply shall not be mixed or stored in the same pile, nor used alternately in the same class of construction or mixed without permission from the City Engineer. The aggregate may be tested at any time prior to its incorporation into a mix. Aggregate sampling and testing shall conform to the following requirements:

ASTM	DESIGNATIONS
C 33	Specification for Concrete Aggregates

AASHTO	DESIGNATIONS
T 96	Abrasion
T 104	Sodium Sulfate Soundness
T 21	Organic Impurities
T 71	Mortar-Making Properties

NEBRASKA DEPARTMENT OF ROADS

NDR T 2	Sampling
NDR T 27	Sieve Analysis
NDR T 504	Clay Lumps, Shale, and Soft Particles
NDR T 103	Freeze and Thaw Soundness
NDR T 85	Specific Gravity and Absorption (Coarse Aggregate)
NDR T 84	Specific Gravity and Absorption (Fine Aggregate)
NDR T 89	Determining the Liquid Limit of Soils
NDR T 90	Determining the Plastic Limit and Plasticity Index of Soils
NDR T 5	Calcium Carbonate
NDR T 248	Reducing Field Samples of Aggregate to Testing Size

8. Fine sand shall have at least 95 percent of its particles pass the No. 10 sieve and no more than 25 percent pass the No. 200 sieve. This definition applies to the sodium sulfate soundness test.

9. Once an aggregate's soundness and abrasion quality has been determined, additional quality testing for soundness and abrasion loss will be at the Owner's Project Manager's discretion.

10. Aggregate shall be evaluated based upon its past performance in concrete pavement and in laboratory test results. Aggregate with adversely reactive constituents shall not be used.

11. During the progress of the Work, should the quality of the aggregate appear to change appreciably, the Contractor may be required to furnish satisfactory evidence of its soundness. The Owner's Project Manager may, from time to time during the progress of the Work, make check tests of the gradation of the aggregates. Any materials failing to meet the requirements of the Standard Specifications shall be rejected and removed from the site of the Work.

12. Aggregates shall meet the gradation requirements of Table 3.01 A, for the Class of Concrete shown in Table 3.01 B, of these Standard Specifications. For all other applications such as overlay concrete or mortar and grout sands, the gradation requirements in the latest edition of the Nebraska Department of Roads "Standard Specifications for Highway Construction" shall apply.

B. Fine Aggregate:

1. Fine aggregate shall consist of sand or sand-gravel or a combination of sand and sand-gravel. The sand and sand-gravel shall be washed and composed of clean, hard, durable and un-coated particles. Aggregates produced from wet pits by pumping will be considered to be washed. Aggregates from a dry pit shall have the method for washing approved by the City Engineer. The fine aggregate shall be free from injurious amounts of clay, loam, alkali, organic matter and other deleterious substances.

2. Fine aggregate shall have a soundness loss of not more than 10 percent by weight at the end of 5 cycles using sodium sulfate solution.

3. The aggregate shall contain no more than one-half percent (0.5%) by weight of clay lumps.

4. The aggregate which produces a color darker than the standard color when subjected to the colorimetric test for organic impurities shall be tested for its mortar-making properties in accordance with AASHTO T 71.

5. The aggregate, when subjected to the mortar-making properties test, shall produce a mortar having a compressive strength at the age of 7 days equal to or greater than that developed by mortar of the same proportions and consistency made of the same cement and aggregate after the aggregate has been treated in a 3 percent solution of sodium hydroxide. Materials failing to produce equal or greater strength shall not be accepted, without permission from the City Engineer.

C. Coarse Aggregate:

1. Coarse aggregate shall consist of limestone composed of clean, hard, durable, and un-coated particles. These materials are natural sedimentary rock composed principally of calcium carbonate.

2. The calcium carbonate content of the aggregate shall be at least eighty percent (80%) (computed as $CaCO_3$ from value determined for CaO).

3. The percent of clay lumps, shale, or soft particles shall not exceed the following amounts:

Clay Lumps	0.5 percent
Shale	1.0 percent
Soft Particles	3.5 percent

4. Any combination of clay lumps, shale and soft particles shall not exceed three and one-half percent (3.5%).

5. Coarse aggregate for concrete shall be free of coatings that will inhibit bond and injurious quantities of loam, alkali, organic matter, thin or laminated pieces, chert or other deleterious substances.

6. Coarse aggregate for concrete shall not have a soundness loss greater than eight percent (8%) by weight at the completion of sixteen (16) cycles of alternate freezing and thawing.

7. The percentage of wear by the Los Angeles Abrasion test shall not exceed forty percent (40%).

TABLE 3.01 A - GRADATION LIMITS FOR MINERAL AGGREGATES FOR USE IN PORTLAND CEMENT CONCRETE

Sieve	FINE AGGREGATE		COARSE AGGREGATE	
	Target	Tolerance	Target	Tolerance
1 ½"	--	--	100	None

Sieve	FINE AGGREGATE		COARSE AGGREGATE	
	Target	Tolerance	Target	Tolerance
1"	100	None	100	-8
3/4"			78	±12
½"			--	--
3/8"			30	±15
# 4	87	±10	6	±6
# 10	60	±10	--	--
# 20	--	--	2 *	±2 *
# 30	28	±12		
# 50				
# 100				
# 200	1.5	±1.5	1.5	±1.5

* The percent passing may be increased to 3 ±3 provided no more than 1.5% is passing the No. 200 sieve when washed.

2.5 WATER

A. Water for concrete or mortar shall be clean and free from injurious amounts of oil, acid, alkali, salt, organic matter, and other deleterious substances. Test specimens of mortar made from the materials and water to be used in the Work shall develop a tensile or compressive strength at seven days of not less than ninety-five percent (95%) of that developed by the mixture of material and distilled water.

B. Wash-out water or water from the reclaiming process of Portland cement concrete shall not be allowed to be used in the mixture without permission from the City Engineer.

2.6 CHEMICAL ADMIXTURES

A. All Chemical Admixtures shall conform to the latest addition of the Nebraska Department of Roads "Standard Specifications for Highway Construction".

B. Portland cement concrete shall be air-entrained. Air-entraining admixtures to be used with Portland Cement Concrete shall conform to ASTM Designation C 260, except that the strength of the concrete containing the admixture shall not be less than ninety-two percent (92%) of a similar concrete without the admixture at all test ages. The air-entraining characteristics of the admixture, when combined in suitable proportions with Portland Cement, aggregate, and water, within the limits of the proportions specified, shall be such that the resulting concrete will have a satisfactory work-ability and a total air content within the limits, as specified herein, for the different classes of concrete.

C. If the air content of the concrete at the job site is less than the minimum specified, only one addition of air-entraining admixtures to a load is allowed. If the air content is then outside the limits specified, the load of concrete shall be rejected.

D. Admixtures which are not incorporated into the mix at the plant shall not be added to individual loads of concrete at the job site to enhance work-ability or pump-ability without permission from the City Engineer.

E. Admixtures shall not be added to individual loads of concrete at the job site to reduce either air content or slump without permission from the City Engineer.

TABLE 3.01 B - PORTLAND CEMENT CONCRETE MIXTURES (CUBIC YARD BATCH)

CLASS OF CONCRETE (1)	GENERAL USE	CEMENT (lb/cy)	CEMENT TYPE (2)	WATER CEMENT RATIO (MAX.)	SLUMP (MAX.) (inches) (3)	AGGREGATES (% BY WEIGHT)		AIR CONTENT RANGE (% BY VOLUME)	28 DAY STRENGTH MIN. PSI
						FINE	COARSE		
SG-3000	Where Specified	564	1PF	0.50	4.0	100	0	6.0 - 8.5	3000
L-3500	Pavement, Sidewalk, Structures	564	1PF	0.50	4.0	70 +/- 3	30 +/- 3	6.0 - 8.5	3500
L-3500S	Slip-form Pavement	564	1PF	0.48	2.5	70 +/- 3	30 +/- 3	7.0 - 10.0	3500
LC-3500	Machine Curb	564	1PF	0.48	2.5	70 +/- 3	30 +/- 3	6.0 - 8.5	3500
L-4500	Structures	658	1PF	0.42	4.0	70 +/- 3	30 +/- 3	6.0 - 8.5	4000
LB-2750	Pavement Base (New Construction Residential)	423	I/II	0.60	4.0	60 +/- 2	40 +/- 2	5.5 - 7.5	2750
LB-3500	Pavement Base (Reconstruction)	564	I/II	0.50	4.0	70 +/- 3	30 +/- 3	5.5 - 7.5	3500
L-5500	Pavement (High/Early Strength)	752	I/II	0.40	4.0	70 +/- 3	30 +/- 3	6.0 - 8.5	4000
PR (4)	Pavement Repair (High/Early Strength)	799	III	0.45	4.0	70 +/- 3	30 +/- 3	6.0 - 8.5	4000

NOTES:
(1) All mixtures shall contain a NDOR approved water reducer at the manufacturer's recommended dosage rate.
(2) For Temporary Pavement, Type I/II cement is allowed.
(3) The maximum slump may be exceeded by use of water reducer, high range water reducer, or both.
(4) Calcium Chloride may be added as per NDOR Standard Specifications for Highway Construction.
This table is for proportion ranges only. Actual mix design weights for specific applications will be provided by the City Engineer.

2.7 HANDLING MATERIALS

A. The concrete constituents, when delivered to the mixing equipment, shall meet the requirements of the above Standard Specifications.

B. The moisture content of the aggregate shall be reasonably uniform from batch to batch. Limestone having moisture absorption of more than one percent (1%) shall be uniformly saturated with water before it is used. The saturation shall be performed sufficiently in advance of mixing operations to permit filling of the pores of the aggregate.

2.8 WEIGHING & MIXING

A. The constituents of the concrete shall be weighed or measured separately at a central batch plant. The central batch plant shall be in substantial compliance with the requirements in the Quality Control Manual, Section 3, Certification of Ready Mixed Concrete Production Facilities published by the National Ready Mixed Concrete Association. The Contractor shall be responsible for the calibration of the plant on an annual basis or as deemed necessary by the City Engineer.

B. The concrete batch shall be either plant-mixed by the central batch plant or truck-mixed using transit mixing trucks. Mixing time shall be in accordance with ASTM C 94 and rate requirements shall be based on the size of drum and the mixing drum manufacturers' Specifications. Mixing time shall start when the cement and water are combined. The concrete shall be transported to the job site in clean, water-tight trucks. A load ticket showing the date, time, plant designation, mix designation, batch size, material quantities per batch, and aggregate moisture values used to calculate aggregate quantities shall accompany each load and be made available to the Owner's Project Manager.

C. No concrete shall be used from a batch that has exceeded ninety (90) minutes from the start of mixing time. A lesser time may be specified by the City Engineer if, in his opinion, conditions warrant it. Concrete hauled in non-agitating trucks shall be placed within thirty (30) minutes after mixing time starts.

D. The temperature of the concrete shall be between 50°F and 95°F when delivered to the Work. The temperature of the combined aggregate and water shall not exceed 95°F.

2.9 CONSISTENCY AND PLACEMENT OF CONCRETE

A. In general, the minimum amount of water shall be used which will produce the required work-ability. The mortar shall cling to the coarse aggregate and shall show no free water when removed from the mixer. The upper surface of the set concrete shall show a cement film upon the surface, but shall be free from laitance. In no case shall so much water be used so as to cause the collection of surplus water on the surface, or to cause segregation of the materials during transportation or placing of the concrete.

B. Concrete shall be plastic, cohesive and workable, and uniform from load to load. Workable concrete is defined as a concrete which can be placed without honeycomb and without surface voids. Work-ability shall be obtained without producing a condition such that free water appears on the surface when finished. The consistency of the mixture shall be that required for the specific conditions and methods of placement; however, the maximum water cement ratio, as specified in Table 3.01 B, shall not be exceeded.

C. The maximum allowable interval for placing successive concrete loads on grade for paving or into forms and excavations for structures shall be 30 minutes unless directed otherwise by the City Engineer. Concrete free fall distance shall not exceed 5 feet. This includes free fall in a discharge pipe when using a conveyor system for placement. Pumped concrete is not considered in free fall until the concrete exits the pumper hose.

2.10 CONCRETE TESTS

A. The City Engineer shall take such tests of the concrete as he deems necessary to determine the strength and the air, water, cement and aggregate proportions. The properties of the concrete will be determined by the tests specified in ASTM Designation C 94.

2.11 FLOWABLE FILL

A. Description:

1. Flowable Fill shall be a mixture of cement, fly ash, fine sand, water, and air having a consistency which will flow under a very low head.

B. Materials:

1. The approximate quantities of each component per cubic yard of mixed material shall be as shown in Table **3.06 A.**

TABLE 3.06 A - FLOWABLE FILL COMPOSITION PER CUBIC YARD

Cement (Type I or II)	60 pounds
Class C Fly Ash	200 pounds
Fine Sand (ssd)	2,700 pounds
Water (approx.)	420 pounds
Air Content (approx.)	10%

2. Actual quantities shall be adjusted to provide a yield of 1 cubic yard with the materials used.

3. Approximate compressive strength should be 85 to 175 psi.

4. Fine Sand shall be an evenly graded material having not less than 95 percent passing the No. 4 sieve and not more than 5 percent passing the No. 200 sieve.

5. Handling and mixing of the materials shall be in accordance with these Standard Specifications.

6. Cement must be on the latest NDOR Approved Products List.

2.12 BASIS OF PAYMENT

A. FLOWABLE FILL that has been completed in conformance with the Plans and Standard Specifications and accepted by the Owner's Project Manager shall be paid for at the contract unit price bid per cubic yard based on the ticketed volume of material delivered to the site. No payment shall be made for materials furnished in excess of that specified in the Contract or approved by the Owner's Project Manager. Such payment shall be full compensation for all materials, hauling, installing, equipment, tools, labor and incidentals necessary to complete the Work.

PART 3 - HOT/COLD WEATHER CONSTRUCTION

3.1 CONCRETE CONSTRUCTION - HOT WEATHER

A. To reduce plastic shrinkage and cracking, the following conditions shall be considered:

1. Concrete temperatures
2. Air temperatures
3. Humpidity
4. Wind velocities

B. When these conditions combine to create a rate of evaporation equal to or greater than 0.2 pounds per square foot per hour (as determined by Figure 3.07), the following precautions shall be taken:

1. Dampen subgrade and forms.
2. Dampen aggregates prior to mixing.
3. Maintain cool aggregates and mixing water.
4. Finish immediately following placement.
5. Cure immediately following finishing operation.
6. Trucks must be discharged within one hour after loading (agitation **shall be minimized).**

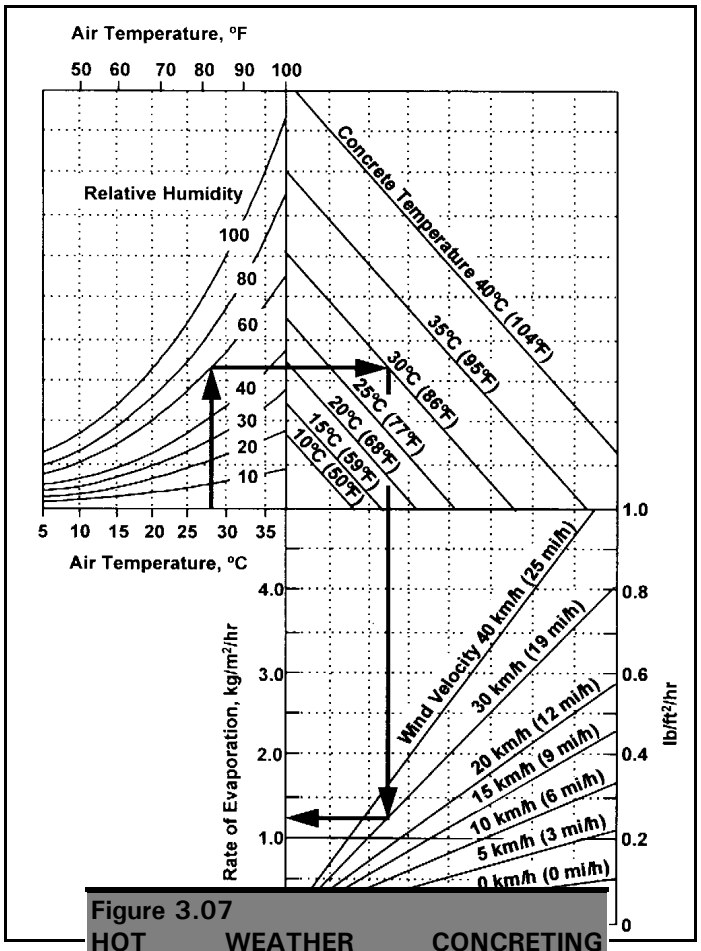


Figure 3.07
HOT WEATHER CONCRETING EVAPORATION NOMOGRAPH

3.2 CONCRETE CONSTRUCTION - COLD WEATHER

A. Concrete shall not be placed in inclement weather except with permission of the City Engineer. The air temperature for placing concrete shall be 35°F and rising. No concrete shall be placed on a frozen sub-grade. When air temperatures can be anticipated below 35°F, the concrete shall be preheated such that the temperature of the fresh concrete in place is a minimum of 55°F and it shall be maintained for seventy-two (72) hours at a minimum of 50°F with adequate layers of burlap, plastic, insulated blankets, or other approved materials.

B. The concrete further shall have achieved the minimum design strength desired prior to any vehicular use of the section, as determined by the Owner's Project Manager. Concrete construction during cold weather shall be continued only with the specific authorization of the City Engineer**, who may require special construction methods.**

END OF SECTION

SECTION 32 31 13

CHAIN-LINK FENCES

PART 1 - DESCRIPTION

1.1 This item shall consist of furnishing and erecting a chain-link fence in accordance with these specifications and the details shown on the plans and in conformity with the lines and grades shown on the plans or established by the Engineer.

