CONTRACT DOCUMENTS
&
TECHNICAL SPECIFICATIONS

HU 2026-16

WEC 1 BOTTOM ASH WATER RECIRCULATION SYSTEM ELECTRICAL CONSTRUCTION

CITY OF HASTINGS

Proposals Will Be Opened Promptly At
1:30 PM, Wednesday, February 25, 2026

Bid Submitted By: _____

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CONTRACT AND SPECIFICATIONS
FOR
WEC UNIT 1 BOTTOM ASH WATER RECIRCULATION SYSTEM
ELECTRICAL CONSTRUCTION
FOR
CITY OF HASTINGS
HASTINGS, NEBRASKA

Contract No. HU 2026-16

I. BIDDING DOCUMENTS

II. CONTRACT FORMS

III. TECHNICAL SPECIFICATIONS

ADVERTISEMENT FOR BIDS

The City of Hastings, Nebraska, will receive bids for the **WEC 1 Bottom Ash Recirculation System Electrical Construction, HU 2026-16** until 1:30 p.m. at the City of Hastings, 1228 N Denver Ave., Hastings, Nebraska, on Wednesday, February 25, 2026, at which time and place all bids will be publicly opened and read aloud. **Brief description of project: Installation of a new motor control center, electrical equipment, instrumentation, raceway, power cables, and controls cables for WEC1 Bottom Ash Hopper Water Recirculation System in Hastings, Nebraska.** If you plan on bidding and are not already on our approved bidders list for this project, you are REQUIRED to fill out the Plan Holders Submittal Form that is located on the City website: https://www.cityofhastings.org/bids/.

The Contract Documents, including plans and specifications, are on file at the City of Hastings 1228 N Denver Avenue, Hastings, Nebraska 68901. Copies of the plans and specifications in electronic (PDF) format may be obtained by visiting the City of Hastings Website: www.cityofhastings.org/bids. A paper copy is available for $75.00, plus sales tax ($5.25), plus shipping.

Each bid shall be accompanied by a certified check, drawn on a solvent bank in the State of Nebraska, or a bid bond in an amount of not less than five percent (5%) of the total bid of all contract construction costs, made payable to the City Treasurer of the City of Hastings, Nebraska, as security that the bidder to whom the contract may be awarded will enter into a contract to build all the improvements in accordance with this notice and give bond in the sum hereinafter provided for the construction of improvements.

No bid shall be withdrawn after opening of bids without the consent of the City of Hastings, Nebraska, for a period of sixty (60) days after scheduled time of closing bids.

Time is of the essence in this contract. In evaluating bid(s) received, the City will consider the timelines of completion of prior construction contracts, existing workload of bidders and available manpower that bidder commits to the project.

The successful bidder will be required to furnish a Performance Bond in the sum of the full amount of the Contract within ten (10) days of the date of award. No additional time will be allowed the Contractor for providing the Performance Bond.

DATED AT HASTINGS, NEBRASKA, this 28th day of January, 2026.

CITY OF HASTINGS, NEBRASKA

_____

Tyler Ficken, City Clerk

Publish:
January 30, 2026
February 6, 2026

Furnish 2 proofs of publication

INSTRUCTIONS TO BIDDERS

All proposal information, including any unit price fill in sheets or other required information, shall be submitted on the proposal forms hereto attached. Copies of addenda, if any, shall be signed and attached. City of Hastings does NOT accept faxed or emailed bid returns.

Bidders shall inform themselves of all relevant matters, and, if awarded the contract, shall not be allowed any extra compensation by reason of any matter or thing concerning which such Bidder might not have fully informed himself, prior to the bidding.

The Bidder bidding on the Specifications herein, who has exceptions to those called for in the Specifications, must so state in the space provided below and/or attach a letter explaining in detail the exceptions taken to those required in the Specifications. This letter of explanation shall become a part of the bid and shall be attached hereto. Failure by the Bidder to outline his exceptions will require the successful Bidder to comply with these Specifications.

EXCEPTIONS TO SPECIFICATIONS:

_____

_____

_____

_____

_____

The City will not assume obligations resulting from losses or damages until acceptance of the equipment.

If any person contemplating submitting a bid for this contract is in doubt as to the true meaning of any part of the Specifications or other proposed contract documents, he may submit to Purchaser 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 or delivered to each person receiving a set of such documents. The Purchaser will not be responsible for any other explanation or interpretation of the proposed documents.

All addendums must be signed and attached to bid documents.

IF YOU HAVE QUESTIONS OR NEED HELP ON THESE SPECIFICATIONS

PLEASE CONTACT ANY OF THE FOLLOWING:

TECHNICAL QUESTIONS

Brandon Miller – Mechanical Engineer
1228 N Denver Ave
Hastings, NE 68901
Ph# 402-462-3653
Email: bidquestions@cityofhastings.org

GENERAL QUESTIONS OR REQUESTS

Renae Griess
Engineering Admin Assistant
Ph# 402-462-3665
Email: bidquestions@cityofhastings.org

IMPORTANT SUBMITTAL INSTRUCTIONS

ON HOW TO SUBMIT YOUR BID
FOR
CITY OF HASTINGS
WEC UNIT 1 BOTTOM ASH WATER
RECIRCULATION SYSTEM ELECTRICAL CONSTRUCTION
Contract No. HU 2026-16

Your bid MUST be returned by means of hand delivery, USPS, Fed-X, UPS, or other carrier. City of Hastings DOES NOT ACCEPT bids that are faxed or emailed.

ALL the following documents are TO BE SUBMITTED in your bid packet.

1. **Cover sheet with your company's name filled in**
2. **ALL addendums received – must be acknowledged and signed**
3. **Bid Bond**
4. **If Exceptions, Instructions to Bidders with any exceptions listed**
5. **Proposal Page(s)**

FAILURE TO RETURN REQUIRED BID DOCUMENTS

COULD SUBJECT YOUR BID PROPOSAL TO BE REJECTED

IMPORTANT MAILING (OR HAND DELIVERY) INSTRUCTIONS

Please address your return envelope as shown in the example below. All bids must be sealed in a properly marked envelope.

To hand deliver, please drop off between the hours of 8am – noon and 1-5pm Monday through Friday.

Your Return Address

City of Hastings
Attn: Renae Griess
1228 N Denver Avenue
Hastings, NE 68901

This Information MUST BE typed or written in the lower left hand corner of return envelope
OR SIMPLY CUT OUT AND TAPE ON YOUR RETURN ENVELOPE

✂ ✂ ✂ ✂

BID DOCUMENTS ENCLOSED
ATTN: Renae Griess
Contract No: BA Recirc System Electrical Construction HU 2026-16
Bid Opens: Wednesday, February 25, 2026 @ 1:30 PM

If returning Fed-X or similar carrier, please enclose the bid in an "inner" envelope which is sealed. Please make sure BOTH envelopes are properly marked on the OUTSIDE OF THE ENVELOPE as shown in the example above.

One bid per envelope. Bid submittal via email is not allowed. Bids must be checked in to the City of Hastings prior to 1:30 pm deadline.

Proposal for WEC Unit 1
Bottom Ash Water Recirculation
System Electrical Construction
Contract No. HU 2026-16

TO: City of Hastings
1228 N. Denver Ave
Hastings, NE 68901

Bid Opening: February 25, 2026 (Wednesday)
SEALED BIDS MUST BE RECEIVED BY 1:30 P.M. AND WILL BE OPENED PROMPTLY AT THAT TIME

We, the undersigned, being familiar with all parts of these documents, being Notice to Bidders, Bid Proposal Price Sheets, Contract Document Forms, Plans and Specifications, Affidavit, Material List, and all other parts of this document, do herein submit our proposal to furnish, install, and perform all tasks required to complete said project area(s) for the total costs.

The labor portion is not subject to sales tax; however, the material portion is taxed accordingly. The project is outside of city limits and is subject to **5.5% sales tax**. See following tax rules and regulation language.

BID SECTION I: BA Water Recirc. System Electrical Construction

Item#	Description	Unit Price	Total
1	Mobilization	LUMP SUM	$
2	Labor for installation of CoH provided MCC, I/O modules, and electrical equipment per Scope of Work	LUMP SUM	$
3	Supply of materials for all power cables per the cable schedule	LUMP SUM	$
4	Labor for installation of power cables	LUMP SUM	$
5	Supply of materials for all control cables per the control cable schedule	LUMP SUM	$
6	Labor for installation of control cables	LUMP SUM	$
7	Supply of materials for conduit, raceway, cable tray, and all supports	LUMP SUM	$
8	Labor for installation of conduit, raceway, cable tray, and all supports	LUMP SUM	$
9	Supply of instrumentation tubing, airline tubing to solenoid valves, fittings, hardware, and instrument mounting supports	LUMP SUM	$
10	Labor for installation of all instrumentation per Inst. List, all hardware, supports and contractor supplied materials from line #9	LUMP SUM	$
11	Sales Tax	*(For Option 1 Contractors only) Sales Tax on materials of the above items	$
TOTAL SECTION I			
			$
In Words			

Proposal for WEC Unit 1
Bottom Ash Water Recirculation
System Electrical Construction
Contract No. HU 2026-16

BID SECTION II: BA Water Recirc. System Electrical Construction Start-Up Support

Item#	Description	Unit Price	Total
1	Labor for start-up support - provide a daily rate and for all crew members needed	LUMP SUM per day	$

Note: Material and Labor for equipment base grouting, touch-up painting, all testing, conduit and circuit labeling, and all other labor and materials not explicitly called out in proposal but included in scope of work shall be subsidiary to line items listed in proposal.

Liquidated Damages: The Contractor shall pay a fee of $1,000.00 per working day for failure to deliver the work before the specified dates in accordance with Section GC.36 – Liquidated Damages of Section 1 – General Conditions.

Substantial Completion Date: April 17, 2026
Project Completion Date (including system checkout and startup): May 1, 2026

Note: Unit prices shall prevail in the case of potential mathematical discrepancies.

The labor portion is not subject to sales tax; however, the material portion is taxed accordingly. See following tax rules and regulation language.

For purposes of sales/use tax, this project falls under Nebraska Sales and Use Tax Regulation 1-017 for Contractors. By definition, a contractor is "any person who repairs property annexed to, or who annexes property to, real estate, including leased property, by attaching building materials to the annexed property or improvement being built or repaired, or who arranges for annexation of property." Please refer to www.revenue.nebraska.gov/salestax.html for additional information.

For calculating this proposal:

- All contractors are to include sales/use tax on materials in the bidder's prices, if applicable.
- **Option 1 contractors must separately state materials, sales tax, labor, and other charges on all invoices for the project. Any invoices submitted that do not include this required breakdown of the charges will not be accepted for payment. (This requirement does not apply to Option 2 or 3 contractors.)**
- The sales/use tax rate on building materials is 7.0% for projects within Hastings' city limits and 5.5% for projects outside of city limits.
- Contractor labor charges for this proposal are not subject to sales/use tax per the Nebraska Department of Revenue Notice to Contractors effective October 1, 2007.
- In submitting this bid, the bidder certifies that he will comply with all applicable laws, ordinances, and codes of the City of Hastings and the State of Nebraska.

THIS BID DOCUMENT MUST BE SUBMITTED WITH BID

Proposal for WEC Unit 1
Bottom Ash Water Recirculation
System Electrical Construction
Contract No. HU 2026-16

- In submitting this bid, the bidder certifies that he will comply with all applicable laws, ordinances, and codes of the City of Hastings and the State of Nebraska.
- For this project, Contractor will supply all materials.

What contractor option have you registered with the Nebraska Department of Labor (must select one)? Please refer to https://dol.nebraska.gov for additional information.

Option 1 _____

Option 2 _____

Option 3 _____

Is Nebraska Sales/Use Tax included in the above prices.

Yes _____ No _____

(ALL COSTS TO INCLUDE CITY AND STATE SALES TAX)

The undersigned bidder agrees to furnish the required performance bond and to enter into a contract within ten (10) days after acceptance of the Proposal and further agrees to complete all work covered by the foregoing Proposal in accordance with specified requirements.

Exceptions: No ☐ Yes ☐ (If yes, list on ***"Instructions to Bidders"*** page)

Any modification of bid proposal will be considered non-conformance of the bid. All exceptions to the proposal shall be noted as an exception to the bid.

City of Hastings may at its own discretion delete any project area and / or component prior to award of contract. City of Hastings will award all bid sections to one contractor.

In submitting this proposal, it is further understood that the City of Hastings reserves the right to reject any or all proposals and may waive any informalities and may accept the proposal which best suits its needs. It is further understood that this proposal may not be withdrawn for a period of sixty days (60) days after bids are opened.

All bid documents, including proposals, bid bonds, subcontractor designation, etc., must be submitted with original signatures. No copies will be accepted.

OFFICIAL NAME & ADDRESS

Proposal for WEC Unit 1
Bottom Ash Water Recirculation
System Electrical Construction
Contract No. HU 2026-16

Firm Name	Signature
Address	Typed or Printed Name
City, State, Zip	Title
Phone No.	Date
Fax No.	Email Address

ALL BIDS MUST BE CHECKED IN TO THE CITY OF HASTINGS PRIOR TO 1:30 PM DEADLINE

AGREEMENT

THIS AGREEMENT, made and entered into this __ day of _____, 2026, by and between the City of Hastings, Party of the First Part, hereinafter called the "Purchaser" or "City", and _____of (town) _____ in the State of _____, Party of the Second Part, hereinafter called the "Contractor".

WITNESSETH: THAT,

WHEREAS: The Purchaser has caused the necessary contract documents to be prepared for defining material, equipment, and/or labor to be supplied to the City of Hastings and delivered complete as specified in the accompanying contract documents.

WHEREAS: The Purchaser has advertised for bids from Contractors, has received said bids, analyzed same and duly awarded a contract to the "Contractor", "Party of the Second Part", for material, equipment, and/or labor as hereinafter set forth and as stated more in detail in the Proposal and related contract documents to wit; Notice to Bidders, Instructions to Bidders, Specifications; all of which documents are attached hereto and made a part of this Contract.

NOW, THEREFORE: It is hereby agreed that for the sum of_____. ($ _____)

to be paid by the Purchaser, within Thirty (30) days after the acceptance of material, equipment, and/or labor by the Purchaser, to the Contractor, the Contractor agrees to furnish all materials, equipment, and/or labor as required by the accompanying specifications, and the aforesaid contract documents, for **HU 2026-16 WEC1 Bottom Ash Water Recirculation System Electrical Construction.**

All materials, equipment, and/or labor shall be in accordance with the accompanying contract documents and specifications which are as much a part of this Agreement as if repeated verbatim herein.

It is further agreed that the Contractor will start work promptly, furnish the necessary drawings promptly and complete the work in the number of days set forth in the Proposal.

IN WITNESS WHEREOF: The Parties of the First and Second Parts have hereto set their hands and seals on the day and year above written.

CITY OF HASTINGS
Party of the First Part

By: _____

Date: _____

ATTEST:

_____
City Clerk

CONTRACTOR
Party of the Second Part

SEAL

_____

By: _____

Title: _____

Date: _____

APPROVED TO FORM:

_____
City Attorney

Note: If executed by one other than President, Partner or the individual Owner, a Power-of-Attorney authorizing execution should accompany this Contract.

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS:

That we, the undersigned, _____,
as principal, and _____,
a corporation organized and existing under the laws of the State of _____,
and duly authorized to transact business in the State of Nebraska, as surety are held and firmly bound unto the CITY OF HASTINGS, NEBRASKA, a municipal corporation organized and existing under the laws of the State of Nebraska, hereinafter referred to as CITY, in the penal sum of _____ Dollars ($_____),
lawful money of the United States, for the payment of which will and truly be made, we the said principal and the said surety do hereby bind ourselves, our heirs, executors, administrators and assigns, jointly and severally, by these presents as follows:

The condition of this obligation is such that, whereas the principal, by an instrument in writing attached hereto and bearing the date of _____, 20____, has agreed with the CITY to do all work necessary and to furnish all labor, materials, supplies, tools and equipment to

_____

_____

_____

as specified thereby and in the specifications, proposals and contract forming the Contract Documents attached thereto and made a part hereof:

NOW THEREFORE, if the principal shall well and truly in good, sufficient and in a workmanlike manner, and to the satisfaction of the CITY perform and complete the work required, and shall defend, indemnify and save harmless the CITY against all damages, claims, demands, expenses and charges of every kind (including claims of patent infringement) arising from any act, omission or neglect of said principal, his agents, servants or employees, with relation to said work, and shall pay all costs, charges, rentals and expenses for labor, materials, supplies and equipment and deliver the said improvement to the CITY completed and ready for operation and free from all encumbrances or claims for labor, materials or otherwise, and shall pay all other expenses lawfully chargeable to the CITY, and this bond shall also be for the use and benefit of all persons who may perform any work or labor or furnish any material in the execution of said Contract and may be

sued on thereby in the name of any such party claiming the benefit hereof, then this obligation shall be void, otherwise the same shall remain in full force and effect. This obligation shall be in full force and effect for the full guarantee period provided in the specifications contained herein.

PROVIDED FURTHER, that said surety for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract or the work to be performed thereunder or the specifications accompanying the same shall in any way affect its obligation on this bond, and it does hereby waive notice of any change, extension of time, alteration or addition to terms of the Contract, to the work or to the specifications.

PROVIDED FURTHER, that if the principal of his, their or its subcontractor or subcontractors fail to duly pay for any labor, materials team, hire sustenance, provisions, provender or any other supplies or materials used or consumed by such contractor of his, their or its subcontractors in performance of the work contracted to be done, the surety will pay the same in any amount not exceeding the sum specified in the bond together with interest as provided by law.

IT WITNESS WHEREOF, said principal and surety have hereunto set their hands and seals at _____ this _____ day of _____, 20____,

This Bond is executed in triplicate counterparts.

_____
Principal

_____
Street Address

(SEAL)

_____ _____
Witness City, State, Zip

_____
Name of Person Executing

_____
Surety

ATTEST:

_____ By: _____
_____ Title: _____

INSURANCE COVERAGE

The undersigned hereby certifies that Workmen's Compensation, Public Liability and Property Damage, and Automobile Liability and Property Damage Insurance is in force and effect in accordance with the requirements contained in "Instruction To Bidders" which is a part of this document "Bid Proposal And Specifications". We further agree to give ten (10) days notice to the Public Power Generation Agency before effective date of cancellation or reduction of any of the above coverage.

This Insurance Coverage applies only to _____

_____

Dated _____

_____
SUPPLIER

By _____

Title_____

Date _____

_____
INSURANCE COMPANY

By_____

Title_____

Address_____

_____

Date_____

A F F I D A V I T

State of Nebraska)
) ss.
County of Adams)

I _____ , _____
Name Title

of _____
Firm Name

do hereby certify that all subcontractors, vendors, persons or firms who have furnished labor or material for the _____

_____

_____

have been fully paid and that all taxes have been paid.

_____
Signature

_____
Date

Subscribed and sworn to me this _____ day of _____, 20_____

_____
Notary Public

My commission expires _____.

A signed and notarized copy of affidavit must be in City of Hastings file before final payment may be made.

Copy of forms will be supplied by City of Hastings prior to final payment.

GENERAL CONDITIONS

GC.1 Contract Documents

It is understood and agreed that the Notice to Bidders, Instructions to Bidders, Proposal, Proposal Data, Contract Agreement, Performance Bond, Payment Bond, General Conditions, Special Conditions, Specifications, Drawings, Addenda, and Change Orders issued by the Purchaser or the Engineer, and specifications and engineering data furnished by the Contractor and accepted by the Purchaser, are each included in this Contract and the work shall be done in accordance therewith.

GC.2 Definitions

Words, phrases, or other expressions used in these contract documents shall have meanings as follows.

1. "Contract" or "contract documents" shall include the items enumerated above under CONTRACT DOCUMENTS.
2. "Purchaser" shall mean the City of Hastings named and designated in the Contract Agreement as "Party of the First Part," and their duly authorized agents. All notices, letters, and other communication directed to the Purchaser shall be addressed and delivered to:

   City of Hastings
   1228 North Denver Avenue
   P.O. Box 398
   Hastings, Nebraska 68902-0289
   Attention: Brandon Miller
   Mechanical Engineer

3. "Contractor" shall mean the corporation, company, partnership, firm or individual named and designated in the Contract Agreement as the "Party of the Second Part," who has entered into this Contract for the performance of the work covered thereby, and its, his, or their duly authorized representatives.
4. "Subcontractor" shall mean and refer only to a corporation, partnership, or individual having a direct contract with the Contractor for performing work covered by these contract documents.
5. "Engineer" shall also refer to City of Hastings as the purchaser.
6. "Date of contract," or equivalent words, shall mean the date written in the first paragraph of the Contract Agreement.
7. "Day" or "days," unless herein otherwise expressly defined, shall mean a calendar day or days of 24 hours each.
8. "The work" shall mean the equipment, supplies, materials, labor, and services to be furnished under the contract and the carrying out of all obligations imposed by the contract documents.

9. "Drawings" or "plans" shall mean all (a) drawings furnished by the Purchaser as a basis for proposals, (b) supplementary drawings furnished by the Purchaser to clarify and to define in greater detail the intent of the contract drawings and specifications, (c) drawings submitted by the successful bidder with his proposal, provided such drawings are acceptable to the Purchaser, (d) drawings furnished by the Purchaser to the Contractor during the progress of the work, and (e) engineering data and drawings submitted by the Contractor during the progress of the work, provided such drawings are acceptable to the Engineer.

10. Whenever in these contract documents the words "as ordered," "as directed," "as required," "as permitted," "as allowed," or words or phrases of like import are used, it shall be understood that the order, direction, requirement, permission, or allowance of the Purchaser or Engineer is intended only to the extent of judging compliance with the terms of the contract; none of these terms shall imply that the Purchaser or the Engineer has any authority or responsibility for supervision of the Contractor's forces or construction operations, such supervision and the sole responsibility therefor being strictly reserved for the Contractor.

11. Similarly the words "approved," "reasonable," "suitable," "acceptable," "proper," "satisfactory," or words of like effect and import, unless otherwise particularly specified herein, shall mean approved, reasonable, suitable, acceptable, proper, or satisfactory in the judgment of the Purchaser or Engineer, to the extent provided in (10) above.

12. Whenever in these contract documents the expression "it is understood and agreed" or an expression of like import is used, such expression means the mutual understanding and agreement of the parties executing the Contract Agreement.

13. "Official acceptance" shall mean the Purchaser's written acceptance of all work performed under this Contract, based on the Engineer's final inspection and issuance of a final payment certificate.

14. “Project completion” shall mean that the Bottom Ash Water Recirculation System is ready for operation. The project construction completion date is at the end of day, April 17th, 2026 with the system ready for operation on May 1st, 2026.

15. “Final Acceptance” shall mean that all work has been completed in accordance with these specifications, the project has been walked down, punch list items have been completed, and Purchaser is ready to accept the Work as complete.

16. “Stop Work Order” shall mean that the Purchaser will provide a written order to the Contractor requiring the Contractor to stop all, or any part of, the work called for by this Contract, for a time defined by the order. The order shall specify the reasoning for the suspended work, which may include, but are not limited to, engineering considerations, changes to the

project scope, safety or environmental concerns, or other issues detrimental to the project. Upon receipt of the order, the Contractor shall immediately comply with its terms and take all reasonable steps to minimize the incurrence of costs allocable to the work covered by the order. As soon as practical, the Purchaser and Contractor shall discuss the impacted activities, schedule, materials, labor, and equipment. If applicable, Purchaser and Contractor will seek to negotiate an equitable adjustment in the schedule, Contract price, or both, and the contract shall be modified, or a change order issued, as necessary. Upon any agreement and finalization of commercial conditions, Purchaser to provide written order to cancel the stop work order.

GC.3 Execution of the Contract

Once the bids have been evaluated, the Purchaser will electronically submit the Contract Agreement to the Contractor. The Contractor shall sign the Contract Agreement and return to Purchaser for the final approval process. Upon final approvals, the Contract Agreement will be signed by the Purchaser and electronically returned to the Contractor. Contractor shall then mail one hardcopy of required bonds, one electronic or hardcopy of insurance documents, and one electronic or hardcopy of power of attorney forms to the Purchaser. The date of contract on the bond forms and power of attorney forms shall match the date provided on the Contract Agreement by the Purchaser.

The Purchaser will review the final documents and electronically send a final conformed contract to the Contractor.

GC.4 Legal Addresses

The business address of the Contractor listed in the Proposal is hereby designated as the place to which all notices, letters, and other communication to the Contractor will be mailed or delivered. The address of the Purchaser appearing in section GC.2 is hereby designated as the place to which all notices, letters, and other communication to the Purchaser shall be mailed or delivered. Either party may change his address at any time by an instrument in writing delivered to the Engineer and to the other party.

GC.5 Scope and Intent of Contract Documents

The various parts of the contract documents are intended to supplement but not necessarily duplicate each other. Any work exhibited in one part and not in another shall be executed as if it had been set forth in all parts, so that the work will be performed according to the complete design as determined by the Engineer.

Should anything necessary for a clear understanding of the work be omitted from the contract documents, or should the requirements appear to be in conflict, the Contractor shall secure written instructions from the Engineer before proceeding with the work affected thereby. It is understood and agreed that the work shall be performed according to the true intent of the contract documents.

GC.6 Independent Contractor
The relationship of the Contractor to the Purchaser shall be that of an independent contractor.

GC.7 Assignment
The Contractor shall not assign the work, or any part thereof, without the previous written consent of the Purchaser, nor shall he assign, by power of attorney or otherwise, any of the money payable under this Contract unless written consent of the Purchaser has been obtained. No right under this Contract, nor claim for any money due or to become due hereunder shall be asserted against the Purchaser, or persons acting for the Purchaser, by reason of any so-called assignment of this Contract or any part thereof, unless such assignment has been authorized by the written consent of the Purchaser. In case the Contractor is permitted to assign moneys due or to become due under this Contract, the instrument of assignment shall contain a clause subordinating the claim of the assignee to all prior liens for services rendered or materials supplied for the performance of the work.

GC.8 Oral Statements
It is understood and agreed that the written terms and provisions of this agreement shall supersede all oral statements of representatives of the Purchaser, and oral statements shall not be effective or be construed as being a part of this Contract.

GC.9 Reference Standards
Reference to the standards of any technical society, organization, or association, or to codes of local or state authorities, shall mean the latest standard, code, specification, or tentative standard adopted and published at the date of taking bids, unless specifically stated otherwise.

GC.10 Source of Materials
To the extent possible, materials, and equipment (including components thereof) furnished under these specifications shall be produced, processed, manufactured, and assembled within the United States of America. Substitution of foreign materials for domestic materials will not be permitted unless such substitution is clearly stated in the Proposal and accepted by the Purchaser.

GC.11 Contractor to Check Drawings and Lists
The Contractor shall check all dimensions, elevations, and quantities indicated on the drawings and lists furnished to him by the Engineer. The Contractor shall notify the Engineer of any discrepancy between the drawings and the conditions at the site, or any error or omission in the drawings, or in the layout as given by stakes, points, or instructions, which he may discover in the course of the work. The Contractor will not be allowed to take advantage of any error or omission in the drawings or other contract documents that a reasonable inspection of them by Contractor would reveal. Full instructions will be furnished by the Engineer should such error or omission be discovered, and the Contractor shall carry out such instructions as if originally specified.

GC.12 Figured Dimensions to Govern
Dimensions and elevations indicated on the drawings shall be accurately followed even though different from scaled measurements. No work indicated on the drawings, the dimensions of

which are not indicated, shall be executed until necessary dimensions have been obtained from the Engineer.

GC.13 No Waiver of Rights

Neither the inspection by the Purchaser or Engineer or any of their officials, employees, or agents, nor any order by the Purchaser or Engineer for payment of money, or any payment for, or acceptance of, the whole or any part of the work by the Purchaser or Engineer, nor any extension of time, nor any possession taken by the Purchaser or its employees, shall operate as a waiver of any provision of this Contract, or of any power herein reserved to the Purchaser, or any right to damages herein provided, nor shall any waiver of any breach in this Contract be held to be a waiver of any other or subsequent breach.

GC.14 Authority of the Engineer

To prevent delays and disputes, and to discourage litigation, it is agreed by the parties to this Contract that the Engineer shall determine the quantities of work which are to be paid for under the contract and shall resolve all questions in relation to the work.

If, in the opinion of the Contractor or the Purchaser, a decision made by the Engineer is not in accordance with the meaning and intent of the contract, either party may file with the Engineer and the other party to the contract, within 30 days after receipt of the decision, a written objection to the decision. Failure to file an objection within the allotted time will be considered acceptance of the Engineer's decision and the decision shall become final and conclusive.

The Engineer's decision and the filing of the written objection thereto shall be a condition precedent to the right to request arbitration or to start action in court.

It is the intent of this agreement that there shall be no delay in the execution of the work and the decision of the Engineer as rendered shall be promptly observed.

GC.15 Engineering Inspection

The Purchaser may appoint (either directly or through the Engineer) such inspectors as the Purchaser deems proper to inspect the work for compliance with the contract documents. The Contractor shall furnish all reasonable assistance required by the Engineer, or inspectors, for the proper inspection of the work. Should the Contractor object to any interpretation of the contract by an inspector, the Contractor may make written appeal to the Engineer for a decision.

Inspectors shall have the authority to reject work which is unsatisfactory, faulty, or defective or does not conform to the requirements of the contract documents. Inspection shall not relieve the Contractor from any obligation to construct the work strictly in accordance with the contract documents.

Upon the failure of the Contractor or its Subcontractors to comply with any of the requirements of this Contract (but not limited to quality or safety), the Purchaser shall have the authority to stop any portion of the work affected by such failure until such failure is

remedied. If the Purchaser issues a Stop Work Order, the Purchaser shall not be liable for any costs or expenses claimed by Contractor arising out of such issuance. The construction schedule shall not be delayed or extended as a result of the Purchaser's issuance of a Stop Work Order.

GC.16 Contractor Default

If the work to be done under this Contract is abandoned by the Contractor; or if this Contract is assigned by him without the written consent of the Purchaser; or if the Contractor is adjudged bankrupt; or if a general assignment of his assets is made for the benefit of his creditors; or if a receiver is appointed for the Contractor or any of his property; of if at any time the Engineer certifies in writing to the Purchaser that the performance of the work under this Contract is being unnecessarily delayed, that the Contractor is violating any of the conditions of this Contract, or that he is executing the same in bad faith or otherwise not in accordance with the terms of said contract; or if the work is not substantially completed within the time named for its completion or within the time to which such completion date may be extended; then the Purchaser may serve written notice upon the Contractor and his surety of the Purchaser's intention to terminate this Contract. Unless within 5 days after the serving of such notice, a satisfactory arrangement is made for continuance, this Contract shall terminate. In the event of such termination, the surety shall have the right to take over and complete the work, provided that if the surety does not commence performance within 30 days, the Purchaser may take over and prosecute the work to completion, by contract or otherwise. The Contractor and his surety shall be liable to the Purchaser for all excess cost sustained by the Purchaser by reason of such prosecution and completion. The Purchaser may take possession of, and utilize in completing the work, all materials, equipment, tools, and plant on the site of the work.

GC.17 Beginning, Progress, and Completion of the Work

The time of completion is a basic consideration of this Contract. Unless otherwise specified in these contract documents or advised by written order of the Purchaser, the Contractor shall begin work within 10 days after the date of contract. The work shall be prosecuted to completion in accordance with the specified schedule, subject to adjustment as provided in these contract documents.

A detailed construction schedule shall be prepared by the Contractor and submitted to the Purchaser for review. The schedule shall contain the various activities required to perform the work and the dates the activities will be started and completed in order to complete the work in accordance with the specified schedule requirements. The Contractor is responsible for determining the sequence and time estimates of the detailed construction activities. However, the Purchaser reserves the right to require the Contractor to modify any portion of the schedule the Purchaser determines to be impracticable or unreasonable; as required to coordinate the Contractor's activities with those of other contractors, if any, engaged in work for the Purchaser on the site; to avoid undue interference with the Purchaser's operations; and to assure completion of the work by the date or dates stipulated. Upon acceptance by the Purchaser of the Contractor's detailed construction schedule, the Contractor will be responsible for maintaining such schedule.

If at any time the Contractor's work is behind schedule, he shall immediately put into effect definite procedures for getting the work back on schedule. The procedures shall be subject to review and modification by the Purchaser.

GC.18 Hindrances and Delays

The Contractor expressly agrees that in undertaking to complete the work within the time specified, he has made allowances for all hindrances and delays which might usually be expected to occur in performing the work. No claims shall be made by the Contractor for such hindrances and delays.

If the Contractor experiences hindrances and delays which, in his opinion, are not usually to be expected in the performance of the work and which affect the performance of the work, he may request a change in the contract. Such hindrances and delays may include, but not be limited to, acts or failure to act by the Purchaser or other contractors employed by the Purchaser, fires, floods, labor disputes, epidemics, or acts of God. Such hindrances and delays shall not include rain, snow, or other non-severe inclement weather. Claims by the Contractor for any change in the contract due to such hindrances and delays shall be made in accordance with the requirements of Article GC.22, CHANGES TO THE CONTRACT. The Contractor shall use all reasonable means to minimize the extent of the delay.

GC.19 Suspension of Work

The Purchaser reserves the right to suspend and reinstate execution of the whole or any part of the work without invalidating the provisions of the contract. Suspension or reinstatement of the work will be by written notice to the Contractor from the Purchaser.

Suspension of work shall not automatically entitle the Contractor to additional compensation or a change in the contract time; however, the Contractor will be reimbursed for real and unavoidable direct costs incurred by him as a result of such suspension and/or the contract will be extended as required to compensate for any delay due to such suspension. Claims by the Contractor for change of contract time or an adjustment of the contract price, due to work suspensions ordered by the Purchaser shall be made in accordance with the requirements of Article GC.22, CHANGES TO THE CONTRACT. The Contractor shall use all reasonable means to minimize the consequences of such suspension.

GC.20 Cancellation of Work

The Purchaser reserves the right to cancel the unshipped portion of the work by giving written notice to the Contractor. In the event of cancellation, the Purchaser will pay the Contractor reasonable and proper cancellation costs.

Cancellation of the work shall not constitute the basis for a claim for damages or loss of anticipated profits.

The Contractor shall, after consultation with the Purchaser, take all reasonable steps to minimize the costs related to cancellation. The Contractor shall provide the Purchaser with an accounting of costs claimed, including adequate supporting information, and the Purchaser may, at its expense, audit the claimed costs and supporting information.

GC.21 Modifications

The Contractor shall modify the work whenever so ordered by the Purchaser and such modifications shall not affect the validity of the contract. Modifications may involve changes in the amount of the work to be performed or changes in the contract time for which appropriate changes to the contract will be made.

Contract changes due to modifications shall be made in accordance with the requirements of Article GC.22, CHANGES TO THE CONTRACT.

GC.22 Changes to the Contract

The contract may be changed only by duly executed change orders issued by the Purchaser.

If, in the opinion of the Purchaser or the Contractor, any event or action by the other party justifies a change in the contract, either party shall initiate with the other party, within 5 days after such event or action, a request for a change to the contract. All documentation required to substantiate the proposed change shall be submitted within a minimum reasonable time after initiating the request for change. Upon the parties reaching agreement regarding the proposed change, the Purchaser will issue a written change order therefor.
Notwithstanding the foregoing provisions requiring duly authorized change orders, in the event agreement has been reached between authorized representatives of the parties regarding the change in the contract pending processing of such change order, the Contractor shall proceed with the work on the basis of written interim authorization from the Purchaser.

If the Contractor claims that any instruction, request, drawing, specifications, or other directive or action of the Purchaser or the Engineer constitutes a change in the contract, but has not been authorized as such by a change order in writing by the Purchaser, the Contractor shall immediately request a written interim authorization and proceed without delay to perform the work in accordance with such authorization. The Contractor shall provide written notice of the claim or dispute to the Engineer and the Purchaser within 5 days of the request for interim authorization. The Contractor's failure to give said written notice within the 5 day period shall constitute a waiver and relinquishment of any such claim or dispute. The Purchaser's written interim authorization shall not constitute approval of the claim for increased or decreased work, but shall be a condition precedent to the Contractor's right to receive payment for such work and to the Contractor's right to prosecute or maintain any proceeding to recover for such work.

GC.22.1 Contract Price Changes

The contract price may be changed due to modifications which involve extra work or decreased work; or due to work suspensions, hindrances, and delays over which the Contractor has no control. Claims for changes in the contract price shall conform to the requirements specified herein.

GC.22.1.1 Increased Price

If a change in the contract is required due to work suspensions or hindrances and delays, the contract price will be increased according to agreed lump sums, agreed acceleration costs, or

other demonstrable costs submitted by the Contractor and substantiated to the satisfaction of the Purchaser.

If a change in the contract price is required due to a modification which increases the amount of the work, and the added work or any part thereof is of a type and character which can properly and fairly be classified under one or more unit price items of the contract, then the contract price will be increased according to the amount actually done and at the applicable unit price. Otherwise, such work shall be paid for as herein-after provided.

Contract price changes for modifications involving extra work will be based on agreed lump sums or on agreed unit prices whenever the Purchaser and the Contractor agree upon such prices before the extra work is started; otherwise, payments for extra work will be based on actual direct cost plus the specified percentage allowance.

For the purpose of determining whether proposed extra work will be authorized, or for determining the payment method for extra work, the Contractor shall submit to the Engineer, upon request, a detailed cost estimate for proposed extra work. The estimate shall indicate itemized quantities and charges for all elements of direct cost. Charges for the Contractor's and subcontractor's extra profit, extra general superintendence, extra field office expense, and extra overheads shall be indicated as a percentage addition to the total estimated direct cost. Unless otherwise agreed upon by the Contractor and the Purchaser, such percentage additions shall be 15 percent for the extra work performed by the Contractor's own forces or 20 percent for extra work performed by a subcontractor.

When payment for extra work is based on actual direct cost, the Contractor will be paid the actual direct cost plus an allowance of 15 percent if the extra work is performed by the Contractor's own forces or 20 percent if the extra work is performed by a subcontractor. The allowance will be paid as full compensation for the Contractor's and sub-contractor's extra profit, extra general superintendence, extra field office expense, extra overheads, and all other elements of extra cost not defined herein as actual direct cost.

The actual direct cost shall include only those extra costs for labor and material expended in direct performance of the extra work and may include the following.

a. The actual payroll cost of all workmen such as laborers, mechanics, craftsmen, and foremen.

b. The Contractor's or subcontractor's net cost for materials and supplies.

c. The rental charge for vehicles and construction equipment.

d. The transportation charges for equipment.

e. The charges for extra power, fuel, lubricants, water, and special services.

f. The charges for extra payroll taxes, bond premiums, and insurance premiums.

The form in which actual direct cost records are kept, the construction methods, and the type and quantity of equipment used shall be acceptable to the Engineer.

Construction equipment which the Contractor has on the jobsite and which is of a type and size suitable for use in performing the extra work shall be used. The hourly rental charges for equipment shall not exceed 1/2 percent of the latest applicable monthly rental rates as published by Dataquest Incorporated in its "Rental Rate Blue Book" and shall apply to only the actual time the equipment is used in performing the extra work.

When extra work requires the use of equipment which the Contractor does not have on the jobsite, the Contractor shall obtain the concurrence of the Engineer before renting or otherwise acquiring additional equipment. The rental charges for the additional equipment shall not exceed the latest applicable "Rental Rate Blue Book" published rental rates.

GC.22.1.2 Decreased Price

If a change in the contract price is required due to a modification which decreases the amount of work, such decrease shall not constitute the basis for a claim for damages or anticipated profits on work affected by such decrease. Where the value of omitted work is not covered by applicable unit prices, the Engineer shall determine, on an equitable basis, the amount of:

a. Credit due the Purchaser for contract work deleted as a result of an authorized change,

b. Allowance to the Contractor for any actual loss incurred in connection with the purchase, delivery, and subsequent disposal of materials or equipment required for use on the work as planned and which could not be used in any part of the work as actually built, and

c. Any other adjustment of the contract amount where the method to be used in making such adjustment is not clearly defined in the contract documents.

Unless otherwise agreed upon by the Purchaser and the Contractor, the credit due the Purchaser for reductions in the amount of work to be done shall be the estimated direct cost of the deleted work plus an overhead allowance of the following.

- 10 percent of the estimated direct cost if the work was to have been done by the Contractor's own forces, or
- 15 percent of the estimated direct cost if the work was to have been done by a subcontractor.

Direct cost referred to above shall include the category of costs listed as actual direct costs, Items (a) to (f) inclusive of the article entitled Increased Price.

GC.22.2 Contract Time Changes

The contract time may be changed due to work modifications, hindrances and delays, and work suspensions over which the Contractor has no control.

Contract time will not be changed for delays caused by unfavorable weather or unsuitable ground conditions normally incident to the work, inadequate construction force, failure to

place timely orders for equipment and materials, or other causes within the control of the Contractor.

GC.23 Step Dispute Resolution

In the event of any controversy, claim or dispute between the Parties arising out of or relating to this Agreement, including its enforcement, such controversy, claim or dispute, including disputes regarded as such by only one of the Parties, the Parties shall negotiate in good faith to resolve such dispute, including third party mediation, if the Parties so agree.

If no settlement is achieved, either Party may pursue a claim in a federal or state court with competent jurisdiction.

GC.24 Laws and Regulations

The Contractor shall observe and comply with all ordinances, laws, and regulations, and shall protect and indemnify the Purchaser and the Purchaser's officers and agents, including the Engineer, against any claim or liability arising from or based on any violation of the same.

GC.25 Taxes, Permits, and Licenses

The Contractor shall pay all sales, use, and other taxes that are lawfully assessed against the Purchaser or Contractor in connection with the work and shall obtain and pay for all required licenses, permits, and inspections.

The Contractor will be compensated for any increase in tax rates, license fees, and permit fees or any new taxes, licenses, or permits imposed after the date of the Proposal; provided, however, that this provision shall be limited to sales, use, and excise taxes assessed against the completed work and to licenses and permits required specifically for the proposed work.

GC.26 Patents

Royalties and fees for patents covering materials, articles, apparatus, devices, equipment, or processes used in the work shall be included in the contract amount. The Contractor shall satisfy all demands that may be made at any time for such royalties or fees and he shall be liable for any damages or claims for patent infringements. The Contractor shall, at his own cost and expense, defend all suits or proceedings that may be instituted against the Purchaser for alleged infringement of any patents involved in the work and, in case of an award of damages, the Contractor shall pay such award. Final payment to the Contractor by the Purchaser will not be made while any such suit or claim remains unsettled.

GC.27 Materials and Equipment

Unless specifically provided otherwise in each case, all materials and equipment furnished for permanent installation in the work shall conform to applicable standard specifications and shall be new, unused, and undamaged when installed or otherwise incorporated in the work. No such material or equipment shall be used by the Contractor for any purpose other than that intended or specified, unless such use is specifically authorized by the Purchaser in each case.

All required tests in connection with acceptance of source of materials shall be made at the Contractor's expense by a properly equipped laboratory of established reputation whose work

and testing facilities are acceptable to the Purchaser. Any change in origin or method of preparation or manufacture of a material being routinely tested will require new tests. Reports of all tests shall be furnished to the Engineer or Purchaser in as many copies as required.

GC.28 Guarantee

The Contractor guarantees that the work herein contracted will be as specified and will be free from defects in design, workmanship, and materials. Contractor does not guarantee or warrant parts subject to normal wear and tear during operation. If within the guarantee period the work fails to meet the provisions of this guarantee, the Contractor shall promptly correct any defects, including nonconformance with the contract documents by adjustment, repair, or replacement of all defective parts or materials at the Contractor's option and expense, after consulting with the Purchaser on the proposed remedy plans.

Except as otherwise prescribed by the terms of any special guarantees required by the contract documents, the guarantee period shall begin on the date of final payment and shall end 12 months later.

The cost of all materials, parts, labor, transportation, supervision, special tools, and supplies required for replacement or repair of parts and for correction of defects shall be paid by the Contractor or by the surety.

This guarantee shall be extended to cover all repairs and replacements furnished under the guarantee and the period of the guarantee for each such repair or replacement shall be 1 year after correction of the defect except as otherwise prescribed by the terms of any special guarantees required by the contract documents.

The Contractor will be given an opportunity to confirm the existence of the defect, but he shall not delay the correction while making such determination.

If within 10 days after the Purchaser has notified the Contractor of a defect, failure, or abnormality in the work, the Contractor has not started to make the necessary repairs or adjustments, the Purchaser is hereby authorized to make the repairs or adjustments or to order the work to be done by a third party; the cost of the work to be paid by the Contractor.

In the event of an emergency where, in the judgment of the Purchaser, delay would cause serious loss or damage, repairs or adjustments may be made by the Purchaser or a third party chosen by the Purchaser without advance notice to the Contractor and the cost of the work shall be paid by the Contractor or by the surety.

GC.29 Contractor's Insurance Coverage

The Contractor shall not commence work under this Contract until Contractor has obtained all the insurance required under this article. Furthermore, the Contractor shall not allow any sub-contractor to commence work under this Contract until the sub-contractor has obtained the same insurance as is required of the Contractor. The sub-contractor alone shall be responsible for the sufficiency of its own insurance program.

GC.29.1 Certificates of Insurance
Certificates of Insurance acceptable to the Purchaser shall be filed with the Purchaser prior to commencement of the work. All insurance carried shall conform to the relevant provisions of the respective Project Documents and be with insurance companies which are rated "A, X" or better by Best's Insurance Guide, or other insurance companies of recognized responsibility satisfactory to the Purchaser.

GC.29.2 Proof of Carriage of Insurance. Satisfactory certificates of insurance shall be filed with the Purchaser prior to starting any construction work on this contract. The parties agree that the requirements with respect to requirements to procure and maintain insurance under this Section is a material part of this Agreement.

GC.29.3 Additional Insureds
Insurance coverages furnished under this Contract, with the exception of Workers' Compensation and Employer's Liability, shall include the City of Hastings and their members, directors, officers, agents, and employees as named Additional Insureds on a primary and noncontributory basis, and shall include Products and completed operations with respect to the activities of the Contractor and shall be maintained for the full duration of the project including for a period after completion to include the statute of repose.

Notwithstanding any other provision of these policies, the insurance afforded shall apply separately to each insured, with respect to any claim, suit, or judgment made or brought by or for any other insured, as though a separate policy had been issued to each, except the insurer's liability shall not be increased beyond the amount or amounts for which the insurer would have been liable had only one insured been named.

The Purchaser shall not by reason of their inclusion under these policies incur liability to the insurance carrier for payment of premium for these policies.

GC.29.4 Waiver of Subrogation
To the extent permitted by applicable law, the Contractor and their sub-contractor shall require their insurance carriers, with respect to all insurance policies, to waive all rights of subrogation against the Purchaser their partners, directors, officers, agents, and employees.

GC.29.5 Workers' Compensation and Employer's Liability Insurance
The Contractor shall procure, and shall maintain during the life of this Contract, Workers' Compensation Insurance as required by workers' compensation laws of the State of Nebraska and also of the state in which the sub-contractor is domiciled.

The Contractor shall also be protected against claims for injury, disease, or death of employees which, for any reason, may not fall within the provisions of a workers' compensation law. The Employer's Liability Insurance shall contain the following limits of liability:

Bodily Injury by Accident	$500,000 each accident
Bodily Injury by Disease	$500,000 each employee

Bodily Injury by Disease	$500,000 policy limit

GC.29.6 General Liability Insurance

This insurance shall be written per project on an “occurrence” policy form, including coverage for premises/operations, products/completed operations, blanket contractual liability, independent contractors and personal injury, with no exclusions for explosion, sudden and accidental pollution or an absolute or total pollution exclusion, collapse and underground perils. The commercial general liability policy shall also include a severability of interest clause and a cross liability clause in the event more than one entity is “named insured” or “named additional insured” under the liability policy.

Limits of Insurance shall be as follows:

Each Occurrence Limit	$1,000,000
Products/Completed Operations	$2,000,000
General Aggregate Limit	$2,000,000
Personal and Advertising Injury	$1,000,000

GC.29.7 Automobile Liability Insurance

This insurance shall be written under a Business Auto Policy and shall protect the Contractor and Additional Insureds against claims arising from injuries to members of the public or damage to property of others arising from the use of automobiles whether such automobiles are owned, non-owned, or hired. Automobile insurance shall include Motor Carrier Endorsement Act MCS 90 and transportation pollution coverage if applicable. If work is being done near a railroad track, the 50’ railroad right of way exclusion must be deleted.

Limit of Liability	$1,000,000 each accident

GC.29.8 Umbrella Liability Policy

This insurance shall protect the Contractor and the Additional Insureds against all claims in excess of the limits provided under the employer's liability, automobile liability, and general liability policies. The liability limits of the umbrella liability policy shall be not less than $5,000,000 per occurrence. This policy shall be an "occurrence" type policy. However, Purchaser reserves the right to require higher limits with respect to each project.

GC.29.9 Pollution Liability – If Applicable

Limits of at least:	$1,000,000 per occurrence; $1,000,000 aggregate

If Contractor or its Sub-subcontractor's work includes but not limited to remediating, handling, processing or disposing of hazardous material including but not limited to asbestos containing materials, silica, lead, PCBs, contaminated soil, etc, coverage shall be provided for bodily injury, property damage and clean-up costs resulting for pollution conditions.

GC.29.10 Riggers Liability – If Applicable

Should work involve the moving, lifting, lowering, rigging or hoisting of property or equipment Contractor shall carry Rigger's Liability Insurance to insure against physical loss or damage to the property or equipment on a Replacement Cost Basis.

GC.29.11 Railroad Protective Liability – If Applicable

Limits of at least: As required by the railroad company

If Contractor or its Subcontractor's work includes working within a railroad right-of-way, Contractor shall carry Railroad Protective Liability Insurance to insure against physical loss or damage to the real property or any equipment located on such railroad right-of-way, on a replacement cost basis. Contractor shall name the railroad and PPGA as additional insureds, in such limits as required by such railroad company.

GC.29.12 Professional Liability – If Applicable

Limits of at least: $1,000,000 per occurrence; $1,000,000 aggregate

Policy shall provide for a retroactive date prior to the starting date of services for which this agreement applies. Policy shall not exclude damages for bodily injury, property damage, or pollution liability. Coverage shall remain in force for a minimum of 3 years following substantial completion of construction through either policy renewal or the purchase of an Extended Reporting Provision. Contractor agrees to waive its rights of recovery. Subcontractor's insurer shall endorse the policy to waive subrogation against Owner and their respective agents, officers, directors and employees.

GC.29.13 Transportation Insurance – If Applicable
Contractor shall purchase inland marine coverage at the expense of Contractor on all equipment and materials, where Purchaser has an insurable interest. Insurance shall protect for Contractor and Purchaser from physical loss of equipment while loading, unloading, in transit to jobsite, and until equipment or materials have been installed or received by Purchaser.

GC.29.14 Property Insurance A.K.A. Builder's Risk – If Applicable
Unless otherwise provided, Contractor shall purchase and maintain property insurance, a.k.a. builder's risk insurance, on the building construction project in amount thereto for entire work at site on a replacement cost basis. Such property insurance shall be maintained, unless otherwise provided in contract documents or otherwise agreed in writing by all persons and entities who are beneficiaries of such insurance, until final acceptance of work by PPGA. Insurance shall include interests of PPGA, Contractor, Subcontractor, and sub-subcontractors in work. This property insurance covering work will have deductible for each occurrence, which will be responsibility of Contractor.

