CONTRACT AND SPECIFICATIONS

FOR

WEC UNIT 1 BOTTOM ASH SYSTEM

BUNKER AND SITE WORK

CITY OF HASTINGS

HASTINGS, NEBRASKA

Contract No. HU 2023-103

Sealed Proposals Will Be Opened Promptly At
1:30 PM, Thursday, December 21, 2023

Bid Submitted By: _____

HASTINGS
UTILITIES

THIS BID DOCUMENT MUST BE SUBMITTED WITH BID

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FOR
WEC UNIT 1 BOTTOM ASH SYSTEM
BUNKER AND SITE WORK
FOR
CITY OF HASTINGS
HASTINGS, NEBRASKA

Contract No. HU 2023-103

I. BIDDING DOCUMENTS

II. CONTRACT FORMS

III. TECHNICAL SPECIFICATIONS

ADVERTISEMENT FOR BIDS

The City of Hastings, Nebraska, will receive bids for: **WEC Unit 1 Bottom Ash System Bunker and Site Work HU 2023-103** until 1:30 p.m. at the City of Hastings, 1228 N Denver Ave., Hastings, Nebraska, on **Thursday, December 21, 2023** at which time and place all bids will be publicly opened and read aloud. **Brief description of project:** excavation, site work, concrete, foundations, and drainage piping for the WEC1 Bottom Ash Conveyor system bunker**.** 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 Ave., 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No bid shall be withdrawn after opening of bids without the consent of the City of Hastings, Nebraska, for a period of sixty (60) days after scheduled time of closing bids.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 and Payment 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 and Payment Bond.

DATED AT HASTINGS, NEBRASKA, this 29th day of November, 2023.

_____

Kimberly S Jacobitz, City Clerk

For City Clerk: Publish and Attach two (2) Proofs of Publication:
December 1, 2023
December 8, 2023

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 themselves, 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 Purchaser will not assume obligations resulting from losses or damages until acceptance of the equipment.

Checks of unsuccessful Bidders will be returned when their bids have been rejected and they will not be retained in excess of sixty (60) days from the date bids are opened. The check of the successful Bidder will be retained until the contract is awarded. Should the successful Bidder fail to perform as the Proposal and Specifications indicate, the City may use the check as liquidated damages within fifteen (15) days after written notice is given to the party who submitted the successful bid.

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 or proposal will not be accepted.

IF YOU HAVE QUESTIONS OR NEED HELP ON THESE SPECIFICATIONS

CONTRACT NO: HU 2023-103

WEC UNIT 1 BOTTOM ASH SYSTEM

BUNKER AND SITE WORK

PLEASE CONTACT ANY OF THE FOLLOWING:

PROJECT QUESTIONS

Brandon Miller
Mechanical Engineer
Direct Line: 402-462-3653
Email: bidquestions@cityofhastings.org

Keith Miller
Lead Engineer
Direct Line: 402-462-3549
Email: bidquestions@cityofhastings.org

GENERAL QUESTIONS OR REQUESTS

Renae Griess
Administrative Assistant – Engineering Dept, City of Hastings
Ph# 402-462-3665
Fax# 402-462-3666
Email: bidquestions@cityofhastings.org

HASTINGS UTILITIES

IMPORTANT SUBMITTAL INSTRUCTIONS

ON HOW TO SUBMIT YOUR BID
FOR
CITY OF HASTINGS
WEC UNIT 1 BOTTOM ASH SYSTEM
BUNKER AND SITE WORK
Contract No. HU 2023-103

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, whether you received your bid invitation electronically, on a CD, DVD, or a HARD COPY by means of hand delivery or the mail carrier service.

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 1pm – 5pm Monday-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, Administrative Assistant
Contract No: HU 2023-103
WEC Unit 1 Bottom Ash System Bunker and Site Work
For City of Hastings
Bid Opens: Thursday, December 21, 2023 @ 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.

FORMAL PROPOSAL FOR

WEC UNIT 1 BOTTOM ASH SYSTEM BUNKER AND SITE WORK

Formal Contract No. HU 2023-103

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

Bid Opening: December 21, 2023 (Thursday)
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, and all other parts of this document, do herein submit our proposal for site work, foundations, concrete, and all other work described in the drawings and technical specifications for the WEC1 Bottom Ash System Bunker **including Nebraska Sales Tax:**

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: Bottom Ash System Bunker & Site Work

Item#	Description	Unit	Quantity	Unit Price	Total
1	Mobilization	LUMP SUM	1	$	$
2	Bonding and Insurance	LUMP SUM	1	$	$
3	Remove Pavement	SY	120	$	$
4	Install Bollards (one shown on drawings with option of adding two more to protect bunker stairs)	EACH	3	$	$
5	Subgrade Preparation	SY	176	$	$
6	10” Concrete Pavement	SY	176	$	$
7	Crushed Rock Surface Course	TONS	5	$	$
8	Sump Pump Installation and Electrical Connection	LUMP SUM	1	$	$
9	8” PVC Sanitary Sewer Main, SDR 35	LF	4	$	$
10	Manhole	EACH	1	$	$
11	1-1/4” Discharge Pipe with Fittings	LF	45	$	$
12	Core Through Wall for Discharge Piping	LUMP SUM	1	$	$
13	Excavation, Established Quantity	CY	60	$	$
14	Unsuitable Material	CY	15	$	$
15	Preparation of Site (Removals and Temporary Shoring)	EACH	1	$	$
16	Conveyor & Stair Concrete Footings (Includes Backfill)	EACH	11	$	$
17	Bunker Helical Piles	EACH	13	$	$

18	Bunker Concrete Foundation and Drain	CY	67	$	$
19	Bunker Drain Grating	LUMP SUM	1	$	$
20	Bunker Concrete Walls	CY	26	$	$
21	Wall Opening and Lintel	LUMP SUM	1	$	$
22	Concrete Infill (Inside Sluice Piping Trench) and Grating Modifications	LUMP SUM	1	$	$
23	Grinder Concrete Pedestals	EACH	2	$	$
24	Sales Tax	*(For Option 1 Contractors only) Sales Tax on materials of the above items		$	$
TOTAL SECTION I					
					$
In Words					

All work shall be completed by the dates listed in the project schedule in Section 3.2.

Liquidated Damages: The Contractor shall pay a fee of $500.00 per working day for failure to deliver the work before the specified dates in accordance with Section 1.806 – Liquidated Damages of Section 1 – General Conditions.

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.
- For this project, Contractor will supply all materials.

FORMAL PROPOSAL FOR

WEC UNIT 1 BOTTOM ASH SYSTEM BUNKER AND SITE WORK

Formal Contract No. HU 2023-103

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)

As noted in the proposal sheet one contract will be awarded for the sum total of all Bid Sections.

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.

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 proposals shall have original signatures. Electronic time-stamped signatures will be acceptable. Photocopied or printed versions of bid bonds will be accepted without original signatures, however a hardcopy with original signatures must be received by City of Hastings within 5 business days.

FORMAL PROPOSAL FOR

WEC UNIT 1 BOTTOM ASH SYSTEM BUNKER AND SITE WORK

Formal Contract No. HU 2023-103

OFFICIAL NAME & ADDRESS

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 CITY CLERK
PRIOR TO 1:30 PM DEADLINE

AGREEMENT

THIS AGREEMENT, made and entered into this day of 2024, by and between the City of Hastings, Party of the First Part, hereinafter called the "Purchaser" or "City", and a 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 **WEC Unit 1 Bottom Ash System Bunker and Site Work HU 2023-103.**

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.

AGREEMENT

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.

SECTION I GENERAL CONDITONS

SECTION 1-1 - DEFINITIONS OF WORDS AND TERMS

Wherever in these specifications or in other contract documents the following terms or pronouns in place of them are used, the intent and meaning shall be interpreted as follows:

1.101 Advertisement. The advertisement for work or materials on which bids are to be received.

1.102 Award. The decision of the City to accept the proposal of the lowest responsible bidder for the work, subject to the execution and approval of a satisfactory contract thereof and bond to secure the performance thereof, and to such other conditions as may be specified or otherwise required by law.

1.103 Bidder. Any individual, firm, or corporation formally submitting a proposal for the work contemplated, acting directly or through a duly authorized representative.

1.104 Calendar Day. Every day shown on the calendar, including weekends and holidays.

1.105 Change Order. A written order to the Contractor, signed by the Engineer, ordering a change in the work from that originally shown in the plans and specifications.

1.106 City. The word "City" as used in these specifications refers to City of Hastings, Nebraska, Utilities Department.

1.107 Contract. The written agreement executed between the City and the Contractor, covering the performance of the work and the furnishing of labor and materials, by which the Contractor is bound to perform the work and furnish the labor and materials, and by which the City is obligated to compensate him therefore at the mutually established and accepted rate or price.

The contract shall include the "Notice to Bidders", these specifications, the Contractor's Bond, the general and detailed plans, the Proposal, Special Provisions, and Supplemental Agreements.

1.108 Maintenance Bond. The approved form of security, executed by the Contractor and his surety or sureties, guaranteeing complete execution of the contract and all supplemental agreements pertaining thereto and the payment of all legal debts pertaining to the construction of the project.

1.109 Contract Item. An item of work specifically described and for which a price, either unit or lump sum, is provided. It includes the performance of all work and the furnishing of all labor, equipment, and materials described in the text of a specification item included in the contract or described in any subdivision of the text of the supplemental specification or special provision of the contract.

1.110 Contract Period. The period from the date specified in the contract for the commencement of work to the date specified for its completion, both dates inclusive.

SECTION I GENERAL CONDITONS

1.111 Contractor. The party of the second part to the contract; the individual, firm, or corporation undertaking the execution of the work under the terms of the contract and acting directly or through his, their, or its agents or authorized employees.

1.112 Easement (Right-of-Way). A right acquired by public authority to use or control property for a designated purpose.

1.113 Engineer. The Director of Engineering, acting either directly or through an assistant or other representative duly authorized by the Director of Engineering, such assistant or representative acting within the scope of the particular duties assigned him, or of the authority given him.

1.114 Extra Work. Work performed by the Contractor in order to complete the contract in an acceptable manner but for which there is no basis of payment provided in the contract.

1.115 Inspector. An authorized representative of the Engineer assigned to make detailed inspection of any or all portions of the work performed and materials furnished by the Contractor.

1.116 Laboratory. The testing laboratory of the City or any other testing laboratory which may be designated by the Engineer.

1.117 Notice to Bidders. The provisions, requirements, and instructions pertaining to the work to be awarded, manner and time of submitting proposals, quantities of the major items or work required, as prepared for the information of bidders.

1.118 Plans. The official plans, profiles, working drawings, and supplemental drawings, or exact reproductions thereof, approved by the Engineer, which show the location, character, dimensions and details of the work to be done, and which are to be considered as a part of the contract supplementary to these specifications.

1.119 Project. The specific work with all appurtenances and construction to be performed thereon under the contract.

1.120 Proposal. The offer of the bidder, submitted on the prescribed proposal form, to perform the work and to furnish the labor and materials at the prices quoted by the bidder.

1.121 Proposal Form. The approved form on which the City requires formal bids be prepared and submitted.

1.122 Proposal Guaranty. The security furnished by the bidder with his proposal for a project, as a guaranty that he will enter into a contract for the work if his proposal is accepted.

1.123 Right-of-Way. The land area which is reserved or secured by the City for constructing the work or for obtaining material therefore.

1.124 Special Provisions. Special directions, provisions or requirements peculiar to the project under consideration and not otherwise thoroughly or satisfactorily detailed or set forth in the specifications. See Section 2 Special Provisions.

1.125 Specifications. The general term comprising all the directions, provisions, and requirements contained herein, together with such as may be added or adopted as supplemental specifications or special provisions, all of which are necessary for the proper performance of the contract.

1.126 Subcontractor. Any individual, firm, or corporation to whom the Contractor, with the written consent of the City, sublets any part of the contract.

1.127 Superintendent. The representative of the Contractor, present on the work at all times during progress, authorized to receive and fulfill instructions from the Engineer and capable of superintending the work efficiently.

1.128 Surety. The corporate body bound with and for the Contractor for the acceptable performance of the contract and the completion of the work, and for payment of all just claims arising therefrom.

1.129 Work. Work shall be understood to mean the furnishing of all labor, materials, equipment, paying all applicable city, state, and federal taxes, and other incidentals necessary or convenient to the successful completion of the project by the Contractor and the carrying out of all the duties and obligations imposed by the contract **if applicable.**

1.130 Working Day. Any day, except Saturdays, Sundays, and Hastings Utilities holidays: New Year's Day, Martin Luther King Day, Memorial Day, Independence Day, Labor Day, Veteran's Day, Thanksgiving, Friday after Thanksgiving, ½ Day Christmas Eve, and Christmas Day. Working days for a project area shall be counted consecutively from project starting date.

1.131 Completion of the Work and Formal Acceptance by the City. Whenever the term "completion of the work and formal acceptance by the City" is used, it refers to and means the formal acceptance of the work by the Engineer and the City at the time the Contractor has all work under the contract completed and in place. Release of the final pay estimate shall constitute formal acceptance by the City.

1.132 Final Acceptance of the Work. Whenever the term "final acceptance of the work" is used, it refers to and means the time when the Engineer and City finally accept the work after the expiration of the time for which the Contractor guarantees to keep the work in repair.

1.133 Abbreviations.

A.A.S.H.O.	American Association of State Highway Officials
A.S.M.E.	American Society of Mechanical Engineers
A.S.T.M.	American Society for Testing Materials
A.R.E.A.	American Railway Engineering Association
A.W.S.	American Welding Society
D.O.T.	Department of Transportation, Office of Pipeline Safety
O.S.H.A.	Occupational Safety and Health Administration
A.W.W.A.	American Water Works Association

SECTION 1-2 - PROPOSAL REQUIREMENTS AND CONDITIONS

1.201 Contents of Proposal Forms. Bidders will be furnished with proposal forms which will state the location and description of the contemplated work and will show the estimate of the various quantities and kinds of work to be performed or materials to be furnished, with a schedule of items for which unit bid prices are asked, and the time in which the work must be completed, and the date, time, and place of opening bids. All special provisions and required provisions will be grouped together and bound with or included through reference in the proposal form.

1.202 Interpretation of Quantities in Proposal Forms. The quantities listed in the proposal forms are to be considered as approximate, unless otherwise provided by special provision. It is understood that the quantities of work to be done and materials to be furnished may each be increased, diminished or omitted, as hereinafter provided, without in any way invalidating the unit bid prices, except as provided in Article 1.403.

1.203 Examination of Plans, Specifications, Special Provisions, and Site of Work.. The bidder is required to examine carefully the site, and the proposal, plans, specifications, special provisions, and contract form, for the work contemplated, and it will be assumed that the bidder has investigated and is satisfied as to the conditions to be encountered, as to the character, quality, and quantities of work to be performed and materials to be furnished, and as to the requirements of these specifications, the special provisions, and contract. It is mutually agreed that the submission of a proposal shall be considered prima facie evidence that the bidder has made such examination.

1.204 Preparation of Proposal. Bidders shall submit their proposals on blank forms furnished by the Engineer, with the full name and address and the place of business or residence of the bidder. If the bidder is co-partnership, then the signature shall be by a member of the firm, with the names and addresses of each member; and if a corporation, then by an officer of the corporation in the corporate name and with the corporate name and with the corporate seal attached thereto.

All blank spaces in the form shall be fully filled; numbers shall be stated in legible figures and writing when required; the signature shall be longhand; and the complete form shall be without interlineation, alteration or erasure.

No oral, telegraphic, telephonic, faxes, or electronically mailed proposals or modifications will be considered.

When certain alternative prices, for both increasing and decreasing the cost, are required, as called for in the proposal sheet, it must be understood that all materials and workmanship required shall be the best of their respective kinds; and in all cases, shall correspond with similar work herein specified and, if accepted, the work shall be done under the general terms of the specifications.

1.205 Statement of Bidder's Financial Conditions. Any bidder may be required by the City to submit data to satisfy the City that such bidder is prepared to fulfill the contract if it is awarded to him.

1.206 Certified Check, Cashier's Check or Bid Bond. Each bidder must submit with his proposal a certified check, cashier's check or bid bond in the amount of not less than five percent (5%) of the amount bid, drawn to the order to the Hastings Utilities, City of Hastings, Nebraska, guaranteeing the execution of the contract and bond required, within ten (10) days of the notification of award. Any certified check must be issued by a U.S. Commercial Bank.

1.207 Filing of Proposal. The proposal and the supporting proposal guaranty for each project shall be filed in separate but attached envelopes, so marked as to indicate their contents. All proposals shall be filed with the City at the place designated in the notice to bidders, prior to the time advertised for the opening of bids.

1.208 Withdrawal of Proposal. A bidder will be permitted to withdraw his proposal unopened after it has been submitted, if his request for withdrawal is made in writing and delivered personally by the bidder or his authorized representative prior to the time specified for opening bids.

1.209 Public Opening of Proposals. Proposals will be publicly opened and read at the time and place stipulated in the notice to bidders.

1.210 Material Guaranty. The bidder may be required to furnish a complete statement of the origin, composition, and manufacture of any or all materials to be used in the construction of the work, together with samples, which samples may be subjected to the tests provided for in these specifications to determine their quality and fitness for the work.

SECTION 1-3 - AWARD OF CONTRACT

1.301 Consideration of Proposals. After the proposals are opened and read, they will be compared on the basis of the summation of the products of the quantities shown in the bid schedule by the unit bid prices. The results of such comparisons will be immediately available to the public.

The right is reserved to reject any and all proposals and to waive technical errors as may be deemed best for the interest of the City.

1.302 Award of Contract. In the award of contract, consideration will be given not only to the prices bid but also the mechanical and other equipment available to the bidder, the financial responsibility of the bidder, and his ability and experience in the performance of like or similar contracts.

The award of alternatives proposed will be selected not only of the price but of the quality of the products provided, availability of replacement parts, repair, connection to future or existing systems, longevity, durability, function, and all other engineering and operational consideration.

Award of contracts will be made as promptly as practical after bids have been opened and read. The City reserves the right to delay the award for such time as is needed for the consideration of the bids, and for the receipt of concurrence in recommended contract awards from other governmental agencies whose concurrence may be required.

1.303 Cancellation of Award. The City reserves the right to cancel the award of any contract at any time before the execution of the said contract by all parties without any liability against the City.

1.304 Return of Proposal Guaranty. Proposal guaranties will be returned to the unsuccessful bidders by mail promptly after the signing of the contract has been made. Return to the successful bidder will be made after the signing of the contract and filing of the contract bond.

1.305 Performance Bond. 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..

1.306 Failure to Execute Contract. Failure to execute a contract and file an acceptable performance bond, as provided herein, within ten (10) days from date of award shall be just cause for the annulment of the award and the forfeiture of the certified check, bid bond, or cashier's check to the City, not as a penalty but in liquidation of damages sustained.

SECTION 1-4 - SCOPE OF WORK

1.401 Intent of Plans and Specifications. The intent of the plans and specifications is to provide for the construction and completion of every detail of the work described therein. It shall be understood by the Contractor that he will furnish all labor, materials if applicable, tools, transportation, and supplies required for all or any part of the work to make each item complete in accordance with the spirit of the contract. It is understood that the apparent silence of the specifications as to any detail, or the apparent omission of a detailed description concerning any point, shall be regarded as meaning that only the best general practice is to prevail, and that only materials and workmanship of the best quality are to be used.

For the purpose of design and the preparation of the Engineer's estimate, the City may perform a reasonable amount of exploratory work to gain information relative to surface and subsurface conditions relating to types of soil, moisture content and types and extent of rock strata.

This information, when shown on the plan, represents to the best of the City's knowledge, conditions as of the date the survey was made. The appearance of this information on the plan will not constitute a guarantee that conditions other than those indicated will not be encountered at the time of construction.

The bidder may utilize this information as he sees fit. Any bidder interested in the work is authorized to make whatever additional investigation he considers advisable.

In making such additional investigation, the bidder is directed to the Engineer for information relating to available right-of-way. If there are, at that time, any parcels of land over which the City does not have jurisdiction, right of entry must be secured by the prospective bidder from those authorized to grant such permission.

1.402 Special Work. Any conditions not covered by these standard specifications are stated in the special provisions.

1.403 Increased or Decreased Quantities of Work. The Engineer reserves the right to alter the quantities of contract items for which there are bid prices. Such increases or decreases in quantities shall be made as he considers necessary or desirable without waiving or invalidating any of the provisions of the contract; provided, that all such alterations shall be ordered in writing

and that a supplemental agreement shall be executed with the Contractor for the item or items involved, when such alterations involve an increase or decrease of more than twenty percent (20%) of the total cost of the work of any group of the contract calculated from the original proposal quantities and the contract unit prices. The Contractor shall not start on any alteration requiring a supplemental agreement until the agreement setting forth an equitable adjustment of compensation, satisfactory to both parties, shall have been executed by the Engineer and the Contractor.

1.404 Changes in Work - Change Order. The City reserves the right to order the performance of work of a class not contemplated in the proposal but which may be considered necessary to complete satisfactorily the work included in the contract. All change orders must be approved in writing prior to start of work.

a. If applicable unit prices are not contained in the Agreement or if the total net change increases or decreases the total Contract Price more than twenty (20) percent, the City shall, before ordering the Contractor to proceed with desired changes, request an itemized proposal from him covering the work involved in the change after which the procedures shall be as follows:

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

    2. If the proposal is not acceptable and prompt agreement between the two parties cannot be reached, the City may order the Contractor to proceed with the work on a cost-plus-limited basis. A cost-plus-limited basis is defined as the net cost of the Contractor's labor, materials, and insurance plus fifteen (15) percent of said net cost to cover overhead and profit, the total cost not to exceed a specified limit.

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

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

    2. The Contractor's proposal (if any) or a conformed copy thereof.

    3. A definite statement as to the resulting change in the Contract Price and any impacts on project schedule.

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

1.405 Removal and Disposal of Structures and Obstructions. Not Applicable to this project.

1.406 Rights In and Use of Materials Found on the Right-of-Way. Unless stated to the contrary in the contract documents, all materials, such as stone, gravel, sand, timber, and structures or parts of structures, found on the right-of-way of the street or on land acquired for the work, are the property of the City or the City of the fee title to the land, and shall not be used or destroyed by the Contractor without special permission from the Engineer. When the Contractor is permitted to use materials found on the right-of-way, any excavations that he makes below the grade elevation

shall be backfilled with other suitable materials so that the finished street will conform to the grade shown on the plans. No extra compensation will be allowed for such backfilling.

When rock excavation is encountered, any portion of rock excavation which would otherwise be deposited in waste areas and not be incorporated in the embankments may be processed and used, royalty free, by the Contractor in any other portion of the construction in which material of that quality would be acceptable. No deduction will be made from excavation quantities for rock so used.

1.407 Right-of-Way. Right-of-Way for the work will be provided without cost to the Contractor. Right-of-way will be made available to the Contractor on or before the date specified for the commencement of the work, unless a later date for the right-of-way to be made available to the Contractor is designated in the contract documents.

1.408 Railroad Crossings. – Not applicable.

SECTION 1-5 - CONTROL OF WORK

1.501 Authority of Engineer. The Engineer will decide any questions that arise with reference to the intent of the contract documents and compliance therewith. He will resolve all questions relating to materials, work, progress, disputes and mutual rights between contractors, fulfillment of contract and compensation, in accordance with the provisions of these specifications.

1.502 Plans and Working Drawings. The approved plans will be supplemented by such working drawings as are necessary to adequately control the work. It is mutually agreed that all authorized alterations affecting the requirements and information given in the approved plans shall be in writing.

Working drawings for any structure shall consist of such detailed plans as may be required of the Contractor for the execution of the work. These are not included in the plans furnished by the Engineer. They shall include shop details, erection plans, masonry, and form work. The Engineer's prior approval of the shop details must be obtained before any fabrication work involving these plans is performed. Erection plans, masonry layout diagrams, and plans for cribs, cofferdams, false work, centering and framework, as well as any other working drawings not previously mentioned, may be required of the Contractor and shall be subject to the Engineer's approval.

1.503 Alteration of Plans or of Character of Work. The Engineer shall have the right to make alterations in plans or character of work as may be considered necessary or desirable during the progress of the work to complete satisfactorily the proposed construction. Such alterations shall not be considered as a waiver of any conditions of the contract or invalidate any of the provisions thereof.

1.504 Coordination of Plans, Specifications, Special Provisions and Supplemental Specifications. These specifications, the supplemental specifications, the plans, special provisions, and all supplementary documents are essential parts of the contract, and a requirement occurring in one is as binding as though occurring in all. They are intended to be complimentary and to describe and provide for a complete work.

1.505 Cooperation of Contractor. The Contractor will be supplied with a minimum of two sets of approved plans and contract assemblies, including special provisions, one set of which the contractor shall keep available on the work at all times.

The Contractor shall give the work the constant attention necessary to facilitate the progress thereof, and shall cooperate with the Engineer and other contractors in every way possible.

The Contractor shall at all times have on the work, as his agent, a competent superintendent capable of reading and thoroughly understanding the plans and specifications, knowledgeable in the pertinent industry codes and standards, thoroughly experienced in the type of work being performed, who shall receive instructions from the Engineer or his authorized representatives.

The superintendent shall have full authority to execute the orders or directions of the Engineer without delay, and to promptly supply such materials, equipment, tools, labor and incidentals as may be required. Such superintendent shall be furnished irrespective of the amount of work sublet.

Before starting any work under this Contract, the Contractor shall file with the City a letter signed by an officer of the company (or City, or partner, as the case may be), giving the name, address, and telephone number of the superintendent who is to represent the Contractor in all matters with prosecution of the work and who is to officially receive on behalf of the Contractor, notices or directions issued by the City or its Engineer, and act upon them as required. If, during the life of the Contract, a change in superintendents is made by the Contractor, a new letter shall be filed simultaneously with the change.

1.506 Surveys. Lines and elevations shall be established by the Engineer before the work commences. City of Hastings Utilities Department shall perform all staking on this project. The Contractor shall make efforts to preserve all survey stakes.

All property pins, section corners, right of way monuments, permanent bench marks (brass caps), and all other survey monuments disturbed or removed by the Contractor shall be replaced by a licensed Surveyor at the expense of the Contractor. The Contractor shall take all necessary precaution to maintain in good condition all survey monuments.

The Contractor will insure the Engineer or his representative is present to verify the location of all utilities (highways, railroads, drainage, etc.) uncovered, crossed, or otherwise exposed during the completion of the project. The Contractor shall keep the Engineer or his representative abreast of activities so adequate response by the Engineer or his representative can be made without unduly delaying the construction process. A 24 hour notice may be enforced if sufficient time is not allowed by the Engineer or his representative to conduct all necessary field surveys.

See specification 2.013 for additional information.

1.507 Authority and Duties of Inspector. The City may appoint inspectors to represent the Engineer in the inspection of all materials used in and all work done under the contract. Such inspection may extend to any part of the work and to the preparation of manufacture of the materials to be used. The Inspector will not be permitted to modify in any way the provisions of the contract documents, nor to delay the work by failing to inspect materials and work with reasonable promptness. An inspector is placed on the work to keep the Engineer informed as to its progress and

the manner in which it is being done; also, to call the Contractor's attention to any infringements of the contract documents. The Inspector will not act as foreman or perform other duties for the Contractor, not improperly interfere with the management of the work. He will not be authorized to approve or accept any portion of the work. In case of dispute between the Contractor and Inspector as to quality of materials or the manner of performing the work, the Inspector shall have authority to reject materials or suspend the work until the question at issue can be decided by the Engineer. Written notice of the suspension of work will be given to the Engineer and the Contractor.

Upon the failure of Contractor or its Subcontractors to comply with any of the requirements of this Contract (but not limited to quality or safety), the City shall have the authority to stop any portion of the work affected by such failure until such failure is remedied. If the City issues a Stop Work Order, the City 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 City's issuance of a Stop Work Order.

1.508 Inspection of Work.

a. The Contractor shall notify the City sufficiently in advance of backfilling or concealing any facilities to permit proper inspection. If any facilities are concealed without approval or consent of the City, the Contractor shall uncover for inspection and recover such facilities, all at his own expense.

b. The Contractor shall furnish the Engineer with every reasonable facility for ascertaining whether the work is being performed in conformance with the contract documents. At any time before acceptance of the work, upon request of the Engineer, the Contractor shall remove or uncover such portions of the finished work as the Engineer may direct. After examination has been made, the Contractor shall restore such portions of the work to the standard required by the contract documents.

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

1.509 Removal of Defective Work. Any defective work shall be removed and replaced at the Contractor's expense. Should the Contractor fail or refuse to remove defective work when so ordered by the Engineer, the Engineer shall have authority to order the Contractor to suspend further operations, and may withhold payment on estimates until such defective work has been removed and replaced in accordance with the plans and specifications. Continued failure or refusal on the part of the Contractor to correct defective work promptly shall be sufficient cause for the City to declare the contract in default, and to proceed to have the work completed in accordance with Article 1.808.

1.510 Final Inspection. Upon written notification by the Contractor or his authorized representative that the work is completed, the Engineer shall make a final inspection within 10 days of the completion of all work included in the contract. If the work is found not to be in accordance with the contract documents, the Engineer shall provide the Contractor with a "Punch List" of the particular defects to be remedied.

Once the Engineer and Contractor determines the work is completed a written Notice by the Engineer shall be given to the Contractor within 10 days of the completion of all work items.

1.511 Review By City. The City, its authorized representatives and agents shall at all time have access to and be permitted to observe and review all work, materials, equipment, payrolls, personnel records, employment conditions, material invoices, and other relevant data and records pertaining to this Contract, provided, however, that all instructions and approval with respect to the work will be given to the Contractor only by the City through its authorized representatives or agents.

1.512 Quality Control. The contractor shall make every effort to provide control of the workmanship of the project. This shall include but not be limited to the following construction practices.

1. Concrete surfaces of sidewalks, paving, slab on grade and other related concrete work shall be smooth and constructed to the elevations as shown on the plans or as directed by the Engineer. An acceptable construction tolerance shall be agreed upon before work is to begin. The Contractor shall notify the Engineer 72 hours before any work is to begin which will involve concrete finishing.
2. Lines and grades of all pipes, conduits, casing, grading, etc. shall be constructed according to the plans or as directed by the Engineer. An acceptable construction tolerance shall be agreed upon before any pipeline, conduit installation, casing installation, or grading begins.

SECTION 1-6 - CONTROL OF MATERIALS.

1.601 Source of Supply and Quality Requirements. The materials used on the work shall meet all quality requirements of the contract. In order to expedite the inspection and testing of materials, the Contractor shall notify the Engineer of his proposed sources of materials prior to delivery. At the option of the Engineer, approval of the source or approval of materials at the source prior to delivery may be required. If it is found after trial that sources of supply for previously approved materials do not produce specified products or when conditions are such that the use of unfit materials cannot be prevented except by extraordinary inspection methods, the Contractor shall furnish materials from other sources. Before delivery is started and at any time during the process of preparation and use, the materials shall be subject to the approval of the Engineer. All materials supplied shall be new and undamaged.

1.602 Storage of Materials. The Contractor shall be responsible for the care and storage of materials delivered on the work or purchased for use thereon. Any material that has been delivered on the work and has become damaged before actual incorporation in the work may be rejected by the Engineer even though it may previously have been accepted. Stored materials shall be so located as to facilitate thorough inspection.

1.603 Unacceptable Materials. All materials not conforming to the requirements of the specifications at the time they are to be used shall be considered as unacceptable and all such materials will be rejected and shall be removed immediately from the site of the work unless otherwise instructed by the Engineer. No rejected material, the defects of which have been corrected, shall be used until approval has been given.

1.604 Guarantee. The Contractor shall guarantee the design, equipment, materials, and workmanship furnished under this Contract to be as specified and to be free from defects during the guarantee period. In addition, the equipment and materials furnished by the Contractor shall be guaranteed to be free from defects in design.

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 formal acceptance by the City and shall end 12 months later.

Upon notification, the Contractor shall promptly make all adjustments, repairs, or replacements which, in the opinion of the Engineer or City, arose out of defects and became necessary during the guarantee period.

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, including repair for ditch settlement, and the period of the guarantee for each such repair or replacement shall be 12 months after installation or the end of the project guarantee period, whichever is later, except as otherwise prescribed by the terms of any special guarantees required by the contract documents.

If within 10 days after the City 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 City 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 City, delay would cause serious loss or damage, repairs or adjustments may be made by the City, or a third party chosen by the City, without advance notice to the Contractor and the cost of the work shall be paid by the Contractor or by the surety.

The acceptance of the installation, or any part of it, shall not act to waive this liability on the part of the Contractor.

1.605 "Or Equal" Clause. Whenever, in any section of the contract documents, plans or specifications, any article, materials, or equipment is defined by describing a proprietary product or by using the name of a manufacturer or vendor, the term "or approval equal", if not inserted, shall be implied. The specified article, material, or equipment mentioned shall be understood as indicating the type, function, minimum standard or design, efficiency and quality desired, and shall not be construed in such a manner as to exclude manufacturer's products of comparable quality, design and efficiency. The Engineer shall determine the acceptability of articles, materials or equipment proposed as equals.

1.606 Shop Drawings. The Contractor shall submit for review and approval all shop drawings as indicated in these specifications before the beginning of construction. Failure to submit shop drawings shall suspend payment of any materials delivered or installed. This includes delivery of materials in storage. These requirements will be strictly enforced.

SECTION 1-7 - LEGAL RELATIONS AND RESPONSIBILITY TO THE PUBLIC

1.701 Laws to be Observed. The Contractor shall keep himself fully informed of, and at all times, shall observe and comply with all federal and state laws, all local bylaws, ordinances, and regulations, and all orders and decrees of bodies or tribunals having any jurisdiction or authority, which in any manner affect those engaged or employed on the work, or which in any way affect the conduct of the work. The Contractor shall protect and indemnify the City and its representatives against any claim or liability arising from or based on the violation of any such law, ordinance, regulation, order, or decree, whether by himself or his employees. It shall be the responsibility of the Contractor to provide all safeguards, safety devices and protective equipment and to take any other needed actions as are reasonably necessary to protect the life and health of employees on the project.

Work Eligibility Status. 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.

1.702 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.

1.703 Permits. The Contractor shall procure and pay for all permits, licenses and bonds necessary for the execution of his work and/or required for municipal, state and federal regulations and laws.

1.704 Restoration of Surfaces Opened by Permit. Upon the presentation of a duly authorized and satisfactory permit from the City, which provides that all necessary repair work will be paid for by the party to whom such permit is issued, the Engineer may authorize the Contractor to allow parties bearing such permits to make openings in the street. The Contractor shall make in an acceptable manner all necessary repairs due to such openings, and such necessary work ordered by the Engineer shall be paid for as provided in these specifications.

1.705 Safety, Health and Sanitation. In the performance of his contract, the Contractor shall comply with all applicable federal, state and local laws governing safety, health and sanitation.

a. The Contractor shall exercise proper precaution at all time for the protection of persons and property and shall be responsible for all damages to persons or property either on or off the site, which occur as a result of his prosecution of the work. The safety provisions of applicable laws and building and construction codes and OSHA shall be observed, and the Contractor shall take or cause to be taken such additional safety and health measures as the City may determine to be reasonably necessary. Machinery, equipment and all hazards shall be guarded in accordance with the safety provisions of the "Manual of Accident Prevention in Construction," published by the Associated General Contractors of America, Inc., to the extend that such provisions are not in conflict with applicable local laws. The Contractor shall comply with the latest edition of Part VI of the Manual on Uniform Traffic Control Devices. The Contractor shall install plastic fence on open holes when directed by the Inspector. The Contractor shall wear hard hats and safety glasses at all times on the construction site.

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

c. The Contractor shall indemnify and hold harmless the City and the Engineer and their agents and employees from and against all claims, damages, losses and expenses including attorney's fees arising out of or resulting from the performance of the work, provided that any such claim, damage, loss or expense 1) is attributed to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the work itself) including the loss of use resulting therefrom, and 2) is caused in whole or in part by any negligent act or omission of the Contractor, any Subcontractor, anyone directly or indirectly employed by any of them 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.

In any and all claims against the City or the Engineer or any of their agents or employees by any employee of the Contractor, any Subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, the indemnification obligation under this paragraph "c" 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 Subcontractor under Workmen's Compensation acts, disability benefit acts or employee benefit acts.

The obligation of the Contractor under this paragraph "c" shall not extend to the liability of the Engineer, his agents or employees arising out of 1) the preparation or approval of maps, drawings, opinions, reports, surveys, Change Orders, designs or specifications, or 2) the giving of or failure to give directions or instructions by the Engineer, his agents or employees provided such giving or failure to give is the primary cause of the injury or damage.

The Contractor shall immediately correct any unsafe conditions identified by the City. In the event the Contractor fails to immediately correct such unsafe conditions, the City may either have the unsafe conditions corrected by others at the Contractor's expense, or direct that the work be stopped in the area of the unsafe condition; however, this right to stop/suspend the work shall not give rise to any duty on the part of the City to exercise this right.

The Contractor waives the right to bring claim for damages against the City or Engineer for the correction of unsafe conditions or work stoppages in connection with the Contractor's Safety, Health, and Accident Prevention Program or such program of another contractor. If such a claim against the City or Engineer is brought by a third party, the Contractor shall indemnify and defend the City or Engineer against such claim. The Contractor shall submit to Hastings Utilities a current copy of the company safety manual before starting work.

1.706 Claims for Labor and Materials. The Contractor shall indemnify and save harmless the City from all claims for labor and materials furnished under this contract. When requested by the City, the Contractor shall submit satisfactory evidence that all persons, items, or corporation who have done work or furnished materials under this contract, for which the City may have become liable under the laws of the State, 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 additional to any other sums that may be retained, will be sufficient, in the opinion of the City, to meet all claims of the persons, firms, and corporations as aforesaid. Such sum shall be retained until the liabilities as aforesaid are fully discharged or satisfactorily secured.

1.707 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.

Certificates of Insurance. Certificates of Insurance acceptable to the City shall be filed with the City prior to commencement of the work. These Certificates shall contain a provision that coverages afforded under the policies will not be canceled, or materially altered, until at least 30 days prior written notice has been given to the City. 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 City.

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 partners, directors, officers, agents, and employees as 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 City shall not by reason of their inclusion under these policies incur liability to the insurance carrier for payment of premium for these policies.

Waiver of Subrogation. 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 City their partners, directors, officers, agents, and employees.

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

General Liability Insurance. This insurance shall be written per project on an “occurrence” policy form, including coverage for premises/operations, products/completed operations, broad form property damage, blanket contractual liability, independent contractor’s 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” under the liability policy. If applicable, this policy shall also be endorsed to include railroad protective with limits no less than replacement cost of the value of any real property covered under any rail agreement entered into by the City. If work is being done near a railroad track, the 50’ railroad right of way exclusion must be deleted.

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

Contractor’s 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.

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

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

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, City reserves the right to require higher limits with respect to each project.

Professional Liability – (If Applicable)

Applicable for contractors providing or is responsible for providing design/engineering/surveying services/or consulting services:

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 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.

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

Proof of Carriage of Insurance. Satisfactory certificates of insurance shall be filed with the City prior to starting any construction work on this contract. The certificates shall state that thirty (30) days written notice shall be given to the City before any policy covered thereby is changed or canceled.

Indemnification. To the fullest extent permitted by laws and regulations, the Contractor shall defend, indemnify, and hold harmless the City, their officers, directors, partners, 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 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 City, or of any of their officers, directors, partners, 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 City, the Contractor, or any of their sub-contractors.

Property Insurance (Builder's Risk). Not applicable to this project.

1.708 Contractor's Responsibility for Utility Property and Services. At points where the Contractor's operations are adjacent to properties of railway, telephone and power companies, or are adjacent to other property, to which damage might result, work shall not be commenced until all arrangements necessary for the protection thereof have been made.

The Contractor shall cooperate with the City on any underground or overhead utility lines in their removal and rearrangement operations in order that these operations may progress in a reasonable manner, and that duplication of rearrangement work may be reduced to a minimum, and that services rendered by those parties will not be unnecessarily interrupted.

In the event of interruption to water or utility services as a result of accidental breakage, or as a result of being exposed or unsupported, the Contractor shall promptly notify the proper authority. He shall cooperate with the said authority in the restoration of service as promptly as possible.

In no case shall interruption to water service be allowed to exist outside of working hours. Fire hydrants shall be kept accessible to the Fire Department at all times and no materials shall be kept or stockpiled within fifteen (15) feet of any fire hydrant.

The Contractor must cooperate with the utility companies and schedule his work in such a manner as to protect the existing utility facilities until the facilities are abandoned or replacement facilities are completed. In instances where partial grading is necessary before a utility can install its facilities, the Contractor shall consult with the utility and plan the work so that reasonable time can be allowed the utility for completing its work.

Contractor shall exercise particular care at all times to avoid damage to any of Hastings Utilities system or other facilities and equipment located at or near the scene of any part of the work,

especially such facilities as may be in operation. Any costs for potholing prior to boring are considered subsidiary to the bid.

Contractor specifically acknowledges that it shall be responsible and liable to Hastings Utilities for all injury or damage to any such existing and operating facilities, including loss of gas or product and all repairs necessitated by any act or omission, resulting in such damages, on the part of the Contractor, his agents or employees, or any subcontractor or subcontractor's agents of employees.

Contractor shall also exercise particular care at all times to avoid damage to underground structures and lines, and specifically recognizes that it shall be held responsible for any injury or damage to unmarked or unidentified underground structures or pipelines, done by Contractor's personnel, or any subcontractor's personnel in connection with performance of the work hereunder.

Please note before beginning any excavation, the Contractor shall be responsible for contacting Diggers Hotline at 1-800-331-5666 or call 811.

1.709 No Waiver of Legal Rights. The City shall not be precluded or estopped by any measurement, estimate, or certificate made either before or after the completion and acceptance of the work and payment therefore, from showing the true amount and character of the work performed and materials furnished by the Contractor, nor from showing that nay such measurement, estimate, or certificate is untrue or is incorrectly made, nor that the work or materials do not, in fact, conform to the contract. The City shall not be precluded or estopped, notwithstanding any such measurement, estimate or certificate and payment in accordance therewith, from recovering from the Contractor or his sureties, or both, such damage as it may sustain by reason of his failure to comply with the terms of the contract. Neither the acceptance by the City, nor any representative of the City, nor any payment for or acceptance of the whole or any part of the work, not any extension of time, nor any possession taken by the City, shall operate as a waiver of any portion of the contract or of any power herein reserved, or of any right to damages. A waiver of any breach of the contract shall not be held to be a waiver of any other or subsequent breach.

1.710 Warranty of Title. No material, supplies or equipment to be installed or furnished under this Contract shall be purchased subject to any chattel mortgage or under a conditional sale, lease-purchase or other agreement by which an interest therein or in any part thereof is retained by the seller or supplier. The Contractor shall warrant good title to all materials, supplies, and equipment installed or incorporated in the work and upon completion of all work, shall deliver the same together with all improvements and appurtenances constructed, or placed thereon, by him to the City free from any claims, liens or charges. Neither the Contractor nor any person, firm or corporation furnishing any material or labor for any work covered by this Contract shall have any right to a lien upon any improvement or appurtenance thereon.

Nothing contained in this paragraph, however, shall defect or impair the right of persons furnishing materials or labor under any law permitting such persons to look to funds due the Contractor in the hands of the City. The provisions of this paragraph shall be inserted in all subcontracts and material contracts and notice of its provisions shall be given to all persons furnishing materials for the work when no formal contract is entered into for such materials.

1.711 Jurisdiction. Any action in court against the Contractor or sureties on his bond, because of damages to property or individual by said Contractor, or his workmen, or because of the violation of any provision of the specifications, or on account of the failure of the Contractor to fully comply with this provision, shall be brought in the District Court of the State of Nebraska in and for Adams County.

1.712 Care of Work.

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

b. The Contractor shall provide sufficient competent watchmen, both day and night, including Saturdays, Sundays, and holidays, from the time the work is commenced until final completion and acceptance.

c. In an emergency affecting the safety of life, limb or property, including adjoining property, the Contractor, without special instructions or authorization from the City, is authorized to act at his discretion to prevent such threatened loss or injury and he shall so act. He shall likewise act if instructed to do so by the City. Any compensation claimed by the Contractor on account of such emergency work will be determined by the City as provided in Section 1.404 hereof.

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

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

SECTION 1-8 - EXECUTION AND PROGRESS

1.801 Subletting or Assigning or Contract. The Contractor will not be permitted to sublet, assign, sell, transfer or otherwise dispose of the contract or any portion thereof, or his right, title, or interest therein; or to either legally or equitably assign any of the money payable under his contract, or his claim thereto, without the written consent of his surety and the Engineer. The Contractor will not be relieved of any responsibility through any of the above actions.

a. The Contractor shall be as fully responsible to the City for the acts and omissions of his subcontractors, and of persons either directly or indirectly employed by them, as he is for the acts and omissions of persons directly employed by him.

b. Nothing contained in the Contract shall create any contractual relation between any subcontractors and the City.