PART 2 - MATERIALS

2.1 FABRIC

A. The fabric shall be woven with a 9-gauge galvanized steel wire in a 2-inch (50 mm) mesh and shall meet the requirements of ASTM A 392, Class 2.

2.2 BARBED WIRE

A. Barbed wire shall be 2-strand 12-1/2 gauge zinc-coated wire with 4-point barbs and shall conform to the requirements of ASTM A 121, Class 3, Chain Link Fence Grade.

2.3 POSTS, RAILS AND BRACES.

A. Post Tops: Existing post caps shall be removed and become the property of the Contractor. New weather-tight post caps with a barbed wire supporting arm shall be provided for each existing post. The new caps shall contain openings to permit through passage of the top rail. The caps shall be pressed steel, wrought iron, or malleable iron and shall be approved by the Engineer prior to installation. During the installation of the new post tops the Contractor shall install and maintain any necessary temporary bracing as required for the installation of the barbed wire. Temporary bracing shall be considered subsidiary to the installation of the 3-strand barbed wire.

B. Termination Post Extensions: Any posts (i.e. termination posts) that require a post extension, to allow for installation of barbed wire, shall have an extension (of the same material as the existing post) installed according to the details shown on the plans. The Contractor shall verify/satisfy themselves as to the existing post material.

C. Line posts, rails, and braces shall conform to the requirements of ASTM F-1043 or ASTM F 1083 as follows:

D. Galvanized tubular steel pipe shall conform to the requirements of Group IA, (Schedule 40) coatings conforming to Type A, or Group IC (High Strength Pipe), External coating Type B, and internal coating Type B or D.

E. Roll Formed Steel Shapes (C-Sections) shall conform to the requirements of Group IIA, and be galvanized in accordance with the requirements of F 1043, Type A.

F. Hot-Rolled Shapes (H Beams) shall meet the requirements of Group III, and be galvanized in accordance with the requirements of F 1043, Type A.

G. Aluminum Pipe shall conform to the requirements of Group IB.

H. Aluminum Shapes shall conform to the requirements of Group IIB.

I. Vinyl or polyester coated steel shall conform to the requirements of ASTM F 1043, Paragraph 7.3 Optional Supplemental Color Coating.

J. Posts, rails, and braces furnished for use in conjunction with aluminum alloy fabric shall be aluminum alloy or composite.

K. Posts, rails, and braces, with the exception of galvanized steel conforming to F 1043 or ASTM F 1083, Group 1A, Type A, or aluminum alloy, shall demonstrate the ability to withstand testing in salt spray in accordance with ASTM B 117 as follows:

1. External: 1,000 hours with a maximum of 5% red rust.

2. Internal: 650 hours with a maximum of 5% red rust.

3. The dimensions of the posts, rails, and braces shall be in accordance with Tables I through VI of Fed. Spec. RR-F-191/3.

2.4 GATES

A. Gate frames shall consist of galvanized steel pipe and shall conform to the specifications for the same material under paragraph 2.3. The fabric shall be of the same type material as used in the fence.

2.5 WIRE TIES AND TENSION WIRES

A. Wire ties for use in conjunction with a given type of fabric shall be of the same material and coating weight identified with the fabric type. Tension wire shall be 7-gauge marcelled steel wire with the same coating as the fabric type and shall conform to ASTM A 824.

B. All material shall conform to Fed. Spec. RR-F-191/4.

2.6 MISCELLANEOUS FITTINGS AND HARDWARE

A. Miscellaneous steel fittings and hardware for use with [zinc-coated] steel fabric shall be of commercial grade steel or better quality, wrought or cast as appropriate to the article, and sufficient in strength to provide a balanced design when used in conjunction with fabric posts, and wires of the quality specified herein. All steel fittings and hardware shall be protected with a zinc coating applied in conformance with ASTM A 153. Barbed wire support arms shall withstand a load of 250 pounds (113 kg) applied vertically to the outermost end of the arm.

2.7 CONCRETE

A. Concrete shall be of a commercial grade with a minimum 28-day compressive strength of 2500 psi (17 240 kPa).

2.8 MARKING

A. Each roll of fabric shall carry a tag showing the kind of base metal (steel, aluminum, or aluminum alloy number), kind of coating, the gauge of the wire, the length of fencing in the roll, and the name of the manufacturer. Posts, wire, and other fittings shall be identified as to manufacturer, kind of base metal (steel, aluminum, or aluminum alloy number), and kind of coating.

PART 3 - CONSTRUCTION METHODS

3.1 CLEARING FENCE LINE

A. All trees, brush, stumps, logs, and other debris which would interfere with the proper construction of the fence in the required location shall be removed a minimum width of 2 feet (61 cm) on each side of the fence centerline before starting fencing operations. The cost of removing and disposing of the material shall not constitute a pay item and shall be considered incidental to fence construction.

3.2 INSTALLING POSTS

A. All posts shall be set in concrete at the required dimension and depth and at the spacing shown on the plans.

B. The concrete shall be thoroughly compacted around the posts by tamping or vibrating and shall have a smooth finish slightly higher than the ground and sloped to drain away from the posts. All posts shall be set plumb and to the required grade and alignment. No materials shall be installed on the posts, nor shall the posts be disturbed in any manner within 7 days after the individual post footing is completed.

C. Should rock be encountered at a depth less than the planned footing depth, a hole 2 inches (50 mm) larger than the greatest dimension of the posts shall be drilled to a depth of 12 inches (300 mm). After the posts are set, the remainder of the drilled hole shall be filled with grout, composed of one part Portland cement and two parts mortar sand. Any remaining space above the rock shall be filled with concrete in the manner described above.

D. In lieu of drilling, the rock may be excavated to the required footing depth. No extra compensation shall be made for rock excavation.

3.3 INSTALLING TOP RAILS

A. The top rail shall be continuous and shall pass through the post tops. The coupling used to join the top rail lengths shall allow for expansion.

3.4 INSTALLING BRACES

A. Horizontal brace rails, with diagonal truss rods and turnbuckles, shall be installed at all terminal posts.

3.5 INSTALLING FABRIC

A. The wire fabric shall be firmly attached to the posts and braced in the manner shown on the plans. All wire shall be stretched taut and shall be installed to the required elevations. The fence shall generally follow the contour of the ground, with the bottom of the fence fabric no less than 1 inch (25 mm) or more than 4 inches (100 mm) from the ground surface. Grading shall be performed where necessary to provide a neat appearance.

B. At locations of small natural swales or drainage ditches and where it is not practical to have the fence conform to the general contour of the ground surface, longer posts may be used and multiple strands of barbed wire stretched thereon to span the opening below the fence. The vertical clearance between strands of barbed wire shall be 6 inches (150 mm) or less.

3.6 ELECTRICAL GROUNDS.

A. Electrical grounds shall be constructed where a power line passes over the fence at 500-foot (150 m) intervals. The ground shall be installed directly below the point of crossing.] The ground shall be accomplished with a copper clad rod 8 feet (240 cm) long and a minimum of 5/8 inch (15 mm) in diameter driven vertically until the top is 6 inches (150 mm) below the ground surface. A No. 6 solid copper conductor shall be clamped to the rod and to the fence in such a manner that each element of the fence is grounded. Installation of ground rods shall not constitute a pay item and shall be considered incidental to fence construction.

3.7 STRETCH EXISTING BARBED WIRE

A. In the locations shown on the plans, the Contractor shall unhook and re-stretch the existing 3-Strand barbed-wire according to the details and notes shown on the plans. The Engineer will resolve any questions.

3.8 MATERIAL REQUIREMENTS

ASTM A 121	Zinc-Coated (Galvanized) Steel Barbed Wire
ASTM A 123	Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 153	Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 392	Zinc-Coated Steel Chain-Link Fence Fabric
ASTM A 491	Aluminum-Coated Steel Chain-Link Fence Fabric
ASTM A 572	High-Strength Low-Alloy Columbium-Vanadium Steels of Structural Steel Quality
ASTM A 653	Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A 824	Metallic-Coated Steel Marcelled Tension Wire for Use With Chain Link Fence
ASTM A 1011	Steel Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability
ASTM B 117	Standard Practice for Operating Salt Spray (Fog) Apparatus
ASTM B 221	Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire Shapes and Tubes
ASTM B 429	Aluminum-Alloy Extruded Structural Pipe and Tube
ASTM F 668	Poly(vinyl Chloride)(PVC) and other Organic Polymer-Coated Steel Chain-Link Fence Fabric

ASTM F 1043	Strength and Protective Coatings on Metal Industrial Chain Link Fence Framework
ASTM F 1083	Pipe, Steel, Hot-Dipped Zinc-coated (galvanized) Welded, for Fence Structures
ASTM F 1183	Aluminum Alloy Chain Link Fence Fabric
ASTM F 1345	Zinc-5% Aluminum-Mischmetal Alloy-Coated Steel Chain Link Fence Fabric
ASTM G 152	Operating Open Flame (Carbon-Arc) Light Apparatus for Exposure of Nonmetallic Materials
ASTM G 153	Operating Enclosed Carbon-Arc Light Apparatus for Exposure of Nonmetallic Materials
ASTM G 154	Operating Fluorescent Light Apparatus for UV Exposure of Nonmetallic Materials
ASTM G 155	Operating (Xenon- Arc) Light Apparatus for Exposure of Nonmetallic Materials
FED SPEC	Fencing, Wire and Post, Metal (Chain-Link Fence Posts, Top Rails and Braces) RR-F-191/3
FED SPEC	Fencing, Wire and Post, Metal (Chain-Link Fence Accessories) RR-F-191/4

END OF SECTION

SECTION 40 17 30

WELDING GENERAL PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 RELATED WORK

A. Division 23 Section “23 05 00 Basic Mechanical Materials and Methods”.

B. Division 23 Section “23 21 11 Plant Piping Systems”.

1.3 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

1. ASME INTERNATIONAL (ASME):

   a. ASME B31.1 Power Piping (2014)

   b. ASME B31.3 Process Piping (2014)

   c. ASME B31.5(2013) Refrigeration Piping and Heat Transfer Components

   d. ASME BPVC SEC IX(2010) Boiler and Pressure Vessel Code; Section IX, Welding and Brazing Qualifications

   e. ASME BPVC SEC V(2010) Boiler and Pressure Vessel Code; Section V, Nondestructive Examination

   f. ASME BPVC SEC VIII D1(2010) Boiler and Pressure Vessel Code; Section VIII, Pressure Vessels Division 1 - Basic Coverage

   g. ASME BPVC SEC VIII D2(2010) Boiler and Pressure Vessel Code; Section VIII, Rules for Construction of Pressure Vessels Division 2 - Alternatives Rules

2. INTERNATIONAL CODE COUNCIL (ICC)

   a. ICC IPC(2012) International Plumbing Code

3. PIPE FABRICATION INSTITUTE (PFI)

   a. PFI ES 1(2010) Internal Machining and Solid Machined Backing Rings for Circumferential Butt Welds

b. PFI ES 21(2010) Internal Machining and Fit-up of GTAW Root Pass Circumferential Butt Welds

c. PFI ES 3(2009) Fabricating Tolerances

d. PFI ES 31(1992; R 2004) Standard for Protection of Ends of Fabricated Piping Assemblies

e. PFI ES 35(1998; R 2004) Nonsymmetrical Bevels and Joint Configurations for Butt Welds

f. PFI ES 7(2013) Minimum Length and Spacing for Welded Nozzles

g. PFI TB1(2013) Pressure Temperature Ratings of Seamless Pipe Used in Power Plant Piping Systems

4. U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

a. 29 CFR 1910 Occupational Safety and Health Standards

b. 29 CFR 1926 Safety and Health Regulations for Construction

1.4 SUBMITTALS

A. Product Data:

1. Manufacturer's catalog data shall be submitted for Welding Equipment and Welding Rods and Accessories in accordance with paragraph entitled, "Welding Equipment," of this section.

B. Samples:

1. Welder's Pre-Qualification Samples shall be submitted prior to start.

C. Test Reports:

1. Test reports shall be submitted for Radiographs.

D. Certificates:

1. Certificates for the following shall be submitted in accordance with paragraph entitled, "Quality Assurance," of this section.

2. Certified Welding Procedure Specifications (WPS):

a. Certified Brazing Procedure Specifications (BPS).
b. Certified Procedure Qualification Records (PQR).
c. Certified Welder Performance Qualifications (WPQ).
d. Certified Brazer Performance Qualifications (BPQ).

1.5 QUALITY ASSURANCE

A. Within 10 calendar days after receipt of Notice to Proceed, the Contractor shall submit for review to the Owner's Representative Certified Welding Procedure Specifications (WPS), Certified Brazing Procedure Specifications (BPS) and Certified Procedure Qualification Records. (PQR)

B. 10 calendar days prior to any employee welding on project material, the Contractor shall submit for approval to the Owner's Representative five (5) copies of each Certified Welder Performance Qualifications (WPQ) and Certified Brazer Performance Qualifications (BPQ).

C. For safety, conform all work performed to 29 CFR 110 and 29 CFR 1926.

D. Personnel Qualifications:

1. This specification contains the minimum requirements for qualifying welding procedures, welders, and welding operators for making and inspecting welds in mechanical fabrications of carbon steel, low alloy steel, extra-high-strength quenched and tempered low alloy steels, and austenitic stainless steel materials.

2. No pre-qualified welding procedures are allowed. Contractor shall qualify the welding procedures and welders by tests prescribed in accordance with ASME BPVC SEC IX, notwithstanding the fact the code or specification may allow pre-qualified procedures.

3. Welder's Pre-Qualification Samples shall be submitted by qualified welding operators performing work on contract prior to start. Only after acceptance of samples, will qualified welding operator be permitted to begin work.

E. Piping Qualifications:

1. Piping:

a. Qualification documents for (WPS, BPS, PQR and WPQ) BPQ shall be in accordance with ASME BPVC SEC IX.

b. Refrigeration Piping: Qualification documents for below 125 psig, WPS, BPS, PQR and WPQ, BPQ for "Refrigeration Piping" shall be in accordance with ASME B31.5.

c. Plumbing: Plumbing work shall be performed by a state licensed plumber registered in the state where the work is being performed.

1.6 WELDING EQUIPMENT

A. Manufacturer's catalog data shall be provided for welding equipment and welding rods and accessories. Equipment shall meet referenced standards contained in this section.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 ERECTION

A. Piping:

1. High Pressure (125 PSIG Or Above):

a. Steam Piping: Fabricate, assemble, and weld, braze piping systems in accordance with ASME B31.3, and Power Piping Codes, PFI ES 1, PFI ES 3, PFI ES 7, PFI ES 21, PFI ES 31, PFI ES 35, and PFI TB1, of the Piping Fabrication Institute's companion code requirements.

b. Other High Pressure Piping (125 PSIG Or Above): Fabricate, assemble, and weld, braze other piping systems in accordance with ASME B31.3, and Power Piping Codes, PFI ES 1, PFI ES 3, PFI ES 7, PFI ES 21, PFI ES 31, PFI ES 35, and PFI TB1, of the Piping Fabrication Institute's companion code requirements.

c. Stainless Steel Piping: Stainless steel piping shall have Gas Tungsten Arc Welding (TIG) or orbital welded joints.

(1) All stainless steel pipe welding shall utilize back gassing to prevent carbide precipitation.

2. Low Pressure Piping (Below 125 PSIG):

a. Refrigeration Piping: Piping systems shall be fabricated, assembled and welded/brazed/soldered in accordance with the ASME B31.5.

b. Plumbing: Plumbing systems shall be fabricated, assembled and welded/brazed/soldered in accordance with ICC IPC.

c. Other Low Pressure Piping: Fabricate, assemble, and weld , braze other low pressure piping systems in accordance with the ASME B31.3.

d. Stainless Steel Piping: Stainless steel piping shall have Gas Tungsten Arc Welding (TIG) or orbital welded joints.

(1) All stainless steel pipe welding shall utilize back gassing to prevent carbide precipitation.

3.2 HEAT INPUT REQUIREMENTS

A. Preheat:

1. Welding shall not be done at ambient temperature below 32 degrees F, or when the surfaces are wet or exposed to rain, snow, or high wind. Temperature of the metals in the area where the welding is to be done shall be not less than 50 degrees F. When the ambient conditions are such that the normal temperature of the base metal is below 50 degrees F, the area surrounding the joint shall be

preheated to provide a base metal temperature of 100 degrees F for a distance of at least 3 inches in all directions from the joint to be welded. Preheat shall be in accordance with ASME BPVC SEC VIII D1.

B. Interpass:

1. In a multipass weld, the interpass temperature is the temperature of the weld metal before the next pass is started. Interpass requirements shall be in accordance with ASME BPVC SEC VIII D1 and ASME BPVC SEC V.

C. Postweld:

1. Weldments shall not be given a postweld heat treatment unless noted in the applicable code qualified/certified welding documentation, WPS, PQR and WPQ.

3.3 INSPECTION/NONDESTRUCTIVE TESTING (NDT)

A. General:

1. Fabrication/Erection inspection shall be performed prior to assembly, during assembly, during welding and after welding to ensure that materials and workmanship meet the requirements of the contract documents.

2. Each specified radiograph shall, as a minimum, have the following additional information permanently included in the image:

a. Agency Weld No. (including repair cycle no.)

b. Agency drawing No.

c. Agency View No.

d. Agency Contract No.

3. Final interpretation and acceptance of all Radiographs of welded joints, with the exception of code stamped pressure vessel welds, will be by the Owner's Representative.

4. Final acceptance of all welded/brazed joints shall be by the Owner's Representative.

5. Prior to the Owner's Representative inspection, all slag and scale shall be removed from all welds. Procedure employed shall not produce notches in either the weld metal or adjacent base metal.

6. Unacceptable welds shall be immediately repaired and made ready for Owner's Representatives reinspection at no additional cost to the Owner.

7. After weld joints have been satisfactorily completed by the Contractor and accepted by the Owner's Representative, the joint area shall be cleaned to a bright, unpitted, and unscarred surface and then protected in accordance with the contract documents.