Before an exposure to loss may occur, the Contractor will provide a copy of the property insurance policy or evidence of property insurance, upon request that includes all property insurance coverages.

Waivers of Subrogation: PPGA, Contractor, and all Subcontractors waive all rights against

(1) each other and any of their subcontractors, sub-subcontractors, agents and employees, each of the other, and (2) PPGA's or Contractor's consultants, separate contractors, if any, and any of their subcontractors, sub-subcontractors, agents and employees, for damages caused by fire or other perils to extent covered by property insurance obtained, or other property insurance applicable to work, except such rights as they have to proceeds of such insurance held by PPGA and/or Contractor as fiduciary. Contractor shall require of consultants, separate contractors, if any, and subcontractors, sub-subcontractors, agents and employees of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. Policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay insurance premium directly or indirectly and whether or not person or entity had an insurable interest in property damaged.

GC.30 Indemnification

To the fullest extent permitted by laws and regulations, the Contractor shall defend, indemnify, and hold harmless the Purchaser, their officers, directors, members, consultants, agents, and employees from and against all claims, damages, losses, and expenses, direct, indirect, or consequential (including but not limited to fees and charges of engineers, architects, attorneys, and other professionals and court and arbitration costs) arising out of or resulting from the negligent, wrongful, or defective performance of the work by the Contractor, any sub-contractor, any person or organization directly or indirectly employed by any of them to perform or furnish any of the work, or anyone for whose acts any of them may be liable, regardless of whether or not it is caused in part by a party indemnified hereunder or arises by or is imposed by law and regulations regardless of the negligence of any such party.

In any and all claims against the Purchaser, or of any of their officers, directors, members, consultants, agents, or employees by any employee of the Contractor, any sub-contractor, any person or organization directly or indirectly employed by any of them to perform or furnish any of the work or anyone for whose acts any of them may be liable, this indemnification obligation shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for the Contractor or any such sub-contractor or other person or organization under workers' or workmen's compensation acts, disability benefit acts, or other employee benefit acts, nor shall this indemnification obligation be limited in any way by any limitation on the amount or type of insurance coverage provided by the Purchaser, the Contractor, or any of their sub-contractors.

GC.31 Release of Liability

Acceptance by the Contractor of the last payment shall be a release to the Purchaser and every officer and agent thereof, from all claims and liability hereunder for anything done or furnished for, or relating to the work, or for any act or neglect of the Purchaser or of any person relating to or affecting the work.

GC.32 Claims for Labor and Materials

The Contractor shall indemnify and save harmless the Purchaser from all claims for labor and materials furnished under this Contract. When requested by the Purchaser, the Contractor shall submit satisfactory evidence that all persons, firms, or corporations who have done work or furnished materials under this Contract, for which the Purchaser may become legally liable, have been fully paid or satisfactorily secured. In case such evidence is not furnished or is not satisfactory, an amount will be retained from money due the Contractor which, in addition to any other sums that may be retained, will be sufficient, in the opinion of the Purchaser, to liquidate all such claims. Such sum will be retained until the claims as aforesaid are fully settled or satisfactorily secured.

Before final acceptance of the work by the Purchaser, the Contractor shall submit to the Engineer in duplicate a notarized affidavit stating that all subcontractors, vendors, persons, or firms who have furnished labor or materials for the work have been fully paid and that all taxes have been paid. If a performance bond has been executed, a statement from the surety shall also be submitted consenting to the making of the final payment.

GC.33 Final Inspection

When the work has been substantially completed and at a time mutually agreeable to the Purchaser and Contractor, the Purchaser will make a final inspection of the work as to the acceptability and completeness of the work.

GC.34 Payments

Payment will be based on the Contractor's progress payment which he will submit to the Purchaser for approval. The Purchaser will retain five percent (5%) of the total contract amount for all work completed including change orders.

GC.35 Hazardous Materials

As required under Federal Hazardous Communications Standards and certain state and local laws, the Contractor shall provide Material Safety Data Sheets covering all hazardous materials furnished under or otherwise associated with the work under this Contract. The Contractor shall provide the Purchaser with either copies of the applicable Material Safety Data Sheets or copies of a document certifying that no Material Safety Data Sheets are required under any federal, state, or local law, regulation, statute, or ordinance in effect at the jobsite.

Hazardous materials are defined in the applicable statue which may use the terminology "toxic substances" instead of "hazardous materials." The Contractor is responsible for determining if any substance or material furnished, used, applied, or stored under this Contract is within the provisions of any applicable statute.

If the work under this Contract includes onsite construction or erection, the Contractor shall provide written notice of the presence of hazardous materials to local fire, medical, and law enforcement agencies as required with a copy of such notice to the Purchaser.

The Contractor shall provide labeling of hazardous materials and training of employees in the safe usage of such materials as required under any applicable federal, state, or local law, regulation, statute, or ordinance.

GC.36 Liquidated Damages

Time is a material provision of this Agreement. If the Contractor is unable to meet the agreed upon completion dates, the Contractor shall immediately notify the Purchaser and confirm the notice in writing within ten (10) business days of the delaying event. The notice shall contain detailed information of the delay including Contractor's estimate of the duration of the delay, Contractor's estimate of the delay's impact to Contractor's schedule and Contractor's plan to mitigate the effects of the delay.

Contractor shall be excused for delays in completion of the work only in accordance with GC.18. In the event of any such delay, Contractor shall only be allowed an extension of the date of completion for a period of time reasonably necessary to overcome the effect of the delay. Contractor shall not be entitled to any extra compensation for such delay. Contractor shall promptly notify the Purchaser in writing, with confirmation receipt of notification,

The liquidated damages amount per calendar day specified in the proposal form will be assessed, not as a penalty but as predetermined and agreed liquidated damages. The Purchaser and Contractor specifically agree the per calendar day amount to be assessed as liquidated damages is fair and reasonable and not excessive. The parties further agree that said per calendar day amount accurately reflect the anticipated loss and inconvenience to the public and lost revenue to or use by the Purchaser due to the project not being completed by the end of the project period or the end of the contract completion date.

The Purchaser shall have the right to deduct liquidated damages from any money in its hands, otherwise due, or to become due, to the Contractor; to submit invoice for payment; or to sue for and recover compensation for damages for nonperformance of this Contract within the time stipulated.

The Liquidated Damages for this project will be $500.00 per calendar day past the project completion date.

GC.37 Consequential Damages

Except for Supplier's third party obligations arising out of or liability for breach of Articles GC.26 and/or GC.30, Purchaser and Supplier will not be liable to each other for loss of profits, loss of use, loss of contracts, or consequential damages arising out of this Contract. This Section will not relieve Supplier of any obligation under GC.36.

GC.38 Limitation of Liability

With the exception of (a) indemnification stated in Article GC.30 and (b) the insurance coverages and limits set forth in Article GC.29, Supplier's total limit of liability on any claim, whether for breach of Contract, breach of warranty, tort, negligence, strict liability, or any other legal theory, for any loss or damage arising out of or connected to, or resulting from this Contract, shall be limited to the purchase price to be paid by Purchaser.

GC.39 Confidentiality

"Confidential Information" means the confidential or proprietary designs, know-how, processes, trade secrets, and other information owned or controlled by Purchaser, Engineer, or Supplier respectively. Supplier agrees to hold any Confidential Information received in the strictest confidence, shall only use the Confidential Information as necessary to perform the work. Purchaser agrees to hold any Confidential Information received in the strictest confidence and shall only use the confidential information as necessary for engineering, construction, start-up, commissioning, maintenance, or other purposes related to the project. Each party shall use the same degree of care as is used for its own information of similar importance, but no less than reasonable care.

GC.40 Work Eligibility Status

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.

GC.41 Fair Labor Standards

The Contractor agrees to comply with all current applicable State, Federal, and City fair labor standards in the execution of the contract. Pursuant to the Title VI Non-Discrimination Program of the City of Hastings, Contractor agrees to comply with the provisions set forth by CITY's Title VI Non-discrimination Program, if applicable. A copy of said provisions are as follows:

During the performance of this contract, the contractor, for itself, its assignees and successors in interest (hereinafter referred to as the "contractor") agrees as follows:

(1) Compliance with Regulations: The contractor shall comply with the Regulation relative to nondiscrimination in Federally-assisted programs of the Department of Transportation (hereinafter, "DOT") Title 49, Code of Federal Regulations, Part 21, and the Federal Highway Administration (hereinafter "FHWA") Title 23, Code of Federal Regulations, Part 200 as they may be amended from time to time, (hereinafter referred to as the Regulations), which are herein incorporated by reference and made a part of this contract.

(2) Nondiscrimination: The Contractor, with regard to the work performed by it during the contract, shall not discriminate on the grounds of race, color, or national origin, sex, age, and disability/handicap in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The contractor shall not participate either directly or indirectly in the discrimination prohibited by 49 CFR, section 21.5 of the Regulations, including employment practices when the contract covers a program set forth in Appendix B of the Regulations.

(3) Solicitations for Subcontractors, Including Procurements of Materials and Equipment: In all solicitations either by competitive bidding or negotiation made by the contractor for work to be performed under a subcontract, including procurements of materials or leases of equipment, each potential subcontractor or supplier shall be notified by the contractor of the contractor's obligations under this contract and the Regulations relative to nondiscrimination on the grounds of race, color, or national origin, sex, age, and disability/handicap.

(4) Information and Reports: The contractor shall provide all information and reports required by the Regulations or directives issued pursuant thereto, and shall permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the (Recipient) or the FHWA to be pertinent to ascertain compliance with such Regulations, orders and instructions. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish this information the contractor shall so certify to the (Recipient), or the FHWA as appropriate, and shall set forth what efforts it has made to obtain the information.

(5) Sanctions for Noncompliance: In the event of the contractor's noncompliance with the nondiscrimination provisions of this contract, the (Recipient) shall impose such contract sanctions as it or the FHWA may determine to be appropriate, including, but not limited to:

(a.) Withholding of payments to the contractor under the contract until the contractor complies, and/or

(b.) Cancellation, termination or suspension of the contract, in whole or in part.

(6) Incorporation of Provisions: The contractor shall include the provisions of paragraphs (1) through (6) in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Regulations, or directives issued pursuant thereto.

The contractor shall take such action with respect to any subcontract or procurement as the (Recipient) or the FHWA may direct as a means of enforcing such provisions including sanctions for non-compliance: Provided, however, that, in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or supplier as a result of such direction, the contractor may request the (Recipient) to enter into such litigation to protect the interests of the (Recipient), and, in addition, the contractor may request the United States to enter into such litigation to protect the interests of the United States.

SECTION 2 – GENERAL DESCRIPTION AND SCOPE OF WORK

2.1 General:

The City of Hastings (Owner) is accepting bids for the Electrical Installation for a new Bottom Ash Hopper Water Recirculation system for Whelan Energy Center, Unit 1 in Hastings, Nebraska. The bidder is strongly encouraged to visit with Hastings prior to submitting a bid. The Bidder shall inform themselves of all conditions and factors which would affect the execution of the work. No claims for financial compensation or time extension, based on the lack of such prior information (or its effect on the cost of the work) will be permitted by the Owner. Please contact Brandon Miller, Mechanical Engineer, at 402-462-3653 if you have any questions about this project or would like to set up a visit.

2.2 Description of System:

Whelan Energy Center, Unit 1 (WEC1) is an 82 megawatt (MW), pulverized coal-fired generating plant located near Hastings, Nebraska. The Unit began commercial operation in 1981. The existing ash sluicing systems have been replaced with dry collection systems and the current ash water pumps are being replaced with a new overflow tank, pumps, piping, valves, and other equipment. Water from the current ash water pumps is used for the bottom ash hopper slope jetting nozzles, front bottom ash hopper jetting nozzles, sluice gate door emergency jetting nozzles, and pyrite sluicing jet pump. The jetting nozzles are used to push bottom ash down the slopes of the bottom ash hopper to the clinker grinders and bottom ash submerged chain conveyor system. The new water recirculation system will eliminate the need to add service water to the bottom ash hopper and recirculate the system water for all bottom ash hopper flushing. New equipment and piping is being provided by Allen-Sherman-Hoff (B&W). The pumps will be powered by a new MCC to be installed on second floor and fed from existing 480V switchgear. All instrumentation and controls will be integrated into the existing combined bottom ash and fly ash PLC and control cabinets.

2.3 Scope of Work Performed Under This Contract:

The contractor shall perform the following scope of work:

- Installation of City of Hastings supplied electrical and controls equipment
    - Install new motor control center MCC 1H adjacent to MCC 1B on the Mezzanine floor.
    - Equipment in existing Bottom Ash System Control Cabinets 903/913 per Olsson Sheet Gen (these materials are supplied by City of Hastings)
        - Install new Allen Bradley digital input module
        - Install new Allen Bradley digital output module
        - Install new DIN rails, terminal blocks, and relays
        - Replace existing terminals in Cabinet 903, TB3 5-12, with new multi-level terminal blocks
- Supply and Installation of all power wiring per attached cable schedule including:
    - From 480V SUS1-4B to new MCC-1H
    - From MCC-1H to new pump P-1
    - From MCC-1H to new pump P-2

- Supply and Installation of all instrumentation and controls wiring per attached controls cable schedule including:
    - From field devices to Bottom Ash control cabinets 903 & 913
    - All interconnecting control wiring between terminal blocks, relays, and I/O modules in Bottom ash control cabinets 903 & 913
    - Labor to rewire Cabinet 913 TB3 5-12 from old terminal blocks to new terminal blocks
- Supply and Installation of all conduit, raceway, cable tray, fittings and associated mounting hardware
    - Conduit from Power feed from SUS1 to MCC-1H per drawing PT_335-13
    - Conduit from MCC-1H to pumps
    - Conduit from instruments to Bottom Ash control cabinets 903 & 913
    - No cable tray is expected to be used
- Supply and Installation of all cable and fittings for equipment grounding system
    - Connect new grounding back to existing plant grounding system per drawings E101 and E102
- Supply and Installation of all instrumentation tubing, fittings, hardware, and instrument mounting steel & accessories
- Supply and Installation of all flexible airline tubing between compressed air isolation valves and all control valve solenoid valves see drawings PT-335-10 and PT-335-11
    - Compressed air piping header installed by others
- Installation of all non-inline instrumentation provided by B&W per the provided P&IDs and Instrument List
- System Start-Up Support:
    - Contractor shall provide labor to support testing and checkout of system. Contractor shall repair and fix items from their scope of work found to be defective during testing.
- Other scope
    - All terminations needed for cable installation
    - All conduit and cable tray mounting hardware
    - Supply all hardware to mount instrumentation to existing steel or provide new stands
    - Labeling
        - cables, conduit, cable trays, and equipment with COH provided numbers and cable numbers on wiring diagrams. Contractor to provide physical labels to attach to equipment.
    - Provide a spreadsheet or document showing circuit numbers and the conduit and raceway numbers the circuits are routed through. Purchaser will provide available conduit/ raceway numbers. Contractor will be responsible for assigning numbers to each individual raceway/ conduit.
    - Clean up of work area before demobilization
        - Clean up and dispose of all construction scraps including but not limited to: hardware, wire, piping, conduit, metals, pallets, crates, packaging and other miscellaneous garbage
        - All demolished parts, equipment, and piping shall be disposed of unless directed otherwise by City of Hastings
        - All spare parts shall be turned over to City of Hastings or put in storage area as directed by City of Hastings

2.4 Work Performed by Others:

The following will be performed under Contract HU 2025-101 (B&W Material Supply):

- Supply of equipment for the bottom ash hopper water recirculation system including items indicated as supplied by B&W on B&W provided contract drawings:
  - Overflow tank
  - Pumps
- Supply of piping, valves, and fittings per B&W provided contract drawings:

The following will be performed under Contract HU 2026-15 (Mechanical Construction):

- Installation of all the equipment furnished by B&W
- Installation of all piping provided by B&W
- Supply and installation of all Contractor supplied piping
- Installation of pipe supports

The following will be performed under Contract HU 2025-146 (PLC Programming):

- All PLC programming and integrating new equipment into existing bottom ash and fly ash programs
- Development of HMI screens

2.5 Miscellaneous Materials and Services Scope:

Miscellaneous Materials and Services Scope			
Item	Description	Contractor (Applies to)	Owner (Applies to)
1.	Receipt, inspection, unloading and storage of materials provided by Equipment Supplier		X
2.	Receipt, inspection, unloading and storage of materials supplied by Contractor	X	
3.	Supply and installation of anchor bolts for contractor installed equipment	X	
4.	All hardware, welding supplies, and miscellaneous materials not provided by owner that are necessary for the completion of the work	X	
5.	Removal and disposal of all demolished equipment, piping, and materials unless otherwise directed by City of Hastings	X	
6.	Supply, installation, and removal of all temporary erection bracing, rigging, attachments and supports	X	
7.	All tooling and equipment required to perform the specified work	X	
8.	Survey and layout of the work from the Purchaser's designated control points	X	

9.	Supply of lifting equipment including cranes, man lifts, fork lifts, and telehandlers needed to complete the work	X	
10.	Supply of all work platforms including scaffolding, and OSHA required fall protection	X	
11.	Tests and inspections as required by specification	X	
12.	Grouting of equipment and column bases	X	
13.	Supply and install of touch up coatings	X	
14.	Station services including air, water, and electrical power		X
15.	Sanitary services in the form of portable toilets	X	
16.	Supply of common trash dumpster		X
17.	Clean up of work area	X	

2.6 Other Requirements:

The contractor shall comply with the following:

- All of Contractor's employees and any Sub-Contractor's employees shall take a mandatory safety orientation provided by City of Hastings before starting work on the project. The safety orientation is required once a year and is good from Jan 1 through Dec 31 each year.
- Contractor shall comply with site LOTO policy. LOTO will be performed by City of Hastings prior to starting any work on the system.
- Contractor shall comply with site Hotwork and Confined Spacy policies where applicable. Owner will provide Hotwork permits.
- Contractor shall follow all relevant OSHA regulations including fall protection and trenching and shoring.
- Weekly progress meetings between Contractor's project superintendent and Project Engineer.

2.7 Submittal Requirements:

The contractor shall submit the following information to the owner:

- Product data sheets for all contractor supplied materials.
  - Cables
  - Conduit, Cable Tray, Raceway
- Material test reports.
- Red-lined drawings indicating deviations from original drawing designs.

2.8 Project Schedule:

The new bottom ash water recirculation system is scheduled to be completed during the WEC Unit 1 2026 Spring outage per the dates below. The existing bottom ash hopper flushing system and ash water pumps will need to be kept in-service until the outage begins.

- Work to be completed during WEC1 Spring 2026 Outage:

    - Installation of new City of Hastings Provided Equipment (I/O modules, DIN rails, terminal blocks, relays)
    - Installation of raceway and conduit
    - Installation of power and controls cables
    - Installation of instrumentation
    - Installation of flexible airline tubing
- Work to be completed ahead of WEC1 Spring 2026 Outage:
    - Installation of concrete pedestals for pumps (by others)
    - Installation of new MCC-1H
    - Installation of conduit (can be installed before outage at contractor's option)

Work will be coordinated with mechanical contractors, contractors performing other outage work, and City of Hastings to allow completion during scheduled outage.

Material and Installation Contract:

Activity	Schedule
Bid Opening	Wednesday, February 25, 2026
Anticipated Contract Award Date	Monday, March 2, 2026

Preliminary Construction Schedule:

The work under this contract will have to be coordinated with City of Hastings and other Contractors to assure the Bottom Ash Water Recirculation System is completed before the end of the scheduled outage. A preliminary construction schedule is shown below.

Activity	**Schedule**
Completion of Concrete Pump Bases (by others)	Friday, March 6, 2026
Delivery of B&W Supplied Equipment	Completed by Friday, March 20, 2026
Start of Spring Outage	**Friday, March 20, 2026 at 23:59**
End of Spring Outage	**Friday, May 1, 2026 at 11:59**
Outage Electrical Construction	Monday, March 23, 2026 through Friday, April 17, 2026
PLC Programming, Controls and System Checkout	Monday, April 20, 2026 through Wednesday, April 29, 2026

2.9 Project Drawings:

The following drawings are part of the project. Vendor drawings for materials and equipment will be supplied to Contractor before the start of work. They are also available upon request. A full set of Issued For Construction drawings will be sent to the contractor electronically via Sharepoint after contract has been signed.

Drawing No.	Revision	Description
B&W Drawings		
225361-01-A201-01	A	Equipment List

225361-01-A204-01	A	Instrument List
225361-01-A205-01	A	Electrical Load List
225361-01-A209-01	A	Valve List
225361-01-C-5682	A	Butterfly Valve Cylinder Operated
225361-01-D-8101	-	Bi-Directional Knifegate Valves Cylinder Operated
225361-01-E701-01	B	General Arrangement Recirculation Pump System
225361-01-E701-02	C	General Arrangement Recirculation Pump System
225361-01-E703-01	A	P&ID Bottom Ash Recirculation System
225361-01-E703-02	D	P&ID Bottom Ash Recirculation System
225361-01-E730-01	B	Erection Arrangement Recirculation Pump System
225361-01-E730-02	C	Erection Arrangement Recirculation Pump System
225361-01-E730-03	C	Erection Arrangement Recirculation Pump System
225361-01-E730-04	C	Erection Arrangement Recirculation Pump System
225361-01-E730-05	B	Erection Arrangement Recirculation Pump System
225361-01-E730-06	C	Erection Arrangement Recirculation Pump System
225361-01-E731-01	A	Hopper Flushing Nozzles
225361-01-E746-01	A	Foundation Plan Recirculation Pump System
225361-01-E790-01	B	Pipe Support Location Plan
225361-01-E790-02	A	Pipe Support Location Plan
225361-01-E790-03	A	Pipe Support Location Plan
225361-01-Paint	B	Paint Specification
City of Hastings Drawings		
PT-335-07	-	Demolition Details
PT-335-08	-	Air Water Separator Relocation Plan
PT-335-09	-	Air Water Separator Details
PT-335-10	-	Compressed Air Piping Plan
PT-335-11	-	P&ID M1016 Compressed Air
PT-335-12	-	P&ID M1017A Compressed Air
PT-335-13	-	Conduit Routing
Olsson Drawings		
E001	A	General Notes and Details
E101	A	Ground Level Grounding Plan
E102	A	Mezzanine Level Grounding Plan
E201	A	Ground Level Power Plan
E202	A	Mezzanine Level Power Plan
E501	A	MCC-1H One-Line Diagram
E1101	A	One-Line Diagram 480V SUS 1A & 1B
Cable Schedule	A	Power Cable Schedule
GEN	A	General Notes – Instrumentation and Controls
ASA-34	A	Wiring Diagram Local Control Panel SGC1 903
ASA-35	A	Wiring Diagram Local Control Panel SGC2 913
ASA-36	A	Wiring Diagram Local Control Panel SGC2 913
Controls Cable Schedule	A	Controls Cable Schedule

SECTION 3 – Technical Specifications

3.1 Equipment Installation:

3.1.1 General:

The contractor shall install equipment provided by City of Hastings.

3.1.2 Equipment to be Installed:

The following equipment will be installed:

- New Motor Control Center MCC 1H
    - Rockwell MCC will have three sections with approximate dimensions 60” x 20” x 90” high
- New Electrical Equipment for SGC Panels 903 and 913
    - Allen Bradley digital input module
    - Allen Bradley digital output module
    - DIN rails, terminal blocks, and relays

3.1.3 Reference Drawings:

The following drawings show equipment to be installed:

- Sheet E202
- Sheet GEN

3.1.4 Low Voltage Equipment:

This equipment consists of low voltage motor control centers (MCCs), reliable power supply equipment, and other low voltage ac switchboards and panels.

All low voltage equipment and medium voltage to low voltage transformers shall be installed according to the manufacturer's recommendations and instructions and local code requirements.

Installation of this equipment shall include accurately aligning each unit on its foundation and securing it in place; and checking all main and secondary connections and tightening them where found loose. All covers or enclosures which have been removed for shipment or removed during installation shall be securely bolted in place. Each enclosure shall be installed so that it is level and all doors freely swing full travel.

Where top mounted junction boxes are provided, they shall be assembled and bolted to the motor control center enclosures.

The enclosures that are split for shipping shall be assembled, bus and control wire shipping split connections shall be made, to assure that mechanical and safety interlocks are installed and functional, all stabs and disconnect devices are properly aligned, isolation barriers are in place, and the drawout units move freely in and out of their compartments. All breakers, starters, and miscellaneous devices shall be installed and exercised to assure that the equipment is suitable for electrical energization.

Motor starter overload heater elements or overload relays of various sizes may be shipped separately. Motor nameplate data and MCC manufacturer's bulletins shall be used for field selecting and installing the proper size overload relays and heater elements. Overload devices shall be set, removed, or installed as directed by Purchaser.

All circuit breakers, fused switches, motor starters, etc., shall be checked for proper mechanical and electrical operation.

3.2 Conductors:

3.2.1 General:

The contractor shall supply and install all power and control conductors per the attached drawings, Power Cable Schedule, and Controls Cable Schedule. Contractor shall adhere to the latest edition of the National Electric Code and all State and Local codes. The Contractor shall follow all specifications on provided drawings as stated in the General Notes and Sheets Notes sections.

3.2.2 Drawings & Cable Schedule:

The drawings and cable schedules shall be used to determine the sizes, types, and quantities of conductors used on the project. These specifications can be found on the following documents:

- Power Cable Schedule
- Controls Cable Schedule

3.2.3 Installation:

3.2.3.1 Cable Placement - All cable described in the Power Cable Schedule and Controls Cable Schedule shall be routed as indicated therein. Routing of other cable shall be as indicated on the drawings and field routed where not specified on the drawings and cable schedules.

If at any time during the progress of the Work, raceways are found which appear inadequate to accommodate the assigned cable, Purchaser shall be notified immediately. Further work on the questionable raceway shall be paused until Purchaser advises how to proceed.

All cable shall be carefully checked both as to size and length before being pulled into conduits or ducts. Cable pulled into the wrong conduit or duct or cut too short to rack, train, and splice as specified herein shall be removed and replaced. Cable removed from one conduit or duct shall not be pulled into another conduit or duct without prior approval from Purchaser.

3.2.3.2 Cable in Trays. All cable shall be carefully laid in or pulled through the tray system so that neither the cable nor the trays are damaged. Cable may be laid along the side of the tray system during placement provided it is protected from dirt, water, oil, or other detrimental materials and from mechanical injury. Cable shall be cut sufficiently long to conform to the contour of the trays, with particular attention paid to vertical inside bends. All excessive slack shall be removed from the cable so that it lies parallel to the sides of the trays. Multiple single conductor cable which constitutes a single power circuit shall be grouped together as defined by the NEC to minimize magnetic influence on other cable in the area.

Power cables shall be installed in tray in accordance with the NEC and the following additional requirements:

Low Voltage Power Cables (2000 volts or less)
Low voltage power cables (all single-conductor and multi-conductor greater than or equal to 4/0 AWG) shall be installed in cable tray in a single layer. If single-conductor cables are triplexed or bound together in circuit groups, the sum of the diameters of all single conductors shall not exceed the cable tray width.

Multiconductor power cables less than 4/0 AWG may be installed in a random manner in accordance with NEC Article 392.22 (A)(1)(b) and (c).

Low voltage multi-conductor power cables 4/0 AWG or larger shall be installed in cable tray in the following manner(s):

In a single layer with no maintained spacing requirement between cables.
The sum of the diameters of all cables shall not exceed the tray width.

Low voltage single-conductor power cables shall be installed in cable tray in the following manner(s):

Triplexed or bound in circuit groups of a single layer with a minimum spacing of 1 times the diameter of the largest conductor contained within the configuration and adjacent conductor configurations or cables.

The cable shall be tied to the trays with nylon ties as necessary (but at not greater than 10 foot intervals) to hold it in place.

3.2.3.3 Splicing - No splices shall be made in conductors for instrument circuits or control circuits except where required at connections to accessory devices equipped with factory installed pigtails or where high temperature wire is necessary locally to connect to a particular device. Shields may be spliced where necessary to permit connection to the station ground.

Power cable circuits may not be spliced unless specifically approved by Purchaser. Where splices are unavoidable, they shall be performed in accordance with the standards listed in this section and at locations acceptable to Purchaser.

Splices shall not be made to utilize short lengths of cable nor shall they be made to provide correct lengths on cable initially cut too short for a particular circuit.

Splices, joints, and connections in cable shall be made only in pull boxes or junction boxes unless otherwise indicated on the drawings and shall be made in accordance with the instructions of the cable manufacturer.

3.2.3.4 Stripping Requirements - Any material in contact with the conductor shall be free-stripping. Cables which require wire brushing of the conductor or dipping of the conductor into molten solder to facilitate termination are not acceptable. If the material in contact with the conductor is not free-stripping, the entire cable reel may be rejected at the option of Purchaser.

3.2.3.5 Cable Identification and Labeling - The ends of all circuits listed in the Cable Schedules shall be identified with a circuit tag. Each tag shall be marked with the circuit number according to the Cable Schedules and drawings. At terminations, each circuit shall be identified. Each phase of multiphase power circuits shall be individually identified. The circuit tag shall be so attached that it is readily visible for circuit identification. During the installation of power and instrument cables, Contractor shall keep a list of all conduits each circuit number is routed through. Purchaser will use this information at the conclusion of the project to create a master circuit list. Example circuit lists showing routing of cables through conduits can be provided by Purchaser.

Phase tape shall be applied to each conductor at the terminations of all power and lighting circuits. The phase taping for power conductors shall be as follows:

208/120 V Circuits	Black – Phase A; Red – Phase B; Blue – Phase C; White – Neutral
480/277 V Circuits	Brown – Phase A; Orange – Phase B; Yellow – Phase C; Grey – Neutral
4160 (or 6900) V Circuits	Black – Phase A; Red – Phase B; Blue – Phase C

Green shall be used for ground at every voltage level. Phase taping circuits shall not be required if cable with colored insulation is installed.

3.2.3.6 Spare Conductors - All spare conductors of a multiconductor cable shall be left at their maximum lengths for possible replacement of any other conductors in the cable. Each spare conductor shall be neatly dressed for future use.

3.2.3.7 Terminations - Cable shall be terminated in accordance with the following requirements:

In general where possible, cables for power circuits exceeding 50 V should be terminated on the field side first followed by the source side.

Train cable in place and cut squarely to required length. Avoid sharp bends.

Remove necessary amount of cable jacket and insulation without damage to the conductor.

Install terminals or terminal connectors as required, ensuring a firm metal-to-metal contact.

Reducing pin terminals (if required and approved for use by Purchaser) shall be installed where 600V power cables have been oversized and will not fit into mechanical connections such as on molded case breakers.

Install high voltage cable termination kits for shielded cable rated 5 kV and above using the procedures recommended by the manufacturer of the kit being used.

Insulate each connection of cable to an insulated conductor (whether cable, bus, or equipment bushing). The insulation shall cover all exposed surfaces of the conductors; the insulation voltage level of the completed termination shall be not less than the insulation voltage level of the connected conductors.

Instrument cable shields and drain wires shall remain on the pair as close to the termination point as practical. Shields shall be permanently taped to prevent unraveling and the drain wires shall have insulating sleeves installed up to the point of termination.

3.2.3.8 Tests After Placement - All insulated conductors shall be electrically tested after placement.

All circuits, including lighting circuits, shall be tested with the circuit complete except for connections to equipment. All splices, stress cones on shielded cable, and terminal connector attachments shall be complete prior to testing.

In addition to the tests performed after cable placement is complete, continuity tests shall be performed on all supervisory and communication cable before and after each splice is made.

Any circuit failing to test satisfactorily shall be replaced or repaired and then retested.

Subcontractor shall provide documentation of the tests on forms provided by Purchaser or acceptable for each test performed.

Continuity Tests. Continuity tests shall include all tests necessary to confirm that each conductor is continuous throughout its entire length.

Identification Tests. Identification tests shall include all tests necessary to confirm that the conductor being investigated originates and terminates at the locations designated in the Circuit List or indicated on the drawings.

Insulation Tests. Resistance from ground provided by the insulation on all field-installed insulated power conductors shall be measured.

Cable Rated Below 5000 Volts. All insulated conductors, except control, instrumentation, supervisory and communication cable, rated less than 5000 volts shall be tested for insulation resistance with a megger or an equivalent testing device, per the most current NETA ATS specification. Insulation resistance measurements shall be made between each conductor and ground and between each conductor and all other conductors of the same circuit. Minimum acceptable resistance values shall comply with the specified acceptance criteria in NETA ATS specification.

3.3 Raceway Components and Installation:

3.3.1 General:

This section covers the furnishing and field installation of all electrical raceway systems and components. The raceway system and installation shall be in accordance with the drawings, Cable Schedules, and these specifications.

The raceway system is defined to include conduit, flexible conduit, cable tray, wireway, junction boxes and pull boxes, and all materials and devices required to install, support, secure, and provide a complete system for support and protection of electrical conductors.

3.3.2 Codes and Standards:

Work performed under these specifications shall be done in accordance with the following codes and standards. Unless otherwise specified, the applicable governing edition and addenda to be used for all references to codes or standards specified herein shall be interpreted to be the jurisdictionally approved edition and addenda. If a code or standard is not jurisdictionally mandated, then the current edition and addenda in effect at the date of this document shall apply. These references shall govern the work except where they conflict with other specifications. In case of conflict, the more stringent shall govern to the extent of such difference.

Raceway systems and components furnished with these specifications shall be manufactured in accordance with applicable standards of the American National Standards Institute (ANSI), the National Electrical Manufacturers Association (NEMA), and Underwriters' Laboratories, Inc. (UL). Raceway systems and components shall be installed in accordance with the applicable requirements of the National Electrical Code (NEC) and the Occupational Safety and Health Administration (OSHA) standards.

3.3.3 Conduit and Raceway Labeling:

Contractor shall label all new field routed cable tray, raceway, and conduits with raceway numbers provided by Purchaser. Labels shall have a white background with black lettering and be approximately 2” x 5” in size. During the installation of cables, Contractor shall make a list of all conduits each circuit on the cable schedule is routed through. See sections 3.2.3.5 and 3.5.3.

3.3.4 Approved Manufacturers of Components:

For the following components, only the listed manufacturers are recognized as maintaining the level of quality of workmanship required by these specifications. A non-listed manufacturer that is considered to provide an equivalent level of quality may be substituted pending supporting testimony provided and prior approval. Acceptance of the manufacturer as a substitute is at the discretion of Purchaser:

Component	**Manufacturer**
Fire stops	Nelson Fire Stops Flame-Safe Fire Stop Systems Fire Stop Systems
Conduit - Steel	Allied Tube and Conduit Triangle PWC, Inc. Wheatland Company
Conduit - Aluminum	Allied Tube and Conduit Wheatland Company Indalex
Conduit - Plastic	Cantex PVC Products Carlon Plastic Conduit

Component	Manufacturer
Conduit - Flexible	Anamet Canada, Inc. Liquatite International Hose Company
Conduit - Fiberglass	Champion Fiberglass United
Conduit bodies and fittings - Metal	O-Z/Gedney Crouse-Hinds Appleton Allied Tube and Conduit
Conduit bodies and fittings - Plastic	Cantex PVC Products Carlon Plastic Conduit
Support channels and fittings	Unistrut Metal Framing Eaton B-Line
Conduit supports	O/Z/Gedney Crouse-Hinds Appleton
Wireway	Cope Legrand Cablofil Eaton B-Line Pentair Hoffman Lee Products Company
Boxes and enclosures - Metal	Pentair Hoffman Wiegmann Appleton Hammond Manufacturing Co.
Boxes and enclosures - Plastic	Hammond Manufacturing Co. Carlon Plastic Products Crouse-Hinds
Cable tray and accessories - Metal	Eaton B-Line Cope Legrand PW MP Husky ABB T&B

3.3.5 General Installation Requirements:

3.3.5.1 Routing of Above Grade Raceway. Electrical cable tray and wireway shall be routed as indicated on the drawings. Conduit shall be field routed according to the general routing indicated on the drawings. The location of field routed raceway and all raceway supports shall be coordinated with other equipment and structures.

Wherever practical, field routed raceway shall be routed so that, except where it is changing floor elevations or being lowered to enter equipment, the lowest part of the raceway, including its associated supports and appurtenances, is at least 7'-6" (2.3 m) above the closest floor or walking surface beneath it. Field routed raceway and its associated supports and appurtenances, located at least 7'-6" (2.3 m) above the closest walking surface, may be routed a reasonable distance away from the supporting wall, ceiling, or structural member so long as the specified support is provided and interference with other equipment and structures is avoided. Field routed raceway and its associated supports and appurtenances, which must be routed closer than 7'-6" (2.3 m) above the closest walking surface, shall be routed as close as possible to surfaces of walls, columns, and the equipment served.

Field routed raceway and all raceway supports shall be located at least 6 inches (150 mm) from the final outside surface of all steam piping, including insulation, and 2 inches (50 mm) from the final outside surface of all other piping, including insulation if provided. Consideration shall be given to the thermally expanded position of piping when field routing raceway.

Field routed raceway and all raceway supports shall be located so that they do not interfere with equipment which expands, vibrates, or moves under normal operation such as a steam generator, flue gas ductwork, or overhead crane.

3.3.5.2 Raceway Attached to Building Steel. Except as otherwise approved or specified, indicated on the drawings, raceway and raceway supports attached to building steel shall be secured by welding, by drilling and tapping, by powder activated devices and fasteners, or by beam clamps. All necessary touch up paint or galvanization shall be completed.

Raceway and raceway supports shall not be attached to grating, handrail, ladders, pipe, equipment, and other raceway not designed for the additional loading.

Raceway and raceway supports shall not be attached to the flanges of the cold-formed support steel in pre-engineered buildings. Instead, raceway and raceway supports shall be attached to the web of the cold-formed support steel by using bolts installed through holes field drilled in the web.

3.3.5.3 Openings through metal wall panel. Single conduit openings in metal wall panel shall be hole punched or drilled the minimum size to allow passage of the conduit through the wall panel. Openings for multiple conduits or cable tray shall be neatly saw cut 2 inches (50 mm) larger than required on all four sides to allow passage of the raceway components.

Insulation removed to clear the opening for the passage of raceway components through metal insulated wall panel shall be reinserted around the outside edges of the opening.

3.3.6 <u>Conduit Components:</u>

An electrical conduit system shall be furnished and installed in accordance with the drawings and the following specifications. Conduit components shall include conduit, fittings, supports, and hardware required for a complete system.

3.3.6.1 Rigid galvanized steel conduit. Steel conduit, couplings and elbows shall be a threaded hot-dipped galvanized rigid mild steel manufactured in accordance with ANSI/NEMA C80.1 and UL 6. The conduit interior and exterior surfaces shall have a continuous hot-dipped galvanized coating with a transparent overcoat of enamel, lacquer, or zinc chromate. Each length of conduit shall have a coupling on one end and a thread protector on the other. The thread protector shall have sufficient mechanical strength to protect the threads during normal handling and storage. Rigid galvanized steel conduit shall be similar to Type GRC as manufactured by Allied Tube and Conduit Corporation, or approved equal.

3.3.6.2 Liquidtight flexible metallic conduit. Liquidtight flexible metallic conduit shall be a plastic jacketed, heavy-duty, locking, flexible metal core manufactured in accordance with ANSI/UL 360. The plastic jacket shall be UV, oil, and acid resistant and shall be suitable for a temperature rating of 60° C. The metal core shall be a locking galvanized steel core for use with galvanized conduit systems, or a locking aluminum core for use with aluminum conduit systems. Liquidtight flexible metallic conduit used in high temperature areas shall have a thermoplastic PVC jacket suitable for a temperature rating of 105° C. Galvanized liquidtight flexible metallic conduit shall be similar to Sealtite Type UA as manufactured by Anamet Canada, Inc. or approved equal. High temperature galvanized liquidtight flexible metallic conduit shall be similar to Sealtite Type HTUA as manufactured by Anamet Canada, Inc. or approved equal. Aluminum liquidtight flexible metallic conduit shall be similar to Sealtite Type EFL as manufactured by Anamet Canada, Inc. or approved equal.

Fittings for flexible conduit in hazardous locations shall be properly rated and marked for the area classification.

3.3.6.3 Rigid metal conduit bodies and fittings. Rigid metal conduit bodies and fittings shall conform to the requirements of ANSI/NEMA FB-1, UL 514B and UL 886 where these standards apply. Conduit bodies and fittings shall be appropriate for the area and equipment with which they are associated. Conduit bodies and fittings used in hazardous areas shall conform to NEC requirements for the area classification.

Threaded galvanized malleable iron or galvanized steel bodies and fittings shall be used with galvanized conduit. Threaded copper free aluminum or aluminum alloy bodies and fittings shall be used with aluminum conduit. Unthreaded zinc coated steel fittings shall be used with electrical metallic tubing. Metallic tubing fittings shall be compression type and watertight.

Additional requirements for rigid metal conduit bodies and fittings are as follows.

3.3.6.4 Conduit outlet bodies. Conduit outlet bodies shall be provided where required for pulling ease and changing conduit direction. Standard conduit outlet bodies shall be threaded to accept threaded cover screws. Standard conduit outlet bodies installed outdoors or in wet locations shall be gasketed to provide a watertight seal. Conduit outlet bodies used in hazardous areas shall be provided with internally threaded gasketed covers.

Standard conduit outlet bodies shall be similar to Types LB, X, LL, LR, T, TB or C as manufactured by O-Z/Gedney or approved equal.

3.3.6.4 Insulated bushings. Insulated bushings with insulating inserts in metal housings shall be provided for the termination of all threaded conduits not terminated in hubs or couplings. Insulating inserts shall be phenolic or a similar thermoplastic material.

Grounding type insulated bushings shall be provided for all conduits containing power circuits and all conduits located in hazardous areas.

Insulated bushings shall be similar to Type IBC as manufactured by O-Z/Gedney or approved equal. Grounding type insulated bushings shall be similar to Type IBC-L-BC as manufactured by O-Z/Gedney or approved equal.

3.3.6.5 Locknuts. Locknuts shall be provided for the termination of all indoor threaded conduits not terminated in hubs or couplings. One interior and one exterior locknut shall be provided. Exterior locknuts shall be gasketed. Locknuts shall be designed to securely bond the conduit to the box when tightened while also preventing loosening by vibration. Interior locknuts shall be similar to Type 1 as manufactured by O-Z/Gedney or approved equal. Exterior locknuts shall be similar to Type SLG as manufactured by O-Z/Gedney or approved equal.

3.3.6.6 Unions. Conduit unions shall be provided for the connection of two threaded conduit ends when the conduit cannot be turned. Standard conduit unions shall be similar to three piece Type 4 Series as manufactured by O-Z/Gedney or approved equal. Hazardous area conduit unions shall be similar to Type UNF as manufactured by O-Z/Gedney or approved equal.

3.3.6.7 Raintight hubs. Raintight hubs shall be provided for the termination of threaded conduits on outdoor equipment where threaded hubs are not provided. Raintight hubs shall be provided with an insulated throat. Standard and hazardous area rated raintight hubs shall be manufactured by Crouse-Hinds, Appleton or approved equal.

3.3.6.8 Combination fittings. Combination fittings shall be provided to connect threaded rigid metal conduit to electrical metallic tubing. Combination fittings shall have a threaded throat to receive the rigid metal conduit, and a threadless compression type throat to receive the electrical metallic tubing. Combination fittings shall be similar to Type ETR as manufactured by O-Z/Gedney or approved equal.

3.3.6.9 Expansion fittings. Expansion fittings shall be provided in threaded conduit runs to allow for the expansion and contraction of conduit supported across expansion joints. Expansion fittings shall be watertight, and shall be provided with bonding jumpers. Standard expansion fittings shall be similar to Type EX as manufactured by O-Z/Gedney or approved equal. Expansion fittings for hazardous areas shall be similar to Type UNFE as manufactured by O-Z/Gedney or approved equal.

3.3.6.9 Drains. Drains shall be provided in the low spots of outdoor conduit runs, and in outdoor conduit runs prior to entering buildings, to remove condensation from the conduit. Conduit drains shall be similar to Type DB as manufactured by O-Z/Gedney or approved equal.

3.3.6.10 Reducers. Reducers shall be provided to connect two different conduit sizes together. Reducers shall be external couplings similar to Type REC as manufactured by Crouse-Hinds or approved equal.

3.3.6.11 Conduit Seal-off fittings. Seal-off fittings shall be provided to isolate conduit runs and prevent the passage of flammable gases, vapors, and dusts from hazardous areas and to contain explosive gases and flame within an explosionproof enclosure. Seal-off fittings shall be suitable for vertical and horizontal conduit installations, and properly rated and marked for the applicable area classification. Seal-off fittings shall have a removable plug for the placement of sealing fiber, and an additional removable plug for the placement of sealing compound. Seal-off fittings shall be similar to Type EYA as manufactured by O-Z/Gedney or approved equal.

Sealing fiber and sealing compounds shall be compatible with the seal-off fittings provided.

3.3.6.12 Liquidtight flexible metallic conduit fittings. Liquidtight flexible metallic fittings shall be provided to connect liquidtight flexible metallic conduit to rigid metal conduit and devices. Liquidtight flexible metallic fittings shall have insulated throats and shall bear the UL label. Liquidtight flexible metallic fittings shall be similar to Type STB and Type STN as manufactured by Appleton or approved equal. Galvanized malleable iron fittings shall be used with galvanized core flexible conduit. Copper free aluminum or aluminum alloy fittings shall be used with aluminum core flexible conduit. Fittings for flexible conduits in hazardous locations shall be properly rated and marked for the area classification.

3.3.6.13 Flexible metallic conduit fittings. Flexible metallic fittings shall be provided to connect flexible metallic conduit to light fixtures and wiring devices in finished areas. Flexible metallic fittings shall have "Squeeze" type or friction connectors for fastening the fitting to the flexible conduit. Flexible metallic fittings shall have insulated throats and bear the UL label. Flexible metallic combination fittings shall have a friction type connector on one end for fastening to flexible metallic conduit, and a compression type connector on the other end for fastening to electrical metallic tubing. Flexible metallic fittings shall be similar to Types C, 24 Series, and CB as manufactured by O-Z/Gedney or approved equal.

3.3.6.14 Flexible metallic conduit fittings. Flexible metallic fittings shall be provided to connect flexible metallic conduit to light fixtures and wiring devices in finished areas. Flexible metallic fittings shall have "Squeeze" type or

3.3.7 <u>Conduit Supports:</u>

Conduit supports shall conform to the requirements of the articles that follow. Specific conduit support materials shall be as indicated on the drawings.

3.3.7.1 Hanger rods. Hanger rods used for the support of formed channel shall be 1/2 inch (13 mm) diameter electrogalvanized continuous threaded steel rods. Hanger rods shall be similar to Type HTHR as manufactured by Unistrut Metal Framing or approved equal.

3.3.7.2 Support channel. Support channel shall be hot-dipped galvanized formed channel made from 12 gauge steel in 1-5/8 inch (41 mm) series sizes. Support channel shall be similar to Type P1000 Series as manufactured by Unistrut Metal Framing or approved equal.

3.3.7.3 Support channel fittings. Support channel fittings shall be flat plate and angular fittings and brackets designed for use with the 1-5/8 inch (41 mm) series formed channel indicated previously. Support channel fittings shall be hot-dipped galvanized steel. Support channel fittings shall be as manufactured by Unistrut Metal Framing or approved equal.

3.3.7.4 Conduit clamps. Conduits in single runs or groups of two shall be supported by one hole cast metal clamps with clamp backs, or with conduit clamps attached to beams. One hole clamps, clamp backs and conduit clamps attached to beams shall be hot-dipped galvanized malleable iron. One hole conduit clamps

and clamp backs shall be similar to Type 14-G Series manufactured by O-Z/Gedney or approved equal. Conduit beam clamps shall be similar to Types UBC, UEC, and UPC manufactured by O-Z/Gedney or approved equal.

Supports for banks of three or more conduits shall be constructed of formed channel with associated two piece galvanized conduit clamps. Two piece conduit clamps shall be designed for use with the 1-5/8 inch (41 mm) series formed channel indicated previously. Two piece conduit clamps shall be similar to Type P1100 Series or Type P1400 Series manufactured by Unistrut Metal Framing or approved equal.

Conduits in single runs or groups of two terminated at cable tray shall be supported from the tray side rail using galvanized malleable iron cable tray conduit clamps similar to Type LCC Series clamps manufactured by Crouse-Hinds or approved equal. Banks of three or more conduits shall be terminated at cable tray with the use of two piece conduit clamps and formed channel attached to the tray side rail as indicated on the drawings.

3.3.7.5 Conduit support spacing. All conduit runs shall be rigidly supported in accordance with the following requirements.

Vertical rigid metal conduit shall be supported in maximum 20 foot (6 m) intervals. Vertical plastic conduit and electrical metallic tubing shall be supported at the maximum intervals indicated for their respective horizontal conduit support spacing shown below.

Rigid metal conduit, plastic conduit, and electrical metallic tubing shall be supported within 3 feet (900 mm) of each junction box, pull box, cabinet, conduit body, or other conduit termination.

Horizontal rigid metal conduit, plastic conduit, and electrical metallic tubing shall be supported at the indicated maximum intervals.

Maximum Support Intervals			
Nominal Conduit Size, inches	**Rigid Metal Spacing, feet**	**Rigid Plastic Spacing, feet**	**Electrical Metallic Tubing Spacing, feet**
1/2	10	3	5
3/4	10	3	5
1	12	3	6
1-1/2	14	5	7
2	16	5	8
2-1/2	16	6	8
3	20	6	10
4	20	7	10
5	20	7	-
6	20	8	-

3.3.8 <u>Conduit Installation:</u>

Conduit and associated components shall be installed as indicated on the drawings and as described in these specifications.

3.3.8.1 Routing. Field routed conduit and associated supports shall not interfere with the installation or maintenance of any dimensioned equipment, building steel, cable tray, HVAC duct, fans, dampers, or pre-routed piping.

Conduit shall not be routed under crane or trolley rails, or through areas designated for the maintenance or removal of equipment accessed by overhead removable panels and hatches. Any conduit which interferes with these areas or purpose shall be promptly removed so as not to delay installation or use of any equipment.

Except as otherwise specified or indicated on the drawings, all conduit shall be installed in exposed runs parallel or perpendicular to dominant surfaces with right angle turns made of symmetrical bends or fittings. Except where prevented by the location of other work, a single conduit or a conduit group shall be centered on structural members.

3.3.8.2 Conduit drains. Outdoor conduits shall not contain moisture pockets. Drains shall be installed in outdoor conduit to remove moisture at locations where conduits terminate on equipment or devices, and at locations where conduits penetrate an exterior wall.

Outdoor conduits shall be installed so that water will not drain into any equipment containing electrical devices or connections. Drains shall be installed at lowest point in conduit above grade. Outdoor conduits terminating on equipment from above shall have a conduit seal fitting with drain installed in the conduit run near the conduit termination where practical. Outdoor conduit terminating on equipment from the side shall have a conduit “tee” body with drain installed in the conduit run near the conduit termination where practical. Outdoor conduit terminating on equipment from below shall have a conduit “tee” body with drain installed in the conduit run at the lowest vertical location directly below the equipment. Equipment serviced from below by underground or embedded conduits shall not require drains.