1.802 Execution of Work. The proposal for each project will show the project period. The progress of the work shall be at a rate sufficient to complete the project within the project period. If it appears that the rate of progress is such that the project will not be completed within the project period, or if the work is not being executed in a satisfactory and workmanlike manner, the City may order the Contractor to take such steps as it considers necessary to complete the project within the period of time specified, or execute the work in a satisfactory manner.

1.803 Limitation of Operations. The Contractor shall conduct the work at all times in such a manner and in such sequence as will insure the least interference with traffic. He shall have due regard to the location of detours and to the provisions for handling traffic. He shall not open up work to the prejudice of work already started, and the Engineer may require the Contractor to finish a section on which work is in progress before work is started on any additional section. The Contractor shall so conduct his operations and maintain the work in such condition that adequate drainage shall be in effect at all times.

1.804 Methods and Equipment. The methods, equipment and appliances used shall produce a satisfactory quality of work, and shall be adequate to maintain the schedule of progress specified. Equipment used on any portion of the project shall be such that no injury to the roadway, adjacent property, or other streets will result from its use.

When the methods and equipment to be used by the Contractor in accomplishing the construction are not prescribed in the contract, the Contractor is free to use any methods or equipment that he demonstrates, to the satisfaction of the Engineer, will accomplish the contract work in conformity with the requirements of the contract.

1.805 Temporary Suspension of Work. Work shall be suspended wholly or in part when, in the opinion of the Engineer, weather or other conditions are unfavorable to its satisfactory prosecution. Work shall also be suspended at the direction of the Engineer pending settlement or disputes arising out of failure of the Contractor to comply with the provisions of the contract. Written notice of suspension of work shall be given by the Engineer. When the conditions causing suspension no longer exist, such written notice shall be given to the Contractor by the Engineer. Promptly after such written notice, the Contractor shall resume prosecution of the work as provided in Article 1.802.

1.806 Liquidated Damages. Time is an essential element of the contract, and it is important that the work be pressed vigorously to completion.

For each working day that any work shall remain uncompleted either after the end of each project period or at the end of the contract completion date, the amount per working day specified in the proposal form will be assessed, not as a penalty but as predetermined and agreed liquidated damages. The City and Contractor specifically agree that the per working day amount to be assessed as liquidated damages is fair and reasonable and not excessive. The parties further agree that said per working day amount accurately reflect the anticipated loss and inconvenience to the public and lost revenue to or use by the City due to the project not being completed by the end of the project period or the end of the contract completion date. The City will prepare and forward to the Contractor an invoice for such liquidated damages. The final payment will be withheld by the City until the invoice is paid by the Contractor.

Due account shall be taken of any adjustment of the project period or the contract completion date granted under Article 1.807.

The assessment of liquidated damages for failure to complete the work either within each project period or the contract completion date shall not constitute a waiver of the City's right to collect for any additional damages which the City may sustain by failure of the Contractor to carry out the terms of its contract.

1.807 Extension of Project Period or Contract Completion Date. An extension of the project period or contract completion date may be granted only in writing by the City for any of the following reasons:

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

No extension of project period or contract completion date will be allowed for variations between contract quantities and actual quantities which cannot be predetermined and which amount to less than twenty percent (20%) of the contract quantities unless approved by the Engineer.

1.808 Abrogation. If the Contractor abandons the work under this contract, sublets it or assigns it without the consent of the city, or if he fails to give his personal attention to it, or if it is the Engineer's opinion that he has unnecessarily or unreasonably delays or neglected the work or any part of it, written notice to that effect is to be given to the Contractor by the Engineer. After such notice, no materials or equipment shall be removed from the work. If, within five (5) days thereafter, the Contractor does not take steps which, in the judgment of the Engineer, will insure the satisfactory completion of the work, then the City may declare this contract null and void and the security forfeited and may notify the Contractor in written to discontinue the work or any part of it; thereupon ceases the Contractor's right or possession of the ground and of all materials and equipment thereon. The City then, at its option, may enter upon and take possession of the work with all material, supplies, and equipment remaining thereon and by contract or otherwise, as the City may determine, may complete the work or the part of it designated, and charge the expense thereof to the Contractor using any materials or equipment found on the site. The expense so charged, together with all damages incurred, will be deducted from any funds due to become due under this contract, and should the unexpended

balance of these funds be insufficient, the excess shall be at the cost of the Contractor and the sureties on the Contractor's bond. Neither completion of a part of the work not the extension for any reason of the time of the completion of the work is to be considered a waiver of this right to abrogate the contract for abandonment, delay or unsatisfactory work.

1.809 Termination of Contractor's Responsibility. The contract shall be considered completed when the work has been accepted in writing by the City. Such acceptance shall release the Contractor from all further obligation with respect thereto, except as to conditions and requirements set forth in his bond.

1.810 Assignment or Novation. The Contractor shall not assign or transfer, any of its rights, duties, benefits, obligations, liabilities, or responsibilities under this Contract without the written consent of the City, provided, however, that assignments to banks, trust companies, or other financial institutions may be made without the consent of the City. No assignment or novation of this Contract shall be valid unless the assignment or novation expressly provides that the assignment of any of the Contractor's rights or benefits under the Contract is subject to a prior lien for labor performed, services rendered, and materials, tools, and equipment supplied for the performance of the work under this Contract in favor of all persons, firms or corporations rendering such labor or services or supplying such materials, tools, or equipment.

1.811 Disputes.

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

b. The Contractor shall submit in detail his claim and his proof thereof. Each decision by the governing body of the City will be in writing and will be mailed to the Contractor by registered or certified mail, return receipt requested, directed to his last known address.

c. If the Contractor does not agree with any decision of the City, he shall in no case allow the dispute to delay the work but shall notify the City promptly that he is proceeding with the work under protest and he may then accept the matter in question from the final release.

SECTION 1-9 - MEASUREMENT AND PAYMENT

1.901 Payments. The City, at its discretion, may include in such monthly estimates payments for materials that will eventually be incorporated in the project, provided that such materials are suitably stored on the site of the project at the time of preparing estimates for payment. Such

payment is to be based upon the estimated value thereof as ascertained by the Engineer. Such material when so paid for by the City shall not be removed from the project without consent of the City and, in case of default on the part of the Contractor, the City may use or cause to be used by others these materials in construction of the project.

The City will retain ten percent (10%) of the total contract amount for all work completed for the first 50% of the total project costs including change orders. The City shall fix the held retainage received once the project is 50% complete unless subsequent change orders increase the value of the project.

Payment of the retainage will be made within forty (45) days after project is substantially complete, provided the Contractor submits a Letter of Credit for 125% of the uncompleted work. Substantial completion will include water mains passing biological testing and placed into service. Sewer mains shall pass pressure testing and be televised with receipt of the inspection report.

The bid proposal price sheets include any and all work for each project. Any requirement shown in the drawings, but not listed separately in the proposal price sheets, are considered subsidiary to the work. This includes but is not limited to abandonments of existing utilities and any potholing required for utility locates prior to boring.

1.902 Payments Withheld. The City may withhold or, on account of subsequently discovered evidence, nullify the whole or a part of any certificate to such extent as may be necessary to protect itself from loss on account of:

1. Defective work not remedied.
2. Claims filed or reasonable evidence indicating probable filing of claims.
3. Failure of the Contractor to make payments properly to subcontractors for material or labor.
4. A reasonable doubt that the contract can be completed for the balance then unpaid.
5. Damage to another Contractor.
6. Damage to public or private property.

When the above grounds are removed, payment shall be made for amounts withheld because of them.

1.903 Acceptance, Final Payment, and Release of Liability. If final inspection reveals that all details of the work have been completed to his satisfaction, the Engineer shall tentatively accept the work, in writing, relieving the Contractor of further responsibility for the care and maintenance of the completed work and, provided that all equipment and materials have been removed from the right-of- way, shall also relieve the Contractor of further public liability. As soon as possible after tentative acceptance of the work, the Engineer shall measure the completed work and compute the quantities of work for which payment is to be made. Before final settlement is made, the City shall be satisfied with the completed work. When the Engineer is satisfied that all items of the work have been found to be consistent with the terms of the contract and specifications, a final estimate,

including the retained percentage due the Contractor, shall be released for payment. Release of the final estimate shall constitute formal acceptance of the work. Acceptance by the Contractor of the final payment shall constitute release of the City and each of its officers and agents from any additional claim or liability hereunder for any act or negligence of the City or of any other person.

All prior partial estimates and payments shall be subject to correction in the final estimate and payment.

1.904 Payment for Extra Work. The Contractor will receive and accept payment for work performed under this contract as follows:

a. Work Performed as Stipulated in the Contract. For all items of work performed which are covered by definite unit prices or lump sum amounts specified in the contract, the Contractor shall receive and accept compensation at the rate specified in the contract.

b. Extra Work. Extra work ordered by the Engineer, of a quality or class not covered by the contract, will be paid for at an agreed price. For extra work ordered by the Engineer and performed on an agreed price basis, the Engineer and the Contractor shall enter into a written agreement before such work is undertaken. This agreement shall describe the extra work that is to be done and shall specify the agreed price or prices therefore.

SECTION 2 SPECIAL CONDITIONS

SECTION 2-0 - GENERAL

2.001 General Provisions. The general conditions are general in scope and may refer to conditions not encountered on the work covered by this contract. Any provisions of the General Provisions which pertains to a nonexistent condition and is not applicable to the work to be performed hereunder, or which conflicts with any provision of the Special Provisions shall have no meaning to the contract and shall be disregarded.

2.002 Liquidated Damages. It is understood and agreed that time is of the essence of the contract. Should the Contractor fail either to perform the work within any project time period or to complete the contract by the contract completion date as defined in the proposal, the Contractor shall pay to the City $500.00 per working day of default unless extension of time granted by the City specifically provides for the waiving of liquidated damages (see 1.806, 1.807) for the time extension granted.

2.003 Maintenance of Traffic. The Contractor shall conduct his work so as to interfere as little as possible with public travel, whether vehicular or pedestrian. Whenever it is necessary to cross, obstruct or close roads, driveways and walks, whether public or private, the Contractor shall, at his own expense, provide and maintain suitable and safe bridges, detours, or other temporary expedients for the accommodation of public and private travel, and shall give reasonable notice to owners of private drives before interfering with them. Such maintenance of travel will not be required when the Contractor has obtained permission from the owner or tenant or private property, or from the authority having jurisdiction over public property involved, to obstruct traffic at the designed area.

2.004 Provisions for Traffic Control and/or Barricading. The Contractor shall provide barricades and maintain a means of traffic control applicable to work site conditions. The means of traffic control and barricade(s) type(s) shall be approved by City of Hastings inspector and by appropriate agency on which work is occurring, being either or combination of city, county, or state right-of-way.

The Contractor shall provide all approved barricades with lights and furnish flagmen as required. Contractor shall provide daily maintenance on all barricades, flashers, etc., during course of construction. A person will be designated by Contractor that is in their employment to be responsible for daily maintenance and shall be available 24 hours a day, seven days a week and will have a telephone number given to City of Hastings and appropriate governing agency on whose right-of-way project is taking place.

2.005 Street Closing. – Not applicable.

2.006 Dust Control. The Contractor shall be required to keep dusty conditions, caused by his operations, from being a source of complaint by adjacent property owners by watering down his haul routes or by other methods approved by the Engineer.

2.007 Removal of Trees, Hedges, Shrubs, and/or Fences. The Contractor shall sufficiently plan ahead to notify property owner(s) of any obstacles in the way of proposed construction that will have to be removed prior to construction by property owners if they desire to save such.

SECTION 2 SPECIAL CONDITIONS

Clearing and removal of items will be shown on plans and completed by Contractor. The payment for removal of said items will be on proposal sheet, however, any tree with a diameter of 6" or less, all shrubs and bushes will be considered subsidiary to work and no additional compensation will be paid. The Contractor shall not remove any trees in the project area without prior approval of City of Hastings.

The Contractor will be required to reimburse the public for any damage to trees which is not authorized by City of Hastings.

2.008 Shutdown, Valve Operation. Shutdowns will be made only by City of Hastings Department personnel. In the event that an emergency condition warrants, the Contractor shall take direct action to make shutdown but must notify City of Hastings immediately and remain on worksite to demonstrate what has taken place to City of Hastings personnel.

All shutdowns, unless emergency, will be scheduled in advance and shall be the responsibility of the Contractor to notify residences and/or businesses effected and give estimated time of return of service.

2.009 Backfill. For backfill requirements refer to appropriate section within the contract documents.

2.010 Reseeding Lawns & Terraces (Bluegrass Reseed). – Not applicable.

2.010A Reseeding State Highway Right-of-Way. – Not applicable.

2.010B Reseeding County Right-of-Way. – Not applicable.

2.010C Mulch. – Not applicable.

2.010D Cover Crop. – Not applicable.

2.010E. Sodding. – Not applicable.

2.010F Seeding & Sodding Summary: - Not applicable.

2.010G Crop Ground Tillage. – Not applicable.

2.010H Fertilizer. – Not applicable.

2.011 Permits. The Contractor shall obtain a constructor's license from the City of Hastings Permits Office, located at The City Building, 220 N. Hastings Avenue, Hastings, Nebraska. This permit will allow the Contractor to install water and sewer service connections. The Contractor shall also obtain any additional permits required by the Permits Office for the installation of the individual services. Electrical permits will be required and require the proper Nebraska licensing as specified in State Electrical Act.

2.012 Working Hours. Normal working hours will be considered to be from 8:00 a.m. to 5:00 p.m., Monday through Friday (holidays excepted: New Year's Day, Martin Luther King Day, Memorial Day, Independence Day, Labor Day, Veteran's Day, Thanksgiving, Friday after

Thanksgiving, ½ day Christmas Eve, and Christmas Day). Any Contractor desiring other working hours must take exception to specifications for consideration by City of Hastings. Any exception must be approved or negotiated to mutual acceptance by Contractor and City of Hastings, final acceptance will be granted in writing.

2.013 Removal and Replacement of Property Stakes. If it is necessary to remove any property corners or markers during construction operations, the Contractor shall notify the Engineer so that the Engineer can establish reference ties. Any markers removed without notice to the Engineer shall be replaced at the Contractor's expense in accordance with the proper land surveying techniques.

2.014 Concrete. All concrete being used shall meet the requirements of the drawings and Section 4 – Technical Specifications Section 32 13 13 Portland Cement and Concrete Paving.

2.015 Asphalt Concrete Paving, Patching. – Not applicable.

2.016 Gravel, Rock Replacement. All aggregate surfacing shall meet the requirements of Section 32 15 00 of Section 4 – Technical Specifications. Contractor to replace gravel and rock in areas where existing on job site that have been removed or disturbed by work entailed in contract or disturbed by contractor for his convenience by his contractor methods. Applications rate shall be determined on job site and to satisfaction of City of Hastings engineer and/or inspector.

The following application rates shall be used unless otherwise directed and/or noted on the drawings.

Location	Quantity
Graveled County Roadways	3" Nominal thickness + 24 feet wide
Graveled City Streets	3" Nominal thickness + 24 feet wide
Graveled Driveways	3" Nominal thickness + width of driveway
Limestone Driveways	3" Nominal thickness + width of driveway

2.017 Removal of Existing Materials. Contractor shall remove all called for materials with care as not to ruin or damage material for further use. Any material required to be removed for reuse and has been damaged by careless and negligent action on part of Contractor, shall constitute cause for replacement or payment by Contractor. Inspection of said material for reuse shall be made at sole discretion of City of Hastings inspector.

2.018 Existing Sprinkler Systems. – Not applicable.

2.019 Appearance of Construction Area and Storage Site. Contractor will be required to keep the construction area in a neat and orderly fashion that would be considered reasonable in regard to work being completed.

SECTION 2 SPECIAL CONDITIONS

Where sidewalks, driveways, etc., exist, Contractor shall keep them free from debris and will be swept off at the end of the construction day. Storage site will be kept in a neat and orderly manner.

No dirt will be allowed to be piled in the street overnight. Dirt piles on the terrace (or alternate locations) must meet all storm water management requirements.

Where Contractor will have a storage site for materials, equipment, etc., on property owned by City, it shall be kept in a neat and orderly manner, free from debris, accumulation of unused materials, etc. Any area used for storage, etc., shall be properly served from the public by temporary fencing if not within a fenced area.

Debris from job site must be removed same day as taken from street, yard, etc. Piling up of these materials, (i.e., concrete, brush, trees, tree limbs) will not be allowed on site.

2.020 Construction Progress Meetings. Construction progress meetings will be held at a predetermined time each week, time to be chosen at the preconstruction conference. City of Hastings will have in attendance Project Engineer and Inspector. Contractor shall have Project Superintendent and job foreman present.

2.021 Public Information Meeting. – Not applicable.

2.022 Filming Job Site Before Construction. – Not applicable.

2.023 Contractor – Multiple Work Location. Contractor will be required to finish work on each project before moving to another project or have personnel enough to maintain crews on both job sites.

2.024 Final Cleaning Up. Upon completion of the work and before acceptance and final payment, the Contractor shall clean the area occupied by him in connection with the work of all rubbish, excess materials, false work, temporary structures, and equipment; all parts of the work shall be left in a neat and presentable condition.

2.025 Preconstruction Conference. A preconstruction conference will be held at City of Hastings offices with the contractor, owner, superintendent, and job foreman prior to construction and all other city, county, state, and other necessary agencies will be notified of this meeting also.

Contractor shall submit to City a detailed construction progress schedule prior to preconstruction meeting.

A preconstruction conference shall be arranged between the Director of Engineering and the Contractor prior to beginning construction. At this meeting the following items shall be addressed.

a. Work by others. Coordination of work to be performed by subcontractors and other contractors performing work related to this project.

b. Availability of land. The site and use of adjacent land shall be reviewed.

c. Project Engineer. The project engineer will be assigned by the Director of Engineering. The Contractor shall designate a construction foreman that will be responsible for communication with the project engineer.

d. Change orders. Procedures for implementing change orders shall be reviewed.

e. Tests and inspection. As described within these documents the Contractor shall perform all necessary tests and inspections. Any documented results shall be submitted to the project engineer. At all times the project engineer shall be allowed to inspect the work being performed.

f. Safety and protection. The Contractor shall be responsible for all safety and necessary protection of all persons in attendance of the project site. The project engineer and other observers shall adhere to all safety precautions deemed necessary by the Contractor.

g. Final inspection and payment. Final inspection shall be performed by the Director of Engineering and his representatives. When all aspects of this project, as described within these documents have been met, the Contractor may submit for final payment.

h. Site security. The contractor shall erect a construction barrier around the active areas of the project site. The barrier shall consist of a temporary fence with appropriate warning signs.

i. Shop drawings, submittals. The required list of submittals shall be reviewed.

j. Pipe Cleaning Video: - Not applicable.

2.026 Customer Relations. Contractor shall exert all reasonable efforts to maintain good will for the benefit of City of Hastings and City with the landowners tenants, and lessees along the right-of-way and with the general public. The Contractor will not be allowed to start construction until he has adequate manpower and material to allow the job to progress smoothly and be complete in a reasonable amount of time. City of Hastings will have the authority to remove workers from the job site who exhibit horseplay and foul language to the public.

2.027 Hard Surface Replacement. – Not applicable.

2.028 Relaying Driveway Culvert Pipe. – Not applicable.

2.029 Operations of the Contractor. The Contractor shall confine his operations exclusively to easements and public right-of-way. If the Contractor desires to operate equipment or store materials on private property that does not have a utility easement, he must obtain permission from the property owner. Prior to release of the payment retention by City of Hastings, the Contractor must restore the private property to original condition. If the landowner is not satisfied with the restoration, City of Hastings will continue to hold the appropriate retention.

The quantities for seeding and sodding in the proposal include only easements and right-of-way. Any seeding and sodding required to restore areas where the Contractor has operated on private property without easements will be the responsibility of the Contractor.

2.030 Barbed Wire & Livestock Fencing. - Not applicable.

2.031 Covid-19 Requirements. The Contractor shall follow DHSS and CDC requirements. Home-Isolation shall be per Quarantine and Isolation Directions such as if the Contractor has fever of 100.4 F or above, or sudden onset of a cough or sudden onset of shortness of breath or

other COVID-19 related symptoms, or has been exposed to COVID-19 positive tested person, or other requirements. Wear facemask or face shield and follow social distancing as recommended by local health district.

2.032 General Public Safety. Security fencing must be placed two feet (2') from the edge of any open excavation. Fencing shall consist of four foot (4') high orange woven safety fence (snow fence) secured by steel T posts. All excavations next to a street, or in a street, must the latest revisions of the Manual for Uniform Traffic Control Devices and City of Hastings Requirements.

SECTION 3 – SCOPE OF WORK

SECTION 3-0 GENERAL DESCRIPTION AND SCOPE OF WORK

3.1 General:

The City of Hastings (Owner) is accepting bids for the construction of a bunker, conveyor foundations, site work, paving, and drainage for a Bottom Ash Conveyor System for Whelan Energy Center, Unit 1 in Hastings, Nebraska. The bidder **is required** to visit the site prior to submitting a bid. The Bidder shall inform himself 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 and to set up the required visit.

3.2 Schedule:

This shall include the completion of various activities in accordance with the milestone time periods and dates listed. The Contractor shall submit a project construction schedule.

Material and Installation Contract:

Activity	Schedule
Bid Opening	Thursday, December 21, 2023
Anticipated Contract Award Date	Tuesday, January 16, 2023
Plant Outage Dates	Friday, March 15 to Friday, April 12, 2024

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 Conveyor system is completed before the end of the scheduled outage. A preliminary construction schedule is shown below.

Activity	Schedule
Completion of Bunker, Conveyor Footings, and Wall Opening (Items 15 through 21 on proposal page)	Friday, March 1, 2024
Completion of Trench Infill and Removal of Existing and Installation of New Grinder Pedestals (Items 22 and 23 on proposal page)	Approximate start March 16, 2024 to finish March 26, 2024 (To start once Mechanical Contractor has completed demolition of existing equipment on boiler)
Completion of Remainder of Scope – Manhole, drain, discharge piping, site work and paving	Friday, April 12, 2024

The completion of the bunker and conveyor footings will allow installation of the outside conveyor (SGC2), platform, and stairs to be started before outage. Trench infill and grinder pedestals will start once the Mechanical Contractor has completed demolition of existing equipment on the bottom of the boiler, and all piping, valves, and fittings in the work area. The remainder of the scope to be completed before the scheduled end of outage.

3.3 Site and System Description:

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. Hastings is converting the existing bottom ash sluicing system into a new bottom ash submerged grind conveyor system. The bottom ash system will consist of two new conveyors. Submerged grind conveyor 1 (SGC1) will start at the boiler and exit out the east plant wall. SGC2 will connect to SGC1 and run north to the new bottom ash bunker. The bunker will be used as temporary storage of the bottom ash until it is moved by truck to a long-term storage bunker south of the plant.

3.4 Work Included Under These Specifications:

The following work will be completed by the Contractor:

1. All work included in Section 4 – Technical Specifications and Appendix A – drawings to include:
    a. Removal of existing pavement and concrete foundations.
    b. All excavation and subgrade preparation.
    c. Conveyor and stair footings.
    d. Bunker helical piles.
    e. Bunker concrete foundation and drain.
    f. Bunker concrete walls.
    g. Manhole with sump pump, inlet from bunker drain, and discharge cored through wall to plant floor drains.
    h. Conveyor wall opening and installation of lintel.
    i. Concrete infill in trench inside Unit 1 and modifications to existing trench grating.
    j. Removal of existing grinder pedestal and installation of new pedestals.
2. Supply of all tools and equipment needed to complete the job.
3. All temporary office space and break facilities needed by contractor.
4. Sanitary services in the form of portable toilets.
5. Clean up of work area.
6. Utility locates.

3.5 Work NOT Included Under These Specifications:

The following work will be completed by City of Hastings:

1. Water line replacement in bunker area per drawing S0.1 has already been completed.
2. Relocation of fuel oil line, safety shower, and chemical fill lines in bunker area have been completed by others.
3. Station services including water, air, and electrical power.
4. Electrical connection for sump pump.
5. Supply common trash dumpster.

6. Mandatory safety orientation for all of Contractors employees.

3.6 Attachments:

The following drawings are attached in Appendix A:

- C0.1 – Cover Sheet
- C0.2 – Control
- C1.0 – Site Removal Plan
- C1.1 – Site Construction Plan
- D1.0 – Standard Site Details
- D1.1 – Standard Site Details
- S0.1 – Water Line Replacement Plan
- S1.1 – Enlarged Foundation Plans
- S2.0 – Foundation Details
- S2.1 – Foundation Details
- S2.2 – Foundation Details

The following drawings are provided for reference:

- PT-321 – Fuel Oil Line Relocation – shows location of underground fuel oil lines and other utilities in the area. Old fuel oil line was abandoned in place in bunker area.
- PT-318 Sheet 1 – shows location of chemical fill lines and safety shower that were relocated from bunker area to north side of Unit 1.

SECTION 4 – TECHNICAL SPECIFICATIONS

FOR

CONTRACT NO. HU 2023-103

WEC UNIT 1 BOTTOM ASH SYSTEM

BUNKER AND SITE WORK

WHELAN ENERGY CENTER, UNIT I

CITY OF HASTINGS

HASTINGS, NEBRASKA

CONTENTS

SECTION 01 10 00

SPECIAL PROVISIONS

PART 1 - GENERAL

These Special Provisions amend or supplement the following Specifications and other provisions of the Contract Documents as indicated below. All provisions which are not so amended or supplemented remain in full force and effect.

The terms used in these Special Provisions will have the meanings indicated in the Specifications and Contract Documents. Additional terms used in these Special Provisions have the meanings indicated below, which are applicable to both the singular and plural thereof.

1.01 PROJECT CONTACT

A. Owner's Primary Contact:

1. Name: Keith Miller, PE
2. Address: Whelan Energy Center
3. Phone Number: 402-462-3549
4. Email: kmiller@cityofhastings.org

B. Engineer's Primary Contact:

1. Name: Ryan C. Kavan, PE
2. Address: 2727 W 2nd Street, Suite 471, Hastings, NE 68901
3. Cell Number: 402-469-8747
4. Email: rkavan@jeo.com

C. Engineer's Secondary (Structural) Contact:

1. Name: Steve Arens, PE, SE
2. Address: 2000 Q Street, Suite 500
3. Cell Number: 402-310-5836
4. Email: sarens@jeo.com

1.02 CONTRACT DRAWINGS AND SPECIFICATIONS

A. The Drawings, Specifications, Proposal, Special Provisions, and all supplementary documents are intended to describe the complete work and are essential parts of the Contract. All requirements occurring in any of them are binding.

B. In cases where there is a discrepancy in the contract documents.

1. Written dimensions take precedence over scaled dimensions on Drawings.
2. Larger scale Drawings take precedence over smaller scale Drawings.
3. Section 01 10 00 – Special Provisions, take precedence over the Drawings.
4. Section 01 10 00 – Special Provisions, take precedence over other Specification Sections.

C. Referenced Sections:

1. Any Specification Section that is referenced by another Specification Section and is not included in the project specifications (see table of contents for complete listing) shall not apply to this project.

D. At least one copy of all Drawings and Specifications shall be maintained by Contractor at the project site and these shall be accessible at all times to Owner and Engineer.

1.03 REPORTS

A. Refer to Section 00 73 00 – Supplementary Conditions, paragraphs SC-5.03 and SC-5.06.

1.04 PERMITS

A. NPDES: Due to the nature and area of this construction project, Owner is required to request discharge authorization for the stormwater discharge from the construction site under the General NPDES Permit Number NER210000. Owner has filed a NOI. A Stormwater Pollution Prevention Plan (SWPPP) for this project has been developed. It will be the responsibility of Contractor and all sub-Contractors to maintain the site according to the permit requirements and the SWPPP. A copy of the SWPPP is available from Engineer upon request, prior to bidding.

1. During construction, Contractor will be responsible for inspecting the erosion control measures and record keeping per the requirements of the NPDES Permit duration of the project.
2. Contractor shall post the Storm Water Pollution Prevention Plan (SWPPP) in a conspicuous place on the project site. This posting shall be available for public viewing during normal business hours and shall have the contact numbers for Contractor.
3. Contractor shall be responsible for maintaining and controlling all erosion control devices throughout the duration of the project, in strict compliance with the conditions of the permit.
4. Contractor shall conduct weekly reviews of the erosion control measures and make any repairs or adjustments necessary to satisfy the requirements of the permit.
5. Contractor shall complete the required Storm Event Monitoring Reports after each rainfall event during the construction project.
6. Copies of all reports, daily reports and forms recorded by Contractor shall be maintained on the site. A copy of these documents shall be provided to Owner through Engineer on a monthly basis, along with monthly Partial Pay Request. Pay requests will not be processed by Owner without copies of these documents.
7. Contractor shall be responsible for removal and disposal of all temporary erosion control measures from the site after final stabilization measures are in place and satisfactory vegetation has been established.

1.05 CODE COMPLIANCE

A. All proposed work shall comply with the National Plumbing Code, National Electrical Code, International Building Code and all applicable state and local codes.

1.06 SPECIAL FUNDING

A. There is no special funding for this project.

1.07 INCIDENTAL AND SUBSIDIARY ITEMS OF WORK

A. Any items or materials called for on the Drawings or in these Specifications that are not measured and paid for directly shall be considered incidental and subsidiary to other items of work for which direct payment is made.

1.08 PROJECT CONDITIONS

A. Existing Utilities:

1. There are utilities in the vicinity of the proposed work.
2. Contractor shall notify the respective utility company(s) and/or "one-call notification center" before commencing work.
3. Neither Owner nor Engineer assumes any responsibility for utility locations being accurately shown, or not shown on the Drawings.
4. Any reference to utilities in the Drawings is approximate. Contractor shall verify the location of any existing utilities within the vicinity of the proposed work.
5. Contractor shall provide notification of intent to begin construction in advance to allow utility company(s) sufficient time to locate or relocate their utilities.
6. Once the location of the utility(s) has been staked, located or marked, it shall be Contractor's responsibility to protect these stakes/markings. Any costs for restaking or remarking shall be Contractor's expense.
7. Contractor shall avoid damaging any utility(s). Any such damage caused by Contractor, Contractor's employees, subcontractors, suppliers or agents will be the responsibility of Contractor to repair at Contractor's expense. No additional compensation will be allowed for protecting utility(s) or for repair of any damage caused by Contractor, Contractor's employees, subcontractors, suppliers or agents.
8. Contractor shall coordinate utility relocation or reconstruction with the appropriate utility company.

B. Maintain Continuous Water Service:

1. Whenever possible, Contractor shall schedule and conduct all work in a sequence, which will provide continuous operation of the water system. Contractor's schedule of planned operations shall outline compliance with this requirement.
2. When it is necessary to temporarily interrupt water service to any user:
    a. Contractor shall limit shutdown to 4 hours maximum time.
    b. Contractor shall make arrangement with Owner at least 48 hours in advance of any shutdown.
    c. Contractor shall get approval of any shutdown from Owner at least 48 hours in advance of the shutdown.
    d. Contractor shall give notification to any effected user at least 48 hours in advance of the shutdown. Such notification shall be closely coordinated with Owner.

C. Maintain Continuous Sanitary Sewer Service:

1. Whenever possible, Contractor shall schedule and conduct all work in a sequence, which will provide continuous operation of the sanitary sewer system. Contractor's schedule of planned operations shall outline compliance with this requirement.
2. When it is necessary to temporarily interrupt sewer service to any user:
    a. Contractor shall limit shutdown to 4 hours maximum time.
    b. Contractor shall make arrangement with Owner at least 48 hours in advance of any shutdown.
    c. Contractor shall get approval of any shutdown from Owner at least 48 hours in advance of the shutdown.
    d. Contractor shall give notification to any effected user at least 48 hours in advance of the shutdown. Such notification shall be closely coordinated with Owner.
3. Contractor shall provide any temporary pumping of sewer flows necessary to provide continuous service to the users. Discharging of untreated wastewater during the construction will not be allowed. Contractor's schedule of planned operations shall outline compliance with this requirement.

D. Maintain Continuous Wastewater Treatment:

1. Discharging of untreated wastewater during the construction will not be allowed. Contractor shall schedule and conduct all work in a sequence, which will provide continuous treatment of the wastewater. Contractor's schedule of planned operations shall outline compliance with this requirement.

E. Irrigation Systems:

1. There are no underground irrigation systems within the project limits.

1.09 SUBMITTALS

A. Refer to Section 01 30 00 – Administrative Requirements.

B. All submittals shall be submitted to the Engineer in digital pdf format.

C. Engineer will review and issue approvals digitally.

D. Refer to Section 01 30 00 – Administrative Requirements, paragraph 3.05.B, references to printing and distribution shall be replaced with digital distribution in a pdf or other approved format. A field office is not required on this project.

E. Minimum items expected to have submittals submitted on include:

1. Helical Pile
2. Concrete mix design(s)
3. Storm sewer pipe and structures
4. Reinforcing steel
5. Lift station basin, pumps, electrical, controls and discharge piping.
6. Aggregate for Aggregate Surfacing

1.10 RECORD DRAWINGS

A. Contractor shall provide two (2) copies of the record drawings/as-builts clearly marking the field adjustments, additions/deletions to the Drawings, and locations of all buried piping/infrastructure and critical elevations of same.

1.11 RIGHT-OF-WAY/EASEMENTS

A. The project shall be constructed within limited easements, right-of-way and property owned by Owner, as shown on the Drawings.

B. Contractor shall confine all operations to areas within the limited easements, right-of-way and property owned by Owner, as shown on the Drawings.

C. Areas outside of the limited easements, right-of-way and existing property owned by Owner, as shown on the Drawings, are not to be disturbed.

D. Contractor shall exercise all reasonable care in any activities that are conducted in the areas of right of way and easement, to minimize damages to the property. Contractor's attention is specifically called to any buildings, trees, fences, drainage structures and other miscellaneous appurtenances to the property.

E. Contractor shall be solely and completely responsible for any damages caused by Contractor, Contractor's employees, sub-Contractors, suppliers or agents to any areas outside of the limited easements, right-of-way and existing property owned by Owner, as shown on the Drawings.

F. Contractor shall be solely responsible for obtaining and shall pay all costs in connection with any additional work area, storage site, access to the site, or temporary right-of-way, which may be required for proper completion of the work.

G. Staging Area: Contractor is responsible for obtaining a site for storage of materials and equipment.

1.12 OPERATION AND MAINTENANCE MANUALS

A. Contractor shall furnish a minimum an electronic PDF copy and four (4) copies of complete manufacturer's operation, maintenance and parts data for all equipment to be installed in the project (none of which will be returned) in three-ring binders. All equipment that may require spare parts shall be documented and data furnished as to source of spare parts. The following material shall be submitted:

1. Manufacturer's Operation & Maintenance Manual.
2. Manufacturer's Parts Manual and Specifications.
3. Manufacturer's Service and Repair Manual.
4. Repair Parts Source.
5. Detailed Drawings of Equipment.
6. Detailed Electrical Schematic Drawings, if applicable.

1.13 SITE ADMINISTRATION

A. Contractor shall be responsible for all areas of the site used by him and by all Sub-Contractors in the performance of the work. He will exert full control over the actions of all employees and other persons with respect to the use and preservation of the property and existing facilities, except such controls as may be specifically reserved to Owner or others. Contractor has the right to exclude from the site all persons who have no purpose

related to the work or its inspection, and may require all persons on the site (except Owner's employees) to observe the same regulations as he requires of his employees.

B. Contractor may use the area within the limited easements, right-of-way and property owned by Owner, as shown on the Drawings, for storage and staging, but must not interfere with normal operations of Owner, without prior written approval from Owner.

1.14 POWER

A. All power for lighting, construction use, operation of Contractor's plant or equipment, or for any other use by Contractor, shall be provided by Contractor at his sole cost and expense and shall be considered incidental and subsidiary to other items of work for which direct payment is made. No separate payments will be made for this work.

1.15 MONTHLY PROGRESS MEETINGS

A. Monthly progress review meetings will be held during the construction period at a time and date set by Owner. Location will be onsite or in the Whelan Energy Center and will be arranged a minimum of 48 hours before the meeting. Attendance by Contractor or his/her authorized representative is mandatory.

1.16 TEMPORARY FACILITIES

A. Temporary Fencing will not be required.

B. Temporary facilities shall be considered incidental and subsidiary to other items of work for which direct payment is made. No separate payments will be made for this work.

1.17 HISTORICAL AND ARCHAEOLOGICAL

A. If, during the course of construction, evidence of deposits of historical or archaeological interest is found, Contractor shall cease operations affecting the find and shall notify Owner. No further disturbance of the deposits shall ensue until Contractor has been notified by Owner that Contractor may proceed. Compensation to Contractor, if any, for lost time or changes in construction resulting from the find shall be determined in accordance with changed or extra work provisions of the Contract Documents.

1.18 DEWATERING OF SITE

A. Work to be performed may require pumping and dewatering to complete the work as specified and as indicated on the Drawings. It is the intent of the specifications that such pumping and dewatering operation shall be the obligation of Contractor.

B. Pumping and dewatering shall be considered incidental and subsidiary to other items of work for which direct payment is made. No separate payments will be made for this work.

C. Contractor will be responsible for design, construction, electrical service and materials, operation, maintenance and permitting of any dewatering system necessary for the successful construction and completion of the project.

D. Contractor shall conduct such investigation as is necessary to satisfy themselves of the groundwater conditions that will be encountered during the construction of the Work.

1.19 SUBSTANTIAL COMPLETION

A. Refer to Section 00 70 00 – General Conditions.

B. Substantial Completion so that the Work can be utilized requires the following components to be complete, operational and tested:

1. Earthwork, Excluding Final Fine Grading

2. Storm Sewer Piping and Structures
3. Aggregate Surfacing
4. Concrete Paving
5. Ash Bunker Operational, Joints Sealed and ready for use.

PART 2 - PRODUCTS

2.01 CONCRETE

A. Compressive Strength When Tested in Accordance with ASTM C39 at 28 Days: Minimum 3,500 psi for paving, 4,000 psi for bunker slab on grade, 4,000 psi for footings, and 5,000 psi for bunker walls.

1. Type 47B-3500, Type 47BD-4000, and Type 47BD-5000 with type 1PF cement Per NDOT Standard Specification.
2. Concrete mix design shall have a minimum of 30% coarse aggregate.
3. Air content shall be 6.5% to 9.0%.

2.02 EARTHEN SOILS

A. Borrow/Fill: Contractor shall use soil from stockpiles onsite at Whelan Energy Center. The contractor is responsible for the loading, hauling, moisture conditioning and compaction to meet the placement and grade requirements of the plans.. Any offsite fill material must be pre-approved by the Owner.

B. Off-site borrow material is not anticipated to be needed for project construction. However if necessary, the Contractor may retrieve additional soils from an offsite location of their choosing.

1. Fill material shall be a clean, inorganic silt or lean clay with a liquid limit less than 45 and a plasticity index less than 20. Fill material shall not contain an appreciable amount of roots, rock, or debris, and should not contain any foreign material with a dimension greater than 3 inch.

C. All earthwork and/or off-site borrow material shall be paid for under the lump sum bid price for site work and will not be measured separately.

2.03 AGGREGATE SURFACING

A. Crushed Rock Surfacing:

1. Crushed rock for surfacing shall consist of clean, hard particles of crushed limestone, quartzite, or dolomite.
2. The crushed rock aggregates for surfacing shall have a Los Angeles Abrasion loss percentage of not more than 45.
3. Crushed rock for surfacing shall have a percent loss of not more than 30 at the end of 16 cycles of the freezing and thawing test.
4. Rock shall meet NDOT 1-1/2” Crushed Rock for Surfacing gradations.

2.04 STORM DRAINAGE

A. All storm sewer piping shall be PVC pipe SDR 35 for 8” storm sewer piping.

1. Joints shall be gasketed to meet water tight standards.

B. Storm Sewer Pipe Bedding:

Bedding shall be in accordance with manufacturer's recommendations for placement in clay soils.

2.05 STORM SEWER MANHOLE WITH SUMP PUMP AND DISCHARGE PIPING.

A. Contractor shall provide a Manhole made of one of the following materials:

1. Precast concrete manhole with internal diameter of 48-inches.
    a. Joints shall be sealed with Cretex
2. A single unit fiberglass manhole with and internal diameter of 60-inches rated for sanitary sewer conditions is acceptable.
    a. Manhole shall be installed in accordance with the manufacturer's recommendations for installation.
3. Alternate lift station manholes may be acceptable. Contractor shall submit documentation of the desired installation for approval. Alternative manholes shall meet standards for sanitary waste and water potentially 8 feet deep.

B. Castings:

1. Manhole lid – Deeter 1030 or equal.

C. The pump shall be a submersible grinder pump capable of a minimum of 15 feet TDH between 20 and 50 GPM, ran on 120V single phase with a maximum of 20 amp power.

1. Approved Manufacture and Model is Zoeller 818 Grinder Pump.
2. As approved by Engineer.

D. Power to disconnect to be provided by owner. The contractor shall install pump wiring to the provided power disconnect. This shall be hard wired in unless approved by Owner.

E. Pump shall run off of a float control.

F. Discharge piping diameter shown on the plans may need to be modified based on the pump selected. Discharge piping, including the coring through the building wall shall be as necessary to match the discharge of the selected pump.

G. Discharge piping shall be grouted at the cored location through the building wall.

H. Pipe shall be secured to the wall and floor of the building when the span exceeds 3 feet unsecured.

I. Contractor shall supply the Owner with a minimum of 2 hard copies and access to an electronic copy of the operations and maintenance manuals.

J. There shall be NO backflow prevention between the building wall and the pump.

K. Discharge piping shall be pressure class 50 or greater including all fittings.

L. Sump pump installation shall include any and all necessary grouting of the manhole penetrations, the pump, float control, discharge piping, electrical from the disconnect, pipe supports or straps, pump supports as may be necessary and operations and maintenance manuals.

M. Contractor shall provide and install a quarter turn ball valve that can be used to drain the discharge piping back into the manhole.

PART 3 - EXECUTION

3.01 ACCESS REQUIREMENTS

A. Notices: Contractor shall provide notice to property owners and authorities:

1. Contractor shall notify owners of adjacent property and utilities when proceeding with the work that may affect them.

2. When it is necessary to temporarily deny access by owners or tenants to their property, or when any utility service connection must be interrupted, Contractor shall give notices sufficiently in advance to enable the affected persons to provide for their needs. Notices shall conform to any applicable local ordinance and, whether delivered orally or in writing, will include information concerning the interruption and instructions on how to limit their inconvenience.

3. Utilities and other concerned agencies shall be contacted at least 48 hours prior to cutting or closing streets or other traffic areas or excavating near underground utilities or pole lines.

4. Contractor shall regularly advise the local law enforcement, fire and rescue authorities of the project status and coordinate with them in a manner to maximize access to property in the construction area in event of an emergency.

B. Contractor to maintain access for the residents of the area located within the area of the project, as much as possible. Contractor shall keep driveways and entrances serving adjacent properties clear and available to the property owner or occupant at all times. Do not use these areas for parking or storage of materials. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on site that obstructs access to property.

C. Contractor shall at all times maintain public access to the neighboring buildings in the project area.

D. Contractor shall provide temporary approaches and crossings of streets and sidewalks during construction operations. The temporary approaches and crossings shall be maintained by Contractor in good condition during construction operations.

E. Contractor to arrange site and premises to allow work by others and Owner.

F. Contractor to limit shutdowns of utility services to 4 hours at a time and arrange with Owner 48 hours in advance of any shutdowns.

G. Contractor shall take all precautions not to damage buildings, utilities, sidewalks, drives, trees and property that are to remain in place during and after construction activities. Contractor shall be responsible for any damage and repair at Contractor's expense.

H. Contractor shall provide their own fencing as may be necessary to maintain security of the site or excavations during construction. The entire site shall be secured at all times to deter entry to the site and prevent injuries to non construction personnel.

3.02 VERIFY UTILITY LOCATION

A. Contractor to verify depth and location of existing utilities prior to any excavation.

B. Contractor to verify that the existing utilities are of the size and type shown in the Drawings prior to providing any connecting materials.

3.03 UNFAVORABLE CONSTRUCTION CONDITIONS

A. During unfavorable weather, wet ground or other unsuitable construction conditions, Contractor shall confine operations to work, which will not be affected adversely by such conditions. No portion of the work shall be constructed under conditions, which would adversely affect the quality or efficiency thereof, unless special means or precautions are taken by Contractor to perform the work in a proper and satisfactory manner.

3.04 UNSUITABLE SOILS

A. If the Contractor encounters unsuitable soils during construction, the Contractor shall coordinate with Owner to determine the extents of the unsuitable soils. Unsuitable Soils shall be excavated until stable and suitable native soil is found, or a minimum of 3-feet from the final proposed grade. Unsuitable Soils shall excavated and removed from the site. The Owner will designate a location withing the Whelan Energy Center property for the contractor to place and stockpile the unsuitable materials. Contractor shall then place approved fill soils from the Owners onsite stock piles. Contractor is responsible for excavating, loading, hauling and stockpiling of the proposed soils in the location designated by the owner so that storm water will not pond.