B. Piping:

1. Test Method:

a. NDT (Nondestructive Testing) of all piping systems, except plumbing systems, shall be performed in accordance with the requirements of ASME BPVC SEC V.

b. The Owner may elect to perform random radiography. Welds to be examined shall be selected at random to ensure that the work product of each welder or welding operator doing the production welding is included. These welds shall satisfy the acceptance standards of the specified code. If any of the butt welds examined reveals an unacceptable indication, all butt welds welded by that welder(s) shall be examined/accepted by radiography. All costs associated with additional testing of that welder(s), retesting, and subsequent radiography shall be at no additional cost to the Owner and borne by the Contractor.

2. Acceptance Requirements:

a. Carbon Steel piping systems shall meet the requirements of ASME B31.3.

b. Other pressure piping systems shall meet the requirements of ASME B31.3.

c. Refrigeration piping systems shall meet the requirements of ASME B31.5.

d. Plumbing piping systems shall meet the requirements of ICC IPC.

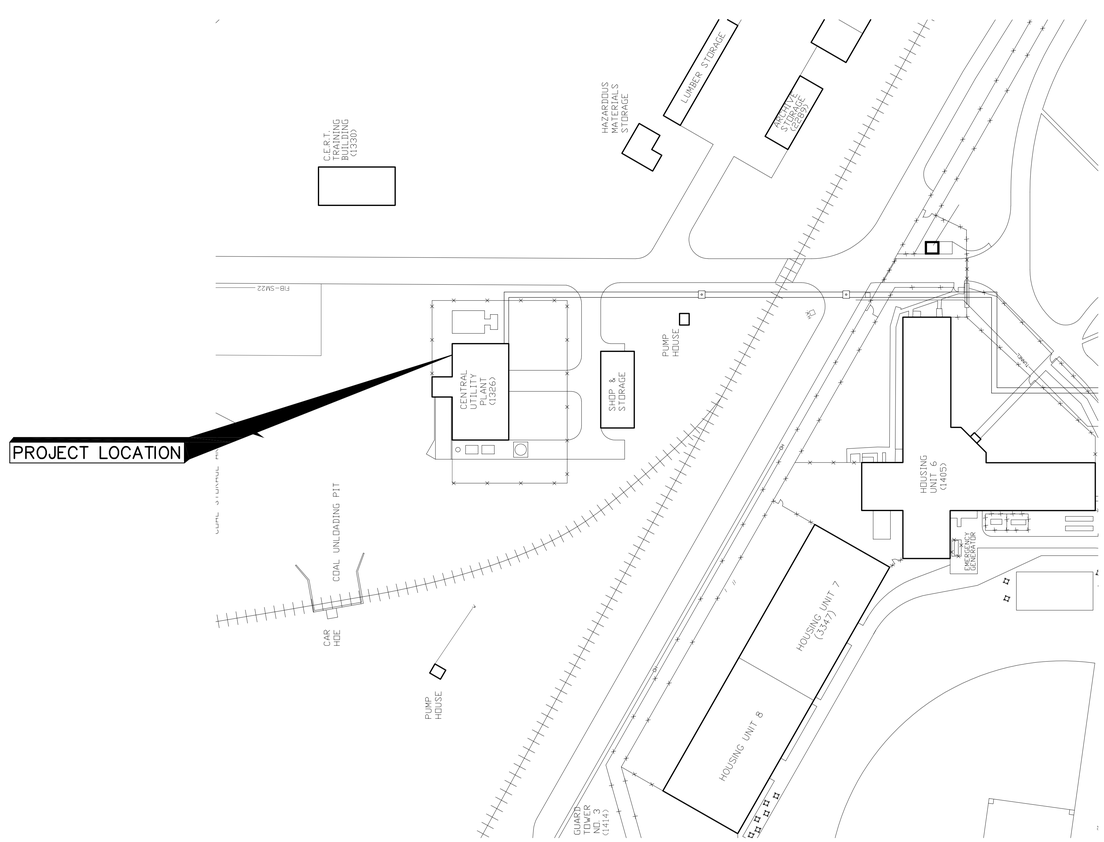
3.4 PROTECTION OF ADJACENT MATERIALS

A. Contractor shall sufficiently protect machinery, materials, floor, furnishings, finishes and other items adjacent to the welding/brazing operations to prevent any damage from these operations.

END OF SECTION

Nebraska Department of Correctional Services

NSP - Lincoln
Lincoln, Nebraska
CUP Temporary Connections



LOCATION PLAN
NO SCALE

INDEX OF DRAWINGS

COORDINATING PROFESSIONAL

PROFESSIONAL MECHANICAL ENGINEER
GREGORY T. KRONAIZL E-8523
STATE OF NEBRASKA
4-30-2017

I, Gregory T. Kronaizl, am the Coordinating Professional on DCS CUP Temporary Connections – Nebraska State Penitentiary

BID DOCUMENTS

FARRIS ENGINEERING
OMAHA | LINCOLN | COLORADO SPRINGS
farris-usa.com

REVISIONS

1	Addendum No. 1 (6-30-2017)
	Issue Signed Bid Documents

DEPARTMENT OF CORRECTIONAL SERVICES - NSP
CUP TEMPORARY UTILITIES
Lincoln, NE

DESIGNED BY: GTK
DRAWN BY: CWK
CHECKED BY: GTK
DATE: June 30, 2017
PROJECT NO: 162032

SHEET TITLE: COVER SHEET, INDEX OF DRAWINGS, AND LOCATION PLAN

SHEET NO: GI101

MECHANICAL SYMBOL LEGEND
(AS APPLICABLE)

PIPING AND SPECIALTIES

Symbol	Description
RD	REFRIGERANT DISCHARGE
RL	REFRIGERANT LIQUID
RS	REFRIGERANT SUCTION
G	GAS PIPING
CD	COIL CONDENSATE DRAIN
LPS	STEAM (LOW PRESSURE)
MPS	STEAM (MEDIUM PRESSURE)
HPS	STEAM (HIGH PRESSURE)
LPR	LOW PRESSURE RETURN
MPR	MEDIUM PRESSURE RETURN
HPR	HIGH PRESSURE RETURN
PC	PUMPED CONDENSATE
HCR	HOT/CHILLED WATER RETURN
HCS	HOT/CHILLED WATER SUPPLY
HWR	HEATING WATER RETURN
HWS	HEATING WATER SUPPLY
CWR	CHILLED WATER RETURN
CWS	CHILLED WATER SUPPLY
EGR	ETHYLENE GLYCOL RETURN
EGS	ETHYLENE GLYCOL SUPPLY
PGR	PROPYLENE GLYCOL RETURN
PGS	PROPYLENE GLYCOL SUPPLY
FOR	FUEL OIL RETURN
FOS	FUEL OIL SUPPLY
FOV	FUEL OIL VENT
CR	CONDENSER WATER RETURN
CS	CONDENSER WATER SUPPLY
HPWR	HEAT PUMP WATER RETURN
HPWS	HEAT PUMP WATER SUPPLY
	INLINE PUMP
MV	MANUAL AIR VENT
A	AUTOMATIC AIR VENT
AS	AIR SEPARATOR
	FLEX CONNECTOR
	NEW CONNECTION POINT
	POINT OF DISCONNECT

MISCELLANEOUS

Symbol	Description
	ELECTRICAL PANEL – SHOWN FOR COORDINATION PURPOSES ONLY
	ELECTRICAL PANEL – SHOWN FOR COORDINATION PURPOSES ONLY
	ELECTRICAL PANEL – SHOWN FOR COORDINATION PURPOSES ONLY
	ELECTRICAL TRANSFORMER – SHOWN FOR COORDINATION PURPOSES ONLY

H.V.A.C.

Symbol	Description
	SUPPLY, OUTSIDE OR MIXED AIR DUCT
	RETURN, RELIEF OR EXHAUST AIR DUCT
10/6	AIR DUCT SIZE (WIDTH/HEIGHT)
	ROUND DUCT
	ROUND DUCT (IN SECTION)
	TURNING VANES
O.A.	OUTSIDE AIR
V.A.	VENTILATION AIR
E.A.	EXHAUST AIR
R.A.	RELIEF OR RETURN AIR
S.A.	SUPPLY AIR
M.A.	MIXED AIR
R.F.	RELIEF OR RETURN FAN
E.F.	EXHAUST FAN
	VOLUME DAMPER (VD)
	OPPOSED BLADE DAMPER
	PARALLEL BLADE DAMPER
M	MOTORIZED ACTUATOR
	PNEUMATIC ACTUATOR
FD	FIRE DAMPER (IN HORIZONTAL DUCT)
SD	SMOKE DAMPER (IN HORIZONTAL DUCT)
FD	FIRE DAMPER (IN VERTICAL DUCT)
SD	SMOKE DAMPER (IN VERTICAL DUCT)
FSD	FIRE/SMOKE DAMPER (IN HORIZONTAL DUCT)
FSD	FIRE/SMOKE DAMPER (IN VERTICAL DUCT)
	SPLITTER
	EXTRACTOR
	SPIN-IN FITTING WITH VOLUME DAMPER
R	ELEVATION CHANGE (RISE OR DROP)
	BACKDRAFT DAMPER
	FLEXIBLE DUCTWORK
N	NIGHT THERMOSTAT
T	THERMOSTAT
T_G	THERMOSTAT WITH GUARD
S	TEMPERATURE SENSOR
S_G	TEMPERATURE SENSOR WITH GUARD
P	PRESSURE SENSOR
PS	PRESSURE SWITCH
H	HUMIDISTAT
	BOILER EMERGENCY SHUTDOWN SWITCH – SEE SPECIFICATIONS
RS	REFRIGERANT SENSOR
	SUPPLY AIR DIRECTION
	RETURN AIR OR EXHAUST AIR DIRECTION
	SUPPLY AIR DIFFUSER – SQUARE
	SUPPLY AIR DIFFUSER – ROUND

PLUMBING

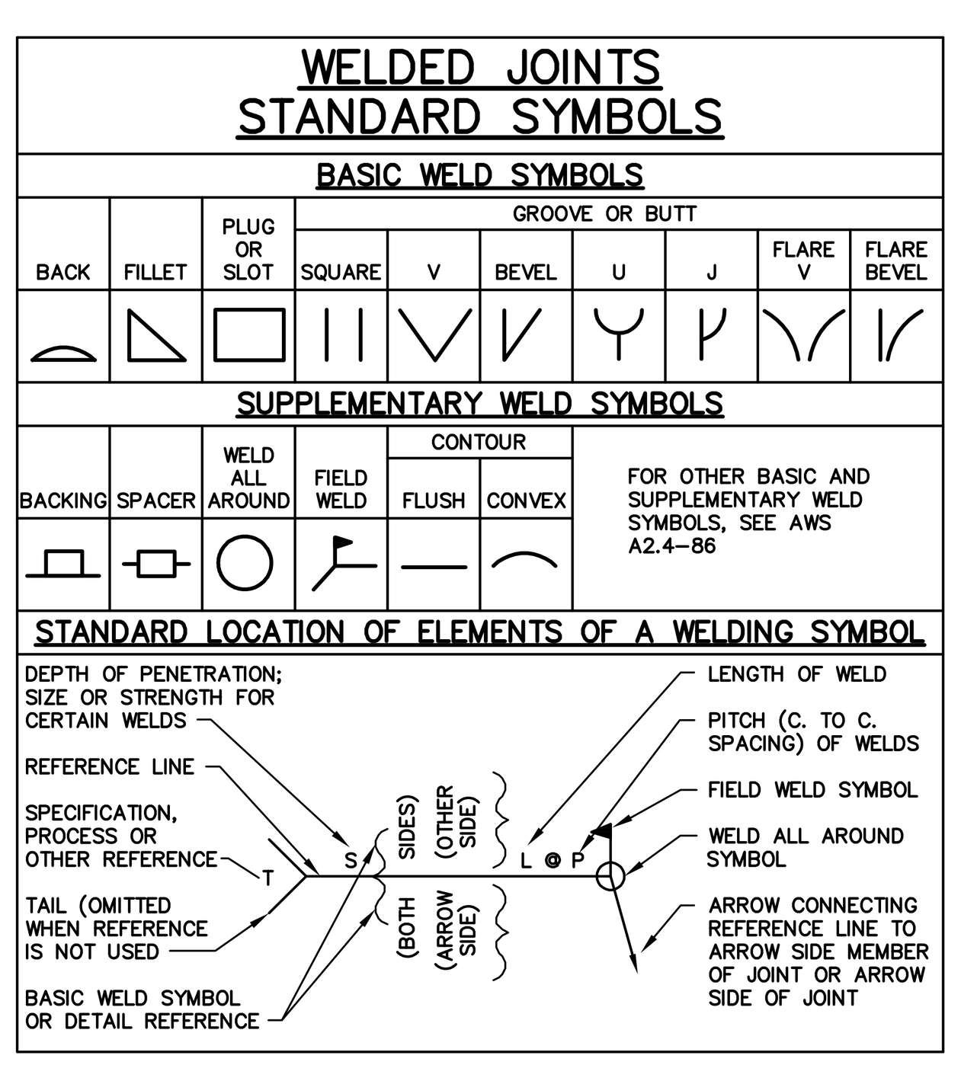
Symbol	Description
NP	NON-POTABLE COLD WATER PIPING
	DOMESTIC COLD WATER PIPING
	DOMESTIC HOT WATER PIPING
	DOMESTIC HOT WATER RECIRC.
	PIPE REMOVAL
SAN	SANITARY BELOW FLOOR OR GRADE
SAN	EXISTING SANITARY BELOW FLOOR/GRADE
SAN	SANITARY ABOVE FLOOR OR GRADE
SAN	EXISTING SANITARY ABOVE FLOOR/GRADE
ST	STORM BELOW FLOOR OR GRADE
ST	EXISTING STORM BELOW FLOOR/GRADE
ST	STORM ABOVE FLOOR OR GRADE
ST	EXISTING STORM ABOVE FLOOR/GRADE
SO	STORM OVERFLOW BELOW FLOOR/GRADE
SO	EXIST. STORM OVERFLOW BELOW FLOOR/GRADE
SO	STORM OVERFLOW ABOVE FLOOR/GRADE
SO	EXIST. STORM OVERFLOW ABOVE FLOOR/GRADE
AW	ACID WASTE BELOW FLOOR OR GRADE
AW	ACID WASTE ABOVE FLOOR OR GRADE
AW	EXIST ACID WASTE BELOW FLOOR/GRADE
AW	EXIST ACID WASTE ABOVE FLOOR/GRADE
SCW	SOFTENED COLD WATER PIPING
SCW	EXISTING SOFTENED COLD WATER PIPING
A	COMPRESSED AIR
A	EXISTING COMPRESSED AIR
	VENT PIPING
AV	ACID VENT PIPING
PA	PLANT (COMPRESSED) AIR
IR	IRRIGATION PIPING
P	TRAP PRIMER
HB	HOSE BIBB
WH	WALL HYDRANT
CO	CLEAN OUT
FD	FLOOR DRAIN
VTR	VENT THRU ROOF
WC	WATER CLOSET
UR	URINAL
L	LAVATORY
S	SINK
DF	DRINKING FOUNTAIN
EWC	ELECTRIC WATER COOLER
SS	SERVICE SINK
SH	SHOWER
DWH	DOMESTIC WATER HEATER
MSB	MOP SINK BASIN

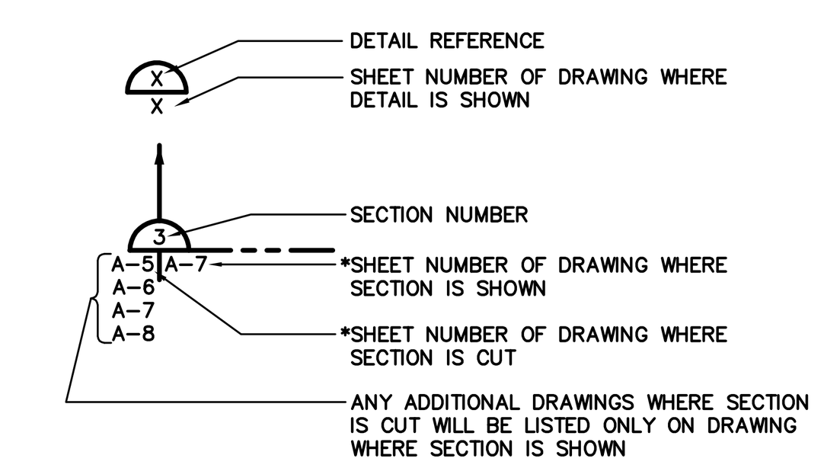
VALVES AND FITTINGS

Symbol	Description
	ELBOW
	ELBOW – OUTLET DOWN
	ELBOW – OUTLET UP
	TEE – OUTLET DOWN
	TEE – OUTLET UP
	TEE
	CAPPED CONNECTION
	STRAINER
	AUTOMATIC 2-WAY VALVE
	AUTOMATIC 3-WAY VALVE
	PRESSURE REDUCING VALVE
	GLOBE VALVE
	AUTOMATIC FLOW CONTROL VALVE
	CHECK VALVE (ARROW IND. FLOW)
	GATE VALVE
R	RELIEF VALVE
	VALVE IN VERTICAL LINE
	PRESSURE GAGE AND COCK
	THERMOMETER
	TEMP. & PRESS. RELIEF VALVE
	UNION
	BALL VALVE
	PIPE ANCHOR
	EXPANSION JOINT
	PLUG VALVE
	BUTTERFLY VALVE
	F & T TRAP
	REDUCER
	STRAINER WITH DRAIN (BALL VALVE)
TW	THERMOMETER WELL
	NEEDLE VALVE
	GAS VALVE
	GAS PRESSURE REGULATOR
RP	REDUCED PRESS. BACKFLOW PREV.
DC	DOUBLE CHK VALVE BACKFLOW PREV.
DDC	DOUBLE DETECTOR CHECK VALVE
	VENTURI TYPE BALANCING VALVE
	VENTURI TYPE BALANCING VALVE W/STRAINER
OD	OVERFLOW DRAIN
RD	ROOF DRAIN