Outdoor conduits penetrating exterior walls shall have a conduit “tee” body with drain installed on the exterior side of the wall at the “low point” of the conduit as close as practical to the wall penetration.

3.3.8.3 Couplings and unions. Rigid metal conduit shall be joined by threaded conduit couplings with the conduit ends butted. The use of running threads will not be permitted. Where rigid metal conduit cannot be turned and joined together by standard threaded couplings, conduit unions or split couplings may be used. Conduit union coupling nuts shall be installed uppermost on vertical or inclined conduit runs to prevent the entrance of water into the union. Split couplings shall not be installed on outdoor conduit.

Plastic conduit shall be joined together in accordance with manufacturer recommendations using unthreaded couplings and a medium bodied solvent cement. Joining surfaces shall be wiped clean of dirt, moisture, or other contaminants prior to application of the solvent cement. If joining surfaces are extremely dirty or coated with oil, a cloth saturated with PVC cleaner shall be used to clean the surfaces. Joining surfaces shall be thoroughly dried before applying solvent cement.

Electrical metallic tubing shall be joined together by unthreaded compression couplings. The use of set-screw couplings will not be permitted.

3.3.8.4 Bends and offsets. A run of conduit shall not contain more than the equivalent of four 90 degree bends, including those immediately at outlet bodies and fittings. Field bends shall be made without reducing the internal diameter of the conduit. The center line radius of field bends shall not be less than six times the nominal trade size diameter of the conduit.

The use of a pipe tee or vise for bending metal conduit will not be permitted.

Plastic conduit bends shall be factory fabricated wherever possible. Where field bending of plastic conduit is required, the conduit length shall be heated to approximately 275° F. Conduit heating may be by radiant heat, hot air, or hot liquid immersion. Open flame heating will not be permitted. Special mandrels or forms shall be used to provide a smooth bend without reduction of the conduit diameter. Conduit discolored by prolonged heating will not be acceptable.

3.3.8.5 Fittings. Conduit outlet bodies installed in conduit runs shall be sized and installed in accordance with the NEC. Covers shall be installed on outlet bodies at the time of installation to prevent the entrance of moisture or contaminants into the conduit system prior to cable pulling operations.

Conduit outlet bodies shall not be installed in conduit runs containing 5 kV and higher voltage conductors, unless the type and location have been reviewed for excessive cable bending radius constraints as defined by the cable manufacturer.

Conduit fittings for metal conduit shall be installed wrench-tight.

Hazardous area conduit seal-off fittings shall be installed at locations required by the NEC for the classified area. Seal-off fitting compounds and fiber shall be installed as recommended by the fitting manufacturer. Completed conduit seal-off fitting installations shall not restrain equipment removal or access beyond that which would be encountered if there were no sealing fitting installed on the conduit run.

3.3.8.6 Cutting and threading. The plane of all conduit ends shall be square and perpendicular with the center line. The ends of all conduit and tubing shall be reamed to remove all rough edges and burrs.

Where threads are required, they shall be cut and cleaned prior to conduit reaming. A cutting oil shall be used in threading operations. The dies shall be kept sharp and provisions shall be made for chip clearance.

All steel conduit ends, after cutting or threading, shall be cleaned and regalvanized with a cold galvanizing coating as specified by Technical Attachment Coating System 1302 Datasheet or with an acceptable equal that meets the specified performance requirements. This protective material shall be applied to any surface where the galvanized coating is damaged or removed.

3.3.8.7 Cleaning. Precautions shall be taken to prevent the accumulation of water, dirt, or concrete in the conduit. Conduit in which water or other foreign materials have been permitted to accumulate shall be thoroughly cleaned. Refer to IEEE 1185-2019 for recommended practice for pre-installation of cables and cleaning of raceway systems.

3.3.8.8 Liquidtight flexible conduit. Liquidtight flexible conduit inserts shall be installed at the locations indicated below. Liquidtight flexible conduit lengths shall not be greater than 24 inches (600 mm) in length for 2 inch (50 mm) and under nominal conduit diameter, and 48 inches (1,200 mm) in length for nominal conduit diameter greater than 2 inches (50 mm)

Liquidtight flexible metallic conduit shall be installed in all rigid metal conduit runs which are supported by both building steel and by structures subject to vibration or thermal expansion.

Liquidtight flexible metallic conduit shall be installed in rigid metal conduit runs which cross expansion joints or which connect to building supported independent structures, such as storage tanks or ash hoppers.

Liquidtight flexible metallic conduit should be considered in all long rigid metal conduit runs where differential expansion problems may be expected.

Liquidtight flexible metallic conduit shall be installed adjacent to all equipment and devices which move in relation to the supply conduit due to vibration, normal operation of the mechanism, or thermal expansion.

The supply conduit shall be connected to pressure switches, thermocouples, solenoids, and similar devices with liquidtight flexible metallic conduit. Liquidtight flexible metallic conduit shall be installed adjacent to the motor terminal housing for motors requiring 4 inch (100 mm) and smaller conduit. Provisions for vibration and thermal expansion at motors requiring larger than 4 inch (100 mm) conduit shall be accomplished by use of pendent hangers or other acceptable means.

3.4 Instrumentation and Control Installation:

3.4.1 General:

All controls and instrumentation shall be installed in accordance with the requirements of this section, project drawings, and instrument lists. Any installation procedures not specified herein or in the Instrument Installation Details shall be done in accordance with the manufacturer's recommendations and good engineering practice and shall be acceptable to Purchaser.

Instruments shall be oriented so that the indication faces the direct access approach to the equipment with which they are associated.

Where an instrument is associated with a valve, it shall be located at the valve or the scale shall be visible from the valve.

An instrument shall not be mounted on a handrail, adjacent to process vents and exhausts, or where it obstructs a walkway.

Instruments shall be accessible for use, calibration, and repair without requiring the removal of piping, grating, or other structures. This requirement also applies to the removal of any covers or housing that is part of the instrument or its installation.

All instruments shall be installed in such a way that they are not subject to shock, excessive vibration, or temperature extremes from process heating, and that they do not block any access-way.

The location of instruments shall permit easy access from grade, permanent platforms, temporary access, ladder or stairways for operation, inspection, and maintenance. Locations shall also minimize the possibility of damage from falling or passing objects and from fire. The use of special ladders or mobile steps should be minimized. If they are necessary, then prior approval will be required on a case-by-case basis.

Safety Instrumented System (SIS – Emergency shutdown) devices must be easily accessed due to the high level of maintenance required for these devices. Ladders or other temporary means are not allowed.

All vent valves or tubes connected to vent ports as well as pressure safety valve vents shall be directed away from the normal personnel access position.

All instruments and connection lines shall have allowance for the movement of equipment caused by seismic loading, vibration, or expansion and contraction caused by temperature changes. Instruments subjected to excessive vibration, shall be installed on separate supports. The layout of the impulse lines shall provide sufficient flexibility to contain the vibration.

All controls and instrument installation and accessories shall be executed and supervised by personnel experienced in this type of work.

Sequence of installation work shall be coordinated with Purchaser to support the project commissioning schedule.

During installation, all connections, covers, and fittings on all instruments shall be in place and provided with temporary coverings as necessary; to protect them until permanently connected. Plastic caps or other protection on electrical access openings to instruments must remain in place until the final wiring installation with appropriate weather-tight connections is made.

Local panels or cabinets shall remain closed once installed. On enclosures using more than one hold-down device or clamp, all hold-down devices shall be fully engaged.

3.4.2 Installation of Locally Mounted Equipment:

In addition to the installation requirements indicated on the drawings, the requirements specified herein shall apply:

Remote mounted transmitters shall be installed below the process tap for liquids and condensing gasses, and above the process taps for gasses. No instrument (other than direct mounted gauges) shall be installed using the impulse piping, tubing, or electrical conduit connection for support or rigidity.

Instrument shall be mounted with a clearance from hot surfaces/systems of at least 2 (two) feet per 100-degree Fahrenheit (for equipment with surface temperature excess 200 degrees Fahrenheit).

Locally mounted instruments shall be mounted on the specified instrument stands or shall be suitably bracketed and surface mounted on the nearest suitable firm steelwork.

Surface mounting pressure gauges with blowout pressure release backs shall be mounted at least 20 mm away from the mounting plate by means of spacers.

All field instruments shall be rigidly supported using 2-inch pipe stanchions, brackets, etc. Instrument stands shall be generally fabricated as shown on the instrument installation details.

Instrument stands shall be attached to columns, building structural steel, or concrete. All instruments shall be supported to avoid stresses being put on the instrument by pneumatic, process, or signal connections.

Bracket, mounting, and stand materials shall be selected, or suitably insulated, to avoid galvanic corrosion and to be suitable for the ambient environment. Miscellaneous hardware including nuts, bolts, spring washers, etc., shall be 316 stainless steel. Standard sized fasteners, such as 0.2362 inches (M6) and 0.3937 inches (M10), shall be used. Alternate materials shall be used where appropriate for the ambient conditions (such as sea spray environments).

All pedestal mounts, support brackets, and general fixing materials shall be hot-dipped galvanized steel or stainless steel to suit the duty. Any cuts, holes, or welds made during installation shall be painted with a suitable galvanizing paint.

Galvanized steel is only acceptable where there is no possibility of the steelwork receiving splash or spray from caustic, acidic, or otherwise corrosive environments such as seawater. It must be suitable for all other chemical and environmental exposure in the area of use. Galvanizing shall be provided by a hot-dipped process; cold galvanized plating is not acceptable.

Brackets, supports, and other materials not already protected in an approved way shall be primed and painted in accordance with the painting specifications to withstand the environment.

Where necessary, electronic instrumentation shall be protected by sunshades to minimize the effects of sun and weather. These sunshades may be for individual instruments or, where appropriate, for several instruments grouped together. Alternatively, a complete area of process plant, (e.g., a mechanical package) may be protected by a shelter giving adequate protection without the need for specific instrument sunshades.

Welding, drilling, or any fixing operations shall not be carried out on process equipment, pipe work, or primary steel structure unless specifically indicated in the construction drawings.

Actuated valves, whether modulating or on-off type, will generally be provided with associated electric-to-pneumatic (E/P) positioners, filter regulators, solenoid valves (where applicable), etc., already piped and mounted on the valve/actuator assembly.

Solenoid valves, positioners, and control loop accessories not located in enclosures or mounted on valves shall be mounted in easily accessible, protected locations near the components with which they are associated. Precautions shall be taken to not install these devices in a location exposed to high heat. Solenoid valves shall not be supported merely by the tubing that they are attached to.

Instrument enclosures shall be mounted with clearance away from adjacent steel or equipment. Clearance shall be provided to allow opening of doors, equipment access, and for proper installation of tubing or pre-traced tube bundles (including pre-traced tube bundle bend radii).

Transmitters that are supplied with local indicators shall be installed so that the indicator is positioned to be easily read. Where necessary, indicator units on transmitters shall be field rotated as required.

Thermal elements that are to be installed in gas or air ducts shall be provided with structural supports as recommended by the manufacturer and as required to prevent excessive deflection of the elements because of their own weight, or to the flow of the gas or air within the ducts.

Individual transmitters or other instruments designated to be locally mounted shall be mounted on an instrument stand and upright, using the appropriate mounting components, approximately 4 feet 6 inches (1,350 mm) above floor level and approximately in the locations indicated on the drawings unless otherwise accepted by Purchaser. For instruments directly mounted to manifolds, the instrument manifold shall be mounted to the instrument stand via the factory supplied mounting bracket.

Transmitters fitted with vent and drain connections shall be mounted so that the vent connection is pointed upward, and the drain connection is pointed downwards.

Line mounted gauges shall be oriented, so the indicator is clearly visible from a nearby walkway or platform.

Panels shall be shimmed for proper alignment and bolted to their foundations or building structure as required. The panels shall be protected from damage during the construction period. Shipping crates modified to permit necessary access may be used for panel protection.

All pressure gauges shall be installed near the process connection, unless otherwise directed by Purchaser, and located where they may be easily read.

Level transmitters, level controllers, and level switches of the displacer or float type shall be installed on vessel instrument piping columns as indicated on the drawings. Topworks of transmitters, controllers, and switches shall be rotated to positions that provide convenient access for calibration, operation, and maintenance. Such work shall be accomplished before installation of tubing and wiring to the devices.

All thermometers shall be installed in the process line and adjusted for ease of reading. Thermocouples and RTDs shall be installed such that the tip touches the bottom of the well, unless noted otherwise.

Pressure switches shall be installed upright with the appropriate mounting hardware near the piping or duct to which they are connected and mounted to permit ease of adjustment.

Temperature switch thermowells and bulbs shall be installed in the process connection. The switches shall be located on an upright support, using the appropriate mounting hardware, and mounted to permit ease of adjustment. The connecting capillary tubing shall be guarded or continuously supported in tubing raceway to protect it from damage.

Any filled systems (temperature, pressure, level or flow devices with capillary tubing from the measuring element to the main instrument) shall be installed in such a manner that the capillary is not "kinked", broken, or otherwise made inoperable. Excess capillary tubing shall be coiled and adequately supported to provide protection from damage. Long lengths of capillary tubing shall be run from process tap to instrument within tube tray. Filled systems

shall never be cut to shorten the capillary length. Where possible, long capillary tubing runs should be protected from direct sunlight to minimize ambient expansion of the fill fluid, causing error in the measurements.

Prior to piping hydrotesting, any instruments which could be damaged (or have a shift in calibration) from the hydrotest pressure shall be isolated or removed from service.

3.4.3 <u>Connection of Equipment and Devices:</u>

3.4.3.1 Pressure Connection Piping and Tubing. Except as otherwise specified or indicated on the drawings, pressure connections between pressure gauges, transmitters, controllers, or pressure switches and the shutoff valve(s) on the main piping or equipment shall be made in accordance with the drawings and the Pipeline List.

Pressure instruments connected to steam lines shall be installed so that a condensate seal shall be formed. Preformed siphons or acceptable equivalent devices may also be used for applications where pressure instruments are mounted above the process connection, subject to approval of Purchaser. Loop seals shall normally be located near the main piping.

Pressure connecting piping and tubing shall slope continuously from the process connection to the instrument. A 1 inch or more per foot (25 mm per 300 mm) slope is preferred on all horizontal installations and where this is not possible, the slope shall never be less than 1/2 inch per foot (13 mm per 300 mm).

Connecting piping and tubing shall be adequately supported so that no pockets are formed in either the hot or cold positions. The preferred direction of slope is downward from process to instrument for steam and liquid piping and upward for gas and air piping. The direction of slope may be reversed by use of appropriate vents or drain connections, subject to approval of Purchaser. Condenser vacuum piping must slope continuously upward from process connection to instrument. Sloping of high static pressure connecting piping may be omitted, subject to the concurrence of Purchaser.

3.4.3.2 Flow Connection Piping and Tubing. Except as otherwise specified or indicated on the drawings, flow sensing connections between flow indicators, transmitters, controllers, or switches and the shutoff valve(s) on the main piping shall be made in accordance with the project drawings.

If condensing reservoirs are required by the meter design, the reservoirs shall be mounted horizontally at or above the elevation of the pressure taps, and both reservoirs shall be at the same elevation within a tolerance of 1/8 inch (3 mm). Support brackets shall be attached to the main line if required to ensure that the position of the reservoirs is accurately maintained. The design of any bracket attached to the main line shall be submitted for approval. Reservoirs shall be installed in accordance with ASME Performance Test Code PTC 19.5, Section 5, Article C.

Flow sensing connecting piping or tubing shall slope continuously from the pressure taps or reservoirs to the meter or flow transmitter, and all horizontal runs shall have a preferred slope of 1 inch or more per foot (25 mm per 300 mm) and where this is not possible, the slope shall never be less than 1/2 inch per foot (13mm per 300 mm). Connecting piping and tubing shall be adequately supported so that no pockets are formed in either the hot or cold positions. If piping or tubing runs are subject to freezing, the high- and low-pressure runs shall be installed so that both runs can be insulated and freeze protected as a single unit. The preferred direction of slope is downward from process to instrument for steam and liquid piping and upward for gas and air piping. The direction of slope of steam or liquid piping may be reversed by use of a vent valve and riser in each line at the system high point, if the static pressure at the high point is positive under all conditions of operation. The direction of slope of gas and air piping may be reversed by use of drain pots and drain valves at the system low point. However, any deviation for the Instrument Installation Details is subject to approval of Purchaser.

3.4.3.3 Level Instrument Piping and Tubing. Piping and tubing for pressure differential type level instruments of the manometric type shall be installed in accordance with the requirements specified above for flowmeters and in accordance with the Instrument Installation Details. Reservoirs or constant head chambers shall be installed at the specified elevation, and connecting piping from the vessel to the reservoir or constant

head chamber shall slope continuously without pockets to the vessel. The transmitter must be located below the low tap, unless diaphragm seals are used.

3.5 Electrical Startup, Testing, and Checkout:

3.5.1 General:

This section describes and defines general criteria which pertain to the startup, testing, and checkout work covered by these specifications. This work is in addition to testing activities required in other sections of this specification. The Contractor shall be responsible, as part of the base scope, for all labor and materials required to demonstrate that the electrical equipment has been installed correctly and functions properly. Functional testing shall include a demonstration that all major equipment installed can be operated in accordance with the design from local and remote stations, control loops and protective devices perform as designed, and other equipment operates in accordance with their specification. After such demonstration, the systems and components shall be turned over to the Purchaser. Upon acceptance of electrical completion, the Contractor shall provide standby craft labor to correct discrepancies found during initial operation on a time and material basis when requested by the Purchaser. Such standby craft labor shall not be utilized for completion of Contractor punch list items for work later identified as resulting from Contractor's lack of construction completion or Contractor's warranty work. Construction checkout of all electrical systems shall be provided by the Contractor subject to approval by the Purchaser. The scope of work extends to all equipment connected and/or installed under these specifications.

The Contractor test procedures and plans must meet NETA and IEEE standards for testing on Switchgear, Load Centers, MCCs, Wet and Dry Transformers, Relay Protection, and Circuit Breaker Testing, as well as Circuit Loop Checks and Control Loop Checks. The Contractor shall document all testing and inspections on Commissioning Test Forms (CTF) that will be supplied by the Engineer to document the testing. The Contractor shall supply to the Purchaser's Startup group their proposed Electrical and Instrumentation Testing procedures for review.

The following activities shall be performed as part of the equipment installation. The Contractor shall perform all mechanical and electrical work required to calibrate, check out, and make the equipment ready for service as required by these specifications.

The following activities shall be completed under these specifications:

Visual and mechanical inspection of equipment.

Mechanical adjustment and testing of all electrical equipment, as required, to assure proper mechanical functioning and operation.

All testing and reconnection necessary to obtain correct operation of the electrical equipment.

Loop verification of all control and instrumentation circuits, in accordance with the Circuit List, to confirm continuity of conductors and that conductors originate and terminate at the locations designated in the circuit list or on the drawings.

All mechanical adjustment necessary or recommended by the manufacturer of all Contractor-supplied or Purchaser-supplied electrical equipment being connected or installed.

Complete testing of the lighting and receptacle system, (including any welding receptacles added to the system) as applicable.

All cable and wiring tests in accordance with Section 3.3 are complete.

All circuit installation records in accordance with Section 3.3 are complete.

All instruments wired and calibrated, even if installed by others.

Verify all cables at termination points and all raceway/conduits have labels as directed by sections 3.2.3.5 and 3.3.3

Assistance shall be provided as required during trial operation and functional testing to correct installation deficiencies.

3.5.2 Equipment Checkout:

Preoperational checks and inspections shall be performed on all equipment as specified herein and in accordance with the equipment manufacturer's recommendations. A representative of the Contractor shall be present during the equipment checks. All field tests shall be witnessed by the Purchaser at the Purchaser's discretion.

Preoperational checks shall include, but not necessarily be limited to, the following:

Safety Equipment. All personnel safety items shall be installed. All bolting shall be securely tightened to the correct torque as recommended by the equipment manufacturer.

Motor Insulation. Motor insulation shall be meggered immediately before energization.

Instrumentation and Controls.

Interlock jumpers shall be removed.

Panel instrumentation shall be turned on.

Lighting and Receptacle Checkout. The Contractor shall test, check out, and energize the lights and receptacles furnished and installed under this Contract. Immediately before energizing a lighting or receptacle circuit, the Contractor shall make the following checks:

The transformer neutral supplying the source panelboard is solidly connected to ground.

The phase and neutral conductors to be energized are free from grounds.

All covers are on lighting fixtures, pull boxes, and junction boxes so exposed conductors will not be energized.

The ground conductor (if required) is solidly grounded.

After completing the pre-energization checks, the Contractor may energize the circuit under the direction of the Purchaser's startup equipment.

All metering, including panel meters and transducers, shall be calibrated to within the manufacturer's accuracy.

Panel instrumentation indicating lights, switches, and relays shall be adjusted and checked out as part of the checkout of the Contractor-installed electrical equipment. Electric metering for volts, watts, amperes, and other electrical quantity functions shall be checked out as described in this article and the following article.

Panel indicators shall initially be calibrated by simulating the electronic signal normally received by the indicator. The final calibration shall be performed using the actual transmitter, signal converter, or system output to be connected to the indicator. The transmitter-receiver combination shall be calibrated to read out accuracy tolerance no greater than twice the average tolerance of the individual devices throughout the range from 0 percent to 100 percent of total scale. In certain instances for specific equipment, the Purchaser will specify a range of interest. In these cases, the Contractor shall calibrate the transmitter-receiver combination to read exactly correct with the calibration standard being utilized, within the range of interest.

Electrical panel instrumentation shall be calibrated.

Unless specified otherwise, all meters shall be tested and calibrated with equipment of no more than 50 percent of the manufacturer's stated accuracy instrument being tested.

All meters shall be visually inspected for damage, and wiring connections shall be verified in accordance with the three-line diagrams.

Every instrument utilizing a plastic lens or window shall be given a static effect check. The static check shall consist of wiping the lens or window vigorously with a dry cloth of a type recommended by the manufacturer which will not harm the surface. If the needle or pointer holds up-scale or below zero set for more than 15 seconds, the surface of the lens or window shall be treated with a clear antistatic compound recommended by the manufacturer.

The Contractor shall verify that direct grounds do not exist on any dc or 480 volt powered systems. Should a ground be detected, the Contractor shall locate the ground source and inform the Purchaser.

Measurement of resistance to ground shall be made of all motors, switchgear, isolated phase bus, cable bus, panelboard bus, nonsegregated phase bus, and motor control center bus immediately prior to placing in service. Measurement of resistance will be with a line operated tester. Voltage of testing device shall be in accordance with the following table or the equipment manufacturer's recommendation, as directed by the Purchaser:

Equipment Voltage	**Voltage, dc**	**Test Current, max, mA**
480 volts	1000 volts	3
4.16 kV	2 kV	1
Above 4.16 kV	5 kV	1

Complete check of all field wiring shall be made after installation and connection to verify that field wiring is as indicated on the drawings and schematic wiring diagrams. Equipment jumpers as indicated on the schematics shall be checked.

Shielded cable ground check should be made after termination is complete using a volt-ohm meter to determine that each is grounded only at the points indicated on the drawings.

All instrument transformers, including bushing current transformers, shall be tested.

Ratio and polarity tests shall be performed on all instrument transformers. Current transformer ratio and polarity tests shall be voltage ratio tests using a digital voltmeter or current ratio tests using high current injection test equipment, as directed by the Engineer.

The external circuit for each current transformer shall be completely tested before the shorting devices are removed from the current transformer secondary terminals. The tests shall include the following:

Continuity check of the circuit external to the current transformer by application of current.

Phase check to verify correct phase relationship at each device connected in the current transformer circuit.

The Contractor shall verify in writing that all work and checkouts have been completed, and when the services of equipment manufacturer's field service representatives are specified, the Contractor shall include verification by such representatives that the equipment is ready for trial operation.

3.5.3 Corrected Drawings. The Contractor shall keep records of changes made to the following documents and provide the purchaser with red lined drawings at the end of construction:

Electrical schematic and wiring diagrams.

Electrical one-line and three-line diagrams.

Cable schedules.
Cable routings in raceway/ conduits as directed by sections 3.2.3.5 and 3.3.3

APPENDIX A – DRAWINGS

FOR

CONTRACT NO. HU 2026-16

BOTTOM ASH HOPPER WATER

RECIRCULATION SYSTEM

ELECTRICAL CONSTRUCTION

WHELAN ENERGY CENTER, UNIT I

CITY OF HASTINGS

HASTINGS, NEBRASKA

ALLEN-SHERMAN-HOFF
EQUIPMENT LIST
225361-01 - CITY OF HASTINGS - WHELAN ENERGY CENTER - UNIT 1

TAG	QTY	ITEM NO.	MATERIAL DESCRIPTION 1	MATERIAL DESCRIPTION 2	DWG NO.
RECIRCULATION SYSTEM					
701	1	SP236575	SETTLING TANK	XX FT DIAMETER	
702	2	SP236547	SLUDGE PUMP-SETTLING TANK	360 GPM 400' TDH	
702G	2	SP236583	3 INCH RUBBER EXPANSION JOINT	PUMP INLET	
702H	2	SP236584	1-1/2 INCH RUBBER EXPANSION JOINT	PUMP DISCHARGE	
704	1	T-KGVBD06CLDAF	6 INCH C/O KNIFEGATE VALVE	TANK OUTLET	D-8101
705	1	BFV06CESF	6 INCH C/O BUTTERFLY VALVE	W/ SOL, OVERFLOW TANK FLUSH	C-5682
706	2	T-KGVBD04CLDAF	4 INCH C/O KNIFEGATE VALVE	W/ SOL & (2) LS, PUMP SUCTION	D-8101
707	2	104510	1 IN H/O BALL VALVE	STRAINER DRAIN VALVE	A-5164
708	2	T-KGVBD04CLDAF	4 INCH C/O KNIFEGATE VALVE	W/ SOL & (2) LS, SLUDGE PUMP DISCHARGE	D-8101
711	1	LATER	TEMPERATURE TRANSMITTER	OVERFLOW TANK	
711A	1	LATER	THERMOWELL	FOR TAG 711	
712	1	BFV03CESF	3 INCH C/O BUTTERFLY VALVE		C-5682
713	1	SP236585	1 INCH C/O BALL VALVE	W/ SOL, TANK FLUSH	
715	1	227687	LEVEL TRANSMITTER		
730C	1	100278-7	PRESSURE GAUGE	0-200 PSIG	4-5026
730D	1	104508	1/2 IN H/O BALL VALVE		A-5164
733	2	104508	1/2 IN H/O BALL VALVE	STRAINER DP TRANSMITTER	A-5164
735	2	SP236589	4 INCH CHECK VALVE		B-5054
738A	1	16806-0308	ORIFICE PLATE	1.00 ORIFICE	B-6026
738B	1	16806-0308	ORIFICE PLATE	1.00 ORIFICE	B-6026
745A	1	104555	2 INCH H/O BALL VALVE	INSTRUMENT ISOLATION	A-5164
749	4	T-KGVBD04H	4 INCH H/O KNIFEGATE VALVE	STRAINER ISOLATION	D-8085
750	1	SP232629	DIFF PRESSURE TRANSMITTER	STRAINER	
751	2	SP236550	BASKET STRAINER	BA PYRITES PUMPS	
752	1	SP236586	CAMLOCK COUPLER	WITH DUST CAP	
760	1	SP236590	LOT - C.S. PIPE & FITTINGS		
761	1	LATER	LOT - HARDWARE		
762	1	LATER	LOT - GASKETS		
790	1	SP236578	LOT - PIPE SUPPORTS		
799	1	LATER	LOT - EQUIPMENT TAGS		

INSTRUMENT LIST

CITY OF HASTINGS - WHELAN ENERGY CENTER
A-S-H CONTRACT NO. 225361-01
UNIT 1 BOTTOM ASH RECIRCULATION SYSTEM

PLANT TAG NUMBER	A-S-H TAG NO	DESCRIPTION	MANUFACTURER NAME	MODEL NUMBER	RANGE	SETPOINT	UNIT	REF. P&ID	REF. DATASHEET	NOTES
1ASA-ZSO-1295	(704)	LIMIT SWITCH OPEN / VALVE 1ASA-ABV-1170	TOPWORX (EMERSON)	GO SWITCH 81-20528-A2	N/A	N/A	N/A	225361-01-E703-02	N/A	
1ASA-ZSC-1294	(704)	LIMIT SWITCH CLOSED / VALVE 1ASA-ABV-1170	TOPWORX (EMERSON)	GO SWITCH 81-20528-A2	N/A	N/A	N/A	225361-01-E703-02	N/A	
1WSA-ZSO-1319	(705)	LIMIT SWITCH OPEN / VALVE 1WSA-ABV-1550	CONTROLINK	CAB01200E OR EQUIV.	N/A	N/A	N/A	225361-01-E703-02	N/A	
1WSA-ZSC-1320	(705)	LIMIT SWITCH CLOSED / VALVE 1WSA-ABV-1550	CONTROLINK	CAB01200E OR EQUIV.	N/A	N/A	N/A	225361-01-E703-02	N/A	
1ASA-ZSO-1271	(706)	LIMIT SWITCH OPEN / VALVE 1ASA-BV-1180	TOPWORX (EMERSON)	GO SWITCH 81-20528-A2	N/A	N/A	N/A	225361-01-E703-02	N/A	
1ASA-ZSC-1272	(706)	LIMIT SWITCH CLOSED / VALVE 1ASA-BV-1180	TOPWORX (EMERSON)	GO SWITCH 81-20528-A2	N/A	N/A	N/A	225361-01-E703-02	N/A	
1ASA-ZSO-1273	(706)	LIMIT SWITCH OPEN / VALVE 1ASA-BV-1183	TOPWORX (EMERSON)	GO SWITCH 81-20528-A2	N/A	N/A	N/A	225361-01-E703-02	N/A	
1ASA-ZSC-1274	(706)	LIMIT SWITCH CLOSED / VALVE 1ASA-BV-1183	TOPWORX (EMERSON)	GO SWITCH 81-20528-A2	N/A	N/A	N/A	225361-01-E703-02	N/A	
1ASA-ZSO-1275	(708)	LIMIT SWITCH OPEN / VALVE 1ASA-BV-1182	TOPWORX (EMERSON)	GO SWITCH 81-20528-A2	N/A	N/A	N/A	225361-01-E703-02	N/A	
1ASA-ZSC-1276	(708)	LIMIT SWITCH CLOSED / VALVE 1ASA-BV-1182	TOPWORX (EMERSON)	GO SWITCH 81-20528-A2	N/A	N/A	N/A	225361-01-E703-02	N/A	
1ASA-ZSO-1277	(708)	LIMIT SWITCH OPEN / VALVE 1ASA-BV-1185	TOPWORX (EMERSON)	GO SWITCH 81-20528-A2	N/A	N/A	N/A	225361-01-E703-02	N/A	
1ASA-ZSC-1278	(708)	LIMIT SWITCH CLOSED / VALVE 1ASA-BV-1185	TOPWORX (EMERSON)	GO SWITCH 81-20528-A2	N/A	N/A	N/A	225361-01-E703-02	N/A	
1ASA-TIT-1268	711	TEMPERATURE TRANSMITTER / ASH HOPPER OVERFLOW TANK	LATER	LATER	LATER	LATER	DEG F	225361-01-E703-02	LATER	4 - 20 mA
1ASA-ZSO-1281	(712)	LIMIT SWITCH OPEN / VALVE 1ASA-ABV-1178	CONTROLINK	CAB01200E OR EQUIV.	N/A	N/A	N/A	225361-01-E703-02	N/A	
1ASA-ZSC-1282	(712)	LIMIT SWITCH CLOSED / VALVE 1ASA-ABV-1178	CONTROLINK	CAB01200E OR EQUIV.	N/A	N/A	N/A	225361-01-E703-02	N/A	
1ASA-ZSO-1279	(713)	LIMIT SWITCH OPEN / VALVE 1ASA-ABV-1179	LATER	LATER	N/A	N/A	N/A	225361-01-E703-02	N/A	
1ASA-ZSC-1280	(713)	LIMIT SWITCH CLOSED / VALVE 1ASA-ABV-1179	LATER	LATER	N/A	N/A	N/A	225361-01-E703-02	N/A	
1ASA-LIT-1269	715	WATER LEVEL TRANSMITTER / ASH HOPPER OVERFLOW TANK	ROSEMOUNT	2051T	0 - 20	N/A	PSIG	225361-01-E703-02	LATER	4 - 20 mA
1ASA-PI-1283	730C	PRESSURE GAUGE / B.A. PYRITES PUMP DISCHARGE	ASHCROFT	451279AS04L-200#	0 - 200	N/A	PSIG	225361-01-E703-02	225361-01-E703-02	
1ASA-PDIT-1270	750	DIFFERENTIAL PRESSURE TRANSMITTER / B.A. PYRITES PUMP STRAINER	LATER	LATER	LATER	LATER	LATER	225361-01-E703-02	LATER	4 - 20 mA

Notes:
1. A status of "F" indicates the item is FINAL.
2. Those items shown in **bold** text are changes from the previous issue of this list.

ELECTRICAL LOAD LIST

CITY OF HASTINGS - WHELAN ENERGY CENTER
A-S-H CONTRACT NO. 225361-01
UNIT 1 BOTTOM ASH RECIRCULATION SYSTEM

EQUIPMENT NUMBER	TAG NO.	QTY	EQUIPMENT DESCRIPTION	VOLT/ HZ/PH	HP	KW	MAX NO. OPER. SIMULT.	CONNECT LOAD (KW)	STARTER INTEGRAL W/ EQUIP?	STARTER TYPE	REF. P&ID	STATUS	NOTES
-	702	2	BOTTOM ASH/PYRITES PUMP MOTOR	460/60/3	60.0	44.74	1	44.74	NO	FVNR	225361-01-E703-02	F	
								44.7					

Notes:
1. A status of "F" indicates the item is FINAL.
2. Those items shown in **bold** text are changes from the previous issue of this list.

VALVE LIST

CITY OF HASTINGS - WHELAN ENERGY CENTER
A-S-H CONTRACT NO. 225361-01
UNIT 1 BOTTOM ASH RECIRCULATION SYSTEM

PLANT TAG NUMBER	A-S-H TAG NO	DESCRIPTION	REFERENCE P&ID DWG	VALVE TYPE	VALVE SIZE	END CONN.	ACTUATOR	MANUFACTURER NAME	MODEL NO.	VENDOR DRAWING	BODY MATERIAL	FLUID
1ASA-ABV-1170	704	ASH HOPPER OVERFLOW TANK BLOWDOWN ISOLATION VALVE	225361-01-E703-02	KNIFE GATE	6"	CL150 RF FLG	PNEUMATIC D/A CYLINDER	A-S-H	T-KGVBD06CLDAF	225361-01-D-8101	304 SS	WATER
1WSA-ABV-1550	705	WSA SERVICE WATER MAKEUP ISOLATION VALVE	225361-01-E703-02	BUTTERFLY	6"	CL150 FF FLG	PNEUMATIC ROTARY	A-S-H	BFV06CESF	225361-01-C-5682	304 SS	WATER
1ASA-BV-1180	706	BOTTOM ASH/PYRITES PUMP SUCTION ISOLATION VALVE	225361-01-E703-02	KNIFE GATE	4"	CL150 RF FLG	PNEUMATIC D/A CYLINDER	A-S-H	T-KGVBD04CLDAF	225361-01-D-8101	304 SS	WATER
1ASA-BV-1183	706	BOTTOM ASH/PYRITES PUMP SUCTION ISOLATION VALVE	225361-01-E703-02	KNIFE GATE	4"	CL150 RF FLG	PNEUMATIC D/A CYLINDER	A-S-H	T-KGVBD04CLDAF	225361-01-D-8101	304 SS	WATER
1ASA-BV-_____	707	BOTTOM ASH/PYRITES PUMP STRAINER DRAIN VALVE	225361-01-E703-02	BALL	1"	FNPT	LEVER	APOLLO OR EQUAL	70-103-01 OR EQUAL	225361-01-A-5164	B584-C84400 BRONZE	WATER
1ASA-BV-_____	707	BOTTOM ASH/PYRITES PUMP STRAINER DRAIN VALVE	225361-01-E703-02	BALL	1"	FNPT	LEVER	APOLLO OR EQUAL	70-103-01 OR EQUAL	225361-01-A-5164	B584-C84400 BRONZE	WATER
1ASA-BV-1182	708	BOTTOM ASH/PYRITES PUMP DISCHARGE ISOLATION VALVE	225361-01-E703-02	KNIFE GATE	4"	CL150 RF FLG	PNEUMATIC D/A CYLINDER	A-S-H	T-KGVBD04CLDAF	225361-01-D-8101	304 SS	WATER
1ASA-BV-1185	708	BOTTOM ASH/PYRITES PUMP DISCHARGE ISOLATION VALVE	225361-01-E703-02	KNIFE GATE	4"	CL150 RF FLG	PNEUMATIC D/A CYLINDER	A-S-H	T-KGVBD04CLDAF	225361-01-D-8101	304 SS	WATER
1ASA-ABV-1178	712	ASH HOPPER OVERFLOW TANK MIN FLOW RECIRCULATION ISOLATION VALVE	225361-01-E703-02	BUTTERFLY	3"	CL150 FF FLG	PNEUMATIC ROTARY	A-S-H	BFV03CESF	225361-01-C-5682	304 SS	WATER
1ASA-ABV-1179	713	ASH HOPPER OVERFLOW TANK FLUSHING ISOLATION VALVE	225361-01-E703-02	BALL	1"	CL150 FF FLG	PNEUMATIC ROTARY	LATER	LATER	LATER	LATER	WATER
1ASA-UV-1181	734	BOTTOM ASH/PYRITES PUMP DISCHARGE CHECK VALVE	225361-01-E703-02	CHECK	4"	CL150 RF FLG	N/A	A-S-H	A-16062-3	225361-01-B-5054	CL.B CAST IRON	WATER
1ASA-UV-1184	734	BOTTOM ASH/PYRITES PUMP DISCHARGE CHECK VALVE	225361-01-E703-02	CHECK	4"	CL150 RF FLG	N/A	A-S-H	A-16062-3	225361-01-B-5054	CAST IRON	WATER
1ASA-BV-1171	749	BOTTOM ASH/PYRITES PUMP STRAINER ISOLATION VALVE	225361-01-E703-02	KNIFE GATE	4"	CL150 RF FLG	HANDWHEEL	A-S-H	T-KGVBD04H	225361-01-D-8085	304 SS	WATER
1ASA-BV-1172	749	BOTTOM ASH/PYRITES PUMP STRAINER ISOLATION VALVE	225361-01-E703-02	KNIFE GATE	4"	CL150 RF FLG	HANDWHEEL	A-S-H	T-KGVBD04H	225361-01-D-8085	304 SS	WATER
1ASA-BV-1173	749	BOTTOM ASH/PYRITES PUMP STRAINER ISOLATION VALVE	225361-01-E703-02	KNIFE GATE	4"	CL150 RF FLG	HANDWHEEL	A-S-H	T-KGVBD04H	225361-01-D-8085	304 SS	WATER
1ASA-BV-1174	749	BOTTOM ASH/PYRITES PUMP STRAINER ISOLATION VALVE	225361-01-E703-02	KNIFE GATE	4"	CL150 RF FLG	HANDWHEEL	A-S-H	T-KGVBD04H	225361-01-D-8085	304 SS	WATER
1ASA-BV-1175	_____	BOTTOM ASH/PYRITES PUMP STRAINER DP TRANSMITTER ROOT VALVE	225361-01-E703-02	BALL	1/2"	FNPT	LEVER	APOLLO OR EQUAL	70-103-01 OR EQUAL	225361-01-A-5164	B584-C84400 BRONZE	WATER
1ASA-BV-1176	_____	BOTTOM ASH/PYRITES PUMP STRAINER DP TRANSMITTER ROOT VALVE	225361-01-E703-02	BALL	1/2"	FNPT	LEVER	APOLLO OR EQUAL	70-103-01 OR EQUAL	225361-01-A-5164	B584-C84400 BRONZE	WATER
1ASA-BV-1186	730D	BOTTOM ASH/PYRITES PUMP DISCHARGE PRESSURE GAUGE ROOT VALVE	225361-01-E703-02	BALL	1/2"	FNPT	LEVER	APOLLO OR EQUAL	70-103-01 OR EQUAL	225361-01-A-5164	B584-C84400 BRONZE	WATER
1ASA-BV-1177	745A	ASH HOPPER OVERFLOW TANK TEMPERATURE TRANSMITTER ROOT VALVE	225361-01-E703-02	BALL	2"	FNPT	LEVER	APOLLO OR EQUAL	70-103-01 OR EQUAL	225361-01-A-5164	B584-C84400 BRONZE	WATER

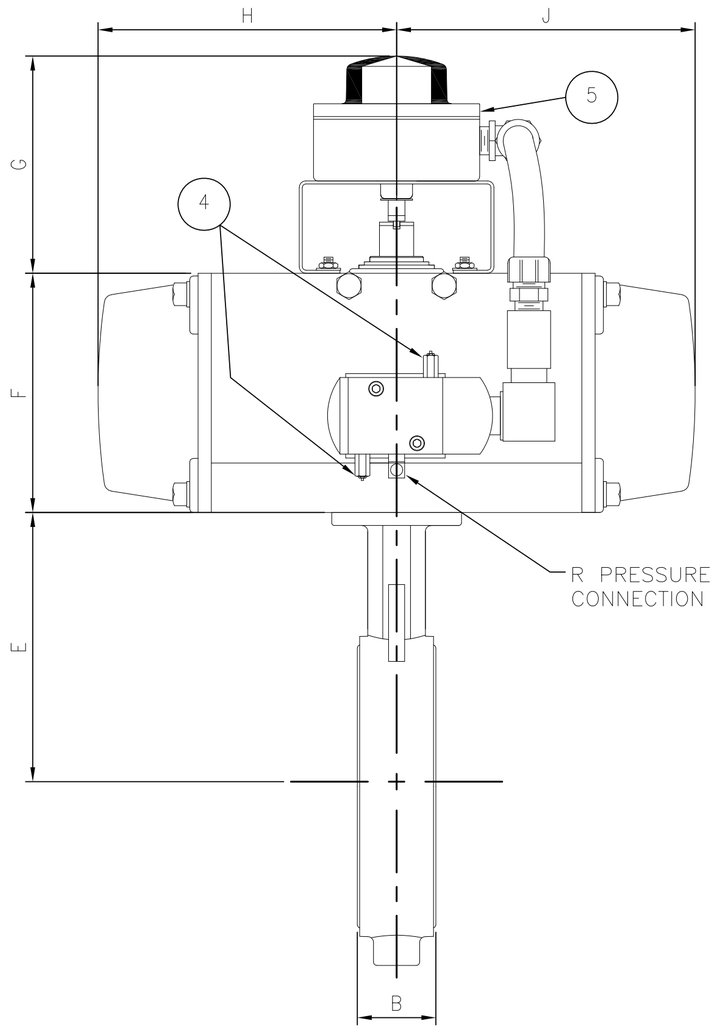
Notes:
1. Those items shown in **bold** text are changes from the previous issue of this list.

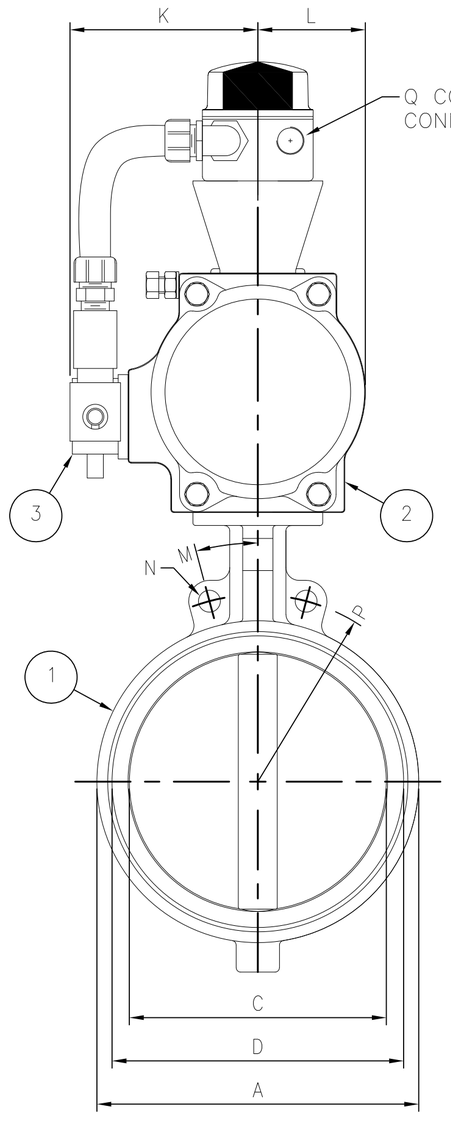
C-5682

DIMENSIONS

VALVE SIZE INCHES	VALVE SIZE DN	ACTUATOR	A	B (A)	C	D	E	F	G	H	J	K	L	M	N–DIA	P – B.C.	Q	R	WEIGHT
2	50	055	3.58 (91)	1.62 (41)	1.32 (34)	2.99 (76)	5.51 (140)	2.97 (75)	5.32 (135)	3.31 (84)	3.31 (84)	2.94 (75)	1.44 (37)	45°	.750 (19)	4.75 (121)	1/2 NPT (15)	1/4 NPT (8)	12 (5)
3	80	065	4.72 (120)	1.75 (44)	2.70 (69)	4.17 (106)	6.30 (160)	3.46 (88)	5.32 (135)	4.19 (106)	4.19 (106)	3.17 (81)	1.67 (42)	45°	.750 (19)	6.00 (152)	1/2 NPT (15)	1/4 NPT (8)	15 (7)
4	100	075	5.91 (150)	2.00 (51)	3.61 (92)	5.20 (132)	7.09 (180)	3.86 (98)	5.32 (135)	4.63 (118)	4.63 (118)	3.34 (85)	1.84 (47)	22.5°	.750 (19)	7.50 (191)	1/2 NPT (15)	1/4 NPT (8)	20 (9)
6	150	100	8.07 (205)	2.12 (54)	5.50 (140)	7.36 (187)	8.07 (205)	4.95 (126)	5.32 (135)	5.79 (147)	5.79 (147)	3.90 (99)	2.40 (61)	22.5°	.875 (22)	9.50 (241)	1/2 NPT (15)	1/4 NPT (8)	32 (15)
8	200	115	10.20 (259)	2.50 (64)	7.39 (187)	9.45 (240)	9.49 (241)	5.53 (141)	5.71 (145)	6.90 (175)	6.90 (175)	4.25 (108)	2.75 (70)	22.5°	.875 (22)	11.75 (298)	1/2 NPT (15)	1/4 NPT (8)	52 (24)
10	250	125	12.21 (310)	2.50 (64)	9.31 (236)	11.50 (292)	10.75 (273)	6.00 (152)	5.71 (145)	7.98 (203)	7.98 (203)	4.44 (113)	2.94 (75)	15°	1.00 (25)	14.25 (362)	1/2 NPT (15)	1/4 NPT (8)	74 (34)
12	300	150	14.33 (364)	3.00 (76)	11.12 (282)	13.58 (345)	12.24 (311)	7.34 (187)	5.71 (145)	9.40 (239)	9.40 (239)	5.09 (129)	3.59 (91)	15°	1.00 (25)	17.00 (432)	1/2 NPT (15)	1/4 NPT (8)	109 (49)

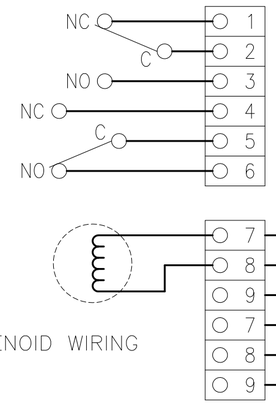
DIMENSIONS IN INCHES (MILLIMETERS) WEIGHTS IN LB (KG)





SWITCH 1 (BOTTOM) OPEN POS

SWITCH 2 (TOP) CLOSED POS



SOLENOID WIRING

BILL OF MATERIAL

PART NO.	QTY	DESCRIPTION	
1	1	BUTTERFLY VALVE	RESILIENT SEATED, WAFER
2	1	ACTUATOR	RACK & PINION, AIR OPERATED
3	1	SOLENOID VALVE	4-WAY WITH MANUAL OVERRIDE
4	2	EXHAUST MUFFLER	W/INTEGRAL SPEED CONTROL
5	2	LIMIT SWITCH	SPDT MECHANICAL SWITCHES

NOTES:

1. DESIGN PRESSURE: 175 PSIG (1.2 Mpa)
2. DESIGN TEMPERATURE: 300° F (150° C) – EPDM SEAT
   390° F (200° C) – VITON SEAT
3. THE VALVE IS DESIGNED TO BE INSTALLED BETWEEN TWO ANSI 150# FLAT FACE WELD NECK FLANGES.
4. NO GASKETS ARE REQUIRED SINCE THE ELASTOMER SEAT ACTS AS A FLANGE GASKET.
5. INSTRUMENT AIR TO BE SUPPLIED TO THE SOLENOID AT A PRESSURE OF 60 TO 120 PSIG (415 TO 825 KPa).
6. THE SOLENOID VALVE IS RATED 120 VAC WITH A NEMA 4/4X ENCLOSURE. POWER CONSUMPTION=6.3 WATTS, 10.1VA INRUSH.
7. THE LIMIT SWITCHES ARE RATED 5 AMP @ 120/240 VAC, 0.6 AMP @ 125 VDC WITH A NEMA 4/4X ENCLOSURE.

VALVE SIZE INCHES	VALVE SIZE DN	SEAT MAT'L	ITEM NO. CLASS H COIL	ITEM NO. CLASS F COIL
2	50	EPDM	BFV02CESH	BFV02CESF
3	80	EPDM	BFV03CESH	BFV03CESF
4	100	EPDM	BFV04CESH	BFV04CESF
6	150	EPDM	BFV06CESH	BFV06CESF
8	200	EPDM	BFV08CESH	BFV08CESF
10	250	EPDM	BFV10CESH	BFV10CESF
12	300	EPDM	BFV12CESH	BFV12CESF
2	50	VITON	BFV02CVSH	BFV02CVSF
3	80	VITON	BFV03CVSH	BFV03CVSF
4	100	VITON	BFV04CVSH	BFV04CVSF
6	150	VITON	BFV06CVSH	BFV06CVSF
8	200	VITON	BFV08CVSH	BFV08CVSF
10	250	VITON	BFV10CVSH	BFV10CVSF
12	300	VITON	BFV12CVSH	BFV12CVSF

TAG NO.'S: **705, 712**
VALVE NO.'S:
1ASA-ABV-1178
1WSA-ABV-1550

REV.	DATE	REV. BY	CKD. BY	ENG. APP.	REVISION RECORD
A	6/24/10	PMD	CMH	CMH	REVISED FACE TO FACE DIMENSIONS OF VALVES

DRAWN BY	FXP	05/26/10
CHECKED BY	LJK	05/26/10
MECH. APP.	CMH	6/2/10
STRUCT. APP.		
ELECT. APP.		

Allen-Sherman-Hoff
A Division of Diamond Power International, Inc.
EXTON, PENNSYLVANIA, U.S.A.