3.05 TOPSOIL AND SUBSOIL

A. Contractor shall remove the upper 6 inches (6”) of topsoil from the area of trench excavation and store it on site. After the trench has been backfilled, Contractor shall replace the stored topsoil on top of the backfill to provide a suitable seed bed for the area above the trench excavation.

B. Topsoil containing crop residue shall be collected separately and reapplied to agricultural ground to proposed finish grades.

C. Excess topsoil shall be neatly stockpiled at a location determined by the Owner only if requested. The proposed stockpile location shall identified during the preconstruction meeting and is proposed to be on the Whelan Energy Center property.

3.06 CONCRETE SAWING

A. Sawing of new concrete for jointing is incidental to the unit price for concrete paving.

3.07 CONCRETE PAVING TIE IN

A. New concrete paving will be tied to existing concrete paving with no. 4 x 18 inch tie bars at 48 inch center to center.

3.08 BARRICADES, LIGHTS AND TRAFFIC CONTROL

A. General:

1. All open trenches and other excavations shall have suitable barricades, signs, lights and other safe guards to provide adequate protection to the public. Obstructions such as material piles and equipment shall be provided with similar warning barricades, signs, lights and other safe guards.
2. Contractor shall maintain traffic and shall provide and maintain traffic control devices in accordance with the contract documents.
3. If there is no specific traffic control plan, then Contractor's traffic control devices shall be in accordance with and shall be placed as required in the current edition of the Manual on Uniform Traffic Control Devices for Streets & Highways.

4. Barricades, signs, lights and other safeguards shall be placed and maintained by Contractor during construction activities.

5. Contractor shall provide all necessary devices for traffic control during construction.

B. Contractor shall conduct operations so that all roadways/driveways within the proposed project are left open to at least one lane of traffic at all times unless approved by Owner 24 hours prior to planned closure.

C. Traffic control, including barricades, signs, lights and other safe guards shall be considered incidental and subsidiary to other items of work for which direct payment is made. No separate payments will be made for this work.

3.09 REMOVALS

A. Contractor shall use care in removing concrete, asphalt and other permanent surfacing. Additional removals required due to Contractor's negligence will be at Contractor's expense.

B. Contractor shall saw-cut existing concrete, asphalt, etc. to be removed and this sawing shall be considered incidental and subsidiary to the other items of work for which direct payment is made. No separate payments will be made for this work.

C. Where sewer and storm sewer castings are removed by Contractor, care shall be taken when removing castings so they are suitable for future reuse. The castings shall be salvaged to Owner and shall be delivered to a site designated by Owner.

3.10 DISPOSAL OF REMOVALS

A. All disposal of any material that is removed shall be done in strict compliance with all applicable State, Federal and Local laws and rules and regulations.

B. Excavated materials: Excess excavated material that is not suitable for reuse in the project is the property of the owner and shall be disposed of at a location owned by the Owner to be identified during the preconstruction meeting. Contractor shall be responsible for hauling to the designated location on the Whelan Energy Center property, and stockpiling the materials to prevent ponding of rain water on the stockpiled material.

C. Concrete: All concrete removals shall be disposed of by Contractor at Contractor's own disposal site and at Contractor's expense.

D. Asphalt: All asphalt removals shall be disposed of by Contractor at Contractor's own disposal site and at Contractor's expense.

E. Trees: All trees and stumps removed shall be disposed of by Contractor at Contractor's own disposal site and at Contractor's expense.

F. Salvage/Re-use Items: Items (if any) that are to be salvaged to Owner and items that are to be salvaged and re-installed are all listed in the Drawings.

G. Miscellaneous: Contractor shall be responsible for the disposal of any miscellaneous items at Contractor's own disposal site and at Contractor's expense.

H. Drainage Pipe: All drainage pipe removed shall be disposed of by Contractor at Contractor's own disposal site and at Contractor's expense.

I. Sewer manholes and structures: All concrete materials resulting from sewer manhole, storm sewer inlet, junction box or other storm sewer and sewer material removal shall

be disposed of by Contractor at Contractor's own disposal site and at Contractor's expense.

3.11 CONSTRUCTION STAKING

A. Refer to Section 00 73 00 - Supplementary Conditions, Paragraph SC-4.03.A.

3.12 SUBGRADE PREPARATION

A. All concrete paving, sidewalks, ramps, etc. shall include subgrade preparation. Contractor shall include cost of subgrade preparation with the appropriate related bid item.

3.13 TESTING

A. Subgrade: Owner shall arrange and pay for all subgrade testing that meets the required densities. Any re-tests shall be paid for by Contractor.

1. Soil Compaction shall meet the following requirements.

a. In critical areas (driven roadways, driveways, alleys, parking lots, under pavement: 98% of maximum standard proctor density, with moisture content at optimum (-) 3% to (+) 3% .

b. Under Structures: 98% of maximum standard proctor density, with moisture content at optimum (-) 3% to (+) 3%. Compact embankment shall extend a minimum of 5 feet outside of edge of foundation.

B. Trench: Owner shall arrange and pay for all trench testing that meets the required densities. Any re-tests shall be paid for by Contractor.

1. Soil Compaction shall meet the following requirements.

a. Trench Backfill in critical areas (driven roadways, driveways, alleys, parking lots, under pavement) 98% of maximum standard proctor density, with moisture content at optimum (-) 3% to (+) 3%

b. Trench Backfill, not in critical areas: 95% of maximum standard proctor density, with moisture content at optimum (-) 3% to (+) 3%

c.

C. Concrete Testing: An independent testing agency employed by Owner shall perform quality control tests and materials testing.

1. The Owner will perform testing similar to specification Section 03 30 00 – 3.09 Field Quality Control and/or Section 32 13 13 – 3.12 Field Quality

3.14 WATER

A. Contractor shall make arrangements to obtain water from Owner, as necessary for construction of the work.

B. Contractor shall furnish all hose, hose adapters, backflow protection devices, meters and fittings necessary, and shall provide transportation and distribution of the water.

C. Contractor shall exercise care in drawing water from the water system and shall not draw water at a rate (when combined with municipal uses) that will reduce the water system storage level below 75% of the maximum.

D. If water is required to provide the proper moisture content for compaction, the transportation and distribution of water shall be considered incidental and subsidiary to other items of work for which direct payment is made.

E. All work associated with this shall not be measured and paid for directly but shall be considered incidental and subsidiary to other items of work for which direct payment is made. No separate payments will be made for this work.

3.15 OPERATION OF WATER SYSTEM VALVE AND WATER MAIN CONNECTIONS

A. No valve or other control on the existing water system shall be operated for any purpose by Contractor without prior permission of Owner.

B. Connections to existing water mains will be coordinated with Owner.

3.16 CLEANUP

A. Contractor shall return all areas disturbed by construction of the project to the original grade or to the finish grade as shown on Drawings and shall restore the site to as clean and sightly condition as before the work began.

B. Contractor shall keep the cleanup of the project current with the construction and shall not have any more than 300 feet of construction at any time during the project which has not been cleaned up.

C. During construction, areas to be maintained for traffic shall be kept clear of all hazardous materials, including but not limited to construction debris, dust, and mud.

D. The cleaning and sweeping of the streets in the construction area shall be completed prior to the completion of the project. The project cleanup shall be conducted to the satisfaction of Owner and Engineer and shall be completed prior to final acceptance of the project.

E. Contractor shall clean streets in project area whenever mud, dirt or debris is tracked onto to the streets as a result of the activities of Contractor, by his/her employees, sub-Contractors, suppliers or agents.

END OF SECTION

SECTION 02 41 13

DEMOLITION AND REMOVALS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Clearing of all tracts.

B. Removal and disposal of all buildings, lighting, traffic signals, guardrail, structures, headwalls, culverts, bridges, abandoned pipelines or utilities, foundations, manholes, pipelines, and other obstructions not designated to remain.

C. Removal of all sidewalks, pavement, driveways, trails, and other surfacing designated to be removed.

D. Salvaging disposition designated material.

E. Backfilling resulting cavities, when required.

1.02 REFERENCES

A. State Standard Specifications, latest edition.

1.03 UNIT PRICES

A. Remove Existing Structure:

1. Includes removal of all structures, piping and appurtenances identified for removal, transport of salvage items to location designated by Owner, disposal of non-salvageable materials and debris from site, and backfilling resulting cavities.

2. Method of Measurement and Pay Unit: By the unit (Each)

B. Remove Pavement:

1. Includes all pavement identified for removal in the plans regardless of type or thickness including sawing.

2. Method of Measurement and Pay Unit: By the square yard.

C. Remove Brick:

1. Includes all brick pavers identified for removal in the plans, salvaging, stacking on pallets, providing pallets, transport of palletized salvaged brick to location designated by Owner, and disposal of non-salvageable brick and materials.

D. Remove Sidewalk:

1. Includes all walks identified for removal in the plans regardless of type or thickness including sawing.

2. Method of Measurement and Pay Unit: By the square foot.

E. Remove Fence:

1. Includes all fence identified for removal.

2. Method of Measurement and Pay Unit: By the lineal foot.

F. Remove Drainage Structure:

1. Includes all inlets, junction boxes, manholes, headwall, etc.

2. Method of Measurement and Pay Unit: By each structure removed (Each).

G. Remove Drainage Piping:

1. Includes all types of storm sewer piping, culverts, and drain pipes.

2. Method of Measurement and Pay Unit: By the lineal foot.

1.04 QUALITY ASSURANCE

A. Perform work in accordance with State Standard Specifications.

1.05 REGULATORY REQUIREMENTS

A. Conform to local, state and federal regulations for disposal of debris.

B. Contractor to obtain, at Contractor's own expense, all permits or licenses for use and maintenance of dumps and waste sites.

C. Coordinate removal and or relocation of work with utility owner.

D. Conform to local, state and federal regulations for preparation and implementation of erosion control plan.

1.06 PROJECT CONDITIONS

A. Protect above and below grade utilities that remain.

B. Protect trees, plants and other features designated to remain as final landscaping.

C. Existing structures to remain in place until new replacement structure is complete unless noted otherwise in the drawings.

D. Non-salvageable materials become property of Contractor.

E. Salvageable materials shall become the property of Contractor, except those items to be salvaged and delivered to Owner. See Section 01 10 00 – Special Provisions for a listing and disposition details.

F. Protect benchmarks, survey control points and existing structures designated to be used in place from damage or displacement.

PART 2 - PRODUCTS

2.01 FILL MATERIAL

A. See Section 31 23 23 – Fill and Backfill for material specifications.

PART 3 - EXECUTION

3.01 PREPARATION

A. Provide, erect and maintain temporary barriers and security devices.

B. Protect existing landscaping materials, appurtenances and structures which are to remain.

C. Prevent movement of adjacent structures. Provide bracing and shoring as necessary.

D. Locate and mark location of utilities to remain.

E. Identify waste area/salvage area for placing removed materials.

3.02 REMOVAL

A. Excavate as necessary to perform removal, excavation cost incidental to the cost of the removal.

B. Basement walls, foundations, floors and miscellaneous structures:

1. Remove walls a minimum 2 feet below finish grade, or as indicated on the Plans.

2. Break concrete floors into pieces approximately 4 square feet; leave in place.

3. Backfill cavity with approved material.

C. Bridges, Culverts and Other Drainage Structures:

1. Remove abutments, piers, bents and walls entirely or to an elevation 2 feet below the subgrade, slope face or original ground level shown in the drawings or as directed by Engineer.

2. Remove piers in streams to 2 feet below natural stream bottom.

3. Dismantle, without damage, salvaged items; match and mark if appropriate for reassembly. Clean and transport to designated storage area.

4. Cut truss member joints apart to render them unfit for reuse on a public road.

D. Manholes, Catch Basins or Inlets to be Abandoned:

1. Plug pipe connections with flowable fill.

2. Backfill cavity with approved material.

E. Pile Cutoff Elevation:

1. Cut off or drive pile to the elevations shown in accordance with State Standard Specifications or a minimum of 2 feet below final grade or streambed.

2. Backfill cavity with approved material.

F. Remove paving, curbs, walks and driveways as indicated. Neatly saw cut edges at right angle to surface. Saw paving, curbs, walks and driveways full depth.

G. Remove paving brick:

1. All removed brick shall be salvaged, unless otherwise stated in Section 01 10 00 – Special Provisions. All whole salvaged brick shall be removed and place on pallets (provided by the Contractor). Loaded pallets shall be transported to the Owner's storage area.

2. All broken or unusable brick shall be disposed of by the Contractor.

H. Roadway lighting, sign lighting and traffic signals.

I. Signs, Sign Support Structures and Foundations:

1. Removal in accordance with State Standard Specifications.

3.03 REMOVING PORTION OF EXISTING STRUCTURE

A. Cut, chip and trim connecting edges to line and grade shown in the drawings.

B. Use care not to weaken or damage that portion of structure to be retained and used in place.

C. Expose, clean, straighten and extend reinforcing steel into new work as shown in the drawings.

3.04 DISPOSAL

A. Remove waste material from project site promptly as it is generated by construction operations; do not permit to accumulate. Unless directed, do not remove topsoil from the site.

B. Remove brush, rubbish, spoil, excess excavated material and material not suitable for backfill to off-site location of Contractor's choice.

C. Disposal areas shall be Contractor's responsibility and as legally permitted.

D. Grade final cover to allow for positive surface drainage.

E. Haul Routes:

1. Determine haul roads with approval of agency having jurisdiction over proposed roadway.

2. Make condition survey of haul roads prior to use and document with necessary photographs and written descriptions.

3. Keep reasonably free from dirt, dust, mud and other debris from construction operations.

4. Clean a minimum of twice a week.

5. Repair any damaged haul roads to match existing conditions before use.

6. No extra payment will be made for removals regardless of disposal locations.

7. Temporary haul routes (roads) developed by the Contractor shall be completely removed at the completion of the project and the area returned to its original condition. The cost of temporary haul routes shall be incidental to the cost of the project.

3.05 SALVAGED MATERIALS

A. Carefully remove, load, transport, unload and store materials and items designated as salvage.

B. Reinstall salvage material and items as shown in the drawings.

C. Reinstall street signage.

D. Reinstall mailboxes at the height and location as per U.S. Postal Service requirements.

3.06 TESTING

A. Owner to arrange and pay for density testing of backfill.

B. Contractor pays for retesting.

END OF SECTION

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Concrete formwork

B. Floors and slabs on grade

C. Concrete foundation walls

D. Elevated concrete slabs

E. Concrete reinforcement

F. Joint devices associated with concrete work

G. Miscellaneous concrete elements, including equipment pads, light pole bases, thrust blocks and manholes

H. Concrete curing

1.02 REFERENCES

A. ACI 211.1 – Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete

B. ACI 301 – Specifications for Structural Concrete for Buildings

C. ACI 302.1R – Guide for Concrete Floor and Slab Construction

D. ACI 304R – Guide for Measuring, Mixing, Transporting, and Placing Concrete

E. ACI 305R – Hot Weather Concreting

F. ACI 306R – Cold Weather Concreting

G. ACI 309R – 05 Guide to Consolidation of Concrete

H. ACI 315 – Standard Practice for Detailing Reinforced Concrete Structures

I. ACI 351 – Grouting Between Foundations and Bases for Support of Equipment and Machinery

J. ASTM C 33 – Standard Specification for Concrete Aggregates

K. ASTM C 39 – Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens

L. ASTM C 94 – Standard Specification for Ready-Mixed Concrete

M. ASTM C 143 – Standard Test Method for Slump of Hydraulic-Cement Concrete

N. ASTM C 150 – Specification for Portland Cement

O. ASTM C 171 – Standard Specification for Sheet Materials for Curing Concrete

P. ASTM C 173 – Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method

Q. ASTM A 185 – Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete (Withdrawn 2013)

R. ASTM C 260 – Standard Specification for Air-Entraining Admixtures for Concrete

S. ASTM C 309 – Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete

T. ASTM C 311 – Standard Test Methods for Sampling and Testing Fly Ash or Natural Pozzolans for Use in Portland - Cement Concrete

U. ASTM C 494 – Standard Specification for Chemical Admixtures for Concrete

V. ASTM A 497 – Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete (Withdrawn 2013)

W. ASTM A 615 – Standard Specification for Deformed and Carbon-Steel Bars for Concrete Reinforcement

X. ASTM C 618 –- Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete

Y. ASTM C 920 – Standard Specification for Elastomeric Joint Sealants

Z. ASTM C 1017 – Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete

AA. ASTM C 1074 – Standard Practice for Estimating Concrete Strength by the Maturity Method

BB. ASTM C 1077 – Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation

CC. ASTM C 1116 – Standard Specification for Fiber-Reinforced Concrete

DD. ASTM D 2628 – Standard Specification for Preformed Polychloroprene Elastomeric Joint Seals for Concrete Pavements

EE. ASTM D 5893 – Standard Specification for Cold Applied, Single Component, Chemically Curing Silicone Joint Sealant for Portland Cement Concrete Pavements.

FF. ASTM DD 6690 – Standard Specification for Joint and Crack Sealants, Hot-Applied for Concrete and Asphalt Pavements

GG. ASTM E 329 – Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection

HH. ASTM E 548 – Standard Guide for General Criteria Used for Evaluating Laboratory Competence

II. ASTM E 1643 – Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs

JJ. AASHTO M 33 – Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type)

KK. AASHTO M 182 – Standard Specification for Burlap Cloth Made from Jute or Kenaf and Cotton Mats

LL. State Standard Specifications for Highway Construction, Latest Addition, including all current supplemental specifications

MM. NSF 61 – Drinking Water System Components - Health Effects

1.03 UNIT PRICES

A. Concrete - Slab on Grade or Vertical in Forms or Miscellaneous Locations:

1. Includes formwork, reinforcement, concrete, placement accessories, consolidating and leveling, troweling and curing.

2. Method of measurement and pay unit by the cubic yard, square yard, as shown on the Bid Form, or as described in the Special Provisions Section 01 10 00.

3. Components and accessories are subsidiary items to placing concrete.

1.04 SUBMITTALS

A. Product Data: Submit manufacturer's data on manufactured material and products indicated.

B. Design Mixes:

1. Submit the proposed mix design for each class of concrete to Engineer and testing firm for review prior to commencement of concrete operations.

2. Specify amounts of mix water to be withheld for later addition at project site, if any.

3. Provide the source, type, name, and amount of each admixture in the design mix.

C. Material Certificates: Signed by manufacturers certifying that each of the following items complies with requirements:

1. Cementitious materials and aggregates.

2. Steel reinforcement and reinforcement accessories.

3. Admixtures.

D. Mockup Panels:

1. Contractor may be required to construct and erect a mockup panel for architectural surfaces, finishes, colors or other treatments.

E. Shop Drawings - Steel Reinforcement: Details of fabrication, bending and placement prepared according to ACI 315.

1. Included material, grade, bar schedules, stirrup spacing, bent bar diagrams, arrangement and supports of concrete reinforcement.

2. Include special reinforcement required for openings through concrete structures.

F. Project Record Documents: Accurately record locations of embedded utilities and components that will be concealed from view upon completion of concrete work.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed concrete work similar in material, design and extent to that indicated for this project and whose work has resulted in construction with a record of successful in-service performance.

B. Concrete Supplier's Qualifications: Firm experienced in manufacturing ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.

1. Concrete Supplier's must be certified according to the National Ready Mixed Concrete Association Certification of Ready Mixed Concrete Production Facilities.

C. Testing Agency Qualifications: Independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 to conduct testing indicated, as documented according to ASTM E 548.

1. Personnel conducting tests shall be qualified as ACI concrete field testing technician, Grade 1, according to ACI CP-1 or an equivalent certification program.

D. Obtain each type or class of cementitious material of the same brand from the same source, aggregate from same source and each admixture from same source.

PART 2 - PRODUCTS

2.01 FORMWORK

A. Form Materials: Contractor's choice of standard products with sufficient strength to withstand hydrostatic head without distortion in excess of permitted tolerances.

1. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true and smooth concrete surfaces. Furnish in largest practical sizes to minimize number of joints.

a. Plywood, metal or other approved panel materials.

b. Use of aluminum forms is prohibited.

2. Rough-Formed Finished Concrete: Plywood, lumber, metal or other approved material. Provide dressed lumber on at least 2 edges and 1 side for tight fit. Use of aluminum forms is prohibited.

3. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber reinforced plastic, paper or fiber tubes that will produce surfaces that meet specified formwork surface class. Use of aluminum forms is prohibited. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.

4. Chamfer Strips: Wood, metal, PVC or rubber strips 3/4 inch by 3/4 inch minimum.

5. Form Coating: Commercially formulated release agent that will not bond, stain or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

    a. For steel forms, formulate form-release agent with rust inhibitor.

6. Form Ties: Cone snap type that will leave no metal within 1 1/2 inches of concrete surface. Form ties with a waterstop shall be used for any structure that its intended purpose is to hold a liquid (i.e., water, wastewater, swimming pools, etc.).

2.02 REINFORCEMENT

A. Reinforcing Steel:

1. ASTM A 615 Grade 60

    a. New, deformed billet-steel bars.

    b. Unfinished.

B. Plain-Steel Welded Wire reinforcement:

1. ASTM A 185, plain, fabricated from as-drawn steel wire into flat sheets.

    a. Rolled sheets are not permitted.

C. Deformed-Steel Welded Wire Reinforcement:

1. ASTM A 497, flat sheet

    a. Rolled sheets are not permitted.

D. Dowel Bars:

1. ASTM A 615 Grade 60.

    a. New, smooth round steel bars.

    b. Coated with organic coating AASHTO M 254, corrosion resistant coated dowel bars.

2. Cut bars true to length with ends square and free of burrs.

E. Reinforcement Accessories:

1. Tie Wire: Annealed, minimum 16 gauge.

2. Chairs, Bar Supports, Bolsters, Spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place shall comply with CRSI's "Manual of Standard Practice’.

3. Chairs, Bar Supports, Bolsters, Spacers, and other devices for spacing: Sized and shaped for adequate support of reinforcement during concrete placement.

2.03 CONCRETE MATERIALS

A. Concrete Materials:

1. Concrete shall consist of aggregate, Portland cement, water, approved air-entraining and other admixtures and pozzolans.

B. Cement:

1. Type I, Type II, Type I/II and Type III Portland cement shall conform to the requirements in ASTM C 150 with the following additional requirements:

   a. Portland cement shall not contain more than 0.60 percent equivalent alkali.

   b. Processing additions may be used in the manufacture of the cement, provided such materials have been shown to meet the requirements of ASTM C 465 and the total amount does not exceed 1 percent of the weight of Portland cement clinker.

2. Interground and Blended Cement shall conform to the requirements in ASTM C 595 with the following additional requirements:

   a. Interground/Blended cement Type IP

      (i) Type IP(25) shall be composed of Class F fly ash or Class N pozzolan replacement shall be 25%+/-2%

      (ii) Type IP(20) shall be composed of Class F fly ash or Class N pozzolan replacement shall be 20%+/-2%

   b. Interground/Blended cement Type IT

      (i) For SCMs, slag cement and limestone, the maximum replacement by weight shall be 40%. The manufacturer has a production tolerance of +2% from the proposed replacement.

      (ii) For slag cement, the maximum replacement shall be 20% or less when incorporated into the final Interground/Blended cement.

      (iii) For limestone cement, the replacement range shall be from 5.1% to 10.0% when incorporated into the final Interground/Blended cement.

C. Normal weight Fine and Coarse Mix Aggregate:

1. Mineral aggregates shall be crushed rock, broken stone, gravel, sand-gravel, coarse sand, fine sand, or a mixture of these materials composed of clean, hard, durable, and uncoated particles.

2. Shall meet the requirements in ASTM C 33.

3. Aggregates shall be free from injurious quantities of dust, soft or flaky particles, loams, alkali, organic matter, paper, wood, or other deleterious matter as determined by Engineer.

4. Free of materials with deleterious reactivity to alkali in cement.

D. Fly Ash: Shall meet the requirements in Class F; ASTM C 618 and ASTM C 311.

1. The use of Class C Fly ash is not acceptable in any concrete on this project.

E. Water:

1. Shall meet the requirements in ASTM C 94 and potable.

2. Water shall be free from objectionable quantities of oil, acid, alkali, salt, organic matter, or other deleterious materials.

2.04 ADMIXTURES

A. Contractor shall report the source, type, name, and amount of each admixture.

B. Air-Entrainment Admixture:

1. Shall meet the requirements in ASTM C 260.

2. For concrete that requires shrinkage reducing admixture, ensure that the air entrainment admixture that meets the shrinkage reducing admixture's manufacturer's requirements is utilized.

C. Plasticizing and Retarding Admixture: Shall meet the requirements in ASTM C 1017.

D. Other Chemical Admixtures:

1. Refer to approved products list in the applicable State or Local Standard Specifications or as specified in Section 01 10 00 - Special Provisions.

2. Admixtures shall meet the requirements in ASTM C 494.

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

4. Admixture shall not contain more than 1 percent of chlorides calculated as calcium chloride.

2.05 CONCRETE ACCESSORIES

A. Vapor Retarder: 10 mil thick nonwoven, polyester-reinforced, polyethylene coated sheet, type recommended for below grade application.

B. Waterstops:

1. Corps of Engineers (COE) CRD-C 572 and ASTM Standards

2. PVC type

3. Factory fabricated corners, intersections and directional changes.

4. Profile: Flat, ribbed with center bulb.

5. Size: 4", unless specified differently on the Plans or Special Provisions.

6. Pre-approved Manufacturers:

a. Greenstreak

b. Progress Unlimited, Inc.

c. Westec Barrier Technologies

d. Williams Products, Inc.

e. Approved Equivalent

C. Joint Filler: Preformed, non-extruding, bituminous type, AASHTO M 33.

D. Joint Sealer:

1. Asphaltic, hot poured, ASTM D 6690, Type II.

a. Application: Use for joints in vehicular traffic areas.

2. Silicone, cold applied, ASTM D 5893.

a. Application: Use for joints in vehicular traffic areas.

3. General Purpose Exterior Sealant: Polyurethane; ASTM C 920, Grade NS, Class 25, Uses T, I, M, A; single component. (Not for use in highway and airfield pavements and bridges.)

a. Applications: Use for:

(i) Control, expansion, and soft joints in masonry.

(ii) Joints between concrete and other materials.

(iii) Joints between metal frames and other materials.

(iv) Other exterior joints for which no other sealant is indicated.

4. Exterior Preformed Expansion Joint Sealer: ASTM D 2628, hollow neoprene (polychloroprene) compression gasket, black in color, supplied in proper size and shape to perform for the finished joint detail on Drawings.

a. Applications: Use for:

(i) Exterior wall expansion joints.

(ii) Parking deck expansion joints.

5. Concrete Paving Joint Sealant: Polyurethane, self-leveling; ASTM C 920, Class 25 100/50, Uses T, I, M and A; single component, color gray.

a. Applications: Use for:

(i) Joints in sidewalks, pedestrian walkways and vehicular paving (other than highway and airfield pavements and bridges) where a self-leveling sealant is appropriate.

2.06 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz/sq yd dry.

C. Moisture-Retaining Cover: ASTM C 171; clear polyethylene or white burlap-polyethylene sheet.

D. Water: Potable.

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.

F. Liquid Membrane-Forming Compounds for Curing Concrete: White pigmented, AASHTO M 148, Type 2.

2.07 CONCRETE MIX DESIGN

A. Specific mix design criteria for project components as stated in Section 01 10 00 – Special Provisions.

B. For trial mixtures method, employ independent testing agency acceptable to Engineer for preparing and reporting proposed mix designs.

C. Admixtures: Add acceptable admixtures as recommended in ACI 211 and at rates recommended by manufacturer.

1. Use water-reducing admixture or high-range water-reducing admixture (superplasticizers) in concrete, as required, for placement and workability.

2. Use water-reducing and retarding admixture when required by high temperatures, low humidity or other adverse placement conditions.

D. Non-Shrink Grout:

1. 6 sack grout, with the following quantities:

a. Cement: Type I, 2.87 cubic feet

b. Sand: Masonry sand, 17.97 cubic feet

c. 6% entrained air

d. Water: 4.54 cubic feet

e. POZZ 900 oz./100 admixture, 12 per mix

f. Water-Cementitious Ratio: 0.502 at SSD aggregate moisture

g. Unit Weight: 140.20 lbs./cf

E. Maximum Water-Cementitious Materials Ratio: As specified by the applicable State or Local Standard Specifications or as specified in Section 01 10 00 - Special Provisions.

F. Air Content: As specified by the applicable State or Local Standard Specifications or as specified in Section 01 10 00 - Special Provisions.

2.08 MIXING

A. Ready-Mixed Concrete: Measure, batch, mix and deliver concrete according to ASTM C 94 and ASTM C 1116 and furnish batch ticket information.

1. When air temperature is between 85- and 90-degrees F, reduce mixing and delivery time from 1 1/2 hours to 75 minutes. When air temperature is above 90 degrees F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.01 EXAMINATION

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

B. Verify compacted subgrade is acceptable and ready to support footings, slabs and any other imposed loads.

3.02 PREPARATION

A. Notify Engineer a minimum of 48 hours prior to commencement of concreting operations.

B. Formwork: Comply with requirements of ACI 301. Design and fabricate forms to support all applied loads until concrete is cured.

1. Set edge forms, bulkheads and intermediate screed strips for slabs to achieve required alignment, elevation and slope in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

2. Chamfer exterior corners and edges of permanently exposed concrete.

3. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt and other debris just before placing concrete.

4. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

5. Verify that forms are clean and free of rust before applying release agent. Coat contact surfaces of forms with form-releasing agent, according to manufacturer's directions, before placing reinforcement.

6. Use of excavated earth back form shall not be permitted unless approved by Engineer. All structural walls shall be formed with form panels.

C. Removing and Reusing Forms:

1. Fabricate and assemble formwork to permit easy stripping and dismantling without damage to concrete. Forms shall be easily removed without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical. Kerf wood inserts for forming keyways, reglets, recesses and the like for easy removal.

2. Formwork for sides of beams, walls, columns and similar parts of the work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 degrees F for 24 hours after placing concrete, provided concrete is hard enough to prevent damage by form removal operations,

concrete has adequate strength to maintain structural integrity of the work and curing and protection operations are maintained.

3. Leave formwork for beam soffits, joists, slabs and other structural elements that support weight of concrete in place until concrete has achieved at least 70 percent of 28-day design compressive strength.

4. Clean and repair surfaces of forms to be reused in the work. Split, frayed, delaminated or otherwise damaged form-facing material is not acceptable for exposed surfaces. Apply new form-release agent.

5. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms on exposed concrete surfaces unless approved by Engineer.

D. Embedded Items:

1. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions and directions furnished with items to be embedded.

a. Install anchor bolts, accurately located, to elevations required.

E. Coordinate placement of joint devices with erection of concrete formwork and placement of form accessories.

F. Vapor Retarder Under Interior Slabs on Grade:

1. Place, protect and repair vapor-retarder sheets according to ASTM E 1643 and manufacturer's instructions.

3.03 REINFORCEMENT

A. Delivery, Storage and Handling

1. Deliver, store and handle steel reinforcement to prevent bending and damage. Avoid damaging coatings on steel reinforcement.

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

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

C. Accurately position, support and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

D. Tying Reinforcement:

1. Tie reinforcing bars securely in place at all points where bars cross other reinforcing bars.

2. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

E. Install welded wire reinforcement in longest practical length on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least 1 mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Splice laps with tie wire.

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

G. Welding on reinforcing steel is prohibited unless specifically authorized by Engineer.

3.04 JOINT PLACEMENT

A. Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired at locations indicated or as approved by Engineer.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.

2. Form with preformed galvanized steel, plastic keyway-section forms or bulkhead forms with keys unless otherwise indicated. Embed keys at least 1 1/2 inches into concrete.

3. Locate joints for beams, slabs, joists and girders in the middle third of span. Offset joints in girders a minimum distance of twice the beam width from beam-girder intersection.

4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, girders and at top of footings or floor slabs.

5. Space vertical joints in walls as indicated. Locate joints beside piers integral with walls, near corners and in concealed locations where possible.

6. Use bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Contraction Joints in Slabs-on-Grade. Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least 1/4 of concrete thickness as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate tool marks on concrete surfaces.

2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints into concrete when cutting action will not tear, abrade or otherwise damage surface and before concrete develops random contraction cracks.

D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams and other locations as indicated.

1. Extend joint filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.

2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface where joint sealants are indicated.

3. Install joint-filler strips in lengths as long as practical. Where more than one length is required, lace or clip sections together.

E. Dowel Joints: Install dowel sleeves and dowels or dowel bar and support assemblies at joints where indicated. Use dowel sleeves or lubricate or asphalt-coat 1/2 of dowel length to prevent concrete bonding to 1 side of joint.

F. Waterstops:

1. Flexible Waterstops: Install in construction joints as indicated to form a continuous diaphragm. Install in longest lengths practical. Support and protect exposed waterstops during progress of work. Field fabricate joints in waterstops according to manufacturer's instructions.

3.05 PLACING CONCRETE

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

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

C. Before placing concrete, verify that installation of formwork, reinforcement and embedded items are complete and required inspections have been performed.

D. Repair vapor retarder damaged during placement of concrete reinforcing. Repair with vapor retarder material; lap over damaged areas a minimum of 6 inches and seal watertight.

E. Install joint devices in accordance with manufacturer's instructions.

F. Ensure reinforcement, embedded parts and forms are not disturbed during concrete placement.

G. Do not add water to concrete during delivery, at project site or during placement unless approved by Engineer.

H. Deposit concrete continuously or in layers at such thickness that no concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as specified. Deposit concrete to avoid segregation. Concrete free fall distance shall not exceed 5 feet. This includes free fall in a discharge pipe. Chutes and tremie pipes may be used for conveying concrete to the forms when authorized by Engineer.

I. Deposit concrete in forms in horizontal layers no deeper than 18 inches and in a manner to avoid inclined construction joints. Place each layer while preceding layer is still plastic to avoid cold joints.

1. Consolidate placed concrete with mechanical vibrating equipment. Use equipment and procedures for consolidating concrete recommended by ACI 309R.

2. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations no farther than the visible effectiveness of the vibrator. Place vibrators to rapidly penetrate placed layers and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration as necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mix constituents to segregate.

J. Deposit and consolidate concrete for floors and slabs in continuous operation, within limits of construction joints, until placement of panel or section is complete.

1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.

2. Maintain reinforcement in position on chairs during concrete placement.

3. Screed slab surfaces with a straightedge and strike off to correct elevations.

4. Slope surfaces uniformly to drains where required.

5. Begin initial floating using bull floats or darbies to form a uniform and open-texture surface plane, free of humps or hollows, before excess moisture or bleedwater appears on surface. Do not further disturb slab surfaces before starting finishing operations.

K. Pumping Concrete:

1. Pump concrete into forms in a continuous stream and free of air pockets. Eject concrete in the pipeline in such a manner that there will be no contamination or segregation of the concrete.

2. Use pump discharge pipes designed to maintain a positive pressure head on the concrete. Free fall distance shall not exceed 5 feet at discharge.

3. Perform air test, slump tests and fabrication of concrete test cylinders at the final discharge point.

L. Cold-Weather Placement: Comply with ACI 306.1 and as follows:

1. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions or low temperatures.

2. When air temperature has fallen to or is expected to fall below 40 degrees F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 degrees F and not more than 80 degrees F at point of placement.

3. Do not use frozen materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.

4. Do not use calcium chloride, salt or materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mix designs.

M. Hot-Weather Placement: Comply with ACI 305R and as follows when hot weather conditions exist:

1. Cool ingredients before mixing to maintain concrete temperature below 90 degrees F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.

2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.

3. Fog-spray forms, steel reinforcement and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots or dry areas.

N. Screed floors level, maintaining surface flatness of maximum 1/4 inch in 10 feet.

3.06 CONCRETE FINISHING

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

B. Unexposed Form Finish: Rub down or chip off fins or other raised areas 1/4 inch or more in height.

C. Exposed Form Finish: Rub down or chip off and smooth fins or other raised areas 1/4 inch or more in height. Provide finish as follows:

1. Smooth Rubbed Finish: Wet concrete and rub with carborundum brick or other abrasive not more than 24 hours after form removal.

2. Grout Cleaned Finish: Wet areas to be cleaned and apply grout mixture by brush or spray; scrub immediately to remove excess grout. After drying, rub vigorously with clean burlap and keep moist for 36 hours.

3. Cork Floated Finish: Immediately after form removal, apply grout with trowel or firm rubber float, compress grout with low-speed grinder and apply final texture with cork float.

D. Concrete Floors and Slabs: Finish to requirements of ACI 302.1R and as follows:

1. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats. Straighten, cut down high spots and fill low spots. Repeat float passes and straightening until surface is left with a uniform, smooth, granular texture.

a. Apply float finish to surfaces indicated, to surfaces to receive trowel finish, and to floor and slab surfaces to be covered with fluid-applied or sheet waterproofing, built-up membrane roofing or sand-bed terrazzo.

2. Trowel Finish: After applying float finish, apply first trowel finish and consolidate concrete by hand or power-driven trowel. Continue troweling passes and straighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

    a. Apply a trowel finish to surfaces indicated and to floor and slab surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic, or quarry tile set over a cleavage membrane, paint or another thin-film finish coating system.

    b. Finish and measure surface so gap at any point between concrete surface and an unleveled freestanding 10-foot long straightedge, resting on 2 high spots and placed anywhere on the surface, does not exceed 1/4 inch.

3. Trowel and Fine-Broom Finish: Apply a partial trowel finish, stopping after second troweling, to surfaces indicated and to surfaces where ceramic or quarry tile is to be installed by either thick-set or thin-set method.

    a. Immediately after second troweling, and when concrete is still plastic, slightly scarify surface with fine broom.

4. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps and elsewhere as indicated.

    a. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Engineer before application.

5. Burlap Drag Finish: Apply a burlap drag finish to paving, parking areas and elsewhere as indicated.

    a. Immediately after float finishing, texture by dragging a wet burlap, carpet or canvas belt over full width of surface in longitudinal direction.

    b. Suspend drag from mandrel or similar device to ensure uniform texture.

    c. Rinse or wash drags as necessary to obtain uniform texture.

    d. Replace drags which cannot be cleaned.

3.07 CURING AND PROTECTION

A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold weather protection and with recommendation in ACI 305R for hot weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry or windy conditions cause moisture loss approaching 0.2 lb/sq ft per hour before and during finishing operations.

1. If the rate of evaporation approaches 0.2 lb/sq ft per hour, Contractor must notify Engineer regarding the additional actions that will be taken to prevent plastic shrinkage cracking.

2. Obtain rate of evaporation from applicable State or local Standard Specification.

C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing by one or a combination of methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than 7 days with the following materials:

a. Water.

b. Continuous water-fog spray.

c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

2. Moisture-Retaining Cover Curing: Cover concrete surfaces and sides with moisture-retaining cover for curing concrete, placed in widest practical width, lapped at least 12 inches and sealed with waterproof tape or adhesive. Cure for not less than 7 days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.

b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.

c. Cure concrete surfaces to receive floor covering with either a moisture-retaining cover or a manufacturer recommended curing compound for use with floor coverings.

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's directions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.

4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's directions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Repeat process 24 hours later and apply second coat. Maintain continuity of coating and repair damage during curing period.

D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings and other surfaces, by one of the methods listed above in formed surfaces.

3.08 JOINT FILLING

A. Prepare, clean and install joint filler according to manufacturer's directions.

B. Remove dirt, debris, saw cuttings, curing compounds and sealers from joints; leave contact faces of joint clean and dry.

C. Install semi-rigid epoxy joint filler depth in saw-cut joints and at least 2 inches into deep-formed joints. Overfill joint and trim joint filler flush with lip of joint after hardening.

D. Seal joints in conformance with Drawings and according to manufacturer's directions for joint sealer product used.

E. For preformed compression seals install compressed into the joint, with manufacturer-approved equipment and installation method.

F. If adhesion is not satisfactory, the joint sealer material will be removed and the joint cleaned and resealed at no cost to Owner.

3.09 FIELD QUALITY CONTROL

A. An independent testing agency employed by Owner shall perform field quality control tests as specified in Section 01 40 00 - Quality Requirements.

1. Contractor shall provide free access to concrete operations at project site and cooperate with testing agency.

2. Contractor shall submit proposed mix design of each class of concrete to Engineer and testing agency for review prior to commencement of concrete operations.

3. Results of testing shall be furnished in a timely manner to Owner, Engineer and Contractor, in writing.

4. Field testing and laboratory testing of concrete will be performed by testing agency employed by Owner to determine conformance with specified requirements.

5. Strength Testing:

a. Compressive Strength Test Samples: ASTM C 39. For each test, mold and cure 3 concrete test cylinders. A set of 3 test cylinders shall be collected for every 100 cubic yard or fractional part thereof for each class of concrete placed in a day. At least one set of cylinders is required for each day concrete placement takes place.

(i) One additional cylinder may be required for a break prior to 7 days.

(ii) Take 1 additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.

b. Maturity Method for Estimating Strength: ASTM C 1074. The Contractor may elect to utilize the maturity curve method to determine concrete strength. The Contractor must notify the Engineer in writing and submit a Plan with any changes applicable with State or local standard specifications.

6. Perform 1 slump test for each set of test cylinders taken.

a. If the concrete mixture is excessively wet causing segregation, excessive bleeding, or any other undesirable condition, the concrete shall be rejected.

b. If the slump is outside the allowable limits specified in Section 01 10 00 - Special Provisions, the load of concrete shall be rejected.

7. Perform 1 air content test for each set of test cylinders taken.

a. If the air content is less than the minimum specified, only one addition of air-entraining admixtures is allowed.

b. If the air content is then outside the allowable limits specified in Section 01 10 00 - Special Provisions, the load of concrete shall be rejected.

B. The independent testing agency employed by Owner will maintain records of placed concrete items and Contractor shall assists testing agency as necessary to accomplish the completion of this record keeping. Records will include type of test samples taken, all test results, date and location of sample collected, concrete test cylinder number, quantity of concrete placed and slump, air content, air temperature test results.

C. Additional Tests: The testing agency employed by Owner shall make additional tests of concrete, as directed by Engineer, when test results indicate that slump, air entrainment, compressive strengths or other requirements have not been met.

1. The cost for this additional testing will be paid for by Contractor.
2. If any additional testing is required to isolate failures, this shall be considered retests and shall be paid for by Contractor.

3.10 DEFECTIVE CONCRETE

A. All materials which Engineer determines to be damaged, defective, or otherwise unsuitable for use will be rejected and shall be removed and replaced at Contractor's expense.

B. Contractor will be required to take corrective measures for high spots or low areas by removal and replacement, or by grinding with a machine equipped with multiple diamond blades with spacers to the required profile. If grinding is used, utilize methods which do not break the cement and aggregate bond. Engineer will determine whether defective concrete will be repaired, or if it will be rejected and removed and replaced. Contractor shall submit the proposed corrective action plan and receive Engineer AND Owner approval prior to performing corrective measures. The approved corrective measure will be done at Contractor's expense.

C. Contractor will be required to take corrective measures for any cracking of concrete no matter what the cause. The corrective measures may include routing and sealing the cracks or removal and replacement. Engineer will determine whether defective concrete will be repaired, or if it will be rejected and removed and replaced. Contractor shall submit the proposed corrective action plan and receive Engineer AND Owner approval prior to performing corrective measures. The approved corrective measures will be done at Contractor's expense.

D. Joints: Contractor will be required to take corrective measures for any joints that in the opinion of Engineer are not constructed per the plans and specifications. Contractor shall submit the proposed corrective action plan and receive Engineer AND Owner approval prior to performing corrective measures. The approved corrective measures will be done at Contractor's expense.

E. Contractor will be required to take corrective measures for any concrete containing excessive honeycombing, spalling, fractures, chips and concrete that does not conform to required lines, details, dimensions, tolerances, specified requirements or other defects at no additional cost to Owner. The corrective measures may include repairing concrete or removal and replacement of concrete. Engineer will determine whether defective concrete will be repaired, or if it will be rejected and removed and replaced. Contractor shall submit the proposed corrective action plan and receive Engineer AND Owner approval prior to performing corrective measures. The approved corrective measures will be done at Contractor's expense.

F. Contractor must protect the concrete from damage due to rain, premature drying, excessive hot or cold temperatures, foot traffic and vehicular traffic. Failure to properly protect concrete may constitute cause for repairing or for removal and replacement of defective concrete. Engineer will determine whether defective concrete shall be repaired, or if it shall be rejected and removed and replaced. Contractor shall submit the proposed corrective action plan to address the defective concrete and receive Engineer AND Owner approval prior to performing corrective measures. The approved corrective measures will be done at Contractor's expense.

G. The cost of any additional testing performed as a result of repairing or removal and replacement of defective concrete shall be borne by Contractor when defective concrete is identified.