ABBREVIATIONS
(AS APPLICABLE)

AV	AIR VENT	ELEV.	ELEVATION	MER	MECHANICAL EQUIPMENT ROOM	STA	STATION
AFF	ABOVE FINISHED FLOOR	EOM	END OF MAIN DRIP	MJ	MECHANICAL JOINT	SIM	SIMILAR
BF	BLIND FLANGE	ET	EXPANSION TANK	MH	MANHOLE	SF	SQUARE FEET
BM–#	BENCH MARK – NUMBER	EX OR (E)	EXISTING	MS	MOTOR STARTER	STD	STANDARD
BJ–#	BALL JOINT – NUMBER	(E)	EXISTING PIPE TO REMAIN	MU	MAKE UP	SR	SHORT RADIUS ELBOW
BFW	BOILER FEED WATER	E.R.	ECCENTRIC REDUCER	MAX	MAXIMUM	Sp. Gr.	SPECIFIC GRADE
BFWR	BOILER FEED WATER RECIRCULATING	EW	EACH WAY	MIN.	MINIMUM	SY	SQUARE YARDS
				MV–#	MANUAL AIR VALVE – NUMBER	SEJ–#	SINGLE EXPANSION JOINT – NUMBER
C	CONVERTOR	FC	FLEXIBLE CONNECTION			SW	SWITCH
CAD	CADMIUM	FF	FINISHED FLOOR	NOM	NOMINAL	SRV	SAFETY RELIEF VALVE
CI	CAST IRON	FHC	FIRE HOSE CABINET	NIC	NOT IN CONTRACT		
CLR	CLEAR	FRP	FIBERGLASS REINFORCED PIPE	NC	NORMALLY CLOSED	TYP	TYPICAL
CONV	CONVECTOR	FL	FLOW LINE	NO	NORMALLY OPEN	THRD	THREADED
CP	CONDENSATE PUMP	FLR	FLOOR	(N)	NEW PIPE	T.O.G.	TOP OF GRADE
C.R.	CONCENTRIC REDUCER	FOF	FUEL OIL FILL			T.O.W.	TOP OF WALL
CS	CARBON STEEL	FS	FREE SUPPORT	OC	ON CENTER	T.O.S.	TOP OF SLAB OR STEEL
CT	CONTRACTOR	FTR	FIN TUBE RADIATION	OD	OUTSIDE DIAMETER	TS	TEMPERATURE SENSOR
CWS–#	CHILLED WATER SUPPLY VALVE – NUMBER	FW	FEED WATER	OFE	OWNER FURNISHED EQUIPMENT	T–#	TRAP ASSEMBLY – NUMBER
CWR–#	CHILLED WATER RETURN VALVE – NUMBER	GALV	GALVANIZED				
CW	COLD WATER	HLA	HIGH LEVEL ALARM	P	PUMP	V	VALVE
℄	CENTERLINE	HP	HORSEPOWER	PA	PIPE ANCHOR	VERT	VERTICAL
CO	CLEAN OUT	HP DSHW	HIGH PRESSURE DESUPERHEATER WATER	PI	POINT OF INTERSECTION	VP	VACUUM PUMP
Db	DRY BULB TEMPERATURE, °F	HDPE	HIGH DENSITY POLYETHYLENE	PC–#	PUMP CONDENSATE VALVE – NUMBER	VR	VACUUM STEAM CONDENSATE RETURN
dB	DECIBELS	HORIZ	HORIZONTAL	PD	PRESSURE DROP (FEET OF WATER)	VD	MANUAL VOLUME DAMPER
DI	DUCTILE IRON	HRP	HYDRONIC RADIANT CEILING PANEL	PH	PIPE HANGER	VTR	VENT THRU ROOF
DL	DRAIN LINE	HPS–#	HIGH PRESSURE STEAM VALVE – NUMBER	PS	PIPE SUPPORT	VV	VALVE VAULT
Dp	DEW POINT TEMPERATURE, °F			PT	PIPE TRANSMITTER		
DPS	DIFFERENTIAL PRESSURE SWITCH	ID	INSIDE DIAMETER			W	WATER
DPT	DIFFERENTIAL PRESSURE TRANSMITTER	IE	INVERT ELEVATION	R	RIGHT	Wb	WET BULB TEMPERATURE, °F
D–#	DRAIN VALVE – NUMBER	IF	IN FACE	RAD	RADIUS	WFM	WATER FLOW MEASURING DEVICE
		LLA	LOW LEVEL ALARM	REF	REFERENCE	WT	WEIGHT
EL	ELEVATION	L	LEFT	RED EL	REDUCING LONG RADIUS ELBOW		
EJ	EXPANSION JOINT	LB	POUND	RCP	REINFORCED CONCRETE PIPE	(1857'–8")	CENTERLINE OF PIPE ELEVATION
		LF	LINEAL FEET	(R)	EXISTING PIPE TO BE REMOVED		
		LR	LONG RADIUS ELBOW				
		LTCP	LOCAL TEMPERATURE CONTROL PANEL				
		LBS/HR	POUNDS PER HOUR				





SECTION IDENTIFICATION

* SHEET NUMBERS OMITTED IF SECTION IS CUT AND DETAILED ON SAME DRAWING

LEGEND NOTES

1. THESE LEGENDS ARE COMPOSED OF STANDARD SYMBOLS AND ARE PERTINENT TO THE CONDITIONS ON THIS SET OF DRAWINGS TO THE EXTENT APPLICABLE.
2. ADDITIONAL LEGENDS AND/OR ANOTHER LEGEND SHEET MAY APPEAR IN THIS SET OF DRAWINGS TO INDICATE SPECIFIC CONDITIONS IN LIEU OF SYMBOLS SHOWN ON THIS SHEET.
3. EXISTING FACILITIES OR ITEMS TO BE REMOVED ARE INDICATED BY USE OF THESE SYMBOLS AND HATCHED THUSLY.
4. HEAVY LINE INDICATES NEW CONSTRUCTION:
   LIGHT LINE INDICATES EXISTING CONSTRUCTION:

SUPPLEMENTAL MECHANICAL SYMBOL LEGEND
(AS APPLICABLE)

Symbol	Description
F	FIRE MAIN
CF	CHEMICAL FEED
BW	BACKWASH WATER
NP	NON-POTABLE WATER
EV	EMERGENCY VENT
VAC	VACUUM
T	TEPID WATER
	DRAIN LINE TO FLOOR DRAIN
WF	WALL FAUCET
WCO	WALL CLEANOUT
	WATER HAMMER ARRESTER
VR	VACUUM STEAM CONDENSATE RETURN
D	DIRECTION OF PIPE PITCH (DOWN)
R	DIRECTION OF PIPE PITCH (RISE)
	WELDED CAPPED CONNECTION
	DIRECTION OF FLOW
	CONCENTRIC REDUCER
	ECCENTRIC REDUCER, STRAIGHT INVERT
	ECCENTRIC REDUCER, STRAIGHT CROWN
	BASKET STRAINER
CT	CONDENSATE TRANSFER
OVFL	OVERFLOW PIPING
CF	CHEMICAL FEED

Symbol	Description
	ORIFICE UNION
M	FLOW METER
	SIGHT GLASS
	INVERTED BUCKET TRAP SET INCLUDING PIPING ACCESSORIES (SEE STD. DETAIL)
T	THERMOSTATIC TRAP
TD	THERMODYNAMIC TRAP
	FLANGED PIPE CONNECTION
	EXPANSION JOINT
	FLEXIBLE CONNECTION (RUBBER SPHERE) WITHOUT CONTROL RODS
	FLEXIBLE CONNECTION (RUBBER SPHERE) WITH CONTROL RODS
	BASKET STRAINER (PLAN VIEW)
	BASKET STRAINER (SIDE VIEW)
	PNEUMATIC PISTON ACTUATOR
S	SOLENOID ACTUATOR
	PUMP
	CHILLER COOLER
	CHILLER CONDENSER
V	VENT PIPING
BFW	BOILER FEED WATER
BFWR	BOILER FEED WATER RECIRCULATING

Symbol	Description
	REFRIGERANT STRAINER
	THERMOSTATIC EXPANSION VALVE
	OS & Y VALVE WITH SUPERVISORY SWITCH
M	MOTOR OPERATED VALVE
	TEMPERATURE REGULATING VALVE
	FLOAT VALVE
L	LOCKABLE BALL VALVE
PA	PIPE ANCHOR
	EXPANSION JOINT, SLIDING WITH ANCHOR
	PIPE GUIDE
	CHECK VALVE
	FLEX CONNECTION
	AIR VACUUM VALVE
	GATE VALVE WITH ANGLED STEM
	BUTTERFLY VALVE WITH PRE-HEATER BYPASS

Symbol	Description
	BLIND FLANGE (BF)
FS	FLOW SWITCH
FCV	FLOW CONTROL VALVE
	VENTURI FLOW METER
	GATE VALVE WITH 3/4" HOSE ADAPTER
	ANGLE GLOBE VALVE
	CIRCUIT SETTER
	SAFETY OR PRESSURE RELIEF VALVE
	TEST PLUG (PRESSURE/TEMPERATURE)
	PRESSURE RELIEF VALVE
	BUTTERFLY VALVE WITH HAND WHEEL
	BUTTERFLY VALVE WITH ACTUATOR
	BUTTERFLY VALVE
DS	DESUPERHEATER
	DRAIN LINE ROUTE TO FLOOR DRAIN
	VORTEX FLOW METER
TD	THERMODYNAMIC TRAP

ELECTRICAL SYMBOLS LEGEND
(AS APPLICABLE)

SWITCHING

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
\$a	SINGLE POLE SWITCH - LETTER INDICATES SWITCH LEG	\$P	PILOT LIGHT SWITCH
\$3	THREE-WAY SWITCH	\$OS	OCCUPANCY SENSOR - WALL SWITCH
\$H	HORSEPOWER RATED SWITCH	OS	OCCUPANCY SENSOR - CEILING MOUNTED (DASHED LINE INDICATES GROUPS OF LUMINAIRES TO BE CONTROLLED BY OCCUPANCY SENSOR(S).)
\$F	FUSED SWITCH	OS	OCCUPANCY SENSOR - WALL MOUNTED (DASHED LINE INDICATES GROUPS OF LUMINAIRES TO BE CONTROLLED BY OCCUPANCY SENSOR(S).)
1	DIGITAL LIGHTING SWITCH		

LIGHTING

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	FLUORESCENT LUMINAIRE		EXIT SIGN
	FLUORESCENT WALL MOUNTED LUMINAIRE		PHOTOCELL, DAYLIGHT SENSOR
	FLUORESCENT STRIP LUMINAIRE		EXTERIOR LUMINAIRE - POLE MOUNTED
	LUMINAIRE		EMERGENCY BATTERY PACK
	WALL MOUNTED LUMINAIRE		EMERGENCY LUMINAIRE REMOTE HEADS

POWER DEVICES

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	SINGLE RECEPTACLE		LIGHTING & APPLIANCE PANELBOARD
	DUPLEX RECEPTACLE		POWER DISTRIBUTION EQUIPMENT
	SPECIAL RECEPTACLE	T	TRANSFORMER
G	DUPLEX RECEPTACLE - GROUND-FAULT CIRCUIT-INTERRUPTER		MOTOR STARTER, LIGHTING CONTACTOR
WR	DUPLEX RECEPTACLE - WEATHER-RESISTANT GROUND-FAULT CIRCUIT-INTERRUPTER		SAFETY SWITCH
J	JUNCTION BOX		COMBINATION MOTOR STARTER & SAFETY SWITCH
	MOTOR		DAMPER
	CABINET (TYPE INDICATED)	S	SOLENOID

RACEWAYS

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	HOME RUN TO PANEL		CONDUIT SEAL
	UNSWITCHED LIGHTING CIRCUIT		CABLE TRAY
	CONDUIT UP	#"	CONDUIT SLEEVE (NUMBER INDICATES SIZE)
	CONDUIT DOWN		

MISCELLANEOUS

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
X / XXX	EQUIPMENT IDENTIFICATION	NF	NON-FUSED
X / XXX	DETAIL REFERENCE / SHEET REFERENCE	WR	WEATHER-RESISTANT
FACP	FIRE ALARM CONTROL PANEL	WG	WIRE GUARD
FAAP	FIRE ALARM ANNUNCIATOR PANEL	30/3/10/3R	RATED AMPACITY/NO. POLES/FUSING REQ'D/NEMA ENCL. NO.
	FIRE ALARM VISUAL SIGNAL	HOA	HAND-OFF-AUTO
#	DATA OUTLET BOX (NUMBER BY SYMBOL INDICATES QUANTITY OF JACKS.)	R	FAN SHUTDOWN RELAY
	PUSHBUTTON STATION, 'P' INDICATES PILOT	S	WALL MOUNTED SPEAKER
		SD DM	DUCT MOUNTED SMOKE DETECTOR

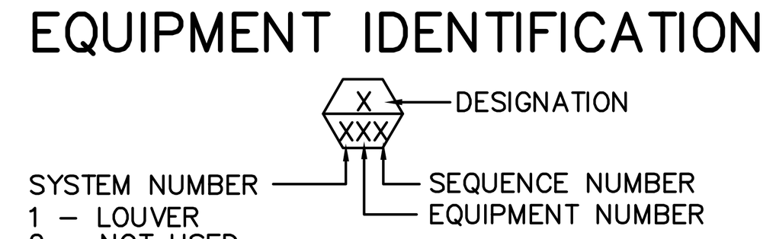
PIPE SUPPORT LEGEND

Symbol	Description
PS	PIPE SUPPORT
GS	GUIDED SUPPORT
PA	PIPE ANCHOR
PG	PIPE GUIDE

RESPONSIBILITY LEGEND

OI	OWNER INSTALLED
OF	OWNER FURNISHED
CI	CONTRACTOR INSTALLED
CF	CONTRACTOR FURNISHED

EQUIPMENT IDENTIFICATION



SYSTEM NUMBER
1 – LOUVER
2 – NOT USED
3 – AIR HANDLING
4 – NOT USED
5 – RETURN FAN
6 – EXHAUST FAN
7 – HEAT EXCHANGER
8 – PUMP
9 – HYDRONIC

GENERAL NOTES

1. EXISTING PROJECT CONDITIONS SHOWN OR ILLUSTRATED ARE FROM AVAILABLE RECORD DRAWINGS AND/OR VISUAL FIELD SURVEYS. THE CONTRACTOR SHALL VERIFY ACTUAL EXISTING CONDITIONS OF THE SITE PRIOR TO BIDDING THE PROJECT. THE CONTRACTOR SHALL NOTIFY ARCHITECT/ENGINEER OF ANY DISCREPANCIES IMMEDIATELY UPON DISCOVERY.
2. CONTRACTOR SHALL OBTAIN ALL REQUIRED PERMITS AND AUTHORIZATIONS REQUIRED FOR THE CONSTRUCTION OF THE PROJECT. COPIES OF SUCH INFORMATION SHALL BE SUBMITTED TO THE OWNER AND ARCHITECT/ENGINEER WITHIN 10 DAYS OF RECEIPT OF SUCH ITEMS. IF PERMITS ARE ISSUED SUBJECT TO CERTAIN CONDITIONS OR REVISION TO THE WORK OR IF PERMITS ARE DELAYED FOR ANY REASON THE CONTRACTOR SHALL NOTIFY THE OWNER AND ARCHITECT/ENGINEER IMMEDIATELY OF SUCH EVENT.
3. CONTRACTOR IS RESPONSIBLE TO COMPLY WITH APPLICABLE LAWS, CODES, REGULATIONS AND ORDINANCES FOR THE PROJECT LOCATION WHETHER SPECIFIED IN THE CONTRACT DOCUMENTS OR NOT.
4. CONTRACTOR SHALL TAKE PRECAUTIONS TO MAINTAIN AND PROTECT EXISTING INFRASTRUCTURE SYSTEMS TO REMAIN, AND NEW WORK REQUIRED TO MEET PROJECT REQUIREMENTS. ANY DAMAGE TO SUCH INFRASTRUCTURE SYSTEMS AND/OR ELEMENTS SHALL BE IMMEDIATELY REPAIRED IN A MANNER ACCEPTABLE TO THE ARCHITECT/ENGINEER. IF SATISFACTORY REPAIRS ARE NOT MADE; THE CONTRACTOR SHALL REPLACE SUCH SYSTEMS AND/OR ELEMENTS WITH EQUAL QUALITY ACCEPTABLE TO THE ARCHITECT/ENGINEER. ALL LABOR AND MATERIAL COSTS FOR THE REPAIRS SHALL BE AT NO ADDITIONAL COST TO THE OWNER.
5. CONTRACTOR IS RESPONSIBLE TO REVIEW AND COORDINATE THE WORK OF ALL SUBCONTRACTORS, TRADES AND SUPPLIERS WITH THE REQUIREMENTS OF THE CONTRACT BEFORE COMMENCING CONSTRUCTION AND TO COORDINATE WITH ALL PARTIES OF THE CONTRACT THE REQUIREMENTS OF THE PROJECT.
6. GENERAL NOTES, SYMBOLS AND DEFINITIONS ARE INCLUDED FOR APPLICABLE DISCIPLINE.
7. CONTRACTOR MUST MAINTAIN FIRE PROTECTION AND EXITING EGRESS REQUIREMENTS FOR THE FACILITY DURING ALL PHASES OF CONSTRUCTION INCLUDING SPECIAL OR SCHEDULE EVENTS. COORDINATE WITH OWNER'S REPRESENTATIVE FOR SCHEDULING CRITICAL PHASES OF WORK WITH FACILITY USER'S.
8. MECHANICAL DRAWINGS ESTABLISH PROJECT REQUIREMENTS AND MUST BE COORDINATED WITH ARCHITECTURAL AND STRUCTURAL FINISH APPEARANCE AND INTEGRITY OF ALL EXPOSED ELEMENTS OF THE WORK OF ALL TRADES INCLUDING THAT WORK ILLUSTRATED ON DRAWINGS OF OTHER DISCIPLINES.
9. WORK SHOWN ON THE DRAWINGS SHALL BE BASE BID WORK UNLESS OTHERWISE SPECIFICALLY NOTED OTHERWISE.
10. FIELD VERIFY EXISTING FINISH FLOOR ELEVATIONS PRIOR TO BEGINNING CONSTRUCTION WORK.
11. EXISTING CONSTRUCTION DIMENSIONS ARE TO FINISH SURFACE AND/OR CENTERLINE OF STRUCTURAL ELEMENTS. NEW CONSTRUCTION DIMENSIONS ARE TO CENTERLINE OF STRUCTURAL ELEMENT, FACE OF CONCRETE OR MASONRY UNLESS OTHERWISE NOTED. REFER DIMENSION DISCREPANCIES IMMEDIATELY TO ARCHITECT/ENGINEER UPON DISCOVERY BETWEEN CONTRACT DOCUMENTS AND ACTUAL FIELD CONDITIONS.
12. COORDINATE ALL EQUIPMENT WORK WITH MANUFACTURERS' AND SUPPLIERS' TO INSURE PROPER ROUGH–IN AND SETTING CLEARANCES FOR INSTALLATION, OPERATIONAL, AND MAINTENANCE REQUIREMENTS.
13. PROTECT EXISTING SURFACES TO REMAIN WHETHER OR NOT THEY ARE INCLUDED WITHIN THE SCOPE OF WORK AND WITHIN LIMITS OF CONSTRUCTION ACTIVITY. PATCH, REPAIR AND RESTORE EXISTING FINISHES AND SURFACES TO MATCH EXISTING AND ACCEPTABLE TO ARCHITECT/ENGINEER.
14. CONTRACTOR TO PROVIDE SEALANT BETWEEN DISSIMILAR MATERIALS.
15. WHERE REPAIR AND PATCHING OF SPRAYED FIRE–RESISTIVE AND FIRESTOP MATERIALS WERE DAMAGED DUE TO INSTALLATION OF NEW MATERIALS, RESTORE FIRE RATING ACCEPTABLE TO THE ARCHITECT/ENGINEER.
16. CONTRACTOR IS RESPONSIBLE TO COORDINATE THE INSTALLATION WORK WITH ALL DISCIPLINES AND SUBCONTRACTORS; DO NOT BEGIN WORK PRIOR TO FINAL SUBMITTAL OF ALL ARCHITECTURAL, STRUCTURAL, MECHANICAL AND ELECTRICAL COORDINATION ELEMENTS RELATED TO THE INSTALLATION OF THAT WORK UNTIL RESOLUTION OF CONFLICTS AND APPROVAL OF RELATED COORDINATION ISSUES.
17. REFER TO SPECIFICATIONS FOR PHASING REQUIREMENTS OF THE WORK.