BUTTERFLY VALVE CYLINDER OPERATED W/SOLENOID & SPDT LIMIT SWITCHES

SHEET 1 OF 1

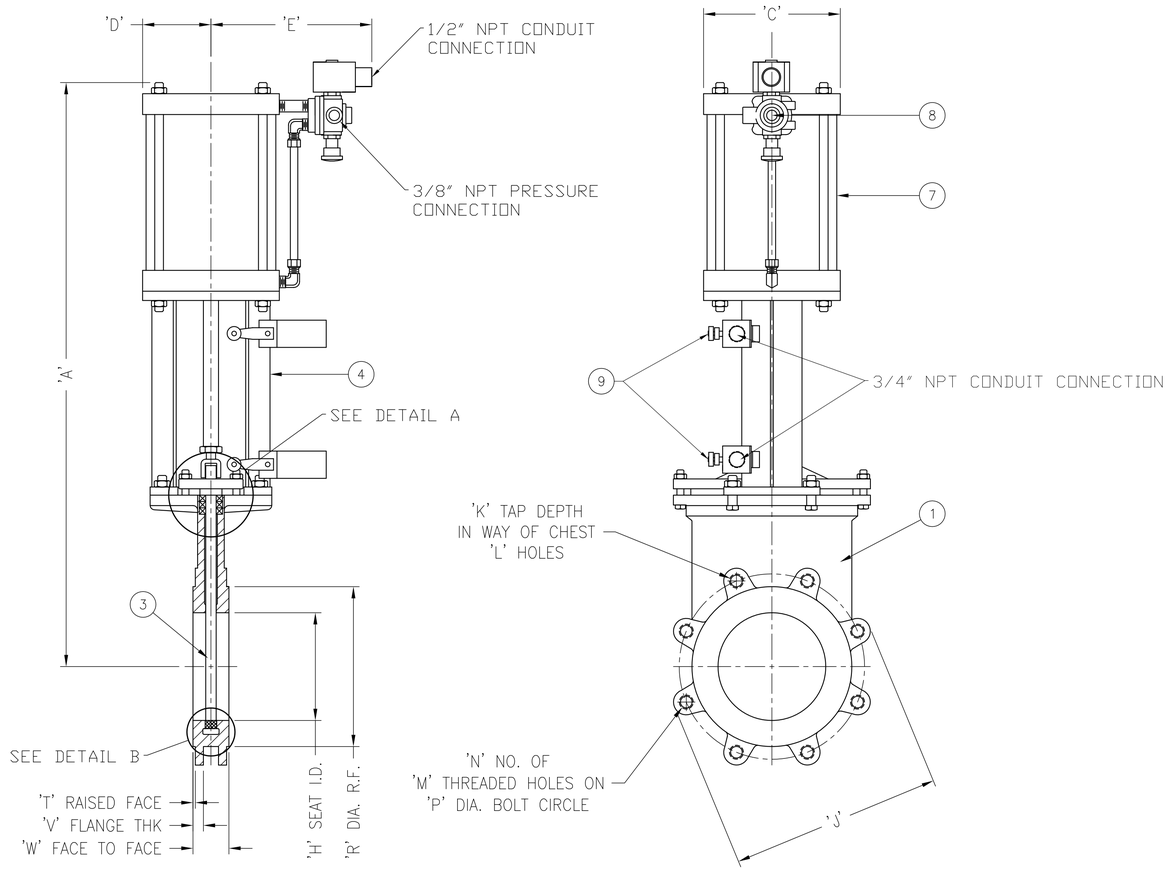
SCALE NONE
CONTRACT STD
DWG C-5682
REV A

DWG NO.: **225361-01-C-5682**

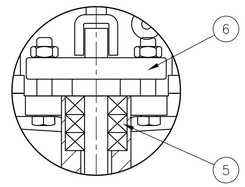
D-8101

SIZE	ACTUATOR	A	C	D	E	H	J	K	L	M	N	P	R	T	V	W	WEIGHT
3" [80]	3.25 DOUBLE ACTING	19.38" [492]	4.00" [102]	2.00" [51]	5.50" [140]	3.00" [76]	7.50" [191]	0.40" [9]	2	5/8-11NC	4	6.00" [152]	5.00" [127]	.06" [2]	0.56" [14]	2.00" [51]	28 [13]
4" [100]	5 DOUBLE ACTING	22.13" [561]	5.50" [140]	2.75" [70]	6.25" [159]	4.00" [102]	9.00" [229]	0.42" [11]	2	5/8-11NC	8	7.50" [191]	6.19" [157]	.06" [2]	0.69" [17]	2.00" [51]	37 [17]
6" [150]	6 DOUBLE ACTING	29.94" [760]	6.50" [165]	3.25" [83]	6.75" [172]	6.00" [152]	11.00" [279]	0.44" [11]	2	3/4-10NC	8	9.50" [241]	8.50" [216]	.06" [2]	0.63" [16]	2.25" [57]	94 [43]
8" [200]	8 DOUBLE ACTING	36.88" [937]	8.63" [219]	4.32" [110]	7.82" [199]	8.00" [203]	13.50" [343]	0.66" [17]	2	3/4-10NC	8	11.75" [298]	10.63" [270]	.06" [2]	0.81" [21]	2.75" [70]	114 [52]
10" [250]	8 DOUBLE ACTING	41.44" [1053]	8.63" [219]	4.32" [110]	7.82" [199]	10.00" [254]	16.00" [406]	0.56" [14]	4	7/8-9NC	12	14.25" [362]	12.75" [324]	.06" [2]	0.94" [24]	2.75" [70]	178 [81]
12" [300]	8 DOUBLE ACTING	48.00" [1219]	8.63" [219]	4.32" [110]	7.82" [199]	12.00" [305]	19.00" [483]	0.50" [13]	4	7/8-9NC	12	17.00" [432]	15.00" [381]	.19" [5]	1.00" [25]	3.00" [76]	236 [107]

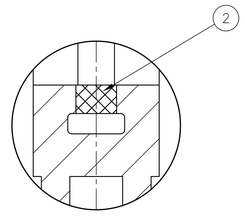
DIMENSIONS IN INCHES [MILLIMETERS]. WEIGHTS IN LB [KG].



TAG NO.'S: **704, 706, 708**
VALVE NO.'S:
1ASA-ABV-1170
1ASA-BV-1180
1ASA-BV-1182
1ASA-BV-1183
1ASA-BV-1185



DETAIL A



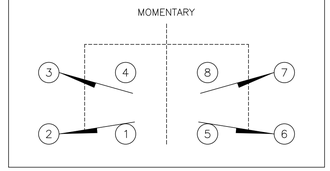
DETAIL B

BILL OF MATERIAL

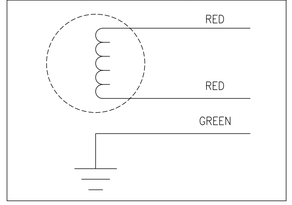
PART NO.	QTY.	DESCRIPTION	MATERIAL
1	1	VALVE BODY	304 STAINLESS STEEL
2	1	SEAT	EPDM OR VITON
3	1	VALVE GATE	304 STAINLESS STEEL
4	1	YOKE	CARBON STEEL
5	3	PACKING	ACRYLIC/SILICONE
6	1	PACKING FOLLOWER	DUCTILE IRON
7	1	PNEUMATIC CYLINDER	ALUMINUM W/ COPPER TUBE & FITTINGS
8	1	SOLENOID VALVE	4-WAY, 120/60 Hz, BRASS BODY
9	2	SWITCH	DPDT LIMIT SWITCH

NOTES
1. DESIGN PRESSURE: 132 PSIG [910 kPa] @ 280°F [138°C] – EPDM SEAT
   123 PSIG [848 kPa] @ 350°F [177°C] – VITON SEAT
2. AIR PRESSURE REQUIRED: 60-125 PSI [414-862 kPa]
3. ELECTRICAL ENCLOSURE FOR SOLENOID & LIMIT SWITCHES: NEMA 4/4X

LIMIT SWITCH ELECTRICAL RATING (TYPICAL BOTH SWITCHES)			
AC VOLTS – PILOT DUTY: 600VAC, 720VA			
		AMPS AT 0.35 POWER FACTOR	
CIRCUITRY	VOLTAGE	MAKE	BREAK
DOUBLE-POLE DOUBLE-THROW	120 240 480 600	30 15 7.5 6	3 1.5 0.75 0.60
DC VOLTS – PILOT DUTY: 240VDC, 30 WATTS			
		MAKE AND BREAK AMPS	
CIRCUITRY	VOLTAGE	INDUCTIVE	RESISTIVE
DOUBLE-POLE DOUBLE-THROW	120 240	0.25 0.15	0.8 0.4



SOLENOID VALVE		
WATT RATING AND POWER CONSUMPTION		
VOLTAGE: 120/60		
WATTS	VA HOLDING	VA INRUSH
20.1	45	140



NOMINAL AMBIENT TEMP. RANGES:
CLASS F: 32°F-125°F [0°C-52°C]
CLASS H: 32°F-140°F [0°C-60°C]

	SEAT (EPDM)	
	TEMPERATURE RATING 280°F [138°C]	
	CLASS F SOLENOID COIL INSULATION	CLASS H SOLENOID COIL INSULATION
SIZE	ITEM NO.	ITEM NO.
3" [80]	T-KGVBD03CLDAF	T-KGVBD03CLDAH
4" [100]	T-KGVBD04CLDAF	T-KGVBD04CLDAH
6" [150]	T-KGVBD06CLDAF	T-KGVBD06CLDAH
8" [200]	T-KGVBD08CLDAF	T-KGVBD08CLDAH
10" [250]	T-KGVBD10CLDAF	T-KGVBD10CLDAH
12" [300]	T-KGVBD12CLDAF	T-KGVBD12CLDAH

	SEAT (VITON)	
	TEMPERATURE RATING 350°F [177°C]	
	CLASS F SOLENOID COIL INSULATION	CLASS H SOLENOID COIL INSULATION
SIZE	ITEM NO.	ITEM NO.
3" [80]	T-KGVBD03CLDAFV	T-KGVBD03CLDAHV
4" [100]	T-KGVBD04CLDAFV	T-KGVBD04CLDAHV
6" [150]	T-KGVBD06CLDAFV	T-KGVBD06CLDAHV
8" [200]	T-KGVBD08CLDAFV	T-KGVBD08CLDAHV
10" [250]	T-KGVBD10CLDAFV	T-KGVBD10CLDAHV
12" [300]	T-KGVBD12CLDAFV	T-KGVBD12CLDAHV

REFERENCES

DWG.	TITLE

REVISIONS

REV.	DATE	REV. BY	CKD. BY	ENG. APP.	ENG. APP.	REVISION RECORD

DRAWN BY	JDL	12/11/13
CHECKED BY	MAH	01/30/14
MECH. APP.	JDL	01/30/14
STRUCT. APP.		
ELECT. APP.		

Allen-Sherman-Hoff
A Division of Diamond Power International, Inc.
EXTON, PENNSYLVANIA, U.S.A.

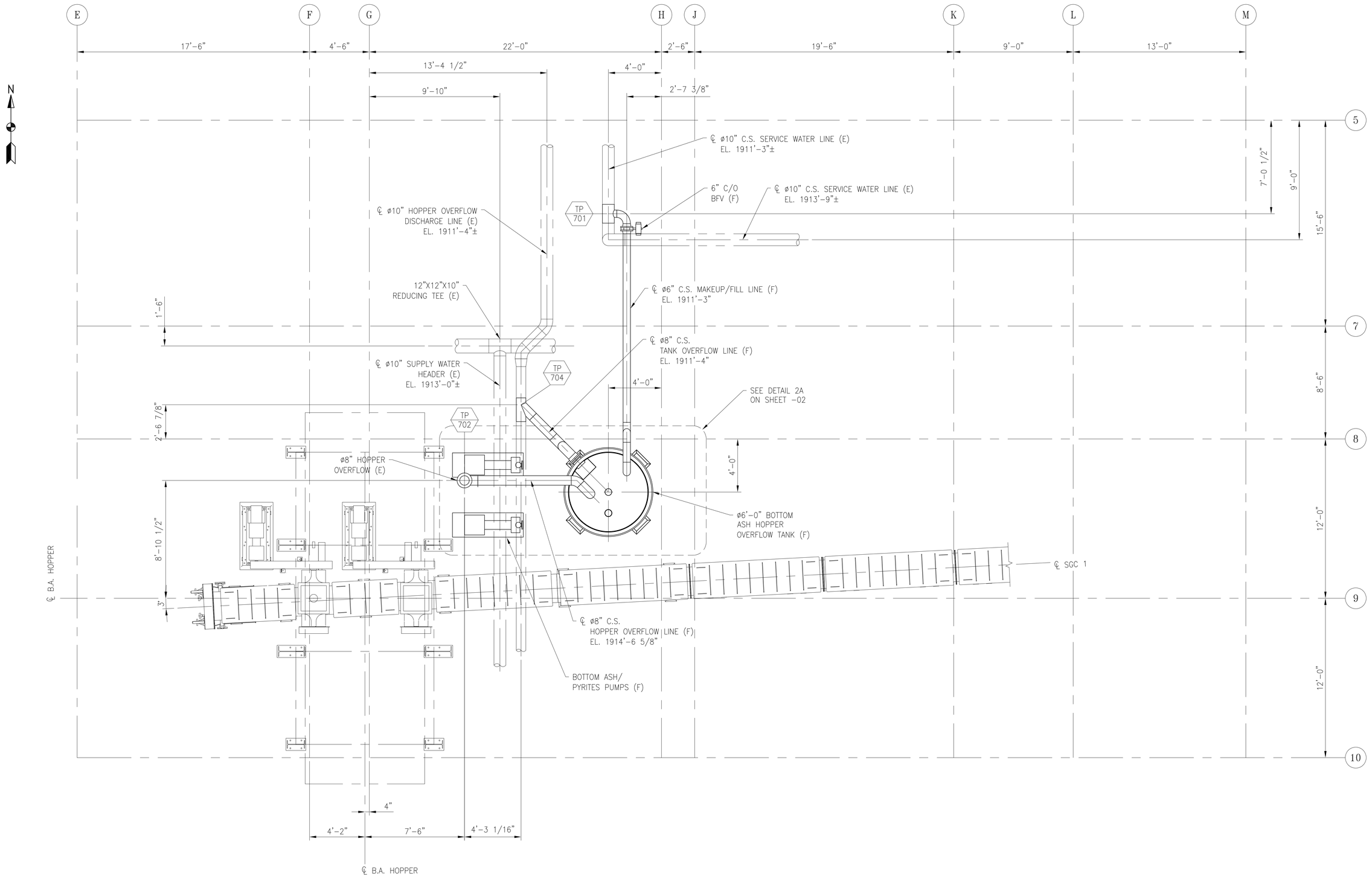
BI-DIRECTIONAL KNIFE GATE VALVES
CYLINDER OPERATED (3"-12")
W/ 2 DPDT LIMIT SWITCHES
STAINLESS STEEL BODY
STANDARD PACKING

SHEET 1 OF 1

SCALE N/A
CONTRACT STD
DWG D-8101
REV

DWG NO.: **225361-01-D-8101**

225361-01-E701-01



PLAN 1A-01

REVISIONS								
B	11/19/25	JT	RJK	RJK		GENERAL REVISION		
A	10/10/25	JT	RJK	RJK		INITIAL ISSUE		
REV.	DATE	REV. BY	CKD. BY	ENG. APP.	ENG. APP.	REVISION RECORD		

DRAWN BY	JT	10/10/25
CHECKED BY	RJK	10/10/25
MECH. APP.	RJK	10/10/25
STRUCT. APP.		
ELECT. APP.		

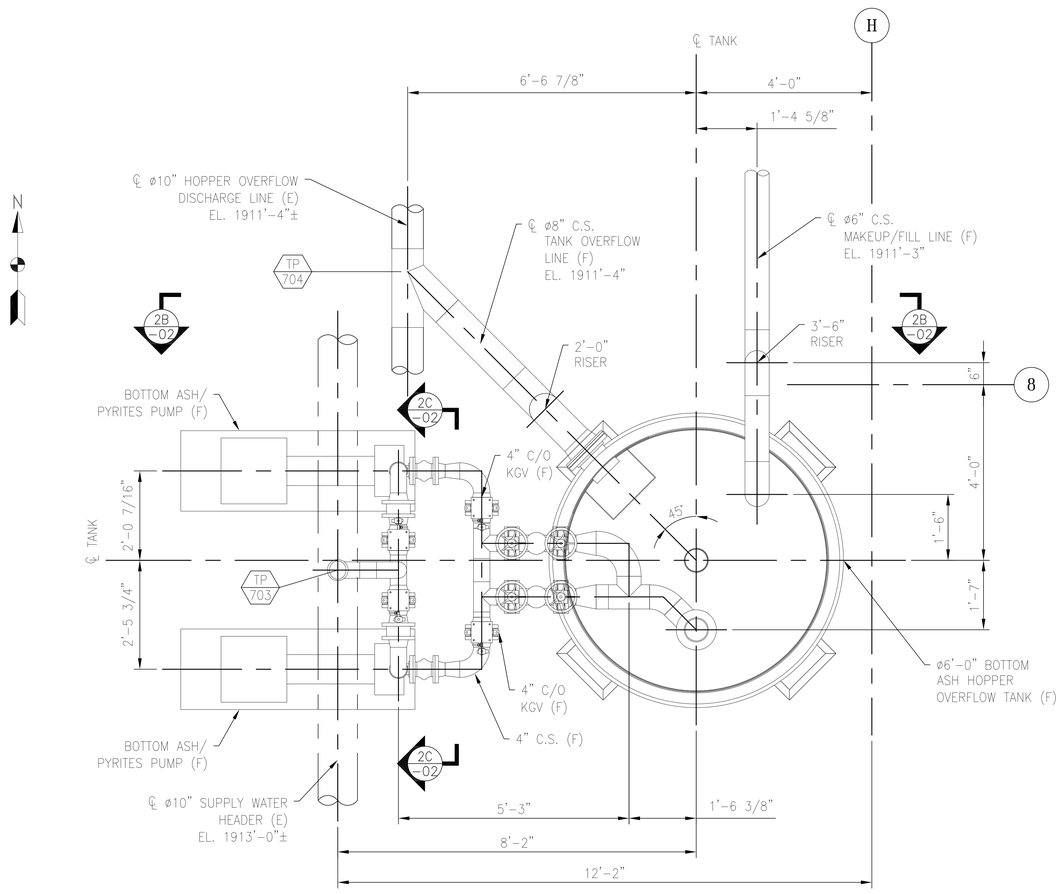
Allen-Sherman-Hoff
The Babcock & Wilcox Company
Exton, Pennsylvania, U.S.A.

GENERAL ARRANGEMENT
RECIRCULATION PUMP SYSTEM
SGC 1
UNIT 1

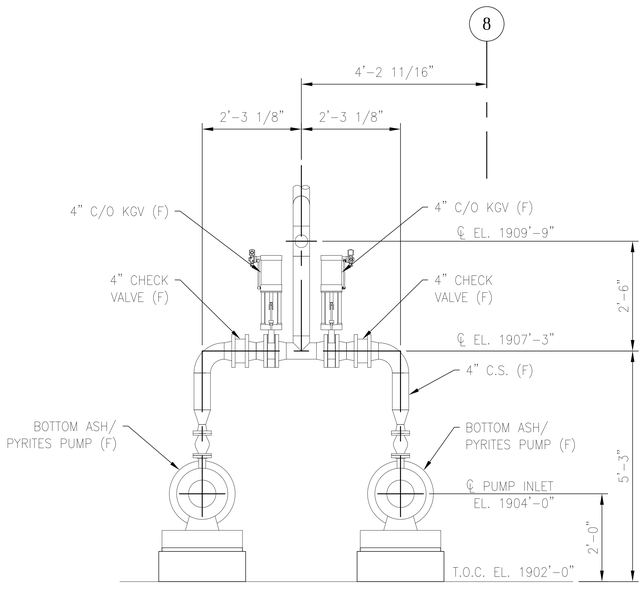
CITY OF HASTINGS
WHELAN ENERGY CENTER
BOTTOM ASH CONVEYOR SYSTEM MODIFICAITON
UNIT 1
HASTINGS, NEBRASKA

CUST. DWG.

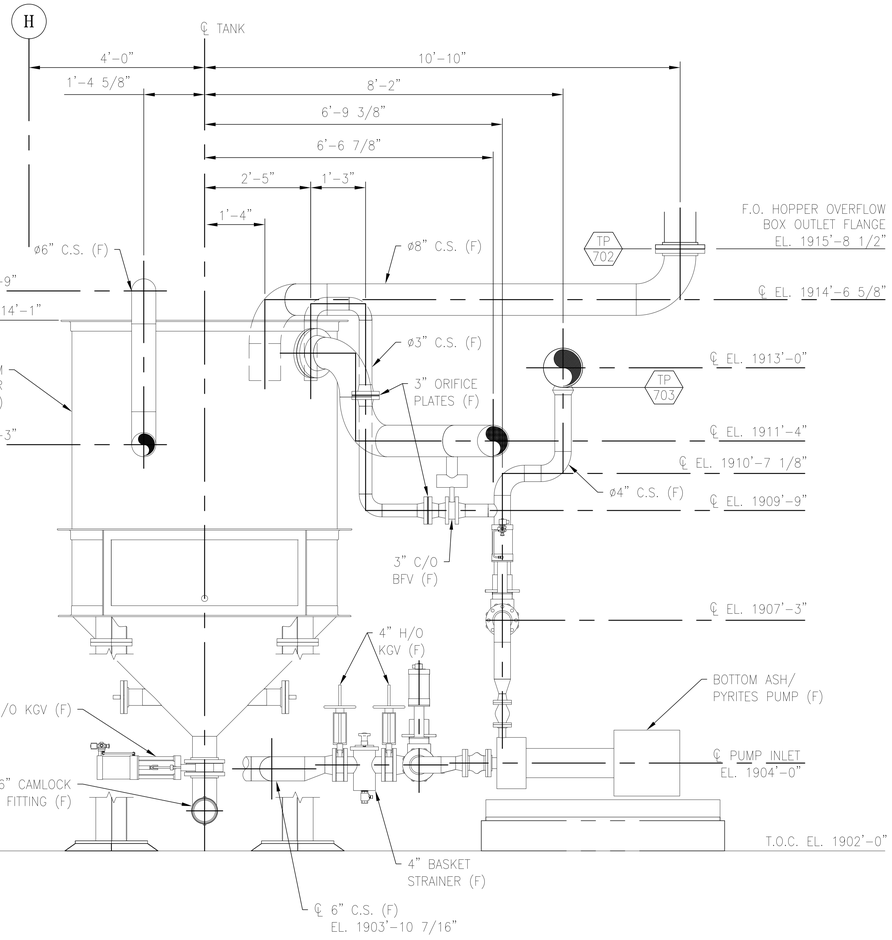
SCALE 3/8"=1'-0"
CONTRACT 225361-01
DWG 225361-01-E701-01
REV B



DETAIL 2A -01



SECTION 2C -02 LOOKING WEST



ELEVATION 2B -02 LOOKING SOUTH

REVISIONS								
REV.	DATE	REV. BY	CKD. BY	ENG. APP.	ENG. APP.	REVISION RECORD		
C	12/10/25	RJK				REVISED PER CUSTOMER COMMENTS		
B	11/19/25	JT	RJK	RJK		GENERAL REVISION		
A	10/10/25	JT	RJK	RJK		INITIAL ISSUE		

DRAWN BY	JT	10/10/25
CHECKED BY	RJK	10/10/25
MECH. APP.	RJK	10/10/25
STRUCT. APP.		
ELECT. APP.		

Allen-Sherman-Hoff
The Babcock & Wilcox Company
Exton, Pennsylvania, U.S.A.

GENERAL ARRANGEMENT
RECIRCULATION PUMP SYSTEM
SGC 1
UNIT 1

CITY OF HASTINGS
WHELAN ENERGY CENTER
BOTTOM ASH CONVEYOR SYSTEM MODIFICAITON
UNIT 1
HASTINGS, NEBRASKA
CUST. DWG.

SCALE 3/4"=1'-0"
CONTRACT 225361-01
DWG 225361-01-E701-02
REV C

225361-01-E703-01

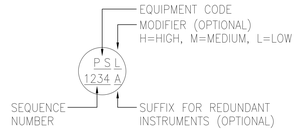
INSTRUMENT IDENTIFICATION CODE

AT –	ANALYSIS TRANSMITTER
CP –	CONTROL PANEL
EA –	ELECTRONIC ALARM (HORNS & BEACONS)
FE –	FLOW RATE SENSOR
FG –	FLOW INDICATOR (LOCAL)
FI –	FLOW INDICATOR
FIS –	FLOW INDICATING SWITCH
FIT –	FLOW INDICATING TRANSMITTER
FS –	FLOW SWITCH
FT –	FLOW TRANSMITTER
FCV –	FLOW CONTROL VALVE
FXH –	FLEXIBLE HOSE
HS –	HAND SWITCH
HV –	HAND VALVE
IT –	CURRENT TRANSMITTER
KC –	TIME CONTROLLER
LCV –	LEVEL CONTROL VALVE
LI –	LEVEL INDICATOR
LIS –	LEVEL INDICATING SWITCH
LIT –	LEVEL INDICATING TRANSMITTER
LS –	LEVEL SWITCH
LT –	LEVEL TRANSMITTER
PB –	PUSH BUTTON
PDI –	PRESSURE DIFFERENTIAL INDICATOR
PDIS –	PRESSURE DIFFERENTIAL INDICATING SWITCH
PDS –	PRESSURE DIFFERENTIAL SWITCH
PDT –	PRESSURE DIFFERENTIAL TRANSMITTER
PDIT –	PRESSURE DIFFERENTIAL INDICATING TRANSMITTER
PI –	PRESSURE INDICATOR
PIT –	PRESSURE INDICATING TRANSMITTER
PS –	PRESSURE SWITCH
PSV –	PRESSURE SAFETY VALVE
PT –	PRESSURE TRANSMITTER
PCV –	PRESSURE CONTROL VALVE (REGULATOR)
SE –	SPEED ELEMENT (TRANSDUCER)
SIC –	SPEED/CURRENT CONTROLLER
SRV –	PRESSURE SAFETY VALVE (RELIEF)
SS –	SPEED SWITCH
ST –	SPEED TRANSMITTER
SV –	SOLENOID VALVE
TDS –	TEMPERATURE DIFFERENTIAL SWITCH
TE –	TEMPERATURE ELEMENT
TI –	TEMPERATURE INDICATOR
TS –	TEMPERATURE SWITCH
TIT –	TEMPERATURE INDICATING TRANSMITTER
TT –	TEMPERATURE TRANSMITTER
TW –	THERMOWELL
UIC –	MULTIVARIABLE INDICATING CONTROLLER
VE –	VIBRATION ELEMENT (TRANSDUCER) SENSOR TYPE (H,K,V,X,Y,&Z)
VS –	VIBRATION SWITCH
WE –	WEIGHT ELEMENT
WT –	WEIGHT TRANSMITTER
XS –	UNCLASSIFIED SWITCH
XV –	ISOLATION VALVE
YS –	DUST DETECTOR SWITCH
ZI –	POSITION INDICATOR
ZS –	POSITION SWITCH
ZSH –	POSITION SWITCH – OPEN
ZSL –	POSITION SWITCH – CLOSED
ZT –	POSITION TRANSMITTER

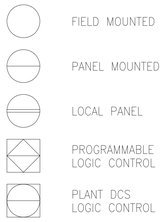
CONTROL SIGNAL IDENTIFICATION CODE

AI –	ANALYSIS INDICATOR
CN –	CONVEYOR
CO –	CONTROLLER
DP –	DIFFERENTIAL PRESSURE
DGI –	DIGITAL INPUT
DGO–	DIGITAL OUTPUT
ELC –	EATON LOGIC CONTROLLER
ES –	EMERGENCY STOP
FI –	FLOW INDICATOR
FY –	FLOW CONTROL
GA –	GENERAL ALARM
GC –	CLINKER GRINDER
GW/GWN–	GENERAL WARNING
HT –	HEATER
II –	CURRENT INDICATOR
KY –	TIME RELAY
LA –	LEVEL ALARM
LD –	LOAD STATUS
LI –	LEVEL INDICATOR
MO –	MOTOR
OL –	OVERLOAD
PDA –	PRESSURE DIFFERENTIAL ALARM
PDI –	PRESSURE DIFFERENTIAL INDICATOR
RDY –	READY
RG –	RUNNING
RM –	REMOTE MODE
RN –	RUN COMMAND
RPI –	REMOTE POWER INDICATION
SA –	SPEED ALARM
SI –	SPEED INDICATOR
SK –	SKID
SP –	STOPPED
SPAL –	SHEAR PIN ALARM
SY –	SPEED CONTROL
T –	TRIP COMMAND
TA–	TEMPERATURE ALARM
TI –	TERMPERATURE INDICATOR
TQI –	TORQUE INDICATOR
TT –	TEMPERATURE TRANSMITTER
UA –	MULTIVARIABLE ALARM
VA –	VIBRATION ALARM
VI –	VIBRATION INDICATOR
WI –	WEIGHT INDICATOR
XA –	UNCLASSIFIED ALARM
XVC –	SOLENOID VALVE CLOSED
XVO–	SOLENOID VALVE OPEN
YA –	DUST DETECTOR ALARM
YI –	STATE INDICATOR
ZI –	POSITION INDICATOR
ZIC –	POSITION INDICATOR CLOSED
ZIO –	POSITION INDICATOR OPEN
ZY –	POSITION CONTROL

INSTRUMENTS

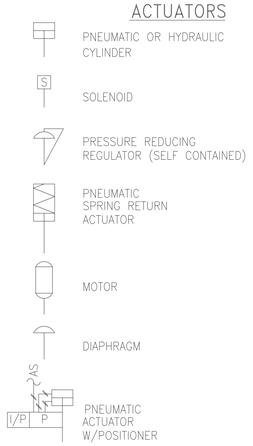


INSTRUMENT SYMBOLS

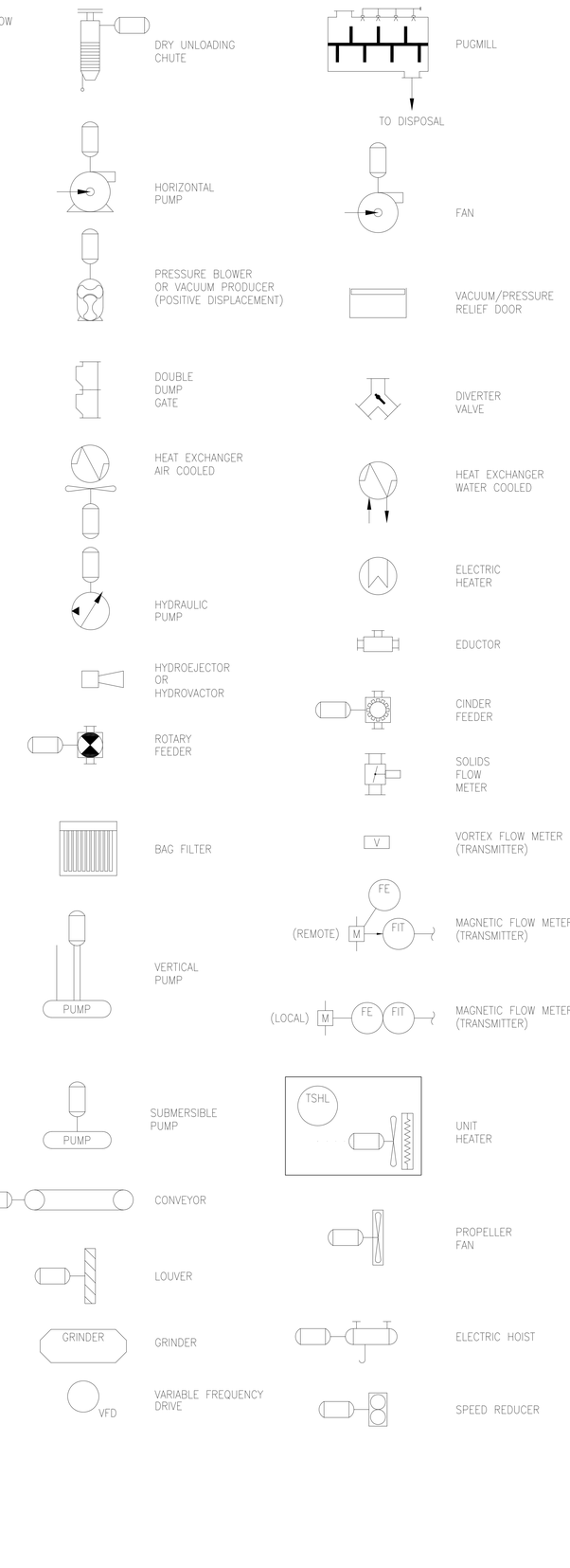


VALVES

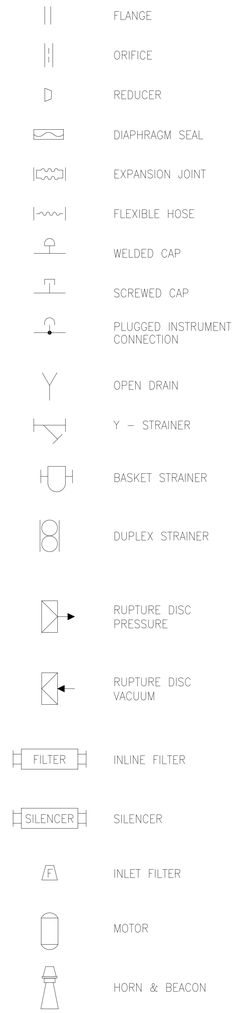
ACTUATORS



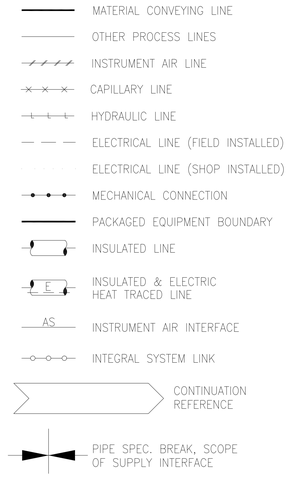
EQUIPMENT



PIPING SPECIALTIES



LINE LEGEND



MATERIAL ABBREVIATIONS

ASH–	ASHCOLITE (CHROME IRON ALLOY)
CS–	CARBON STEEL
SS–	STAINLESS STEEL

MECHANICAL IDENTIFICATION CODES

BN–	BIN
CD–	GEAR BOX OR CONTROL DRIVE
CNV–	SUBMERGED GRIND CONVEYOR
EJ–	EXPANSION JOINT
FG–	FLOW GAUGE
FLT–	FILTER/STRAINER
GAT–	SLUICE GATE
GRN–	CLINKER-GRINDER
HOP–	BUNKER OR HOPPER
HPU–	HYDRAULIC DRIVE
HT–	ELECTRIC HEATER
JET–	EJECTOR
MO–	ELECTRIC MOTOR
MX–	MIXER
PU–	PUMP
VFD–	VARIABLE FREQUENCY DRIVE
TNK–	TANK

SYSTEM CODES

ASA–	BOTTOM ASH HANDLING
ASB–	FLY ASH HANDLING
CAA–	STATION AIR
HRA–	CIRCULATING WATER
WSA–	SERVICE WATER

NOTES

1. EACH EQUIPMENT ITEM IN A SYSTEM IS ASSIGNED A 3 OR 4 DIGIT B&W TAG NUMBER. THE TAGS ARE SHOWN NEXT TO THE ASSOCIATED EQUIPMENT IN PARENTHESIS. EXAMPLE (015)
2. ALL AUTOMATED VALVES ARE NORMALLY CLOSED IN THE DE-ENERGIZED STATE UNLESS SPECIFICALLY NOTED ON THE DRAWING AS NORMALLY OPEN (N.O.).
3. ALL MANUALLY OPERATED VALVES ARE NORMALLY OPEN UNLESS SPECIFICALLY NOTED ON THE DRAWING AS NORMALLY CLOSED (N.C.).
4. ALL INSTRUMENT & PLANT AIR PIPING IS NOT FURNISHED BY B&W UNLESS NOTED OTHERWISE ON THE DRAWING.
5. ALL INSTRUMENT AIR TUBING IS 3/8"ø (10mm) MINIMUM UNLESS NOTED OTHERWISE ON THE DRAWING.
6. ALL EQUIPMENT IS DESIGNED FOR INSTRUMENT QUALITY AIR WITH A PRESSURE RANGE OF 80-120 PSIG (5.6-8.4 Kg/CM^2) UNLESS NOTED OTHERWISE ON THE DRAWING.
7. (F) DENOTES "FURNISHED BY B&W". (NF) DENOTES "NOT FURNISHED BY B&W". (E) DENOTES "EXISTING".
8. P&ID's ARE SCHEMATICS AND ARE NOT INTENDED TO BE USED AS CONSTRUCTION DRAWINGS.
9. ALL AUTOMATED VALVES ARE FAIL CLOSED AT LOSS OF SIGNAL AND FAIL AT LAST POSITION DURING LOSS OF AIR, UNLESS NOTED OTHERWISE ON THE DRAWING.

REVISIONS REV.	DATE	REV. BY	CKD. BY	ENG. APP.	ENG. APP.	REVISION RECORD
A	9/30/25	ATL	RJK			INITIAL ISSUE

DRAWN BY	ATL	3/17/23
CHECKED BY	RJK	9/30/25
MECH. APP.		
STRUCT. APP.		
ELECT. APP.		

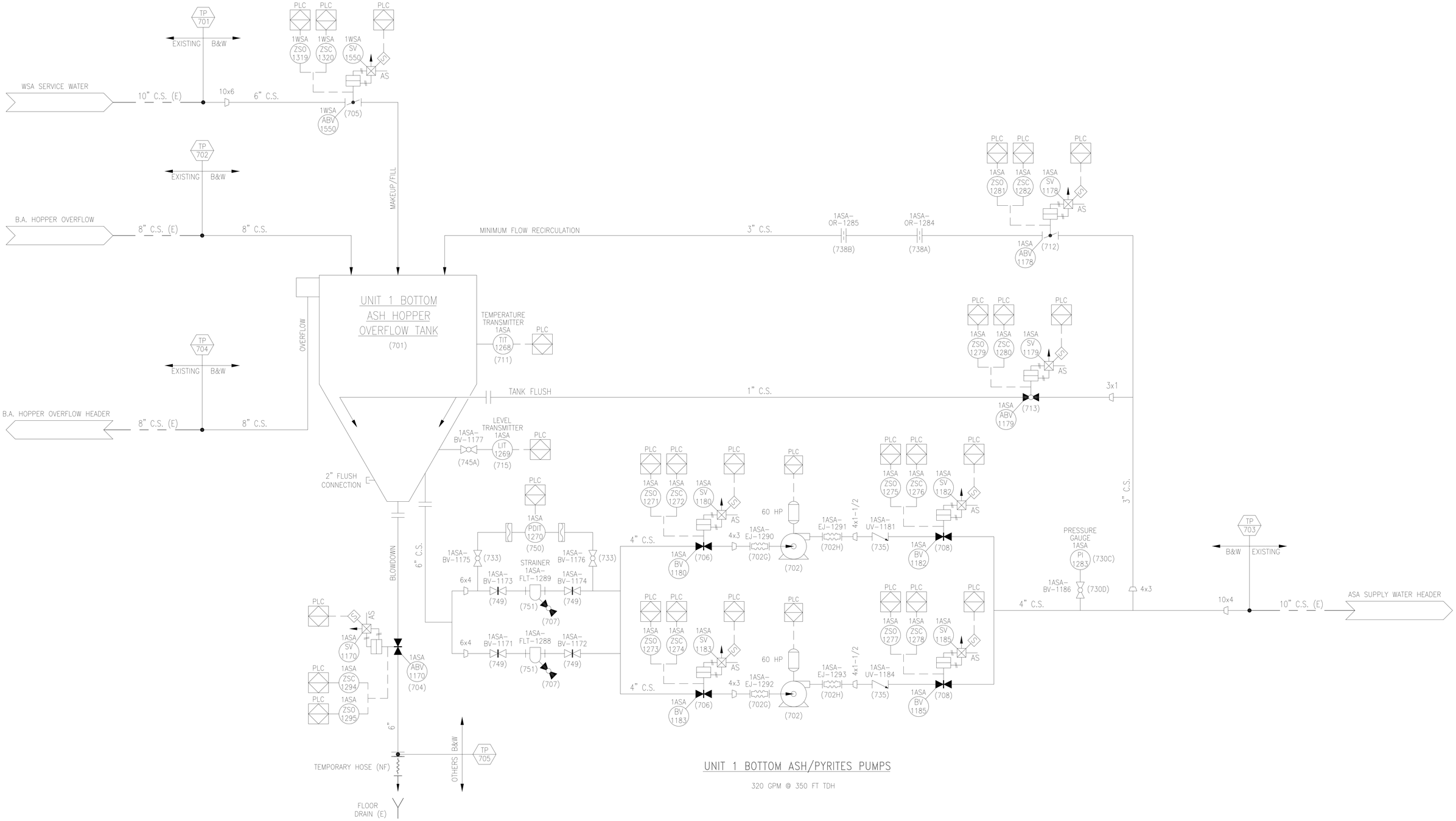
Allen-Sherman-Hoff
The Babcock & Wilcox Company
Exton, Pennsylvania, U.S.A.

PROCESS AND INSTRUMENTATION DIAGRAM
BOTTOM ASH RECIRCULATION SYSTEM

CITY OF HASTINGS
WHELAN ENERGY CENTER
BOTTOM ASH CONVEYOR SYSTEM MODIFICATION UNIT 1
HASTINGS, NEBRASKA

SCALE NONE
CONTRACT 225361-01
DWG 225361-01-E703-01
REV A

225361-01-E703-02



UNIT 1 BOTTOM ASH/PYRITES PUMPS

320 GPM @ 350 FT TDH

NOTES

1. ALL AUTOMATED VALVES ARE NORMALLY CLOSED IN THE DE–ENERGIZED STATE UNLESS SPECIFICALLY NOTED ON THE DRAWING AS NORMALLY OPEN (N.O.).
2. ALL AUTOMATED VALVES ARE FAIL CLOSED AT LOSS OF SIGNAL AND FAIL AT LAST POSITION DURING LOSS OF AIR, UNLESS NOTED OTHERWISE ON THE DRAWING.

REVISIONS REV.	DATE	REV. BY	CKD. BY	ENG. APP.	ENG. APP.	REVISION RECORD
D	12/10/25	RJK				TAGGING REVISIONS
C	11/19/25	RJK	JT			CORRECTED PUMP ARRANGEMENT
B	11/7/25	RJK	JT			REVISED PER CUSTOMER COMMENTS
A	9/30/25	ATL	RJK			INITIAL ISSUE

DRAWN BY	ATL	3/17/23
CHECKED BY	RJK	9/30/25
MECH. APP.		
STRUCT. APP.		
ELECT. APP.		

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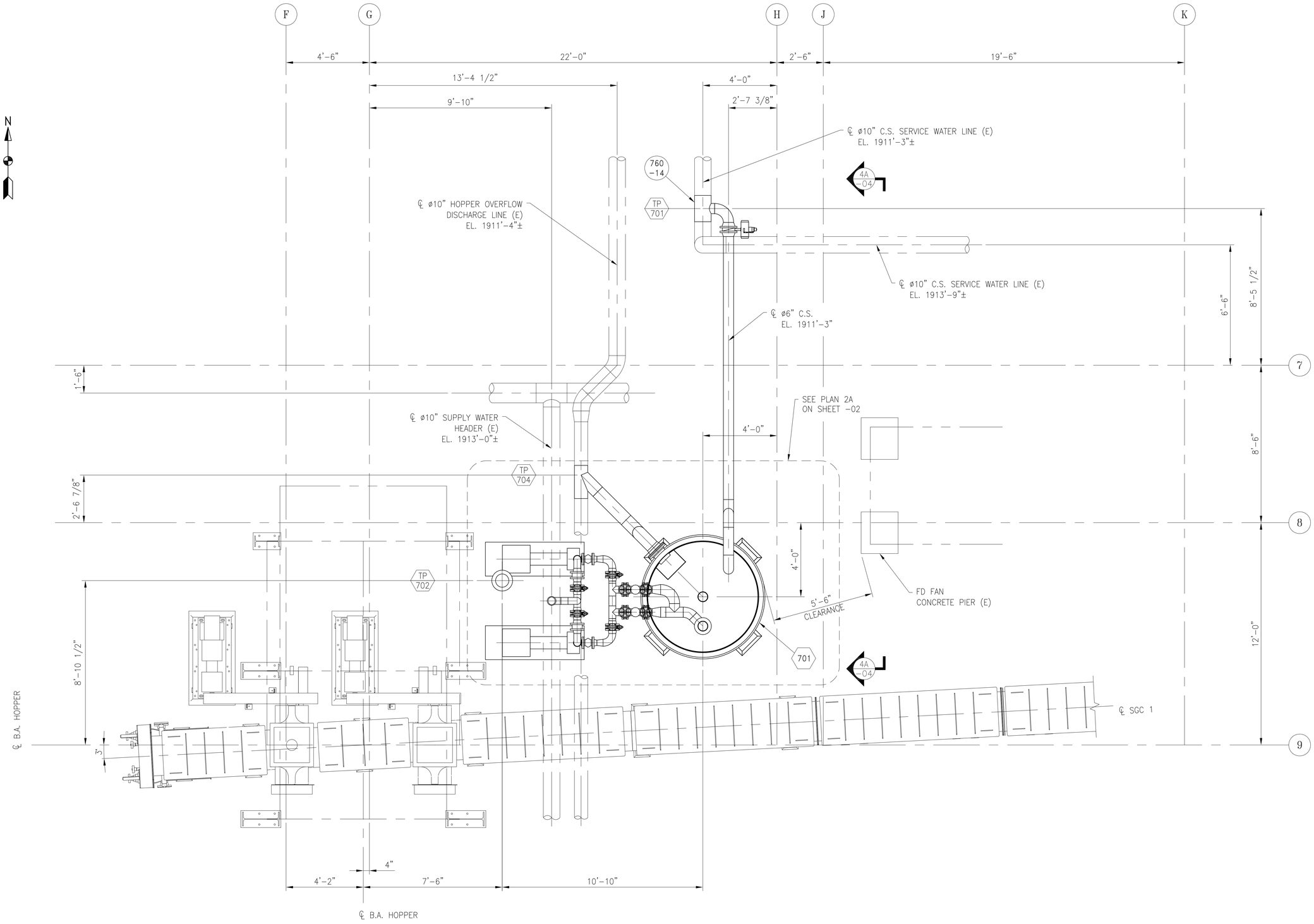
Exton, Pennsylvania, U.S.A.

PROCESS AND INSTRUMENTATION DIAGRAM
BOTTOM ASH
RECIRCULATION SYSTEM

CITY OF HASTINGS
WHELAN ENERGY CENTER
BOTTOM ASH CONVEYOR SYSTEM MODIFICATION
UNIT 1
HASTINGS, NEBRASKA

SCALE NONE
CONTRACT 225361–01
DWG 225361–01–E703–02
REV D

225361-01-E730-01



PLAN 1A-01

REVISIONS								
REV.	DATE	REV. BY	CKD. BY	ENG. APP.	ENG. APP.	REVISION RECORD		
B	11/26/26	JT	RJK	RJK		GENERAL REVISION		
A	10/31/25	JT	RJK	RJK		INITIAL ISSUE		

DRAWN BY	JT	10/31/25
CHECKED BY	RJK	10/31/25
MECH. APP.	RJK	10/31/25
STRUCT. APP.		
ELECT. APP.		

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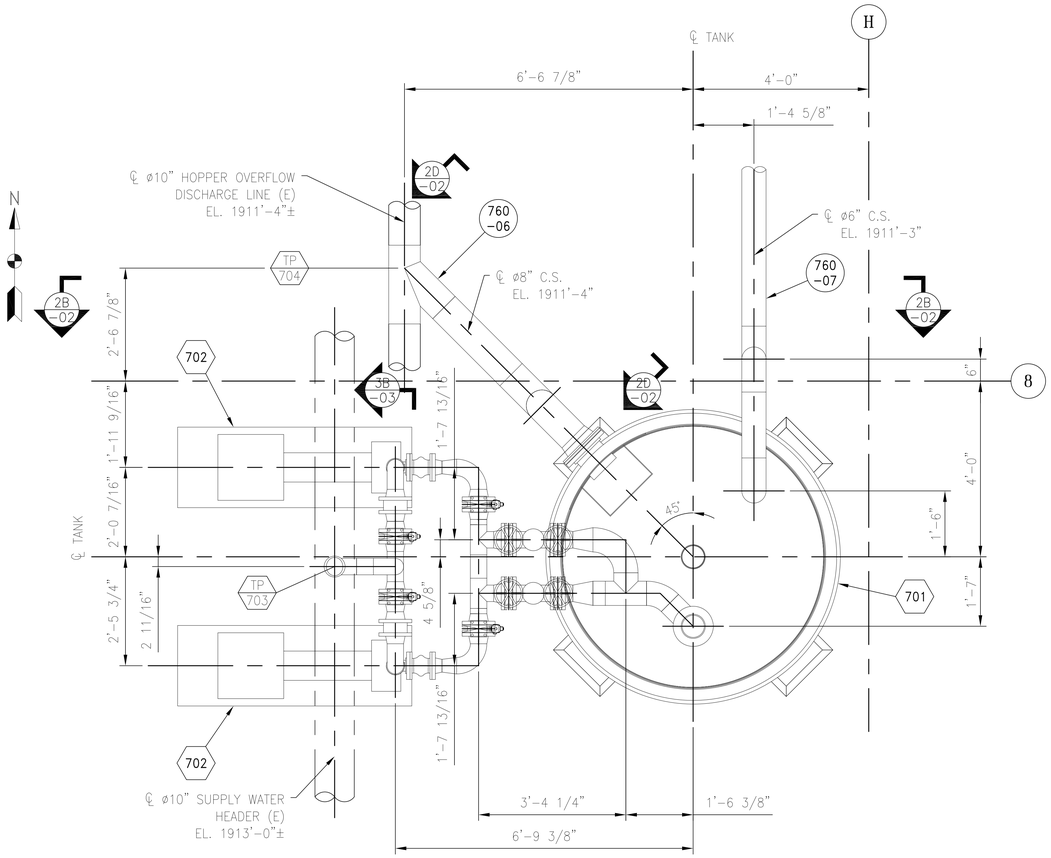
The Babcock & Wilcox Company
Exton, Pennsylvania, U.S.A.