3.11 TOLERANCES

A. Maximum Variation of Surface Flatness: 1/8 inch in 10 feet.

B. Maximum Variation from True Position: 1/4 inch.

C. All concrete shall meet or exceed the strength requirement of the specifications.

1. If concrete does not meet the minimum strength requirement, the Contractor may elect to further evaluate the use of the concrete in place. Evaluation shall be performed by the Engineer of record, at the Contractor's expense. .

2. Concrete not approved by the Engineer shall be rejected and shall be removed and replaced at Contractor's expense.

D. All concrete shall meet or exceed the minimum thickness as per the plans and specifications.

1. If concrete does not meet the minimum thickness requirement, the Contractor may elect to further evaluate the use of the concrete in place. Evaluation shall be performed by the Engineer of record, at the Contractor's expense.

2. Concrete not approved by the Engineer shall be rejected and shall be removed and replaced at Contractor's expense.

END OF SECTION

SECTION 07 90 00

JOINT SEALERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Sealants and joint backing.

B. Precompressed foam sealers.

C. Hollow gaskets.

1.02 REFERENCES

A. ASTM C 834 - Standard Specification for Latex Sealants; 2000.

B. ASTM C 919 - Standard Practice for Use of Sealants in Acoustical Applications; 2002.

C. ASTM C 920 - Standard Specification for Elastomeric Joint Sealants; 2002.

D. ASTM C 1193 - Standard Guide for Use of Joint Sealants; 2000.

E. ASTM D 1056 - Standard Specification for Flexible Cellular Materials--Sponge or Expanded Rubber; 2000.

F. ASTM D 1667 - Standard Specification for Flexible Cellular Materials--Vinyl Chloride Polymers and Copolymers (Closed-Cell Foam); 1997.

G. ASTM D 2628 - Standard Specification for Preformed Polychloroprene Elastomeric Joint Seals for concrete Pavements; 1991 (Reapproved 1998).

1.03 SUBMITTALS

A. Product Data: Provide data indicating sealant chemical characteristics.

B. Samples: Submit two samples, 2x2 inch in size illustrating sealant colors for selection.

C. Manufacturer's Installation Instructions: Indicate special procedures.

1.04 QUALITY ASSURANCE

A. Maintain one copy of each referenced document covering installation requirements on site.

B. Applicator Qualifications: Company specializing in performing the work of this section with minimum two years experience.

1.05 ENVIRONMENTAL REQUIREMENTS

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

1.06 COORDINATION

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

1.07 WARRANTY

A. Correct defective work within warranty period.

B. Warranty: Include coverage for installed sealants and accessories which fail to achieve

airtight seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Silicone Sealants:

1. Bostik: www.bostik.com.
2. Dow Corning Corp: www.dowcorning.com.
3. GE Plastics: www.geplastics.com.
4. Pecora Corporation: www.pecora.com.
5. Sonneborn Building Products, ChemRex, Inc: www.chemrex.com.
6. Tremco, Inc: www.tremcosealants.com.

B. Polyurethane Sealants:

1. Bostik: www.bostik.com.
2. Pecora Corporation: www.pecora.com.
3. Sonneborn Building Products, ChemRex, Inc: www.chemrex.com.
4. Tremco, Inc: www.tremcosealants.com.

C. Polysulfide Sealants:

1. Morton International, Inc.
2. Pecora Corporation: www.pecora.com.
3. Sonneborn Building Products, ChemRex, Inc: www.chemrex.com.

D. Acrylic Sealants:

1. Tremco, Inc: www.tremcosealants.com.

E. Butyl Sealants:

1. Bostik: www.bostik.com.
2. Pecora Corporation: www.pecora.com.
3. Tremco, Inc: www.tremcosealants.com.

F. Acrylic Emulsion Latex Sealants:

1. Bostik: www.bostik.com.
2. Pecora Corporation: www.pecora.com.
3. Sonneborn Building Products, ChemRex, Inc: www.chemrex.com.
4. Tremco, Inc: www.tremcosealants.com.

G. Preformed Compressible Foam Sealers:

1. Emseal Joint Systems, Ltd: www.emseal.com.
2. Sandell Manufacturing Company, Inc: www.sandellmfg.com.

3. Polytite Manufacturing Corporation: www.polytite.com.

2.02 SEALANTS

A. General Purpose Exterior Sealant: Polyurethane; ASTM C 920, Grade NS, Class 25, Uses M, G, and A; single component.

1. Applications: Use for:

a. Control, expansion, and soft joints in masonry.

b. Joints between concrete and other materials.

c. Joints between metal frames and other materials.

d. Other exterior joints for which no other sealant is indicated.

B. Exterior Expansion Joint Sealer: ASTM D 2628, hollow neoprene (polychloroprene) compression gasket.

1. Black color.

2. Size and Shape: As indicated on Drawings.

3. Applications: Use for:

a. Exterior wall expansion joints.

b. Parking deck expansion joints.

C. General Purpose Interior Sealant: Acrylic emulsion latex; ASTM C 834, Type OP, Grade NF single component, paintable.

1. Color: Standard colors matching finished surfaces.

2. Applications: Use for:

a. Interior wall and ceiling control joints.

b. Joints between door and window frames and wall surfaces.

c. Other interior joints for which no other type of sealant is indicated.

D. Silicone Sealant: White silicone; ASTM C 920, Uses I, M and A; single component, mildew resistant.

E. Concrete Paving Joint Sealant: Polyurethane, self-leveling; ASTM C 920, Class 25, Uses T, I, M and A; single component.

1. Color: Gray.

2. Applications: Use for:

a. Joints in sidewalks and vehicular paving.

2.03 ACCESSORIES

A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.

B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.

C. Joint Backing: Round foam rod compatible with sealant; ASTM D 1667, closed cell PVC;

oversized 30 to 50 percent larger than joint width.

D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

PART 3 EXECUTION

3.01 EXAMINATION

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

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

3.02 PREPARATION

A. Remove loose materials and foreign matter which might impair adhesion of sealant.

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

C. Perform preparation in accordance with manufacturer's instructions and ASTM C 1193.

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

3.03 INSTALLATION

A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

B. Perform installation in accordance with ASTM C 1193.

C. Perform acoustical sealant application work in accordance with ASTM C 919.

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

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

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

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

H. Tool joints concave.

I. Compression Gaskets: Avoid joints except at ends, corners, and intersections; seal all joints with adhesive; install with face 1/8 to 1/4 inch below adjoining surface.

3.04 CLEANING

A. Clean adjacent soiled surfaces.

3.05 PROTECTION OF FINISHED WORK

A. Protect sealants until cured.

END OF SECTION

SECTION 09 96 00

HIGH-PERFORMANCE COATINGS

PART 1 - GENERAL

1.01 SUMMARY

A. General Intention:

1. The work covered under this specification includes furnishing all materials, equipment, tools and labor for surface preparation and application of high-performance coatings.
2. The type of materials to be coated include, but are not limited to: equipment, pipe and appurtenances, exposed steel and steel tanks, concrete and other items as shown on drawings and schedules, and described herein and elsewhere in these specifications.

B. Section Includes:

1. The work under this section consists of surface preparation, priming and painting necessary to complete the project, as shown on drawings and schedules, and described herein and elsewhere in these specifications.

C. Contractor Responsibility:

1. The Contractor shall be responsible for performing all the work called for in this specification, in a safe and workmanlike manner.

1.02 REFERENCES

A. ASTM D 16 Standard Terminology for Paint, Related Coatings, Materials, and Applications

B. ASTM D 3359 Standard Test Methods for Measuring Adhesion by Tape Test

C. ASTM D 4263 Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method

D. ASTM D 4541 Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers

E. ASTM D 1005 Standard Test Method for Measurement of Dry-Film Thickness of Organic Coatings Using Micrometers

F. ASTM D 4417 Standard Test Methods for Field Measurement of Surface Profile of Blast Cleaned Steel

G. The Society for Protective Coatings:

1. SSPC-SP1 Specification for Solvent Cleaning
2. SSPC-SP2 Specification for Hand Tool Cleaning
3. SSPC-SP3 Specification for Power Tool Cleaning
4. SSPC-SP5 Specification for White Metal Blast Cleaning
5. SSPC-SP6 Specification for Commercial Blast Cleaning
6. SSPC-SP7 Specification for Brush-Off Blast Cleaning
7. SSPC-SP10 Specification for Near White Metal Blast Cleaning
8. SSPC-SP11 Specification for Power Tool Cleaning to Bare Metal

9. SSPC-PA1 Shop, Field, and Maintenance Painting of Steel
10. SSPC-PA2 Measurement of Dry Paint Thickness with Magnetic Gages
11. SSPC-SP12 Water Jetting

1.03 DEFINITIONS

A. Terms Coating or Paint shall, in a general sense, refer to primers, alkyds, latex, polyurethane, enamels and epoxy type coatings, including emulsions, stains, sealers, fillers and other applied materials, whether used as prime, intermediate or finish coats, and the application of these materials.

B. Dry Film Thickness (DFT): Thickness, measured in mils (1/1000 inch), of a coat of paint in a cured state.

1.04 SUBMITTALS

A. Product Data:

1. Submit manufacturer's literature describing products to be provided, giving manufacturer's name, product name, and product line number for each material.
2. Submit technical data sheets for each product, giving descriptive data, including solids content.
3. Submit color charts showing manufacturer's full range of standard colors, for each product.
4. Submit manufacturer's warranty, for each product.
5. Submit a list of similar installations where the product was used.

B. Submit Manufacturer's Application Instructions:

1. Manufacturer's application instructions shall include:
   a. Application equipment to be used.
   b. Thinning instructions.
   c. Mixing instructions.
   d. Recommended thickness, dry film thickness, DFT, mils, to be applied, per coat.
   e. Curing time for each coat applied.
   f. Temperature limitations for storage and application.
2. Manufacturer's application instructions that are submitted shall be the basis for accepting or rejecting the application procedures used by Contractor.

C. Certificate:

1. Provide manufacturer's certification that products to be used comply with specified requirements and are suitable for intended application.

1.05 **QUALIFICATIONS:**

A. Provide products from a company specializing in manufacture of coatings with a minimum of 10 years experience.

B. Painter shall be trained in surface preparation and application techniques and procedures for the coating materials used and shall demonstrate a minimum of 2 (two) years experience in application of the coating materials used.

C. Contractor shall maintain, throughout duration of application, a crew of painters who are experienced and fully qualified.

1.06 DELIVERY AND STORAGE

A. Packing and Shipping:

1. Deliver only products in manufacturer's original unopened containers. Each container shall have manufacturer's label, intact and legible.
2. Provide Material Safety Data Sheets (MSDS), for all material provided.
3. Include on label for each container:
   a. Manufacturer's name
   b. Type of coating material
   c. Manufacturer's stock number and lot number
   d. Color name and number
   e. Instructions for thinning, where applicable

B. Storage and Protection:

1. Store materials in conformity with manufacturer's printed instructions.

1.07 PROJECT CONDITIONS

A. Environmental Requirements:

1. Apply coating materials per manufacturer's printed instructions:
2. Do not apply coating materials in snow, rain, fog or mist, or to damp or wet surfaces, unless otherwise permitted by coating materials manufacturer's printed instructions.
3. Do not apply coating materials if, either during the application period or during the curing period:
   a. The temperature of the surfaces to be coated does not conform to the temperature limits specified by coating materials manufacturer.
4. Provide for proper ventilation, using explosion proof equipment, during the surface preparation, application and curing operations.
5. Provide adequate illumination, using explosion proof lights and equipment, during the surface preparation, application and curing operations.
6. Atmosphere shall be free of airborne dust and any other contaminate or foreign matter, during the application and initial curing operations.

PART 2 - PRODUCTS

2.01 COATING MATERIALS

A. Coating system/materials to be used

1. See Section 01 10 00 – Special Provisions.

B. Single Source Responsibility:

1. Undercoats shall be produced by same manufacturer as the finish coat(s).
2. Undercoats and finish coat(s) shall be approved by manufacturer as suitable for use with each other, for the surface being painted.

C. Materials specified shall not preclude consideration of equivalent materials.

1. Requests for approval as equivalent materials shall be submitted to Engineer for consideration at least ten (10) days prior to the date of the bid opening.
2. Requests for substitution shall include evidence of satisfactory past performance.
3. Substitutions, which change number of coats, will not be considered equivalent.
4. Substitutions, which lessen the performance of the coating system or reduce the warranty, will not be considered equivalent.

D. Provide secondary materials, which are produced or are specifically recommended by coating system manufacturer to ensure capability of system.
1. Use only thinners approved by coating materials manufacturer, and use only within manufacturer's recommended limits.

E. Color:
1. See Section 01 10 00 – Special Provisions.
2. When the color is not stated elsewhere, the color shall be selected by the Owner from the manufacturer's standard color chart for the product used.

2.02 ACCESSORIES

A. Coating Application Accessories:
1. Provide application accessories as indicated in coating manufacturer's application instructions, including but not limited to cleaning agents, etching agents, cleaning cloths, sanding materials, and clean-up materials.
2. Material not specifically identified, but necessary for the proper application of the coating system, shall be provided.

2.03 MIXING INSTRUCTIONS

A. Coating materials shall arrive on the job ready-mixed, except for tinting of undercoats, possible thinning, and mixing of multi-component products. Specific product mixing and thinning instructions shall be provided by the manufacturer.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verification of Site Conditions:
1. Examine the site and surroundings, and the environment under which the surface preparation and painting will be performed for, conditions that will adversely affect the execution of the work, permanence or quality of the coating.
2. Correct conditions detrimental to timely and proper execution of the work.
3. Do not proceed until unsatisfactory conditions have been corrected.
4. Commencement of surface preparation and painting by Contractor constitutes Contractor acceptance of the site conditions and the responsibility for satisfactorily completing the work.

3.02 PREPARATION

A. Protection:
1. Take precautionary measures to prevent fire hazards and spontaneous combustion.

2. Provide drop cloths, shields, and other protective equipment.
3. Protect elements surrounding the work from damage or disfiguration.
4. Protect all of the worksite and surroundings, whether to be painted or not, against damage by the surface preparation, painting, finishing and cleanup work.
5. Protect newly coated areas against damage.
6. Protect the work of other trades, whether to be painted or not, against damage by surface preparation, painting, finishing and cleanup work.
7. Protect all electrical items including controls, switches, outlets, lights, and panels against damage by surface preparation, painting, finishing and cleanup work.
8. Provide "Wet Paint" signs as required to protect newly painted finishes.

B. Surface Preparation - General Requirements:

1. See Section 01 10 00 – Special Provisions.
2. Prior to application, the surfaces shall be properly prepared to receive the specified coatings in compliance with manufacturer's recommendations.
3. Surfaces to be coated shall be clean, dry and free from dust and any foreign matter which would adversely affect durability, adhesion or appearance of the coating.

3.03 APPLICATION

A. General Requirements:

1. See Section 01 10 00 – Special Provisions.
2. Do not apply coating when conditions exist that would adversely affect durability, adhesion or appearance of the coating.
3. Mix and prepare coating in accordance with manufacturer's directions.
4. Apply coating in compliance with manufacturer's instructions, using application method best suited for obtaining a full uniform coverage of surfaces to be coated and providing a uniform finish, color and appearance.
5. Apply first coat to surfaces that have been cleaned, pretreated or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
6. Apply primer, intermediate, and finish coats to comply with wet and dry film thickness and spreading rates for each type of coating as recommended by manufacturer.
7. Number of coats specified shall be minimum number acceptable.
    a. Apply additional coats as needed to provide a smooth, even application, with a uniform finish, color and appearance.
    b. Closely adhere to re-coat times recommended by manufacturer.
    c. Provide adequate ventilation during curing phase.
8. Use only application equipment that is clean, properly adjusted, in good working order and of type recommended by coating manufacturer.
9. Allow sufficient time between successive coats to permit proper curing.

3.04 REPAIR/RESTORATION

A. At completion of the work, touch-up and restore finishes where damaged.

1. Touch-up of minor damage shall be acceptable where result is not visibly different from surrounding surfaces.
2. Where result is visibly different; either in color, sheen or texture, recoating of the entire surface shall be done.

B. When stain, dirt, or undercoats show through final coat, correct defects and cover with additional coats until coating is of uniform finish, color, appearance and coverage.

3.05 FIELD QUALITY CONTROL

A. See Section 01 10 00 – Special Provisions.

3.06 CLEANUP

A. Leave storage area neat and clean at all times.

B. As the work proceeds, promptly remove spilled, splashed or splattered materials from surfaces.

C. Remove spattered paint by proper methods of washing and scraping, using care not to scratch or otherwise damage finished surfaces.

D. Upon completion of the painting work, clean window glass and other paint spattered surfaces.

3.07 WASTE MANAGEMENT

A. General Requirements:

1. During progress of the work, at end of each workday, remove from site discarded paint materials, rubbish, cans and rags.
2. Place materials defined as hazardous or toxic waste in designated containers.
3. Return solvent and oil soaked rags for contaminant recovery and laundering, or for proper disposal.
4. Do not dispose of coating materials or solvents by pouring on ground. Place in designated containers for proper disposal.
5. Contractor shall be responsible for all costs associated with waste disposal that may result from execution of this Project.

END OF SECTION

SECTION 09 96 10

HIGH-PERFORMANCE COATINGS WATER AND WASTEWATER ENVIRONMENTS

PART 1 - GENERAL

1.01 SUMMARY

A. General Intention:

1. The work covered under this specification includes applications for high-performance coatings to equipment, piping or other miscellaneous materials typically associated with potable drinking water and wastewater facilities and structures.

2. The types of applications for coating included in this Section generally include, but are not limited to: submerged and non-submerged equipment, ferrous and non-ferrous piping, ferrous mechanical treatment equipment, pumps, steel piping supports and other items as shown in the Drawings or otherwise noted in the Specifications.

B. Section Includes:

1. The work under this section includes furnishing all materials, equipment, tools and labor for surface preparation, priming and painting necessary to complete the application of the high-performance coatings, as shown in the Drawings and Specifications.

C. Contractor Responsibility:

1. The Contractor shall be responsible for performing all the work called for in this specification, in a safe and workmanlike manner.

1.02 REFERENCES

A. ASTM B 117 – Standard Practice for Operating Salt Spray (Fog) Apparatus

B. ASTM D 16 – Standard Terminology for Paint, Related Coatings, Materials, and Applications

C. ASTM D 520 – Standard Specification for Zinc Dust Pigment

D. ASTM D 870 – Standard Practice for Testing Water Resistance of Coatings Using Water Immersion

E. ASTM D 1005 – Test for determining dry film thickness

F. ASTM D 1014 – Standard Practice for Conducting Exterior Exposure Tests of Paints and Coatings on Metal Substrates

G. ASTM D 2370 – Standard Test Method for Tensile Properties of Organic Coatings

H. ASTM D 2794 – Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)

I. ASTM D 3359 – Test Method for Measuring Adhesion by Tape Test

J. ASTM D 4060 – Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser

K. ASTM D 4141 – Standard Practice for Conducting Black Box and Solar Concentrating Exposures of Coatings

L. ASTM D 4263 – Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method.

M. ASTM D 4417 – Test for determining surface profile

N. ASTM D 4541 – Test Method for Pull Off Strength of Coatings Using Portable Adhesion-Testers

O. ASTM D 4585 – Standard Practice for Testing Water Resistance of Coatings Using Controlled Condensation

P. ASTM D 4587 – 11 Standard Practice for Fluorescent UV-Condensation Exposures of Paint and Related Coatings

Q. ASTM G 8 – Standard Test Methods for Cathodic Disbonding of Pipeline Coatings

R. The Society for Protective Coatings:

1. SSPC-SP1 Specification for Solvent Cleaning
2. SSPC-SP2 Specification for Hand Tool Cleaning
3. SSPC-SP3 Specification for Power Tool Cleaning
4. SSPC-SP5 Specification for White Metal Blast Cleaning
5. SSPC-SP6 Specification for Commercial Blast Cleaning
6. SSPC-SP7 Specification for Brush-Off Blast Cleaning
7. SSPC-SP10 Specification for Near White Metal Blast Cleaning
8. SSPC-SP11 Specification for Power Tool Cleaning to Bare Metal
9. SSPC-PA1 Painting Application Specification
10. SSPC-PA2 Measurement of Dry Paint Thickness with Magnetic Gages
11. SP WJ-1 Waterjet Cleaning of Metals - Clean to Bare Substrate
12. SP WJ-2 Waterjet Cleaning of Metals - Very Thorough Cleaning
13. SP WJ-3 Waterjet Cleaning of Metals - Thorough Cleaning
14. SP-WJ-4 Waterjet Cleaning of Metals – Light Cleaning

S. ASME A13.1 – Scheme for the Identification of Piping Systems

T. AWWA D102 Standard for Coating Steel Water-Storage Tanks

U. NSF/ANSI Standard 61: Drinking Water System Components -- Health Effects

1.03 DEFINITIONS

A. Terms Coating or Paint shall, in a general sense, refer to primers, alkyds, latex, polyurethane, enamels and epoxy type coatings, including emulsions, stains, sealers, fillers and other applied materials, whether used as prime, intermediate or finish coats, and the application of these materials.

B. Dry Film Thickness (DFT): Thickness, measured in mils (1/1000 inch), of a coat of paint in a cured state.

1.04 SUBMITTALS

A. Product Data:

1. Submit manufacturer’s literature describing products to be provided, giving manufacturer’s name, product name, and product line number for each material.

2. Submit technical data sheets for each product, giving descriptive data, including solids content.
3. Submit color charts showing manufacturer's full range of standard colors, for each product.
4. Submit manufacturer's warranty, for each product.
5. Submit a list of similar installations where the product was used.

B. Submit Manufacturer's Application Instructions:
1. Manufacturer's application instructions shall include:
a. Application equipment to be used.
b. Thinning instructions.
c. Mixing instructions.
d. Recommended thickness, dry film thickness, DFT, mils, to be applied, per coat.
e. Curing time for each coat applied.
f. Temperature limitations for storage and application.

C. Certificate:
1. Provide manufacturer's certification that products to be used comply with specified requirements (including Performance Requirements stated) and are suitable for intended application.

1.05 QUALIFICATIONS:

A. Manufacturer shall have specialized in the manufacturing of potable water, sanitary and marine style coatings with a minimum of 10 years experience in that field.

B. Manufacturer and authorized sales representative shall have evidence of 10 years of successful experience in providing coatings of the type, design, function and quality within either the State or 120 miles of the project site.

C. Painter shall be trained in surface preparation and application techniques and procedures for the coating materials used and shall demonstrate a minimum of 2 (two) years experience in application of the coating materials used.

D. Contractor shall maintain, throughout duration of application, a crew of painters who are experienced and fully qualified.

1.06 DELIVERY AND STORAGE

A. Packing and Shipping:
1. Deliver only products in manufacturer's original unopened containers. Each container shall have manufacturer's label, intact and legible.
2. Provide Material Safety Data Sheets (MSDS), for all material provided.
3. Include on label for each container:
a. Manufacturer's name
b. Type of coating material
c. Manufacturer's stock number and lot number
d. Color name and number
e. Instructions for thinning, where applicable

B. Storage and Protection:

1. Store materials in conformity with manufacturer's printed instructions.

PART 2 - PRODUCTS

2.01 COATING MATERIALS

A. Single Source Responsibility:

1. Undercoats shall be produced by same manufacturer as the finish coat(s).

2. Undercoats and finish coat(s) shall be approved by manufacturer as suitable for use with each other, for the surface being painted and the environment outlined in the Drawings and Specifications that will allow the paint system to function properly.

B. Coating materials shall arrive on the job ready-mixed, except for tinting of undercoats, possible thinning, and mixing of multi-component products. Specific product mixing and thinning instructions shall be provided by the manufacturer.

C. Provide secondary materials, which are produced or are specifically recommended by coating system manufacturer to ensure capability of system.

1. Use only thinners approved by coating materials manufacturer, and use only within manufacturer's recommended limits.

D. When applied to potentially immersed Potable Water Equipment, Tanks and Piping, paint/coating materials shall be NSF/ANSI Standard 61 Approved.

E. Coating materials manufacturer shall demonstrate and document compliance with performance requirements for coating materials.

2.02 POLYAMIDOAMINE EPOXY, TWO COMPONENT

A. Acceptable Surface Temperatures:

1. Minimum: 50 degree F

B. Cure Time at 60 degrees F:

1. Handle: 8 hours maximum

C. Performance Requirements:

1. Humidity per ASTM D 4585 Standards: No blistering, cracking, checking, rusting or delamination of film after 10,000 hours exposure.

2. Abrasion per ASTM D 4060 Standards: CS-17 Wheel, 1,000 gram load: 140 mg loss maximum after 1,000 cycles.

3. Adhesion per ASTM D 4541 Standards: Type V Tester: 1,750 psi minimum.

4. Salt Fog Spray per ASTM B 117 Standards: No blistering, cracking or delamination of film. No more than 1% rusting on plane. No more than 1/16" rust creepage at scribe after 6,700 hours exposure.

2.03 POLYFUNCTIONAL ALIPHATIC POLYURETHANE, TWO COMPONENT

A. Acceptable Surface Temperatures:

1. Minimum: 35 degree F

B. Cure Time at 55 degrees F:

1. Handle: 12 hours maximum

C. Performance Requirements:

1. Exterior Exposure per ASTM D 4141 Standards, Method C: No blistering, cracking or chalking. 97% gloss retention and 0.11 DEhunter color change minimum after 500 MJ/m2 EMMAQUA exposure.
2. Abrasion per ASTM D 4060 Standards, CS-17 Wheel, 1,000 gram load: 120 mg loss maximum after 1,000 cycles.
3. QUV Exposure ASTM D 4587 Standards: No Blistering, cracking, chalking, no less than 84% gloss retention; no more than 1.31 DED CIELAB color change after 10,000hrs exposure.
4. Impact Resistance per ASTM D 2794 Standards: No visible cracking or delamination after 16 inch-pounds, minimum, direct impact.

2.04 ZINC EPOXY PRIMER COATING/PAINT:

A. Two component, moisture cured, zinc-rich epoxy primer.

B. When applied to potentially immersed Potable Water Equipment and Piping, shall be NSF/ANSI Standard 61 Approved.

C. Base Materials and Requirements:

1. Can be topcoated with Epoxies, Polyurethanes and Acrylics
2. Zinc Pigment:
   a. ASTM D 520, Type II or Type III
   b. Lead content: 0.002% or less

D. Acceptable Surface Temperatures:

1. Minimum: 35 degree F

E. Cure Time at 55 degrees F:

1. Handle: 5 hours maximum

F. Performance Requirements:

1. Cathodic Disbondment per ASTM G8 Standards, Method A: No blistering, cracking, rusting or delamination and no undercutting at holiday after 30 days exposure.
2. Adhesion per ASTM D 4541 Standards, Method E, Type V Tester: 2,000 psi minimum.
3. Salt Fog Spray per ASTM B 117 Standards: No blistering, cracking or delamination of film. No more than 1% rusting on plane. No more than 1/8" rust creepage at scribe after 50,000 hours exposure.

2.05 HYDROPHOBIC AROMATIC POLYURETHANE, TWO COMPONENT

A. Acceptable Surface Temperatures:

1. Minimum: 35 degree F

B. Cure Time at 60 degrees F:

1. Handle: 10 hours maximum

C. Performance Requirements:

1. Tensile Strength ASTM D 2370 Standards: No less than 2,693 psi (18.6 MPa) tensile strength.

2. Abrasion per ASTM D 4060 Standards, CS-17 Wheel, 1,000 gram load: 114 mg loss maximum after 1,000 cycles.
3. Adhesion per ASTM D 4541 Standards, Type V Tester: 1,300 psi minimum.
4. Impact per ASTM D 2794 Standards: No visible cracking or delamination of film after 48 inch-pounds or less direct impact
5. Severe Wastewater Analysis Testing: Initial impedance of 10.2 (log-Z). No blistering, cracking, checking or loss of adhesion. No more than 0.1 (log-Z) reduction in electrical impedance after 28 days exposure.

2.06 POLYAMIDOAMINE EPOXY: TWO COMPONENT, HIGH-BUILD EPOXY.

A. Base Materials and Requirements:
1. Potable water immersed ferrous materials, equipment and pipe.

B. Acceptable Surface Temperatures:
1. Minimum: 35 degree F

C. Cure Time at 55 degrees F:
1. Handle: 14 hours maximum
2. Topcoat: 24 hours maximum
3. Immersion: 10 days maximum

D. Performance Requirements:
1. Humidity per ASTM D 4585 Standards: No blistering, cracking, checking, rusting or delamination of film after 10,000 hours exposure.
2. Abrasion per ASTM D 4060 Standards, CS-17 Wheel, 1,000 gram load: 140 mg loss maximum after 1,000 cycles.
3. Adhesion per ASTM D 4541 Standards, Type V Tester: 1,750 psi minimum.
4. Salt Fog Spray per ASTM B 117 Standards: No blistering, cracking or delamination of film. No more than 1% rusting on plane. No more than 1/16" rust creepage at scribe after 6,700 hours exposure.

2.07 PIPE BANDING AND LABELS

A. Comply with 2007 ASME A13.1 Standards

B. Shall designate the material conveyed in the piping and the general flow direction.

C. Materials:
1. Coiled Rigid Vinyl or Strap-On Rigid Vinyl with Nylon Ties
a. Engineer approved equal
2. Shall wrap 360 degrees around the pipe.
3. Printed with UV resistant ink
4. Service Temp: -40 to 180 degrees F

D. Colored banding on piping or similar installations shall be placed:
1. 10 feet spacing, maximum.
2. At all changes in direction.
3. Both sides of obstructions

E. Band width:

1. 2 inches for pipes up to 8 inches in diameter.
2. 4 inches for pipes over 8 inches and up to 24 inches in diameter.
3. 8 inches for pipes over 24 inches in diameter

F. Arrow and Letter Heights:

1. Pipes smaller than 4": 1" height lettering, minimum
2. Pipes 4" or larger: 2" height lettering, minimum

2.08 COLOR

A. See Section 01 10 00 – Special Provisions.

B. When the color is not stated elsewhere, the color shall be selected by the Owner from the manufacturer's standard color chart for the product used.

C. The following general colors and schemes shall be utilized when coating materials listed within in this Section. Contractor to coordinate all final color selections with the Engineer prior to application of materials.

D.

	Location/Purpose:	Generic Color(s):
1.	Raw Drinking Water	Olive Green
2.	Settled or Clarified Drinking Water	Aqua
3.	Finished or Potable Water	Dark Blue
4.	Sewage Plant Effluent	Clay
5.	Backwash Waste	Light Brown
6.	Sludge	Dark Brown
7.	Sanitary Sewer	Dark Gray
8.	Alum or Primary Coagulant	Orange
9.	Ammonia	White
10.	Carbon Slurries	Black
11.	Caustic Solutions	Yellow w/ Green Band
12.	Chlorine	Yellow
13.	Fluoride	Light Blue w/ Red Band
14.	Lime Slurries	Light Green
15.	Ozone	Yellow w/ Orange Band
16.	Phosphate	Light Green w/ Red Band
17.	Polymer or Coagulant Aid	Orange w/ Green Band
18.	Permanganates	Violet
19.	Soda Ash	Light Green w/ Orange Band
20.	Sulfuric Acid	Yellow w/ Red Band
21.	Sulfur Dioxide	Light Green w/ Yellow Band
22.	Compressed Air	Dark Green
23.	Gas	Red
24.	Other	Light Gray or Consult Engineer

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verification of Site Conditions:

1. Examine the site and surroundings, and the environment under which the surface preparation and painting will be performed for, conditions that will adversely affect the execution of the work, permanence or quality of the coating.
2. Correct conditions detrimental to timely and proper execution of the work.
3. Do not proceed until unsatisfactory conditions have been corrected.
4. Commencement of surface preparation and painting by Contractor constitutes Contractor acceptance of the site conditions and the responsibility for satisfactorily completing the work.

3.02 PREPARATION

A. Surface Preparation - General Requirements:

1. Prior to application, the surfaces shall be properly prepared to receive the specified coatings in compliance with manufacturer's recommendations.
2. Surfaces to be coated shall be clean, dry and free from dust and any foreign matter which would adversely affect durability, adhesion or appearance of the coating.

B. Protection:

1. Take precautionary measures to prevent fire hazards and spontaneous combustion.
2. Provide drop cloths, shields, and other protective equipment.
3. Protect elements surrounding the work from damage or disfiguration.
4. Protect all of the worksite and surroundings, whether to be painted or not, against damage by the surface preparation, painting, finishing and cleanup work.
5. Protect newly coated areas against damage.
6. Protect the work of other trades, whether to be painted or not, against damage by surface preparation, painting, finishing and cleanup work.
7. Protect all electrical items including controls, switches, outlets, lights, and panels against damage by surface preparation, painting, finishing and cleanup work.

C. Shop and Field Surface Preparation:

1. Remove all oil, grease, soil, dirt and other soluble contaminants in accordance with SSPC-SP1.
2. Repair any damaged or corroded areas and weld where necessary, with inspection by Engineer, following repair. Weld slag, weld spatter, rough edges and sharp edges of weld seams shall be ground smooth.
3. All rusted, abraded and unpainted areas shall be abrasive blast cleaned in accordance with the recommended methods outlined in manufacturer's

preparation requirements for the environment outlined in the Drawings and Specifications.

4. Immediately after blasting and before any rusting occurs, apply one coat of primer to all bare ferrous metal surfaces.

3.03 FACTORY OR SHOP PRIMED MATERIALS

A. Application of the primer coating is permitted to occur away from the project site with proper inspection documentation outlined later in this Section.

B. Field preparation of ferrous components that have a predominant shop primed surface will remain necessary at locations such as welded seams, damaged areas or components that otherwise do not have shop primer applied.

C. Shop primed materials are not required to be further blasted bare nor additionally primed other than for repairs, surface preparation and cleaning purposes or increasing the thicknesses of the material previously applied.

D. At material locations where the primer coating has been damaged or destroyed, it shall be repaired in the field or returned to the factory/shop.

1. The primer located within a 2-inch radius of the damaged area shall be removed using a power tool or blasting.

2. The surface shall be re-prepared for application of the primer coating in accordance with the manufacturer's recommendations and Engineer.

3.04 APPLICATION

A. Environmental Requirements:

1. Do not apply coating when conditions exist that would adversely affect durability, adhesion or appearance of the coating. Do not apply coating materials in snow, rain, fog or mist, or to damp or wet surfaces, unless otherwise permitted by coating materials manufacturer's printed instructions.

2. Provide for proper ventilation, using explosion proof equipment, during the surface preparation, application and curing operations.

3. Provide adequate illumination, using explosion proof lights and equipment, during the surface preparation, application and curing operations.

4. Atmosphere shall be free of airborne dust and any other contaminate or foreign matter, during the application and initial curing operations.

B. General Requirements:

1. Mix and prepare coating in accordance with manufacturer's directions.

2. Apply coating in compliance with manufacturer's instructions, using application method best suited for obtaining a full uniform coverage of surfaces to be coated and providing a uniform finish, color and appearance.

3. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

4. Apply first coat to surfaces that have been cleaned, pretreated or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.

5. Apply primer, intermediate, and finish coats to comply with wet and dry film thickness and spreading rates for each type of coating as recommended by manufacturer and herein specified minimums.

6. Number of coats specified shall be minimum number acceptable.

   a. Apply additional coats as needed to provide a smooth, even application, with a uniform finish, color and appearance.

   b. If two coats of the same material is specified, Contractor may, at own cost, apply one single coat of material at the total thickness required with written approval of coating manufacturer and Engineer.

   c. Closely adhere to re-coat times recommended by manufacturer.

   d. Provide adequate ventilation during curing phase.

7. Use only application equipment that is clean, properly adjusted, in good working order and of type recommended by coating manufacturer.

8. Allow sufficient time between successive coats to permit proper curing.

C. Field Intermediate Coat:

1. After the topcoating time of the primer is completed, apply one coat of epoxy intermediate coating all primed surfaces.

2. If primed areas are exposed for more than 30 days, the primed surface shall be brush blasted to clean.

3. To achieve complete finish coat coverage, the intermediate coat color should be noticeably different than the specified finish coat color. When feasible, the field intermediate coat should be in the same finish coat color family (blue, beige, gray, etc.) with a difference in light reflectance value of approximately 10%.

D. Field Finish Coat:

1. After the topcoating time of the intermediate coat is completed, apply finish coat to surfaces.

2. If areas that have received an intermediate coat are not coated again within 30 days, the surface shall be brush blasted to clean, before the succeeding coat is applied.

E. Coating Application Accessories:

1. Provide application accessories as indicated in coating manufacturer's application instructions, including but not limited to cleaning agents, etching agents, cleaning cloths, sanding materials, and clean-up materials.

2. Material not specifically identified, but necessary for the proper application of the coating system, shall be provided, and are considered incidental and included in the price.

3.05 ABOVE GRADE PVC PIPING, FITTINGS AND VALVES

A. Surface Preparation:

1. Scarify

2. Clean and dry.

B. Prime Coat:

1. Polyamidoamine Epoxy, two component

2. Finish: Satin
3. Thickness: 2.0 to 3.0 mils DFT

C. Field Intermediate Coat:
1. Polyamidoamine Epoxy, two component
2. Finish: Satin
3. Thickness: 2.0 to 3.0 mils DFT

D. Field Finish Coat:
1. This paragraph only applies if pipe is located such to be regularly exposed to outdoor weather conditions.
2. Polyfunctional Aliphatic Polyurethane, two component
3. Finish: High Gloss
4. Thickness: 2.0 to 3.0 mils DFT

E. Total Dry Film Thickness: 4.0 to 6.0 mils, or 6.0 to 9.0 mils in weather conditions

3.06 ABOVE GRADE DUCTILE IRON PIPING, FITTINGS AND VALVES

A. Surface Preparation:
1. SP 6 – Commercial Blast
2. 1.5 mils anchor profile.
3. Clean and dry.

B. Shop and/or Field Prime Coat:
1. Polyamidoamine Epoxy, two component
2. Finish: Satin
3. Thickness: 3.0 to 5.0 mils DFT

C. Onsite Cleaning of Shop Primed Materials:
1. Field preparation with a power wash over the entire surface with a 3,000 psi power washer or equal to remove all loose paint or other surface contaminants.

D. Field Intermediate Coat:
1. Polyamidoamine Epoxy, two component
2. Finish: Satin
3. Thickness: 3.0 to 5.0 mils DFT

E. Field Finish Coat:
1. This paragraph only applies if pipe is located such to be regularly exposed to outdoor weather conditions.
2. Polyfunctional Aliphatic Polyurethane, two component
3. Finish: High Gloss
4. Thickness: 3.0 to 5.0 mils DFT

F. Total Dry Film Thickness: 6.0 to 10.0 mils, or 9.0 to 15.0 mils in sunlight/weather conditions

3.07 EXTERIOR FERROUS EQUIPMENT (NON-IMMERSED)

A. Surface Preparation:
   1. SP 10 – Near White Metal Blast Cleaning
   2. 1.5 mils anchor profile.
   3. Clean and dry.

B. Shop and/or Field Prime Coat:
   1. Zinc epoxy primer coating/paint
   2. Thickness: 2.5 to 3.5 mils DFT

C. Onsite Cleaning of Shop Primed Materials:
   1. Field preparation with a power wash over the entire surface with a 3,000 psi power washer or equal to remove all loose paint or other surface contaminants.

D. Field Intermediate Coat:
   1. Polyamidoamine Epoxy, two component
   2. Finish: Satin
   3. Thickness: 2.0 to 3.0 mils DFT

E. Field Finish Coat:
   1. Polyfunctional Aliphatic Polyurethane, two component
   2. Finish: High Gloss
   3. Thickness: 2.0 to 5.0 mils DFT

F. Total Dry Film Thickness: 6.5 to 11.5 mils

3.08 INTERIOR FERROUS EQUIPMENT (NON-IMMERSED)

A. All rusted, abraded and unpainted areas shall be abrasive blast cleaned in accordance with the recommended methods outlined in The Society for Protective Coatings Specification SSPC-SP6 (NACE No. 3).

B. Surface Preparation:
   1. SP 6 – Commercial Blast
   2. 1.5 mils anchor profile.
   3. Clean and dry.

C. Shop and/or Field Primer Coat:
   1. Zinc epoxy primer coating/paint
   2. Thickness: 2.0 to 3.0 mils DFT

D. Onsite Cleaning of Shop Primed Materials:
   1. Field preparation with a power wash over the entire surface with a 3,000 psi power washer or equal to remove all loose paint or other surface contaminants.

E. Field Finish Coat:
   1. Polyamidoamine Epoxy, two component
   2. Finish: Satin
   3. Thickness: 2.0 to 3.0 mils DFT

F. Total Dry Film Thickness: 4.0 to 6.0 mils

3.09 IMMERSED FERROUS EQUIPMENT AND PIPING

A. Immersed environment shall be considered to be where the material is regularly immersed in, or within six inches of splashing materials, such as; water, chemicals or wastewater sludge.

B. All rusted, abraded and unpainted areas shall be abrasive blast cleaned in accordance with the recommended methods outlined in The Society for Protective Coatings Specification SSPC-SP10 (NACE No. 2).

C. Surface Preparation:

1. SP 10 – Near White Metal Blast Cleaning
2. 1.5 mils anchor profile.
3. Clean and dry.

D. Shop and Field Primer Coat:

1. Hydrophobic Aromatic Polyurethane, two component
2. Finish: Satin
3. Thickness: 7.0 to 10.0 mils DFT

E. Onsite Cleaning of Shop Primed Materials:

1. Field preparation with a power wash over the entire surface with a 3,000 psi power washer or equal to remove all loose paint or other surface contaminants.

F. Field Finish Coat:

1. Hydrophobic Aromatic Polyurethane, two component
2. Finish: Satin
3. Thickness: 7.0 to 10.0 mils DFT

G. Total Dry Film Thickness: 14.0 to 20.0 mils

3.10 POTABLE WATER IMMERSED FERROUS EQUIPMENT AND PIPING

A. Immersed environment shall be considered to be where the material is regularly immersed in, or within six inches of splashing materials, such as; water or chemicals.

B. Meet AWWA D102-06 Standards for Inside Coating System No. 5

C. All rusted, abraded and unpainted areas shall be abrasive blast cleaned to a near white finish in accordance with the recommended methods outlined in The Society for Protective Coatings Specification SSPC-SP10 (NACE No. 2).

D. Surface Preparation:

1. SP 10 – Near White Metal Blast Cleaning
2. Clean and dry.

E. Shop and Field Prime Coat:

1. Zinc epoxy primer coating/paint
2. Thickness: 2.5 to 3.5 mils DFT

F. Onsite Cleaning of Shop Primed Materials:

1. Field preparation with a power wash over the entire surface with a 3,000 psi power washer or equal to remove all loose paint or other surface contaminants.

G. Field Intermediate Coat:

1. Polyamidoamine Epoxy: Two component, HIGH-BUILD EPOXY.

a. NSF/ANSI Standard 61 Approved

2. Thickness: 4.0 to 6.0 mils DFT

H. Field Finish Coat:

1. Polyamidoamine Epoxy: Two component, HIGH-BUILD EPOXY.

a. NSF/ANSI Standard 61 Approved

2. Thickness: 4.0 to 6.0 mils DFT

I. Total Dry Film Thickness: 10.5 to 15.5 mils

3.11 FIELD QUALITY CONTROL

A. Daily Records: The following information shall be recorded for each day of coatings application for each type of material applied.

1. Date, starting and ending times.

2. Atmospheric conditions, including precipitation, temperature and wind.

3. Surface temperature of material that coating is applied to.

B. Measure and document wet film thickness of each coating every 100 feet of piping or 200 square feet of flat surfacing, whichever is less. A minimum of 3 tests per location shall be taken.

C. Provide 'wet paint' signs in areas where coating activity is taking place and/or coating is curing.

D. The Contractor shall prepare and deliver to the Owner an inspection log setting forth the number of tests taken and results of each test. All logs shall note the date of the test and person making the inspection. Any thickness not met, type of failures observed and the percentage of the surface area where failure has occurred shall be included to the extent possible. Color photographs illustrating each type of failure shall be included in the log(s).

3.12 REPAIR/RESTORATION

A. At completion of the work, touch-up and restore finishes where damaged.

1. Touch-up of minor damage shall be acceptable where result is not visibly different from surrounding surfaces.

2. Where result is visibly different; either in color, sheen or texture, recoating of the entire surface shall be done.

B. When stain, dirt, or undercoats show through finish coat, correct defects and cover with additional coats until coating is of uniform finish, color, appearance and coverage.

3.13 CLEANUP

A. Leave storage area neat and clean at all times.

B. As the work proceeds, promptly remove spilled, splashed or splattered materials from surfaces.

C. Remove spattered paint by proper methods of washing and scraping, using care not to scratch or otherwise damage finished surfaces.

D. Upon completion of the painting work, clean window glass and other paint spattered surfaces.

3.14 WASTE MANAGEMENT

A. General Requirements:

1. During progress of the work, at end of each workday, remove from site discarded paint materials, rubbish, cans and rags.
2. Place materials defined as hazardous or toxic waste in designated containers.
3. Return solvent and oil soaked rags for contaminant recovery and laundering, or for proper disposal.
4. Do not dispose of coating materials or solvents by pouring on ground. Place in designated containers for proper disposal.
5. Contractor shall be responsible for all costs associated with waste disposal that may result from execution of this Project.