GENERAL MECHANICAL NOTES (APPLIES TO ALL MECHANICAL SHEETS)

M–1 CONTRACTOR SHALL FIELD VERIFY ALL PIPING ELEVATIONS AND LOCATIONS BEFORE BEGINNING INSTALLATION WORK. THE DRAWINGS DO NOT INDICATE ALL PIPING, TUBING, ELECTRICAL CONDUITS OR MISC. ITEMS FOR CLARITY. ANY CONFLICTS WITH PIPING SYSTEMS SHALL BE PROMPTLY REPORTED TO THE OWNER'S REPRESENTATIVE.

M–2 COORDINATE MECHANICAL INSTALLATION WITH OTHER TRADES AND CONSTRUCTION CONTRACTS.

M–3 MECHANICAL CONTRACTOR SHALL FURNISH AND INSTALL MISC. STEEL REQUIRED TO SUPPORT PIPING AND EQUIPMENT NOT DETAILED ON STRUCTURAL PIPE SUPPORT DRAWINGS OR DETAILS.

M–4 PIPING AND SUPPORTS SHALL NOT INTERFERE WITH EQUIPMENT MAINTENANCE, ACCESS, CLEAR OR PULL SPACES.

M–5 INSTRUMENTATION PIPING CONNECTIONS ARE NOT DIMENSIONED ON THE PIPING DRAWINGS. CONNECTION LOCATIONS SHOWN ARE INTENDED AS A GENERAL GUIDE AND DO NOT ILLUSTRATE EXACT LOCATIONS. CONTRACTOR SHALL AVOID INTERFERENCE WITH OTHER INSTRUMENT CONNECTIONS, PIPING, EQUIPMENT AND WORK OF OTHER DISCIPLINES ADJACENT TO EACH OTHER. A MINIMUM DISTANCE OF 12 INCHES SHALL BE MAINTAINED BETWEEN UNLESS OTHERWISE INDICATED. RECONNECT EXISTING INSTRUMENTATION.

M–6 ALL BUTTERFLY VALVES SHALL HAVE PIPE SPOOL SECTION ON BOTH SIDES OF VALVE TO PREVENT VALVE DISC FROM ENTERING ADJACENT FITTINGS, UNLESS OTHERWISE INDICATED.

M–7 ALL SCREWED PIPING (VALVES, EQUIPMENT AND FITTINGS) SHOWN ON THE DRAWINGS AS FITTING TO FITTING AND NOT DIMENSIONED SHALL BE INSTALLED USING 3 INCH LONG PIPE NIPPLE BETWEEN EACH ITEM UNLESS OTHERWISE NOTED.

M–8 ISOLATING VALVES, VENT AND DRAIN VALVES, VENT COCKS, THERMOMETER WELLS, PRESSURE GAUGES MUST BE ACCESSIBLE OUTSIDE OF INSULATED SURFACES AFTER THE INSULATION SYSTEM HAS BEEN INSTALLED .

M–9 VENT HIGH POINTS WITH 1 INCH BALL VALVE AT ACCESSIBLE LOCATIONS. ROUTE TO NEAREST FLOOR DRAIN UNLESS OTHERWISE INDICATED.

M–10 PROVIDE 1 INCH BALL VALVE DRAIN AT ALL LOW POINTS WITH HOSE THREAD OUTLET AND THREADED CAP.

M–11 SUPPORTS PROVIDED FOR EQUIPMENT SHALL MAINTAIN ASME CODE RATING FOR AFFECTED EQUIPMENT.

M–12 PRESSURE INDICATOR AND TRANSMITTER TAPS IN PIPING SHALL BE MINIMUM 3/4 INCH CONNECTION THREAD–O–LET.

M–13 ALL LOADS SHALL BE SUPPORTED FROM STRUCTURES EITHER AT THE FLOOR OR FROM STRUCTURAL SUPPORT MEMBERS AS INDICATED; NO HANGING LOAD SHALL IMPOSE ANY LOAD ON FLEXIBLE CONNECTIONS AT EQUIPMENT OR THAT NOT SHOWN UNLESS APPROVED BY THE OWNER'S REPRESENTATIVE IN WRITING.

M–14 DRAWINGS OF REVISED PIPING ARRANGEMENTS SHALL BE SUBMITTED IF EQUIPMENT AND PIPING IS NOT SIMILAR TO THAT SHOWN ON THE DRAWINGS. REVISIONS SHALL BE SUBJECT TO REVIEW AND APPROVAL BY THE OWNER'S REPRESENTATIVE PRIOR TO COMMENCEMENT OF CHANGES TO THE WORK.

M–15 REFER TO PIPE SUPPORT, HANGER, GUIDE AND ANCHOR DETAILS AND STRUCTURAL STEEL DETAILS FOR PIPE SUPPORT SYSTEM.

M–16 MISCELLANEOUS PIPING 2 INCH AND SMALLER IS NOT DIMENSIONED ON THE DRAWINGS. ROUTING IS INTENDED AS A GENERAL GUIDE. THE CONTRACTOR SHALL AVOID INTERFERENCE WITH OTHER PIPING, EQUIPMENT AND THE WORK OF OTHER DISCIPLINES. FINAL LOCATIONS OF PIPING SHALL ALLOW PROVISIONS FOR AIR VENTING AND DRAIN REQUIREMENTS.

M–17 WHERE STEEL FLANGES ARE MATED WITH CAST IRON FLANGES, PROVIDE WITH FLAT FACES AND FULL GASKETS.

M–18 RELOCATE MISCELLANEOUS PIPING AND INSTRUMENTATION LINES WHERE INTERFERENCE WITH NEW CONSTRUCTION IS UNAVOIDABLE, OR WHERE RELOCATION OF EQUIPMENT IS INDICATED.

M–19 PROVIDE 3/4 INCH THREAD–O–LET AND MOUNT TEMPERATURE SENSOR WELLS AS DETAILED.

M–20 EQUIPMENT FURNISHED SHALL BE RATED FOR ELEVATION 1174 FEET ABOVE SEA LEVEL.

M–21 INCIDENTAL (SMALL) PIPING CONNECTIONS AT PLANT EQUIPMENT SHALL BE PER MANUFACTURER'S SHOP DRAWING RECOMMENDATIONS OF PLANT EQUIPMENT PROVIDED.

M–22 EQUIPMENT VENTS, DRAINS, PUMPOUT CONNECTIONS, AND FILL CONNECTIONS ON EQUIPMENT SHALL BE CONNECTED PER MANUFACTURER'S SHOP DRAWINGS AND INSTALLATION RECOMMENDATIONS.

M–23 VENT AND RELIEF VALVE CONNECTIONS SHALL BE AS DETAILED WITH FLEXIBLE CONNECTOR, DRAIN FITTING AND PIPED THRU EXTERIOR WALL OR ROOF. STEAM VENTS SHALL BE AS DETAILED WITH DRIP ELL FITTING AND PIPED TO DRAIN.

M–24 PIPING, DUCTWORK, INSTRUMENTATION AND CONTROLS SHOWN ON PIPING AND INSTRUMENTATION AND CONTROL DIAGRAMS SHALL BE FURNISHED AND INSTALLED IN ACCORDANCE WITH THE SPECIFICATIONS.

M–25 PIPE SUPPORTS SHALL BE PROVIDED IN ACCORDANCE WITH MSS–SP58 AND SP69. PIPE SUPPORTS HAVE BEEN INDICATED ON THE DRAWINGS FOR PIPE 6 INCH IN DIAMETER AND LARGER, AND FOR ANCHORS AND GUIDES ON SOME SMALLER PIPING. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ADDITIONAL SUPPORTS REQUIRED BY MSS–SP58 AND SP69 OR THE SPECIFICATIONS.

M–26 PROVIDE INSULATION ON EQUIPMENT IN ACCORDANCE W/MFRS RECOMMENDATIONS SEE SPECS AND PREPURCHASE EQUIPMENT SHOP DRAWINGS.

M–27 PROVIDE REDUCING ELBOW PIPE FITTINGS WHERE SHOWN. ELLS SHALL BE LONG RADIUS TYPE.

M–28 INDICATED ARE APPROXIMATE LOCATIONS OF HVAC EQUIPMENT AND DUCTWORK. NOT INDICATED ARE ALL OFFSETS AND FITTINGS. COORDINATE WITH OTHER TRADES BEFORE PROCEEDING WITH WORK AND PROVIDE OFFSETS TO AVOID CONFLICTS.

M–29 SUPPORT DUCTWORK, COMPONENTS AND EQUIPMENT FROM BUILDING STRUCTURE.

M–30 DUCTWORK DIMENSIONS ON PLANS AND DETAILS INDICATE THE SIDE OF DUCT SEEN FIRST. ALL DIMENSIONS GIVEN IN INCHES AND INDICATE INSIDE CLEAR DIMENSIONS. INCREASE SIZE TO ACCOMMODATE LINER.

M–31 CONSTRUCT ELBOWS WITH CENTERLINE RADIUS OF 1–1/2 TIMES THE WIDTH OF DUCT. WHERE SPACE CONDITIONS DO NOT PERMIT AND WHERE INDICATED ON DRAWINGS USE SQUARE ELBOWS WITH TURNING VANES OR SPLITTER VANES.

M–32 SIZE TRANSITIONS WITH A MINIMUM SLOPE OF 1:4. USE 45° ENTRY FITTINGS FOR BRANCH DUCT TAPS. SEAL SHEET METAL CONNECTIONS AND JOINTS.

M–33 FLEXIBLE DUCTS SHALL BE FACTORY INSULATED. PROVIDE DRAW BANDS AND DUCT TAPE ON ALL ROUND FLEXIBLE CONNECTIONS. MAXIMUM LENGTH OF FLEXIBLE DUCTS SHALL BE THREE FEET.

M–34 CONTRACTOR SHALL BE RESPONSIBLE FOR PROPERLY SEALING ANY PENETRATION MADE OR REQUIRED THROUGH A FIRE RATED WALL. SEE SPECIFICATIONS FOR FIRE & SMOKE RATED SEALANTS. SEE ARCHITECTURAL PLANS FOR RATED WALLS (TYPICAL ALL AREAS).

M–35 COORDINATE ALL GRILLE, REGISTER AND DIFFUSER LOCATIONS WITH REFLECTED CEILING PLAN AND LIGHTING.

M–36 PROVIDE VOLUME DAMPER ON ALL MAIN SUPPLY DUCTWORK BEFORE ANY BRANCHES.

M–37 THOROUGHLY CLEAN ALL DUCTWORK, REMOVING ALL SHIPPING LABELS AND OTHER IDENTIFICATION TAGS. PROVIDE MILL–PHOSPHATIZED FINISH FOR EXPOSED SURFACE OF ALL DUCTS EXPOSED TO VIEW. DUCTWORK AND INSTALLATION SHALL BE OF THE HIGHEST QUALITY.

M–38 FIRE DAMPER (FD), PROVIDE DUCT ACCESS DOOR AT FIRE DAMPER TO ALLOW MAINTENANCE AND VISUAL INSPECTION PER NFPA REQUIREMENTS. IF ACCESS DOOR IS NOT POSSIBLE PROVIDE REMOVABLE SECTION OF DUCTWORK TO ALLOW FOR MAINTENANCE AND VISUAL INSPECTION PER NFPA REQUIREMENTS.

BID DOCUMENTS

FARRIS ENGINEERING
OMAHA | LINCOLN | COLORADO SPRINGS
farris-usa.com

PROFESSIONAL MECHANICAL ENGINEER
GREGORY T. KRONAIZL
E-5523
STATE OF NEBRASKA
6-30-2017

REVISIONS
1 Addendum No. 1 (6-30-2017)
Issue Signed Bid Documents

DEPARTMENT OF CORRECTIONAL SERVICES - NSP CUP TEMPORARY UTILITIES
Lincoln, NE

DESIGNED BY: GTK
DRAWN BY: CWK
CHECKED BY: GTK
DATE: June 30, 2017
PROJECT NO: 162032

SHEET TITLE: SYMBOLS LEGEND, ABBREVIATIONS, AND GENERAL NOTES

SHEET NO: **GI102**

DIGGERS HOTLINE OF NEBRASKA

CALL BEFORE YOU DIG... IT'S THE LAW
STATEWIDE (800) 331-5666

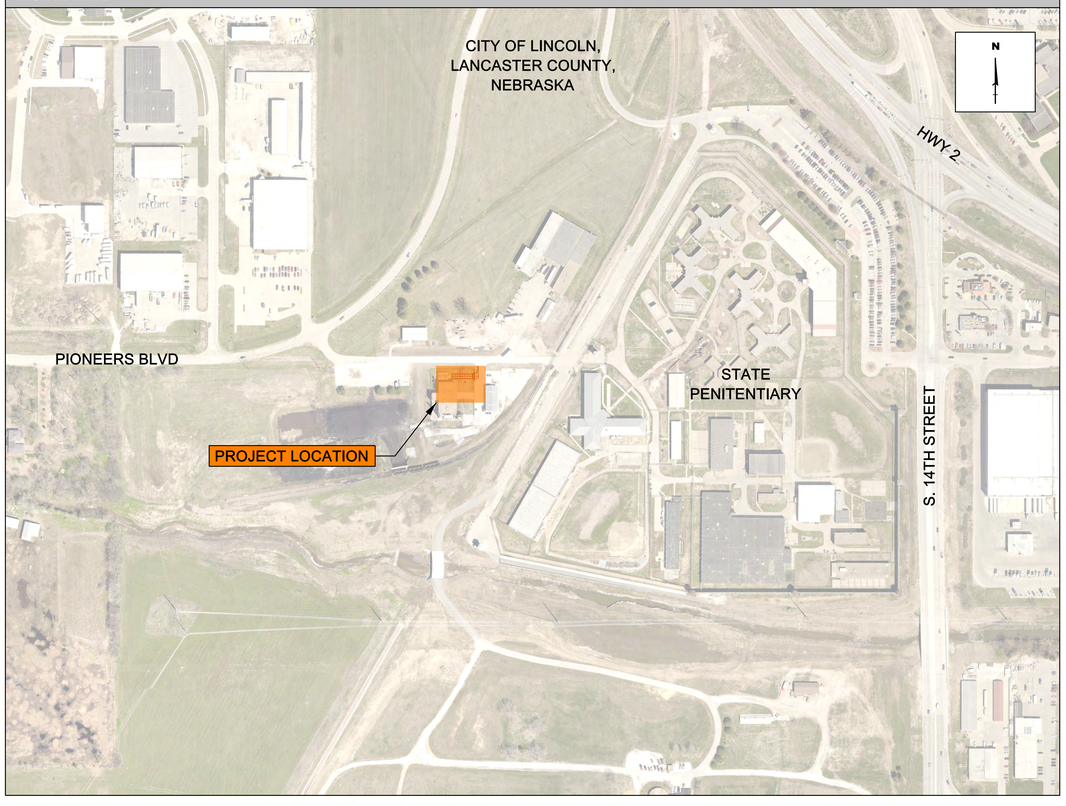
PRIOR TO CONSTRUCTION:

CALL: 1-800-331-5666 FOR LOCATION OF UNDERGROUND TELEPHONE, ELECTRIC, GAS MAINS, CABLE TELEVISION, WATER, SEWER OR ANY OTHER UTILITIES.