ERECTION ARRANGEMENT
RECIRCULATION PUMP SYSTEM
SGC 1
UNIT 1

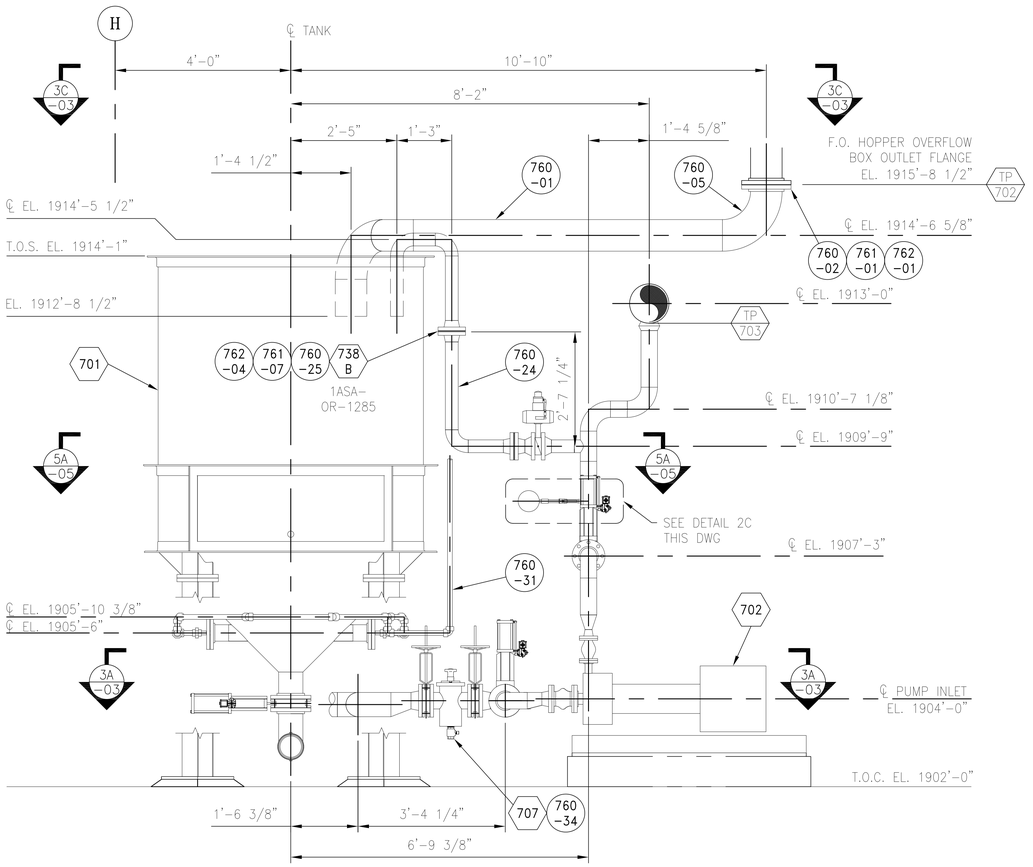
CITY OF HASTINGS
WHELAN ENERGY CENTER
BOTTOM ASH CONVEYOR SYSTEM MODIFICAITON
UNIT 1
HASTINGS, NEBRASKA
CUST. DWG.

SCALE 1/2"=1'-0"
CONTRACT 225361-01
DWG 225361-01-E730-01
REV B

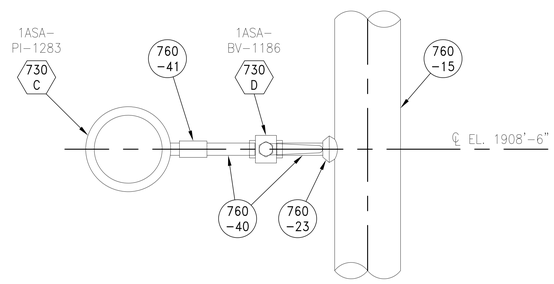
225361-01-E730-02



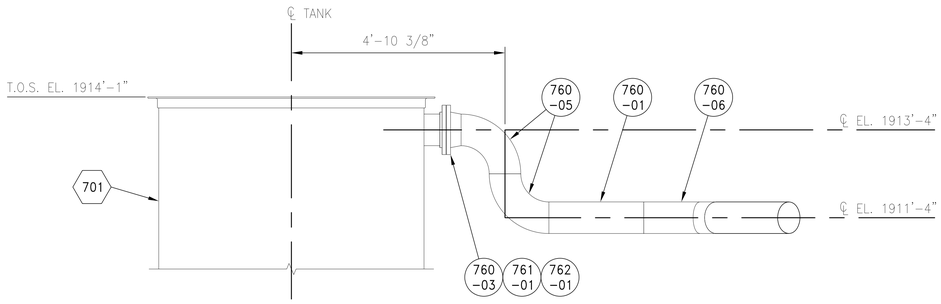
PLAN 2A -01



ELEVATION 2B -02
LOOKING SOUTH
OVERFLOW & MAKEUP PIPING NOT SHOWN FOR CLARITY



DETAIL 2C -02
SCALE: 3"=1'-0"



SECTION 2D -02

REVISIONS										
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								CHECKED BY	RJK	10/31/25
	C	12/10/25	RJK				REVISED PER CUSTOMER COMMENTS	MECH. APP.	RJK	10/31/25
	B	11/26/26	JT	RJK	RJK		GENERAL REVISION	STRUCT. APP.		
	A	10/31/25	JT	RJK	RJK		INITIAL ISSUE	ELECT. APP.		
	REV.	DATE	REV. BY	CKD. BY	ENG. APP.	ENG. APP.	REVISION RECORD			

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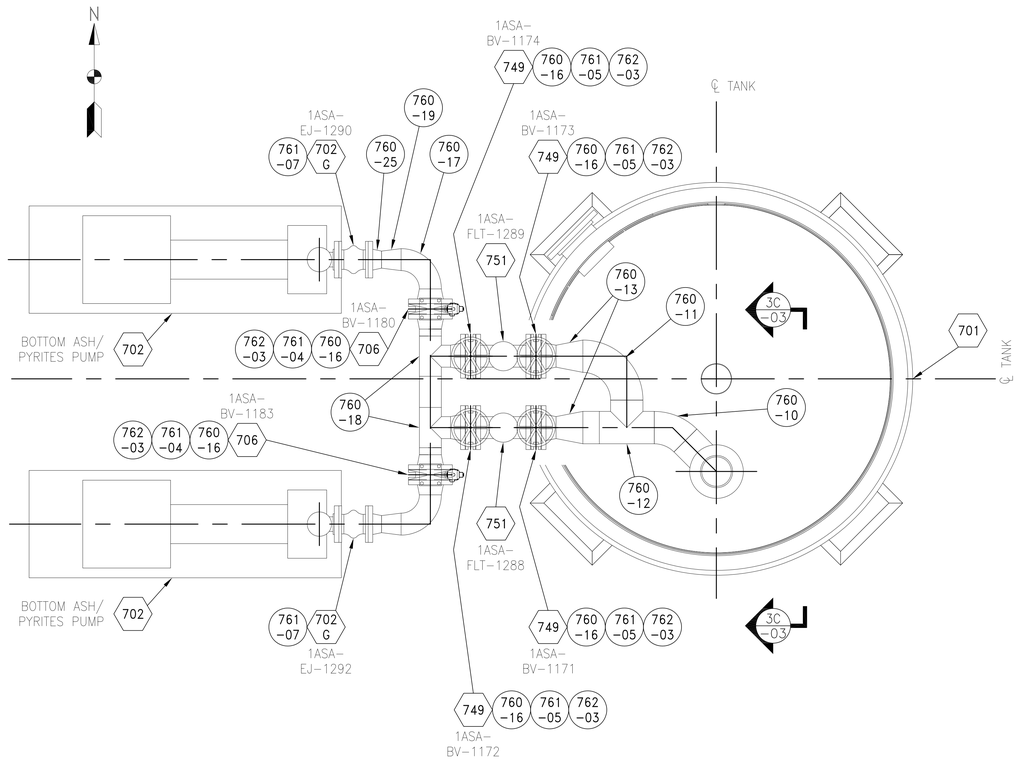
ERECTION ARRANGEMENT
RECIRCULATION PUMP SYSTEM
SGC 1
UNIT 1

CITY OF HASTINGS
WHELAN ENERGY CENTER
BOTTOM ASH CONVEYOR SYSTEM MODIFICATION
UNIT 1
HASTINGS, NEBRASKA

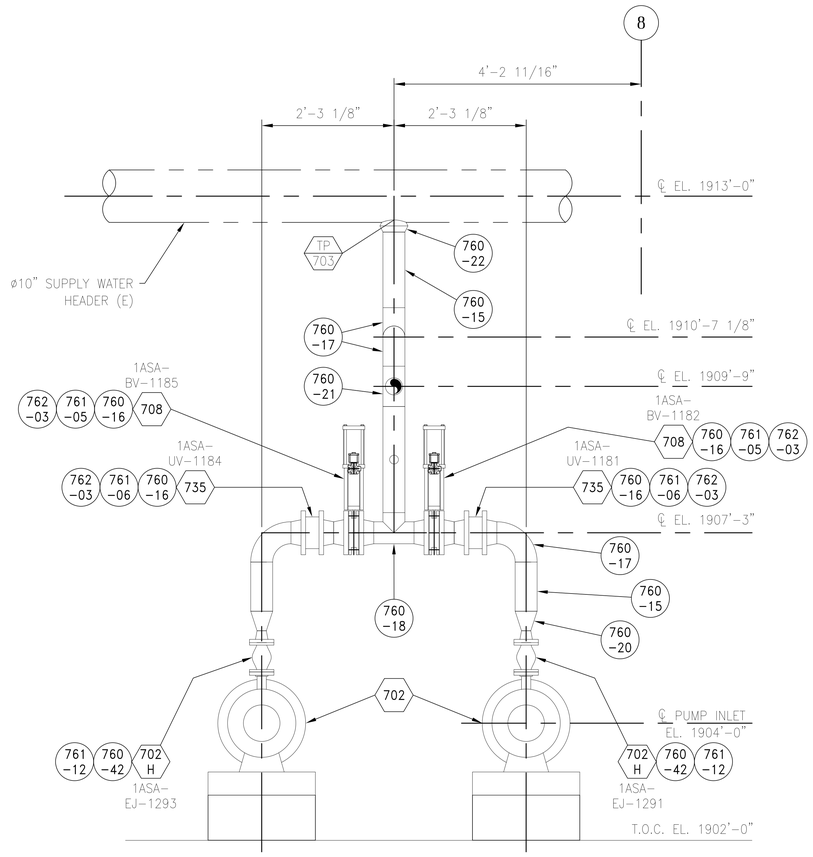
CUST. DWG.

SCALE 3/4"=1'-0"
CONTRACT 225361-01
DWG 225361-01-E730-02
REV C

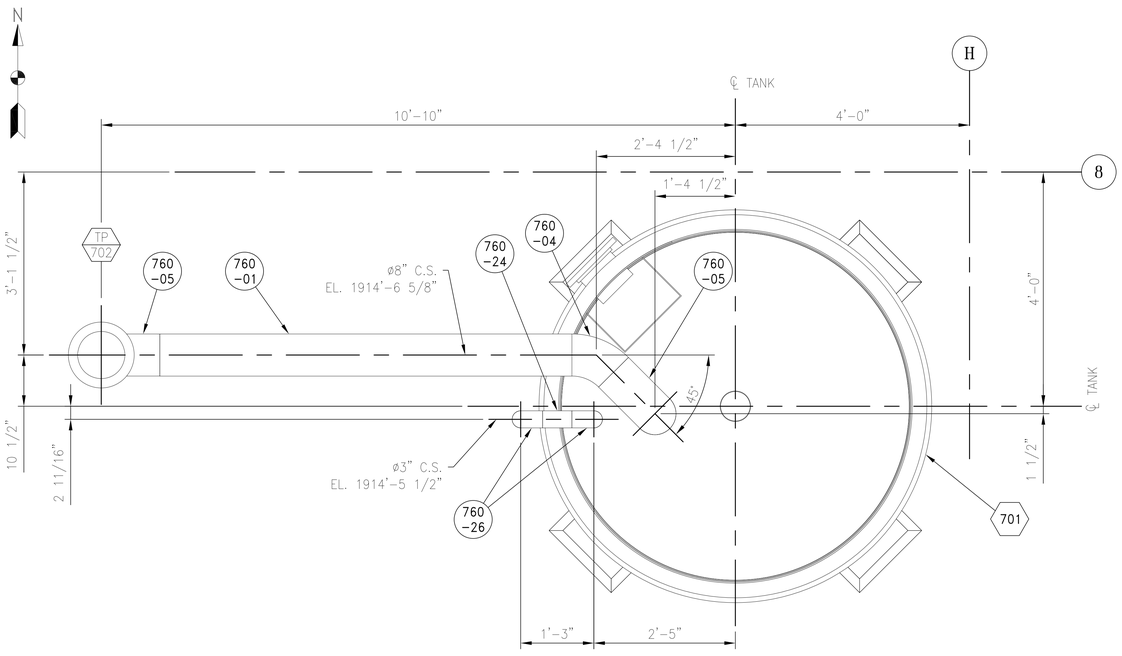
225361-01-E730-03



SECTION 3A -02



SECTION 3B LOOKING WEST -02



SECTION 3C -02

REVISIONS								
							DRAWN BY	JT	10/31/25
							CHECKED BY	RJK	10/31/25
	C	12/10/25	RJK				REVISED CHECK VALVE TAG NUMBERS	MECH. APP.	RJK	10/31/25
	B	11/26/26	JT	RJK	RJK		GENERAL REVISION	STRUCT. APP.		
	A	10/31/25	JT	RJK	RJK		INITIAL ISSUE	ELECT. APP.		
	REV.	DATE	REV. BY	CKD. BY	ENG. APP.	ENG. APP.	REVISION RECORD			

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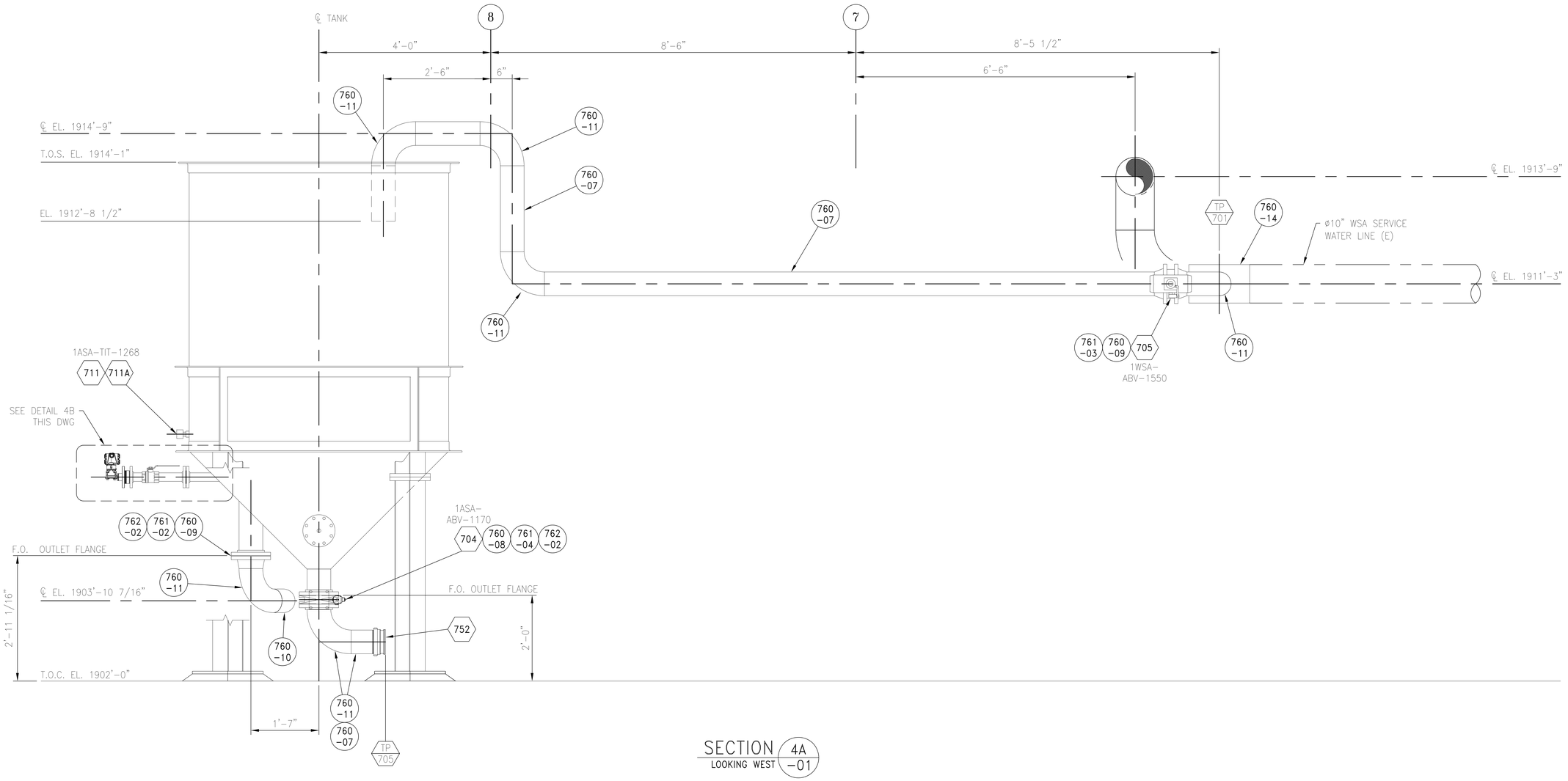
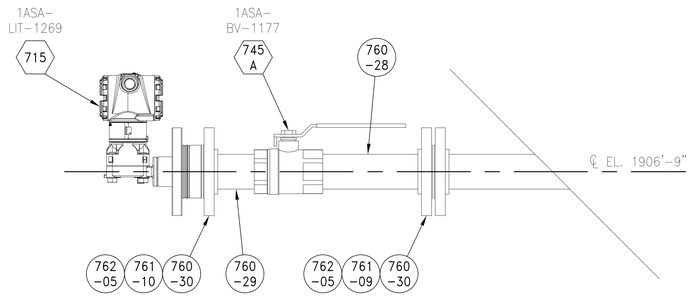
ERECTION ARRANGEMENT
RECIRCULATION PUMP SYSTEM
SGC 1
UNIT 1

CITY OF HASTINGS
WHELAN ENERGY CENTER
BOTTOM ASH CONVEYOR SYSTEM MODIFICATION
UNIT 1
HASTINGS, NEBRASKA
CUST. DWG.

SCALE 1"=1'-0"
CONTRACT 225361-01
DWG 225361-01-E730-03
REV C



SECTION 4A -01
LOOKING WEST



DETAIL 4B -04
SCALE: 3"=1'-0"

REVISIONS							
REV.	DATE	REV. BY	CKD. BY	ENG. APP.	ENG. APP.	REVISION RECORD	
C	12/10/25	RJK				REVISED PER CUSTOMER COMMENTS	
B	11/26/26	JT	RJK	RJK		GENERAL REVISION	
A	10/31/25	JT	RJK	RJK		INITIAL ISSUE	

DRAWN BY	JT	10/31/25
CHECKED BY	RJK	10/31/25
MECH. APP.	RJK	10/31/25
STRUCT. APP.		
ELECT. APP.		

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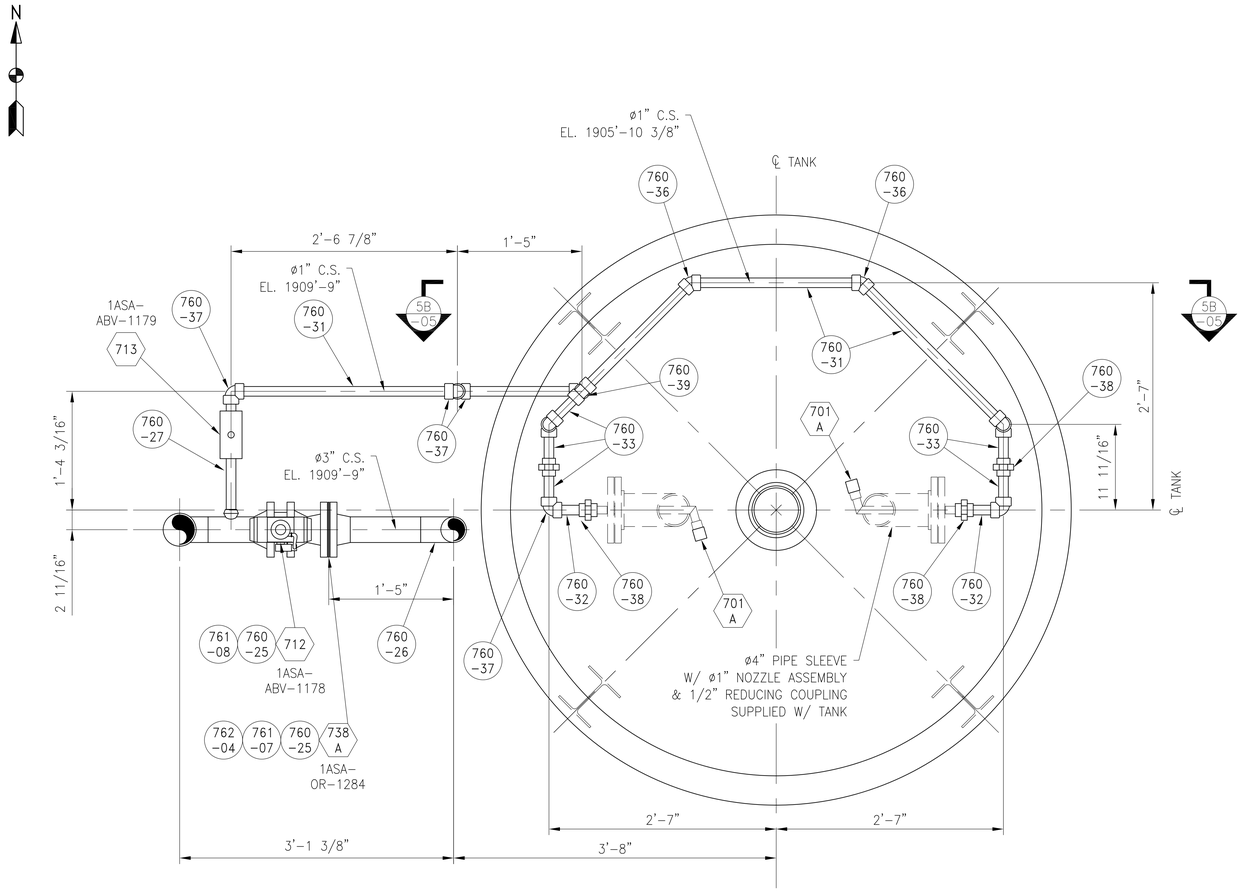
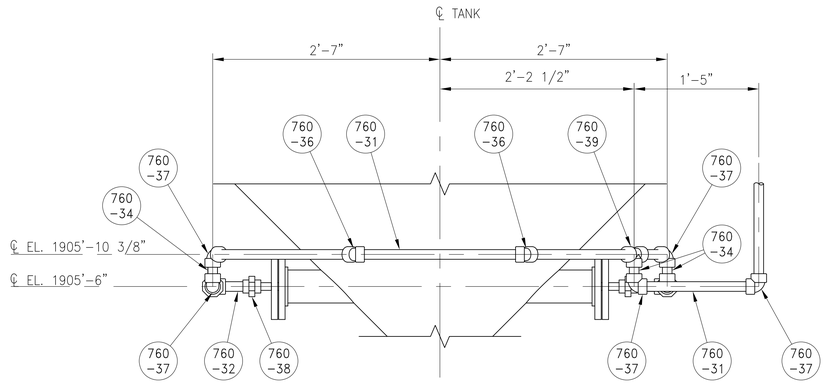
ERECTION ARRANGEMENT
RECIRCULATION PUMP SYSTEM
SGC 1
UNIT 1

CITY OF HASTINGS
WHELAN ENERGY CENTER
BOTTOM ASH CONVEYOR SYSTEM MODIFICATION
UNIT 1
HASTINGS, NEBRASKA
CUST. DWG.

SCALE 1"=1'-0"
CONTRACT 225361-01
DWG 225361-01-E730-04
REV C



SECTION 5A -02



SECTION 5B -05
LOOKING SOUTH

REVISIONS							
REV.	DATE	REV. BY	CKD. BY	ENG. APP.	ENG. APP.	REVISION RECORD	
B	11/26/26	JT	RJK	RJK		GENERAL REVISION	
A	10/31/25	JT	RJK	RJK		INITIAL ISSUE	

DRAWN BY	JT	10/31/25
CHECKED BY	RJK	10/31/25
MECH. APP.	RJK	10/31/25
STRUCT. APP.		
ELECT. APP.		

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The Babcock & Wilcox Company
Exton, Pennsylvania, U.S.A.

ERECTION ARRANGEMENT
RECIRCULATION PUMP SYSTEM
SGC 1
UNIT 1

CITY OF HASTINGS
WHELAN ENERGY CENTER
BOTTOM ASH CONVEYOR SYSTEM MODIFICAITON
UNIT 1
HASTINGS, NEBRASKA

CUST. DWG.

SCALE 1 1/2"=1'-0"
CONTRACT 225361-01
DWG 225361-01-E730-05
REV B

225361-01-E730-06

SYMBOLS & ABBREVIATIONS

BW = BUTT WELD
C/O = CONTROL OPERATED
CS = CARBON STEEL
(E) = EXISTING
(F) = FURNISHED BY A-S-H CO.
(FE) = FURNISHED BY ERECTOR
FF = FLAT FACE
FS = FORGED STEEL
HTG = HIGH TEMP GASKET
H/O = HAND OPERATED VALVE
IG = INCLUDES GASKET
IWB = INTEGRAL WEAR BACK
LF = LINEAR FEET
(NF) = FURNISHED BY OTHERS.
RF = RAISED FACE
S = SEAT SIDE OF VALVE
SO = SLIP-ON
SW = SOCKET WELD
TBE = THREADED BOTH ENDS
THD = THREADED
TOE = THREAD ONE END
WN = WELD NECK
◯ = INDICATES PART NUMBERS IN BILL OF MATERIAL
⬡ = INDICATES EQUIPMENT LIST TAG NUMBER

GENERAL NOTES:

1. SMALL BORE PIPE ROUTING IS OF A GENERAL NATURE, CONTRACTOR MAY ALTER ROUTING TO SUIT.
2. FOR PIPE SUPPORT DETAILS AND DIMENSIONS, REFERENCE 225361-01-E790 SERIES.
3. FOR TANK FOUNDATION PLANS, REFERENCE 225361-01-E720 SERIES.
4. FOR PUMP FOUNDATION PLAN, REFERENCE 225361-01-E746 SERIES.

TAG 760 BILL OF MATERIAL C.S. PIPE & FITTINGS

PART NO.	QTY	DESCRIPTION
760-01	12 LF	8" PIPE, SCH STD
760-02	1	8"-150# FLANGE, FFSO
760-03	1	8"-150# FLANGE, WNFF
760-04	1	8"x45° LR ELBOW, SCH STD, BW
760-05	4	8"x90° LR ELBOW, SCH STD, BW
760-06	1	8"x45° LATERAL, SCH STD, BW
760-07	24 LF	6" PIPE, SCH STD
760-08	1	6"-150# FLANGE, FFSO
760-09	3	6"-150# FLANGE, WNFF
760-10	1	6"x45° LR ELBOW, SCH STD, BW
760-11	7	6"x90° LR ELBOW, SCH STD, BW
760-12	1	6" TEE, SCH STD, BW
760-13	2	6"x4" ECCENTRIC REDUCER, SCH STD, BW
760-14	1	10"x10"x6" REDUCING TEE, SCH STD, BW
760-15	10 LF	4" PIPE, SCH STD
760-16	16	4"-150# FLANGE, WNFF
760-17	6	4"x90° LR ELBOW, SCH STD, BW
760-18	3	4" TEE, SCH STD, BW
760-19	2	4"x3" ECCENTRIC REDUCER, SCH STD, BW
760-20	2	4"x1 1/2" CONCENTRIC REDUCER, SCH STD, BW
760-21	1	4"x4"x3" REDUCING TEE, SCH STD, BW
760-22	1	10"x4" WELDOLET, SCH STD, BW
760-23	1	4"x1/2" THREDOLET, 3000#
760-24	10 LF	3" PIPE, SCH STD
760-25	8	3"-150# FLANGE, WNFF
760-26	3	3"x90° LR ELBOW, SCH STD, BW
760-27	1	3"x1" THREDOLET, 3000#
760-28	1	2" PIPE NIPPLE x 8" LG, SCH 80, TBE
760-29	1	2" PIPE NIPPLE x 4" LG, SCH 80, TBE
760-30	2	2"-150# RF FLANGE, 3000#, THREADED
760-31	18 LF	1" PIPE, SCH 80
760-32	2	1" PIPE NIPPLE x 3 1/2" LG, SCH 80, TBE
760-33	5	1" PIPE NIPPLE x 4" LG, SCH 80, TBE
760-34	5	1" PIPE NIPPLE x 2" LG, SCH 80, TBE
760-36	2	1"x45° THREADED ELBOW, 3000# FS
760-37	10	1"x90° THREADED ELBOW, 3000# FS
760-38	4	1" THREADED UNION, 3000# FS
760-39	1	1" THREADED TEE, 3000# FS
760-40	2	1/2" PIPE NIPPLE x 4" LG, SCH 80, TBE
760-41	1	1/2" THREADED FULL COUPLING, 300# FS
760-42	2	1 1/2"-150# FLANGE, WNFF

STEEL PIPE B/M NOTES

1. PIPE 2.5" DIA & BELOW TO BE SCH 80, ASTM A106 GR. B, SEAMLESS, RANDOM LENGTH.
2. PIPE 3" DIA AND ABOVE TO BE SCH STD, ASTM A53 GR. B, SEAMLESS, RANDOM LENGTH.
3. PIPE FITTINGS 3" AND ABOVE MATERIAL TO BE ASTM A234 GR. WPB, SEAMLESS, BUTT WELDED.
4. ALL THREADED FITTINGS TO BE 3000# ASTM A105.
5. FITTING DIMENSIONS SHALL CONFORM TO ANSI B16.9 & B16.28 FOR SIZES 3" DIA AND LARGER.
6. FLANGE DIMENSIONS SHALL CONFORM TO ANSI B16.5.
7. ALL CARBON STEEL PIPE SHALL BE CLEANED AND PAINTED IN ACCORDANCE WITH PAINT SPEC 225361-01-PAINT-G.
8. PLASTIC END CAPS OR PLUGS REQUIRED FOR SHIPMENT.
9. ALL ITEMS ARE TO BE TAGGED PRIOR TO SHIPMENT WITH THE PART NUMBER INDICATED IN BOM ABOVE.

EQUIPMENT LIST

TAG NO.	QTY	ITEM NO.	DESCRIPTION	DWG NO.
701	1	SP236575	OVERFLOW TANK	-
701A	2	LATER	FLUSH NOZZLE TIP	-
702	2	SP236547	BOTTOM ASH/PYRITES RECIRCULATION PUMP	-
702G	2	SP236583	3" RUBBER EXPANSION JOINT, PUMP INLET	-
702H	2	SP236584	1 1/2" RUBBER EXPANSION JOINT, PUMP DISCH.	-
704	1	T-KGVBD06CLDAF	6" C/O KNIFEGATE VALVE	D-8101
705	1	BFV06CESF	6" C/O BUTTERFLY VALVE	C-5682
706	2	T-KGVBD04CLDAF	4" C/O KNIFEGATE VALVE	D-8101
707	2	104510	1" H/O BALL VALVE	A-5164
708	2	T-KGVBD04CLDAF	4" C/O KNIFEGATE VALVE	D-8101
711	1	LATER	TEMPERATURE TRANSMITTER	-
711A	1	LATER	THERMOWELL	-
712	1	BFV03CESF	3" C/O BUTTERFLY VALVE	C-5682
713	1	SP236585	1" C/O BALL VALVE	-
715	1	227687	LEVEL TRANSMITTER	-
730C	1	100278-7	PRESSURE GAUGE	4-5026
730D	1	104508	1/2" H/O BALL VALVE	A-5164
733	2	104508	1/2" H/O BALL VALVE	A-5164
735	2	SP236589	4" CHECK VALVE	-
738A	1	16806-0308	ORIFICE PLATE	B-6026
738B	1	16806-0308	ORIFICE PLATE	B-6026
745A	1	104555	2" H/O BALL VALVE	A-5164
749	4	T-KGVBD04H	4" H/O KNIFEGATE VALVE	D-8085
750	1	SP232629	DIFFERENTIAL PRESSURE TRANSMITTER	-
751	2	SP236550	BASKET STRAINER	-
752	1	SP236586	CAMLOCK COUPLER, 6"MNPT, W/ DUST CAP	-
760	1-LOT	SP236590	LOT-C.S. PIPE & FITTINGS	SEE BOM
761	1-LOT	LATER	LOT-HARDWARE	SEE BOM
762	1-LOT	LATER	LOT-GASKETS	SEE BOM

TAG 761 BILL OF MATERIAL HARDWARE

PART NO.	QTY	DESCRIPTION
761-01	16	HEX HEAD BOLT 3/4"-10 X 3 1/2" LG W/H. HEX NUT & PLAIN WASHER (8" FLG)
761-02	8	HEX HEAD BOLT 3/4"-10 X 3-1/4" LG W/H. HEX NUT & PLAIN WASHER (6" FLG)
761-03	8	STUD BOLT 3/4"-10 X 6-1/4" LG W/ (2) H. HEX NUT (6" BFV)
761-04	16	STUD BOLT 3/4"-10 X 3-1/4" LG W/H. HEX NUT (6" KGV)
761-05	128	STUD BOLT 5/8"-11 X 2-3/4" LG W/H. HEX NUT (4" KGV)
761-06	16	STUD BOLT 5/8"-11 X 6 1/2" LG W/ (2) H. HEX NUT (4" CHECK VALVE)
761-07	24	HEX HEAD BOLT 5/8"-11 X 3" LG W/H. HEX NUT & PLAIN WASHER (3" FLG)
761-08	4	STUD BOLT 5/8"-11 X 5-1/2" LG W/ (2) H. HEX NUT (3" BFV)
761-09	4	HEX HEAD BOLT 5/8"-11 X 2 3/4" LG W/H. HEX NUT & PLAIN WASHER (2" FLG)
761-10	4	HEX HEAD BOLT 5/8"-11 X 4" LG W/H. HEX NUT & PLAIN WASHER (2" DIAPHRAGM)
761-12	16	HEX HEAD BOLT 1/2"-13 X 2 1/4" LG W/H. HEX NUT & PLAIN WASHER (1 1/2" FLG)

HARDWARE B/M NOTES

1. BOLTS & THREADED ROD SHALL BE ASTM A193 GRADE B7 W/ ZINC PLATING PER ASTM B633.
2. NUTS SHALL BE ASTM A194 GRADE 2H HEAVY HEX W/ ZINC PLATING PER ASTM B633.
3. PLAIN WASHERS TYPE A PER ANSI B27.2 W/ZINC PLATING PER ASTM B633.

TAG 762 BILL OF MATERIAL GASKET

PART NO.	QTY	DESCRIPTION
762-01	2	8"-150# FULL FACE TYPE GASKET 1/8" THICK FOR FLAT FACE FLANGE
762-02	3	6"-150# FULL FACE TYPE GASKET 1/8" THICK FOR FLAT FACE FLANGE
762-03	20	4"-150# FULL FACE TYPE GASKET 1/8" THICK FOR FLAT FACE FLANGE
762-04	4	3"-150# FULL FACE TYPE GASKET 1/8" THICK FOR FLAT FACE FLANGE
762-05	2	2"-150# RAISED FACE RING TYPE GASKET 1/8" THICK FOR RAISED FACE FLANGE

GASKET B/M NOTES

1. GASKET MATERIAL SHALL BE RED RUBBER (SBR) OR NEOPRENE.
2. ALL ITEMS ARE TO BE TAGGED PRIOR TO SHIPMENT WITH THE PART NUMBER INDICATED IN BOM ABOVE.

REVISIONS								
REV.	DATE	REV. BY	CKD. BY	ENG. APP.	ENG. APP.	REVISION RECORD		
C	12/10/25	RJK				EQUIPMENT LIST UPDATES		
B	11/26/26	JT	RJK	RJK		GENERAL REVISION		
A	10/31/25	JT	RJK	RJK		INITIAL ISSUE		
							DRAWN BY	JT 10/31/25
							CHECKED BY	RJK 10/31/25
							MECH. APP.	RJK 10/31/25
							STRUCT. APP.	
							ELECT. APP.	

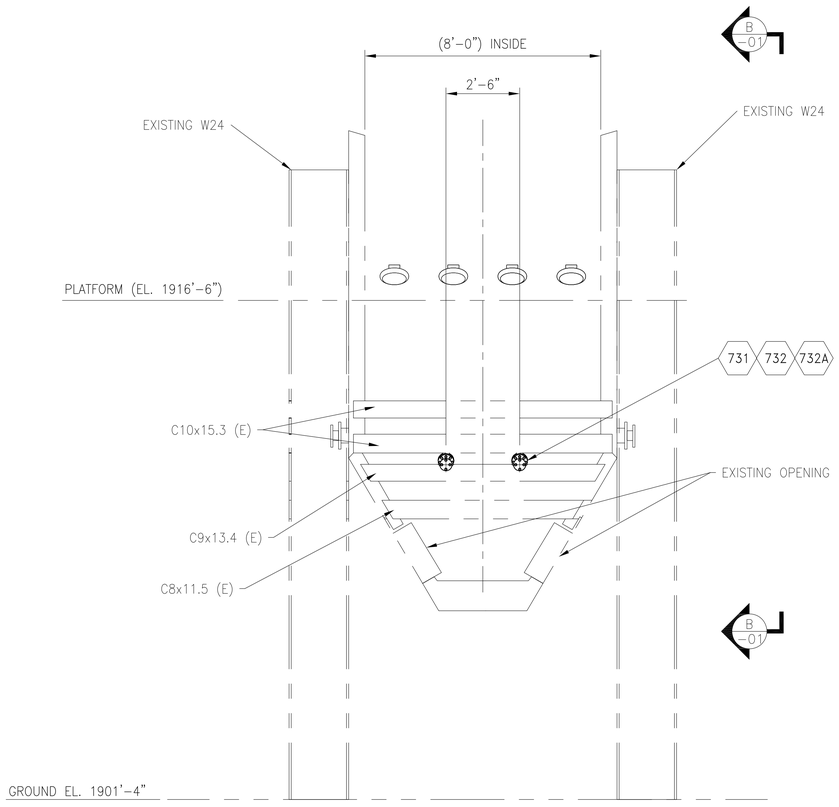
Allen-Sherman-Hoff
The Babcock & Wilcox Company
Exton, Pennsylvania, U.S.A.

ERECTION ARRANGEMENT
RECIRCULATION PUMP SYSTEM
SGC 1
UNIT 1

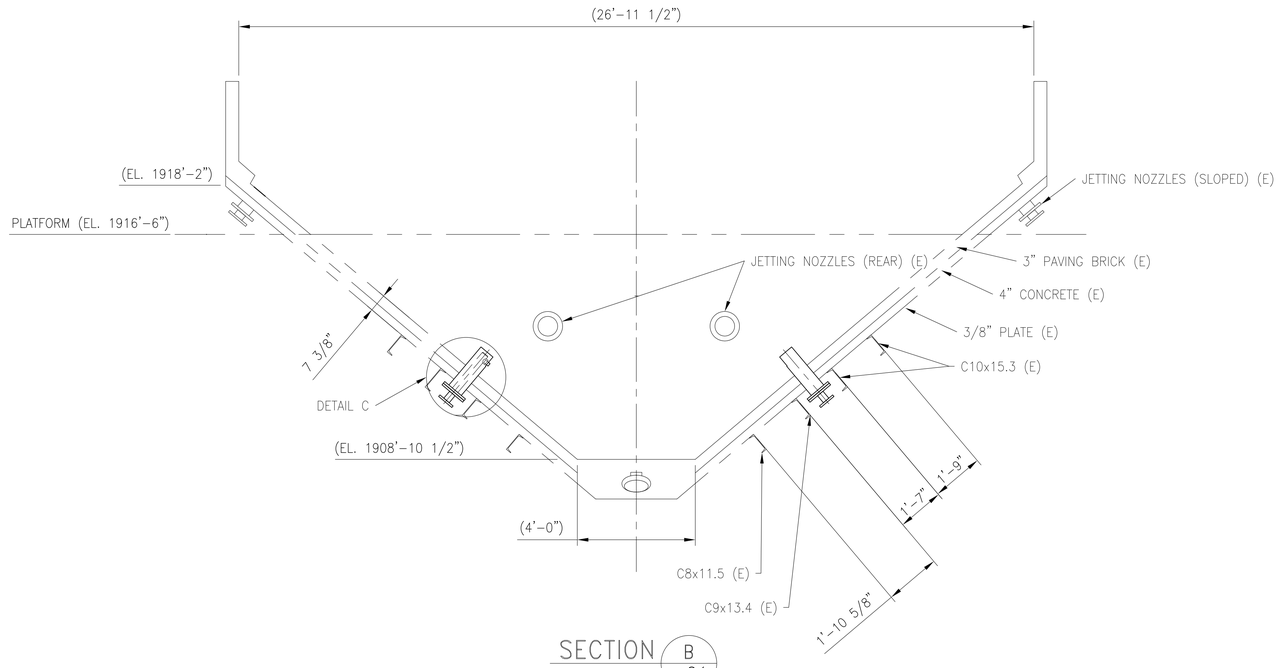
CITY OF HASTINGS
WHELAN ENERGY CENTER
BOTTOM ASH CONVEYOR SYSTEM MODIFICATION
UNIT 1
HASTINGS, NEBRASKA
CUST. DWG.

SCALE NONE
CONTRACT 225361-01
DWG 225361-01-E730-06
REV C

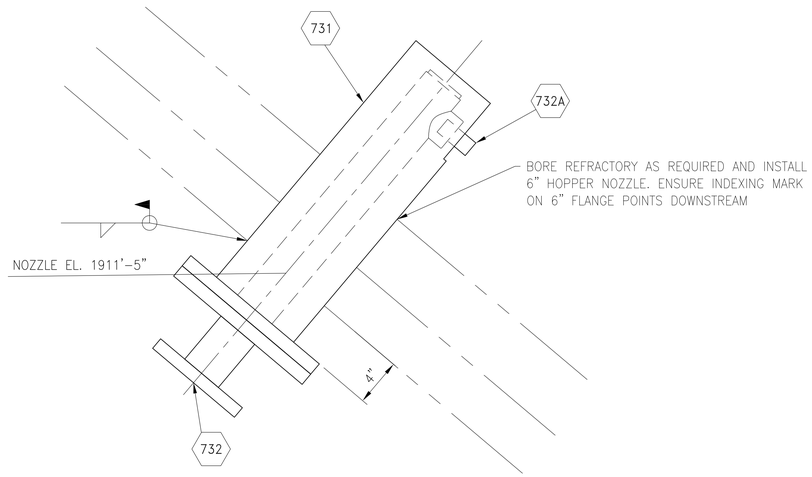
BILL OF MATERIALS			
TAG	QTY	PART #	DESCRIPTION
731	4	228471	HOPPER NOZZLE
732	4	228470	FLUSHING LANCE
732A	4	TBD	1" FLAT SPRAY NOZZLE
735	1	TBD	LOT – CARNON STEEL PIPE & FITTINGS
736	1	TBD	LOT – HARDWARE
737	1	TBD	LOT – GASKETS
739	1	TBD	C/O BUTTERFLY VALVE



ELEVATION A –01



SECTION B –01



DETAIL C –01

REVISIONS							
REV.	DATE	REV. BY	CKD. BY	ENG. APP.	ENG. APP.	REVISION RECORD	
A	01/06/26	JLZ	RJK	RJK		INITIAL ISSUE	

DRAWN BY	JLZ	01/07/26
CHECKED BY	RJK	01/07/26
MECH. APP.	RJK	01/07/26
STRUCT. APP.		
ELECT. APP.		

Allen-Sherman-Hoff
The Babcock & Wilcox Company
Exton, Pennsylvania, U.S.A.

HOPPER NOZZLE LOCATIONS

ELEVATIONS AND DETAILS
UNIT 1

CITY OF HASTINGS
WHELAN ENERGY CENTER
B.A. WATER RECIRCULATION SYSTEM
UNIT 1
HASTINGS, NEBRASKA

SCALE 1/2" = 1'–0"
CONTRACT 225361–01
DWG 225361–01–E731–01
REV A

PAINT SPECIFICATION

TO: **J. Bannan** **CC:** **R. Katona**
K. Jones

FROM: **J. O'Malley**

DATE: **12 November 2025**

CUSTOMER: **Whelan Energy Center**
City of Hastings
Bottom Ash Conveyor System Modification, Unit 1

CONTRACT: **225361-01**

Paint Specification Number: 225361-01-PAINT Rev. B

☐ New

☒ Revision to Paint Specification, VOID all previous revisions.

☐ Revised Paint Specification Number, change all documents accordingly for this contract.

☐ Cancel Paint Specification Number _____ for this contract.

This Paint Specification is retroactive for all previously issued BOM's.

Revision (A) – Initial Submittal

Revision (B) – Revised Paint Color for PAINT-B per Customer Comments

PAINT SPECIFICATION

A-S-H Paint Specification No.:	225361-01-PAINT-A	12 November 2025 Rev. B
A-S-H Contract Number:	225361-01	
Customer:	Whelan Energy Center, City of Hastings	
Customer/Engineer's Specification:	HU 2025-101	

Category: **Carbon Steel Structural Shapes, Pipe Supports**, and Other Carbon Steel Products Unless Otherwise Superseded by a Specific Contract Paint Specification

Cleaning and Surface Preparation Requirements:

1. Remove all oil, grease, dirt, etc., in accordance with SSPC-SP1 "Solvent Cleaning".
2. Remove rust, scale, weld spatter and other detrimental foreign matter in accordance with SSPC-SP2 "Hand Tool Cleaning" or SSPC-SP3 "Power Tool Cleaning" at a minimum.
3. All material must be pickled prior to galvanizing.

Primer/Finish Coat: Hot-Dip Galvanizing

No. of Coats: 1 **Dry Film Thickness:** Per ASTM A-123

Application: In accordance with ASTM A-123, A-153, and/or ASTM A-385

Note: **All pipe support hardware shall be galvanized or mechanically plated.**

Field weld edges are to be left unpainted for a distance of three (3) inches to either side of the weld areas. These edges are to be coated with a weldable primer such as Deoxaluminate, Bloxide or A-S-H approved equal.

Any necessary repairs shall be conducted in accordance with ASTM A-780 "*Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings*".

PAINT SPECIFICATION

A-S-H Paint Specification No.:	225361-01-PAINT-B	12 November 2025 Rev. B
A-S-H Contract Number:	225361-01	
Customer:	Whelan Energy Center, City of Hastings	
Customer/Engineer's Specification:	HU 2025-101	

Category: **Overflow Tank located Indoors** (including integrated structural steel)

Cleaning and Surface Preparation Requirements:

1. Remove all oil, grease, dirt, etc., in accordance with SSPC-SP1 "Solvent Cleaning".
2. Surface preparation in accordance with SSPC-SP6 "Commercial Blast Cleaning" at a minimum.

Primer Coat(s): Carboline Carbozinc 859 Organic Zinc Rich Epoxy

No. of Coats: 1 **Dry Film Thickness:** 6.0-8.0 mils DFT

Finish Coat(s): Carboline Carboguard 890 Epoxy

No. of Coats: 1 **Dry Film Thickness:** 2.0-3.0 mils DFT

FINISH COLOR SHALL BE: "Dark Bronze" per Customer, see Note below.

Application: In accordance with SSPC-PA1 "Paint Application Specification for Shop, Field and Maintenance Painting" and Paint Manufacturer's Recommendations.

Note: **Field weld edges are to be left unpainted for a distance of three (3) inches to either side of the weld areas. These edges are to be coated with a weldable primer such as Deoxaluminate, Bloxide or A-S-H approved equal.**

Customer Custom Color: Hastings Utility Windigo Brown

Blend-a-Color		OZ	32	64	128
B1	Black	2	23	-	1
G2	New Green	4	58	-	-
R2	Maroon	2	4	1	-
Y3	Deep Gold	-	4	-	-
W1	White	-	12	-	-

PAINT SPECIFICATION

A-S-H Paint Specification No.:	225361-01-PAINT-C	12 November 2025 Rev. B
A-S-H Contract Number:	225361-01	
Customer:	Whelan Energy Center, City of Hastings	
Customer/Engineer's Specification:	HU 2025-101	
Category:	**A-S-H Standard Products and Assemblies**	

Cleaning and Surface Preparation Requirements:

1. Remove all oil, grease, dirt, etc. in accordance with SSPC-SP1 "Solvent Cleaning".

2. Remove rust, scale, weld spatter and other detrimental foreign matter in accordance with SSPC-SP6 "Commercial Blast Cleaning" at a minimum.

Allen-Sherman-Hoff Standard Paint
Manufactured by: International Protective Coatings

Primer/Finish Coat: International – Interlac 789 Alkyd Paint **Color**: MSC 72294 BLUE

No. Of Coats: 1 **Dry Film Thickness:** 3 to 4 MILS DFT

Application: In accordance with SSPC-PA1 "Shop, Field and Maintenance Painting" and Paint Manufacturer's Recommendation.

Note: **All paint products shall be lead and chromate free.**

PAINT SPECIFICATION

A-S-H Paint Specification No.:	225361-01-PAINT-D	12 November 2025 Rev. B
A-S-H Contract Number:	225361-01	
Customer:	Whelan Energy Center, City of Hastings	
Customer/Engineer's Specification:	HU 2025-101	

Category: **Standard Electrical and Mechanical Equipment to include: Motors, Valves, Solenoids, Limit Switches, etc.**

Cleaning and Surface Preparation Requirements:

1. Remove all oil, grease, dirt, etc., in accordance with SSPC-SP1 "Solvent Cleaning".
2. Surface preparation in accordance with manufacturer's standard paint/coating system.

Primer/Finish Coat(s): In accordance with the manufacturer's standard paint/coating system.

No. of Coats: 1 **Dry Film Thickness:** Per paint manufacturer's recommendation.

Application: In accordance with SSPC-PA1 "Paint Application Specification for Shop, Field and Maintenance Painting" and Paint Manufacturer's Recommendations.

Note: **All paint products shall be lead and chromate free.**

PAINT SPECIFICATION

A-S-H Paint Specification No.:	225361-01-PAINT-E	12 November 2025 Rev. B
A-S-H Contract Number:	225361-01	
Customer:	Whelan Energy Center, City of Hastings	
Customer/Engineer's Specification:	HU 2025-101	

Category: **Ladders, Caged Ladders, Handrail and Machine Guards**

Cleaning and Surface Preparation Requirements:

1. Remove all oil, grease, dirt, etc., in accordance with SSPC-SP1 "Solvent Cleaning".
2. Surface preparation in accordance with manufacturer's standard paint/coating system.

Primer/Finish Coat(s): In accordance with the manufacturer's standard paint/coating system.

No. of Coats: 1 **Dry Film Thickness:** Per paint manufacturer's recommendation.

Application: In accordance with SSPC-PA1 "Paint Application Specification for Shop, Field and Maintenance Painting" and Paint Manufacturer's Recommendations.

Note: **All paint products shall be lead and chromate free.**

Ladders, Caged Ladders, Guards and Handrail are to be painted SAFETY YELLOW.

PAINT SPECIFICATION

A-S-H Paint Specification No.:	225361-01-PAINT-F	12 November 2025 Rev. B
A-S-H Contract Number:	225361-01	
Customer:	Whelan Energy Center, City of Hastings	
Customer/Engineer's Specification:	HU 2025-101	

Category: **Hardware (Connection Bolts, Nuts, Washers, and Compressible Washer-Type, Direct-Tension Indicators)**

Cleaning and Surface Preparation Requirements:

1. Remove all oil, grease, dirt, etc., in accordance with SSPC-SP1 "Solvent Cleaning".
2. Surface preparation in accordance with manufacturer's standard paint/coating system.