END OF SECTION

SECTION 31 10 00

SITE CLEARING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. General:

1. Remove surface debris.
2. Removal of vegetation and sod.
3. Remove trees, shrubs and other plants.
4. Remove root system of trees and shrubs.
5. Disposal.

1.02 REFERENCES

A. State Standard Specifications, latest edition, including all current supplemental specifications.

1.03 REGULATORY REQUIREMENTS

A. Conform to local, state, and federal regulations for disposal of debris.

B. Contractor shall obtain, at Contractor's own expense, all permits or licenses for the use and maintaining of dumps and waste areas.

C. Coordinate clearing work with utility Owners.

D. Conform to local, state, and federal regulations for preparation and implementation of erosion control plan.

1.04 UNIT PRICES

A. General Clearing and Grubbing:

1. Includes:

a. Clearing: Removal and disposal of all unwanted material from the surface, such as trees/stumps vegetation, boulders and trash.

b. Grubbing: Removal and disposal of all unwanted materials from underground, such as boulders, stumps, roots or other debris.

c. Backfill: Backfill required to fill cavities as a result of any removal shall be included in the cost of the clearing and grubbing.

2. Method of Measurement and Pay Unit: By the lump sum.

B. Tree and/or Stump Removal:

1. Includes trees and stumps (including root ball) that the circumference exceeds 80 inches at 40 inches above ground level (or the circumference exceeds 80 inches at ground level if stump only). Backfill required to fill cavities as a result of the removals shall be included in the cost of the removal.

2. Method of Measurement and Pay Unit: By each tree/stump removed.

1.05 PROJECT CONDITIONS

A. Conform to applicable regulations relating to environmental requirements, disposal of debris, use of herbicides and hazardous materials.

B. Coordinate clearing work with utility companies.

C. Protect utilities to remain from damage.

D. Protect trees, plants, amenities and other features designated to remain as final landscaping.

E. Protect benchmarks, survey control points and existing structures from damage or displacement.

PART 2 – PRODUCTS

2.01 MATERIALS

A. See Section 31 23 23 – Fill and Backfill for material specifications.

PART 3 - EXECUTION

3.01 PREPARATION

A. Locate and identify utilities to remain. Tag utilities to be removed.

B. Verify that existing plants designated to remain are tagged or identified.

C. Tag existing plants designated to remain.

D. Identify a waste area/salvage area for placing removed materials.

3.02 CLEARING

A. Clear areas required for access to site and execution of work.

B. Remove trees, shrubs and stumps within limits of construction (LOC).

C. Remove roots to a depth of 36 inches.

D. Clear undergrowth and deadwood without disturbing subsoil.

E. Remove existing sod or vegetation without disturbing topsoil.

3.03 REMOVAL

A. Remove surface rock.

B. Remove debris from site.

3.04 SALVAGED MATERIALS

A. Carefully remove, load, transport, unload, and store materials and items designated as salvage.

B. Reinstall salvage material and items as shown in the plans.

3.05 DISPOSAL

A. Remove waste material from project site promptly as it is generated by construction operations; do not permit to accumulate. Unless directed, do not remove topsoil from the site.

B. Remove brush, trees, stumps, roots, rubbish, spoil, excess excavated material and material not suitable for backfill to off-site location of Contractor's choice, cost to be incidental to the removal.

C. Disposal areas shall be Contractor's responsibility unless otherwise indicated in Section 01 10 00 - Special Provisions.

D. Grade final cover to allow for positive surface drainage.

E. Haul Routes:

1. Determine haul roads with approval of agency having jurisdiction over proposed roadway.

2. Make condition survey of haul roads prior to use and document with necessary photographs and written descriptions.

3. Keep reasonably free from dirt, dust, mud and other debris from construction operations.

4. Clean a minimum of twice a week.

5. Repair any damaged haul roads to match existing conditions before use.

6. No extra payment shall be made for removals regardless of disposal locations.

7. Temporary haul routes (roads) developed by the Contractor shall be completely removed at the completion of the project and the area returned to its original condition. The cost of temporary haul routes shall be incidental to the cost of the project.

END OF SECTION

SECTION 31 22 00

GRADING, EXCAVATION AND EMBANKMENT

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Removal, storage, and placement of topsoil.

B. Rough grading for site improvements.

C. Building, Shaping, Excavation and/or Embankment for:

1. Building volume below grade, footings, pile caps, site structures, box culverts, and general grading and fills.

2. Roadbeds, subgrades, shoulders, bridge approaches and private entrances.

3. Slopes, dikes, channels and ditches needed for drainage.

4. Stripping of all unsuitable materials.

5. Obtaining soils from off-site borrow pit.

1.02 REFERENCES

A. State Standard Specifications, latest edition.

B. AASHTO T 180 – Standard Specification for Moisture – Density Relations of Soils Using a 4.54 kg (10-lb) Rammer and a 457 mm (18 inch) Drop: American Association of State Highway and Transportation Officials.

B. ASTM C 136 –Standard Test Method for Sieve Analysis of Fine Coarse Aggregates.

C. ASTM D 698 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3))

D. ASTM D 1556 – Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method.

E. ASTM D 1557 –Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3)).

F. ASTM D 2167 –Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.

G. ASTM D 2487 –Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System).

H. ASTM D 6938 –Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

J. ASTM D 4318 –Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

1.03 UNIT PRICES

A. Topsoil:

1. Work may be considered subsidiary to bid item "Earthwork as Excavation" and/ or "Earthwork as Embankment" or work may be paid for as "Topsoiling" per cubic yard. If paid for by unit price, measurement will be in cubic yards of topsoil stripped, salvaged, supplied (if required), and spread, and will be computed on the basis of a uniform 6 inch finished thickness, or as specified.

2. Includes excavating existing topsoil, stockpiling, scarifying substrate surface, supplying, placing topsoil where required and compacting.

3. The loading, hauling and disposal of surplus material at a site of the contractor's choice is considered subsidiary to excavating existing topsoil.

B. Earthwork as Excavation:

1. Payment may be made by Established Quantity OR per Cubic Yard (CY). If paid for per cubic yard, measurement shall be based on a post construction survey or other agreed upon method of measurement between Engineer and Contractor.

2. If paid by Established Quantity, plan quantity(s) not field measured upon completion of project,

3. The loading, hauling and disposal of surplus material at a site of the contractor's choice is considered subsidiary.

4. Includes excavation, placing where required, compacting soils to the elevations shown in the drawings and water applied to obtain compaction.

C. Earthwork as Embankment:

1. Payment may be made by Established Quantity OR per Cubic Yard (CY). If paid for per cubic yard, measurement shall be based on a post construction survey or other agreed upon method of measurement between Engineer and Contractor.

2. If paid by Established Quantity, plan quantity not field measured upon completion of project.

3. Contractor may be required to furnish borrow material – See plans and or Section 01 10 00 – Special Provisions.

4. No Additional Compensation for:

   a. Additional material required to obtain compaction.

   b. Material placed outside of limit of typical cross section.

   c. Material placed to correct settlement of embankment.

   d. Water applied to obtain compaction.

5. Includes excavation, supplying, placing where required, compacting soils to the elevations shown in the drawings and water applied to obtain compaction.

D. Unsuitable Materials:

1. Includes excavating materials which are determined by Engineer to be unsuitable, loading and removal of unsuitable material from site, and furnish and backfill with materials specified by Engineer.

2. Method of Measurement and Pay Unit: By the cubic yard (measured in place).

1.05 SUBMITTALS

A. Project Record Documents: Contractor shall accurately record actual locations of utilities remaining by horizontal dimensions, elevations or inverts, and slope gradients.

B. Samples: 60-pound samples of each type of fill. Submit in airtight containers to testing laboratory unless samples are to be acquired by the testing agency.

C. Materials Sources: Submit name of imported materials source.

D. Fill Composition Test Reports: Results of laboratory tests on proposed and actual materials used.

E. Compaction density test reports.

1.06 QUALITY ASSURANCE

A. Perform work in accordance with State Standard Specifications, Section 01 40 00 – Quality Requirements and Section 01 10 00 – Special Provisions.

1.07 PROJECT CONDITIONS

A. Protect above and below-grade utilities that remain.

B. Protect plants, lawns, rock outcroppings, amenities and other features to remain as a portion of final landscaping.

C. Protect benchmarks, survey control points, existing structure, fences, sidewalks, paving, curbs, batter boards and amenities from excavating equipment and vehicular traffic.

PART 2 - PRODUCTS

2.01 MATERIALS

A. See Section 31 23 23 – Fill and Backfill for material specifications.

B. Water required for grading is Contractor's responsibility. The cost of furnishing water will not be a direct pay item, unless specified otherwise, but is to be included in other items for which payment is made.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that survey benchmark and intended elevations for the work are as indicated.

3.02 PREPARATION

A. Identify required lines, levels, contours and datum.

B. Stake and flag locations of known utilities.

C. Locate, identify and protect utilities that remain from damage.

D. Notify utility owner to remove and relocate utilities when relocation is required.

E. Implement erosion control plan.

3.03 EXCAVATING

A. Underpin adjacent structures which may be damaged by excavating work.

B. Excavate to accommodate new structures.

C. Notify Engineer of unexpected subsurface conditions and discontinue affected work in area until notified to resume work.

D. Slope bank of excavations deeper than 3 feet to angle of repose or less until shored.

E. Do not interfere with 45 degree bearing splay of foundations.

F. Cut utility trenches wide enough to allow inspection of installed utilities.

G. Hand trim excavations. Remove loose materials.

H. Remove lumped subsoil, boulders and rock.

I. Correct areas that are over-excavated and load-bearing surfaces that are disturbed.

J. Grade top perimeter of excavation to prevent surface water from draining into excavation.

K. Remove excavated material that is unsuitable for reuse from site.

L. Remove excess excavated material from site.

3.04 ROUGH GRADING

A. Remove topsoil within the limits of construction (LOC) without mixing with foreign materials and stockpile. Minimum depth of topsoil removal shall be 6 inches unless otherwise noted in the drawings.

B. Do not remove topsoil when wet.

C. Remove subsoil from areas to be further excavated, relandscaped or regraded.

D. Do not remove wet subsoil unless it is subsequently processed to obtain optimum moisture content.

E. When excavating through roots, perform work by hand and cut roots with sharp axe.

F. Benching Slopes: Horizontally bench existing slopes greater than 1 foot vertical rise in 4 feet to key fill material to slope for firm bearing.

G. Stability: Replace damaged or displaced subsoil to same requirements as for specified fill.

H. Employ a compaction method that achieves the specified density requirements.

I. Employ a placement method that does not disturb or damage other work.

J. Do not fill over porous, wet, frozen or spongy subgrade surfaces.

K. Prewatering, if required, shall be defined and paid for within the Section 01 10 00 Special Provisions.

L. Maintain optimum moisture content of fill materials to attain required compaction density. See Geotechnical Report.

M. Granular Fill: Place and compact materials in equal, continuous layers not exceeding 6 inches compacted depth or as indicated in the Geotechnical Report.

N. Maintain Roadbed in Such Condition That:

1. Roadbed drains at all times.

2. Side ditches are constructed to avoid damage to embankments by erosion.

3. Slopes are trimmed accurately.

4. Avoid loosening material below or outside of the required slopes, remove all breakage and slides.

5. Excavate side ditches as shown in the drawings.

6. Finished roadway matches the lines, grades and cross sections shown in the drawings.

3.05 SOIL REMOVAL AND STOCKPILING

A. Stockpile topsoil to be reused on site. Remainder to be removed from site and disposed of at a location of the contractor's choice, unless otherwise stated in Section 01 10 00 – Specials Provisions.

B. Stockpile subsoil to be reused on site. Remainder to be removed from site and disposed of at a location of the contractor's choice, unless otherwise stated in Section 01 10 00 – Specials Provisions.

C. Stockpiles: Use areas designated; protect from erosion.

3.06 FINISH GRADING

A. Before Finish Grading:

1. Verify building and trench backfilling have been inspected.

2. Verify subgrade has been contoured and compacted.

B. Remove debris, roots, branches and stones in excess of 1 inch in size.

C. Where topsoil is to be placed, scarify surface to depth of 6 inches.

D. In areas where vehicles or equipment have compacted soil, scarify surface to depth of 6 inches.

E. Place topsoil in areas where seeding, sodding and planting are indicated.

F. Place topsoil to the following compacted thicknesses:

1. Areas to be Seeded with Grass: 6 inches.

2. Areas to be Sodded: 4 inches.

3. Shrub Beds: 8 inches.

4. Flower Beds: 2 inches.

5. Planter Boxes: To within 3 inches of box trim.

G. Place topsoil during dry weather.

H. Remove roots, weeds, rocks and foreign material while spreading.

I. Near trees, shrubs and buildings, spread topsoil manually to prevent damage.

J. Fine grade topsoil to eliminate uneven areas and low spots. Maintain profiles and contour of subgrade.

3.07 HAUL ROUTES

A. Determine haul roads with approval of agency having jurisdiction over proposed roadway.

B. Make condition survey of haul roads prior to use and document with necessary photographs and written descriptions.

C. Keep reasonably free from dirt, dust, mud and other debris from construction operations.

D. Clean a minimum of twice a week.

E. Repair any damaged haul roads to match existing conditions before use.

F. No extra payment shall be made for removals regardless of disposal locations.

G. Temporary haul routes (roads) developed by the Contractor shall be completely removed at the completion of the project and the area returned to its original condition. The cost of temporary haul routes shall be incidental to the cost of the project.

3.08 TOLERANCES

A. Top Surface of Finish Grade and/or Subgrade: Plus or minus 0.08 feet from required elevation.

3.09 FIELD QUALITY CONTROL

A. Compaction density testing shall be performed on compacted fill in accordance with ASTM D 1556, ASTM D 2167, or ASTM D 6938.

B. Results shall be evaluated in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D 698 "standard proctor", ASTM D 1557 "modified proctor" or AASHTO T 180.

C. If tests indicate work does not meet specified requirements, remove work, replace and retest.

D. Frequency of Tests:

1. Test randomly.

2. Under Paving, Slabs-on-Grade and Similar Construction, or as directed by Engineer: A minimum of 1 test for each lift of 0 to 2 feet in depth per 100’ x 100’ area or as determined by Engineer.

E. Proof roll compacted fill at surfaces that will be under slabs-on-grade, pavers and paving.

3.10 CLEANING AND PROTECTION

A. Prevent displacement of banks and keep loose soil from falling into excavation; maintain soil stability.

B. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.

C. Remove unused stockpiled topsoil and subsoil. After removing all stockpiles, grade areas to prevent standing water. Maintain drainage away from buildings and structures at a 2 percent grade or as indicated on the drawings.

D. Leave site clean and raked, ready to seed, sod or landscape.

END OF SECTION

SECTION 31 23 13

SUBGRADE PREPARATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Subgrade preparation of subgrade soils.

1.03 REFERENCES

A. State Standard Specifications, latest edition.

1.04 UNIT PRICES

A. Subgrade Preparation:

1. Pay unit by the square yard (SY).

2. Required subgrade preparation 3 feet, or width as stated on Plans, beyond the edge of the pavement is considered incidental and will not be a pay item.

B. Unsuitable Materials:

1. Includes excavating materials which are determined by Engineer to be unsuitable as subgrade, loading and removal of unsuitable material to a site of the contractor's choice, and furnish and backfill with materials specified by Engineer.

2. Method of Measurement and Pay Unit: By the cubic yard (measured in place).

PART 2 - PRODUCTS

2.01 MATERIALS

A. See Section 31 23 23 – Fill and Backfill for material specifications.

B. Water required for subgrade preparation is Contractor's responsibility. The cost of furnishing water will not be a direct pay item but is to be included in the bid item subgrade preparation.

2.02 CERTIFICATION

A. Borrow material delivered to the project must be approved by Owner's designated geotechnical firm prior to bringing the material on-site. Contractor shall be responsible for any testing costs to confirm that the material is acceptable.

PART 3 - EXECUTION

3.01 CONSTRUCTION METHODS

A. Subgrade preparation shall include the subgrade directly under the proposed pavement and shall extend a minimum of 3 feet, or width stated on Plans, laterally beyond the edge of the pavement. The depth of the subgrade preparation shall be as recommended in the geotechnical report.

B. The subgrade shall be disced or ripped, removed or windrowed to thoroughly mix the soil, then redistributed and compacted in 2 lifts or as otherwise directed in the geotechnical report.

C. The subgrade should be compacted to a maximum dry density and a moisture content as recommended in the geotechnical report.

D. Subgrade testing shall be completed by an approved testing laboratory and shall be at Owner's expense. Any areas that do not meet the compaction requirements shall be reworked and recompacted at Contractor's expense. Any retesting of the subgrade shall be at Contractor's expense.

E. Subgrades shall be profiled with an automated, electronically controlled machine. The machine must provide accurate vertical and horizontal control.

F. The subgrade surface shall be proof rolled to identify any soft spots prior to the placement of any paving. The removal and replacement of the material in any soft spots to a minimum depth of 12 inches shall be at Contractor's expense.

G. Subgrade profiling and other subgrade preparations are subsidiary to subgrade preparation.

H. The material from subgrade profiling shall be removed from the site at the time of profiling operations if it is not suitable for use as final grading material. If this material is not to be used as backfill material, it shall be disposed of at Contractor's own disposal site. Engineer to determine the suitability of the trimmings for use as final grading material.

3.02 FIELD QUALITY CONTROL

A. Compaction density testing shall be performed on compacted fill in accordance with ASTM D 1556, ASTM D 2167, or ASTM D 6938.

B. Results shall be evaluated in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D 698 "standard proctor", ASTM D 1557 "modified proctor" or AASHTO T 180.

C. If tests indicate work does not meet specified requirements, remove work, replace and retest.

D. Frequency of Tests:

1. 1 test per 100 to 150 linear feet per lane of roadway subgrade or as determined by Engineer.

2. 1 test per 100' X 100' area or as directed by Engineer for irregular areas.

E. Proof roll subgrade that will be under paving.

END OF SECTION

SECTION 31 23 33

TRENCHING FOR UTILITIES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Excavation, backfilling and compacting for utilities.

1.02 REFERENCES

A. AASHTO T 180 - Standard Specification for Moisture - Density Relations of Soils Using a 4.54 kg (10-lb) Rammer and a 457 mm (18 in.) Drop; American Association of State Highway and Transportation Officials.

B. ASTM C 136 - Standard Test Method for Sieve Analysis of Fine Coarse Aggregates.

C. ASTM D 698 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3)).

D. ASTM D 1556 – Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method.

E. ASTM D 1557 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2,700 kN-m/m^3)).

F. ASTM D 2167 – Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.

G. ASTM D 2487 – Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System).

H. ASTM D 6938 – Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

I. ASTM D 4318 – Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

J. State Standard Specifications for Highway Construction, latest edition, including all current supplemental specifications.

1.03 METHOD OF PAYMENT

A. Excavation, trenching, backfilling, moisture condition and compaction are subsidiary items that are not measured for payment and for which no direct payment shall be made. Contractor must include the cost of performing this work in a related item that is identified in the plans and specifications which is measured for payment and for which direct payment is made.

1. Includes excavating to required elevations. The loading, hauling and disposal of surplus material at a site of the contractor's choice is considered subsidiary.

B. Unsuitable Materials:

1. Includes excavating materials which are determined by Engineer to be unsuitable as subgrade for pipe and/or structures, loading and removal of

unsuitable material to a site of the contractor's choice, and furnish and backfill with materials specified by Engineer.

2. Method of Measurement and Pay Unit: By the cubic yard (measured in place).

1.04 SUBMITTALS

A. Samples: 60 pound sample of each type of fill. Submit in airtight containers to testing laboratory.

B. Materials Sources: Submit name of imported materials source.

C. Fill Composition Test Reports: Results of laboratory tests on proposed and actual materials used.

D. Compaction density test reports.

1.05 PROJECT CONDITIONS

A. Provide sufficient quantities of fill to meet project schedule and requirements. When necessary, store materials on-site in advance of need.

B. When fill materials need to be stored on-site, locate stockpiles where designated. See Engineer.

1. Separate differing materials with dividers or stockpile separately to prevent intermixing.

2. Prevent contamination.

3. Protect stockpiles from erosion and deterioration of materials.

C. Verify that survey benchmarks and intended elevations for the work are as indicated. Notify Engineer immediately if a discrepancy is identified.

D. Protect plants, lawns, rock outcroppings, trees, amenities and other features to remain.

E. Protect benchmarks, survey control points, existing structures, fences, sidewalks, paving, curbs, utility pedestals and amenities from excavating equipment and vehicular traffic.

F. Provide exploratory excavation to determine exact location of existing underground structures or utilities.

PART 2 - PRODUCTS

2.01 FILL MATERIALS

A. See Section 31 23 23 – Fill and Backfill for material specifications.

B. Refer to the Drawing, Section 01 10 00 – Special Provision, and/or geotechnical report for specific bedding material requirements.

2.02 SOURCE QUALITY CONTROL

A. Where fill materials are specified by reference to a specific standard, test and analyze samples for compliance before delivery to site.

B. If tests indicate materials do not meet specified requirements, change material and retest.

C. Provide materials of each type from same source throughout the work.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Identify required lines, levels, contours and datum locations.

3.02 TRENCHING

A. Notify Engineer of unexpected subsurface conditions and discontinue affected work in areas until notified to resume work.

B. Slope banks of excavation deeper than 3 feet to angle of repose or less until shored.

1. Install shoring to protect pavements and structures or where backsloping is impractical.

2. Pile excavated material beyond edge of trench to prevent slides and cave-in.

C. Stockpile topsoil material for placement in areas disturbed by construction.

D. Do not interfere with 45 degree bearing splay of foundations.

E. Cut trenches wide enough to allow inspection of installed utilities.

F. Bottom width of trench not less than 8 inches nor more than 12 inches on each side of pipe, or as indicated on the Plans.

G. Hand trim excavations. Remove loose material.

H. Remove large stones and other hard matter which could damage piping or impede consistent backfilling or compaction.

I. Remove lumped subsoil, boulders and rock.

J. Remove excavated material that is unsuitable for reuse from site.

K. Stockpile excavated material to be reused in area designated on-site.

L. Remove excess excavated material from site.

3.03 PREPARATION FOR UTILITY PLACEMENT

A. Cut out soft areas of subgrade not capable of compaction in place. Backfill with specified fill.

B. Compact subgrade to density equal to or greater than requirements for subsequent fill material. See Geotechnical Report.

C. Until ready to backfill, maintain excavations and prevent loose soil from falling into excavation.

D. Provide uniform bearing for each pipe section.

1. Round bottom of trench to allow at least 1/4 of the circumference to rest firmly on undisturbed earth.

2. Excavate holes for pipe bells.

E. Verify that trace wire has been installed and is unbroken or damaged.

3.04 BEDDING AND BACKFILLING

A. Backfill to contours and elevations indicated using unfrozen materials.

B. Employ a placement method that does not disturb or damage other work.

C. Do not fill over porous, wet, frozen or spongy subgrade surfaces.

D. Adjust and maintain optimum moisture content of fill and backfill materials to attain required compaction density.

E. Fill: Place and compact materials in equal, continuous layers.

F. Place bedding material as indicated on the drawings.

G. Manually backfill under pipe haunches and around bells.

1. Fill in uniform layer on each side of pipe to prevent displacement.

2. Use handheld pneumatic or mechanical compacting equipment.

3. Use manual methods until backfill is a minimum of 12 inches above top of pipe, or as indicated on the Plans.

4. Use caution to prevent damage to trace wire.

H. Leave shoring in place where required to protect structures or pavement.

1. Cut off top of piling a minimum of 36 inches below subgrade elevation.

I. Correct areas that are over-excavated.

1. Thrust Bearing Surfaces: Fill with concrete.

2. Other Areas: Use specified fill, flush to required elevation, compacted as per the geotechnical report.

J. Reshape and recompact areas subjected to vehicular traffic.

K. Slope grade away from building and structures minimum 2 percent unless noted otherwise. Make gradual grade changes. Blend slope into level areas.

3.05 TOLERANCES

A. Top Surface of Backfill: Plus or minus 0.08 feet from required elevations.

3.06 FIELD QUALITY CONTROL

A. Compaction density testing shall be performed on compacted fill in accordance with ASTM D 1556, ASTM D 2167, or ASTM D 6938.

B. Results shall be evaluated in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D 698 "standard proctor", ASTM D 1557 "modified proctor" or AASHTO T 180.

C. If tests indicate work does not meet specified requirements, remove work, replace and retest.

D. Frequency of Tests:

1. Under Paving, Slabs-on-Grade and Similar Construction:

a. 1 test per 150 linear feet of main line or as determined by Engineer. Test at random depths.

b. 1 test of each service line or as determined by Engineer.

2. Nonpaved Area:

a. 1 test per 300 linear feet of main line or as determined by Engineer. Test at random depths.

b. 1 test of each service line or as determined by Engineer.

E. Proof roll compacted fill at surfaces that will be under slabs-on-grade, pavers and paving.

3.07 CLEANUP

A. Remove unused stockpiled materials; leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

END OF SECTION

SECTION 31 25 00

EROSION CONTROL

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Storm water pollution prevention plans – SWPPP.

B. Permits.

C. Erosion control blanket.

D. Silt fence.

E. Straw wattle.

F. Inlet filters.

1.02 UNIT PRICES

A. SWPPP or Storm Water Management Plans, construction of erosion control facilities, maintenance, permit compliance responsibilities, erosion control materials, and installation, payment by lump sum, as shown on the Bid Form, and/or refer to Section 01 10 00 - Special Provisions.

B. Permit Compliance – No separate payment, incidental to project cost.

C. Erosion control blankets (all types):

1. Method of Measurement and Pay Unit: By the square yard per type or as shown on the Bid Form.

2. Includes matting, filter fabric, staples, placement, delivery, installation and maintenance.

D. Silt fence (all types):

1. Method of Measurement and Pay Unit: By the lineal foot per type or as shown on the Bid Form.

2. Includes fence, posts, trenching and backfilling, installation and maintenance.

E. Straw wattles:

1. Method of Measurement and Pay Unit: By the lineal foot per size or as shown on the Bid Form

2. Includes material and installation.

F. Inlet filters:

1. Method of Measurement and Pay Unit: Included in the cost of the inlet, by each or as shown on the Bid Form

2. Includes material, installation, maintenance, and disposal.

1.03 REFERENCES

A. Erosion Control Technology Council.

B. National Pollutant Discharge Elimination System (NPDES) General NPDES Permit Number NER110000.

C. State Standard Specifications, latest revision.

1.04 PERMITS

A. NPDES: The Owner is responsible for submitting the Notice of Intent (NOI) to the permitting authority for this project. Once the project is provided a permit number and the proper forms are received, copies will be provided to the Contractor.

1. Under this permit the Contractor will be responsible for:

a. Filling out and obtaining signatures on the Start Form. This must be turned in prior to work beginning on the project.

b. Installation and removal as called for on plans and in these specifications.

c. Maintain the site according to the permit requirements. Erosion control features will be cleaned when they have been 50 percent filled.

d. Completing a daily record for erosion control measures installed and condition of those installed previously.

e. Maintaining a record of rainfall events and the effects on the erosion control measures.

f. Maintain a record of events when the erosion control measures failed and what corrective measures were taken.

g. Filling out and obtaining signatures on the End form. This must be turned in at the completion of work on the project.

h. Allowing for the inspection of the site by others including; Regulatory Authority, Engineer, Owner or other designated representatives.

i. Providing a copy of all documents to Engineer and Owner at completion of project.

PART 2 - PRODUCTS

2.01 EROSION CONTROL BLANKET

A. The erosion control blanket shall be placed as per the manufacturer's recommendations and the plans. The erosion control blanket shall be placed after the area is seeded and before the area is mulched.

B. Wire staples shall be used for anchoring the erosion control blanket. The staple pattern shall be per the manufacturers recommendations.

C. The seed shall comply with the applicable portions of Section 01 10 00 – Special Provisions and Section 32 92 19 - Seeding. The seed mixture shall be of the types and applied at the rate shown in the special provisions.

D. The fertilizer shall comply with the applicable portion of Section 32 92 19 - Seeding. The fertilizer shall be of the types and applied at the rate shown in the special provisions.

E. All erosion control mats shall be of type specified in the plans.

2.02 SILT FENCE

A. The silt fence material shall be of the type specified in the plans.

B. The stakes shall be as shown in the plans, or as follows:

1. The pins that are required shall be 11 gauge (0.120 inch) steel wire with a 1 inch or larger throat with at least 6-inch legs.

2. Silt fence stakes shall be 5.5 foot studded, steel "T" fence posts.

a. Used posts are acceptable.

C. Stakes for low profile silt fence shall be wood, 1 1/2 inches x 1 1/2 inches x 36 inches.

2.03 STRAW WATTLE

A. The straw wattles (or sediment logs) shall be of the type, size and length specified in the plans.

B. The stakes shall be as shown in the plans.

1. Wood stakes shall be 1-1/8" x 1-1/8" x 30" for 9" and 12" straw wattle.

2. Wood stakes shall be 1-1/8" x 1-1/8" x 48" for 20" straw wattle.

2.04 INLET FILTERS

A. The inlet filters shall be of the type and size as shown on the plans.

PART 3 - EXECUTION

3.01 SWPPP OR STORM WATER MANAGEMENT PLAN

A. These facilities shall be constructed as shown on the plans. The time frame for construction is set forth in Section 01 10 00 – Specials Provisions or as directed by the Engineer. The SWPPP shall be maintained throughout the duration of the project and until the Engineer has deemed the SWPPP may be closed, transferred to another party or as stated in Section 01 10 00 – Special Provisions.

3.02 EROSION CONTROL BLANKETS

A. This work shall be performed as soon as possible after finish grading operations have been completed or as directed.

B. No restrictive seeding time periods shall apply to this work.

C. Contractor shall tamp and shape fill earth to the finish grade as needed to repair erosion to the grades and conditions shown in the plans.

1. If additional fill dirt is required, it will not be paid for as extra work and must be provided and placed at no additional cost.

D. Contractor shall perform all work in the areas to be protected so that the land surface is graded smooth and free of all debris, including roots and stones larger than 1 inch in their largest dimensions.

1. All lumps of soil shall be pulverized, raked out or removed.

2. Vegetation shall be removed from these areas, except for the desirable native vegetation that has been designated by Engineer to remain undisturbed.

3. The soil in the areas to be protected by the soil retention blanket shall be loosened to a depth of not less than 1 inch by discing, harrowing, raking or other approved methods.

E. Contractor shall obtain Engineer's approval of all soil preparation work, fertilizer and seed.

F. Contractor shall place the erosion control blankets immediately following fertilizing and seeding.

1. The blanket shall be laid out flat, parallel to the surface runoff flow direction, and secured as shown in the plans for each specific type of erosion control.

2. Care shall be exercised in placing the blanket so as not to disturb previously seeded areas.

3.03 SILT FENCE

A. The silt fence shall be installed and in good working condition prior to any grading operations taking place.

1. Contractor shall excavate a trench to the depth, width and length shown in the plans.

B. Contractor shall place the silt fence in the trench and pin it as shown in the plans.

1. If the silt fence is installed with mechanical methods, installing pins is not required.

C. Contractor shall backfill the trench, compact the soil and attach the fabric to the posts as shown in the plans.

1. All silt fence splice joints shall be overlapped a minimum of 16 inches (400 mm).

D. Contractor shall remove and dispose of silt that accumulates near the silt fence during construction and at completion of the project. Each time silt is removed, the fence shall be repaired to a good working condition.

E. Contractor shall maintain the silt fence in good working condition at all times.

3.04 STRAW WATTLES

A. Contractor shall place straw wattles immediately after finish grading is complete in areas where straw wattles are to be constructed or as directed.

B. Contractor shall install straw wattles as per the plans.

C. The remainder of the area shall be prepared and the entire area shall be fertilized and seeded in accordance with Standard Specifications or Section 32 92 19 – Seeding.

D. Contractor shall then place the erosion control blanket and staple it as shown in the plans.

1. If the filter fabric is attached to the erosion control blanket, then the seed shall

be broadcast over the blanket and then the blanket shall be soil filled.

E. The limits of the completed straw wattles shall extend up the fore slope and back slope of the swale or channel to effectively contain the runoff and prevent erosion and washout at the edges of the installation.

F. All straw wattles shall be held securely in place.

G. In shale, the 2 reinforcing steel stakes in each barrier shall be wired together to prevent the barrier from floating off the stakes.

H. All stakes shall be driven into the ground a minimum of 16 inches.

I. Contractor shall remove and dispose of silt that accumulates adjacent to the straw wattle.

3.05 INLET FILTERS

A. Contractor shall install inlet filters immediately after the construction of the inlet structure.

B. Contractor shall remove and dispose of silt that accumulates in the inlet filter. If the inlet filter becomes damaged, the Contractor shall replace the inlet filter, the cost of such shall be incidental.

3.06 EROSION CONTROL REMOVAL

A. Contractor shall remove inlet filters, silt fence, straw wattles including stakes and posts, after vegetation has been fully established and as otherwise directed by Engineer (not to exceed 1 year).

B. Contractor to obtain permission from Engineer prior to the removal of any erosion control materials.

3.07 SWPPP FACILITY REMOVAL

A. Contractor may be required to remove facilities that were constructed as part of a SWPPP, such as detention or sedimentation basins, accumulated silt, drainage piping, riprap, etc. Refer to Section 01 10 00 – Special Provisions or the Bid Form.

B. Contractor to obtain permission from the Engineer prior to the removal of any SWPPP Facilities.

C. Contractor may be required to seed the removal areas. Refer to Section 01 10 00 – Special Provisions or the Bid Form.

END OF SECTION

SECTION 31 66 15
HELICAL PILE

Description

The work shall consist of designing, furnishing and installing pre-manufactured helical piles to support new structures.

1.1 GENERAL

The Helical Piles consist of helical bearing plate(s) attached at the tip of a high strength central steel shaft. The central steel shaft is intended to accept applied load and transfer to a bearing soil strata at some depth below the surface.

1.2 Purpose of Specification

The purpose of this specification is to describe the furnishing of all designs, materials, tools, equipment, labor supervision, and installation techniques necessary to install Helical Piles as detailed on the contract drawings, including pile-top details.

1.3 Scope of Work

This work consists of furnishing all necessary engineering and design services, supervision, labor, tools, materials, and equipment to perform all work necessary to install the Helical Piles per the specifications described herein, and as shown on the contract drawings. The Contractor shall install Helical Piles that will develop the load capacities as detailed on the drawings. The responsibilities and duties of the respective parties for this project are summarized in Table 1.0.

Table 1.0 Tasks and Responsibilities to be Allocated

	TASK	RESPONSIBLE PARTY
1	Site Investigation, Initial Geotechnical Investigation, Soil Parameters	Owner
2	Overall scope of work, structure –including design loads, pile locations, pile spacing and orientation	Owner
3	Design criteria	Owner
4	Specify type of corrosion protection	Owner
5	Minimum total pile length, depth to bearing stratum	Owner
6	Helical Pile components and details	Contractor
7	Details of pile connection to structure	Contractor
8	Preparation of working drawings and installation records	Contractor
9	Construction methods, schedule, sequencing, and coordination of work	Contractor
10	Requirements of field production control, including logging of installation torque vs. installed depth	Contractor
11	Quality Control	Contractor
12	Quality Assurance	Owner

1.4 Qualifications of the Helical Pile Contractor

The HELICAL PILE Contractor shall be experienced in performing design and construction of helical piles and shall furnish all materials, labor, and supervision

to perform the work. The Contractor shall be trained and certified by the Helical Pile Manufacturer in the proper methods of design and installation of the HELICAL PILE system. The Contractor shall provide names of on-site personnel materially involved with the work, including those who carry documented certification from the Helical Pile Manufacturer. At a minimum, these personnel shall include foreman, machine operator, and project engineer/manager.

1.5 Allowable Tolerances

1.5.1 Centerline of piling shall not be more than 3 inches from indicated plan location.

1.5.2 Pile plumbness shall be within 2° of plan inclination.

1.5.3 Top elevation of pile shall be within +1 inch to -2 inches of the design vertical elevation.

1.6 Quality Assurance

1.6.1 Helical Piles shall be installed by a contractor certified by the helical pile manufacturer. The Contractor shall have satisfied the certification requirements relative to the technical aspects of the product and installation procedures as required by the manufacturer. Certification documents shall be provided upon request to the Owner or their representative.

1.6.2 The certified Contractor shall employ an adequate number of skilled workers who are experienced in the necessary crafts and who are familiar with the specified requirements and methods needed for proper performance of the work of this specification.

1.6.3 All Helical Piles shall be installed in the presence of a designated representative of the Owner unless said representative informs the Contractor otherwise.

1.6.4 Helical Pile components as specified shall be manufactured by a facility whose quality systems comply with ISO (International Organization of Standards) 9001 requirements. Certificates of Registration denoting ISO Standards Number shall be presented upon request to the Owner or their representative.

1.7 Design Criteria

1.7.1 Helical Piles shall be designed to meet the specified loads as shown on the contract drawings. The calculations and working drawings required from the Contractor shall be submitted to the Owner for review and acceptance in accordance to Section 2.1 “Construction Submittals”. See PILE DATA in the contract drawings for the design pile bearing. This value is provided in kips as determined from the Allowable Stress Design (ASD) according to the 2018 Edition of the International Building Code (IBC). A minimum factor of safety of 2 applied to the service or nominal loading is required.

1.7.2 The ultimate structural capacity shall be determined as:

1.7.2.1 For compression loads:

$P_{ultc} = f_{yshaft} * A_{shaft}$

Where: P_{ultc} = ultimate structural capacity in compression (kip)

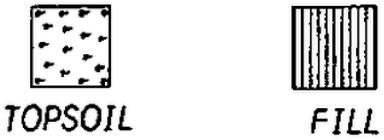
f_{yshaft} = minimum yield strength of central steel shaft (ksi) A_{shaft}

= area of central steel shaft ($in.^2$)

The ultimate structural capacity may be reduced by the ultimate load capacity per helix plate(s) – depending on what fraction of the total load is transferred to the soil in end bearing.

1.7.3 The contract drawings may indicate specific reinforcing details for the interface at the top of the HELICAL PILE and the structure.

1.7.4 The HELICAL PILE capacity (either in skin friction or end-bearing) shall not be relied upon from the following soil layers as defined in the geological profile or geotechnical reports:



The overall length and installed torque of a HELICAL PILE shall be specified such that the required in-soil capacity is developed by end- bearing on the helical plate(s) in an appropriate strata(s).

It is recommended that the theoretical end-bearing capacity of the helical plates be determined using commercially available software. The N- values for the various strata(s) are provided on the geotechnical report. The Owner shall determine the allowable response to axial loads.

1.8 Ground Conditions

The Geologic profile, including standard penetration (N-values) in the geotechnical report shall be considered to be representative of the in-situ subsurface conditions likely to be encountered on the project site.

The geotechnical report was completed by Thiele Geotech Inc., dated 05/19/2020. Preliminary recommendations for the helical piles are provided; final working drawings and design calculations shall be completed by the Contractor.

The N-values are provided in the geotechnical report. This information shall be the used as the basis for helical pile design using generally accepted engineering judgment and methods.

If during HELICAL PILE installation, subsurface conditions of a type and location are encountered of a frequency that were not reported, inferred and/or expected at the time of preparation of the bid, the additional costs required to overcome such conditions shall be considered as extras to be paid for.

2.1 SUBMITTALS

2.2 Construction Submittals

2.2.1 The Contractor shall prepare and submit to the Owner, for review, working drawings and design calculations for the Helical Pile foundation intended for use at least 14 calendar days prior to planned start of construction. All submittals shall be signed and sealed by a Registered Professional Engineer currently licensed in the State of Nebraska.

2.2.2 The Contractor shall submit a detailed description of the construction procedures proposed for use to the Owner for review. This shall include a list of major equipment to be used.

2.2.3 The Working Drawings shall include the following:

- 2.2.3.a HELICAL PILE number, location and pattern by assigned identification number
- 2.2.3.b HELICAL PILE design load
- 2.2.3.c Type and size of central steel shaft
- 2.2.3.d Helix configuration (number and diameter of helical plates)
- 2.2.3.e Minimum effective installation torque
- 2.2.3.f Minimum overall length
- 2.2.3.g Inclination angle (-0- for vertical piles)
- 2.2.3.h Minimum cased length, if applicable
- 2.2.3.i Cut-off elevation

2.2.4 The Contractor shall submit shop drawings for all HELICAL PILE components, including casing components and pile top attachment to the Owner for review. This includes HELICAL PILE lead and extension section identification (manufacturer's catalog numbers).

2.2.5 The Contractor shall submit certified mill test reports for the central steel shaft, as the material is delivered, to the Owner for record purposes. The ultimate strength, yield strength, % elongation, and chemistry composition shall be provided.

2.2.6 The Contractor shall submit to the Owner copies of calibration reports for each torque indicator and all load test equipment to be used on the project. The calibration tests shall have been performed within one year of the date submitted. HELICAL PILE installation and testing shall not proceed until the Owner has received the calibration reports. These calibration reports shall include, but are not limited to, the following information:

- 2.2.6.a Name of project and Contractor

2.2.6.b Name of testing agency
2.2.6.c Identification (serial number) of device calibrated
2.2.6.d Description of calibrated testing equipment
2.2.6.e Date of calibration
2.2.6.f Calibration data

2.2.7 Work shall not begin until all the submittals have been received and reviewed by the Owner. The Contractor shall allow the Owner a reasonable time to review, comment, and return the submittal package after a complete set has been received. All costs associated with incomplete or unacceptable submittals shall be the responsibility of the Contractor.

2.3 Installation Records (see sample installation log)

The Contractor shall provide the Owner copies of HELICAL PILE installation records within 24 hours after each installation is completed. Records shall be prepared in accordance with the specified division of responsibilities as noted in Table 1.0. These installation records shall include, but are not limited to, the following information:

2.3.1 Name of project and Contractor
2.3.2 Name of Contractor's supervisor during installation
2.3.3 Date and time of installation
2.3.4 Name and model of installation equipment
2.3.5 Type of torque indicator used
2.3.6 Location of HELICAL PILE by assigned identification number
2.3.7 Actual HELICAL PILE type and configuration – including lead section (number and size of helical plates), number and type of extension sections (manufacturer's SKU numbers)
2.3.8 HELICAL PILE installation duration and observations
2.3.9 Total length of installed HELICAL PILE
2.3.10 Cut-off elevation
2.3.11 Inclination angle (-0- for vertical piles)
2.3.12 Installation torque at one-foot intervals for the final 10 feet
2.3.13 Comments pertaining to interruptions, obstructions, or other relevant information
2.3.14 Rated load capacities

2.4 Closeout Submittals

The Contractor shall transfer all manufacturer's warranties and guarantees to the Department. All manufacturer's warranty and guarantee documentation and all operation and parts manuals shall also be given to the Department.

3. PRODUCTS AND MATERIALS

3.1 Central Steel Shaft:

The central steel shaft, consisting of lead sections, helical extensions, and plain extensions, shall comply with the following minimum requirements:

3.1.1 Round-Cornered-Square (RCS) solid steel bars:
Shall be hot rolled Round-Cornered-Square (RCS) solid steel bars meeting dimensional and workmanship requirements of ASTM A29. The bar shall be either modified medium carbon steel grade (similar to
AISI 1044) with improved strength due to fine grain size or high strength low alloy (HSLA), low to medium carbon steel grade with improved strength due to fine grain size.

3.1.1.1 Minimum torsional strength rating = 5,500 ft-lb
3.1.1.2 Minimum yield strength = 70 ksi
3.1.1.3 Round-Cornered Square (RCS) solid steel bars shall only be used in conjunction with a grout column of 4 to 10 inches to provide lateral stability to the central shaft. The grout shall be a neat grout with a compressive capacity of no less than
4000 psi. All appropriate displacement plates and spacings shall be shown in the shop drawings.

3.1.2 Structural steel tube or pipe:

Shall be seamless or straight-seam welded, per ASTM A53, A252, ASTM A500, or ASTM A618. Minimum wall thickness is 0.300" (schedule 80).

3.1.2.1 Torsional strength rating = 11,000 ft-lb
3.1.2.2 Minimum yield strength = 50 ksi

3.2 Helical Bearing Plate:

Shall be hot rolled carbon steel sheet, strip, or plate formed on matching metal dies to true helical shape and uniform pitch. Bearing plate material shall conform to the following ASTM specifications:

3.2.1 ASTM A36, ASTM A572, A1018, or A656 with minimum yield strength of 50 ksi. Minimum plate thickness is 3/8".

3.3 Bolts:

The size and type of bolts used to connect the central steel shaft sections together shall conform to the following ASTM specifications:

3.3.1 For use with solid square shafts: 3/4" diameter bolts per ASTM A320 Grade L7.
3.3.2 For use with solid square shafts: 7/8" diameter bolt per ASTM A193 Grade B7.
3.3.3 For use with solid square shafts: 1-1/8" diameter bolt per ASTM A193 Grade B7.