NOTE: EXISTING UNDERGROUND AND OVERHEAD UTILITIES AND DRAINAGE STRUCTURES HAVE BEEN PLOTTED FROM AVAILABLE INFORMATION AND THEREFORE, THEIR LOCATIONS MUST BE CONSIDERED APPROXIMATE ONLY. IT IS THE RESPONSIBILITY OF THE INDIVIDUAL CONTRACTORS TO EXACTLY LOCATE AND PROTECT EACH EXISTING UTILITY BEFORE AND DURING ACTUAL CONSTRUCTION.

CIVIL
SITE OVERVIEW

VICINITY MAP



SCHEDULE OF APPROXIMATE CIVIL QUANTITIES

ITEM DESCRIPTION	UNIT	QUANTITY
MOBILIZATION	1	LS
CONSTRUCTION STAKING	1	LS
CLEARING & GRUBBING	0.1	ACRE
SAW CUT PAVEMENT	57	LF
REMOVE CONCRETE PAVEMENT	3	CY
REMOVE CHAIN LINK FENCE	40	LF
REMOVE TIMBER PLANTER	4	EA
REMOVE SHRUB	2	EA
REMOVE 24" TREE	1	EA
REMOVE LANDSCAPING BOULDERS (SALVAGE TO OWNER)	1	LS
EXCAVATION	55	CY
EMBANKMENT	40	CY
7" PORTLAND CEMENT CONCRETE PAVEMENT	164	SY
8' CHAIN LINK FENCE	18	LF
22' WIDE DOUBLE SWING GATE	1	EA
SEEDING	0.1	ACRE

CIVIL GENERAL NOTES

1. THE APPROXIMATE LOCATION OF KNOWN CABLES AND UTILITIES ARE INDICATED ON THE PLANS. ALL CABLES AND UTILITIES MAY NOT BE SHOWN. PRIOR TO BEGINNING ANY WORK ALL CONTRACTORS SHALL HAVE CONTACTED ONE CALL TO LOCATE TELEPHONE, GAS, WATER, SEWER, COMMUNICATION, LIGHTING LINES AND OTHER CABLES / UTILITES WITHIN THE CONSTRUCTION SITE.
2. EXISTING PAVEMENT, TURF, ROADS, CABLES, UTILITIES, AND INCIDENTALS THAT ARE DAMAGED BY THE CONTRACTOR SHALL BE REPAIRED BY THE CONTRACTOR AT NO COST TO THE OWNER.
3. THE ITEMS IDENTIFIED IN THE SCHEDULE OF APPROXIMATE QUANTITIES ARE INTENDED TO IDENTIFY THE MAJOR WORK ITEMS. ALL ITEMS NOT SPECIFICALLY MENTIONED SHALL BE CONSIDERED SUBSIDIARY TO BID ITEMS TO WHICH THEY ARE RELATED AND WILL NOT BE CONSIDERED AS PAY ITEMS.
4. THE CONTRACTOR SHALL PRESERVE ALL SURVEY CONTROL. THE CONTRACTOR IS RESPONSIBLE FOR ALL STAKING ON THIS PROJECT.
5. PRIOR TO MOVING OFF THE JOB THE CONTRACTOR SHALL NOTIFY THE OWNER TO PERFORM A FINAL WALK-THROUGH INSPECTION.
6. THE PROJECT IS CURRENTLY UNAWARE OF ANY CONTAMINATED SOILS THAT WILL BE ENCOUNTERED DURING THE EARTHWORK GRADING OPERATIONS. HOWEVER, THE CONTRACTOR WILL BE REQUIRED TO DISPOSE OF ANY CONTAMINATED SOILS THAT MAY BE ENCOUNTERED IN AN APPROVED WASTE FACILITY. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING THE OWNER DOCUMENTATION OF ALL SOILS THAT HAVE BEEN DISPOSED OF IN AN APPROVED LANDFILL SITE. THE ENGINEER WILL BE OBSERVING AND PERFORMING SOILS TESTING. THE CONTRACTOR SHALL COORDINATE AND COOPERATE WITH THE ENGINEER TO ALLOW FOR THE PERFOMANCE OF THE OBSERVATION AND TESTING ACTIVITIES.
7. EXCAVATIONS THAT WILL BE OCCUPIED BY PERSONNEL SHALL BE MADE IN ACCORDANCE WITH THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) CONSTRUCTION STANDARD-29 CFR PART 1926, SUBPART P-EXCAVATIONS. OSHA STATES THAT A SOIL SHALL BE RECLASSIFIED IF THE PROPERTIES, FACTORS OR CONDITIONS AFFECTING THE SOIL'S CLASSIFICATION CHANGE IN ANY WAY. SHEET PILING AND/OR SHORING WILL BE NECESSARY IF THE SIDES OF THE EXCAVATION CANNOT BE SLOPED TO MEET OSHA REGULATIONS.

FARRIS ENGINEERING
OMAHA | LINCOLN | COLORADO SPRINGS
farris-usa.com

PROFESSIONAL ENGINEER
FRANK J. DOLAND
E-7854
NEBRASKA
6/30/17

REVISIONS
Addendum No. 1 (6-30-2017)
Issue Signed Bid Documents

DEPARTMENT OF CORRECTIONAL SERVICES - NSP
CUP TEMPORARY UTILITIES
Lincoln, NE

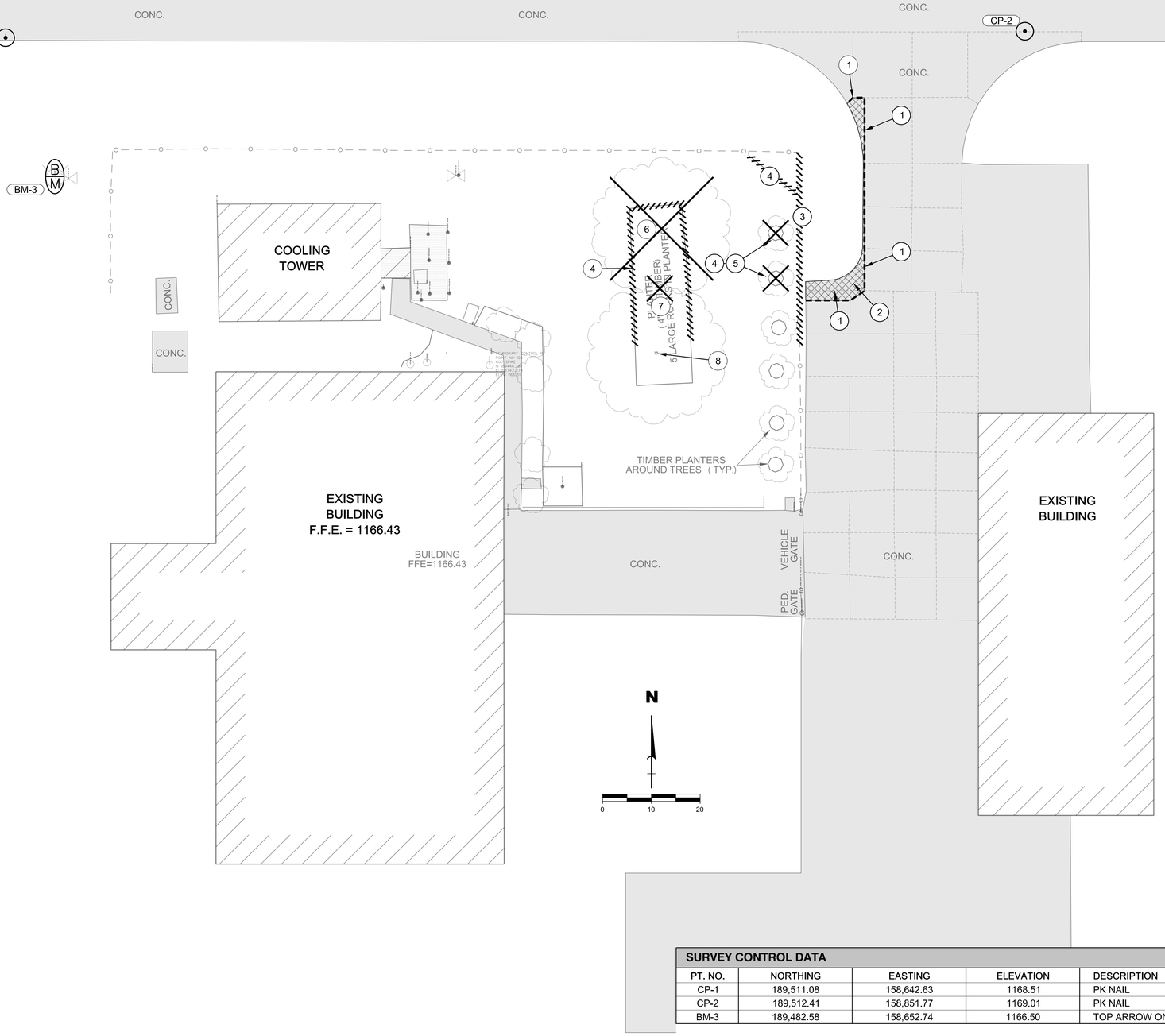
DESIGNED BY: NLH / FJD
DRAWN BY: NLH
CHECKED BY: FJD
DATE: June 30, 2017
PROJECT NO: 162032

SHEET TITLE: SITE OVERVIEW

SHEET NO: C-101

benesch
Alfred Benesch & Company
825 M Street, Suite 100
Lincoln, Nebraska 68508
402-479-2200 Job No. 111426.00

BID DOCUMENTS



REMOVAL ITEMS

1. SAW CUT PAVEMENT
   57 LF
2. REMOVE EXISTING PAVEMENT
   3 CY
3. REMOVE EXISTING CHAIN LINK FENCE
   40 LF
4. REMOVE EXISTING TIMBER PLANTER
   4 EA
5. REMOVE EXISTING SHRUBS
   2 EA
6. REMOVE EXISTING 24" TREE
   1 EA
7. REMOVE EXISTING LANDSCAPING ROCKS & SALVAGE TO OWNER
   1 LS
8. EXISTING TREE TO REMAIN AND BE PROTECTED DURING CONSTRUCTION

SURVEY CONTROL DATA

PT. NO.	NORTHING	EASTING	ELEVATION	DESCRIPTION
CP-1	189,511.08	158,642.63	1168.51	PK NAIL
CP-2	189,512.41	158,851.77	1169.01	PK NAIL
BM-3	189,482.58	158,652.74	1166.50	TOP ARROW ON HYDRANT

BID DOCUMENTS

FARRIS ENGINEERING
OMAHA | LINCOLN | COLORADO SPRINGS
farris-usa.com

FRANK J. DOLAND E-7854 PROFESSIONAL ENGINEER STATE OF NEBRASKA 6/30/2017

REVISIONS
1 Addendum No. 1 (6-30-2017)
Issue Signed Bid Documents

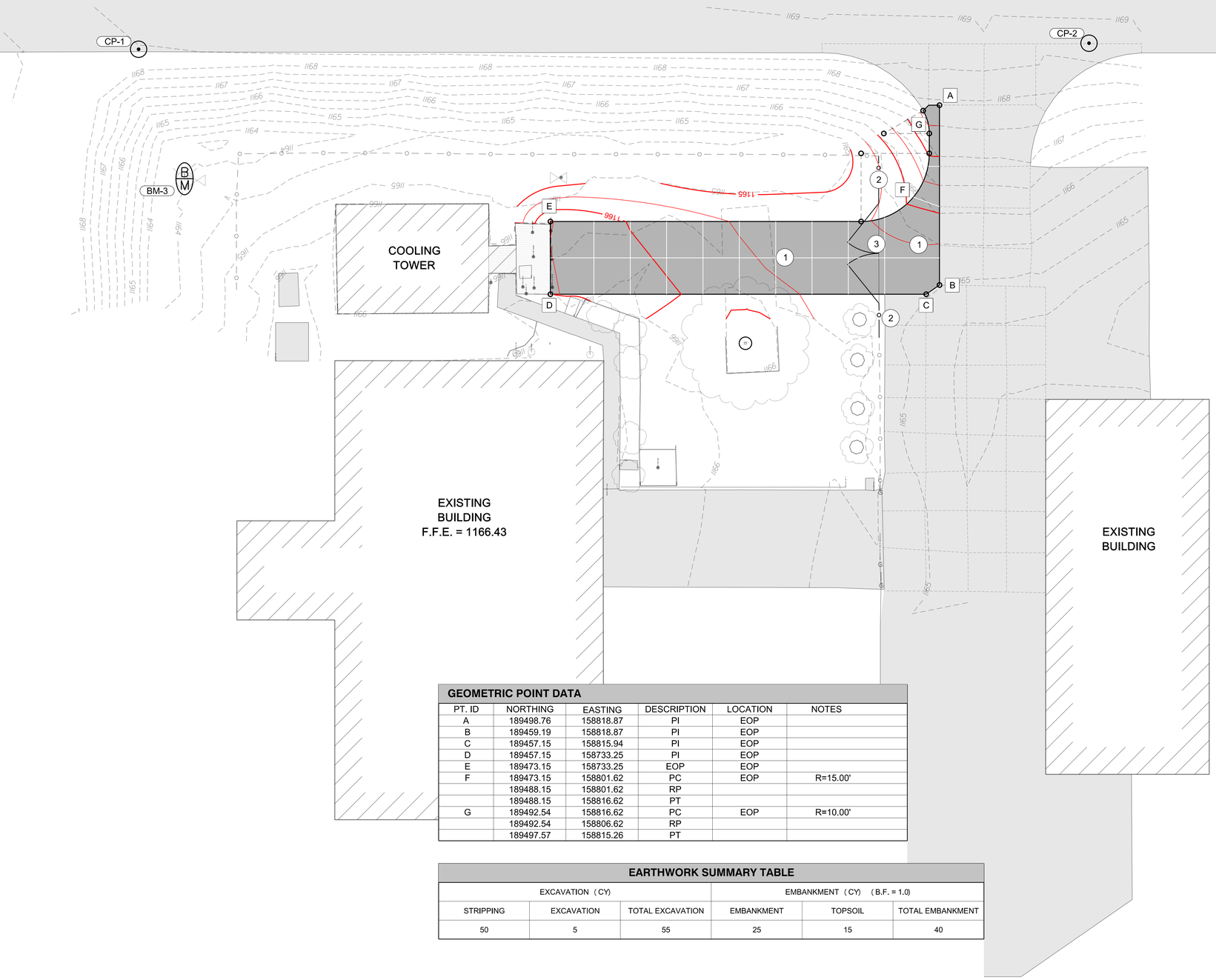
DEPARTMENT OF CORRECTIONAL SERVICES - NSP
CUP TEMPORARY UTILITIES
Lincoln, NE

DESIGNED BY: NLH / FJD
DRAWN BY: NLH
CHECKED BY: FJD
DATE: June 30, 2017
PROJECT NO: 162032

SHEET TITLE: SURVEY CONTROL / REMOVALS PLAN

SHEET NO: **C-102**

benesch
Alfred Benesch & Company
825 M Street, Suite 100
Lincoln, Nebraska 68508
402-479-2200 Job No. 111426.00



CONSTRUCTION NOTES

1. CONSTRUCT 7" PORTLAND CEMENT CONCRETE PAVEMENT
   164 SY
2. CONSTRUCT 8' CHAIN LINK FENCE
   (SEE DETAILS ON SHEET C-106)
   18 LF
3. CONSTRUCT 22' WIDE DOUBLE SWING GATE
   (SEE DETAILS ON SHEET C-106)
   1 EA
4. CONSTRUCT EXPANSION JOINTS AT LOCATIONS WHERE NEW DRIVE MEETS EXISTING CONCRETE.

GRADING NOTES

1. STRIP 6" OF TOPSOIL IN ALL OTHER AREAS TO BE DISTURBED. STOCKPILE FOR USE OVER AREAS OUTSIDE AREAS TO BE PAVED OR SURFACED WITH AGGEGATE MATERIAL.
2. UNDERCUT 4" IN CUT AREAS IN ALL AREAS TO RECEIVE TOPSOIL AND PLACE 4" OF TOPSOIL.

GEOMETRIC POINT DATA

PT. ID	NORTHING	EASTING	DESCRIPTION	LOCATION	NOTES
A	189498.76	158818.87	PI	EOP	
B	189459.19	158818.87	PI	EOP	
C	189457.15	158815.94	PI	EOP	
D	189457.15	158733.25	PI	EOP	
E	189473.15	158733.25	EOP	EOP	
F	189473.15	158801.62	PC	EOP	R=15.00'
	189488.15	158801.62	RP		
	189488.15	158816.62	PT		
G	189492.54	158816.62	PC	EOP	R=10.00'
	189492.54	158806.62	RP		
	189497.57	158815.26	PT		

EARTHWORK SUMMARY TABLE

EXCAVATION (CY)			EMBANKMENT (CY) (B.F. = 1.0)		
STRIPPING	EXCAVATION	TOTAL EXCAVATION	EMBANKMENT	TOPSOIL	TOTAL EMBANKMENT
50	5	55	25	15	40

FARRIS ENGINEERING
OMAHA | LINCOLN | COLORADO SPRINGS
farris-usa.com

PROFESSIONAL ENGINEER
CIVIL
FRANK J. DOLAND
E-7854
NEBRASKA
6/30/17

REVISIONS
1 Addendum No. 1 (6-30-2017)
Issue Signed Bid Documents

DEPARTMENT OF CORRECTIONAL SERVICES - NSP
CUP TEMPORARY UTILITIES
Lincoln, NE

DESIGNED BY: NLH / FJD
DRAWN BY: NLH
CHECKED BY: FJD
DATE: June 30, 2017
PROJECT NO: 162032

SHEET TITLE
GRADING & CONSTRUCTION PLAN

SHEET NO
C-103

benesch
Alfred Benesch & Company
825 M Street, Suite 100
Lincoln, Nebraska 68508
402-479-2200 Job No, 111426.00

BID DOCUMENTS

JOINTS & GRADES NOTES

ALL SPOT ELEVATION ARE TOP OF PAVEMENT ELEVATIONS.