Primer/Finish Coat(s): In accordance with the manufacturer's standard paint/coating system.

No. of Coats: 1 **Dry Film Thickness:** Per paint manufacturer's recommendation.

Application: In accordance with SSPC-PA1 "Paint Application Specification for Shop, Field and Maintenance Painting" and Paint Manufacturer's Recommendations.

Note: **All Structural Bolts (ASTM F3125, Grade A325, Type 1), nuts, washers and compressible washer-type, direct-tension indicators shall be mechanically galvanized per ASTM B695 Class 50.**

Nuts shall be tapped after galvanizing to minimum diametral amounts specified in ASTM A563. Coat nuts with waterproof lubricant, clean and dry to touch.

Flat and beveled washers shall be mechanically galvanized hardened washers conforming to ASTM F436.

PAINT SPECIFICATION

A-S-H Paint Specification No.:	225361-01-PAINT-G	12 November 2025 Rev. B
A-S-H Contract Number:	225361-01	
Customer:	Whelan Energy Center, City of Hastings	
Customer/Engineer's Specification:	HU 2025-101	
Category:	**Carbon Steel Pipe**	

Cleaning and Surface Preparation Requirements:

3. Remove all oil, grease, dirt, etc., in accordance with SSPC-SP1 "Solvent Cleaning".
4. Surface preparation in accordance with SSPC-SP6 "Commercial Blast Cleaning" at a minimum.

Primer Coat(s): Carboline Carbozinc 859 Organic Zinc Rich Epoxy

No. of Coats: 1 **Dry Film Thickness:** 6.0-8.0 mils DFT

Finish Coat(s): Carboline Carboguard 890 Epoxy

No. of Coats: 1 **Dry Film Thickness:** 2.0-3.0 mils DFT

FINISH COLOR SHALL BE: 2716 "Edison Gray"

Application: In accordance with SSPC-PA1 "Paint Application Specification for Shop, Field and Maintenance Painting" and Paint Manufacturer's Recommendations.

Note: **All field weld areas shall be prepped and coated with a weldable primer such as Deoxaluminate or Bloxide for a distance of three inches (3") adjacent to the weld joint.**

This specification is only applicable to pipe sizes 3" and larger.

Raised faces of flanges shall not be painted.

ELECTRICAL SYMBOL LEGEND

POWER DEVICES

- DUPLEX RECEPTACLE: MOUNT AT 18" TO CENTER OF DEVICE AFF UNLESS OTHERWISE NOTED.
- SINGLE RECEPTACLE; MOUNT AT 18" TO CENTER OF DEVICE AFF UNLESS OTHERWISE NOTED.
- FOUR PLEX RECEPTACLE; MOUNT AT 18" TO CENTER OF DEVICE AFF UNLESS OTHERWISE NOTED.
- DUPLEX RECEPTACLE; DEVICE MOUNTED 6" ABOVE COUNTER
- HORIZONTAL DUPLEX RECEPTACLE
- GFI GROUND FAULT INTERRUPTER DUPLEX RECEPTACLE
- WP WATERPROOF RECEPTACLE
- IG ISOLATED GROUND RECEPTACLE
- SPECIAL-PURPOSE OUTLET, LETTER DESIGNATES TYPE, SEE SPECIAL CONNECTION SCHEDULE FOR REQUIREMENTS
- DUPLEX RECEPTACLE; PEDESTAL MOUNTED
- DUPLEX RECEPTACLE. ON EMERGENCY CIRCUIT
- FOUR PLEX RECEPTACLE. ON EMERGENCY CIRCUIT
- DUPLEX RECEPTACLE; SOLID FILL DESIGNATES WHICH RECEPTACLE IS TO BE SWITCHED.
- 220V RECEPTACLE
- J WALL MOUNTED JUNCTION BOX
- J CEILING MOUNTED JUNCTION BOX
- J FLOOR MOUNTED JUNCTION BOX
- SURFACE RACEWAY WITH OUTLETS AS INDICATED ON PLANS,MOUNTED AT 18" TO CENTER OF DEVICE AFF UNLESS OTHERWISE NOTED
- FLOOR MOUNTED DUPLEX RECEPTACLE
- FLOOR MOUNTED FOUR PLEX RECEPTACLE
- CEILING MOUNTED DUPLEX RECEPTACLE
- CEILING MOUNTED FOUR PLEX RECEPTACLE
- ELECTRICAL DISTRIBUTION PANEL
- RECESSED MOUNTED ELECTRICAL PANEL
- SURFACE MOUNTED ELECTRICAL PANEL
- T ELECTRICAL POWER TRANSFORMER
- FUSED DISCONNECT SWITCH
- NON-FUSED DISCONNECT SWITCH
- COMBINATION MAGNETIC STARTER AND DISCONNECT SWITCH
- STARTER/MOTOR CONTROLLER
- ELECTICAL MOTOR - SINGLE PHASE
- ELECTRICAL MOTOR - THREE PHASE
- R RELAY
- B BATTERY PACK
- MOTORIZED DAMPER

LIGHTING

- CEILING MOUNTED OR RECESSED LIGHT FIXTURE; LABEL INDICATES FIXTURE TYPE
- PENDANT MOUNTED LIGHT FIXTURE; LABEL INDICATES FIXTURE TYPE
- WALL MOUNTED LIGHT FIXTURE; LABEL INDICATES FIXTURE TYPE
- 2'x4' FLUORESCENT LIGHT FIXTURE; LABEL INDICATES FIXTURE TYPE
- 2'x2' FLUORESCENT LIGHT FIXTURE; LABEL INDICATES FIXTURE TYPE
- 1'x4' TYPICAL CEILING MOUNTED FLUORESCENT FIXTURE; LABEL INDICATES FIXTURE TYPE
- 1'x4' TYPICAL PENDANT MOUNTED FLUORESCENT FIXTURE; LABEL INDICATES FIXTURE TYPE
- 1'x4' TYPICAL WALL MOUNTED FLUORESCENT FIXTURE; LABEL INDICATES FIXTURE TYPE
- 1'x2' TYPICAL WALL MOUNTED FLUORESCENT FIXTURE; LABEL INDICATES FIXTURE TYPE
- FLUORESCENT INDUSTRIAL STRIP LIGHT FIXTURE; LABEL INDICATES FIXTURE TYPE
- FLUORESCENT STRIP LIGHT FIXTURE; LABEL INDICATES FIXTURE TYPE
- FLUORESCENT UNDER CABINET FIXTURE; LABEL INDICATES FIXTURE TYPE
- 2'x4' TYPICAL FLUORESCENT FIXTURE - NORMAL/EMERGENCY
- 2'x2' TYPICAL FLUORESCENT FIXTURE - NORMAL/EMERGENCY
- 1'x4' TYPICAL CEILING MOUNTED FLUORESCENT FIXTURE - NORMAL/EMERGENCY
- CEILING MOUNTED OR RECESSED TYPICAL FIXTURE - NORMAL/EMERGENCY
- BRANCH CIRCUIT WIRING CONCEALED IN WALLS OR CEILING
- BRANCH CIRCUIT WIRING CONCEALED IN WALLS OR CEILING
- OS CEILING OR WALL-MOUNTED OCCUPANCY SENSOR
- PC CEILING OR WALL-MOUNTED PHOTO CELL
- DOUBLE FACED CEILING OR WALL-MOUNTED, EXIT SIGN WITH EMERGENCY POWER BACK UP.
- SINGLE FACED CEILING OR WALL MOUNTED, EXIT SIGN WITH EMERGENCY POWER BACK UP.
- COMBINATION EXIT AND EMERGENCY LIGHT
- DIRECTION ARROW FOR EMERGENCY LIGHT
- CEILING OR WALL MOUNTED, SELF-CONTAINED EMERGENCY LIGHT UNIT; FIXTURE SHALL MONITOR LIGHTING CIRCUIT IN AREA.
- $ SINGLE-POLE SWITCH
- $2 DOUBLE-POLE SWITCH
- $3 3-WAY SWITCH
- $4 4-WAY SWITCH
- $P SINGLE-POLE SWITCH AND PILOT LIGHT
- $TE SINGLE POLE MANUAL MOTOR STARTER WITH THERMAL ELEMENT
- $D SINGLE-POLE DIMMER SWITCH
- $K SINGLE-POLE KEYED SWITCH
- $L LOW VOLTAGE SWITCH
- $F FAN SWITCH
- $M MOMENTARY CONTACT SWITCH
- PUSHBUTTON SWITCH
- COMBINATION PUSHBUTTON SWITCH
- MUSHROOM EMERGENCY SHUT-OFF SWITCH.
- LC LIGHTING CONTACTOR
- TC TIME CLOCK, AS INDICATED ON PLANS

SPECIAL SYSTEMS

- DATA/TELEPHONE OUTLET, FLOOR MOUNTED
- COMBINATION DATA/TELEPHONE OUTLET
- TELEPHONE
- DATA OUTLET; NUMBER INDICATES QUANTITY, BLANK INDICATES SINGLE OUTLET. MOUNTED AT 18" TO CENTER OF DEVICE AFF UNLESS OTHERWISE NOTED.
- DATA, CEILING MOUNTED
- DATA, FLOOR MOUNTED
- TELEVISION OUTLET, CEILING MOUNTED
- TV TELEVISION CABLE OUTLET; MOUNT AT 18" TO CENTER OF DEVICE AFF UNLESS OTHERWISE NOTED
- WAP WIRELESS ACCESS POINT, CEILING MOUNTED
- FB MULTI-OUTLET FLOOR BOX, SEE FLOOR BOX SCHEDULE FOR REQUIREMENTS.
- S SPEAKER, WALL MOUNTED
- S SPEAKER, CEILING MOUNTED
- E ELECTRIC VALVE
- I INSTRUMENT DEVICE
- IS INTERIOR SIREN ALARM
- C CLOCK, WALL MOUNTED
- C CLOCK, CEILING MOUNTED
- CABLE TRAY
- GROUND BAR

FIRE ALARM

- M MAGNETIC DOOR HOLD DEVICE
- FS SPRINKLER FLOW SWITCH
- TS SPRINKLER TAMPER SWITCH
- EXTERIOR REMOTE FLASHING STROBE LIGHT
- F MANUAL PULL STATION; MOUNT ACCORDING TO MOUNTING HEIGHT DETAIL AT 46" TO CENTER OF DEVICE AFF, ADA COMPLIANT
- F HORN & STROBE; MOUNT SO BOTTOM OF DEVICE IS AT 80" AFF UNNLESS OTHERWISE NOTED, ADA COMPLIANT
- F STROBE; MOUNT SO BOTTOM OF DEVICE IS AT 80" AFF UNLESS OTHERWISE NOTED, ADA COMPLIANT
- F SPEAKER & STROBE; MOUNT SO BOTTOM OF DEVICE IS AT 80" AFF UNNLESS OTHERWISE NOTED, ADA COMPLIANT
- FIRE ALARM VOICE WALL MOUNT SPEAKER
- FIRE ALARM VOICE CEILING MOUNT SPEAKER
- SMOKE DETECTOR
- DUCT MOUNTED SMOKE DETECTOR
- HD THERMAL HEAT DETECTOR
- PIV POST INDICATOR VALVE
- BELL
- R SHUTDOWN RELAY WITH REMOTE TEST SWITCH
- SHUTDOWN RELAY AND TEST SWITCH
- FACP FIRE ALARM CONTROL PANEL
- RAP REMOTE ANNUNCIATOR PANEL
- SMOKE DAMPER
- FIRE DAMPER
- COMBINATION FIRE AND SMOKE DAMPER

SECURITY DEVICES

- DCM DOOR CONTROL MODULE
- ACP ACCESS CONTROL PANEL
- ES ELECTRIC DOOR STRIKER
- VIDEO CAMERA, WITH MOUNTING HARDWARE
- VM VIDEO MONITOR
- VR VIDEO RECORDER
- ML ELECTRIC MAGNETIC LOCK
- CL ELECTRIC CYLINDER LOCK
- CR CARD READER
- REX REQUEST TO EXIT
- DOOR CONTACT - RECESSED
- DOOR CONTACT - SURFACE MOUNT
- M MOTION DETECTOR, CEILING MOUNTED
- M MOTION DETECTOR, WALL MOUNTED
- EMERGENCY DOOR RELEASE BUTTON
- PANIC BUTTON
- SECURITY BUZZER HORN
- INTERCOM SUBSTATION
- INTERCOM SUBSTATION WITH CAMERA
- INTERCOM MASTER STATION
- GLASS BREAK SENSOR
- POWER TRANSFER HINGE

ABBREVIATIONS/MODIFIERS

(X)	SHEET NOTE TAG, LABEL INDICATES NOTE NUMBER
*	ABOVE COUNTER
A	AMPERE
AD	AUTOMATIC DAMPER
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AHU	AIR HANDLING UNIT
AFCI	ARC FAULT CIRCUIT INTERUPTER
ATS	AUTOMATIC TRANSFER SWITCH
C	CONDUIT
C/B	CIRCUIT BREAKER
CIR	CIRCUIT
CUH	CABINET UNIT HEATER
E	EXISTING DEVICES TO REMAIN
EF	EXHAUST FAN
EMT	ELECTRIC METALLIC TUBING
ER	NEW LOCATION OF EXISTING RELOCATED
EWC	ELECTRIC WATER COOLER
EWH	ELECTRIC WATER HEATER
FA	FIRE ALARM
FB	FLOOR BOX
FMC	FLEXIBLE METALLIC TUBING
GFI	GROUND FAULT INTERRUPTER
HD	HAND DRYER
IG	ISOLATED GROUND
MAU	MAKE-UP AIR UNIT
MD	MOTORIZED DAMPER
NF	NON-FUSED
NL	NIGHT LIGHT
NR	NEW TO REPLACE EXISTING
P	POLE
PE	PRIMARY ELECTRIC SERVICE
PTD	ELECTRIC PAPER TOWEL DISPENSER
PVC	POLYVINYL CHLORIDE CONDUIT
RE	REMOVE EXISTING
REF	ROOF EXHAUST FAN
RL	RELOCATE EXISTING
RMC	RIGID METALLIC CONDUIT
RR	REMOVE AND REPLACE ON NEW SURFACE
RTU	ROOFTOP UNIT
SD	SMOKE DAMPER
SE	SECONDARY ELECTRIC SERVICE
S&P	SPACE AND PROVISION
T	TELEPHONE SERVICE
TCP	TEMPERATURE CONTROL PANEL
TP	TAMPER PROOF
TV	TELEVISION
UGE	UNDERGROUND ELECTRICAL
VFC	VARIABLE FREQUENCY CONTROLLER
VFD	VARIABLE FREQUENCY DRIVE
W	WIRE
WG	WIRE GUARD
WP	WEATHERPROOF
XFMR	TRANSFORMER

GENERAL NOTES:

A. ALL SYMBOLS & ABBREVIATIONS ARE TYPICAL AND MAY NOT APPLY TO THIS PROJECT.

B. CIRCUITING SHOWN IS DIAGRAMMATIC ONLY. EXACT ROUTING MAY CARRY AND MAY REQUIRE ADDITIONAL J-BOXES AND/OR SPECIAL FITTINGS.

C. FIELD VERIFY EXISTING CONDITIONS.

D. ALL EMPTY CONDUITS INDICATED SHALL BE FURNISHED AND INSTALLED WITH PULLWIRES. INSULATED BUSHINGS ON EACH END AND HAVE IDENTIFICATION FLAG AT EACH END LABELED FOR INTENDED USE.

E. ALL ELECTRICAL PENETRATIONS THROUGH CONCRETE SHALL BE SPACED TO HAVE A MINIMUM OF 3" OF CONCRETE ON ALL SIDES.

F. WHERE DEVICES OR POWER ROUGH-IN IS SHOWN TO BE INSTALLED IN A MASONRY WALL, PROVIDE MASONRY BOXES AND INSTALL CONDUIT WITHIN WALL. COORDINATE WITH CONTRACTOR.

G. ALL ELECTRICAL WORK SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE NATIONAL ELECTRICAL CODE, AS REQUIRED BY LOCAL JURISDICTION.

H. CONTRACTOR SHALL GUARANTEE ALL EQUIPMENT, ACCESSORIES, AND MATERIAL FURNISHED BY HIM FOR A PERIOD OF ONE YEAR FROM FINAL ACCEPTANCE AGAINST ALL DEFECTS.

I. ALL WIRING SHALL BE INSTALLED IN CONDUIT.

J. ALL POWER CIRCUITS SHALL HAVE AN EQUIPMENT GROUND CONDUCTOR.

K. ALL RECEPTACLES SHALL BE AT 18" AFF TO CENTERLINE UNLESS NOTED OTHERWISE.

L. VERIFY ALL EXISTING CONDITIONS PRIOR TO SUBMITTING BID. NO ADDITIONAL FEES WILL BE PAID DUE TO UNANTICIPATED EXISTING CONDITIONS.

M. COORDINATE ALL SCHEDULING, ELEVATIONS, SIZES, QUANTITIES, AND ROUTING OF WORK WITH OWNER AND OTHER TRADES.

N. FIELD VERIFY SIZE, LOCATION, ELEVATION AND QUANTITY OF ALL ARCHITECTURAL, MECHANICAL, ELECTRICAL, AND PIPING EQUIPMENT AND COMPONENTS THAT MAY IMPACT IMPLEMENTATION OF THIS WORK.

O. PROVIDE CIRCUIT # AND PANEL LABELING ON ALL DEVICES. ALL PANELBOARDS SHALL BE PROVIDED WITH AN UPDATED TYPED CIRCUIT DIRECTORY WITH CIRCUIT NUMBER AND EQUIPMENT SERVED. ALL LABELING TO BE STENCILED ADHESIVE ON RECEPTACLES, SWITCHES, OR EQUIPMENT TERMINATIONS.

P. ALL DISCONNECT SWITCHES SHALL BE HEAVY DUTY HP RATED SAFETY SWITCHES WITH NEMA RATINGS AS SHOWN IN THE DRAWINGS OR SPECIFICATIONS.

Q. ALL CONDUIT STUBS SHALL BE TERMINATED WITH BUSHINGS.

R. EXTERIOR RECEPTACLES SHALL BE GFCI TYPE, INSTALLED IN WEATHERPROOF BOXES WITH "WHILE-IN-USE" COVERS.

S. RECEPTACLES PROVIDED SHALL BE DUPLEX NEMA 5-20R UNLESS OTHERWISE NOTED.

T. WHERE A DEVICE IS TO BE MOUNTED ON A BLOCK OR CONCRETE WALL, PROVIDE SURFACE MOUNTED BOX AND RACEWAY (UNLESS INDICATED OTHERWISE).

U. ALL WIRING TO BE CONTINUOUS WITHOUT SPLICES UNLESS OTHERWISE NOTED.

V. POWER AND CONTROL WIRING SHALL NOT BE RUN IN SAME CONDUIT.

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GENERAL NOTES AND DETAILS

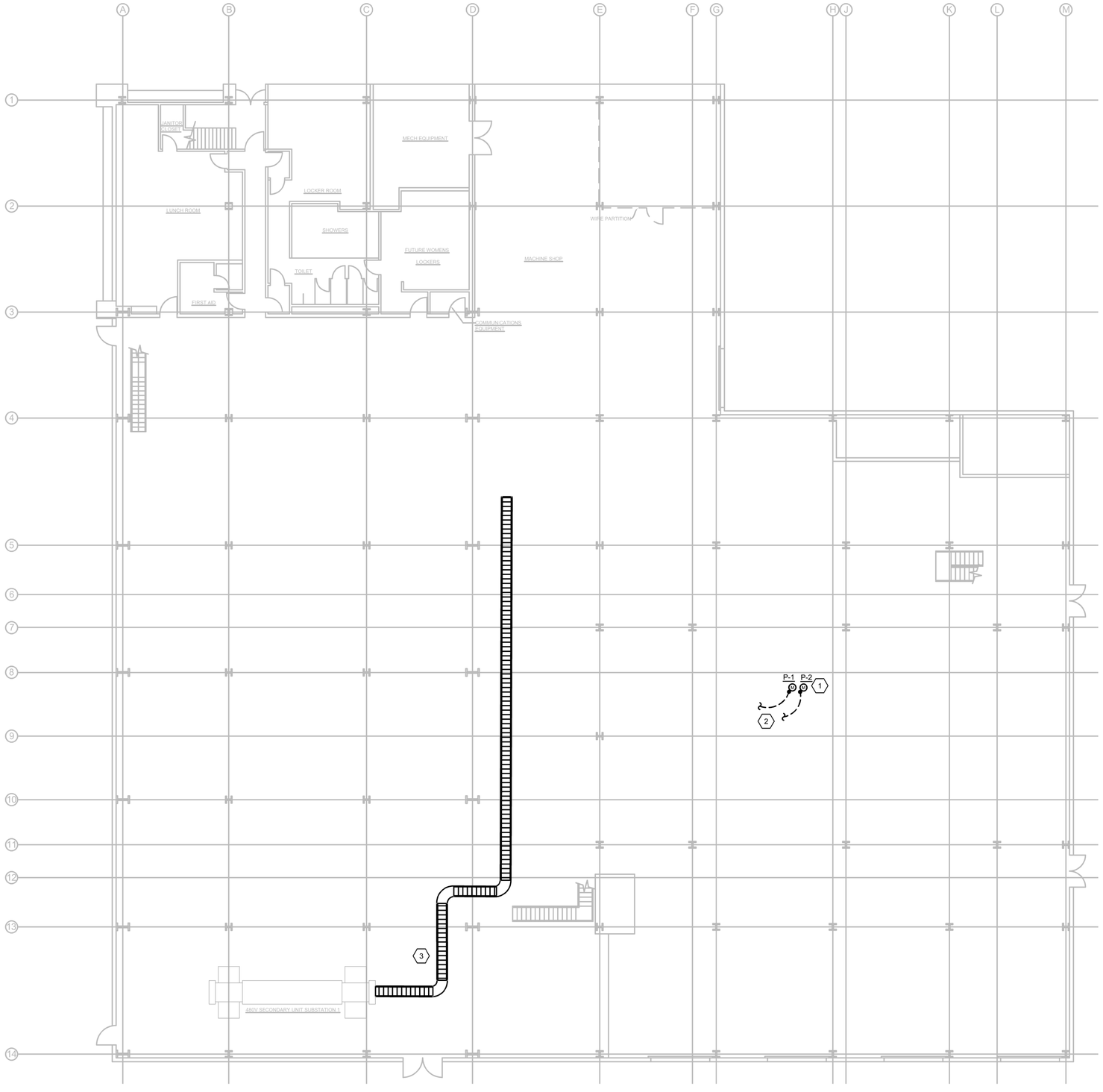
WEC1 BOTTOM ASH RECIRCULATION SYSTEM

HASTINGS, NEBRASKA

2026

drawn by: ACE
designed by: NAM
project no.: 025-07130
date: 01-20-2026

SHEET
E001



1 GROUD LEVEL GROUNDING PLAN

SCALE: 3/32" = 1'-0"

GENERAL NOTES:

A. INFORMATION SHOWN ON THIS DRAWING CONCERNING TYPE AND LOCATION OF UNDERGROUND AND OTHER UTILITIES IS NOT GUARANTEED TO BE ACCURATE OR ALL INCLUSIVE. THE CONTRACTOR IS RESPONSIBLE FOR MAKING DETERMINATION AS TO TYPE AND LOCATION CF SAME AS MAY BE NECESSARY TO AVOID DAMAGE THERETO.

B. IF WIRING DEVIATES SIGNIFICANTLY FROM THE LAYOUT ON THE PLANS, ACCOUNT FOR MORE VOLTAGE DROP BY INCREASING THE CONDUCTOR SIZE BY A FACTOR OF ONE SIZE AND THE GROUND WIRE PROPORTIONALLY PER CODE.

C. COORDINATE ALL NEW PRIMARY SERVICE WORK, OUTAGES, PAD REQUIREMENTS, ETC. WITH UTILITY COMPANY FOR EXACT INSTALLATION REQUIREMENTS.

D. TEST GROUND SYSTEMS ONLY WHEN EARTH IS DRY. MEASUREMENTS WILL INCLUDE EARTH RESISTIVITY AND RESISTANCE OF ELECTRODES AND GROUNDING SYSTEM. WHERE RESISTANCE IS GREATER THAN 5 OHMS, CONTRACTOR SHALL INVESTIGATE AND CORRECT ANY INSTALLATION DEFICIENCIES WHICH WOULD CAUSE THE MEASURMENTS TO BE POOR. RETEST SYSTEMS QUARTERLY TO VERIFY 5 OHM RESISTANCE IS MAINTAINED. INCLUDE ALL TESTING IN CONTRACT.

SHEET NOTES:

1. TIE-IN NEW ELECTRICAL EQUIPMENT GROUNDING SYSTEM INTO EXISTING ELECTRICAL EQUIPMENT.
2. TIE-IN NEW GROUNDING SYSTEM TO EXISTING GROUND GRID.
3. INSTALL GROUND WIRE ALONG INSIDE WALL OF CABLE TRAY ALONG ENTIRE TRAY LENGTH FOR EQUIPMENT GROUNDING.

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GROUND LEVEL GROUNDING PLAN

WEC1 BOTTOM ASH RECIRCULATION SYSTEM

HASTINGS, NEBRASKA

2026

drawn by: ACE
designed by: NAM
project no.: 025-07130
date: 01-20-2026

SHEET E101

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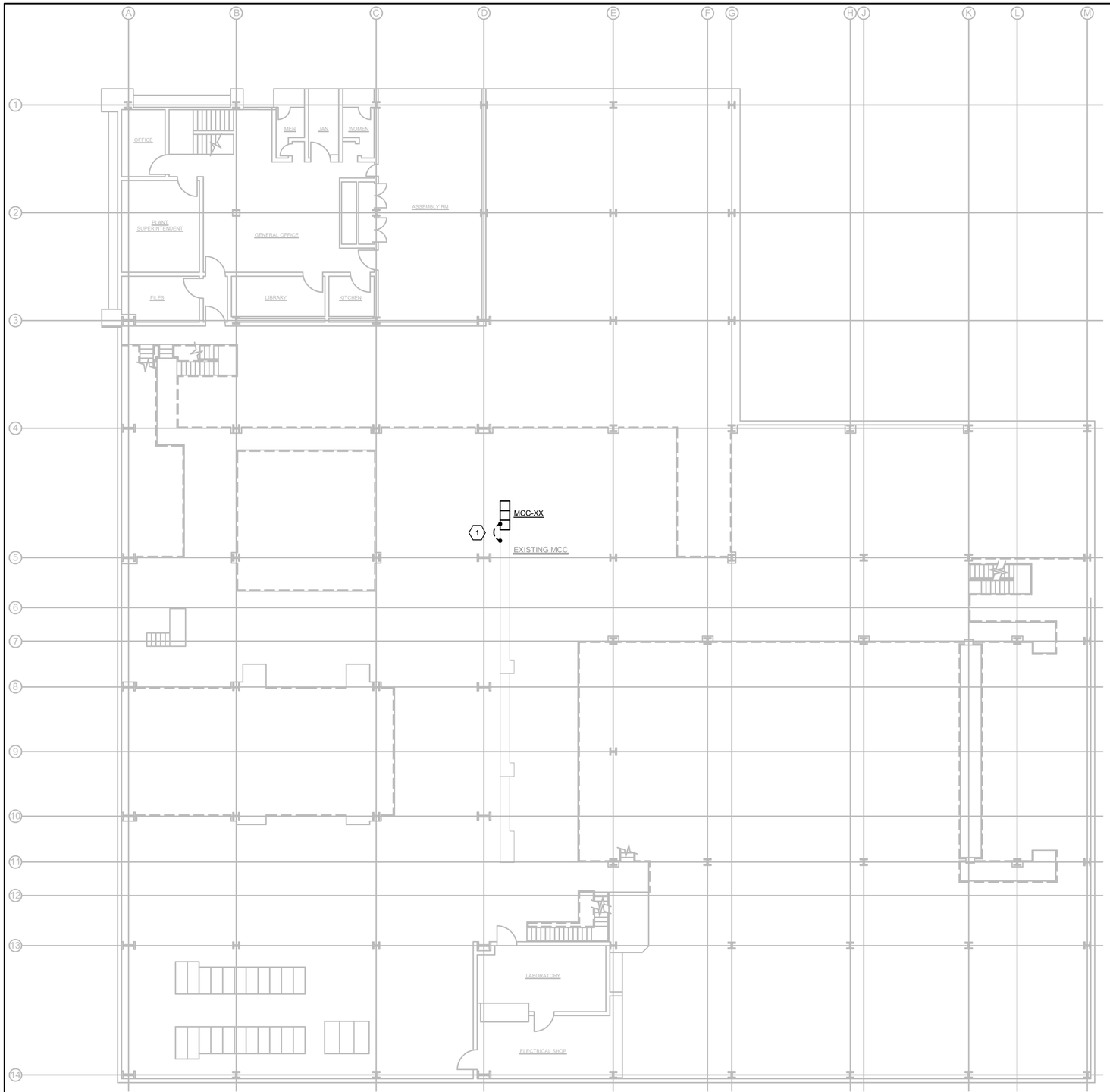

1 MEZZANINE LEVEL GROUNDING PLAN

SCALE: 3/32" = 1'-0"

GENERAL NOTES:

A. INFORMATION SHOWN ON THIS DRAWING CONCERNING TYPE AND LOCATION OF UNDERGROUND AND OTHER UTILITIES IS NOT GUARANTEED TO BE ACCURATE OR ALL INCLUSIVE. THE CONTRACTOR IS RESPONSIBLE FOR MAKING DETERMINATION AS TO TYPE AND LOCATION CF SAME AS MAY BE NECESSARY TO AVOID DAMAGE THERETO.

B. IF WIRING DEVIATES SIGNIFICANTLY FROM THE LAYOUT ON THE PLANS, ACCOUNT FOR MORE VOLTAGE DROP BY INCREASING THE CONDUCTOR SIZE BY A FACTOR OF ONE SIZE AND THE GROUND WIRE PROPORTIONALLY PER CODE.

C. COORDINATE ALL NEW PRIMARY SERVICE WORK, OUTAGES, PAD REQUIREMENTS, ETC. WITH UTILITY COMPANY FOR EXACT INSTALLATION REQUIREMENTS.

D. TEST GROUND SYSTEMS ONLY WHEN EARTH IS DRY. MEASUREMENTS WILL INCLUDE EARTH RESISTIVITY AND RESISTANCE OF ELECTRODES AND GROUNDING SYSTEM. WHERE RESISTANCE IS GREATER THAN 5 OHMS, CONTRACTOR SHALL INVESTIGATE AND CORRECT ANY INSTALLATION DEFICIENCIES WHICH WOULD CAUSE THE MEASURMENTS TO BE POOR. RETEST SYSTEMS QUARTERLY TO VERIFY 5 OHM RESISTANCE IS MAINTAINED. INCLUDE ALL TESTING IN CONTRACT.

SHEET NOTES:

1. TIE-IN NEW ELECTRICAL EQUIPMENT GROUNDING SYSTEM INTO EXISTING ELECTRICAL EQUIPMENT.

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MEZZANINE LEVEL GROUNDING PLAN

WEC1 BOTTOM ASH RECIRCULATION SYSTEM

HASTINGS, NEBRASKA

2026

drawn by: ACE
designed by: NAM
project no.: 025-07130
date: 01-20-2026

SHEET E102

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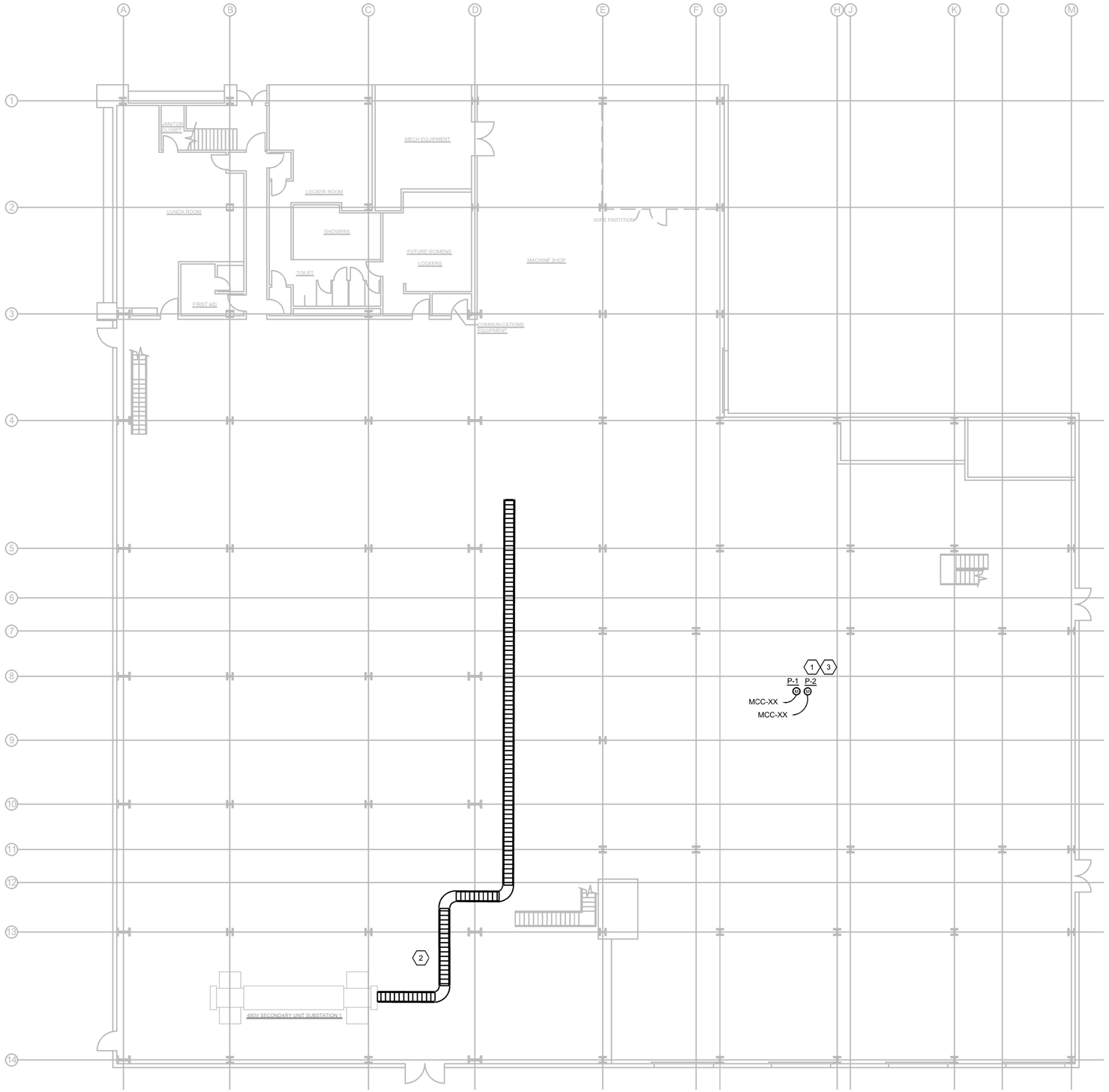

1 GROUND LEVEL ELECTRICAL PLAN

SCALE: 3/32" = 1'-0"

GENERAL NOTES:

A. ELECTRICAL INSTALLATION SHALL ADHERE TO THE LATEST EDITION OF THE NATIONAL ELECTRICAL CODE AND ALL STATE AND LOCAL CODE.

B. REFER TO SHEET E501 FOR MOTOR CONTROL CENTER XX ONE LINE DIAGRAM.

C. REFER TO CABLE SCHEDULE FOR ADDITIONAL INFORMATION.

D. CIRCUITING SHOWN IS DIAGRAMMATIC ONLY. EXACT ROUTING MAY VARY AND MAY REQUIRE ADDITIONAL J-BOXES AND/OR SPECIAL FITTINGS.

SHEET NOTES:

1. PUMP P-1 IS USED AS PRIMARY PUMP. PUMP P-2 IS MEANT FOR BACKUP REDUNDANCY.

3. CONTRACTOR TO FIELD ROUTE POWER CABLING FOR PUMPS IN RGS CONDUIT.

4. FOR CABLE TRAY AND CONDUIT ROUTING SEE DRAWING PT-335-13.

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GROUND LEVEL POWER PLAN

WEC1 BOTTOM ASH RECIRCULATION SYSTEM

HASTINGS, NEBRASKA

2026

drawn by: ACE
designed by: NAM
project no.: 025-07130
date: 01-20-2026

SHEET E201

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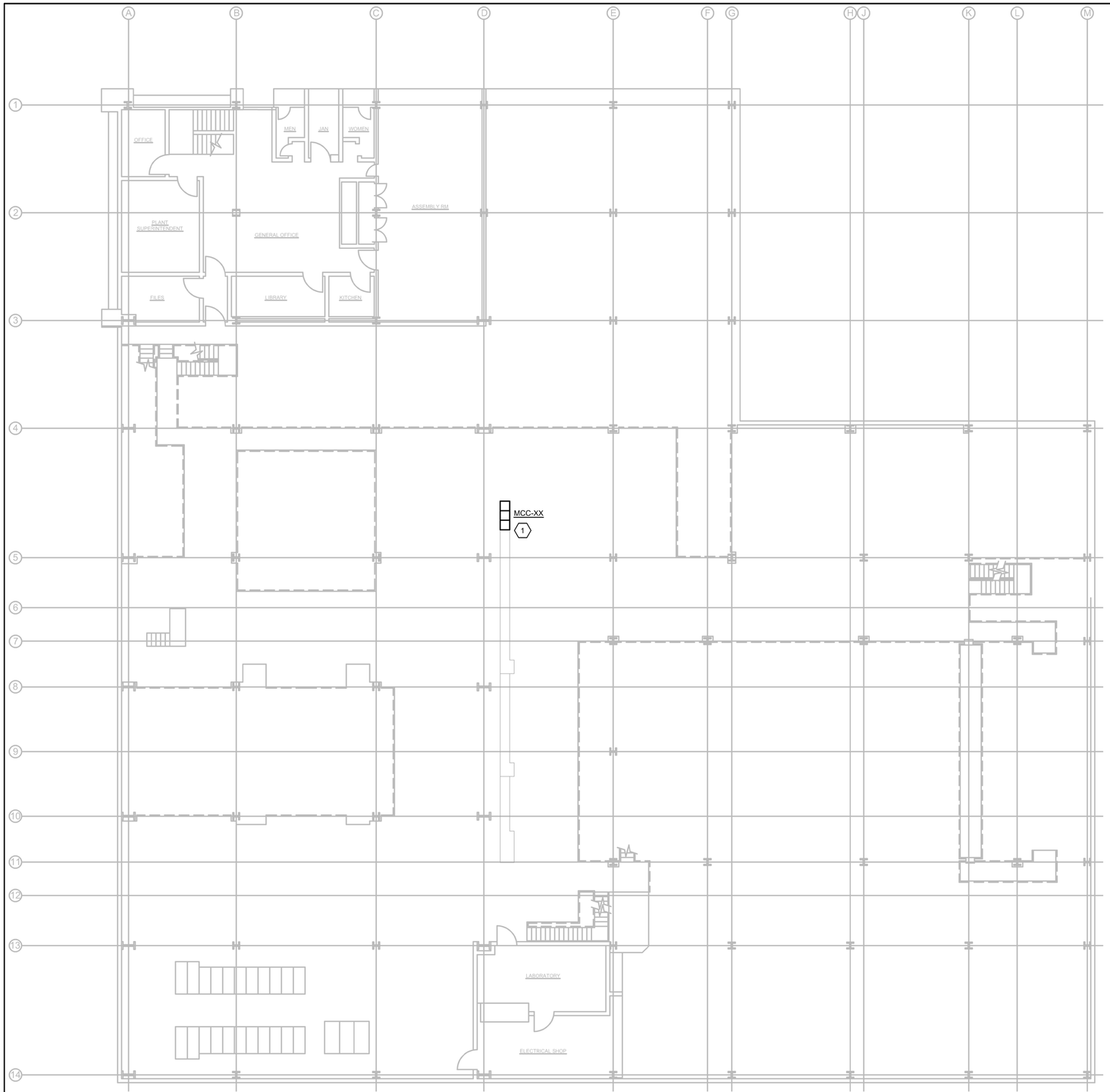

1 MEZZANINE LEVEL ELECTRICAL PLAN

SCALE: 3/32" = 1'-0"

GENERAL NOTES:

A. ELECTRICAL INSTALLATION SHALL ADHERE TO THE LATEST EDITION OF THE NATIONAL ELECTRICAL CODE AND ALL STATE AND LOCAL CODE.

B. REFER TO EXISTING ONE LINE DRAWING E1101 FOR MOTOR CONTROL CENTER XX ONE LINE DIAGRAM.

C. REFER TO CABLE SCHEDULE FOR ADDITIONAL INFORMATION.

D. CIRCUITING SHOWN IS DIAGRAMMATIC ONLY. EXACT ROUTING MAY VARY AND MAY REQUIRE ADDITIONAL J-BOXES AND/OR SPECIAL FITTINGS.

SHEET NOTES:

1. INSTALL NEW THREE (3) SECTION, 600A MOTOR CONTROL CENTER (MCC). SEE CABLE SCHEDULE FOR CABLE INFORMATION.

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MEZZANINE LEVEL
POWER PLAN

WEC1 BOTTOM ASH
RECIRCULATION SYSTEM

HASTINGS, NEBRASKA

2026

drawn by: ACE
designed by: NAM
project no.: 025-07130
date: 01-20-2026

SHEET
E202

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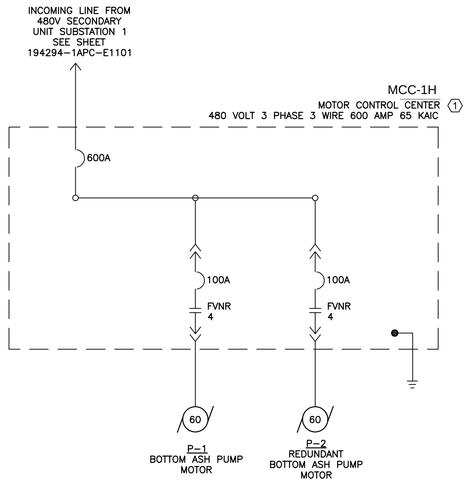

SHEET NOTES:

1. PROVIDE NEW THREE (3) SECTION 600A MCC. PROVIDE SPACES IN MCC SECTIONS WHERE NO LOADS ARE CONNECTED FOR FUTURE EXPANSION.

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MCC-XX
ONE-LINE DIAGRAM

WEC1 BOTTOM ASH
RECIRCULATION SYSTEM

HASTINGS, NEBRASKA

2026

drawn by: ACE
designed by: NAM
project no.: 025-07130
date: 01-20-2026

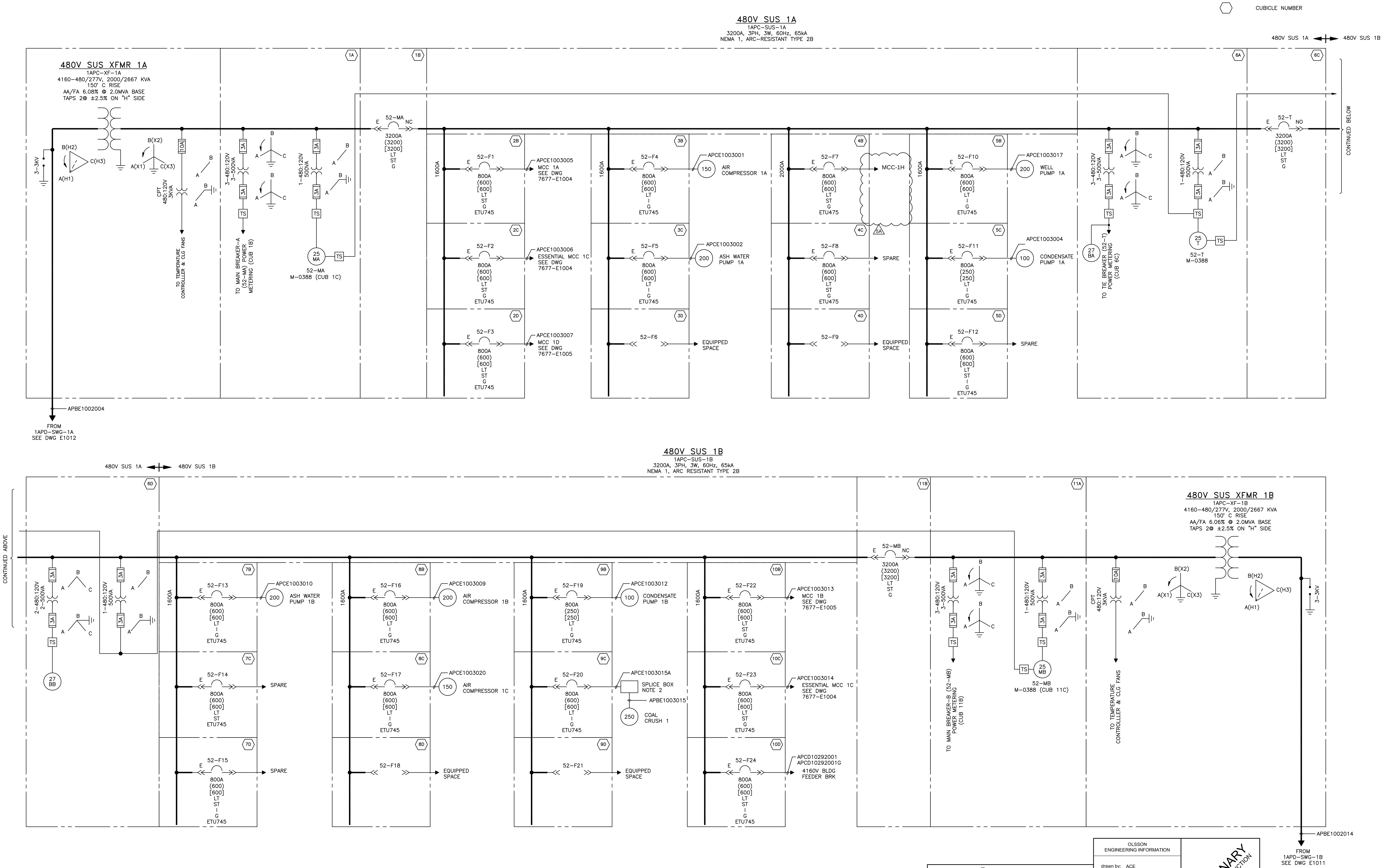
SHEET
E501

NOTES:

1. ALL DEVICES ARE LOCATED IN SWITCHGEAR LINEUP UNLESS INDICATED OTHERWISE.
2. SPLICE BOX FURNISHED BY CONSTSTRUCTION CONTRACTOR 70.1000.

RELAY & DEVICE NOMENCLATURE:

2500A	BREAKER FRAME AMP RATING
(2500)	BREAKER TRIP RATING
[2500]	BREAKER PLUG RATING
LT	LONG TIME PROTECTION
ST	SHORT TIME PROTECTION
I	INSTANTANEOUS PROTECTION
G	GROUND FAULT PROTECTION
E	ELECTRICALLY OPERATED BREAKER
NC	NORMALLY CLOSED
NO	NORMALLY OPEN
25	SYNCH CHECK RELAY
27	UNDERVOLTAGE RELAY
TS	TEST SWITCH
⬡	CUBICLE NUMBER



OLSSON ENGINEERING INFORMATION

drawn by: ACE
checked by: NAM
approved by: NAM
QA/QC by: NAM
date: 01-20-26
project no.: 025-07130
COA no.: CA-0638

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5A	01/20/26	ISSUED FOR BID - BOTTOM ASH RECIRC	ACE	NAM	NAM		
4	04/26/19	70.1000 CONF TO PHASE 2 CONSTR	EJV	KDL	RED	CGB	CGB
3	02/14/19	70.1000 PHASE 2 UPDATES	MRW	MAA	JWK	SAM	CGB
2	01/18/19	70.1000 PHASE 2 REDRAWN TO CONSTR	NAT	MAA	JWK	SAM	CGB
1	08/14/18	70.1000 CONFORMED TO CONSTRUCTION	SSE	DA	OAM	SAM	CGB
0	04/09/18	ISSUED FOR CONSTRUCTION	PKN	DA	OAM	SAM	CGB

I HEREBY CERTIFY THAT THIS DOCUMENT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY REGISTERED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF
SIGNED
DATE REG NO.

BLACK & VEATCH

ENGINEER DA DRAWN NAT
CHECKED OAM DATE 04/09/18

CITY OF HASTINGS, HEBRAKA
WHELAN ENERGY CENTER UNIT 1

ONE-LINE DIAGRAM
480V SUS 1A & 1B

PROJECT 194294 DRAWING NUMBER 1APC-E1101 REV 5A

ACAD 18.2s (LMS Tech)
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INSTRUMENTATION AND CONTROL SYSTEM

1. SUMMARY

A. THIS SECTION COVERS THE FURNISHING AND INSTALLATION OF COMPONENTS REQUIRED TO SUPPORT THE MODIFICATION AND EXPANSION OF THE EXISTING SCADA SYSTEM.

B. THE CONTRACTOR SHALL PROVIDE ALL SPECIFIED HARDWARE, INPUT/OUTPUT DEVICES, INSTRUMENTATION, ACCESSORIES, AND APPURTENANCES NECESSARY TO SUPPORT THE SYSTEM MODIFICATIONS, INCLUDING MOUNTING, WIRING, TESTING, AND COORDINATION WITH THE SYSTEM INTEGRATOR FOR FINAL COMMISSIONING.

2. SYSTEM DESCRIPTION

A. SCADA SYSTEM CONSISTS OF SENSORS, INDICATORS, ACTUATORS, FINAL CONTROL ELEMENTS, INTERFACE EQUIPMENT, AND ACCESSORIES CONNECTED TO DISTRIBUTED, PROGRAMMABLE CONTROLLERS OPERATING IN A MULTI-USER, MULTITASKING ENVIRONMENT PROGRAMMED TO SUPERVISE AND CONTROL MECHANICAL SYSTEMS.

B. THE SCADA SYSTEM SHALL INCLUDE THE FOLLOWING:

1. NEW TERMINALS SHALL BE PROVIDED AND INSTALLED BY THE CONTRACTOR IN THE EXISTING BOTTOM ASH CONTROL PANELS, 903 AND 913.

2. NEW DIGITAL INPUT AND DIGITAL OUTPUT SHALL BE PROVIDED AND INSTALLED BY THE CONTRACTOR IN THE EXISTING BOTTOM ASH CONTROL PANEL, 913.

3. INSTALL CABLE, CONDUIT, AND TERMINATIONS BETWEEN PLC ENCLOSURE AND EQUIPMENT AND INSTRUMENTATION PER THE DRAWINGS.

3. SUBMITTALS

A. PRODUCT DATA. INCLUDE MANUFACTURER'S TECHNICAL LITERATURE FOR EACH CONTROL DEVICE. INDICATE DIMENSIONS, CAPACITIES, PERFORMANCE CHARACTERISTICS, ELECTRICAL CHARACTERISTICS, FINISHES FOR MATERIALS, AND INSTALLATION AND STARTUP INSTRUCTIONS FOR EACH TYPE OF PRODUCT FURNISHED UNDER THIS CONTRACT. PROVIDE INFORMATION SPECIFIC TO THIS PROJECT. WHERE STANDARD MANUFACTURER'S CUT SHEETS ARE PROVIDED, CLEARLY INDICATE MODEL NUMBERS AND OPTIONS PROVIDED.