3.3.4 For use with solid square shafts: 1-1/4" diameter bolt per ASTM A193 Grade B7.

3.3.5 For use with steel tube or pipe shafts: 3/4" diameter bolts per SAE J429 Grade 5.

3.4 Couplings:

Shall be formed as integral part of the plain and helical extension material. For square shafts, the couplings shall be hot upset forged sockets or hot forge expanded sockets. An external welded coupler or external detached coupler shall be used for round shafts.

3.5 Plates, Shapes, or Pier Caps:

Structural steel plates and shapes for HELICAL PILE top attachments shall conform to ASTM A36 or ASTM A572 Grade 50.

4.1 EXECUTION

4.2 Installation Equipment

4.2.1 Shall be rotary type, hydraulic power driven torque motor with clockwise and counterclockwise rotation capabilities. The torque motor shall be capable of continuous adjustment to revolutions per minute (RPM's) during installation. Percussion drilling equipment shall not be permitted. The torque motor shall have torque capacity 15% greater than the torsional strength rating of the central steel shaft to be installed.

4.2.2 Equipment shall be capable of applying adequate down pressure (crowd) and torque simultaneously to suit project soil conditions and load requirements. The equipment shall be capable of continuous position adjustment to maintain proper HELICAL PILE alignment.

4.3 Installation Tooling

4.3.1 Installation tooling should be maintained in good working order and safe to operate at all times. Flange bolts and nuts should be regularly inspected for proper tightening torque. Bolts, connecting pins, and retainers should be periodically inspected for wear and/or damage and replaced with identical items provided by the manufacturer. Heed all warning labels. Worn or damaged tooling should be replaced.

4.3.2 A torque indicator shall be used during HELICAL PILE installation. The torque indicator can be an integral part of the installation equipment or externally mounted in-line with the installation tooling.

4.3.2.1 Shall be capable of providing continuous measurement of applied torque throughout the installation.

4.3.2.2 Shall be capable of torque measurements in increments of, at most, 500 ft-lb

4.3.2.3 Shall be calibrated prior to pre-production testing or start of work. Torque indicators which are an integral part of the installation equipment, shall be calibrated on-site. Torque indicators which are mounted in-line with the installation tooling, shall be calibrated either on-site or at an appropriately equipped test facility. Indicators that measure torque as a function of hydraulic pressure shall be calibrated at normal operating temperatures.

4.3.2.4 Shall be re-calibrated, if in the opinion of the Owner and/or Contractor reasonable doubt exists as to the accuracy of the torque measurements.

4.4 Installation Procedures

4.4.1 Central Steel Shaft:

4.4.1.1 The HELICAL PILE installation technique shall be such that it is consistent with the geotechnical, logistical, environmental, and load carrying conditions of the project.

4.4.1.2 The lead section shall be positioned at the location as shown on the working drawings. The HELICAL PILE sections shall be engaged and advanced into the soil in a smooth, continuous manner at a rate of rotation of 5 to 20 RPM's. Extension sections shall be provided to obtain the required minimum overall length and installation torque as shown on the working drawings. Connect sections together using coupling bolt and nut torqued to 40 ft-lb.

4.4.1.3 Sufficient down pressure shall be applied to uniformly advance the HELICAL PILE sections approximately 3 inches per revolution. The rate of rotation and magnitude of down pressure shall be adjusted for different soil conditions and depths.

4.5 Termination Criteria

4.5.1 The torque as measured during the installation shall not exceed the torsional strength rating of the central steel shaft.

4.5.2 The minimum installation torque and minimum overall length criteria as shown on the working drawings shall be satisfied prior to terminating the installation of the Helical Pile.

4.5.3 If the torsional strength rating of the central steel shaft and/or installation equipment has been reached prior to achieving the contractor specified minimum overall length required, the Contractor shall have the following options:

4.5.3.1 Terminate the installation at the depth obtained subject to the review and acceptance of the HELICAL PILE design representative.

4.5.3.2 Remove the existing HELICAL PILE and install a new one with fewer and/or smaller diameter helical plates. The new helix configuration shall be subject to review and acceptance of the Owner. If re-installing in the same location, the top-most helix of the new HELICAL PILE shall be terminated at least (3) three feet beyond the terminating depth of the original HELICAL PILE. Shaft section shall not be reused after it has been permanently twisted during a previous installation.

4.5.4 If the minimum installation torque as shown on the working drawings is not achieved at the minimum overall length, and there is no maximum length constraint, the Contractor shall have the following options:

4.5.4.1 Install the HELICAL PILE deeper using additional extension sections, displacement plates, casing if required, and grout.

4.5.4.2 Remove the existing HELICAL PILE and install a new one with additional and/or larger diameter helical plates. The new helix configuration shall be subject to review and acceptance of the Owner. If re-installing in the same location, the top-most helix of the new HELICAL PILE shall be terminated at least (3) three feet beyond the terminating depth of the original HELICAL PILE.

4.5.4.3 De-rate the load capacity of the HELICAL PILE and install additional pile(s). The de-rated capacity and additional pile location shall be subject to the review and acceptance of the Owner.

4.5.5 If the HELICAL PILE is refused or deflected by a subsurface obstruction, the installation shall be terminated and the pile removed. The obstruction shall be removed, if feasible, and the HELICAL PILE re-installed. If obstruction can't be removed, the HELICAL PILE shall be installed at an adjacent location, subject to review and acceptance of the Owner.

4.5.6 The average torque for the last three feet of penetration shall be used as the basis of comparison with the minimum installation torque as shown on the working drawings. The average torque shall be defined as the average of the last three readings recorded at one-foot intervals.

5.0 METHOD OF MEASUREMENT/BASIS OF PAYMENT

5.1 Helical Pile central steel shafts will be measured for payment by the each for pile meeting the design criteria. This will be determined by field measurement and recorded on the helical pile installation log.

5.2 Unforeseen obstructions encountered that result in a production interruption will be paid for as “extra work”.

Helical Pile Installation Log

Page(s):_____of _____

Project Name: _____

Contractor: _____

Name & Model of Installation Equip: _____

Project No:_____ **Date:** _____

Project Address: **Time:** _____

_____ **Time to Install:** _____

_____ **Pile Location No:** _____

_____ **Shaft Type/Size:**_____

Project Type:_____ _____

(New Construction/Remedial Repair) _____

Termination/Bracket:_____ **Helix Configuration:** _____

On-Site Supervisor:_____ **Total Length of HELICAL PILE:** _____

Inclination angle of HELICAL PILE:_____ **Torque Indicator Type:** _____

Comments:_____ **Cut-off Elevation:** _____

_____

_____

Helical Pile Installation

Depth (feet)	Torque (ft-lb)	Grout Flow (volume/shaft length)

Depth (feet)	Torque (ft-lb)	Grout Flow (volume/shaft length)

SECTION 32 13 13

PORTLAND CEMENT CONCRETE PAVING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Concrete roads, streets, sidewalks, trails, curb ramps, curb and gutter, driveways, alleys and parking areas.

1.02 REFERENCES

A. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete

B. ACI 301 - Specifications for Structural Concrete for Buildings

C. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete

D. ACI 305R – Guide for Hot Weather Concreting

E. ACI 306R – Guide to Cold Weather Concreting

F. ASTM A 185 – Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete (Withdrawn 2013).

G. ASTM A 497 – Standard Specification for Steel Welded Wire Fabric, Deformed, for Concrete (Withdrawn 2013).

H. ASTM A 615 – Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.

I. ASTM C 33 – Standard Specification for Concrete Aggregates.

J. ASTM C 39 – Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.

K. ASTM C 94 – Standard Specification for Ready-Mixed Concrete.

L. ASTM C 150 – Standard Specification for Portland Cement.

M. ASTM C 173 – Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.

N. ASTM C 260 – Standard Specification for Air-Entraining Admixtures for Concrete.

O. ASTM C 309 – Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

P. ASTM C 311 – Standard Test Methods for Sampling and Testing Fly Ash or Natural Pozzolans for Use as a Mineral Admixture in Portland-Cement Concrete.

Q. ASTM C 494 – Standard Specification for Chemical Admixtures for Concrete.

R. ASTM C 618 – Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.

S. ASTM C 685 – Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing.

T. ASTM C 1074 – Standard Practice for Estimating Concrete Strength by the Maturity Method.

U. ASTM C 1116 – Standard Specification for Fiber-Reinforced Concrete.

V. ASTM D 1751 – Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).

W. ASTM D 1752 – Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete paving and Structural Construction.

X. ASTM D2628 – Standard Specification for Preformed Polychloroprene Elastomeric Joint Seals for Concrete Pavements.

Y. ASTM D 5893 – Standard Specification for Cold Applied, Single Component, Chemically Curing Silicone Joint Sealant for Portland Cement Concrete Pavements.

Z. ASTM D 6690 – Standard Specification for Joint and Crack Sealants, Hot-Applied, for Concrete and Asphalt Pavements.

AA. AASHTO M 33 – Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).

BB. AASHTO M 148 – Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

CC. State Standard Specifications for Highway Construction, Latest Addition, including all current supplemental specifications.

1.03 UNIT PRICES

A. Portland Cement Concrete:

1. Paid for by the square yard, square feet or lineal foot for each thickness as shown on the Bid Form, includes placing, floating, finishing, curing, sawing, cold weather protection and incidentals.

B. Detectable Warning Panels:

1. Paid for by the square feet of the detectable warning panel, includes furnishing and installing each unit.

C. Earth Shoulder Construction:

1. Method of Measurement and Pay Unit: By stations of 100 feet. If no bid item is considered incidental to other bid items.

2. Includes shouldering:

a. Furnish and excavate topsoil from sources other than right-of-way.

b. Haul, compact, blade and shape material to conform to typical section shown in the plans and cross sections.

3. Each shoulder will be measured separately along the project centerline regardless of width.

4. Deductions will be made for areas where shoulders are not required.

5. Additional length of shoulder construction due to intersection returns, tapers, curves, tangents, stubs, driveways, sidewalks and other irregular areas are considered to be subsidiary to earth shoulder construction.

6. Water applied to obtain compaction is considered to be subsidiary.

1.04 SUBMITTALS

A. Submit the proposed mix design for each class of concrete to Engineer and testing firm for review prior to commencement of concrete operations.

B. Submit information on any proposed additives for the mix design.

C. Submit information on reinforcement for baskets, special design, etc.

1. Included material, grade, bar schedules, stirrup spacing, bent bar diagrams, arrangement and supports of concrete reinforcement.

D. Material Certificates: Signed by manufacturers certifying that each of the following items complies with requirements:

1. Cementitious materials and aggregates.

2. Steel reinforcement and reinforcement accessories.

3. Admixtures.

1.05 QUALITY ASSURANCE

A. Obtain cementitious materials, aggregate and each admixture from same source throughout.

B. Concrete Supplier Qualifications: Firm experienced in manufacturing ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.

1. Concrete Supplier must be certified according to the National Ready Mixed Concrete Association Certification of Ready Mixed Concrete Production Facilities.

C. Testing Agency Qualifications: Independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 to conduct testing indicated, as documented according to ASTM E 548.

D. Follow recommendations of the applicable State or Local Standard Specifications, and ACI 306R, when placing concrete during hot or cold weather.

1.06 ENVIRONMENTAL REQUIREMENTS

A. Reference: Applicable State or Local Standard Specifications.

B. Do not place concrete when base surface temperature is less than 40 degrees F or surface is unstable or frozen.

C. Do not start to place concrete until ascending ambient air temperature reads 41 degrees F.

D. Cease placing operations when descending ambient air temperature reaches 41 degrees F.

E. Protect concrete when the air temperature may be expected to drop below 36 degrees F.

F. Any concrete damaged by freezing will be rejected. Removal and replacement at Contractor's expense.

G. When evaporation rate approaches 0.2 lb./sf/h, Contractor must notify Engineer regarding the actions to be taken to prevent plastic shrinkage cracking. Obtain rate of evaporation using nomograph, applicable State or Local Standard Specifications.

1.07 METHOD OF CONSTRUCTION

A. Full Width, Slip Form Paving Machines:

1. Required method of main line paving.

2. Reference: Applicable State or Local Standard Specifications.

3. Exceptions to Full Width Paving:

a. Intersection returns.

b. Driveways and parking area.

c. Irregular shapes.

d. Sidewalks.

e. Areas designated in the drawings to be constructed in phases in order to provide access to property.

B. Paving Less Than Full Width:

1. Restrictions:

a. No equipment is allowed within 3 feet of the edge of freshly poured concrete paving for a minimum of 3 days.

b. No concrete trucks, pumping machines, paving machines, conveyors or related equipment used to transport or place concrete shall be allowed on new paving for a minimum of 7 days and concrete has developed a compressive strength of 3,500 psi.

2. Additional Costs:

a. If approved by Owner and Engineer, Contractor shall be responsible for additional costs related to paving less than full width on main line paving areas.

b. If approved by Owner and Engineer, Contractor shall make payment to Owner an amount equal to 5.0 percent of the total bid for square yards of concrete paving as submitted to compensate for the additional time involved. This payment shall be made to Owner prior to final payment of the completed project.

c. Additional costs include:

(i) Construction staking.

(ii) Construction observation by resident project representative (RPR) and/or Engineer.

(iii) Construction Administration.

(iv) Additional compaction testing of subgrade.

(v) Additional concrete testing.

PART 2 - PRODUCTS

2.01 FORM MATERIALS

A. Form Materials: Conform to applicable State or Local Standard Specifications.

2.02 REINFORCEMENTS

A. Tie Bars: New, deformed billet-steel bars, Grade 60, ASTM A 615.

B. Dowel Bars: New, smooth, round steel bars, Grade 60, ASTM A 615 coated with organic coating AASHTO M 254, corrosion resistant coated dowel bars.

2.03 CONCRETE MATERIALS

A. Concrete Materials: As specified in applicable State or Local Standard Specifications or as specified in Section 01 10 00 - Special Provisions.

B. Cement:

1. Type I, Type II, Type I/II and Type III Portland cement shall conform to the requirements in ASTM C 150 with the following additional requirements.

a. Portland cement shall not contain more than 0.60 percent equivalent alkali.

b. Processing additions may be used in the manufacture of the cement, provided such materials have been shown to meet the requirements of ASTM C 465 and the total amount does not exceed 1 percent of the weight of Portland cement clinker.

2. Interground and Blended Cement shall conform to the requirements in ASTM C 595 with the following additional requirements:

a. Interground/Blended cement Type IP

(i) Type IP(25) shall be composed of Class F fly ash or Class N pozzolan replacement shall be 25%+/-2%

(ii) Type IP(20) shall be composed of Class F fly ash or Class N pozzolan replacement shall be 20%+/-2%

b. Interground/Blended cement Type IT

(i) For SCMs, slag cement and limestone, the maximum replacement by weight shall be 40%. The manufacturer has a production tolerance of +2% from the proposed replacement.

(ii) For slag cement, the maximum replacement shall be 20% or less when incorporated into the final Interground/Blended cement.

(iii) For limestone cement, the replacement range shall be from 5.1% to 10.0% when incorporated into the final Interground/Blended cement.

C. Fine and Coarse Mix Aggregate:

1. Mineral aggregates shall be crushed rock, broken stone, gravel, sand-gravel, coarse sand, fine sand, or a mixture of these materials composed of clean, hard, durable, and uncoated particle.

2. Shall meet the requirements in ASTM C 33.

3. Aggregates shall be free from injurious quantities of dust, soft or flaky particles, loams, alkali, organic matter, paper, wood, or other deleterious matter as determined by Engineer.

4. Free of materials with deleterious reactivity to alkali in cement.

D. Fly Ash: Class F, ASTM C 618 and ASTM C 311.

1. The use of Class C Fly Ash is not acceptable in any concrete on this project.

E. Water:

1. Shall meet the requirements in ASTM C 94 and potable.

2. Water shall be free from objectionable quantities of oil, acid, alkali, salt, organic matter, or other deleterious materials.

F. Air-Entrainment Admixture: Shall meet the requirements of ASTM C 260.

G. Other Chemical Admixtures:

1. See applicable State or Local Standard Specifications or as specified in Section 01 10 00 - Special Provisions.

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

3. Admixture shall not contain more than 1 percent of chlorides calculated as calcium chloride.

2.04 ACCESSORIES

A. Joint Filler: Preformed, nonextruding, bituminous type, AASHTO M 33.

B. Joint Sealer: Asphaltic, hot poured, ASTM D 6690, Type II or Silicone, cold applied, ASTM D5893. If required on Drawings, preformed elastomeric compression joint seals shall be ASTM D2628 supplied in proper size and shape to perform for the finished joint detail on Drawings.

C. Liquid Membrane-Forming Compounds for Curing Concrete: White pigmented, AASHTO M 148, Type 2.

D. Reinforcement Accessories:

1. Tie Wire: Annealed, minimum 16 gauge.

2. Chairs, Bar Supports, Bolsters, Spacers, and other devices for spacing: Sized and shaped for adequate support of reinforcement during concrete placement.

2.05 CONCRETE MIX DESIGN

A. Street and roadway paving, alleys, driveways, trails, curb and gutter and parking areas.

1. Proportioning Normal Weight Concrete: As specified in Section 01 10 00 - Special Provisions.

2. Concrete Strength: Minimum compressive strength at 28 days in pounds per square inch (psi) - 3,500 psi. or as specified in Section 01 10 00 - Special Provisions.

3. Admixtures: Add approved admixture at rate recommended by manufacturer.

B. Sidewalks:

1. Proportioning Normal Weight Concrete: As specified in Section 01 10 00 – Special Provisions.

2. Concrete Strength: Minimum compressive strength at 28 days in pounds per square inch (psi) - 3,500 psi. or as specified in Section 01 10 00 - Special Provisions.

3. Admixtures: Add approved admixture at rate recommended by manufacturer.

2.06 MIXING

A. Ready-Mixed Concrete: Measure, batch, mix and deliver according to ASTM C 94 and ASTM C 1116 and furnish batch ticket information.

1. When air temperature is between 85- and 90-degrees F, reduce mixing and delivery time from 1 1/2 hours to 75 minutes. When air temperature is above 90 degrees F, reduce mixing and delivery time to 60 minutes.

B. On Project Site: Mix in drum type batch mixer, complying with ASTM C 685. Mix each batch not less than 1.5 minutes and not more than 5 minutes.

C. Transit Mixers: Comply with ASTM C 94.

2.07 DETECTABLE WARNING PANELS

A. At all curb ramps, detectable warning panels will be required. The panels shall be a color selected by Owner, from the manufacturer's standard color palette. The total area of the panels shall not be less than 4 feet wide by 2 feet deep. Concrete stamping is not allowed.

B. See Section 01 10 00 - Special Provisions for type specified and color. The premade panels will be installed as per the manufacturer's recommendations.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify compacted subgrade is acceptable and ready to support paving and imposed loads.

B. Verify gradient and elevation of base are correct.

C. Review project site to coordinate construction activities.

3.02 SUBGRADE

A. In compliance with requirements Section 01 10 00 - Special Provisions, subgrade preparation or subgrade stabilization section and the recommendations of the geotechnical report for subgrade preparation requirements.

3.03 PREPARATION

A. Moisten subgrade to minimize absorption of water from fresh concrete.

B. Coat surfaces of manhole frames with oil to prevent bond with concrete.

C. Notify Engineer a minimum of 48 hours prior to commencement of concreting operations.

3.04 FORMING

A. Place and secure forms to correct location, dimension, profile and gradient.

B. Assemble formwork to permit easy stripping and dismantling without damage to concrete.

C. Place vertical joint filler in position and in straight lines. Secure to formwork during concrete placement.

3.05 REINFORCEMENT

A. Place reinforcement as indicated in the plans.

B. Keep reinforcement clean and free from foreign materials.

C. Furnish and install suitable supports for all reinforcing steel and dowel bars.

D. Tying Reinforcement:

1. Tie reinforcing bars securely in place at all points where bars cross other reinforcing bars.

2. Tie epoxy coated reinforcing bars with plastic coated ties.

3. After tying epoxy coated reinforcing, perform holiday test. Repair any damaged epoxy coating. Retest.

E. Lubricate dowel bars as shown in the plans.

1. Lubricate to form a complete and continuous film over portion of bar being coated.

2. Coating to be sufficient to break bond between dowel bars and concrete.

3. Lubricant to have sufficient contrast with bar to be easily seen.

F. Placement of Dowel Bars:

1. Mid-depth of slab.

2. Parallel with finished surface of slab.

3. Parallel with centerline of roadway.

G. Dowel Bar Placement:

1. Baskets, or

2. Approved mechanical inserters, or

3. Free end of dowels supported in a frame to properly maintain alignment.

H. Longitudinal Tie Bar Placement:

1. Support on bar pins, or

2. Approved mechanical inserter.

I. Longitudinal Tie Bar Placement in Key-Type Joint:

1. Bend at 90 degrees at center to facilitate placement.

2. Before placing adjacent slab, bend at 45 degrees to longitudinal joint.

3. Replace bars that crack or break (see applicable State or Local Standard Specifications).

4. Replace cracked or broken bars at no cost to Owner.

3.06 PLACING CONCRETE

A. Construction methods in accordance with applicable State or Local Standard Specifications or as specified in Section 01 10 00 - Special Provisions.

B. Ensure reinforcement, inserts, embedded parts and formed joints are not disturbed during concrete placement.

C. Place concrete continuously over the full width of the panel and between predetermined construction joints. Do not break or interrupt successive pours such that cold joints occur.

D. Keep concrete manipulation to a minimum when bringing concrete to proper line and grade.

E. Adjust forward speed of finishing machines so that operations are continuous and uninterrupted.

F. Addition of water to the surface of the concrete to assist finishing operations is not allowed.

G. Remove laitance and surplus water while concrete is still plastic.

H. Test surface for smoothness and true to line and grade with 10-foot straightedge.

1. Set parallel with centerline.

2. Lap half-length on each successive position.

3. Remove high areas, fill depressions and consolidate concrete with hand floats.

I. Texture concrete over full width of surface in the longitudinal direction.

1. Use wet burlap, carpet or canvas belt.

2. Suspend drags with a mandrel or similar device to insure a uniform texture.

3. Remove drag from surface of concrete when the paving train is not in motion 30 minutes or more.

4. Rinse or wash drags as necessary to obtain a uniform surface.

5. Replace drags which cannot be cleaned.

6. Remove concrete over joints after final drag finish.

J. Use edging tool to round joints and edges of concrete along the side forms.

3.07 JOINTS

A. Align curb, gutter and sidewalk joints.

B. Place preformed expansion joint materials as shown in the plans.

1. Form joints with joint filler extending from the bottom of the concrete to within 1/2 inch of finished surface.

2. Secure to resist movement while placing concrete.

C. Provide keyed joints as shown in the plans.

D. Construction Joints:

1. Begin initial sawing when concrete can support the weight of the saw and sawing does not create raveling. Early entry or soft cut sawing will be allowed.

2. Complete sawing before random cracking occurs.

3. Cut each traverse joint in one continuous pass.

4. Discontinue sawing of joint if a crack occurs at or near the joint location before sawing or a crack develops ahead of the saw. Route these cracks to a depth of 1 1/2 inches and 0.4 to 0.6 inches wide and seal with joint sealers.

5. Any spalling of joints to be repaired in accordance with applicable State or Local Standard Specifications.

3.08 FINISHING

A. Roads, Streets, Alleys and Parking Areas: Use wet burlap, carpet or canvas drag.

B. Driveways and Sidewalks:

1. New Concrete Abutting Existing Concrete: Match existing texture.

2. New Construction: Steel floating with light broom finish.

C. Trails:

1. Use wet burlap, carpet or canvas drag, or float and light broom finish texture perpendicular to direction of travel.

2. 1/4-inch radius edge and transverse cut joints.

D. Curb Ramps:

1. Meet minimum design standard in accordance with requirements of applicable State or Local Standard Specifications, as specified in Section 01 10 00 - Special Provisions and special plan for curb ramps.

2. Float and light broom finish.

3. Truncated Domes - Detectable Warning Panels, See Section 01 10 00 - Special Provisions.

4. Americans with Disabilities Act (ADA) approved detectable warnings.

E. Apply liquid membrane-forming compounds for curing concrete immediately after finishing. Apply in accordance with manufacturer's instructions.

3.09 JOINT SEALING

A. Preparation:

1. Seal joints according to manufacturer's recommendations.

2. Clean joints and ensure they are dry and free of oil residue prior to filling joints with joint sealer.

B. Filling:

1. Top surface of joint material to be approximately 1/4 inch below surface of concrete.

2. Remove overflow material.

3. Repair overfilled joints by reinstalling the joint filler.

4. For preformed compression seals install compressed into the joint, with manufacturer-approved equipment and installation method.

C. If adhesion is not satisfactory, the material will be removed and the joint cleaned and resealed at no cost to Owner.

D. All joints will be sealed including joints between existing and new concrete.

3.10 TOLERANCES

A. Maximum Variation of Surface Flatness: 1/8 inch in 10 feet.

B. Maximum Variation from True Position: 1/4 inch.

C. All concrete shall meet or exceed the strength requirement of the specifications.

1. At Owner’s option, Owner may elect to allow concrete that does not meet the minimum strength requirement to remain in place subject to an adjustment (reduction) in the payment to Contractor. The adjustment in the payment will be according to the following table:

CONCRETE STRENGTH PAY FACTOR TABLE

Payment Deductions Based on Concrete Strength	
Percent of Required Concrete Compressive Strength	**Pay Factor**
Greater than 99.9	1.00
Greater than 98.5 to 99.9	0.9975
Greater than 97.5 to 98.5	0.9950

Greater than 96.0 to 97.5	0.99
Greater than 94.0 to 96.0	0.98
Greater than 92.0 to 94.0	0.97
Greater than 90.0 to 92.0	0.94
Greater than 88.0 to 90.0	0.90
Greater than 86.0 to 88.0	0.86
Greater than 84.0 to 86.0	0.81
Greater than 82.0 to 84.0	0.76
Greater than 80.0 to 82.0	0.70
Less than 80.0	0.40 or Reject

2. If there is no adjustment in the payment to Contractor for concrete that does not meet the minimum strength requirement, the concrete shall be rejected and shall be removed and replaced at Contractor's expense.

D. All concrete shall meet or exceed the minimum thickness as per the plans and specifications.

1. At Owner's option, Owner may elect to allow concrete that does not meet the minimum thickness requirement to remain in place subject to an adjustment (reduction) in the payment to Contractor. The adjustment in the payment will be according to the following table:

THICKNESS PAY FACTOR TABLE

Payment Deductions Based on Deficient Pavement Thickness	
Thickness Deficiency	**Pay Factor**
0 to 0.25 inch	1.00
Greater than 0.25 to 0.30 inch	0.85
Greater than 0.30 to 0.35 inch	0.80
Greater than 0.35 to 0.40 inch	0.75
Greater than 0.40 to 0.45 inch	0.70
Greater than 0.45 to 0.50 inch	0.65

2. If there is no adjustment in the payment to Contractor for concrete that does not meet the minimum thickness requirement, the concrete shall be rejected and shall be removed and replaced at Contractor's expense.

3.11 DEFECTIVE CONCRETE

A. All materials which Engineer determines to be damaged, defective, or otherwise unsuitable for use will be rejected and shall be removed and replaced at Contractor's expense.

B. Contractor will be required to take corrective measures for high spots by removal and replacement, or by grinding with a machine equipped with multiple diamond blades with spacers to the required profile. If grinding is used, utilize methods which do not break the cement and aggregate bond. Engineer will determine whether defective concrete will be repaired, or if it will be rejected and removed and replaced. Contractor shall submit the proposed corrective action plan and receive Engineer AND Owner approval prior to performing corrective measures. The approved corrective measure will be done at Contractor's expense.

C. Contractor will be required to take corrective measures for low areas that pond water by removal and replacement of concrete or by grinding with a machine equipped with multiple diamond blades with spacers to the required profile. If grinding is used, utilize methods which do not break the cement - aggregate bond. Engineer will determine whether defective concrete will be repaired, or if it will be rejected and removed and replaced. Contractor shall submit the proposed corrective action plan and receive Engineer and Owner approval prior to performing corrective measures. The approved corrective measure will be done at Contractor's expense.

D. Contractor will be required to take corrective measures for any cracking of concrete no matter what the cause. The corrective measures may include routing and sealing the cracks or removal and replacement. Engineer will determine whether defective concrete will be repaired, or if it will be rejected and removed and replaced. Contractor shall submit the proposed corrective action plan and receive Engineer AND Owner approval prior to performing corrective measures. The approved corrective measures will be done at Contractor's expense.

E. Joints: Contractor will be required to take corrective measures for any joints that in the opinion of Engineer are not constructed per the plans and specifications. Contractor shall submit the proposed corrective action plan and receive Engineer AND Owner approval prior to performing corrective measures. The approved corrective measures will be done at Contractor's expense.

F. Contractor will be required to take corrective measures for any concrete containing excessive honeycombing, spalling, fractures, chips or other defects at no additional cost to Owner. The corrective measures may include repairing concrete or removal and replacement of concrete. Engineer will determine whether defective concrete will be repaired, or if it will be rejected and removed and replaced. Contractor shall submit the proposed corrective action plan and receive Engineer AND Owner approval prior to performing corrective measures. The approved corrective measures will be done at Contractor's expense.

G. Contractor must protect the concrete from damage due to rain, premature drying, excessive hot or cold temperatures, foot traffic and vehicular traffic. Failure to properly protect concrete may constitute cause for repairing or for removal and replacement of defective concrete. Engineer will determine whether defective concrete shall be repaired, or if it shall be rejected and removed and replaced. Contractor shall submit the proposed corrective action plan to address the defective concrete and receive

Engineer AND Owner approval prior to performing corrective measures. The approved corrective measures will be done at Contractor's expense.

3.12 FIELD QUALITY CONTROL

A. An independent testing agency employed by Owner shall perform field quality control tests as specified in Section 01 40 00 - Quality Requirements.

1. Results of testing will be furnished in a timely manner to Owner, Engineer and Contractor, in writing.

2. Contractor shall provide free access to concrete operations at project site and cooperate with testing agency.

3. Contractor shall submit proposed mix design of each class of concrete to Engineer and testing agency for review at least 10 days prior to commencement of concrete operations.

4. Field testing and laboratory testing of concrete will be performed by testing agency employed by Owner to determine conformance with specified requirements.

5. Strength Testing

   a. Compressive Strength Test Samples: ASTM C 39. For each test, mold and cure 3 concrete test cylinders. A set of 3 test cylinders shall be collected for every 100 cubic yard or fractional part thereof for each class of concrete placed in a day. At least one set of cylinders is required for each day concrete placement takes place.

      (i) One additional cylinder may be required for a break prior to 7 days.

      (ii) Take 1 additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.

   b. Maturity Method for Estimating Strength: ASTM C 1074. The Contractor may elect to utilize the maturity curve method to determine concrete strength. The Contractor must notify the Engineer in writing and submit a Plan with any changes applicable with State or local standard specifications.

6. Perform 1 slump test for each set of test cylinders taken.

   a. If the concrete mixture is excessively wet causing segregation, excessive bleeding, or any other undesirable condition, the concrete shall be rejected.

   b. If the slump is outside the allowable limits specified in Section 01 10 00 - Special Provisions, the load of concrete shall be rejected.

7. Perform 1 air content test for each set of test cylinders taken.

   a. If the air content is less than the minimum specified, only one addition of air-entraining admixtures is allowed.

b. If the air content is then outside the allowable limits specified in Section 01 10 00 - Special Provisions, the load of concrete shall be rejected.

B. The independent testing agency employed by Owner will maintain records of placed concrete items and Contractor shall assists testing agency as necessary to accomplish the completion of this record keeping. Records will include type of test samples taken, all test results, date and location of sample collected, concrete test cylinder number, quantity of concrete placed and slump, air content, air temperature test results.

C. Additional Tests: The testing agency employed by Owner shall make additional tests of concrete, as directed by Engineer, when test results indicate that slump, air entrainment, compressive strengths or other requirements have not been met.

1. The cost for this additional testing will be paid for by Contractor.

2. If any additional testing is required to isolate failures, this shall be considered retests and shall be paid for by Contractor.

3.13 PROTECTION

A. Immediately after placement, protect concrete from premature drying, excessive hot or cold temperatures, foot traffic, vehicular traffic and rain events.

B. Do not permit pedestrian traffic over concrete for a minimum of 1 day after finishing.

C. Do not permit vehicular traffic over concrete for a minimum of 7 days and after design strength of concrete has been achieved and joint sealants have properly cured per manufacturers requirements.

END OF SECTION

SECTION 32 15 00

AGGREGATE SURFACING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Aggregate surfacing.

1.02 REFERENCES

A. State Standard Specifications, latest revision.

1.03 UNIT PRICES - MEASUREMENT AND PAYMENT

A. Removing, Salvaging and Reinstalling Existing Gravel/Rock Surfacing: The removing, salvaging and reinstalling of the existing gravel and rock surfacing on existing private driveways, parking lot/areas, streets, roads or alleys will not be measured and paid for separately but shall be considered subsidiary to the cost of those items for which direct measurement and payment are made.

B. New Aggregate Surfacing: The measurement and payment for furnishing and installing aggregate surfacing on existing private driveways, parking lot/areas, streets, roads or alleys, as shown in the plans or as directed by Owner through Engineer, will be made based on the tons of material delivered and placed. Contractor shall provide weigh scale tickets to Owner through Engineer for all aggregate that is delivered and placed to resurface areas as shown in the plans or as directed by Owner through Engineer. Contractor's unit price for aggregate surfacing shall include furnishing, delivering and spreading aggregate on an approved roadbed surface and includes furnishing the necessary material, labor, equipment, tools and incidentals necessary to complete the work.

1.04 QUALITY ASSURANCE

A. Aggregate surfacing shall meet the specifications in the Standard Specifications, for gravel and crushed rock surfacing.

B. Submit a recent analysis from proposed aggregate source showing compliance with the specifications.

PART 2 - PRODUCTS

2.01 ROAD GRAVEL SURFACING

A. State of Nebraska gravel gradations:

Gravel Surfacing Gradation Limits	
Sieve Size	Percent Passing Target Value
1 inch	100
No. 4	78
No. 10	16
No. 200	3

B. State of Iowa gravel gradations:

Class C - Gradation #10 Gravel Surfacing Gradation Limits	
Sieve Size	Percent Passing Target Value
¾”	100
No. 4	50-80
No. 8	25-60

2.02 CRUSHED ROCK SURFACING (ROADS, DRIVEWAYS, PARKING AREAS, TEMPORARY SURFACING)

A. State of Nebraska crushed rock surfacing gradations:

¾” Crushed Rock for Surfacing Gradation Limits	
Sieve Size	Percent Passing
1 inch	100
No. 4	20-60
No. 10	0-30
No. 200	0-10

1-1/2” Crushed Rock for Surfacing Gradation Limits	
Sieve Size	Percent Passing
1”	100
¾”	65-95
3/8”	30-70
No. 10	10-30
No. 200	0-10

B. State of Iowa crushed rock surfacing gradations:

Class A - Gradation #11 Crushed Rock Surfacing Gradation Limits	
Sieve Size	Percent Passing Target Value
1 inch	100
¾"	95-100
½"	70-90
No. 4	30-55
No. 8	15-40
No. 200	6-16

PART 3 - EXECUTION

3.01 INSPECTION

A. Verify compacted subgrade is dry and ready to receive work of this section.

B. Verify gradients and elevations of subgrade are correct.

C. Beginning of installation means acceptance of existing conditions.

3.02 PLACING AGGREGATE SURFACING

A. Spread material over prepared subgrade to a total compacted thickness as shown in the plans or as specified in Section 01 10 00 - Special Provisions.

B. Level surfaces to elevations and gradients indicated.

C. Compact placed aggregate materials by rolling.

D. Perform hand tamping in areas inaccessible to compaction equipment.

E. Add moisture as needed to supplement the compaction process.

END OF SECTION

SECTION 33 41 11

STORM DRAINAGE PIPING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Storm drainage piping, fittings and accessories.

B. Connection of drainage system to existing storm sewer system or open channel.

C. Manholes, junction boxes, grate inlet, curb inlets, drop curb inlets and area inlets.

1.02 REFERENCES

A. AASHTO M 36 – Standard Specification for Corrugated Steel Pipe, Metallic-Coated, for Sewers and Drains; American Association of State Highway and Transportation Officials.

B. AASHTO M 170 – Standard Specification for Reinforced Concrete Culvert, Storm Drain, ad Sewer Pipe.

C. AASHTO M 199 – Standard Specification for Precast Reinforced Concrete Manhole Sections.

D. AASHTO M 206 – Standard Specification for Reinforced Concrete Arch Culvert, Storm Drain, ad Sewer Pipe.

E. AASHTO M 207 – Standard Specification for Reinforced Concrete Elliptical Culvert, Storm Drain, and Sewer Pipe.

F. AASHTO M 232 – Standard Specification for Zinc Coating (Hot-Dip) On Iron and Steel Hardware.

G. AASHTO M 298 – Standard Specification for Coatings of Zinc Mechanically Deposited on Steel.

H. AASHTO M 294 – Standard Specification for Corrugated Polyethylene Pipe, 300- to 1500-mm (12- to 60-in.) Diameter.

I. ASTM C 14 – Standard Specification for Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe.

J. ASTM C 76 – Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.

K. ASTM C 443 – Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.

L. ASTM A 615 – Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.

M. ASTM A 929 – Standard Specification for Steel Sheet, Metallic-Coated by the Hot-Dip Process for Corrugated Steel Pipe.

N. ASTM D 698 – Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3).

O. ASTM D 1056 – Standard Specification for Flexible Cellular Materials—Sponge or Expanded Rubber.

P. ASTM D 1556 – Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method.

Q. ASTM D 1557 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3)).

R. ASTM D 1785 – Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.

S. ASTM D 2167 – Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.

T. ASTM D 2321 – Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity – Flow Applications.

U. ASTM D 2729 – Standard Specification for Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

V. ASTM D 2751 – Standard Specification for Acrylonitrile – Butadiene – Styrene (ABS) Sewer Pipe and Fittings.

W. ASTM D 6938 – Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

X. ASTM D 3034 – Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

Y. ASTM F 679 – Standard Specification for Poly (Vinyl Chloride) (PVC) Large Diameter Plastic Gravity Sewer Pipe and Fittings.

Z. ASTM F 794 – Specification for Poly (Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter.

AA. ASTM F 894 – Specification for Polyethylene (PE) Large Diameter Profile Wall Sewer and Drains Pipe.

BB. ASTM F 949 – Specification for Poly (Vinyl Chloride) (PVC) Corrugated Sewer Pipe with a Smooth Interior and Fittings.

1.03 UNIT PRICES

A. Pipe:

1. Method of Measurement:

a. Measured along centerline of pipe, to the nearest foot.

b. No deduction for junction boxes/manholes or fittings installed in the line.

2. Pay Unit: By the linear foot (LF) for each respective size and type of pipe.

a. Includes excavation, hand trimming excavation, pipe, placement, assembly, bedding, backfilling and compaction of backfill, testing and incidentals thereto.

b. Testing includes:

(i) Alignment testing of pipe.

(ii) Compacted density testing of backfill.

(iii) Concrete compressive strength testing.

(iv) Televising inspection.

B. Special Pipe Fittings (Elbows, Bends, Flared End Sections):

1. Method of Measurement and Pay Unit: By the unit, Each, for at the contract unit price for the various sizes in the accepted work.

2. Includes hand trimming excavation, bedding, backfilling, connection to pipe and incidentals thereto.

C. Manholes, Junction Boxes, Curb Inlets, Drop Curb Inlets and Area Inlets:

1. Method of Measurement and Pay Unit: By the unit, Each, for at the contract unit price for the various sizes in the accepted work.

2. Includes excavation, hand trimming excavation, bedding, backfilling, compaction, foundation pad, concrete, reinforcing steel manhole ring and cover, castings, inlet filter, erosion and silt control measures and incidentals thereto.

D. Connection to Existing Storm Drainage Pipe or Junction:

1. Method of Measurement and Pay Unit: By the unit, Each.

2. Includes excavation, hand trimming excavation, bedding, backfilling and compaction of backfill, adapters, fittings, thrust restraints, couplings, coring the wall of the structure, sleeves, gaskets and incidentals thereto.

E. Dewatering of Trench:

1. Dewatering, including intercepting and diverting site drainage and surface water flows away from excavations and trenches, and removing standing water from trench or excavation with a sump and pump shall be considered incidental and subsidiary to other items of work for which direct payment is made.

2. Includes providing all permits required for the dewatering and paying all permit costs, pump, piping, wells and/or well points, dewatering equipment, assembly and disassembly, backfilling and compaction of backfill, energy cost and incidentals thereto.

F. Erosion Control Measures:

1. Method of Measurement and Payment: Subsidiary to items in which direct payment is made.

2. Erosion control measures include before, during and after construction.

G. TV Inspection:

1. Considered to be a subsidiary item included in the cost of the item for which payment is made.

1.04 DEFINITIONS

A. Bedding: Fill placed under, beside and directly over pipe prior to subsequent backfill operations.

1.05 SUBMITTALS

A. Product Data: Provide data indicating pipe and pipe accessories.

B. Manufacturer's Installation Instructions: Indicate special procedures required to install products specified.

C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

D. Project Record Documents:

1. Record location of pipe runs, connections and invert elevations.

2. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

E. Testing:

1. Alignment and Deflection Test of Pipe, provide copy of Test Records to Engineer.

2. Televising of Storm Drainage Pipe, provide copy of Televising to Engineer.

PART 2 - PRODUCTS

2.01 PIPE FOR CULVERTS AND STORM DRAINS

A. Reinforced Concrete Pipe (RCP):

1. Round RCP

a. Conform to ASTM C76 and AASHTO M 170.

b. Thickness/Rating: Class III, minimum, Wall B.

2. Arch RCP

a. Conform to ASTM C506 and AASHTO M 206.

b. Thickness/Rating: Class A-III, minimum.

3. Elliptical RCP

a. Conform to ASTM C507 and AASHTO M 207.

b. Thickness/Rating: Class HE-III, minimum (horizontal orientation).

4. Joints: Tongue and Groove

a. Seal joints with cold-application material of either a single component or multiple component type. Material shall conform to either ASTM C 877 or C 990 standards.

5. Joints: O-Ring or Gasketed

a. Pipes using O-ring or profile gaskets may be substituted for tongue and groove pipes at no additional cost to the Owner.

b. The design of rings or gasketed joints and the physical requirements for preformed flexible joint sealants shall conform to ASTM C 990, and rubber-type gaskets shall conform to ASTM C 443.

(i) The base polymer shall be a blend of neoprene and EPDM meeting the physical requirements of ASTM D 1056, Class 2C2.

(ii) The closed cell rubber shall meet the ozone testing requirement of ASTM D 1171 of seventy (70) hours at forty degrees Celsius (40^{o} C) at 100 PHM, bent loop with no cracks and shall have a quality retention rating of not less than 70 percent when tested for weather resistance.

(iii) Each seal shall be completely covered with a natural skin and shall be assembled into a continuous ring which shall conform to the joint size and shape.

(iv) Cross sectional dimensions shall conform to RMA Class II tolerances and installation shall be in accordance with the manufacturer's recommendations.

B. Corrugated Metal Pipe (CMP):

1. Corrugated Steel Pipe, Pipe Arches and Underdrains:

a. Conform to AASHTO M36, Type I, or ASTM A 929 steel circular section with annular or helical corrugations.

b. Zinc-coated steel or aluminum-coated steel materials shall not be mixed in any installation.

c. Bolts, nuts, washers and other hardware used with coupling bands galvanized AASHTO M232 or mechanically galvanized AASHTO M298, Class 50.

d. Minimum Gauge or Sheet Thickness for Steel Culverts:

Nominal Diameter (Inches)	Sheet Thickness Gauge (Inches)
8 thru 24	16 (0.057)
30 thru 36	14 (0.072)
42 thru 54	12 (0.101)
60 thru 72	10 (0.129)
Over 72	8 (0.168)

2. Connecting Bands: Connecting bands shall be of the type, size and sheet thickness of band, and the size of angles, bolts, rods and lugs as indicated or where not indicated as specified in the applicable standards or specifications for the pipe. Exterior rivet heads in the longitudinal seam under the connecting band shall be countersunk or the rivets shall be omitted and the seam welded. Connecting bands with annular or helical corrugations to match pipe ends.

C. Plastic Pipe:

1. Polyvinyl Chloride (PVC):

a. PVC plastic meeting ASTM D1784, minimum cell class 12454-B.

b. Minimum pipe stiffness of 46 psi.

c. Integral bell and spigot joints with elastomeric seals according to ASTM D 3212 and ASTM F 477.

d. Solid/Smooth Wall PVC Pipe

(i) Conform to ASTM D 3034 and ASTM F 679.

(ii) Thickness/Rating: SDR 35, minimum.

e. Profile PVC Pipe

(i) Smooth interior and ribbed exterior.

(ii) Conform to ASTM F 794, Series 46.

f. Corrugated PVC Pipe

(i) Smooth interior and corrugated exterior.

(ii) Conform to ASTM F 949.

g. Composite Pipe

(i) Conform to ASTM D 2680.