ADD 1100 TO ALL SPOT ELEVATIONS.

● DENOTES MESHED REINFORCED PANEL
(SEE SHEET C-105 FOR DETAILS)

N

0 5 10

COOLING TOWER

EXISTING BUILDING
F.F.E. = 1166.43

9.6' 8' 8' 8' 8' 8' 8' 8' 8' 8' 12.1'

8'

8'

FARRIS ENGINEERING
OMAHA | LINCOLN | COLORADO SPRINGS
farris-usa.com

PROFESSIONAL ENGINEER
FRANK J. DOLAND
E-7854
NEBRASKA
6/30/17

REVISIONS

Addendum No. 1 (6-30-2017)	
Issue Signed Bid Documents	

DEPARTMENT OF CORRECTIONAL SERVICES - NSP CUP TEMPORARY UTILITIES
Lincoln, NE

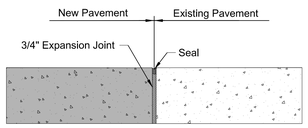
DESIGNED BY: NLH / FJD
DRAWN BY: NLH
CHECKED BY: FJD
DATE: June 30, 2017
PROJECT NO: 162032

SHEET TITLE: JOINTS & GRADES

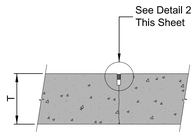
SHEET NO: **C-104**

benesch
Alfred Benesch & Company
825 M Street, Suite 100
Lincoln, Nebraska 68508
402-479-2200 Job No. 111426.00

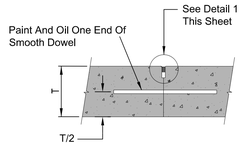
BID DOCUMENTS



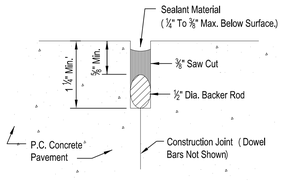
EXPANSION JOINT DETAIL
NOT TO SCALE



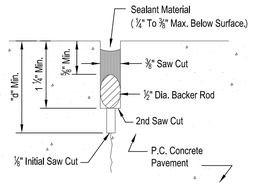
CONTRACTION JOINT DETAIL
NOT TO SCALE



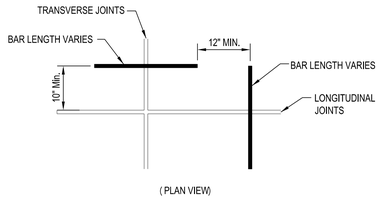
CONSTRUCTION JOINT DETAIL
NOT TO SCALE



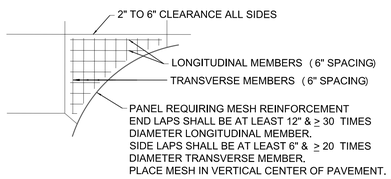
DETAIL 1
(TYPICAL CONSTRUCTION JOINT)



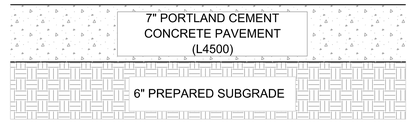
DETAIL 2
(TYPICAL CONTRACTION JOINT)



POSITION OF DOWELS AT JOINTS
NOT TO SCALE



MESH REINFORCEMENT DETAIL
NOT TO SCALE



THE PREPARED SUBGRADE SHALL CONSIST OF LEAN CLAY (CL) COMPACTED TO A MINIMUM OF 100% OF THE SOILS MAXIMUM DRY DENSITY (ASTM D698) AT A MINIMUM MOISTURE CONTENT OF 2% BELOW THE SOILS OPTIMUM MOISTURE CONTENT (ASTM D698). PRIOR TO CONSTRUCTING THE CONCRETE PAVEMENT, THE SUBGRADE SHALL BE PROOFROLLED WITH A LOADED DUMP TRUCK OR SIMILAR PIECE OF EQUIPMENT TO LOCATE ANY UNSTABLE SOILS. ANY UNSTABLE SOILS OR SOILS THAT ARE LOW IN MOISTURE CONTENT SHALL BE EITHER REMOVED AND REPLACED WITH PROPERLY PLACED EARTH FILL OR REWORKED TO CONFORM TO THE MOISTURE CONTENT AND COMPACTION SPECIFICATIONS PRESENTED ABOVE. PROPOSED FILL MATERIALS SHALL BE SUBJECT TO APPROVAL BY THE GEOTECHNICAL ENGINEER. REPRESENTATIVE SAMPLES OF THE EXISTING SUBGRADE SOILS AND PROPOSED FILL MATERIALS SHALL BE SUBMITTED TO THE GEOTECHNICAL ENGINEER AT LEAST THREE DAYS PRIOR TO PLACEMENT SO THE NECESSARY LABORATORY TESTS CAN BE PERFORMED.

TYPICAL PAVING SECTION
NOT TO SCALE

PAVING GENERAL NOTES

1. IMPORTANT - PAVEMENT PANEL NOTED WITH A DOT ⁂ IN THE PANEL (SEE SHEET 4) SHALL BE REINFORCED WITH STEEL MESH IN BOTH DIRECTIONS. STEEL MESH SHALL BE 6 X 6 X W2.9 (6 GAUGE) AS DETAILED ON THIS SHEET AND PLACED ON WIRE MESH SUPPORTS.
2. T = PAVEMENT THICKNESS AS SHOWN IN PLANS
3. JOINT SEAL W/D FACTOR SHALL BE 1:1 UNLESS OTHERWISE SPECIFIED BY JOINT MATERIAL MANUFACTURER.
4. ALL DOWEL BARS SHALL BE 1" EPOXY COATED SMOOTH BARS, 18" LONG & SPACED 12" CENTER TO CENTER.
5. ALL TIE BARS SHALL BE EPOXY COATED #5 DEFORMED BARS, 30" LONG & SPACED AT 30" CENTER TO CENTER.

FARRIS ENGINEERING
OMAHA | LINCOLN | COLORADO SPRINGS
farris-usa.com

PROFESSIONAL ENGINEER
FRANK J. DOLAND
E-7854
NEBRASKA
6/30/17

REVISIONS
1 Addendum No. 1 (6-30-2017)
Issue Signed Bid Documents

DEPARTMENT OF CORRECTIONAL SERVICES - NSP
CUP TEMPORARY UTILITIES
Lincoln, NE

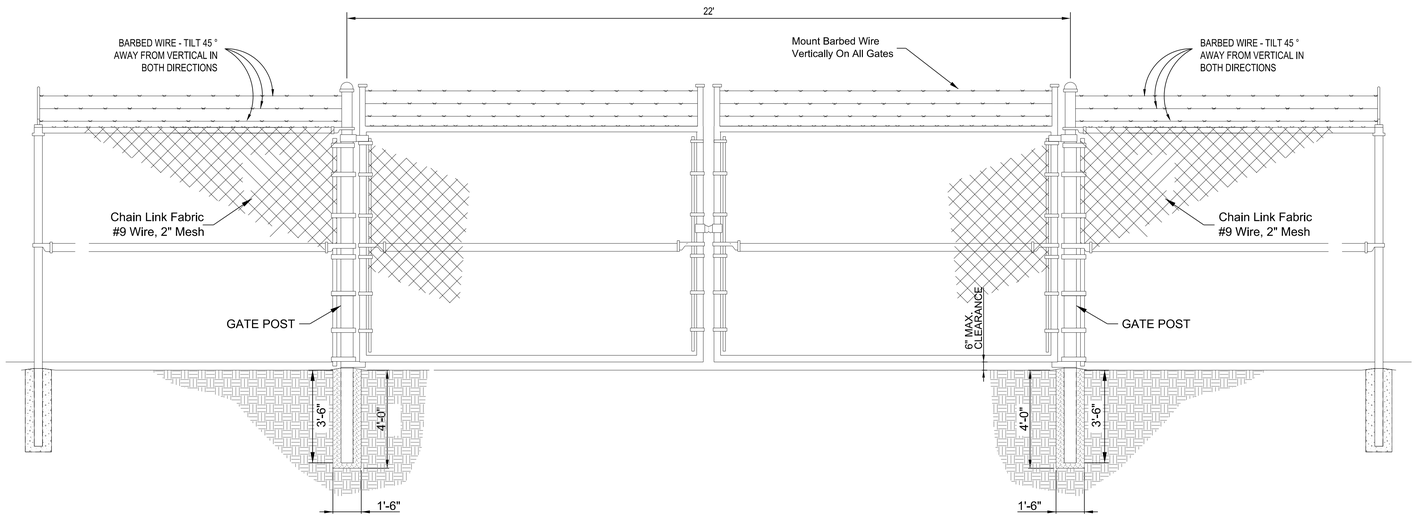
DESIGNED BY: NLH / FJD
DRAWN BY: NLH
CHECKED BY: FJD
DATE: June 30, 2017
PROJECT NO: 162032

SHEET TITLE
DETAILS

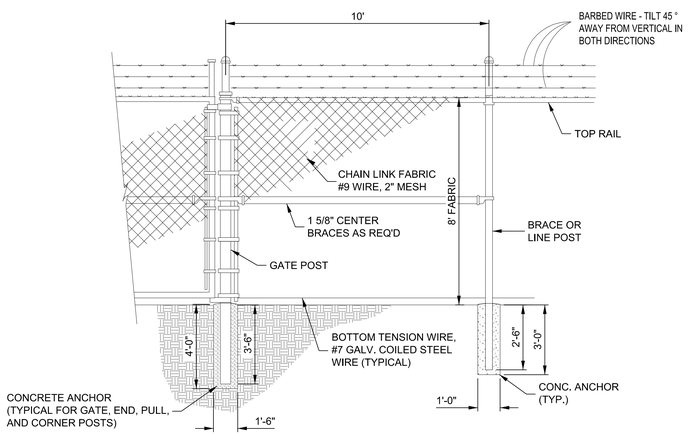
SHEET NO
C-105

benesch
Alfred Benesch & Company
825 M Street, Suite 100
Lincoln, Nebraska 68508
402-479-2200 Job No. 111426.00

BID DOCUMENTS



DOUBLE SWING GATE DETAIL
NOT TO SCALE



SECURITY FENCE DETAIL
NOT TO SCALE

FARRIS ENGINEERING
OMAHA | LINCOLN | COLORADO SPRINGS
farris-usa.com

PROFESSIONAL ENGINEER
FRANK J. DOLAND
E-7854
NEBRASKA
6/30/2017

REVISIONS
1 Addendum No. 1 (6-30-2017)
Issue Signed Bid Documents

DEPARTMENT OF CORRECTIONAL SERVICES - NSP
CUP TEMPORARY UTILITIES
Lincoln, NE

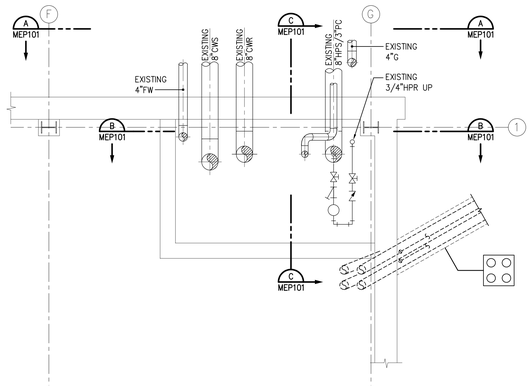
DESIGNED BY: NLH / FJD
DRAWN BY: NLH
CHECKED BY: FJD
DATE: June 30, 2017
PROJECT NO: 162032

SHEET TITLE: DETAILS

SHEET NO: C-106

benesch
Alfred Benesch & Company
825 M Street, Suite 100
Lincoln, Nebraska 68508
402-479-2200 Job No. 111426.00

BID DOCUMENTS

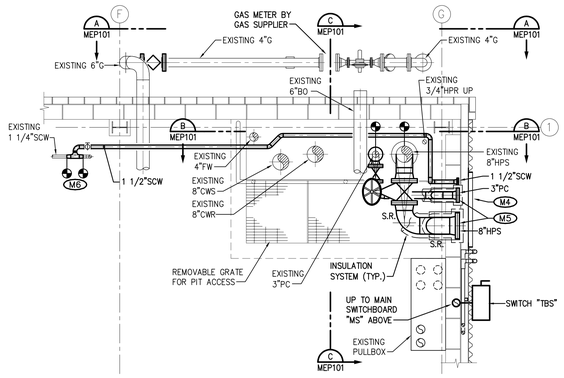


PARTIAL PLAN–PIT LEVEL

SCALE: 3/8 INCH = 1 FOOT

12" 0 2' 4' 6'

NORTH

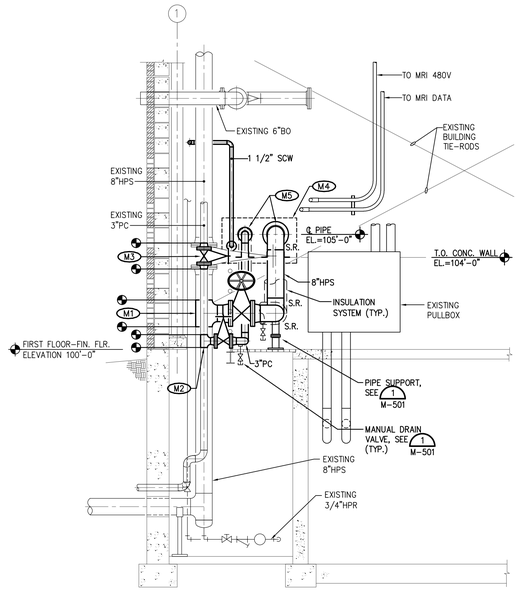


PARTIAL PLAN–FIRST FLOOR

SCALE: 3/8 INCH = 1 FOOT

12" 0 2' 4' 6'

NORTH



ELECTRICAL KEYNOTES: (E#)

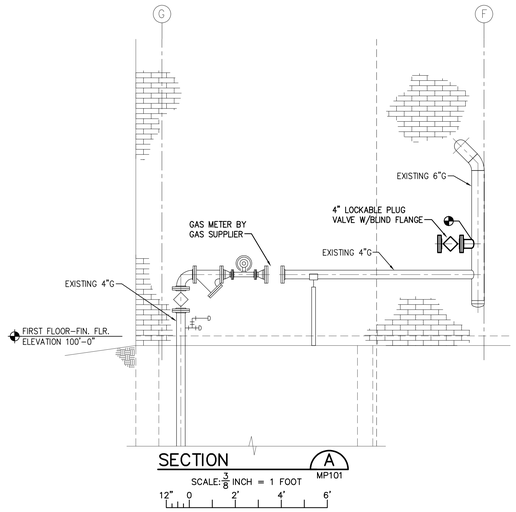
- E1 PROVIDE SIEMENS, 480 VOLT, 200 AMP, 3 POLE, 35,000 AIC, TYPE JXD6 CIRCUIT BREAKER IN EXISTING SIEMENS SWITCHBOARD. FIELD VERIFY BUS ATTACHMENT REQUIREMENTS.
- E2 PROVIDE 200 AMP, 480 VOLT, 3 POLE, FUSIBLE, SOLID NEUTRAL FUSED SWITCH, COMPLETE WITH 3–200 AMP, DUAL ELEMENT, CURRENT LIMITING FUSES IN A NEMA 3R ENCLOSURE.

MECHANICAL DEMO KEYNOTES: (MD#)

- MD1 REMOVE PIPE SPOOL FOR NEW 3" NPS ISOLATION VALVE.
- MD2 REMOVE PIPE SPOOL FOR NEW 8" NPS TIE–IN TEE CONNECTIONS.
- MD3 REMOVE PIPE SPOOL FOR NEW 3" NPS TIE–IN TEE CONNECTIONS.

MECHANICAL KEYNOTES: (M#)

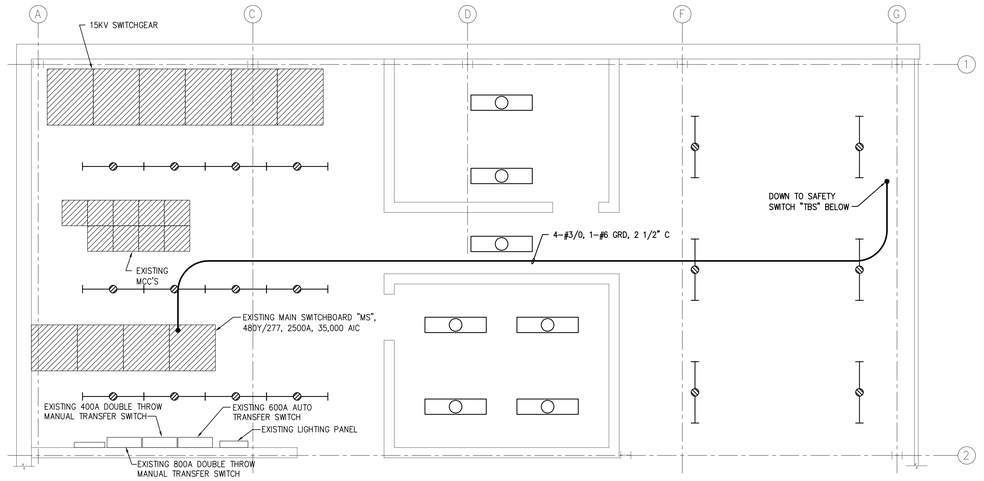
- M1 CUT NEW 8" TEE INTO EXISTING 8"HPS LINE. PROVIDE NEW 8" GATE VALVE, WELDNECK FLANGES, PIPING, INSULATION, SUPPORTS AND HANGERS. SEE **DETAILS 1, 2, 3/M–501.**
- M2 CUT NEW 3" TEE INTO EXISTING 3"PC LINE. PROVIDE NEW 3" GATE VALVE, WELDNECK FLANGES, PIPING, INSULATION, SUPPORTS AND HANGERS. SEE **DETAILS 1, 2, 3/M–501.**
- M3 CUT NEW 3" GATE VALVE INTO EXISTING 3"PC LINE. PROVIDE NEW WELDNECK FLANGES.
- M4 CUT OPENING IN EXTERIOR CORRUGATED PAINTED METAL BUILDING PANEL, WALL AND PROVIDE NEW ENCLOSURE OVER OPENING SEE DETAILS ON SHEET M–501.
- M5 TERMINATE TEMPORARY BOILER STEAM CONNECTIONS WITH BOLTED BLIND FLANGES ON 8"HPS AND 3"PC PIPING.
- M6 CUT NEW 1 1/2" TEE FITTING WITH (2) 1 1/2" x 1 1/4" REDUCERS INTO EXISTING 1 1/4" SCW LINE.