B. SHOP DRAWINGS. DETAIL EQUIPMENT ASSEMBLIES AND INDICATE DIMENSIONS, REQUIRED CLEARANCES, METHOD OF FIELD ASSEMBLY, INDIVIDUAL COMPONENTS, AND WIRE LABELS. PROVIDE DRAWINGS THAT ARE SPECIFIC TO THIS PROJECT, NOT DRAWINGS OF A GENERAL NATURE. CONTRACTOR SHALL COORDINATE WITH THE OWNER TO DETERMINE SPECIFIC REQUIREMENTS FOR WIRE LABELING AND DRAWING NUMBERING SCHEMES.

1. SCHEMATIC DIAGRAMS. ILLUSTRATE WIRING OF MCC BUCKETS, LOCAL STARTERS, CONTROL VALVES, AND OTHER CONTROL DEVICES. SHOW DEVELOPMENTS THAT DOCUMENT AVAILABLE CONTACTS ON PUSHBUTTONS, SELECTOR SWITCHES, AUXILIARY CONTACTS AND RELAYS, AND OTHER DEVICES.

2. WIRING DIAGRAMS. ILLUSTRATE BOTH CONTROL PANEL INTERNAL WIRING AND WIRING THAT MUST BE PERFORMED EXTERNAL TO CONTROL PANELS. PROVIDE DIAGRAMS THAT INDICATE POWER WIRING AND FUSING BETWEEN CONTROL PANEL DEVICES. CLEARLY INDICATE FUSE SIZING AND PART NUMBERS FOR FIELD-REPLACEABLE MODULES, SUCH AS SURGE PROTECTION DEVICES. PROVIDE DIAGRAMS THAT ILLUSTRATE PLC INPUT AND OUTPUT WIRING. DESIGN LOGICAL WIRE LABELING SCHEME AND INCLUDE WIRE LABELS ON ALL WIRING DIAGRAMS.

3. LAYOUT DIAGRAMS. PROVIDE DIAGRAMS THAT ILLUSTRATE FRONT VIEWS OF ALL CUSTOM-FABRICATED OR RETROFIT CONTROL PANELS. ILLUSTRATE SIDE VIEWS WHERE SIDE PENETRATIONS ARE NECESSARY. PROVIDE DIAGRAMS THAT ILLUSTRATE CONTROL PANEL BACKPANEL LAYOUTS. MAKE DRAWINGS TO-SCALE.

4. BILL OF MATERIALS. DOCUMENT MANUFACTURER AND COMPLETE PART NUMBER OF ALL COMPONENTS USED. THE MATERIALS LIST SHALL BE IN A TABULAR FORMAT ON THE DRAWINGS AND SHALL INCLUDE BUT IS NOT LIMITED TO PLC COMPONENTS, OPERATOR INTERFACE DEVICES, POWER SUPPLIES, RELAYS, PUSHBUTTONS, SELECTOR SWITCHES, INDICATING LIGHTS, CIRCUIT BREAKERS, FUSE BLOCKS, AND TERMINAL BLOCKS.

C. CALCULATIONS. PROVIDE SUPPORTING CALCULATIONS TO DOCUMENT SIZING OF POWER SUPPLIES AND UN-INTERRUPTIBLE POWER SUPPLIES.

D. EXCEPTIONS. PROVIDE A DETAILED LIST OF ANY EXCEPTIONS, FUNCTIONAL DIFFERENCES, OR DISCREPANCIES BETWEEN THE SYSTEM PROPOSED AND THESE SPECIFICATIONS.

E. SITE ACCEPTANCE TEST REPORT. FOLLOWING THE SITE ACCEPTANCE TESTING (SAT), AN I/O CHECKOUT REPORT SHALL BE SUBMITTED TO PROVE A FULLY FUNCTIONAL SYSTEM TEST WAS EXECUTED.

4. FINAL DOCUMENTATION

A. SUBMIT FOUR COPIES OF FINAL DOCUMENTATION FOR APPROVAL. ALL FINAL DOCUMENTATION SHALL BE PROVIDED IN THREE-RING BINDERS WITH DESCRIPTIVE COVERS, INDEX, AND SECTION DIVIDERS. FINAL DOCUMENTATION SHALL BE PROVIDED IN ELECTRONIC .PDF FORMAT IN ADDITION TO PAPER COPIES. PROVIDE AN ELECTRONIC COPY IN EACH FINAL DOCUMENTATION BINDER.

B. FINAL DOCUMENTATION SHALL INCLUDE ALL OF THE INFORMATION PROVIDED AS SUBMITTALS.

C. AS-BUILT DRAWINGS: FINAL DOCUMENTATION SHALL INCLUDE ALL ADDITIONS, DELETIONS, AND CORRECTIONS MADE DURING I/O CHECKOUT AND STARTUP.

D. AS-BUILT DRAWINGS: PROVIDE THE COMPLETED CABLE SCHEDULE WITH ALL CONTRACTOR AS-BUILT MODIFICATIONS REFLECTED.

E. PHOTOS: PROVIDE HIGH RESOLUTION, FULL-LENGTH, COLOR PHOTOGRAPHS OF THE FRONT AND BACK OF EACH ENCLOSURE WITH DOORS OPEN. FILES SHALL BE INCLUDED IN JPEG FORMAT FOR FINAL DOCUMENTATION.

5. SPARE PARTS

A. MINIMUM REQUIREMENTS. EACH CONTRACTOR PROVIDING INSTRUMENTATION AND CONTROL SYSTEM COMPONENTS SHALL PROVIDE SPARE PARTS TO MEET THE FOLLOWING REQUIREMENTS:

1. 100 PERCENT SPARE OF ALL LAMPS AND FUSES.

2. 10 PERCENT SPARE AUXILIARY OR INTERPOSING RELAYS OF EACH TYPE USED.

B. ALL SPARE PARTS UTILIZED DURING SYSTEM STARTUP SHALL BE REPLACED BY THE CONTRACTOR PRIOR TO FINAL COMPLETION.

6. SITE ACCEPTANCE TESTING (SAT)

UPON COMPLETION OF SYSTEM INSTALLATION, THE CONTRACTOR SHALL CONDUCT SITE ACCEPTANCE TESTING TO VERIFY THE SCADA SYSTEM I/O AND POWER WIRING. EACH CONTROL PANEL OR DEVICE SHALL BE PUT INTO SERVICE AND EACH I/O POINT SHALL BE INDIVIDUALLY CHECKED FOR ACCEPTABLE OPERATION. WHERE POSSIBLE, SCADA SYSTEM INPUTS SHALL BE TESTED BY MANIPULATING THE SENSOR OR FIELD DEVICE TO VERIFY CORRECT OPERATION. WHERE POSSIBLE, SCADA SYSTEM OUTPUTS SHALL BE TESTED BY MANIPULATING REGISTERS IN THE CONTROLLER AND OBSERVING THE FINAL CONTROL ELEMENT FOR CORRECT OPERATION.

1. OBSERVATION. THE CONTRACTOR SHALL INFORM THE ENGINEER AT LEAST 15 DAYS IN ADVANCE OF THE SITE ACCEPTANCE TESTING DATE(S). THE ENGINEER AND/OR THE OWNER RESERVE THE RIGHT TO OBSERVE SITE ACCEPTANCE TESTING.

2. IF SITE ACCEPTANCE TESTING MUST BE PERFORMED ON AN OPERATING PROCESS, AND IF PLANT SYSTEMS MUST BE MODIFIED OR SHUT DOWN TO FACILITATE TESTING, THE CONTRACTOR MAY REQUEST THAT THE OWNER OR THE ENGINEER BE PRESENT TO VIEW SUCH TESTING.

B. THE CONTRACTOR SHALL PRODUCE A REPORT THAT DOCUMENTS EACH I/O POINT TESTED, ALONG WITH THE DATE TESTED AND THE INITIALS OF THE INDIVIDUAL PERFORMING THE TEST. THIS REPORT SHALL BE SUBMITTED TO THE ENGINEER.

C. UPON COMPLETION OF SITE ACCEPTANCE TESTING, THE ENGINEER WILL PERFORM A SOFTWARE STARTUP. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PROVIDE ALL HARDWARE AND WIRING TESTING PRIOR TO THE SOFTWARE STARTUP. THE CONTRACTOR WILL NOT BE REQUIRED TO BE PRESENT DURING THE SOFTWARE STARTUP UNLESS THE ENGINEER DETERMINES THAT WIRING PROBLEMS ARE PRESENT IN THE SYSTEM.

7. GENERAL NOTES

A. LOW VOLTAGE CONTROL WIRING SHALL NOT SHARE CONDUIT WITH 120VAC OR ABOVE.

B. ALL CONDUIT INSTALLATIONS FOR CONTROL WIRING SHALL COMPLY WITH NATIONAL ELECTRICAL CODE (NEC) CONDUIT FILL REQUIREMENTS. WHERE MULTIPLE CONDUCTORS ARE ROUTED THROUGH A SINGLE CONDUIT, THE TOTAL FILL PERCENTAGE SHALL NOT EXCEED THE ALLOWABLE LIMITS.

C. CONTRACTOR SHALL PROVIDE A PANDUIT OR EQUIVALENT CABLE MANAGEMENT SYSTEM. ALL WIREWAYS CONTAINING FIELD WIRING SHALL HAVE A MINIMUM DEPTH OF 4 INCHES. EXISTING WIREWAYS SHALL BE REUSED WHERE FEASIBLE AND IN GOOD CONDITION.

D. ALL DEVICES AND WIREWAYS SHALL BE SECURELY MOUNTED ON THE DESIGNATED BACKPANEL IN ACCORDANCE WITH THE PROJECT LAYOUT AND MANUFACTURER RECOMMENDATIONS.

E. CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROPER SELECTION AND SIZING OF ALL FUSES AND CIRCUIT BREAKERS TO ENSURE COMPLIANCE WITH EQUIPMENT RATINGS AND APPLICABLE CODES.

F. PROVIDE INTERPOSING RELAYS AS REQUIRED TO MATCH CONTROL SYSTEM COIL VOLTAGE SPECIFICATIONS AND ENSURE PROPER INTERFACE BETWEEN FIELD DEVICES AND CONTROL EQUIPMENT.

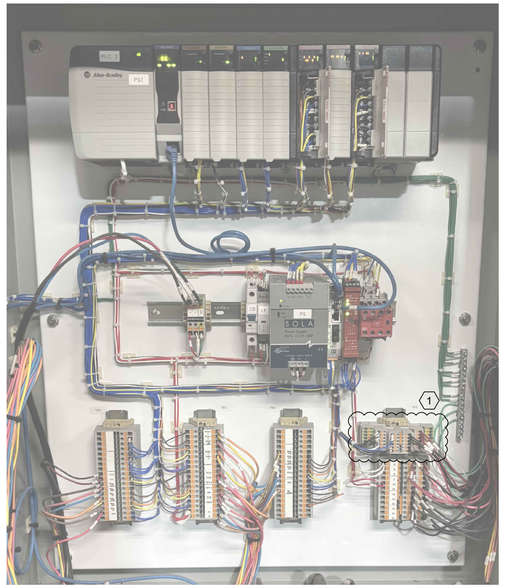
G. WHERE TERMINAL BLOCKS ARE ADDED TO EXISTING CONTROL PANELS, THE CONTRACTOR SHALL COORDINATE WITH THE OWNER TO CONFIRM LOCATION AND CONFIGURATION PRIOR TO INSTALLATION.

H. CONTRACTOR SHALL MAKE ALL NECESSARY MODIFICATIONS TO THE EXISTING BOTTOM ASH PANELS, 903 AND 913, TO COMPLETE THE CIRCUIT CONNECTIONS BETWEEN FIELD I/O AND THE PLC MODULES.

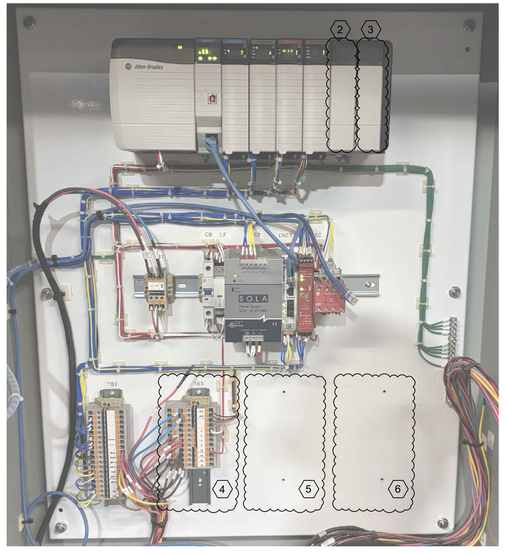
I. FOR INSTRUMENT LOCATION DETAILS, REFER TO B&W DRAWING SET NO. 225361-01-E730.

J. CONTRACTOR SHALL ROUTE ALL WIRING TO AND FROM THE ASH HOPPER UTILIZING EXISTING CABLE TRAY INFRASTRUCTURE. FROM THE END OF THE TRAY SYSTEM, UNDERGROUND CONDUIT SHALL BE USED TO COMPLETE THE PATHWAY TO THE HOPPER. FOR DETAILED ROUTING AND INSTALLATION REQUIREMENTS, REFER TO ELECTRICAL DRAWING E-101 AND E-102.

I. FOR CONDUCTOR TERMINATIONS IN PANELS AND AT INSTRUMENTS, SEE CONTROLS CABLE SCHEDULE.



1 EXISTING PANEL 903
SCALE: NOT TO SCALE



2 EXISTING PANEL 913
SCALE: NOT TO SCALE

SHEET KEYNOTES

1. CONTRACTOR SHALL FURNISH AND INSTALL NEW TERMINALS ON EXISTING TB5. CONTRACTOR SHALL MATCH THE EXISTING INSTALLATION AND ENSURE ANALOG INPUTS AND OUTPUTS ARE LANDED ON THE SAME TERMINAL STRIP MAINTAINING SEPARATE CONSECUTIVE GROUPINGS.
2. REMOVE EXISTING FILLER MODULE 5 AND REPLACE WITH NEW ALLEN BRADLEY 1756-IA16 DIGITAL INPUT. CONTRACTOR SHALL ENSURE MODULE IS PROPERLY INSTALLED AND FULLY FUNCTIONAL BEFORE I/O CHECKOUT.
3. REMOVE EXISTING FILLER MODULE 6 AND REPLACE WITH NEW ALLEN BRADLEY 1756-OA16 DIGITAL OUTPUT. CONTRACTOR SHALL ENSURE MODULE IS PROPERLY INSTALLED AND FULLY FUNCTIONAL BEFORE I/O CHECKOUT.
4. CONTRACTOR SHALL REMOVE EXISTING TERMINALS ASSOCIATED WITH 120VAC AND NEUTRAL TERMINAL BLOCK GROUPINGS ON TB3 AND INSTALL MULTI-LEVEL TERMINAL BLOCKS WITH JUMPERS INSTALLED TO ENSURE ALL GROUPED TERMINALS HAVE ELECTRICAL CONTINUITY WITH EACH OTHER. THE TERMINAL STRIP SHALL BE SIZED AND CONFIGURED TO ACCOMMODATE ALL EXISTING CONNECTIONS AS WELL AS PROVISIONS FOR FUTURE INSTRUMENTATION. FINAL LOCATION OF THE TERMINAL BLOCK SHALL BE COORDINATED WITH THE OWNER PRIOR TO INSTALLATION.
5. CONTRACTOR SHALL FURNISH AND INSTALL NEW DIN RAIL AND MULTI-LEVEL TERMINALS FOR TERMINAL STRIP (TB4). THE TERMINAL STRIP SHALL BE SIZED AND CONFIGURED TO ACCOMMODATE ALL NEW CONNECTIONS AS WELL AS PROVISIONS FOR FUTURE INSTRUMENTATION. PROVIDE AND INSTALL ALL WIRING NECESSARY TO CONNECT PLC I/O MODULES TO THE NEW AND EXISTING TERMINAL BLOCKS AND RELAYS TO ENSURE A COMPLETE AND FUNCTIONING SYSTEM. FINAL LOCATION OF THE TERMINAL BLOCK SHALL BE COORDINATED WITH THE OWNER PRIOR TO INSTALLATION.
6. CONTRACTOR SHALL FURNISH AND INSTALL A NEW DIN RAIL AND PLUG-STYLE RELAYS FOR TERMINAL STRIP (TB5). PROVIDE AND INSTALL ALL WIRING NECESSARY TO CONNECT PLC I/O MODULES TO THE NEW AND EXISTING TERMINAL BLOCKS AND RELAYS TO ENSURE A COMPLETE AND FUNCTIONING SYSTEM. FINAL LOCATION OF THE TERMINAL STRIP SHALL BE COORDINATED WITH THE OWNER PRIOR TO INSTALLATION.

City of Hastings will provide the following equipment:
.
*New Allen-Bradley Digital Input Module (Note 2)
*New Allen-Bradley Digital Output Module (Note 3)
*Terminal blocks for Cabinet 903 TB5 (Note 1)
*Terminal blocks for Cabinet 913 TB3 (Note 4)
*Din rail and multilevel terminal blocks for Cabinet 913 TB4 (Note 5)
*DIN rail and relays for Cabinet 913 TB5 (Note 6)
.
Contractor to provide all other materials including interconnecting wiring, cable management, wire terminations.

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TEL 402.341.1116
FAX 402.341.5895
Olsson - Engineering
Nebraska COA #CA-0638

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JANUARY 21, 2026
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OLSSON

REV. NO.	DATE	DESCRIPTION
A	01-21-2026	ISSUED FOR BID

REVISIONS

GENERAL NOTES

WEC1 BOTTOM ASH
RECIRCULATION SYSTEM

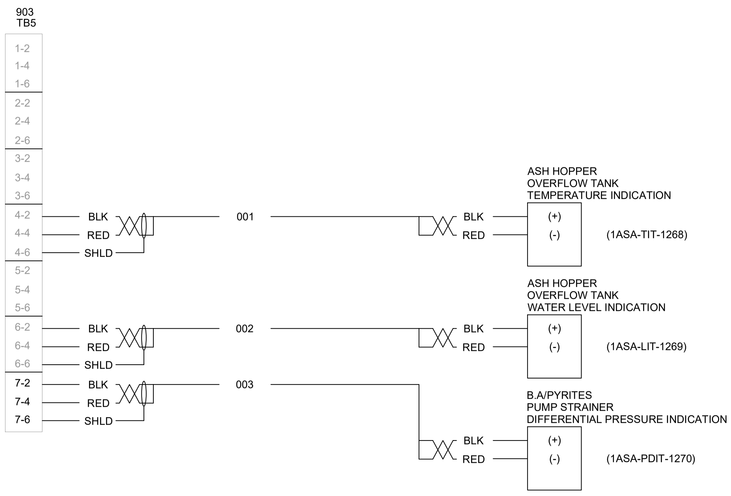
HASTINGS, NEBRASKA

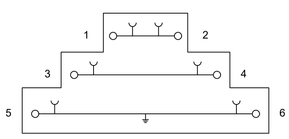
2026

drawn by: CJH
designed by: RAA
project no.: 025-07130
date: 01-21-2026

SHEET
GEN

F:\2025\07001-07500\025-07130\40-Design\AutoCAD\Final Plans\Sheets\FED\I&C\Wiring Diagrams_025-07130.dwg
DATE: Jan 21, 2026 12:01pm USER: choward





TERMINAL BLOCK LAYOUT TYPICAL FOR TB5
PHOENIX CONTACT PT 2,5-3PV

SHEET KEYNOTES

1. REFER TO VENDER DRAWING SET 225361-01-E730 FOR INSTRUMENT INSTALLATION LOCATION.

SHEET
ASA-34

drawn by: CJH
designed by: RAA
project no: 025-07130
date: 01-21-2026

WIRING DIAGRAM
LOCAL CONTROL PANEL SGC1 903

WEC1 BOTTOM ASH
RECIRCULATION SYSTEM

HASTINGS, NEBRASKA | 2026

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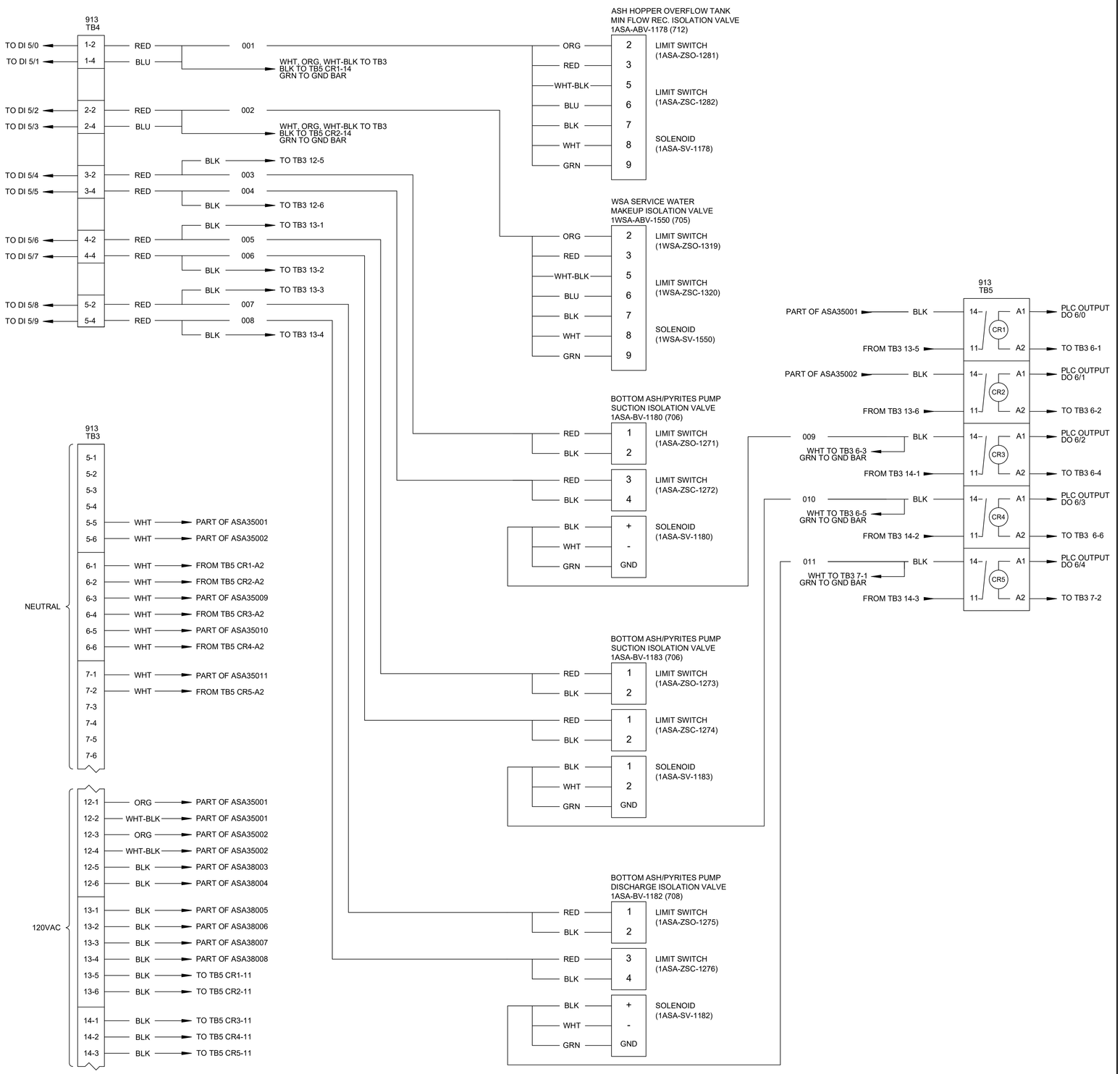
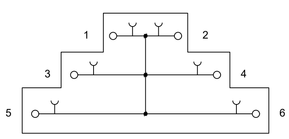
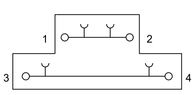




TERMINAL BLOCK LAYOUT TYPICAL FOR TB3 5-18
PHOENIX CONTACT PT 2,5-3PV



TERMINAL BLOCK LAYOUT TYPICAL FOR TB4 1-18
PHOENIX CONTACT PTTB 2,5

SHEET KEYNOTES

1. REFER TO VENDER DRAWING SET 225361-01-E730 FOR INSTRUMENT INSTALLATION LOCATION.

SHEET
ASA-35

drawn by: CBH
designed by: RAA
project no: 025-07130
date: 01-21-2026

WIRING DIAGRAM
LOCAL CONTROL STATION SGC2 913

WEC1 BOTTOM ASH
RECIRCULATION SYSTEM

HASTINGS, NEBRASKA | 2026

REV. NO.	DATE	DESCRIPTION
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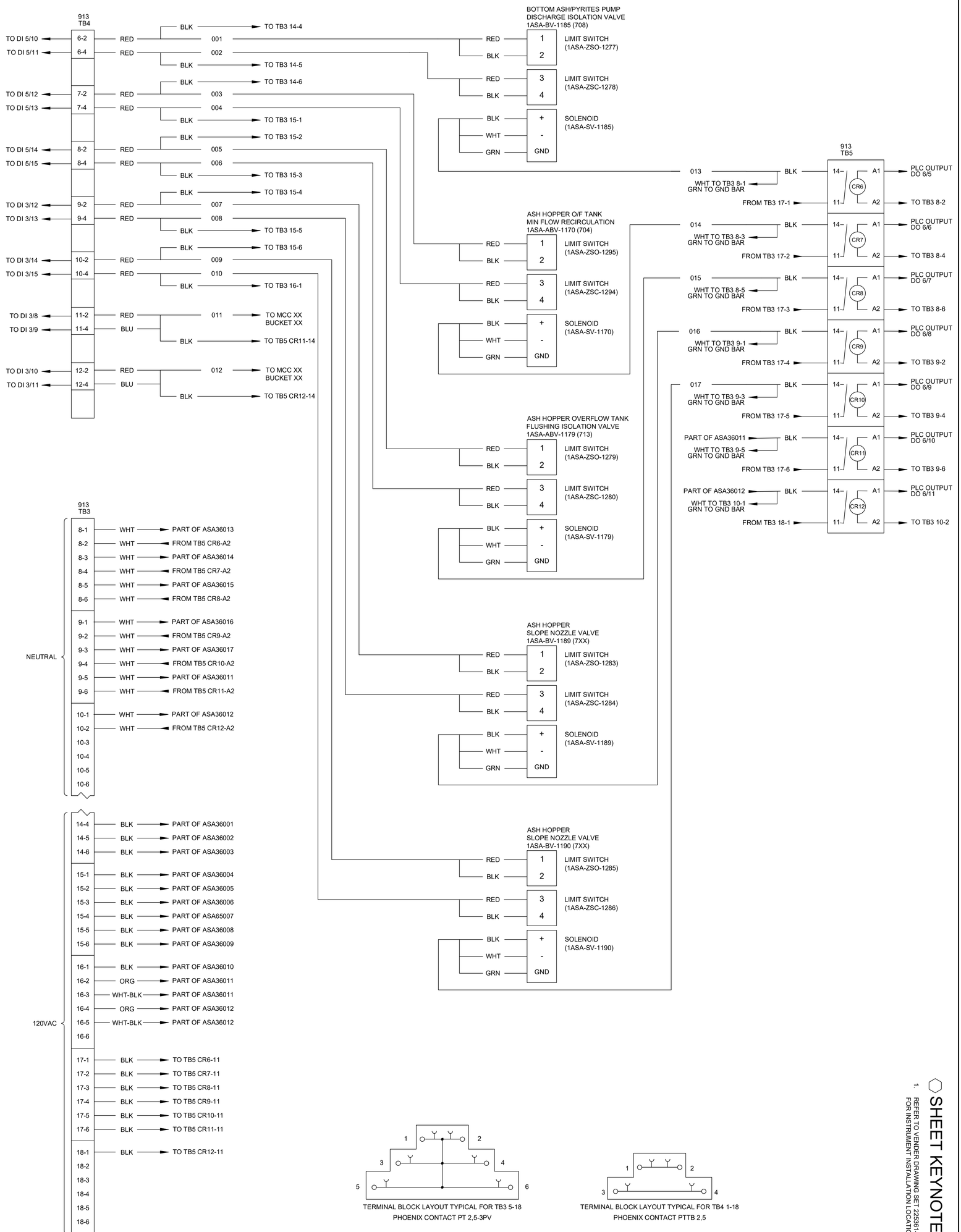

TERMINAL BLOCK LAYOUT TYPICAL FOR TB3 5-18
PHOENIX CONTACT PT 2,5-3PV

TERMINAL BLOCK LAYOUT TYPICAL FOR TB4 1-18
PHOENIX CONTACT PTTB 2,5

SHEET KEYNOTES

1. REFER TO VENDER DRAWING SET 225361-01-E730 FOR INSTRUMENT INSTALLATION LOCATION

SHEET
ASA-36

drawn by: CBH
designed by: RAA
project no: 025-07130
date: 01-21-2026

WIRING DIAGRAM
LOCAL CONTROL PANEL SGC2 913

WEC1 BOTTOM ASH
RECIRCULATION SYSTEM

HASTINGS, NEBRASKA | 2026

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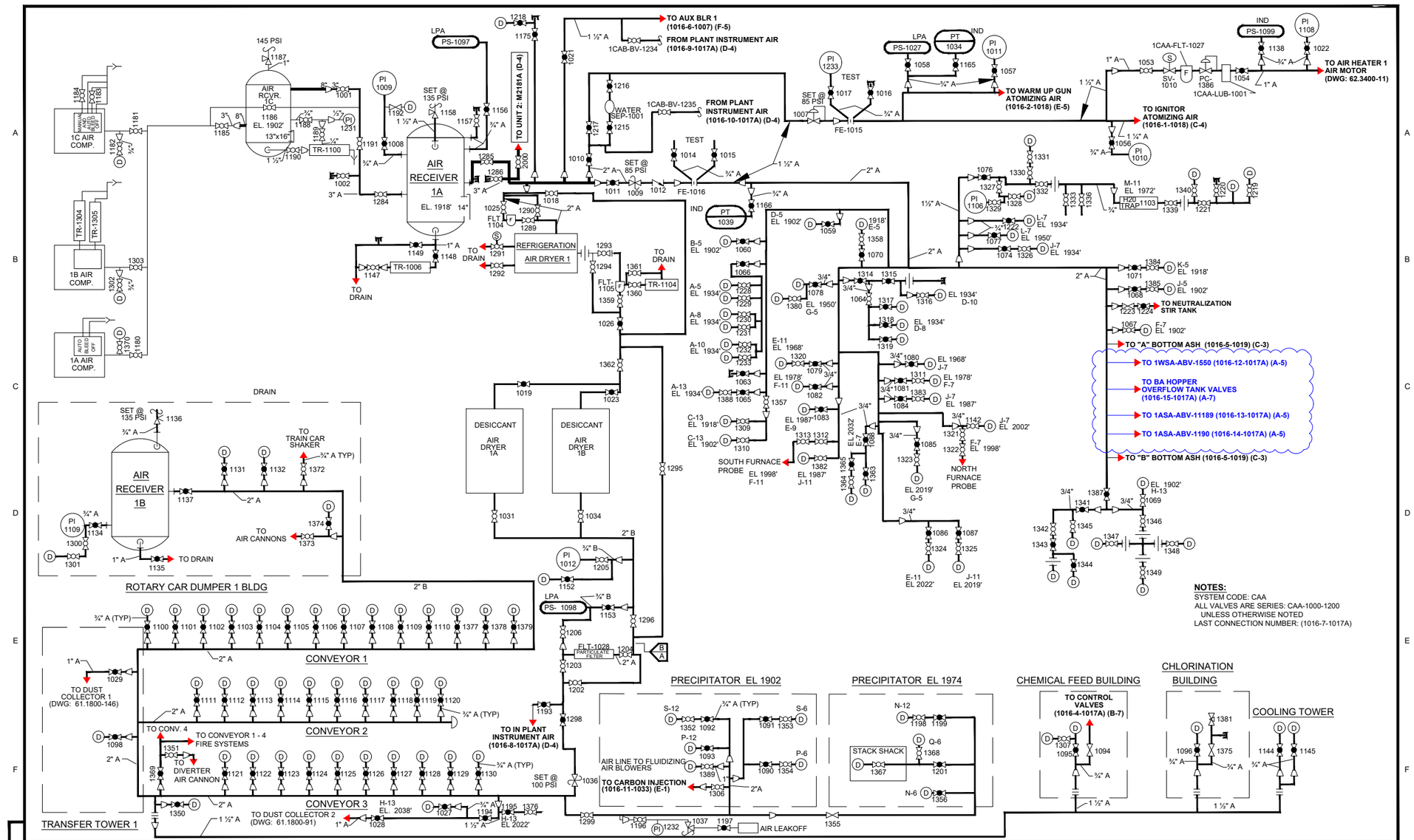
CABLE SCHEDULE

ITEM NO.	CABLE NO.	REV	FROM	TO	DESCRIPTION	CIRCUIT VOLTAGE	HP / KVA	CIRCUIT AMPERAGE	NO. OF SETS	CONDUCTOR SIZE	CABLE TYPE	CABLE VOLTAGE	CABLE O.D. (in.)	CABLE LBS/FT	ROUTING	MINIMUM CONDUIT SIZE	ESTIMATED CABLE LENGTH	COMMENTS
LOW VOLTAGE CABLES																		
1		A	480V SUS 1	MCC-XX	SUS 1 to MCC-XX Primary Feeder	480V	NA	600A	2	3/C #350KCMIL, #1 GND	3/C W/GND, TYPE XHHW-2, CU, TC	600V			TRAY/CONDUIT	2.5"	170'	
2		A	MCC-XX	P-1	MCC Bucket XX to Bottom Ash Pump Motor	480V	60HP	77A	1	3/C #1, #8 GND	3/C W/GND, TYPE XHHW-2, CU, TC	600V			TRAY/CONDUIT	1.5"	125'	
3		A	MCC-XX	P-2	MCC Bucket XX to Redundant Bottom Ash Pump Motor	480V	60HP	77A	1	3/C #1, #8 GND	3/C W/GND, TYPE XHHW-2, CU, TC	600V			TRAY/CONDUIT	1.5"	125'	
4																		

Notes:
1. AMPACITY OF 600V CABLES ARE BASED ON TABLE 310.16 OF THE NATIONAL ELECTRICAL CODE.
2. CABLE LENGTHS ARE ENGINEER'S ESTIMATE ONLY. CONTRACTOR TO VERIFY IN FIELD.
3. MINIMUM CONDUIT SIZES WERE BASED OFF SOUTHWIRE CABLE. IF OTHER CABLE IS USED, VERIFY CONDUIT SIZE IS SUFFICIENT.