2. High Density Polyethylene Pipe (HDPE) and Fittings:

a. Conform to AASHTO M294, Type S, corrugated exterior and smooth interior.

b. HDPE material meeting ASTM D 3350, minimum cell class 335420 C.

c. Minimum pipe stiffness at 5% deflection according to ASTM D 2412.

d. Integral bell and spigot joints with elastomeric seals complying with ASTM F 477.

e. Corrugated HDPE Pipe

(i) Conform to AASHTO M252 and M294, Type C or S.

(ii) Pipe shall be produced from PE certified by the resin producer as meeting the requirements of ASTM D 3350, minimum cell class 335420C.

f. Profile Wall HDPE Pipe

(i) Conform to AASHTO F 894.

(ii) Pipe shall be produced from PE certified by the resin producer as meeting the requirements of ASTM D 3350, minimum cell class 335434C.

g. Closed-Cell Synthetic Expanded Rubber Gaskets: ASTM D 1056, Grade 2A2.

2.02 PIPE ACCESSORIES

A. Fittings: Same material as pipe molded or formed to suit pipe size and joint design.

B. Concrete Flared-End Sections:

1. AASHTO M170, Class III.

2. AASHTO M206, Class A-III.

3. AASHTO M207, Class HE-III.

C. Metal Flared-End Sections:

1. Steel Flared-End Sections: AASHTO M36 or ASTM A 929. Galvanized bolts, nuts, washers and other hardware items used with coupling bands, AASHTO M232 or mechanically galvanized, AASHTO M298, Class 50.

2. Minimum gauge or sheet thickness for steel flared-end sections same as pipe culverts.

2.03 MANHOLES, JUNCTION BOXES, CURB INLETS, DROP CURB INLETS AND AREA INLETS

A. Concrete:

1. Minimum Compressive Strength: 3,500 psi.

2. The concrete mixture shall have air content by volume of concrete, based on measurements made immediately after discharge from the mixer, of 5 to 7 percent when maximum size of coarse aggregate exceeds 1-1/2 inches.

B. Reinforcing Steel:

1. ASTM A 615: Grade 60 deformed billet-steel bars.

C. Precast Reinforced Concrete Round Manhole Riser:

1. Refer to Section 33 39 14 – Manholes and Covers.

2. Conform to AASHTO M199.

D. Precast Reinforced Concrete Box: Manufactured in accordance with and conforming to ASTM C 1433.

E. Cast-In-Place Concrete Structures:

1. The concrete covering over steel reinforcing shall not be less than 1 inch thick for covers and not less than 1-1/2 inches thick for walls and flooring. Concrete covering deposited directly against the ground shall have a thickness of at least 3 inches between steel and ground.

2. Expansion-joint filler material shall conform to ASTM D 1751, or ASTM D 1752, or shall be resin-impregnated fiberboard conforming to the physical requirements of ASTM D 1752.

3. Base and Deck shall be set level at elevations shown to receive concrete wall section(s), riser blocks and castings.

F. Steps

1. Comply with ASTM C 478 and all OSHA requirements.

2. Manufacture using polypropylene encased steel.

3. 1/2 inch diameter Grade 60 deformed steel reinforcing bar encapsulated in molded copolymer polypropylene ASTM C 478, ASTM D 4101 and ASTM A 615.

4. 10 inches nominal step tread width.

5. Provide steps in all structures unless specified otherwise.

G. Precast Concrete Segmental Blocks: Precast concrete segmental block shall conform to ASTM C 139, not more than 8 inches thick, not less than 8 inches long, and of such shape that joints can be sealed effectively and bonded with cement mortar.

H. Castings:

1. Shall be iron, ferrous casting, smooth, well cleaned by shot blasting, uniform quality, free of blowholes, shrinkage, distortion or other defects, machined horizontal bearing surfaces made from cast gray iron, ASTM A 48, Class 35B or cast ductile iron, ASTM A 536, Grade 65-45-12.

2. Weight, shape, size, and waterway openings for grates and curb inlets shall be as indicated in the Drawings and following Specifications.

3. All frames and covers shall be machined so that each cover will fit properly in its frame with no rocking. No casting will be accepted that is warped, cracked, has swells, or that has been plugged or filled.

4. Load Capacity:

a. Castings rated to meet requirements for H-20 traffic loading.

b. Submit certification on the ability of frame and cover or gratings to carry the imposed live load.

2.04 MORTAR

A. Mortar for pipe joints, connections to other drainage structures, and block construction shall conform to the requirements of ASTM C 270.

1. Type S or M

2. 28 day Compressive Strength: 1,800 psi, minimum

3. Mix Proportions: 1 part mortar to 2-1/4 to 3 parts sand

4. Water Retention: 75%, minimum

2.05 BEDDING

A. The bedding surface for the pipe shall provide a firm foundation of uniform density throughout the entire length of the pipe.

B. Concrete Pipe Requirements: When no bedding class is specified or detailed on the Drawings, concrete pipe shall be bedded in granular material minimum 4 inch in depth in trenches with soil foundation. Depth of granular bedding in trenches with rock foundation shall be 1/2 inch in depth per foot of depth of fill, minimum depth of bedding shall be 8 inch up to maximum depth of 24 inches. The middle third of the granular bedding shall be loosely placed. Bell holes and depressions for joints shall be removed and formed so entire barrel of pipe is uniformly supported. The bell hole and

depressions for the joints shall be not more than the length, depth, and width required for properly making the particular type of joint.

C. Corrugated Metal Pipe Requirements: When no bedding class is specified or detailed on the Drawings, bedding for corrugated metal pipe and pipe arch shall be in accordance with ASTM A 798. It is not required to shape the bedding to the pipe geometry. However, for pipe arches, either shape the bedding to the relatively flat bottom arc or fine grade the foundation to a shallow v-shape.

D. Plastic Pipe Requirements: When no bedding class is specified or detailed on the Drawings, bedding for PVC, PE, SRPE and PP pipe shall meet the requirements of ASTM D 2321 and manufacturer's recommendations. Use Class IB or II material for bedding, haunching, and initial backfill. Use Class I, II, or III material for PP pipe bedding, haunching and initial backfill.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify measurements at site; make necessary field measurements to accurately determine pipe makeup lengths or closures.

B. Examine site conditions to ensure construction operations do not pose hazards to adjacent structures or facilities.

3.02 TRENCHING

A. Refer to Section 31 23 33 – Trenching for Utilities.

3.03 INSTALLATION - PIPE

A. Verify that trench excavation cut is ready to receive work and excavation dimensions and elevations are as indicated in the Drawings.

B. Install pipe, fittings and accessories in accordance with manufacturer's instructions.

C. Seal joints soil-tight.

D. Install piping system beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions.

E. Lay pipe to slope gradients noted in the Drawings.

F. The open end of the pipes shall be protected at all times against the entrance of earth or other foreign material.

G. Pipe shall not be laid in water, and pipe shall not be laid when trench conditions or weather are unsuitable for such work. Diversion of drainage or dewatering of trenches during construction shall be provided as necessary.

H. Reinforced Concrete Pipe (RCP):

1. Place pipe such that joint openings on the outside or inside of the pipe do not exceed 1/8 inch at the bottom and 5/8 inch at the top.

2. Mortar:

a. The mortar shall be used within 30 minutes after the ingredients are mixed with water.

b. After each pipe has been laid and firmly bedded in place, tongue and groove exterior joints, lift holes and other voids shall be completely filled with mortar.

c. If the pipes are tongue and groove construction and are 36 inches in diameter or larger, the joint space on the inside surface of the pipe shall be wiped clean, completely filled with mortar and finished smooth.

d. The mortar head on the outside shall be protected from air and sun with a proper covering until satisfactorily cured.

3. If a rubber O-ring or profile gasket is utilized for RCP, coat the rubber gasket and joint with soap-based lubricant immediately prior to closing the joint.

4. Fill lift holes of concrete pipe with cement mortar, precast concrete or plastic plugs.

I. Connect to storm sewer system or open channel.

J. Install erosion and silt control measures to keep pipe free from silt.

3.04 INSTALLATION - MANHOLES, JUNCTION BOXES, CURB INLETS, DROP CURB INLETS AND AREA INLETS

A. Form bottom of excavation clean and smooth to correct elevation.

B. Form and place cast-in-place concrete base pad with provision for storm sewer pipe end sections.

C. Level top surface of base pad; sleeve concrete shaft sections to receive storm sewer pipe sections.

D. Establish elevations and pipe inverts for inlets and outlets as indicated.

E. All wall forms shall be cast-in-place using form panels or surfaces cabable of producing a uniform surface, texture and appearance at least equal to that obtained by using plywood form panels of good condition as specified in Specification Section 03 30 00 Cast-In Place Concrete.

F. Use of excavated earth back form shall not be permitted. All walls shall be formed with form panels.

G. Mount lid and frame level in grout, secured to top section to elevation indicated.

H. Install erosion and silt control measures to keep inlet structure free from silt.

3.05 PROTECTION

A. Protect pipe and bedding cover from damage or displacement until backfilling operation is in progress.

B. Protect pipe and drainage structures from the entry of silt. Contractor to install appropriate erosion control and silt control measures during and after construction. Contractor to remove any accumulated silt prior to the acceptance of the project.

3.06 PIPING ALIGNMENT TOLERANCE

A. Apply the following tolerances for piping installed by open trench construction or installed inside a casing pipe.

B. General alignment shall be checked using televised inspection of all gravity mains greater than 20 linear feet, and must be completed prior to paving.

C. Maximum allowable horizontal and vertical alignment variance from design line and grade shall be the greater of:

1. +/- 5% of the inside diameter of the pipe.

2. or +/- 1/2 inch.

D. Maximum allowable reverse slope (sag) in gravity main shall be that which causes a standing water depth of 1" or 10% of the inside diameter of the pipe, whichever is greater, at any point along the line.

E. Remove and reinstall pipe to proper grade where there is standing water greater than the maximum allowable depth.

F. Sags shall only be allowed where entering and exiting grades are adequate to provide a velocity of 2 feet per second or more.

3.07 CLEANING STORM DRAINAGE PIPES

A. Plug downstream manholes.

B. Flush and clean drainage lines and manholes prior to testing.

C. Remove debris at junctions and manholes.

D. Do not allow debris to enter existing drainage system.

3.08 FIELD QUALITY CONTROL

A. Refer to Section 31 23 33 – Trenching for Utilities.

B. Perform televised inspection of completed storm sewer system at Contractor's expense.

1. If tests indicate work does not meet specified requirements, remove defective materials/work and replace and retest; and/or take necessary remedial action and retest, all at no cost to Owner.

3.09 PIPING ALIGNMENT AND DEFLECTION TESTING

A. Provide alignment and deflection test 30 days or more after backfilling trench.

B. Alignment shall be checked by providing a televised inspection of completed storm drainage pipe performed by testing laboratory, independent Contractor or method approved by Engineer.

1. Televised inspection shall include:

a. Digital recording, in a format agreed upon by Owner and Engineer.

b. Written log of location of:

(i) Location of defects in pipe or joints.

(ii) Location of debris in pipe.

(iii) Location of any sag.

(iv) Other notable items in pipe

c. Defective Materials and/or Workmanship:

(i) Acceptance based on televised inspection.

(ii) Repair defects in pipe.

(iii) Replace damage materials.

(iv) Repeat TV inspection, until satisfactory results are obtained.

C. Deflection testing: Use rigid ball or mandrel having not less than 95 percent of base inside diameter or average inside diameter of pipe depending on which is specified in ASTM to which the pipe is manufactured.

1. Allowable Deflection: 5 percent or less.

2. Mechanical pulling devices not allowed.

3. Defective Materials and/or Workmanship:

a. Locate and correct misaligned and/or deflected sections.

b. Replace damaged or defective materials.

c. Repeat alignment and deflection test, until satisfactory results are obtained.

END OF SECTION

Existing Geotechnical Report and Boring Log from Existing Silo Adjacent to the New Concrete Bunker Location

REPORT OF GEOTECHNICAL INVESTIGATION

WHELAN ENERGY CENTER UNIT #1 ACTIVATED CARBON STORAGE SILO 4520 E. SOUTH STREET HASTINGS, NEBRASKA

M.S. PROJECT NO. 194-53-21 DECEMBER 19, 2014 A-434

INTRODUCTION

This report presents the results of a geotechnical investigation performed for a proposed activated carbon storage silo for the Whelan Energy Center unit #1 in Hastings, Nebraska. This work was authorized by Mr. Tyson Quinn of Hastings Utilities based on our December 5th e-mail proposal of work and costs.

Included in this investigation were a single soil borings, laboratory testing, and a report of conclusions and recommendations. The scope of our report was limited to the following:

- Evaluating the engineering properties of the soils encountered.
- Recommending types and depths of foundation elements.
- Evaluating soil bearing capacity and settlement.
- Providing recommendations for earthwork and soil related construction with respect to the soils encountered.

This report was prepared by Mid-State Engineering and Testing by a professional engineer registered in the State of Nebraska. Recommendations are based on the applicable standards of the profession at the time of this study. This report has been prepared for the exclusive use of Hastings Utilities for specific application to the planned construction. All work was conducted in accordance with generally accepted soil and foundation engineering practices.

PROJECT DESCRIPTION

As proposed, new construction will consist of a 14' diameter, 45' tall storage silo. The silo will be supported by either a reinforced concrete mat or a combination structural mat/caisson foundation. Maximum mat loads on the order of 250 kips were provided by Imperial Industries, Inc of Wausau, Wisconsin.

The silo will be located adjacent to the existing Whelan energy building at the location indicated on the attached site plan. Its our understanding the adjacent structures are supported by a deep pile foundation system.

Currently, the construction area is relatively level. Its assumed finish floor elevation will be within 1 or 2 feet of existing site elevation, and that the structural mat will bear at frost depth at least four (4) feet below current site elevations.

FIELD WORK

The site investigations was conducted on December 12, 2014. The exploratory program included a single 40' deep soil boring. The boring was located in the field with reference to the existing facility and is shown on the attached site plan (Appendix A). The locations of the boring should be considered accurate to the degree implied by the means and methods used.

The exploratory boring was advanced to depth with a truck-mounted rotary drilling rig using 6 inch diameter continuous flight augers. Undisturbed samples, designated "U" samples, were obtained with 3.0-inch (outside diameter), thin-walled, tube samplers hydraulically pushed in general accordance with ASTM D1587-83 (Thin Walled Tube Sampling of Soils). Split-barrel samples, designated "S" samples, were obtained while performing Standard Penetration Test (SPT) with a 1.50-inch (inside diameter), thick-walled sampler driven in general accordance with ASTM D-1586-84 (Penetration Test and Split-Barrel Sampling of Soils). Soil samples were obtained at the sampling intervals noted on the Boring Log (Appendix B). Recovered samples were extruded in the field, sealed in plastic containers, labeled, and protected for transportation to the laboratory for testing.

The field boring log was prepared by an experienced soils engineer in general accordance with ASTM D2488-84, (Description of Soils by the Visual-Manual Procedure). Stratification lines represent the approximate boundary between soil types. In-situ, the transition between sediments may be gradual. Water level readings were made in the drill holes at the times and under conditions noted on the boring logs.

LABORATORY TESTING

The field boring log was reviewed to outline the depths, thickness, and extent the various soil stratum encountered. Based on site stratigraphy and the construction proposed, a testing program was established to evaluate the engineering properties of the bearing strata. Specific tests performed include:

- Moisture Contents
- Unit Weight Determinations
- Unconfined Compression Tests
- Atterberg Limits Testing
- One Dimensional Consolidation Test

All tests were conducted in general accordance with current ASTM standards. Laboratory test results are presented in Appendix B.

In-situ Moisture Contents, Unit Weights Determinations and the standard penetration testing performed in the field was used to evaluate the overall uniformity/variability of the on-site soils for the determination of bearing capacity and settlement.

The Unconfined Compression tests evaluate soil shear strengths and define the stress/strain characteristics of the bearing soils.

The One Dimensional Consolidation Testing defines the load/settlement relationship of the undisturbed site soils.

Atterberg Limits were used to determine plasticity characteristics and to classify the soils under the Unified Soil Classification System.

Based on the results of this testing program, the field logs were reviewed and supplemented as shown in Appendix B. These final logs represent our interpretation of the field logs and reflect the additional information gained from the laboratory-testing program.

SITE CONDITIONS

This silo will be located adjacent to the existing Whelen Energy Center at the approximate location indicated on the attached site plan. At this time the project site consist of a grassy area, with slight drainage away from the facility.

SOIL CONDITIONS

This site lies in the plains region of South Central Nebraska. The generalized subsurface profile for this region consists of wind deposited Loessal soils of various ages on upland areas overlying water deposited Alluvial sediments. Within the depths investigated, the subsurface soils encountered consist of Old Fill material and Colluvial deposits overlying Peorian and Loveland Age Loess deposits.

Old Fill material was encountered at the surface, extending to a depth of about 6 to 7 feet below existing site elevation. This material was described as a light brown/dark brown mix of moist, stiff, lean and fat clays. This old fill material exhibits the following range in in-situ engineering properties:

Moisture Contents (%) .....20 – 26
Dry Unit Weights (pcf) 99
Unconfined Strengths (tsf) 2.8

Based on Atterberg Limits testing and visual evaluation, this old fill material classify as moderate to highly plastic lean (CL) and fat (CH) clays.

The Colluvial deposits are naturally occurring sediments which accumulate through the action of wind and local wash, generally at the base of surrounding hillsides and in valley bottoms. These deposits were encountered below the fill extending to a depth of about 12 feet. These soils were described as dark grey brown and brown, moist, stiff, lean clays. These deposits exhibit the following in-situ engineering properties:

Moisture Contents (%) 23
Dry Unit Weights (pcf) 101
Unconfined Strengths (tsf) 1.2

Based on visual evaluation, these Colluvial sediments also classify as moderate to highly plastic lean and fat clays (CL/CH).

Peorian Age Loess deposits were encountered below the Old Fill material and Colluvial sediments, extending to depths of about 32 feet, below existing grade. These deposits were described as light brown, moist to slightly moist, firm to stiff, lean clays. These deposits exhibit the following range in in-situ engineering properties:

Moisture Contents (%) ..... 22 - 29
Dry Unit Weights (pcf) ..... 92 - 98
Unconfined Compressive Strength (tsf).....1.1
Plastic Index 20

Based on Atterberg Limits testing and visual evaluation, these deposits classify as moderately plastic lean clays (CL).

Loveland Age Loess deposits were encountered below the Peorian Age soils extending beyond the bottom of the maximum 40 foot boring depth. These deposits were described as red brown and dark red brown, moist, stiff, lean clays. These deposits exhibit the following range in in-situ engineering properties:

Moisture Contents (%) .....17 – 20
Standard Penetration Test Blow Counts (N).....29 – 45
Material Passing #200 Sieve (%) 92

Based on lab and visual evaluation, these deposits classify as moderately plastic lean clays (CL) with some fine sand.

GROUNDWATER

Groundwater was not encountered within the maximum 40 foot boring depth. Consequently, it is not expected groundwater will impact the planned construction. It should be recognized, however, that fluctuations in groundwater level occur due to seasonal variations in rainfall, runoff, temperature, or other factors that may differ from those at the time measurement were made.

CONCLUSIONS AND RECOMMENDATIONS

GENERAL

In the event the recommendations of this study are followed, this site is considered suitable for the planned construction. In general, the undisturbed site soils are capable of supporting the silo and groundwater was not encountered within a depth expected to impact design or construction.

The primary concerns are the unknowns associated with the existing old fill soils, and the somewhat compressible nature of the undisturbed soils present below the old fill materials.

The soils below frost depth in the single soil boring appears to be adequately compacted. While the condition of the in place fill wont be fully known till construction begins, it appears based on the initial condition indicated the fill will be acceptable with engineering approval for support of the silo foundation. It should be anticipated, however, that some additional removal and replacement of unsatisfactory old fill material may be required. To this effect, it is imperative the soils engineer be allowed to observe and approve the foundation excavation prior to rebar and concrete placement. Unsatisfactory soil will need to either be removed and replaced or the foundation poured full depth once the substandard soil is removed.

Due to site restriction, it will not be possible to oversize the foundation to reduce foundation loads transferred to the soil. Based on the provided design information, maximum mat loads on the order of 1500 to 1700 psf are indicated (assuming a 15' diameter mat). Based on these moderate loading conditions, its expected a structural mat bearing below frost depth will be an acceptable foundation design for the proposed silo. Maximum total settlement on the order of 1½ inch (about ¾" differential) is expected with this approach. Any additional settlement control (if required) could be achieved through the use of open caisson, push piers or helical augers incorporated with the mat foundation design.

It should be noted, this evaluation is based on a single soil boring in the general construction area. We recommended the Engineer observe the footing subgrade to verify insitu bearing conditions.

Recommendations regarding these and other aspects of this project are included in the following sections of this report.

EARTHWORK AND EXCAVATIONS

Prior to overall site grading, we recommend stripping the site of topsoil and vegetation.

Once stripped and excavated to design elevations, we recommend the Geotechnical engineer observe and approve all foundation excavations prior to rebar and concrete placement. Any unsuitable soil conditions identified at this time will need to be corrected as previously outlined in the "General" section of the report.

Over-excavated soils are considered suitable for use as structural fill if needed. We recommend off-site borrow material if required, consist of lean clays or sandy clays having a plastic index between 15 and 25. If structural fill is required, we recommend fill and backfill material be placed in loose lifts of 8 inches or less in thickness, with each lift compacted with appropriate equipment to a minimum of 95 percent of the material's standard Proctor maximum dry density (ASTM D698-91). Moisture content at the time of compaction should be controlled to between -3 and +3 percent of the optimum moisture content.

We recommend backfill material for utility trenches below the structure be placed in 6 inch loose lifts, with each lift compacted to a minimum of 95 percent of the material's standard Proctor maximum dry density (ASTM D698-91). Backfill placed around the foundation should be compacted to a minimum of 90 percent of the material's standard Proctor maximum dry density (ASTM D698-91).

We recommended a technician, working under the supervision of an experienced Geotechnical engineer, periodically monitor earthwork operations to evaluate compliance with the above recommendations.

Vertical cuts and excavations may stand for short periods of time, but should never in any case, be considered stable. All excavations should be sloped back, shored, or shielded for protection of workers. Trenching and excavation activities should conform to federal and local regulations including OSHA specifications as a minimum.

FOUNDATION ANALYSIS

The selection of an allowable soil bearing pressure for shallow foundation elements must fulfill two requirements. First, the loads must be sufficiently less than the ultimate bearing capacity of the foundation to insure stability. Second, the differential settlement must not exceed an amount that will produce adverse behavior of the dryer.

In order to meet the previous criteria, we have explored both the bearing capacity and the load settlement characteristics of the on-site soils. The recommended allowable bearing capacity is based on a factor of safety of 3 against the full dead load plus normal live load. Maximum total settlement on the order of 1-2 inches and differential settlements on the order of 1 inch are generally considered acceptable for the silo foundation and were used in our analysis. The allowable bearing pressure is expressed in terms of the net pressure transferred to the soil.

Based on the expected maximum 250 kip silo load, the site is considered suitable for a structural mat foundation. Based on the insitu soil conditions, this site is considered suitable for a mat loading up to about 1800 pounds per square foot. The use of this recommended allowable bearing pressure in conjunction with engineer approval of the bearing soils, will limit maximum total settlement to about 1 ½ inch or less, while limiting differential settlement across the structure to about half this amount.

We recommend that footing/foundation elements extend a minimum of 42 inches below final exterior grade for frost protection.

SURFACE DRAINAGE AND LANDSCAPING

The success of the shallow foundation system is contingent upon keeping the subgrade soils at a relative constant moisture content and not allowing surface drainage to reach the bearing soils. Positive surface drainage away from the dryer foundation must be maintained at all times. Landscaped areas should be designed and built in such a way that irrigation and other surface water will be collected and carried away from foundation elements.

During construction, temporary grades need to be established to prevent runoff from entering the mat excavation. If surface moisture is allowed to infiltrate the bearing soils prior to mat construction, we recommend an experienced soil engineer observe the affected soils. This is to determine if the bearing capacity has been affected, and if additional soil modification will be required to correct the problem. Backfilling should not take place until structural strength requirements have been met, and should be graded to drain away from the mat.
The final grade of the foundation backfill and any overlying pavement should have a positive slope away from foundation walls on all sides. A minimum slope of 1 inch per foot for the first 5 to 10 feet is recommended. However, the slope may be decreased if the ground surface next to foundations is covered with concrete slabs or asphalt pavements. A minimum slope of 2 percent is recommended for all other areas. Pavements and exterior slabs next to structures should be carefully sealed against moisture intrusion at the joints. Irrigation within 10 feet of the foundation should be carefully controlled and minimized.

GENERAL COMMENTS

If any changes in the nature, design, or location of this project are planned, the conclusions and recommendations contained in this report shall not be considered valid unless those changes are reviewed and the conclusions of this report either modified or verified in writing by the Geotechnical engineer.

The analysis and recommendations submitted in this report are based in part upon the data obtained from the single soil borings. The nature and extent of variations of the on-site soils may not become evident until construction. If variations appear, it will then be necessary to reevaluate the recommendations of this report.

It is recommended the geotechnical engineer be allowed to review the final design and specifications. It is also recommended that a geotechnical engineer be retained to provide

QA/QC engineering and testing services during the excavation, earthwork, and foundation construction phases of the project. This is to verify compliance with the proposed design, project specifications, or final recommendations and to modify these recommendations if subsurface conditions differ from those expected.

Respectfully submitted,
Mid-State Engineering and Testing, Inc.

Jim Musilek, P.E.
Nebraska Reg. #E-5935

MID-STATE ENGINEERING & TESTING, INC.

BORING LOG

PROJECT	Utility Silo
LOCATION	Hastings, Nebraska
JOB NO.	194-53-21
DATE	12/10/2014

DRILL HOLE NO.	LOCATION OF DRILL HOLE	ELEVATION	DATUM	TOTAL DEPTH
DH-1				40.0'

WATER LEVEL OBSERVATIONS			TYPE OF SURFACE	DRILLER
WHILE DRILLING	END OF DRILLING	HOURS	Top Soil	Robert Reiling
			DRILLING METHOD	LOGGER
			4 1/2' Continuous Flight Auger	Richard Ringler

DEPTH FT.	SAMPLE NO. & TYPE	N" BLOWS / FT	REC %	COLOR	MOIST	CONS.	SOIL TYPE (Class)	GEOLOGIC DESCRIPTION & OTHER REMARKS	MOIST %	DRY WEIGHT PCF	QU TSF	DEPTH FT.
								Topsoil				
	A-1			Brown	Moist	Firm	CL	**OLD FILL MATERIAL** w/ Trace Sand and Gravel				
									26.2	99.0	2.8	
5	U-2			Light Grey				Rust				5
				Dark Grey Brown	Moist	Stiff	CL/CH	**COLLUVIAL DEPOSITS** w/ Carbon and Rust Stains Root Hairs				
	U-3								22.7	101.0	3.3	
10				Brown								10
	U-4			Light Brn	Moist	Stiff	CL	**PEORIAN LOESS DEPOSITS** w/ Rust Stains Carbon Spots Calcium Concretions				
15									21.6	97.7		15
					Very Moist							
	U-5								25.0	96.0		
20												20
	U-6								27.7	92.2	1.1	
25												25
				Red Brn	Very Moist	Stiff	CL	**LOVELAND LOESS DEPOSITS** w/ Carbon Spots Trace Fine Sand				
	U-7								28.7	92.2		
30												30
					Moist	Very Stiff						
	S-8	15/20/25 (45)							17.2			
35												35

MID-STATE ENGINEERING & TESTING, INC.

BORING LOG

PROJECT	Utility Silo
LOCATION	Hastings, Nebraska
JOB NO.	194-53-21
DATE	12/12/2014

DRILL HOLE NO.	LOCATION OF DRILL HOLE	ELEVATION	DATUM	TOTAL DEPTH
DH-1	As Per Boring Location Plan			40.0'

DEPTH FT.	SAMPLE NO. & TYPE	N° BLOWS / FT.	REC. %	COLOR	MOIST	CONS.	SOIL TYPE (Class)	GEOLOGIC DESCRIPTION & OTHER REMARKS	MOIST %	DRY WEIGHT PCF	QU TSF	DEPTH FT.
				Red Brn	Moist	Very Stiff	CL	**LOVELAND LOESS DEPOSITS** w/ Carbon Spots				
40	S-9	10/13/16 (29)							19.7			40
								Bottom of Hole 40.0'				
45												45
50												50
55												55
60												60
65												65
70												70
75												75

THIS PAGE CONCLUDES

THE

SPECIFICATIONS

FOR THE

WHELAN ENERGY CENTER BOTTOM ASH – NORTH BUNKER
HASTINGS, NE HU WORK ORDER NO. PL-624

APPENDIX A – ATTACHMENTS

FOR

CONTRACT NO. HU 2023-103

WEC UNIT 1 BOTTOM ASH SYSTEM

BUNKER AND SITE WORK

WHELAN ENERGY CENTER, UNIT I

CITY OF HASTINGS

HASTINGS, NEBRASKA

2023
NORTH
WHELAN ENERGY CENTER UNIT 1
BOTTOM ASH REMOVAL SYSTEM

JEO PROJECT: 230998.00
HU WORK ORDER: PL - 624

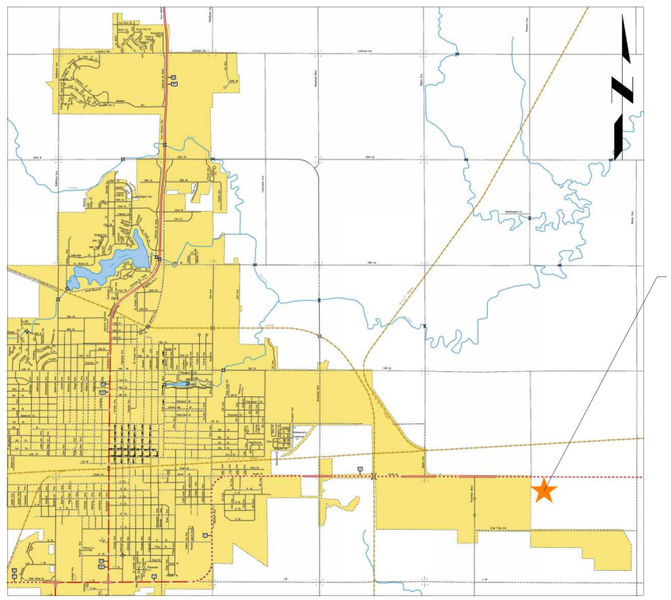
OWNER:

NAME:	CONTACT INFO:
KEITH MILLER	COMPANY: HASTINGS UTILITIES PHONE: 402.462.3549 EMAIL:KMILLER@CITYOFHASTINGS.ORG

ENGINEER:

SUBMITTING ORGANIZATION	JEO CONSULTING GROUP, INC. 1937 N CHESTNUT ST, WAHOO, NE 68066 P: 800.723.8567 CERTIFICATE OF AUTHORIZATION NO.: CA-0069
COORDINATING PROFESSIONAL	STEVE ARENS JEO CONSULTING GROUP, INC. 2000 Q ST STE 500, LINCOLN, NE 68503 P: 402.310.5836 EMAIL: SARENS@JEO.COM

INDEX OF SHEETS:



LOCATION MAP

PROJECT LOCATION,
4520 EAST SOUTH STREET
HASTINGS, NEBRASKA 68901

Know what's **below.** Call before you dig.

ALL SITE PLAN INFORMATION IS BASED UPON **US SURVEY FEET (sFT)**

I, STEVE ARENS, AM THE COORDINATING PROFESSIONAL ON THE NORTH WHELAN ENERGY CENTER BOTTOM ASH REMOVAL SYSTEM PROJECT.

NOTE:
NEITHER THE OWNER (CLIENT) NOR JEO CONSULTING GROUP, INC. ASSUMES ANY RESPONSIBILITY FOR UTILITY LOCATIONS BEING ACCURATELY SHOWN OR NOT SHOWN ON THE PLANS.

UNDERGROUND UTILITIES BASE MAP WAS PROVIDED BY CLIENT FOR REFERENCE. UNDERGROUND UTILITIES WERE NOT MARKED BY OWNER AND NEARLY ALL UTILITIES ARE PRIVATE OWNED BY OWNER ON SITE.

THE EXACT LOCATION AND/OR SIZE OF UNDERGROUND FEATURES MAY NOT BE ACCURATELY, COMPLETELY AND RELIABLY DEPICTED. FIELD VERIFICATION OF UTILITIES MAY BE REQUIRED. CONTRACTOR(S) SHALL NOTIFY THE RESPECTIVE UTILITY COMPANIES BEFORE COMMENCING ANY WORK.

JEO CONSULTING GROUP 1-800-723-8567

2023
NORTH
WHELEN ENERGY CENTER UNIT 1
BOTTOM ASH REMOVAL SYSTEM
HASTINGS, NEBRASKA

COVER SHEET

PROFESSIONAL CIVIL ENGINEER
STEVEN W. ARENS
E-14723
11/17/2023
STATE OF NEBRASKA

PROJECT NO.	230998.00
DATE	11/17/2023
DRAWN BY	TW
FILE NAME	Struct_TLW.dwg
FIELD BOOK	HASTINGS #59
FIELD CREW	B,S.
SURVEY FILE NO.	SV-230998
PLAN IN HAND INITIALS	########
PLAN IN HAND DATE	########
70 PERCENT REVIEW INITIALS	########
70 PERCENT REVIEW DATE	########
95 PERCENT REVIEW INITIALS	########
95 PERCENT REVIEW DATE	########
REVISIONS	

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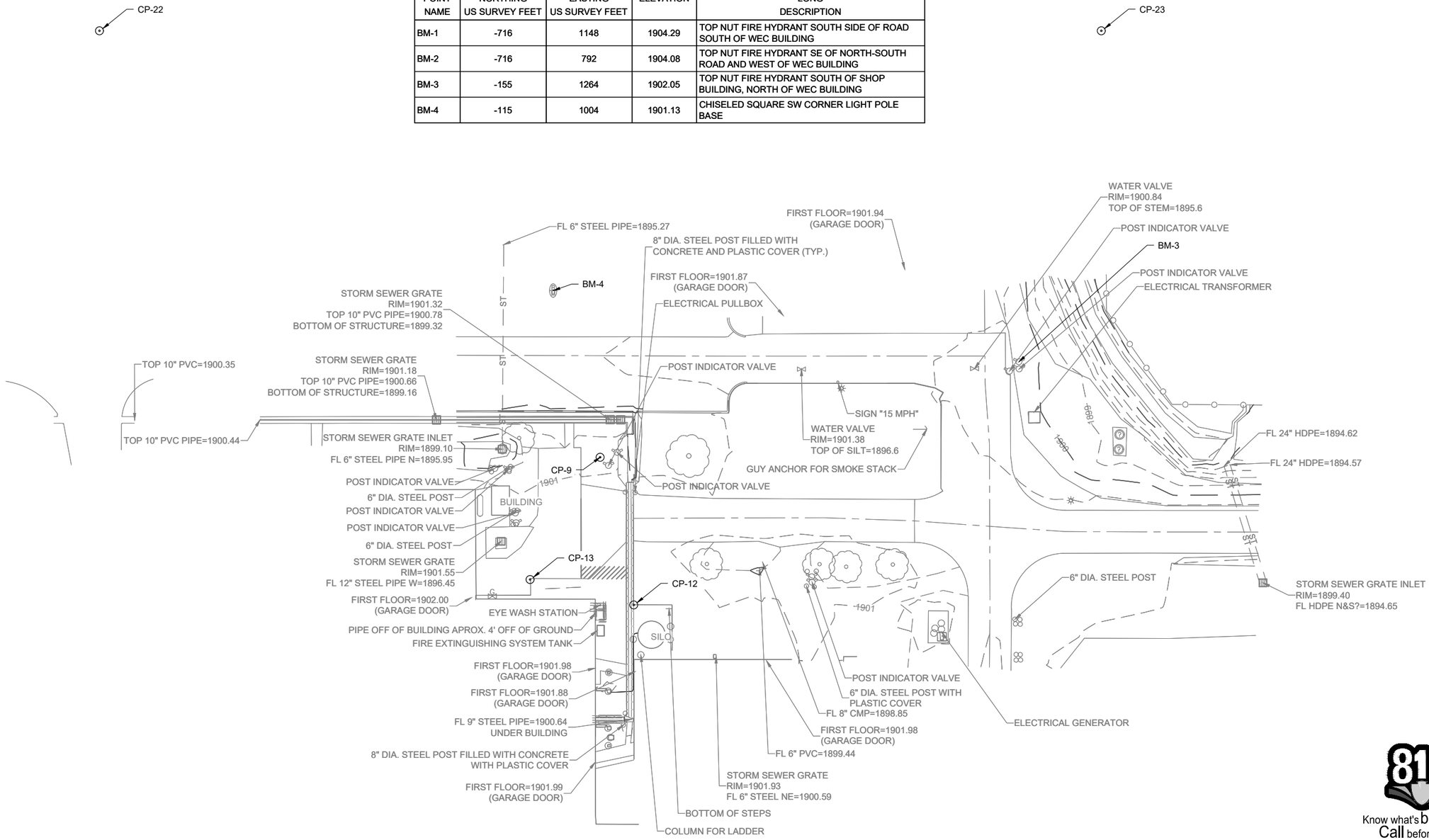
GRAPHIC SCALE
0 15 30 60
UNIT OF MEASURE IS FEET

HORIZONTAL SURVEY CONTROL - PLANT SYSTEM			
POINT NAME	NORTHING US SURVEY FEET	EASTING US SURVEY FEET	LONG DESCRIPTION
CP-9	-208.33	1029.79	5/8" REBAR
CP-10	-724.54	1137.43	5/8" REBAR
CP-11	-874.34	701.04	5/8" REBAR
CP-12	-290.9000	1048.57	
CP-13	-276.68	990.65	
CP-21	-195.00	-25.00	ALUMINUM CAP IN CONCRETE
CP-22	30.03	749.97	ALUMINUM CAP IN CONCRETE
CP-23	30.05	1309.86	ALUMINUM CAP IN CONCRETE
CP-27	-1715.00	1265.00	ALUMINUM CAP IN CONCRETE

BENCHMARKS - PLANT SYSTEM				
POINT NAME	NORTHING US SURVEY FEET	EASTING US SURVEY FEET	ELEVATION	LONG DESCRIPTION
BM-1	-716	1148	1904.29	TOP NUT FIRE HYDRANT SOUTH SIDE OF ROAD SOUTH OF WEC BUILDING
BM-2	-716	792	1904.08	TOP NUT FIRE HYDRANT SE OF NORTH-SOUTH ROAD AND WEST OF WEC BUILDING
BM-3	-155	1264	1902.05	TOP NUT FIRE HYDRANT SOUTH OF SHOP BUILDING, NORTH OF WEC BUILDING
BM-4	-115	1004	1901.13	CHISELED SQUARE SW CORNER LIGHT POLE BASE



Know what's below. Call before you dig.