SECTION A MP101

SCALE: 3/8 INCH = 1 FOOT

12" 0 2' 4' 6'



PARTIAL ELECTRICAL PLAN–MEZZANINE LEVEL

SCALE: 1/4 INCH = 1 FOOT

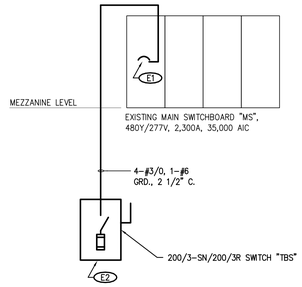
12" 0 5'

NORTH

SECTION C MP101

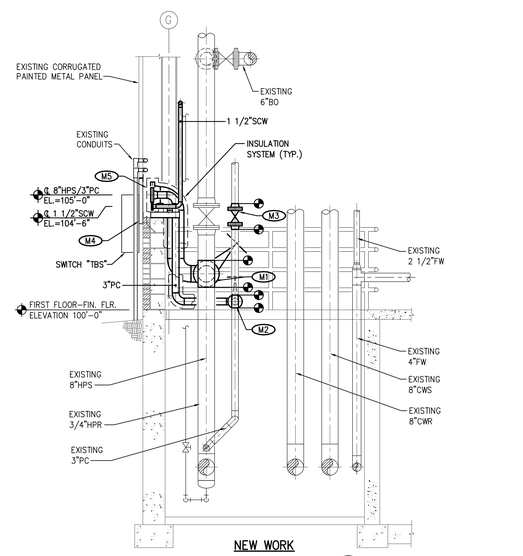
SCALE: 3/8 INCH = 1 FOOT

12" 0 2' 4' 6'



PARTIAL ONE–LINE DIAGRAM

NO SCALE

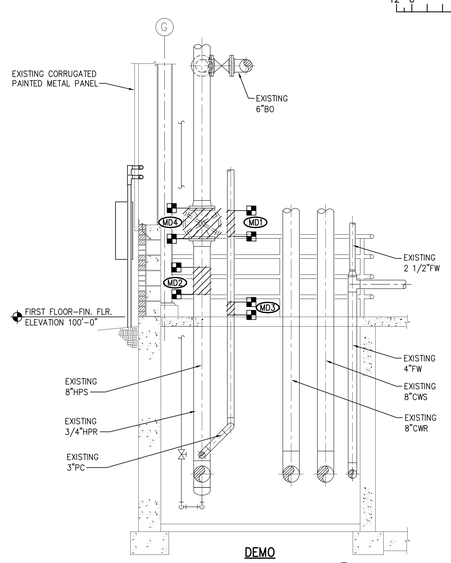


NEW WORK

SECTION B MP101

SCALE: 3/8 INCH = 1 FOOT

12" 0 2' 4' 6'

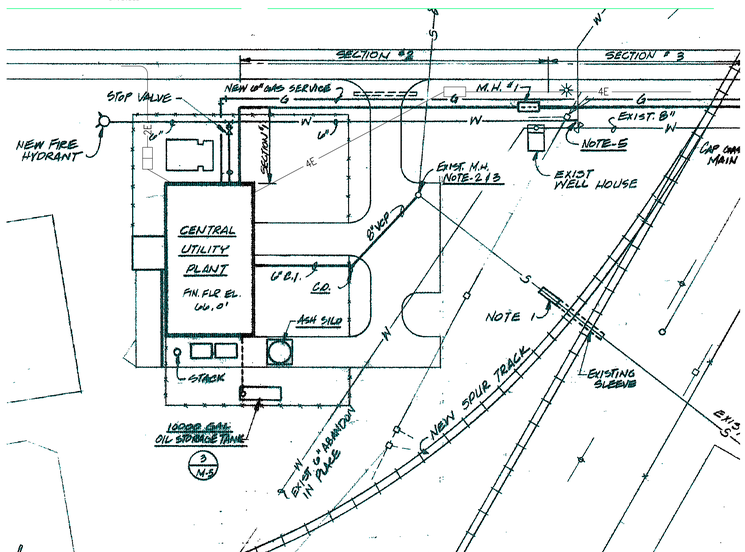


DEMO

SECTION B MP101

SCALE: 3/8 INCH = 1 FOOT

12" 0 2' 4' 6'

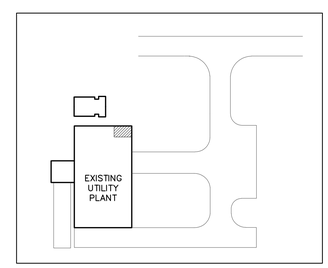


(TAKEN FROM 1978 ORIGINAL CONSTRUCTION DRAWINGS)

PARTIAL SITE PLAN

NO SCALE

NORTH



KEYPLAN

NO SCALE

NORTH

BID DOCUMENTS

FARRIS ENGINEERING
OMAHA | LINCOLN | COLORADO SPRINGS
farris-usa.com

PROFESSIONAL MECHANICAL ENGINEER — GREGORY T. KRONAIZL E-5523 — STATE OF NEBRASKA — 6-30-2017

PROFESSIONAL ELECTRICAL ENGINEER — DENNIS C. LOX E-7734 — STATE OF NEBRASKA — 6-30-2017

REVISIONS

1	Addendum No. 1 (6-30-2017) Issue-Signed Bid Documents

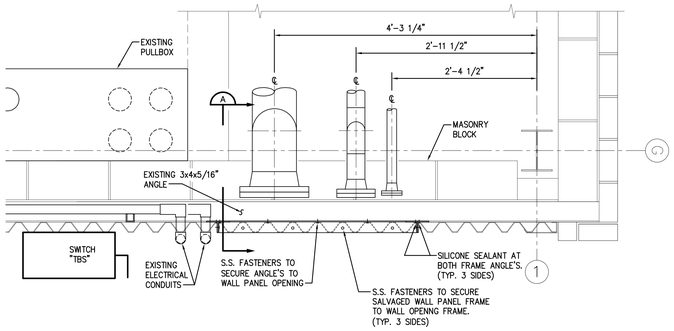
DEPARTMENT OF CORRECTIONAL SERVICES - NSP CUP TEMPORARY UTILITIES
Lincoln, NE

DESIGNED BY:	GTK
DRAWN BY:	CWK
CHECKED BY:	GTK
DATE:	June 30, 2017
PROJECT NO:	162032

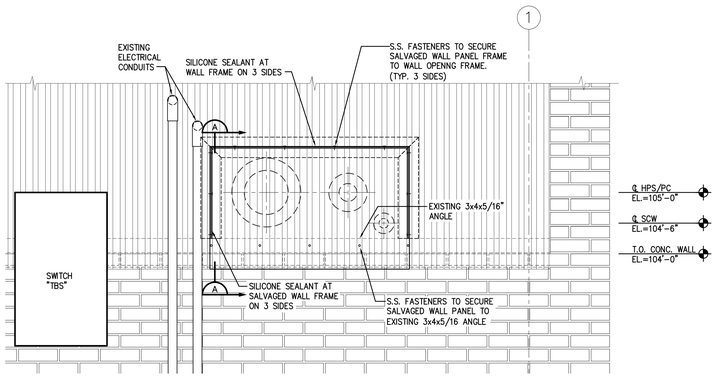
SHEET TITLE: MECHANICAL/ ELECTRICAL PLANS, SECTIONS, SITE PLAN AND DETAILS

SHEET NO: **ME101**

O:\2016\162032\CAD\Mechanical\162032_ME101.dwg, ME101, 6/30/17 11:09pm, cwk



PLAN



ELEVATION

SALVAGED PANEL INSTALLATION DETAIL 7 / M-501

SCALE: 1 INCH = 1 FOOT

12" 6" 0 1'

WALL PANEL OPENING FRAME DETAIL 6 / M-501

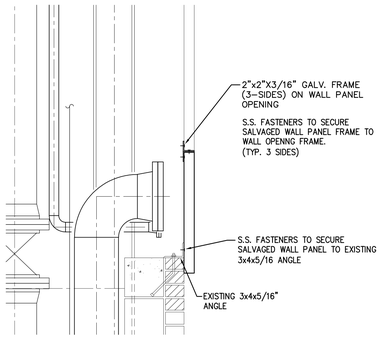
SCALE: 1 INCH = 1 FOOT

12" 6" 0 1'

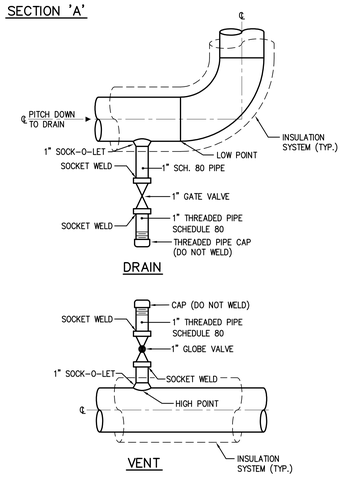
SALVAGED PANEL REMOVAL DETAIL 4 / M-501

SCALE: 1 INCH = 1 FOOT

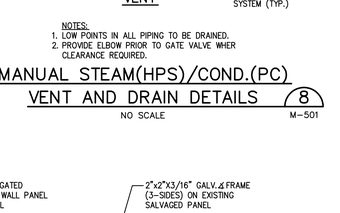
12" 6" 0 1'



SECTION 'A'



DRAIN

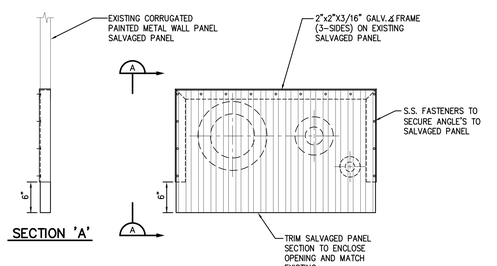


VENT

NOTES:
1. LOW POINTS IN ALL PIPING TO BE DRAINED.
2. PROVIDE ELBOW PRIOR TO GATE VALVE WHER CLEARANCE REQUIRED.

MANUAL STEAM(HPS)/COND.(PC) VENT AND DRAIN DETAILS 8 / M-501

NO SCALE

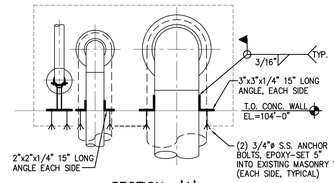


SECTION 'A'

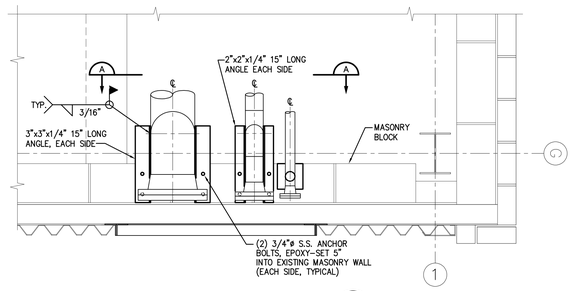
SALVAGED PANEL FRAME DETAIL 5 / M-501

SCALE: 1 INCH = 1 FOOT

12" 6" 0 1'



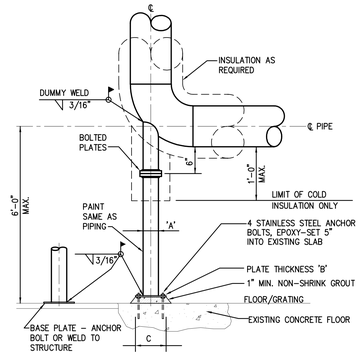
SECTION 'A'



PIPE SUPPORT DETAIL 3 / M-501

SCALE: 1 INCH = 1 FOOT

12" 6" 0 1'

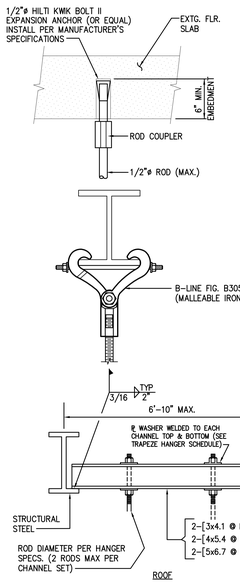


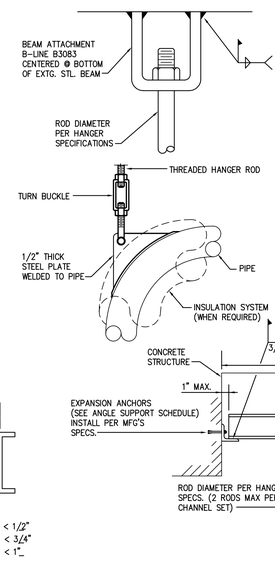
SUPPORT SCHEDULE			
PIPE SIZE	'A' SUPPORT PIPE DIA.	'B' BASE ℄	ANCHOR BOLTS DIA.
≤ 4	2"	8x8x3/8	1/2"
≤ 12	3"	10x10x1/2	5/8"
≤ 16	4"	12x12x5/8	5/8"
≤ 24	6"	14x14x3/4	3/4"

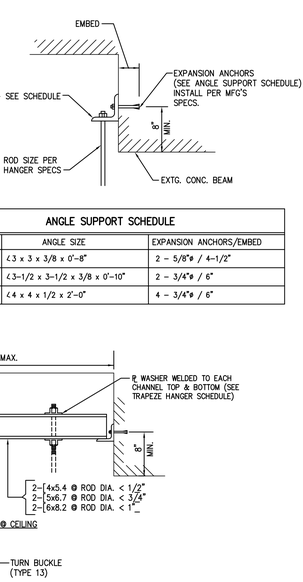
PS-1

PIPE SUPPORT DETAIL 1 / M-501

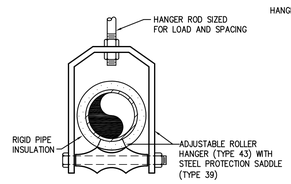
NO SCALE

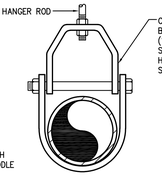


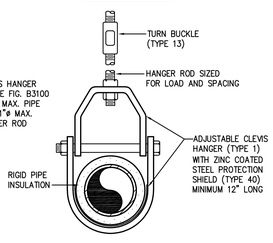




ANGLE SUPPORT SCHEDULE		
ROD SIZE	ANGLE SIZE	EXPANSION ANCHORS/EMBED
≤ 1/2"	∠3 x 3 x 3/8 x 0'-8"	2 - 5/8"ø / 4-1/2"
≤ 3/4"	∠3-1/2 x 3-1/2 x 3/8 x 0'-10"	2 - 3/4"ø / 6"
≤ 1"	∠4 x 4 x 1/2 x 2'-0"	4 - 3/4"ø / 6"







DRILL-IN ANCHOR SCHEDULE		
PIPE SIZE	ROD SIZE	EXPANSION ANCHORS/EMBED
STEAM≤ 4 WATER ≤ 6	1/2"	1/2"ø / 6"

MISC. HANGER DETAILS 2 / M-501

NO SCALE

BID DOCUMENTS

FARRIS ENGINEERING
OMAHA | LINCOLN | COLORADO SPRINGS
farris-usa.com

PROFESSIONAL MECHANICAL ENGINEER
GREGORY T KRONAIZL E-5523
STATE OF NEBRASKA
6-30-2017

REVISIONS
1 Addendum No. 1 (6-30-2017) Issue-Signed Bid Documents

DEPARTMENT OF CORRECTIONAL SERVICES - NSP
CUP TEMPORARY UTILITIES
Lincoln, NE

DESIGNED BY: GTK
DRAWN BY: CWK
CHECKED BY: GTK
DATE: June 30, 2017
PROJECT NO: 162032

SHEET TITLE: MECHANICAL DETAILS

SHEET NO: M-501

Sign-In Sheet

Project: Temporary Boiler Connection Project #: 1602
Facility: NSP
Project Leader: Nathan Bornemeier
Meeting Location: NSP Power Plant
Date: 6/27/17 Time: 10:00 a.m.
X Pre-Bid Conference ☐ Pre-Construction Conference
☐ Other:

	Name	Organization	Office Phone	
1.	Kyle Hohenstein	Dicky Hinds Mgr	(402) 610-7401	kyle.hohenstein@dhmlinc.com
2.	Jeff Cooper	NIFCO	402-477-0666	Jcooper@nifcomechanical.com
3.	Doug Standage	Commonwealth	402-499-9384	dstandage@commonwealthelectric.com
4.	Dennis Lux	Farris	402-330-5900	dlux@farris-usa.com
5.	Jerry Pohlmann	Farris	402-479-5777	
6.	Nate Bornemeier	Collections	402-479-5861	
7.				
8.				
9.				
10.				
11.				
12.				
13.				
14.				