Hastings Utilities WEC1 Controls Cable Schedule

	CABLE INFO						I/O INFO						SOURCE TERMINATIONS					Destination Termination				INSTRUMENT INFO							
REV	CABLE TAG/LABEL	CABLE RATING	CABLE TYPE	JACKET TYPE	INSUL TYPE	AWG	IO DEVICE TAG	SOURCE SIGNAL TYPE	SIGNAL TYPE VOLTAGE	RACK	SLOT	POINT	SOURCE TERM/PANEL	TERM BLOCK	TERMINAL	TB GROUP	WIRE COLOR	DESTINATION TERM/PANEL / DEVICE	TERM BLOCK	TERMINAL	WIRE COLOR	INSTRUMENT TYPE	MANUFACTURE	MODEL #	EU RANGE	SETPOINT	VOLTAGE	NOTES	SERVICE
A	-	600V TC	1-7C	PVC	THHN	14 AWG	CR1-11	-	120 VAC	-	-	-	913	TB3	13-4	120VAC	BLK	913	TB5	11	BLK								
A	-	600V TC	1-7C	PVC	THHN	14 AWG	CR1-A1	DO	120 VAC	3	6	0	913	TB5	A1	120VAC	BLK	913	-	PLC	BLK								ASH HOPPER O/F TANK MIN FLOW RECIRC ISOLATION VALVE OPEN CMD
A	-	600V TC	1-7C	PVC	THHN	14 AWG	CR1-A2	-	120 VAC	-	-	-	913	TB3	6-1	NEUTRAL	WHT	913	TB5	A2	WHT								
A	-	600V TC	1-7C	PVC	THHN	14 AWG	CR2-11	-	120 VAC	-	-	-	913	TB3	13-6	120VAC	BLK	913	TB5	11	BLK								
A	-	600V TC	1-7C	PVC	THHN	14 AWG	CR2-A1	DO	120 VAC	3	6	1	913	TB5	A1	120VAC	BLK	913	-	PLC	BLK								WSA SERVICE WATER MAKEUP ISOLATION VALVE OPEN CMD
A	-	600V TC	1-7C	PVC	THHN	14 AWG	CR2-A2	-	120 VAC	-	-	-	913	TB3	6-2	NEUTRAL	WHT	913	TB5	A2	WHT								
A	-	600V TC	1-7C	PVC	THHN	14 AWG	CR11-11	-	120 VAC	-	-	-	913	TB3	17-6	120VAC	BLK	913	TB5	11	BLK								
A	-	600V TC	1-7C	PVC	THHN	14 AWG	CR11-A1	DO	120 VAC	3	6	10	913	TB5	A1	120VAC	BLK	913	-	PLC	BLK								BOTTOM ASH/PYRITES PUMP MOTOR RUN CMD
A	-	600V TC	1-7C	PVC	THHN	14 AWG	CR11-A2	-	120 VAC	-	-	-	913	TB3	9-6	NEUTRAL	WHT	913	TB5	A2	WHT								
A	-	600V TC	1-7C	PVC	THHN	14 AWG	CR12-11	-	120 VAC	-	-	-	913	TB3	18-1	120VAC	BLK	913	TB5	11	BLK								
A	-	600V TC	1-7C	PVC	THHN	14 AWG	CR12-A1	DO	120 VAC	3	6	11	913	TB5	A1	120VAC	BLK	913	-	PLC	BLK								BOTTOM ASH/PYRITES PUMP MOTOR RUN CMD
A	-	600V TC	1-7C	PVC	THHN	14 AWG	CR12-A2	-	120 VAC	-	-	-	913	TB3	10-2	NEUTRAL	WHT	913	TB5	A2	WHT								
A	-	600V TC	1-7C	PVC	THHN	14 AWG	CR3-11	-	120 VAC	-	-	-	913	TB3	14-1	120VAC	BLK	913	TB5	11	BLK								
A	-	600V TC	1-7C	PVC	THHN	14 AWG	CR3-A1	DO	120 VAC	3	6	2	913	TB5	A1	120VAC	BLK	913	-	PLC	BLK								BOTTOM ASH/PYRITES PUMP SUCTION ISOLATION VALVE OPEN CMD
A	-	600V TC	1-7C	PVC	THHN	14 AWG	CR3-A2	-	120 VAC	-	-	-	913	TB3	6-4	NEUTRAL	WHT	913	TB5	A2	WHT								
A	-	600V TC	1-7C	PVC	THHN	14 AWG	CR4-11	-	120 VAC	-	-	-	913	TB3	14-2	120VAC	BLK	913	TB5	11	BLK								
A	-	600V TC	1-7C	PVC	THHN	14 AWG	CR4-A1	DO	120 VAC	3	6	3	913	TB5	A1	120VAC	BLK	913	-	PLC	BLK								BOTTOM ASH/PYRITES PUMP SUCTION ISOLATION VALVE OPEN CMD
A	-	600V TC	1-7C	PVC	THHN	14 AWG	CR4-A2	-	120 VAC	-	-	-	913	TB3	6-6	NEUTRAL	WHT	913	TB5	A2	WHT								
A	-	600V TC	1-7C	PVC	THHN	14 AWG	CR5-11	-	120 VAC	-	-	-	913	TB3	14-3	120VAC	BLK	913	TB5	11	BLK								
A	-	600V TC	1-7C	PVC	THHN	14 AWG	CR5-A1	DO	120 VAC	3	6	4	913	TB5	A1	120VAC	BLK	913	-	PLC	BLK								BOTTOM ASH/PYRITES PUMP DISCHARGE ISOLATION VALVE OPEN CMD
A	-	600V TC	1-7C	PVC	THHN	14 AWG	CR5-A2	-	120 VAC	-	-	-	913	TB3	7-2	NEUTRAL	WHT	913	TB5	A2	WHT								
A	-	600V TC	1-7C	PVC	THHN	14 AWG	CR6-11	-	120 VAC	-	-	-	913	TB3	17-1	120VAC	BLK	913	TB5	11	BLK								
A	-	600V TC	1-7C	PVC	THHN	14 AWG	CR6-A1	DO	120 VAC	3	6	5	913	TB5	A1	120VAC	BLK	913	-	PLC	BLK								BOTTOM ASH/PYRITES PUMP DISCHARGE ISOLATION VALVE OPEN CMD
A	-	600V TC	1-7C	PVC	THHN	14 AWG	CR6-A2	-	120 VAC	-	-	-	913	TB3	8-2	NEUTRAL	WHT	913	TB5	A2	WHT								
A	-	600V TC	1-7C	PVC	THHN	14 AWG	CR7-11	-	120 VAC	-	-	-	913	TB3	17-2	120VAC	BLK	913	TB5	11	BLK								
A	-	600V TC	1-7C	PVC	THHN	14 AWG	CR7-A1	DO	120 VAC	3	6	6	913	TB5	A1	120VAC	BLK	913	-	PLC	BLK								ASH HOPPER OVERFLOW TANK BLOWDOWN ISOLATION VALVE OPEN CMD
A	-	600V TC	1-7C	PVC	THHN	14 AWG	CR7-A2	-	120 VAC	-	-	-	913	TB3	8-4	NEUTRAL	WHT	913	TB5	A2	WHT								
A	-	600V TC	1-7C	PVC	THHN	14 AWG	CR8-11	-	120 VAC	-	-	-	913	TB3	17-3	120VAC	BLK	913	TB5	11	BLK								
A	-	600V TC	1-7C	PVC	THHN	14 AWG	CR8-A1	DO	120 VAC	3	6	7	913	TB5	A1	120VAC	BLK	913	-	PLC	BLK								ASH HOPPER OVERFLOW TANK FLUSHING ISOLATION VALVE OPEN CMD
A	-	600V TC	1-7C	PVC	THHN	14 AWG	CR8-A2	-	120 VAC	-	-	-	913	TB3	8-6	NEUTRAL	WHT	913	TB5	A2	WHT								
A	-	600V TC	1-7C	PVC	THHN	14 AWG	CR9-11	-	120 VAC	-	-	-	913	TB3	17-4	120VAC	BLK	913	TB5	11	BLK								
A	-	600V TC	1-7C	PVC	THHN	14 AWG	CR9-A1	DO	120 VAC	3	6	8	913	TB5	A1	120VAC	BLK	913	-	PLC	BLK								SLOPE NOZZLE VALVE OPEN CMD
A	-	600V TC	1-7C	PVC	THHN	14 AWG	CR9-A2	-	120 VAC	-	-	-	913	TB3	9-2	NEUTRAL	WHT	913	TB5	A2	WHT								
A	-	600V TC	1-7C	PVC	THHN	14 AWG	CR10-11	-	120 VAC	-	-	-	913	TB3	17-5	120VAC	BLK	913	TB5	11	BLK								
A	-	600V TC	1-7C	PVC	THHN	14 AWG	CR10-A1	DO	120 VAC	3	6	9	913	TB5	A1	120VAC	BLK	913	-	PLC	BLK								SLOPE NOZZLE VALVE OPEN CMD
A	-	600V TC	1-7C	PVC	THHN	14 AWG	CR10-A2	-	120 VAC	-	-	-	913	TB3	9-4	NEUTRAL	WHT	913	TB5	A2	WHT								
A	1ASA34001	300V TC	1-TSP	PVC	THHN	18 AWG	1ASA-TIT-1268	AI	4-20 mADC	2	1	3	903	TB5	4-2	-	BLK	1ASA-TIT-1268	-	+	BLK	TEMPERATURE TRANSMITTER	LATER	LATER	LATER DEG F	LATER		EXISTING TB	ASH HOPPER OVERFLOW TANK TEMPERATURE INDICATION
A	1ASA34001	300V TC	1-TSP	PVC	THHN	18 AWG	1ASA-TIT-1268	AI	4-20 mADC	2	1	3	903	TB5	4-4	-	RED	1ASA-TIT-1268	-	-	RED							EXISTING TB	
A	1ASA34001	300V TC	1-TSP	PVC	THHN	18 AWG	1ASA-TIT-1268	-	-	-	-	-	903	TB5	4-6	-	SHLD	1ASA-TIT-1268	-										
A	1ASA34002	300V TC	1-TSP	PVC	THHN	18 AWG	1ASA-LIT-1269	AI	4-20 mADC	2	1	4	903	TB5	6-2	-	BLK	1ASA-LIT-1269	-	+	BLK	LEVEL TRANSMITTER	ROSEMOUNT	2051T	0 - 20PSIG	SEE P&ID		EXISTING TB	ASH HOPPER OVERFLOW TANK WATER LEVEL INDICATION
A	1ASA34002	300V TC	1-TSP	PVC	THHN	18 AWG	1ASA-LIT-1269	AI	4-20 mADC	2	1	4	903	TB5	6-4	-	RED	1ASA-LIT-1269	-	-	RED							EXISTING TB	
A	1ASA34002	300V TC	1-TSP	PVC	THHN	18 AWG	1ASA-LIT-1269	-	-	-	-	-	903	TB5	6-6	-	SHLD	1ASA-LIT-1269	-										
A	1ASA34003	300V TC	1-TSP	PVC	THHN	18 AWG	1ASA-PDIT-1270	AI	4-20 mADC	2	1	5	903	TB5	7-2	-	BLK	1ASA-PDIT-1270	-	+	BLK	PRESS TRANSMITTER	LATER	LATER	LATER	LATER			B.A./PYRITES PUMP STRAINER DIFFERENTIAL PRESSURE INDICATION
A	1ASA34003	300V TC	1-TSP	PVC	THHN	18 AWG	1ASA-PDIT-1270	AI	4-20 mADC	2	1	5	903	TB5	7-4	-	RED	1ASA-PDIT-1270	-	-	RED								
A	1ASA34003	300V TC	1-TSP	PVC	THHN	18 AWG	1ASA-PDIT-1270	-	-	-	-	-	903	TB5	7-6	-	SHLD	1ASA-PDIT-1270	-										
A	1ASA35001	600V TC	1-7C	PVC	THHN	14 AWG	1ASA-SV-1178	-	120 VAC	-	-	-	913	TB5	CR1-14	-	BLK	1ASA-ABV-1178	-	7	BLK	SOLENOID VALVE	A-S-H	BFV06CESF	N/A	N/A	120 VAC		ASH HOPPER O/F TANK MIN FLOW RECIRC ISOLATION VALVE OPEN CMD
A	1ASA35001	600V TC	1-7C	PVC	THHN	14 AWG	1ASA-SV-1178	-	120 VAC	-	-	-	913	TB3	5-5	NEUTRAL	WHT	1ASA-ABV-1178	-	8	WHT								
A	1ASA35001	600V TC	1-7C	PVC	THHN	14 AWG	1ASA-SV-1178	-	-	-	-	-	913	GND BAR	GND	-	GRN	1ASA-ABV-1178	-	9	GRN								
A	1ASA35001	600V TC	1-7C	PVC	THHN	14 AWG	1ASA-ZSC-1282	DI	120 VAC	3	5	1	913	TB4	1-4	-	BLU	1ASA-ABV-1178	-	3	BLU	LIMIT SWITCH	CONTROLINK	CAB01200E	N/A	OPEN	120 VAC		ASH HOPPER O/F TANK MIN FLOW RECIRC ISOLATION VALVE OPEN
A	1ASA35001	600V TC	1-7C	PVC	THHN	14 AWG	1ASA-ZSC-1282	-	120 VAC	-	-	-	913	TB3	12-1	120VAC	ORG	1ASA-ABV-1178	-	2	ORG								
A	1ASA35001	600V TC	1-7C	PVC	THHN	14 AWG	1ASA-ZSO-1281	DI	120 VAC	3	5	0	913	TB4	1-2	-	RED	1ASA-ABV-1178	-	6	RED	LIMIT SWITCH	CONTROLINK	CAB01200E	N/A	CLOSED	120 VAC		ASH HOPPER O/F TANK MIN FLOW RECIRC ISOLATION VALVE CLOSED
A	1ASA35001	600V TC	1-7C	PVC	THHN	14 AWG	1ASA-ZSO-1281	-	120 VAC	-	-	-	913	TB3	12-2	120VAC	WHT-BLK	1ASA-ABV-1178	-	5	WHT-BLK								
A	1ASA35002	600V TC	1-7C	PVC	THHN	14 AWG	1WSA-SV-1550	-	120 VAC	-	-	-	913	TB5	CR2-14	-	BLK	1WSA-ABV-1550	-	7	BLK	SOLENOID VALVE	A-S-H	BFV06CESF	N/A	N/A	120 VAC		WSA SERVICE WATER MAKEUP ISOLATION VALVE OPEN CMD
A	1ASA35002	600V TC	1-7C	PVC	THHN	14 AWG	1WSA-SV-1550	-	120 VAC	-	-	-	913	TB3	5-6	NEUTRAL	WHT	1WSA-ABV-1550	-	8	WHT								
A	1ASA35002	600V TC	1-7C	PVC	THHN	14 AWG	1WSA-SV-1550	-	-	-	-	-	913	GND BAR	GND	-	GRN	1WSA-ABV-1550	-	9	GRN								
A	1ASA35002	600V TC	1-7C	PVC	THHN	14 AWG	1WSA-ZSC-1320	DI	120 VAC	3	5	3	913	TB4	2-4	-	BLU	1WSA-ABV-1550	-	3	BLU	LIMIT SWITCH	CONTROLINK	CAB01200E	N/A	CLOSED	120 VAC		WSA SERVICE WATER MAKEUP ISOLATION VALVE CLOSED
A	1ASA35002	600V TC	1-7C	PVC	THHN	14 AWG	1WSA-ZSC-1320	-	120 VAC	-	-	-	913	TB3	12-3	120VAC	ORG	1WSA-ABV-1550	-	2	ORG								
A	1ASA35002	600V TC	1-7C	PVC	THHN	14 AWG	1WSA-ZSO-1319	DI	120 VAC	3	5	2	913	TB4	2-2	-	RED	1WSA-ABV-1550	-	5	RED	LIMIT SWITCH	CONTROLINK	CAB01200E	N/A	OPEN	120 VAC		WSA SERVICE WATER MAKEUP ISOLATION VALVE OPEN
A	1ASA35002	600V TC	1-7C	PVC	THHN	14 AWG	1WSA-ZSO-1319	-	120 VAC	-	-	-	913	TB3	12-4	120VAC	WHT-BLK	1WSA-ABV-1550	-	6	WHT-BLK								
A	1ASA35003	600V TC	1-2C	PVC	THHN	14 AWG	1ASA-ZSO-1271	DI	120 VAC	3	5	4	913	TB4	3-2	-	RED	1ASA-BV-1180	-	1	RED	LIMIT SWITCH	TOPWORX (EMERSON)	GO SWITCH 81-20528-A2	N/A	OPEN	120 VAC		BOTTOM ASH/PYRITES PUMP SUCTION ISOLATION VALVE OPEN
A	1ASA35003	600V TC	1-2C	PVC	THHN	14 AWG	1ASA-ZSO-1271	-	120 VAC	-	-	-	913	TB3	12-5	120VAC	BLK	1ASA-BV-1180	-	2	BLK								
A	1ASA35004	600V TC	1-2C	PVC	THHN	14 AWG	1ASA-ZSC-1272	DI	120 VAC	3	5	5	913	TB4	3-4	-	RED	1ASA-BV-1180	-	3	RED	LIMIT SWITCH	TOPWORX (EMERSON)	GO SWITCH 81-20528-A2	N/A	CLOSED	120 VAC		BOTTOM ASH/PYRITES PUMP SUCTION ISOLATION VALVE CLOSED
A	1ASA35004	600V TC	1-2C	PVC	THHN	14 AWG	1ASA-ZSC-1272	-	120 VAC	-	-	-	913	TB3	12-6	120VAC	BLK	1ASA-BV-1180	-	4	BLK								
A	1ASA35005	600V TC	1-2C	PVC	THHN	14 AWG	1ASA-ZSO-1273	DI	120 VAC	3	5	6	913	TB4	4-2	-	RED	1ASA-BV-1183	-	1	RED	LIMIT SWITCH	TOPWORX (EMERSON)	GO SWITCH 81-20528-A2	N/A	OPEN	120 VAC		BOTTOM ASH/PYRITES PUMP SUCTION ISOLATION VALVE OPEN
A	1ASA35005	600V TC	1-2C	PVC	THHN	14 AWG	1ASA-ZSO-1273	-	120 VAC	-	-	-	913	TB3	13-1	120VAC	BLK	1ASA-BV-1183	-	2	BLK								
A	1ASA35006	600V TC	1-2C	PVC	THHN	14 AWG	1ASA-ZSC-1274	DI	120 VAC	3	5	7	913	TB4	4-4	-	RED	1ASA-BV-1183	-	3	RED	LIMIT SWITCH	TOPWORX (EMERSON)	GO SWITCH 81-20528-A2	N/A	CLOSED	120 VAC		BOTTOM ASH/PYRITES PUMP SUCTION ISOLATION VALVE CLOSED
A	1ASA35006	600V TC	1-2C	PVC	THHN	14 AWG	1ASA-ZSC-1274	-	120 VAC	-	-	-	913	TB3	13-2	120VAC	BLK	1ASA-BV-1183	-	4	BLK								
A	1ASA35007	600V TC	1-2C	PVC	THHN	14 AWG	1ASA-ZSO-1275	DI	120 VAC	3	5	8	913	TB4	5-2	-	RED	1ASA-BV-1182	-	1	RED	LIMIT SWITCH	TOPWORX (EMERSON)	GO SWITCH 81-20528-A2	N/A	OPEN	120 VAC		BOTTOM ASH/PYRITES PUMP DISCHARGE ISOLATION VALVE OPEN
A	1ASA35007	600V TC	1-2C	PVC	THHN	14 AWG	1ASA-ZSO-1275	-	120 VAC	-	-	-	913	TB3	13-3	120VAC	BLK	1ASA-BV-1182	-	2	BLK								
A	1ASA35008	600V TC	1-2C	PVC	THHN	14 AWG	1ASA-ZSC-1276	DI	120 VAC	3	5	9	913	TB4	5-4	-	RED	1ASA-BV-1182	-	3	RED	LIMIT SWITCH	TOPWORX (EMERSON)	GO SWITCH 81-20528-A2	N/A	CLOSED	120 VAC		BOTTOM ASH/PYRITES PUMP DISCHARGE ISOLATION VALVE CLOSED
A	1ASA35008	600V TC	1-2C	PVC	THHN	14 AWG	1ASA-ZSC-1276	-	120 VAC	-	-	-	913	TB3	13-4	120VAC	BLK	1ASA-BV-1182	-	4	BLK								
A	1ASA35009	600V TC	1-3C	PVC	THHN	14 AWG	1ASA-SV-1180	-	-	-	-	-	913	TB5	CR3-14	-	BLK	1ASA-BV-1180	-	+	BLK	SOLENOID VALVE	A-S-H	T-KGVBD06CLDAF	N/A	N/A	120 VAC		BOTTOM ASH/PYRITES PUMP SUCTION ISOLATION VALVE OPEN CMD
A	1ASA35009	600V TC	1-3C	PVC	THHN	14 AWG	1ASA-SV-1180	-	120 VAC	-	-	-	913	TB3	6-3	NEUTRAL	WHT	1ASA-BV-1180	-	-	WHT								
A	1ASA35009	600V TC	1-3C	PVC	THHN	14 AWG	1ASA-SV-1180	-	-	-	-	-	913	GND BAR	GND	-	GRN	1ASA-BV-1180	-	GND	GRN								
A	1ASA35010	600V TC	1-3C	PVC	THHN	14 AWG	1ASA-SV-1183	-	-	-	-	-	913	TB5	CR4-14	-	BLK	1ASA-BV-1183	-	+	BLK	SOLENOID VALVE	A-S-H	T-KGVBD06CLDAF	N/A	N/A	120 VAC		BOTTOM ASH/PYRITES PUMP SUCTION ISOLATION VALVE OPEN CMD
A	1ASA35010	600V TC	1-3C	PVC	THHN	14 AWG	1ASA-SV-1183	-	120 VAC	-	-	-	913	TB3	6-5	NEUTRAL	WHT	1ASA-BV-1183	-	-	WHT								
A	1ASA35010	600V TC	1-3C	PVC	THHN	14 AWG	1ASA-SV-1183	-	-	-	-	-	913	GND BAR	GND	-	GRN	1ASA-BV-1183	-	GND	GRN								
A	1ASA35011	600V TC	1-3C	PVC	THHN	14 AWG	1ASA-SV-1182	-	-	-	-	-	913	TB5	CR5-14	-	BLK	1ASA-BV-1182	-	+	BLK	SOLENOID VALVE	A-S-H	T-KGVBD06CLDAF	N/A	N/A	120 VAC		BOTTOM ASH/PYRITES PUMP DISCHARGE ISOLATION VALVE OPEN CMD
A	1ASA35011	600V TC	1-3C	PVC	THHN	14 AWG	1ASA-SV-1182	-	120 VAC	-	-	-	913	TB3	7-1	NEUTRAL	WHT	1ASA-BV-1182	-	-	WHT								
A	1ASA35011	600V TC	1-3C	PVC	THHN	14 AWG	1ASA-SV-1182	-	-	-	-	-	913	GND BAR	GND	-	GRN	1ASA-BV-1182	-	GND	GRN								
A	1ASA36001	600V TC	1-2C	PVC	THHN	14 AWG	1ASA-ZSO-1277	DI	120 VAC	3	5	10	913	TB4	6-2	-	RED	1ASA-BV-1185	-	1	RED	LIMIT SWITCH	TOPWORX (EMERSON)	GO SWITCH 81-20528-A2	N/A	OPEN	120 VAC		BOTTOM ASH/PYRITES PUMP DISCHARGE ISOLATION VALVE OPEN
A	1ASA36001	600V TC	1-2C	PVC	THHN	14 AWG	1ASA-ZSO-1277	-	120 VAC	-	-	-	913	TB3	14-4	120VAC	BLK	1ASA-BV-1185	-	2	BLK								
A	1ASA36002	600V TC	1-2C	PVC	THHN	14 AWG	1ASA-ZSC-1278	DI	120 VAC	3	5	11	913	TB4	6-4	-	RED	1ASA-BV-1185	-	3	RED	LIMIT SWITCH	TOPWORX (EMERSON)	GO SWITCH 81-20528-A2	N/A	CLOSED	120 VAC		BOTTOM ASH/PYRITES PUMP DISCHARGE ISOLATION VALVE CLOSED
A	1ASA36002	600V TC	1-2C	PVC	THHN	14 AWG	1ASA-ZSC-1278	-	120 VAC	-	-	-	913	TB3	14-5	120VAC	BLK	1ASA-BV-1185	-	4	BLK								
A	1ASA36003	600V TC	1-2C	PVC	THHN	14 AWG	1ASA-ZSO-1295	DI	120 VAC	3	5	12	913	TB4	7-2	-	RED	1ASA-ABV-1170	-	1	RED	LIMIT SWITCH	TOPWORX (EMERSON)	GO SWITCH 81-20528-A2	N/A	OPEN	120 VAC		ASH HOPPER OVERFLOW TANK BLOWDOWN ISOLATION VALVE OPEN
A	1ASA36003	600V TC	1-2C	PVC	THHN	14 AWG	1ASA-ZSO-1295	-	120 VAC	-	-	-	913	TB3	14-6	120VAC	BLK	1ASA-ABV-1170	-	2	BLK								
A	1ASA36004	600V TC	1-2C	PVC	THHN	14 AWG	1ASA-ZSC-1294	DI	120 VAC	3	5	13	913	TB4	7-4	-	RED	1ASA-ABV-1170	-	3	RED	LIMIT SWITCH	TOPWORX (EMERSON)	GO SWITCH 81-20528-A2	N/A	CLOSED	120 VAC		ASH HOPPER OVERFLOW TANK BLOWDOWN ISOLATION VALVE CLOSED
A	1ASA36004	600V TC	1-2C	PVC	THHN	14 AWG	1ASA-ZSC-1294	-	120 VAC	-	-	-	913	TB3	15-1	120VAC	BLK	1ASA-ABV-1170	-	4	BLK								
A	1ASA36005	600V TC	1-2C	PVC	THHN	14 AWG	1ASA-ZSO-1279	DI	120 VAC	3	5	14	913	TB4	8-2	-	RED	1ASA-ABV-1179	-	1	RED	LIMIT SWITCH	LATER	LATER	N/A	OPEN	120 VAC		ASH HOPPER OVERFLOW TANK FLUSHING ISOLATION VALVE OPEN
A	1ASA36005	600V TC	1-2C	PVC	THHN	14 AWG	1ASA-ZSO-1279	-	120 VAC	-	-	-	913	TB3	15-2	120VAC	BLK	1ASA-ABV-1179	-	2	BLK								
A	1ASA36006	600V TC	1-2C	PVC	THHN	14 AWG	1ASA-ZSC-1280	DI	120 VAC	3	5	15	913	TB4	8-4	-	RED	1ASA-ABV-1179	-	3	RED	LIMIT SWITCH	LATER	LATER	N/A	CLOSED	120 VAC		ASH HOPPER OVERFLOW TANK FLUSHING ISOLATION VALVE CLOSED
A	1ASA36006	600V TC	1-2C	PVC	THHN	14 AWG	1ASA-ZSC-1280	-	120 VAC	-	-	-	913	TB3	15-3	120VAC	BLK	1ASA-ABV-1179	-	4	BLK								
A	1ASA36007	600V TC	1-2C	PVC	THHN	14 AWG	1ASA-ZSO-1283	DI	120 VAC	3	3	12	913	TB4	9-2	-	RED	1ASA-ABV-1189	-	1	RED	LIMIT SWITCH	LATER	LATER	N/A	OPEN	120 VAC		SLOPE NOZZLE VALVE OPEN
A	1ASA36007	600V TC	1-2C	PVC	THHN	14 AWG	1ASA-ZSO-1283	-	120 VAC	-	-	-	913	TB3	15-4	120VAC	BLK	1ASA-ABV-1189	-	2	BLK								
A	1ASA36008	600V TC	1-2C	PVC	THHN	14 AWG	1ASA-ZSC-1284	DI	120 VAC	3	3	13	913	TB4	9-4	-	RED	1ASA-ABV-1189	-	3	RED	LIMIT SWITCH	LATER	LATER	N/A	CLOSED	120 VAC		SLOPE NOZZLE VALVE CLOSED
A	1ASA36008	600V TC	1-2C	PVC	THHN	14 AWG	1ASA-ZSC-1284	-	120 VAC	-	-	-	913	TB3	15-5	120VAC	BLK	1ASA-ABV-1189	-	4	BLK								
A	1ASA36009	600V TC	1-2C	PVC	THHN	14 AWG	1ASA-ZSO-1285	DI	120 VAC	3	3	15	913	TB4	10-2	-	RED	1ASA-ABV-1190	-	1	RED	LIMIT SWITCH	LATER	LATER	N/A	OPEN	120 VAC		SLOPE NOZZLE VALVE OPEN
A	1ASA36009	600V TC	1-2C	PVC	THHN	14 AWG	1ASA-ZSO-1285	-	120 VAC	-	-	-	913	TB3	15-6	120VAC	BLK	1ASA-ABV-1190	-	2	BLK								
A	1ASA36010	600V TC	1-2C	PVC	THHN	14 AWG	1ASA-ZSC-1286	DI	120 VAC	3	3	14	913	TB4	10-4	-	RED	1ASA-ABV-1190	-	3	RED	LIMIT SWITCH	LATER	LATER	N/A	CLOSED	120 VAC		SLOPE NOZZLE VALVE CLOSED
A	1ASA36010	600V TC	1-2C	PVC	THHN	14 AWG	1ASA-ZSC-1286	-	120 VAC	-	-	-	913	TB3	16-1	120VAC	BLK	1ASA-ABV-1190	-	4	BLK								
A	1ASA36011	600V TC	1-7C	PVC	THHN	14 AWG	M-001	-	120 VAC	-	-	-	913	TB5	CR11-14	-	BLK	MCC-	-		BLK	MOTOR	-	-	-	-	-		BOTTOM ASH/PYRITES PUMP MOTOR RUN CMD
A	1ASA36011	600V TC	1-7C	PVC	THHN	14 AWG	M-001	-	120 VAC	-	-	-	913	TB3	XXX	NEUTRAL	WHT	MCC-	-		WHT								
A	1ASA36011	600V TC	1-7C	PVC	THHN	14 AWG	M-001	-	120 VAC	-	-	-	913	GND BAR	GND	-	GRN	MCC-	-		GRN								
A	1ASA36011	600V TC	1-7C	PVC	THHN	14 AWG	M-001	DI	120 VAC	3	3	8	913	TB4	11-2	-	RED	MCC-	-		RED								BOTTOM ASH/PYRITES PUMP MOTOR RUNNING
A	1ASA36011	600V TC	1-7C	PVC	THHN	14 AWG	M-001	-	120 VAC	-	-	-	913	TB3	XXX	120VAC	ORG	MCC-	-		ORG								
A	1ASA36011	600V TC	1-7C	PVC	THHN	14 AWG	M-001	DI	120 VAC	3	3	9	913	TB4	11-4	-	BLU	MCC-	-		BLU								BOTTOM ASH/PYRITES PUMP MOTOR OVERLOAD
A	1ASA36011	600V TC	1-7C	PVC	THHN	14 AWG	M-001	-	120 VAC	-	-	-	913	TB3	XXX	120VAC	WHT-BLK	MCC-	-		WHT-BLK								
A	1ASA36012	600V TC	1-7C	PVC	THHN	14 AWG	M-001	-	120 VAC	-	-	-	913	TB5	CR12-14	-	BLK	MCC-	-		BLK	MOTOR	-	-	-	-	-		BOTTOM ASH/PYRITES PUMP MOTOR RUN CMD
A	1ASA36012	600V TC	1-7C	PVC	THHN	14 AWG	M-001	-	120 VAC	-	-	-	913	TB3	XXX	NEUTRAL	WHT	MCC-	-		WHT								
A	1ASA36012	600V TC	1-7C	PVC	THHN	14 AWG	M-001	-	120 VAC	-	-	-	913	GND BAR	GND	-	GRN	MCC-	-		GRN								
A	1ASA36012	600V TC	1-7C	PVC	THHN	14 AWG	M-001	DI	120 VAC	3	3	10	913	TB4	12-2	-	RED	MCC-	-		RED								BOTTOM ASH/PYRITES PUMP MOTOR RUNNING
A	1ASA36012	600V TC	1-7C	PVC	THHN	14 AWG	M-001	-	120 VAC	-	-	-	913	TB3	XXX	120VAC	ORG	MCC-	-		ORG								
A	1ASA36012	600V TC	1-7C	PVC	THHN	14 AWG	M-001	DI	120 VAC	3	3	11	913	TB4	12-4	-	BLU	MCC-	-		BLU								BOTTOM ASH/PYRITES PUMP MOTOR OVERLOAD
A	1ASA36012	600V TC	1-7C	PVC	THHN	14 AWG	M-001	-	120 VAC	-	-	-	913	TB3	XXX	120VAC	WHT-BLK	MCC-	-		WHT-BLK								
A	1ASA36013	600V TC	1-3C	PVC	THHN	14 AWG	1ASA-SV-1185	-	-	-	-	-	913	TB5	CR6-14	-	BLK	1ASA-BV-1185	-	+	BLK	SOLENOID VALVE	A-S-H	T-KGVBD06CLDAF	N/A	N/A	120 VAC		BOTTOM ASH/PYRITES PUMP DISCHARGE ISOLATION VALVE OPEN CMD
A	1ASA36013	600V TC	1-3C	PVC	THHN	14 AWG	1ASA-SV-1185	-	120 VAC	-	-	-	913	TB3	8-1	NEUTRAL	WHT	1ASA-BV-1185	-	-	WHT								
A	1ASA36013	600V TC	1-3C	PVC	THHN	14 AWG	1ASA-SV-1185	-	-	-	-	-	913	GND BAR	GND	-	GRN	1ASA-BV-1185	-	GND	GRN								
A	1ASA36014	600V TC	1-3C	PVC	THHN	14 AWG	1ASA-SV-1170	-	-	-	-	-	913	TB5	CR7-14	-	BLK	1ASA-ABV-1170	-	+	BLK	SOLENOID VALVE	A-S-H	T-KGVBD06CLDAF	N/A	N/A	120 VAC		ASH HOPPER OVERFLOW TANK BLOWDOWN ISOLATION VALVE OPEN CMD
A	1ASA36014	600V TC	1-3C	PVC	THHN	14 AWG	1ASA-SV-1170	-	120 VAC	-	-	-	913	TB3	8-3	NEUTRAL	WHT	1ASA-ABV-1170	-	-	WHT								
A	1ASA36014	600V TC	1-3C	PVC	THHN	14 AWG	1ASA-SV-1170	-	-	-	-	-	913	GND BAR	GND	-	GRN	1ASA-ABV-1170	-	GND	GRN								
A	1ASA36015	600V TC	1-3C	PVC	THHN	14 AWG	1ASA-SV-1179	-	-	-	-	-	913	TB5	CR8-14	-	BLK	1ASA-ABV-1179	-	+	BLK	SOLENOID VALVE	A-S-H	T-KGVBD06CLDAF	N/A	N/A	120 VAC		ASH HOPPER OVERFLOW TANK FLUSHING ISOLATION VALVE OPEN CMD
A	1ASA36015	600V TC	1-3C	PVC	THHN	14 AWG	1ASA-SV-1179	-	120 VAC	-	-	-	913	TB3	8-5	NEUTRAL	WHT	1ASA-ABV-1179	-	-	WHT								
A	1ASA36015	600V TC	1-3C	PVC	THHN	14 AWG	1ASA-SV-1179	-	-	-	-	-	913	GND BAR	GND	-	GRN	1ASA-ABV-1179	-	GND	GRN								
A	1ASA36016	600V TC	1-3C	PVC	THHN	14 AWG	1ASA-SV-1189	-	-	-	-	-	913	TB5	CR9-14	-	BLK	1ASA-ABV-1189	-	+	BLK	SOLENOID VALVE	LATER	LATER	N/A	N/A	120 VAC		SLOPE NOZZLE VALVE OPEN CMD
A	1ASA36016	600V TC	1-3C	PVC	THHN	14 AWG	1ASA-SV-1189	-	120 VAC	-	-	-	913	TB3	9-1	NEUTRAL	WHT	1ASA-ABV-1189	-	-	WHT								
A	1ASA36016	600V TC	1-3C	PVC	THHN	14 AWG	1ASA-SV-1189	-	-	-	-	-	913	GND BAR	GND	-	GRN	1ASA-ABV-1189	-	GND	GRN								
A	1ASA36017	600V TC	1-3C	PVC	THHN	14 AWG	1ASA-SV-1190	-	-	-	-	-	913	TB5	CR10-14	-	BLK	1ASA-ABV-1190	-	+	BLK	SOLENOID VALVE	LATER	LATER	N/A	N/A	120 VAC		SLOPE NOZZLE VALVE OPEN CMD
A	1ASA36017	600V TC	1-3C	PVC	THHN	14 AWG	1ASA-SV-1190	-	120 VAC	-	-	-	913	TB3	9-3	NEUTRAL	WHT	1ASA-ABV-1190	-	-	WHT								
A	1ASA36017	600V TC	1-3C	PVC	THHN	14 AWG	1ASA-SV-1190	-	-	-	-	-	913	GND BAR	GND	-	GRN	1ASA-ABV-1190	-	GND	GRN								



NO	DATE	REVISIONS	DWN	CK	APP
10	10/5/22	SORBENT INJ. CHANGED TO CARBON	BM		
9	1/28/21	ADDED VALVES 1CAB-BV-1234 & 1235	BT		
8	1/8/19	Operations Verifications 2018	EK	AB	
7	7/14/17	REVIEWED AND VERIFIED	TA		CW
6	1/10/06	AUTOCAD FORMAT	JES		KWL
5	4/12/82	INSTRUMENT REVISIONS	CWH		KWL/MHS
4	3/3/82	AIR CONTROL PIPONG FOR AC	C.H.		KWL/MHS
3	9/15/81	CONFORMED TO CONST RECORDS	AGG		ALC CJS
2	9/28/79	REVISED AS CIRCLED	AGG		ALC CJS
1	2/23/79	ISSUE FOR CONSTRUCTION	AGG		ALC CJS
0	12/15/78	BID 72.0000	AGG		ALC

A-G NO. BE0401

I HEREBY CERTIFY THAT THIS DOCUMENT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM DULY REGISTERED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF NEBRASKA.
SIGNED H.C. TEMME
DATE 2-23-79 REG. NO. E-2965

BLACK & VEATCH CONSULTING ENGINEERS
PROJECT 7677

CITY OF HASTINGS, NEBRASKA
WHELAN ENERGY CENTER UNIT 1
PIPING AND INSTRUMENT DIAGRAM
STATION AIR

B&V DWG NO. M1016
REV. 10

NOTES:
1.) SEE DRAWING PT-335-10 FOR PIPING DETAILS.
2.) CLOUD INDICATES NEW PIPING, VALVES, & EQUIPMENT.

No.	Revision	By	Date

HASTINGS UTILITIES

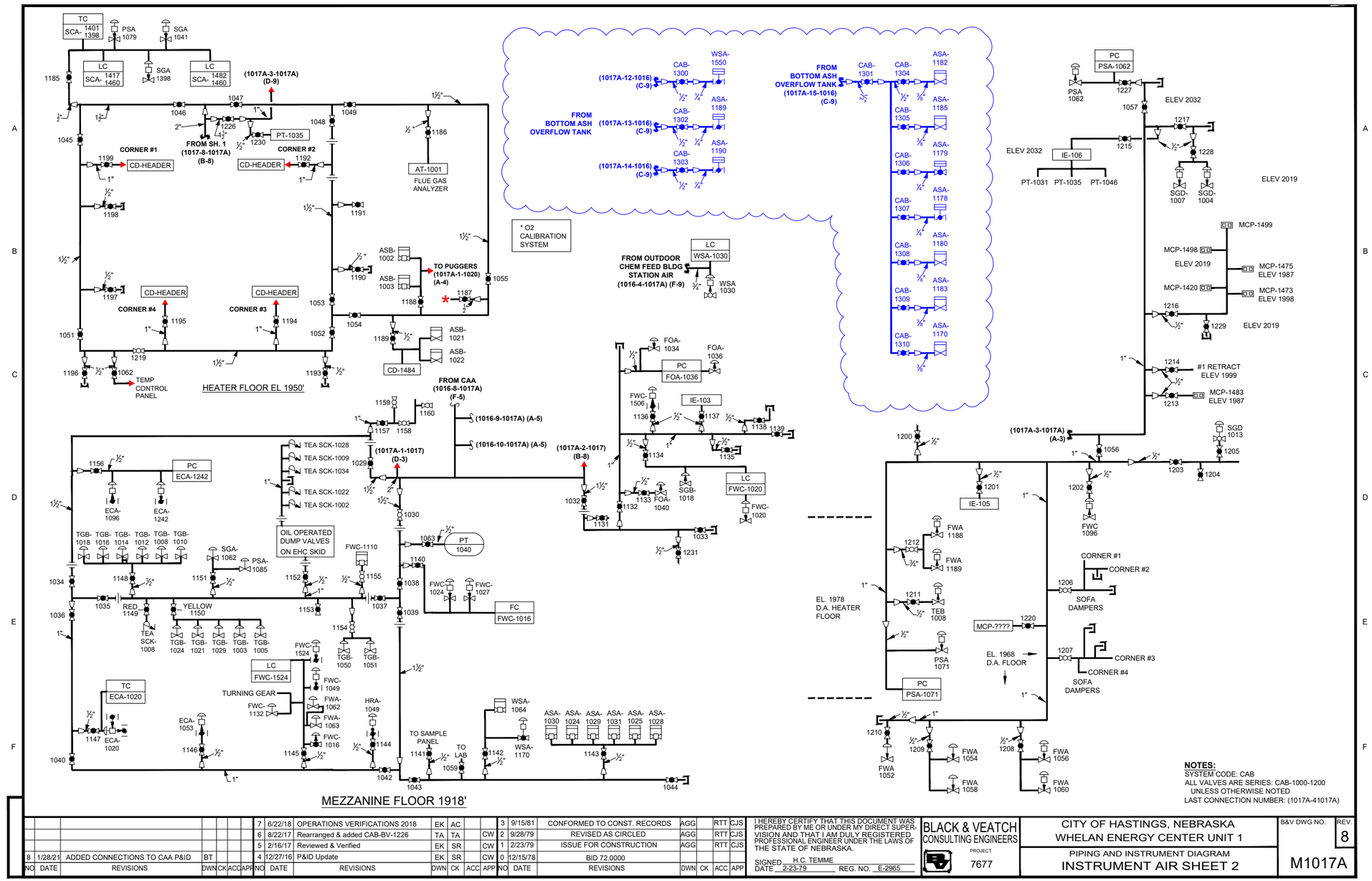
CITY OF HASTINGS ENGINEERING DEPT.

SCALE: N.T.S.	CONTRACTOR -	DRN. BY.	BWM
DATE: 1/16/26		APPRD. BY.	-

WEC1 BOTTOM ASH RECIRC SYSTEM

P&ID M1016
NEW CONSTRUCTION

DRG. NO. PT-335-11



NO	DATE	REVISIONS	DWN	CK	ACC	APP
8	1/28/21	ADDED CONNECTIONS TO CAA P&ID	BT			
7	6/22/18	OPERATIONS VERIFICATIONS 2018	EK	AC		
6	8/22/17	Rearranged & added CAB-BV-1226	TA	TA	CW	
5	2/16/17	Reviewed & Verified	EK	SR	CW	
4	12/27/16	P&ID Update	EK	SR	CW	
3	9/15/81	CONFORMED TO CONST. RECORDS	AGG		RTT	CJS
2	9/28/79	REVISED AS CIRCLED	AGG		RTT	CJS
1	2/23/79	ISSUE FOR CONSTRUCTION	AGG		RTT	CJS
0	12/15/78	BID 72.0000				

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SIGNED H.C. TEMME
DATE 2-23-79 REG. NO. E-2965

BLACK & VEATCH CONSULTING ENGINEERS
PROJECT 7677

CITY OF HASTINGS, NEBRASKA
WHELAN ENERGY CENTER UNIT 1
PIPING AND INSTRUMENT DIAGRAM
INSTRUMENT AIR SHEET 2

B&V DWG NO. M1017A
REV. 8

NOTES:
1.) SEE DRAWING PT-335-10 FOR PIPING DETAILS.
2.) CLOUD INDICATES NEW PIPING, VALVES, & EQUIPMENT.

No.	Revision	By	Date

HASTINGS UTILITIES

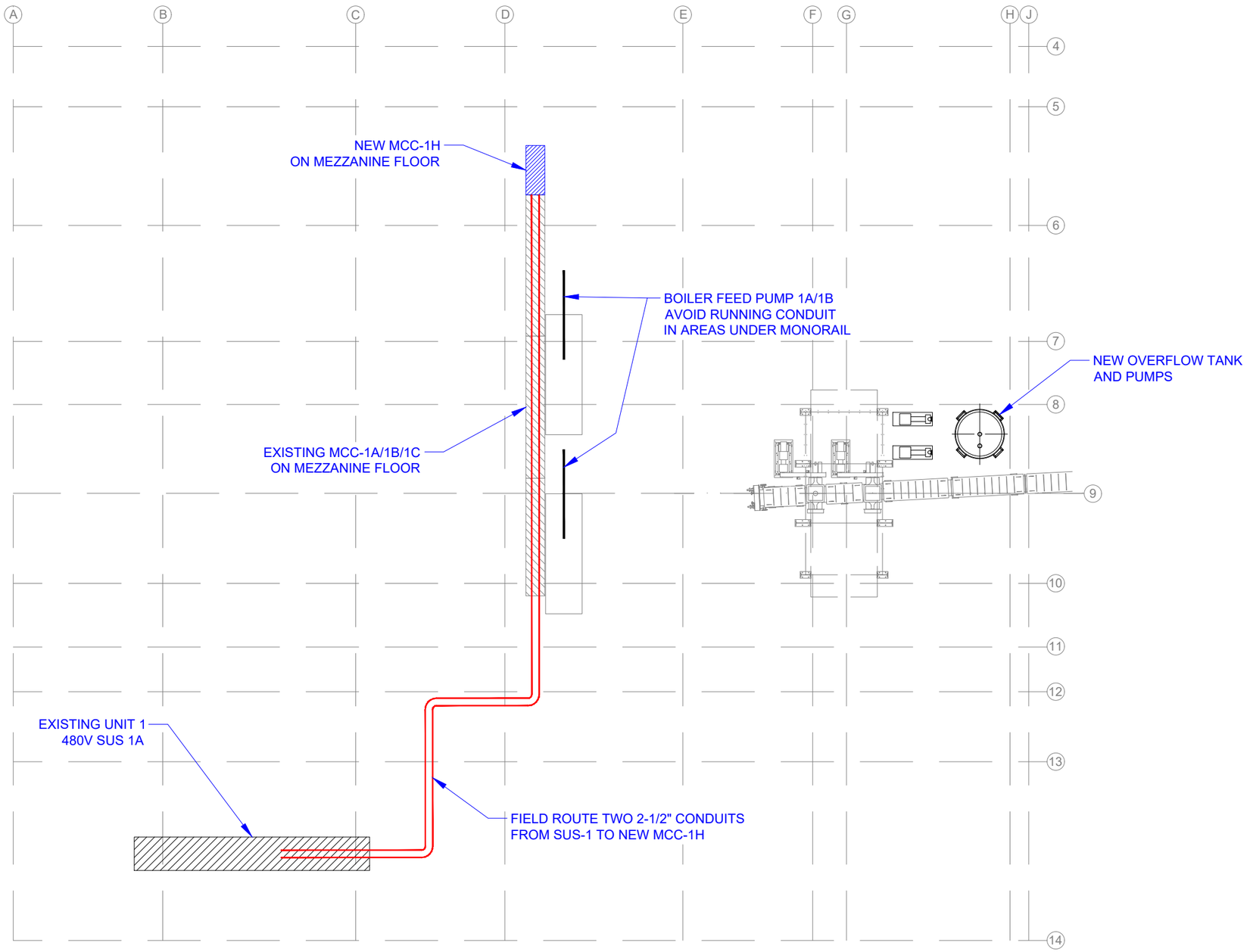
CITY OF HASTINGS ENGINEERING DEPT.

SCALE: N.T.S.	CONTRACTOR -	DRN. BY.	BWM
DATE: 1/16/26		APPRD. BY.	-

WEC1 BOTTOM ASH RECIRC SYSTEM

P&ID M1017A
NEW CONSTRUCTION

DRG. NO. PT-335-12



NOTES:
1.) SEE DRAWING A1007 FOR PLANT COLUMN LINE DIMENSIONS.
2.) NEW MCC-1H INSTALLED ON MEZZANINE FLOOR. EXISTING SUS-1 ON GROUND FLOOR.
3.) APPROXIMATE CONDUIT LENGTH = 125'
4.) CONDUIT FROM MCC-1H TO PUMPS, AND FROM FIELD DEVICES TO CONTROL CABINETS ARE FIELD ROUTED. SEE DRAWING E201.

No.	Revision	By	Date

HASTINGS UTILITIES

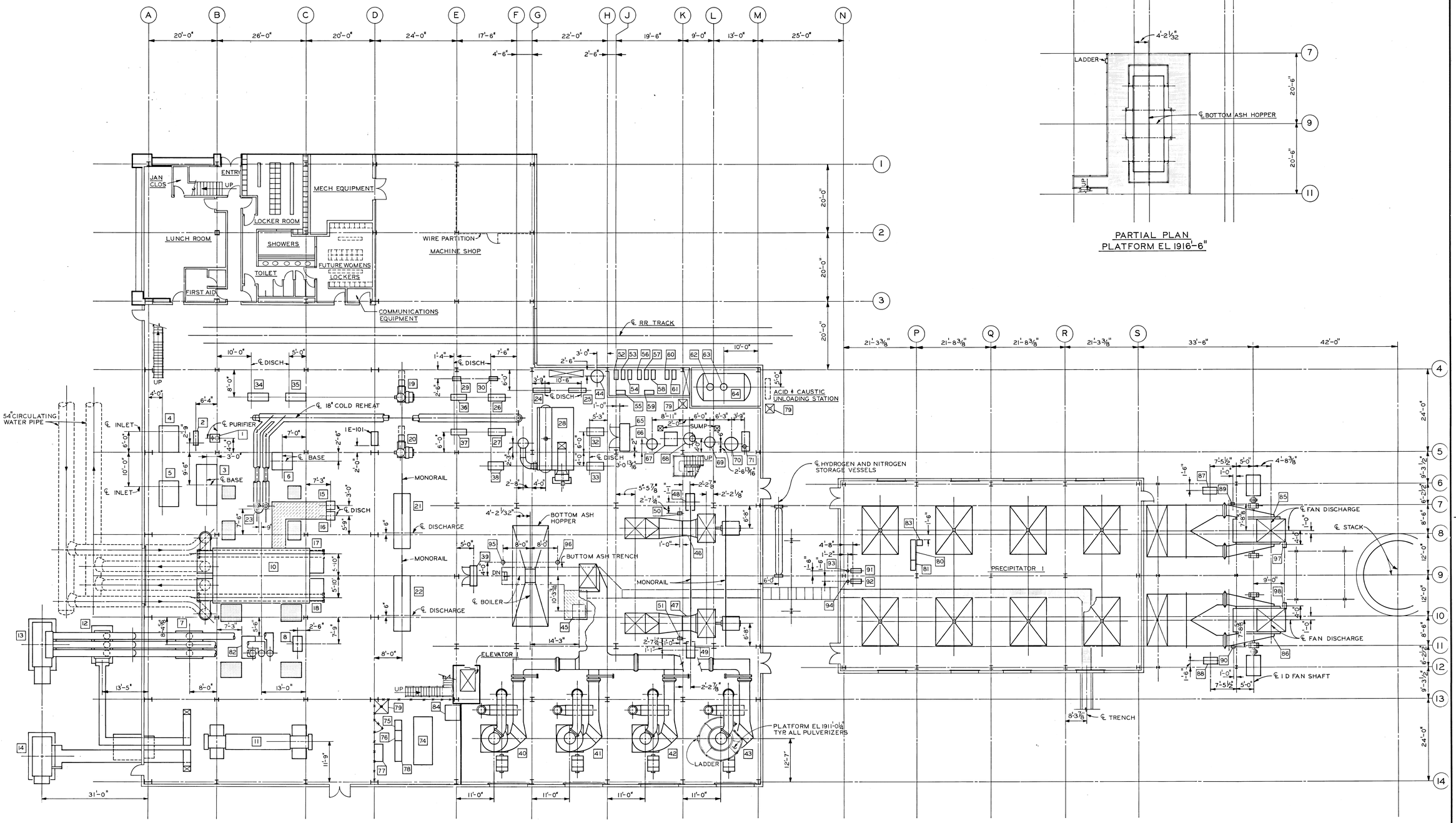
CITY OF HASTINGS ENGINEERING DEPT.

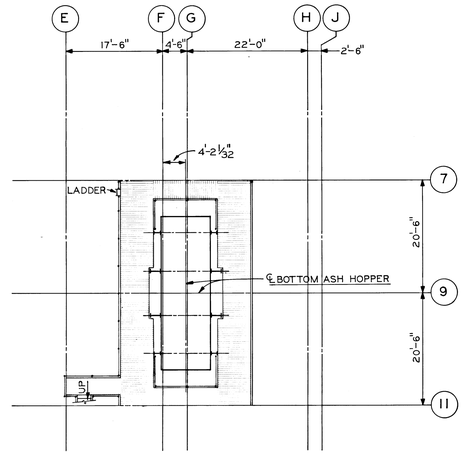
SCALE: N.T.S.	CONTRACTOR -	DRN. BY. BWM
DATE: 1/16/26		APPRD. BY. -

WEC1 BOTTOM ASH RECIRC SYSTEM

CABLE TRAY/ CONDUIT PLAN

DRG. NO. PT-335-13





PARTIAL PLAN
PLATFORM EL 1916'-6"

EQUIP. NO.	EQUIPMENT	LOCATION											
1	TURBINE OIL CENTRIFUGE 1	B5	21	BOILER FEED PUMP 1A	D8	41	PULVERIZER 1B	H13	61	DEMINERALIZER CAUSTIC REGENERATION PUMP 1B	K4	81	PRECIPITATOR HOPPER VIBRATOR/LEVEL CONTROL PANEL 1	P9
2	TURBINE OIL TRANSFER PUMP 1	B5	22	BOILER FEED PUMP 1B	D10	42	PULVERIZER 1C	K13	62	DEMINERALIZER ACID REGENERATION PUMP 1A	L4	82	NEUTRAL GROUNDING COMPARTMENT	B10
3	TURBINE OIL STORAGE TANK 1	B5	23	MISCELLANEOUS DRAINS RECEIVER 1	B8	43	PULVERIZER 1D	M13	63	DEMINERALIZER ACID REGENERATION PUMP 1B	L4	83	MOTOR CONTROL CENTER 1E	N10
4	CONDENSER EXHAUSTER 1A	A5	24	IGNITOR FUEL OIL PUMP 1A	G4	44	BOILER BLOWDOWN TANK 1	H4	64	DEMINERALIZER ACID STORAGE TANK 1	L4	84	JUNCTION BOX	E13
5	CONDENSER EXHAUSTER 1B	A5	25	IGNITOR FUEL OIL PUMP 1B	H4	45	MILLS REJECTS HOLDING HOPPER 1	H10	65	DEMINERALIZER CONTROL PANEL 1	J5	85	INDUCED DRAFT FAN 1A	S8
6	ELECTRO-HYDRAULIC CONTROL UNIT 1	C5	26	AUXILIARY BOILER MAKEUP WATER PUMP 1A	F4	46	FORCED DRAFT FAN 1A	L7	66	SECONDARY ANION EXCHANGER 1	J5	86	INDUCED DRAFT FAN 1B	S10
x 7	GENERATOR PT AND SURGE ARRESTER COMPARTMENT 1	B10	27	AUXILIARY BOILER MAKEUP WATER PUMP 1B	F5	47	FORCED DRAFT FAN 1B	L11	67	DEGASIFIED WATER TRANSFER PUMPS 1A AND 1B	K5	87	INDUCED DRAFT FAN OIL UNIT 1A	S6
x 8	HYDROGEN SEAL OIL UNIT 1	C10	28	AUXILIARY BOILER 1	G5	48	FORCED DRAFT FAN OIL UNIT 1A	L7	68	FORCED DRAFT DEGASIFIER 1	K5	88	INDUCED DRAFT FAN OIL UNIT 1B	S12
x 9			29	BEARING WATER BOOSTER PUMP 1A	E4	49	FORCED DRAFT FAN OIL UNIT 1B	L11	69	PRIMARY ANION EXCHANGER 1	K5	89	INDUCED DRAFT FAN INLET VANE DRIVE UNIT 1A	S9
x 10	CONDENSER 1	C9	30	BEARING WATER BOOSTER PUMP 1B	E4	50	FORCED DRAFT FAN BLADE DRIVE UNIT 1A	L7	70	PRIMARY CATION EXCHANGER 1	L5	90	INDUCED DRAFT FAN INLET VANE DRIVE UNIT 1B	S9
x 11	480V SECONDARY UNIT SUBSTATION 1	B13	31			51	FORCED DRAFT FAN BLADE DRIVE UNIT 1B	L11	71	POLISHING FILTER 1	L5	91	PRECIPITATOR ASH FLUIDIZING AIR BLOWER 1A	N9
12	MAIN AUXILIARY TRANSFORMER 1	A10	32	ASH WATER PUMPS 1A	H5	52	AUXILIARY BOILER HYDRAZINE FEED PUMP 1	J4	72			92	PRECIPITATOR ASH FLUIDIZING AIR BLOWER 1B	N9
x 13	GENERATOR TRANSFORMER 1	A10	33	ASH WATER PUMPS 1B	H5	53	HYDRAZINE FEED PUMP 1A	J4	73			93	PRECIPITATOR ASH FLUIDIZING AIR HEATER 1A	N9
x 14	RESERVE AUXILIARY TRANSFORMER 1	A13	34	AUXILIARY COOLING WATER PUMP 1A	C4	54	HYDRAZINE FEED PUMP 1B	J4	74	UNIT BATTERY 1	E13	94	PRECIPITATOR ASH FLUIDIZING AIR HEATER 1B	N9
15	CONDENSATE PUMP 1A	C8	35	AUXILIARY COOLING WATER PUMP 1B	C4	55	HYDRAZINE FEED TANK 1	J4	75	BATTERY CHARGER 1A	D13	95	AIR-WATER RESERVOIR 1A	F9
16	CONDENSATE PUMP 1B	C8	36	AIR PREHEAT WATER PUMP 1A	E4	56	PHOSPHATE FEED PUMP 1A	J4	76	BATTERY CHARGER 1B	D13	96	AIR-WATER RESERVOIR 1B	G9
17	AUXILIARY COOLING WATER HEAT EXCHANGER 1A	C8	37	AIR PREHEAT WATER PUMP 1B	E5	57	PHOSPHATE FEED PUMP 1B	J4	77	UNIT INVERTER 1	D14	97	INDUCED DRAFT FAN OUTLET DAMPER DRIVE UNIT 1A	S8
18	AUXILIARY COOLING WATER HEAT EXCHANGER 1B	C10	38	FIRE WATER BOOSTER PUMP 1	G4	58	AUXILIARY BOILER PHOSPHATE FEED PUMP 1	J4	78	D.C. PANEL 1	D14	98	INDUCED DRAFT FAN OUTLET DAMPER DRIVE UNIT 1B	S12
19	AIR COMPRESSOR 1A	D4	39	ASH HANDLING PANEL 1	E9	59	PHOSPHATE FEED TANK 1	J4	79	SAFETY SHOWER				
20	AIR COMPRESSOR 1B	D5	40	PULVERIZER 1A	G13	60	DEMINERALIZER CAUSTIC REGENERATION PUMP 1A	K4	80	PRECIPITATOR HOPPER HEATER CONTROL PANEL 1	P8			

6-20-78

NO	DATE	REVISIONS	DWN	CK	ACC	APP
7	9-15-81	CONFORMED TO CONSTRUCTION RECORDS				
6	11-1-79	GENERAL REVISIONS	TJ		CJS	CJS
5	8-24-79	REVISED AS CIRCLED	GEC	GEC	CJS	CJS
4	3-21-79	ISSUE FOR CONSTRUCTION	TJ	JOF	CJS	CJS
3	2-23-79	INFORMATION SPEC. 72.0000				
2	2-9-79	ISSUED FOR BID, SPEC. 73.0000				
1	12-15-78	BID 72.0000				
0	11-17-78	ISSUED FOR BID SPEC. 71.0000				

SCALE: 3/32" = 1'-0"

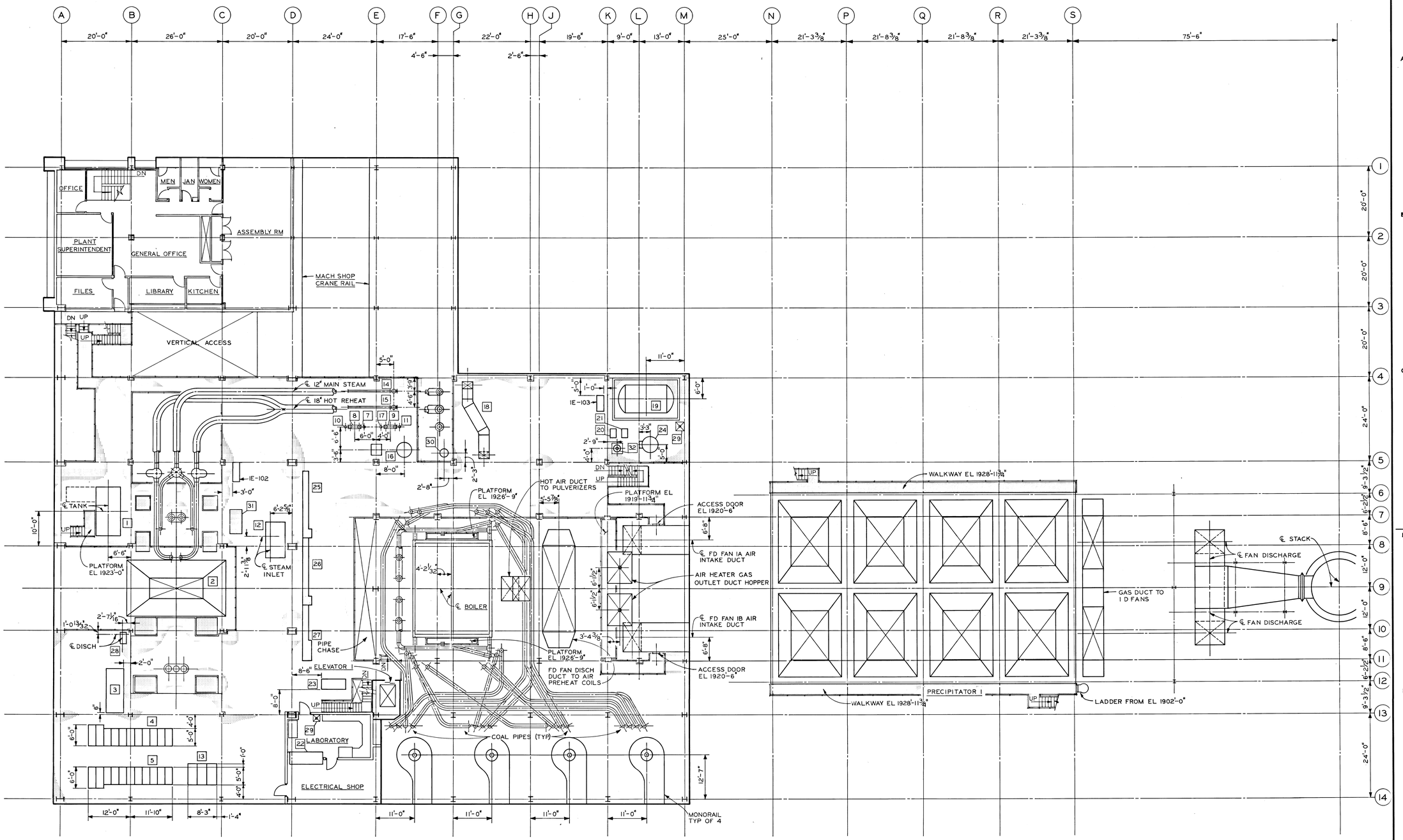
I HEREBY CERTIFY THAT THIS DOCUMENT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY REGISTERED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF NEBRASKA
SIGNED
DATE 3-21-79 REG. NO. E-2965

BLACK & VEATCH CONSULTING ENGINEERS
PROJECT 7677

CITY OF HASTINGS, NEBRASKA
HASTINGS ENERGY CENTER UNIT 1
PLANT ARRANGEMENT
GROUND FLOOR EL 1902'-0"

C&V DWG NO. A1001 REV. 7

F-0N-122A



EQUIP. NO.	EQUIPMENT	LOCATION			
1	TURBINE OIL RESERVOIR I	B8	21	DEMINERALIZER REGENERATION WATER PUMP IB	K5
2	CONDENSER I	C9	22	WATER QUALITY PANEL I	D13
3	EXCITATION SWITCHGEAR I	B13	23	SAMPLE TABLE I	E13
4	4160 VOLT SWITCHGEAR IA	B13	24	DEMINERALIZER WATER HEATER I	L5
5	4160 VOLT SWITCHGEAR IB	B14	25	MOTOR CONTROL CENTER IB	D8
6	REFRIGERATION AIR DRYER I	E5	26	MOTOR CONTROL CENTER IA	D9
7	AIR PREFILTER IA	E5	27	MOTOR CONTROL CENTER IC	D10
8	DESICCANT AIR DRYER IA	E5	28	TURBINE BEARING DRAIN EXHAUSTER I	B10
9	DESICCANT AIR DRYER IB	E5	29	SAFETY SHOWER	—
10	AIR AFTERFILTER IA	E5	30	AUXILIARY BOILER I STACK	G5
11	AIR AFTERFILTER IB	E5	31	REMOVABLE GRATING FOR CONDENSATE PUMP REMOVAL	C5
12	GLAND STEAM CONDENSER I	D8	32	FORCED DRAFT DEGASIFIER	K5
13	RELAY SWITCHBOARD	A13			
14	COMPRESSED AIR AFTERCOOLER IA	E4			
15	COMPRESSED AIR AFTERCOOLER IB	E4			
16	AIR RECEIVER IA	E5			
17	AIR PREFILTER IB	E5			
18	AUXILIARY BOILER I AIR INTAKE DUCT	G5			
19	DEMINERALIZER CAUSTIC STORAGE TANK I	L4			
20	DEMINERALIZER REGENERATION WATER PUMP IA	K5			

6-20-78

NO	DATE	REVISIONS	DWN	CK	ACC	APP
6	9-15-81	CONFORMED TO CONSTRUCTION RECORDS				
5	8-24-79	REVISED AS CIRCLED	GC	GC	CJS	CJS
4	3-21-79	ISSUE FOR CONSTRUCTION	TJ	GC	CJS	CJS
3	2-23-79	INFORMATION SPEC. 72.0000				
2	2-9-79	ISSUED FOR BID, SPEC. 73.0000				
1	12-15-78	BID 72.0000				
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BLACK & VEATCH CONSULTING ENGINEERS
PROJECT 7677

CITY OF HASTINGS, NEBRASKA
HASTINGS ENERGY CENTER UNIT 1
PLANT ARRANGEMENT
MEZZANINE FLOOR EL 1918'-0"

B&V DWG NO. A1002 REV. 6

P-DS-122 A