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2023
NORTH
WHELAN ENERGY CENTER
BOTTOM ASH REMOVAL SYSTEM
HASTINGS, NEBRASKA

CONTROL

PROFESSIONAL CIVIL ENGINEER
Brian C. Bloom
11/17/23
STATE OF NEBRASKA

PROJECT NO.	230998
DATE	11/17/2023
DRAWN BY	MPR
FILE NAME	S_230998-NorthStructural.dwg
FIELD BOOK	HASTINGS #59
FIELD CREW	B.S.
SURVEY FILE NO.	SV-230998
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PLAN IN HAND DATE	PIH DATE
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70 PERCENT REVIEW DATE	70% DATE
95 PERCENT REVIEW INITIALS	95% INI
95 PERCENT REVIEW DATE	95% DATE
REVISIONS	

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GRAPHIC SCALE

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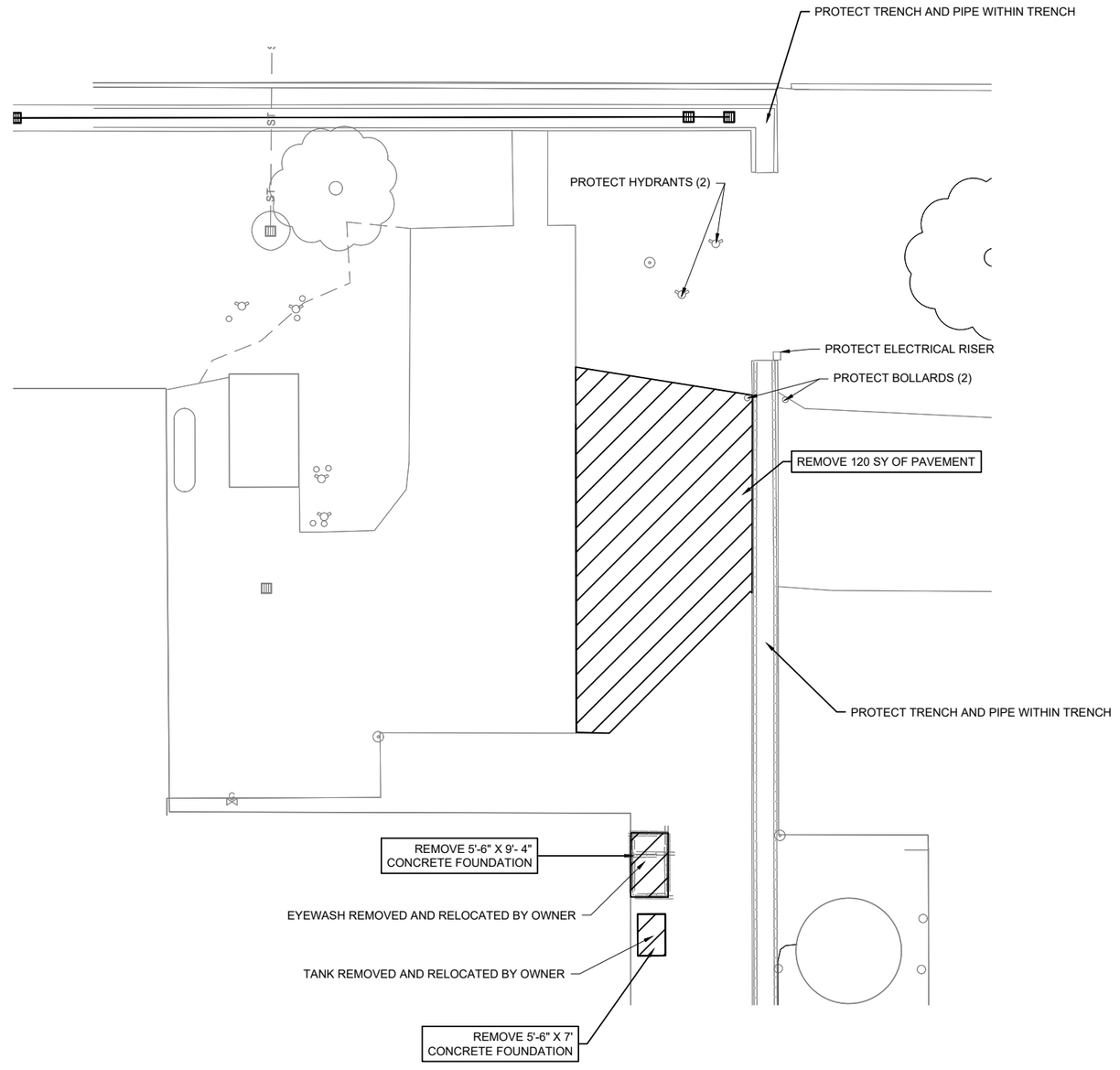
UNIT OF MEASURE IS FEET



JEO CONSULTING GROUP
1-800-728-8567

2023
NORTH
WHELAN ENERGY CENTER
BOTTOM ASH REMOVAL SYSTEM
HASTINGS, NEBRASKA

SITE REMOVAL PLAN

PROFESSIONAL CIVIL ENGINEER
Brian C. Bloom
11/17/23
STATE OF NEBRASKA

PROJECT NO.	230998
DATE	11/17/2023
DRAWN BY	MPR
FILE NAME	S_230998-NorthStructural.dwg
FIELD BOOK	HASTINGS #59
FIELD CREW	B.S.
SURVEY FILE NO.	SV-230998
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DATE	70% DATE
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DATE	95% DATE
REVISIONS	

811 Know what's below. Call before you dig.

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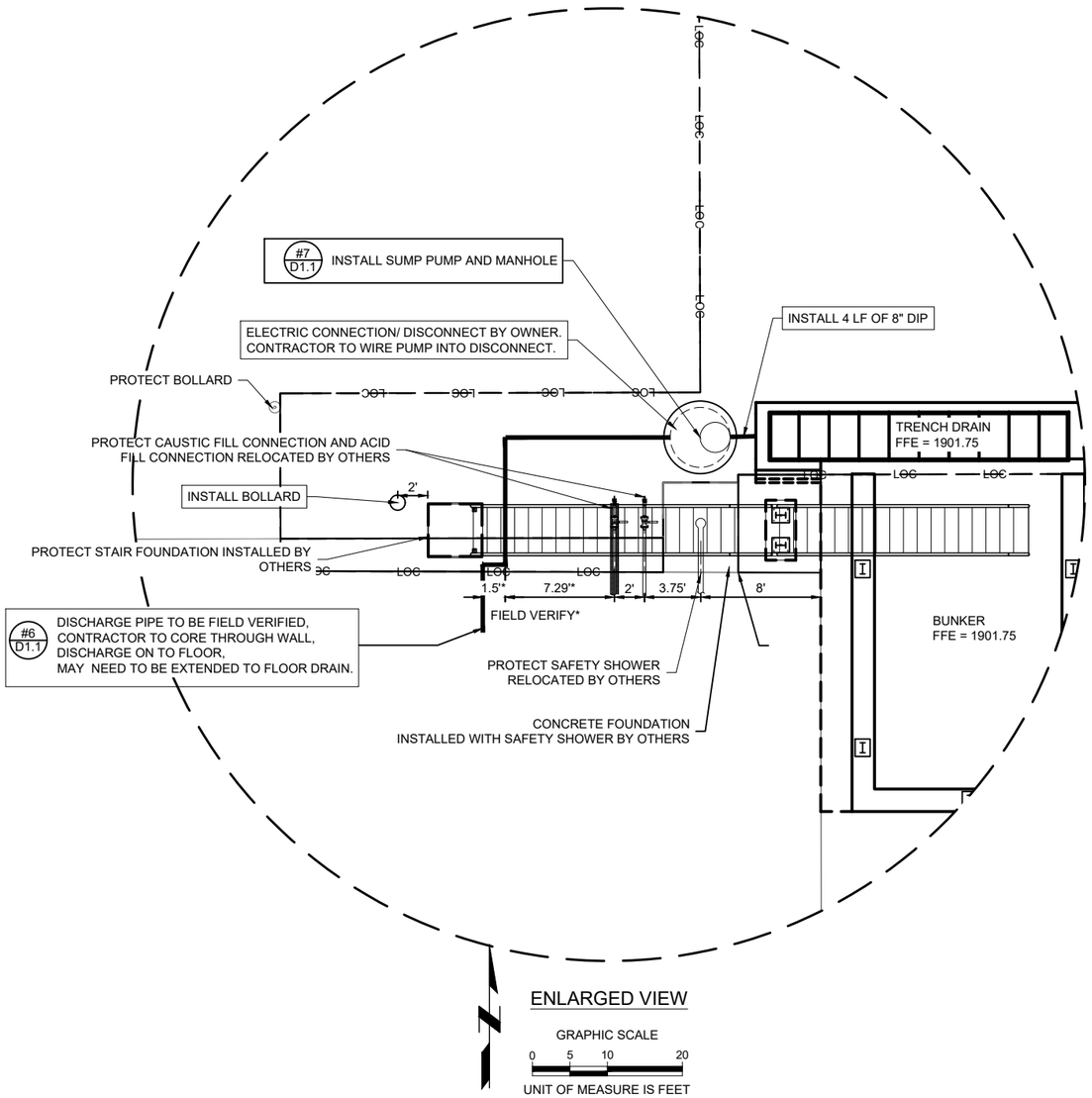


ENLARGED VIEW

GRAPHIC SCALE

0 5 10 20

UNIT OF MEASURE IS FEET

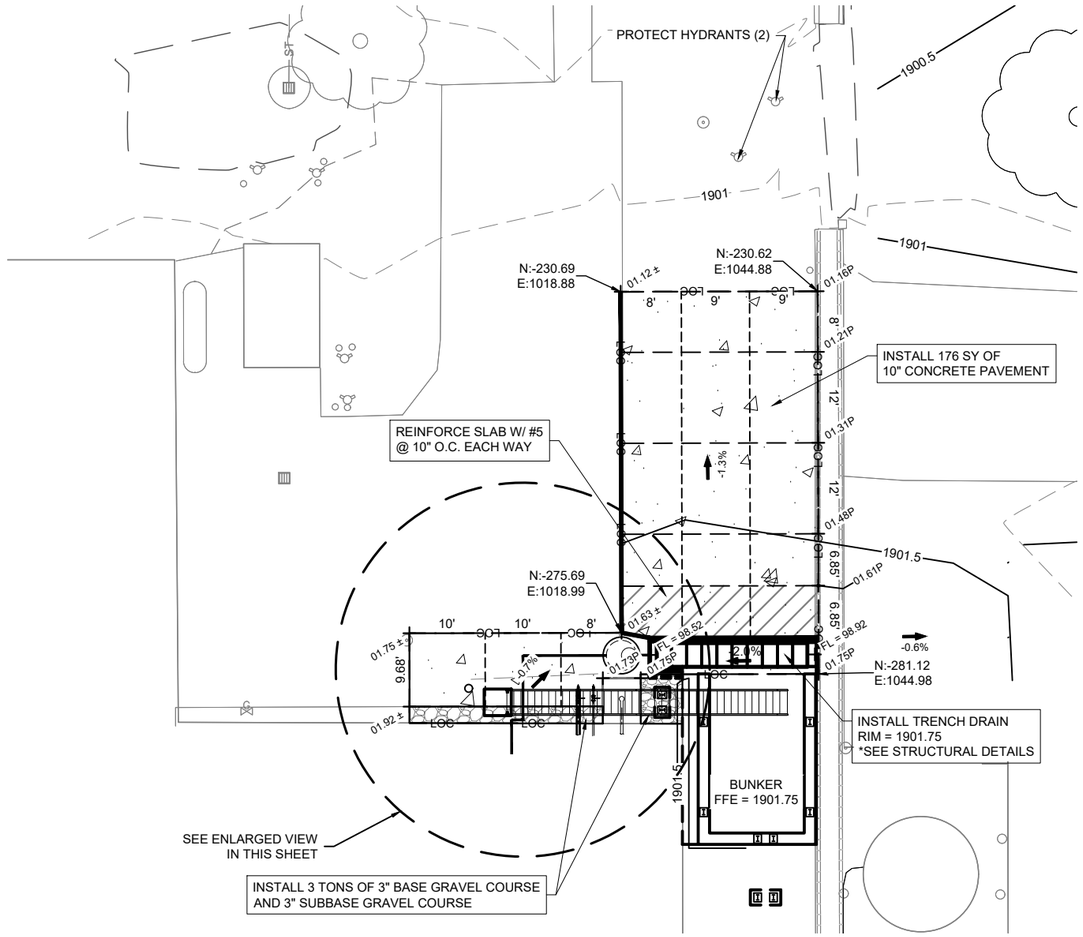
JOINT LEGEND

- LONGITUDINAL JOINT
- TRANSVERSE JOINT
- TIED JOINT
- EXPANSION JOINT

GRAPHIC SCALE

0 5 10 20

UNIT OF MEASURE IS FEET



GRADING LEGEND

- 1900 — PROPOSED MAJOR CONTOUR
- 1901.5 — PROPOSED MINOR CONTOUR
- 1900 — EXISTING MAJOR CONTOUR
- 1901 — EXISTING MINOR CONTOUR
- FLOW DIRECTION
- 01.87 ± — EXISTING SURFACE ELEVATION
- 00.97P — PROPOSED TOP OF PAVEMENT SURFACE ELEVATION

EARTHWORK QUANTITIES		
CUT (CY)	FILL (CY)	NET (CY)
60	5	55 <CUT>

EARTHWORK QUANTITIES ARE FOR INFORMATION ONLY.
NO FILL FACTOR WAS USED.

UNSUITABLE MATERIAL		
CUT (CY)	FILL (CY)	NET (CY)
15	0	15 <CUT>

UNSUITABLE MATERIAL IS AN APPROXIMATE QUANTITY.
OWNER SHALL APPROVE ALL EXCAVATION AND
REPLACEMENT OF UNSUITABLE MATERIAL AND ACTUAL
QUANTITY REMOVED FROM FINISHED GRADE WILL BE
CALCULATED DURING CONSTRUCTION.

811 Know what's below. Call before you dig.

JEO CONSULTING GROUP 1-800-723-5367

2023
NORTH
WHELAN ENERGY CENTER
BOTTOM ASH REMOVAL SYSTEM
HASTINGS, NEBRASKA

SITE CONSTRUCTION PLAN

PROFESSIONAL CIVIL ENGINEER
Brian P. Broom
11/17/23
STATE OF NEBRASKA

PROJECT NO.	230998
DATE	11/17/2023
DRAWN BY	MPR
FILE NAME	S_230998-NorthStructural.dwg
FIELD BOOK	HASTINGS #59
FIELD CREW	B.S.
SURVEY FILE NO.	SV-230998
PLAN IN HAND INITIALS	PIH INI
PLAN IN HAND DATE	PIH DATE
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70 PERCENT REVIEW DATE	70% DATE
95 PERCENT REVIEW INITIALS	95% INI
95 PERCENT REVIEW DATE	95% DATE
REVISIONS	

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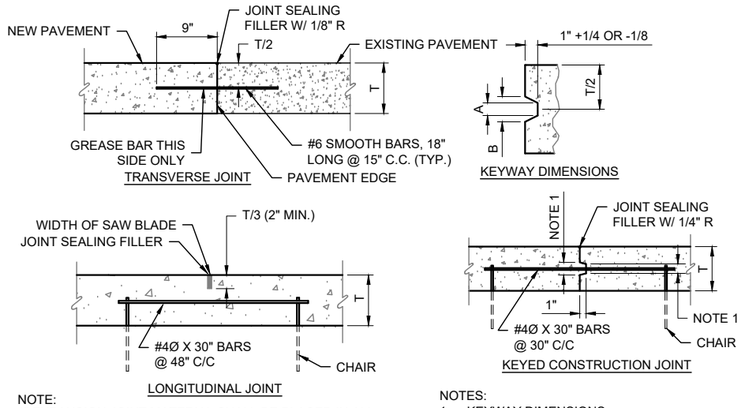
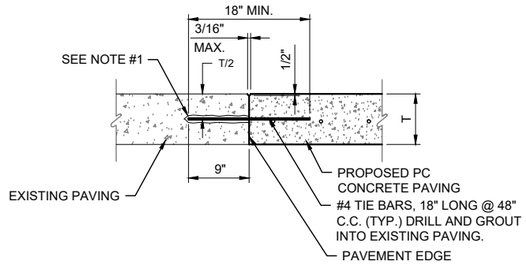


NOTE:
1" EXPANSION JOINT MATERIAL SHALL BE PLACED IN ALL SIDEWALK OR CROSSWALKS AT INTERVALS OF NOT MORE THAN 50' AND AT ALL POINTS WHERE SIDEWALKS AND CROSSWALKS BUTT AGAINST A CURB AND GUTTER SECTION. IF SIDEWALK OR CROSSWALK TO BE CONSTRUCTED IS LESS THAN 50' IN LENGTH ONE SUCH EXPANSION JOINT SHALL BE PLACED AS DIRECTED BY THE ENGINEER. ALL EXPANSION JOINTS WILL BE SEALED W/SONOLUITE JOINT SEALER (GRAY).

NOTES:
1. KEYWAY DIMENSIONS

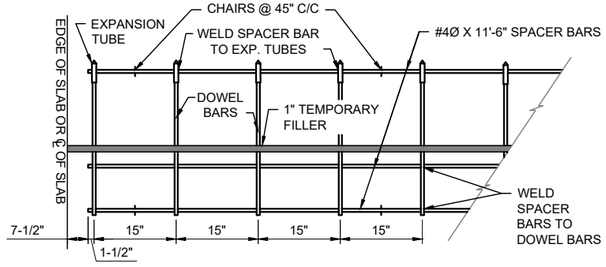
KEYWAY DIMENSIONS			
KEYWAY TYPE	PAVEMENT 'T'	A	B
STANDARD	8" OR GREATER	1 3/4"	2 3/4"
NARROW	LESS THAN 8"	1"	2"

1 CONSTRUCTION JOINTS
SCALE: N.T.S.

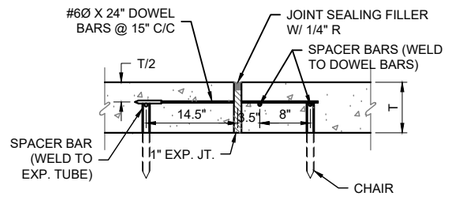


NOTES:
1. DRILL HOLE DIA. 1/8" LARGER THAN TIE BAR.
2. NO BAR WILL BE CLOSER THAN 6 INCHES TO ANY LONGITUDINAL JOINT (CENTERLINE OR LANELINE).

2 PAVING TIE-IN DETAIL
SCALE: N.T.S.

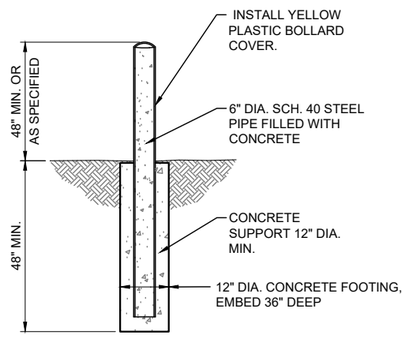


3 EXPANSION JOINT ASSEMBLY PLAN
SCALE: N.T.S.



NOTES:
1. PREFORMED EXPANSION JOINT FILLER SHALL BE USED FOR EXPANSION JOINTS UNLESS OTHERWISE SPECIFIED.
2. GREASE DOWEL BAR ON EXPANSION TUBE SIDE ONLY.

4 EXPANSION JOINT
SCALE: 1"=1'-0"



5 BOLLARD DETAIL
SCALE: N.T.S.

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2023
NORTH
WHELAN ENERGY CENTER
BOTTOM ASH REMOVAL SYSTEM
HASTINGS, NEBRASKA

STANDARD SITE DETAILS

PROFESSIONAL CIVIL ENGINEER
Brian P. Bloom
11/17/23
STATE OF NEBRASKA

PROJECT NO.	230998
DATE	11/17/2023
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FIELD BOOK	HASTINGS #59
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REVISIONS	

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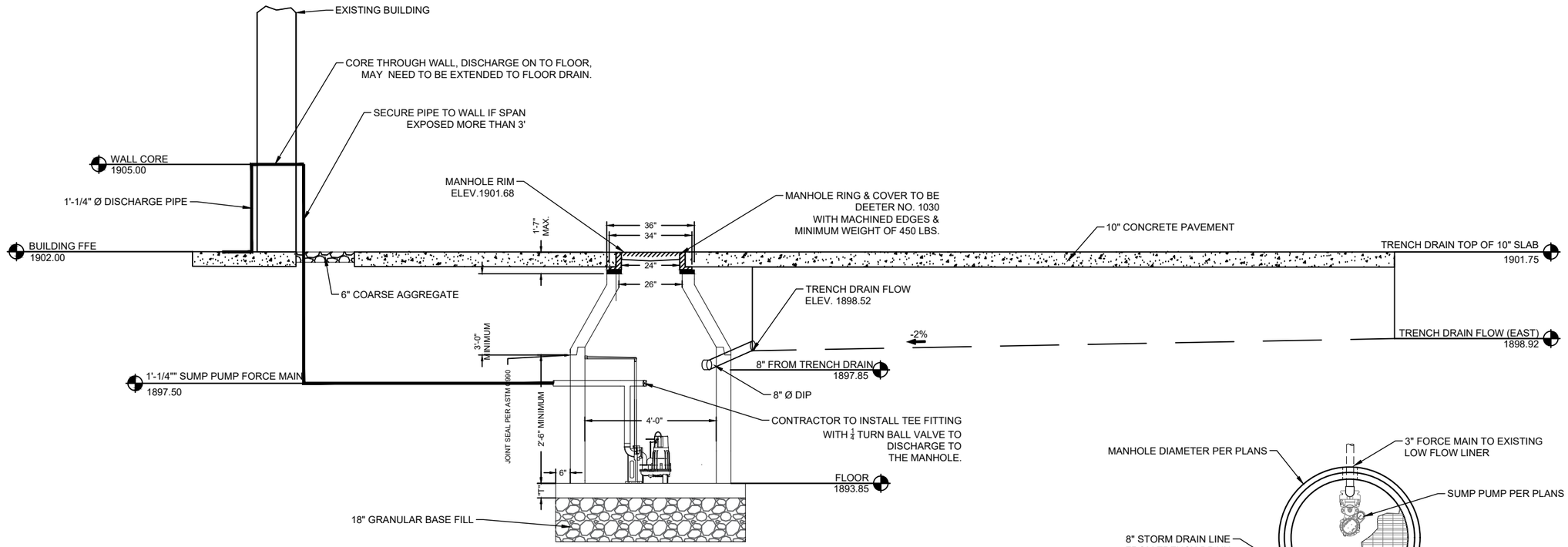
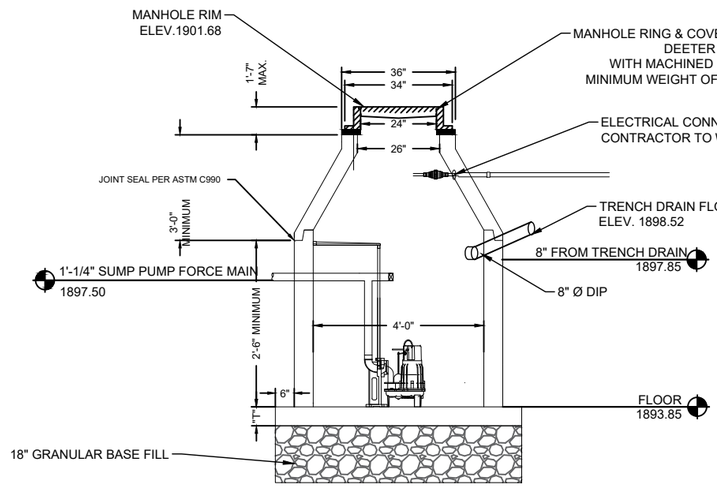


6 DISCHARGE PIPE
SCALE: N.T.S.

NOTES:
1. SUPPORT ALL VALVES, PIPING AND KEY EXTENSIONS IN MANHOLE AS REQUIRED TO ALLOW OPERATION WITH OUT DAMAGING VALVE OR PIPING.
2. SUMP PUMP SHALL BE CAPABLE OF PUMPING 20 GPM @ 15' TDH, BASIS OF DESIGN ZOELLER BRAND MODEL 818
3. INSTALL 1.5' GRANULAR FILL BASE



7 STORM SEWER MANHOLE WITH SUMP PUMP
SCALE: N.T.S.

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1-800-728-8567

2023
NORTH
WHELAN ENERGY CENTER
BOTTOM ASH REMOVAL SYSTEM
HASTINGS, NEBRASKA

STANDARD SITE DETAILS

PROFESSIONAL CIVIL ENGINEER
Brian P. Moore
11/17/23
STATE OF NEBRASKA

PROJECT NO.	230998
DATE	11/17/2023
DRAWN BY	MPR
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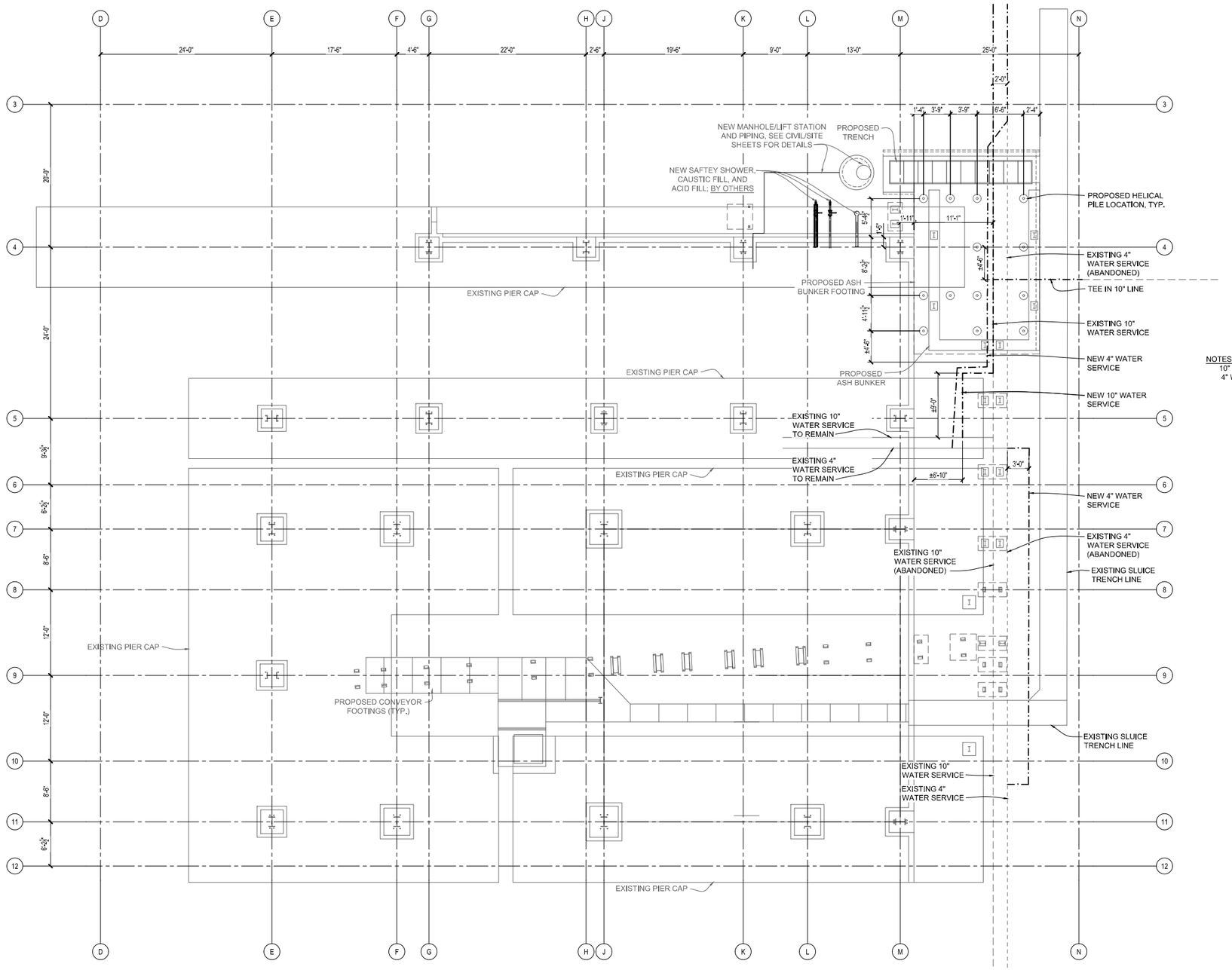

1 WATER LINE REPLACEMENT PLAN
1/8" = 1'-0"

THIS SHEET IS FOR REFERENCE ONLY

WATERLINE REPLACEMENT/RELOCATION BY OTHERS. WATER LINES WILL BE RELOCATED TO NEW, PROPOSED LOCATIONS PRIOR TO THIS BOTTOM ASH CONSTRUCTION WORK.

NOTES:
10" WATER SERVICE CL, ELEV. = ±1895.5
4" WATER SERVICE CL, ELEV. = ±1894.0

JE CONSULTING GROUP
1-800-723-9867

2023
NORTH
WHELEN ENERGY CENTER UNIT 1
BOTTOM ASH REMOVAL SYSTEM
HASTINGS, NEBRASKA

WATER LINE REPLACEMENT PLAN

PROFESSIONAL CIVIL ENGINEER
STEVEN W. ARENS
E-14723
11/17/2023
STATE OF NEBRASKA

PROJECT NO.	230998.00
DATE	11/17/2023
DRAWN BY	TW
FILE NAME	Struct_TLW.dwg
FIELD BOOK	HASTINGS #59
FIELD CREW	B.S.
SURVEY FILE NO.	SV-230998
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REVISIONS	

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Governing Codes
- IBC 2018
- ASCE 7-16
- ACI 318-14 (Cast-in-Place Concrete)
- AISC 14TH EDITION (Structural Steel)

Design Loads:
- Occupancy Category..... III
- Live Loads
  - Roof
    - minimum roof live load..... 20 psf
  - Snow
    - Ground Snow (Pg)..... 25 psf
    - Flat Roof Snow (Pf)..... 20 psf
    - Snow exposure (Ce)..... 1.0
    - Thermal factor (Ct)..... 1.0
    - Importance factor (Is)..... 1.1
    - Rain on snow [Pg > 20 psf]..... NA
    - Unbalanced snow loads..... ASCE 7 Section 7.6
  - Floor
    - Stairs..... 100 psf
- Wind Loads
  - Basic wind speed..... 120 mph
  - Exposure..... C
  - Cladding..... see applicable tables in IBC 2018
- Seismic Loads
  - Site classification..... D
  - Importance factor (Ie)..... 1.25
  - Seismic use group..... III
  - Seismic design category..... A
  - Spectral reponse coefficients
    - Ss = 0.078
    - S1 = 0.0411
    - Sds = 0.083
    - Sd1 = 0.066
  - Basic seismic force resisting system: By Conveyor Supplier
  - Seismic response coefficient (Cs) = By Conveyor Supplier
  - Response modification factor (R) = By Conveyor Supplier

Materials:

Concrete

28 Day Concrete Strengths (Minimum):
- Footings..... 4000 psi
- Slabs on grade..... 4000 psi
- C.I.P. walls..... 5000 psi
- Reinforcing Bars..... ASTM A615 Grade 60
- Welded Bars and Anchors..... ASTM A706 Grade 60

Recycled/Crushed Concrete..... 100% passing 3/4" Dia, less than 6% passing no. 200 sieve

Sand/Gravel Mix..... NDOT 47B Sand/Gravel Mix

Structural Steel

Anchor Rods..... ASTM F1554, Grade 36 E or S

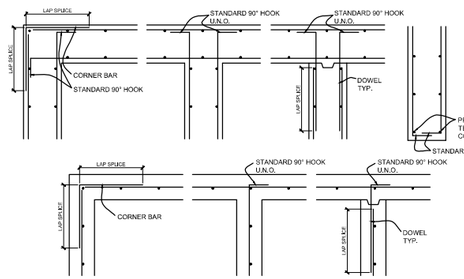
Adhesive Anchors..... Hilti HIT HY 200 or approved equivalent

Helical Pile Notes:
1. All helical piles shall be designed for gravity load shown on plans and no uplift loads. Loads shown are working loads. Helical design shall provide a minimum factor of safety of 2.0.
2. Actual length of piling to be installed shall be determined by the contractor and verified in the field based on installation records.
3. All pile installation shall be observed and recorded by a geotechnical engineer.
4. A complete, accurate log of piling installed shall be maintained and furnished to the contractor, owner and engineer. This log should indicate the following: Pile location, diameter, length, elevation of tip and top of pile, quantity of grout (if used) in each pile , date of installation, type of helical, and installation data verifying load capacity.
5. Helical pile to extend down to Loveland Loess layer.
6. Pre-drilling may be required. Contractor to confirm with helical contractor.
7. Helical Pile max service load = 60 kips

Foundations
1. Allowable bearing capacity = 1800 psf
2. Foundation design is based upon a soils report and foundation design recommendations prepared by Mid-State Engineering and Testing, dated 12-19-2014 (Project No. 194-53-21), Contractor to review and follow all geotechnical report specifications. The geotechnical engineer to be retained to provide continuous testing and observation during all earthwork and foundation construction phases and verify all report recommendations are being implemented.
3. Footing widths not dimensioned shall be a total of 12" wider than the wall above (16" minimum).
4. Protect foundation excavations from frost; do not place concrete on frozen ground.
5. Foundation excavations shall be kept free of loose material and standing water and shall be checked and approved by the geotechnical engineer before the placement of concrete.
6. Frost depth = 40". Contractor to coordinate foundation with grading plan to maintain this minimum requirement above bottom of all footings.
7. Construction details for all slabs-on-grade shall be in accordance with standard industry practice and the soils report.
8. All footings shall bear on suitable undisturbed soil, or engineered compacted fill, as specified in the geotechnical report. Any footings requiring fill material below to be over excavated and recompacted as directed by geotechnical engineer.
9. All footing excavations and slab subgrade to be inspected by the geotechnical engineer prior to placement of concrete and shall test all fill for required compaction.
10. Any and all backfill material to be approved by the geotechnical engineer prior to construction. fill to be installed in 6" to 8" lifts and compacted to the degree as specified in the geotechnical report.
11. All footings to be centered under walls, piers or columns unless noted otherwise.

Concrete
1. Footing widths not dimensioned shall be a total of 12" wider than the wall above (16" minimum).
2. All concrete work shall conform to ACI 301 and ACI 318. All reinforcing supplied shall conform to ACI 315.
3. Dowels shall be set 3" from the bottom of footing and shall extend above the top of footing the minimum distance required for lap lengths or as noted on the drawings. Bars shall be the same size and spacing as bars above.
4. Bars marked continuous shall be in as long lengths as possible. Lap bars as shown in Tyical Reinforcement Table. Laps shall occur in regions of low stress only. Provide corner bars in the same size and number as the continuous reinforcing at all concrete and footing intersections or 90 degree bends of proper length at the ends of reinforcing bars at intersections.
5. Reinforcing shall be accurately placed before placing concrete. Do not float reinforcing (wet-set).
6. Mechanically vibrate all concrete.
7. Do not place pipes, ducts, or chases in structural concrete without approval of the ARCHITECT/ENGINEER. See architectural, mechanical, and electrical drawings for locations.
8. Construct form work so concrete members and structures are of size, shape, alignment, elevation and position indicated within tolerance limits of ACI 117.
9. Control joints in slab on grade shall be placed at column line intersections and as shown on plans.
10. All reinforcing steel shall be bent cold, detailed, fabricated, and held in place in accordance with the "Manual of Standard Practice For Detailing Reinforced Concrete Structures" [ACI 315 latest edition], expect as otherwise detailed or specified.
11. Provide the following concrete cover to reinforcing:
    - A. for concrete cast against the earth and permanently exposed to earth: ..... 3"
    - B. for concrete exposed to earth or weather: ..... 2"
    - C. for concrete not exposed to weather or in contact with earth:
      - a. slabs, walls, joists: ..... 3/4"
      - b. beams, columns: ..... 1 1/2"
12. The contractor shall exercise extreme caution so as to not undermine, disturb, damage, or in any way cause un-desirable movement, cracking, and/or settlement of the adjacent construction. The CONTRACTOR is completely responsible for all shoring, forming, bracing, etc.
13. See plans for floor slab on grade construction. All mesh reinforcing shall be supplied in sheet stock, not roll stock.
14. All continuous footings, grade beams, and pad footings have been designed for a "net" allowable soil bearing pressure provided in the foundations section. The CONTRACTOR shall employ services of a qualified geotechnical engineering firm to verify the design soil bearing pressure and to perform all required field observations and tests.
15. Sub-soils supporting or in direct contact with footings, slabs on grade, or other foundation elements shall be protected against freezing conditions that could cause movements or other detrimental effects to the structure as a whole or to any of its component parts.
16. All slabs on grade shall bear on properly compacted backfill. Any unaccetable backfill as determined by project's geotechnical engineer, shall be removed and replaced as required by the geotechnical engineer.
17. The bottoms of all footings shall be placed at a minimum depth of 48" below adjacent finish grade.
18. Submit concrete mix designs to the STRUCTURAL ENGINEER for approval.
19. Submit shop drawings of reinforcing steel for footings and other concrete work to the STRUCTURAL ENGINEER for approval.

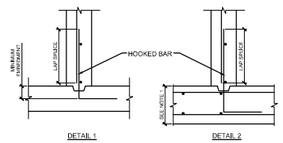
1 GENERAL NOTES

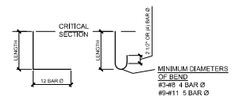


TYPICAL REINFORCING NOTES
1. Reinforcing bar development and lap splice length shall be as shown in table, unless noted otherwise.
2. The lengths shown in the table are based on the following concrete coverage and reinforcing center to center (c.c.) spacing,
   - beams or columns:
     - cover greater than or equal to 1.0 bar Ø
     - c.c. spacing greater than or equal to 2.0 bar Ø
   - all others:
     - cover greater than or equal to 1.0 bar Ø
     - c.c. spacing greater than or equal to 3.0 bar Ø
3. Top bars are defined as horizontal reinforcement such that more than 12" of fresh concrete is cast in the member below the development length or splice.
4. Development length and splice length shown shall NOT apply if any one of the following conditions occur:
   - a. f'c < 3,000 psi
   - b. fy < 60,000 psi
   - c. the cover or c.c. spacing is not as listed above
   - d. the reinforcing steel is epoxy coated
   - e. light weight concrete is used
5. Center to center spacing is defined as below:

MAIN REINFORCING BAR
LAPPED REINFORCING BAR

DEVELOPMENT LENGTH NOTES
1. Where drawings are detailed similar to detail 2 (below) extend the embedment length such that the hooked bar contacts the layer of main reinforcing shown.
2. Embedment lengths in chart are typical except as noted in detail 2 (below) or as indicated on drawings.





REINFORCING DEVELOPMENT AND SPLICES
f'c = 3,000 psi

BAR SIZE	DEVELOPMENT LENGTH		SPLICE LENGTH	
	OTHER	TOP	OTHER	TOP
#3	1'-5"	1'-10"	1'-10"	2'-4"
#4	1'-10"	2'-5"	2'-5"	3'-1"
#5	2'-4"	3'-0"	3'-0"	3'-11"
#6	2'-9"	3'-7"	3'-7"	4'-8"
#7	4'-0"	5'-3"	5'-3"	6'-9"
#8	4'-5"	6'-0"	6'-0"	7'-9"
#9	5'-2"	6'-9"	6'-9"	8'-9"
#10	5'-10"	7'-7"	7'-7"	9'-10"
#11	6'-5"	8'-4"	8'-4"	10'-10"

REINFORCING DEVELOPMENT AND SPLICES
f'c = 4,000 psi

BAR SIZE	DEVELOPMENT LENGTH		SPLICE LENGTH	
	OTHER	TOP	OTHER	TOP
#3	1'-0"	1'-3"	1'-3"	2'-0"
#4	1'-3"	1'-8"	1'-8"	2'-4"
#5	1'-7"	2'-1"	2'-1"	2'-9"
#6	1'-11"	2'-6"	2'-6"	3'-3"
#7	3'-6"	4'-6"	4'-6"	5'-11"
#8	3'-11"	5'-1"	5'-1"	6'-8"
#9	4'-6"	5'-9"	5'-9"	7'-6"
#10	5'-1"	6'-6"	6'-6"	8'-5"
#11	5'-7"	7'-3"	7'-3"	9'-6"

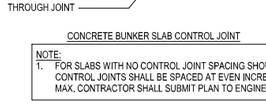
DEVELOPMENT LENGTH HOOKED BARS
f'c = 3,000 psi

BAR SIZE	DEVELOPMENT LENGTH OR MINIMUM EMBEDMENT
#3	9"
#4	11"
#5	1'-2"
#6	1'-5"
#7	1'-8"
#8	1'-10"
#9	2'-1"
#10	2'-4"
#11	2'-7"

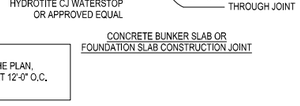
DEVELOPMENT LENGTH HOOKED BARS
f'c = 4,000 psi

BAR SIZE	DEVELOPMENT LENGTH OR MINIMUM EMBEDMENT
#3	8"
#4	10"
#5	1'-0"
#6	1'-3"
#7	1'-5"
#8	1'-7"
#9	1'-10"
#10	2'-1"
#11	2'-5"

2 TYPICAL REINFORCING NOTES



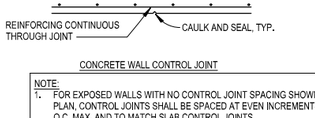
CONCRETE BUNKER SLAB CONTROL JOINT



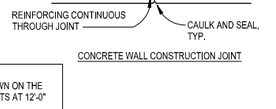
CONCRETE BUNKER SLAB OR FOUNDATION SLAB CONSTRUCTION JOINT

NOTE:
1. FOR SLABS WITH NO CONTROL JOINT SPACING SHOWN ON THE PLAN, CONTROL JOINTS SHALL BE SPACED AT EVEN INCREMENTS AT 12'-0" O.C. MAX. CONTRACTOR SHALL SUBMIT PLAN TO ENGINEER.

3 BUNKER SLAB ON GRADE CONTROL/CONSTRUCTION JOINTS



CONCRETE WALL CONTROL JOINT



CONCRETE WALL CONSTRUCTION JOINT

NOTE:
1. FOR EXPOSED WALLS WITH NO CONTROL JOINT SPACING SHOWN ON THE PLAN, CONTROL JOINTS SHALL BE SPACED AT EVEN INCREMENTS AT 12'-0" O.C. MAX. AND TO MATCH SLAB CONTROL JOINTS

4 CONCRETE WALL CONTROL/CONSTRUCTION JOINTS

JEO CONSULTING GROUP
1-800-723-9967

2023
NORTH
WHELEN ENERGY CENTER UNIT 1
BOTTOM ASH REMOVAL SYSTEM
HASTINGS, NEBRASKA

GENERAL NOTES AND DETAILS

PROFESSIONAL CIVIL ENGINEER
STEVEN W. ARENS
E-14723
11/17/2023
STATE OF NEBRASKA

PROJECT NO.	230998.00
DATE	11/17/2023
DRAWN BY	TW
FILE NAME	Struct_TLW.dwg
FIELD BOOK	HASTINGS #59
FIELD CREW	B.S.
SURVEY FILE NO.	SV-230998
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95 PERCENT REVIEW DATE	########
REVISIONS	

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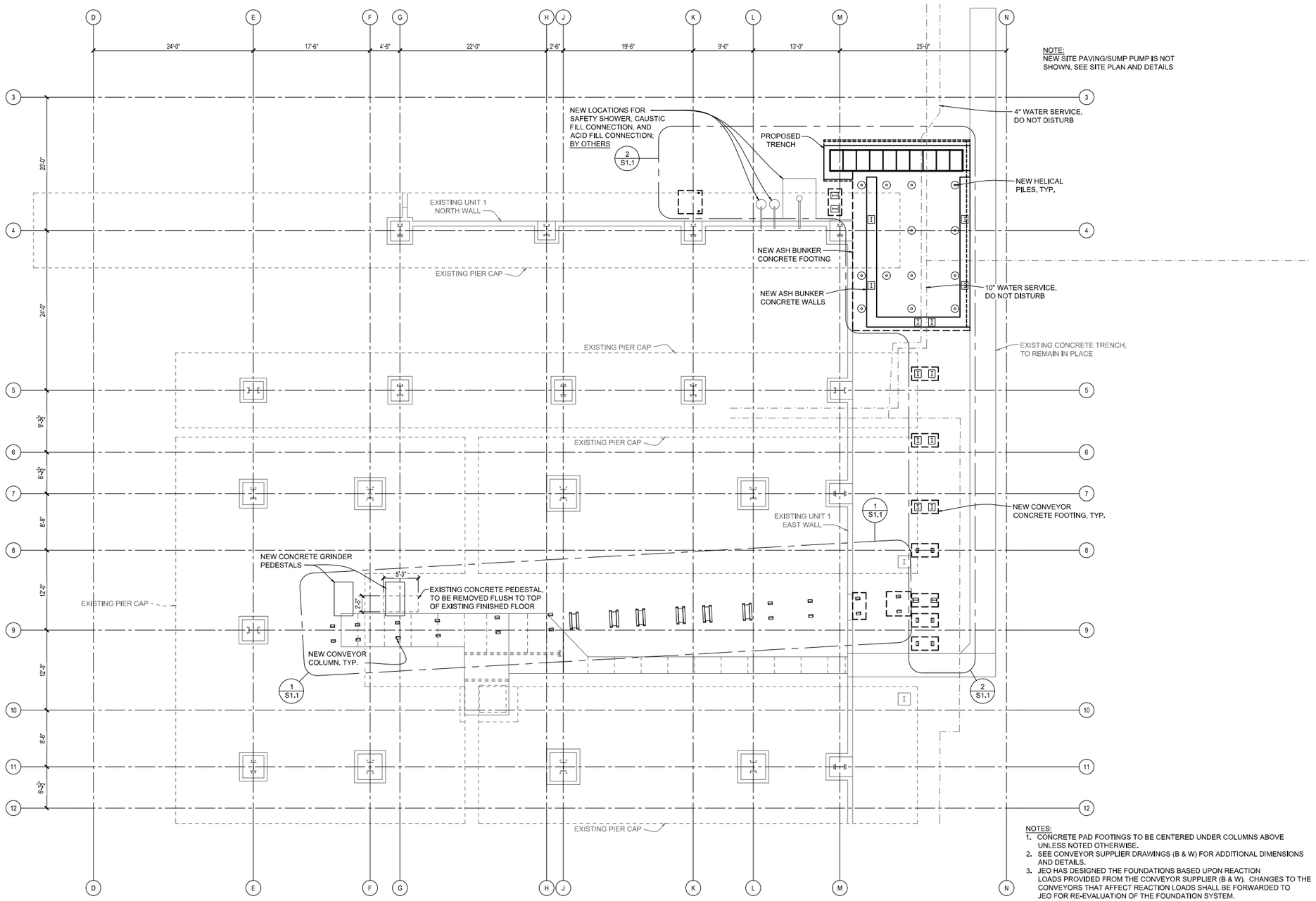


NOTES:
1. CONCRETE PAD FOOTINGS TO BE CENTERED UNDER COLUMNS ABOVE UNLESS NOTED OTHERWISE.
2. SEE CONVEYOR SUPPLIER DRAWINGS (B & W) FOR ADDITIONAL DIMENSIONS AND DETAILS.
3. JEO HAS DESIGNED THE FOUNDATIONS BASED UPON REACTION LOADS PROVIDED FROM THE CONVEYOR SUPPLIER (B & W). CHANGES TO THE CONVEYORS THAT AFFECT REACTION LOADS SHALL BE FORWARDED TO JEO FOR RE-EVALUATION OF THE FOUNDATION SYSTEM.
4. COORDINATE EXISTING CONDUITS AND UTILITIES WITH HASTINGS UTILITIES. HASTINGS UTILITIES WILL RELOCATE EXISTING CONDUITS AND EXISTING EQUIPMENT AS NEEDED.
5. CONTRACTOR SHALL FIELD VERIFY EXISTING DIMENSIONS.

1 CONVEYOR FOUNDATION PLAN
1/8" = 1'-0"

JEO CONSULTING GROUP
1-800-723-9967

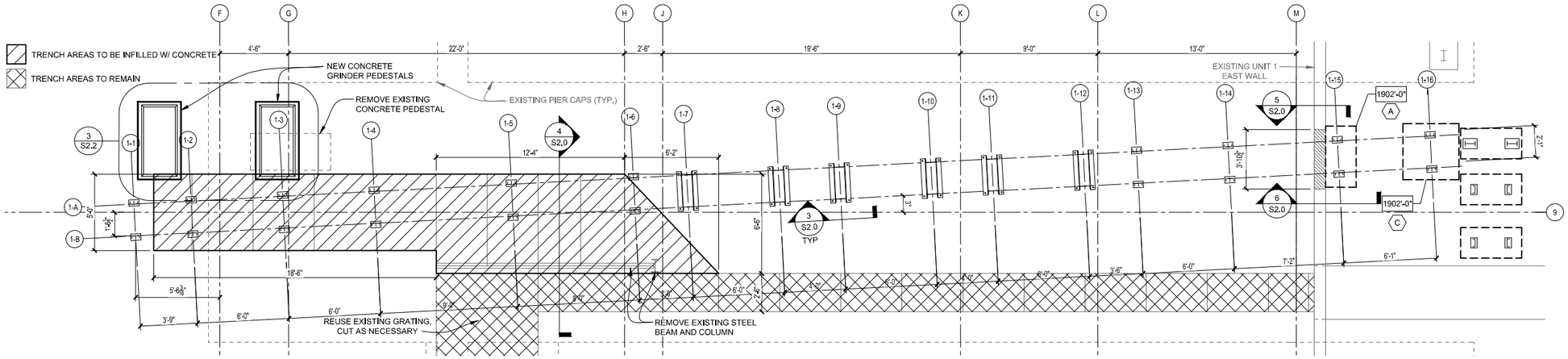
2023
NORTH
WHELEN ENERGY CENTER UNIT 1
BOTTOM ASH REMOVAL SYSTEM
HASTINGS, NEBRASKA

CONVEYOR FOUNDATION PLAN

PROFESSIONAL CIVIL ENGINEER
STEVEN W. ARENS
E-14723
11/17/2023
STATE OF NEBRASKA

PROJECT NO.	230998.00
DATE	11/17/2023
DRAWN BY	TW
FILE NAME	Struct_TLW.dwg
FIELD BOOK	HASTINGS #59
FIELD CREW	B.S.
SURVEY FILE NO.	SV-230998
PLAN IN HAND INITIALS	########
PLAN IN HAND DATE	########
70 PERCENT REVIEW INITIALS	########
70 PERCENT REVIEW DATE	########
95 PERCENT REVIEW INITIALS	########
95 PERCENT REVIEW DATE	########
REVISIONS	

S1.0



1 PARTIAL CONVEYOR FOOTING PLAN
1/4" = 1'-0"

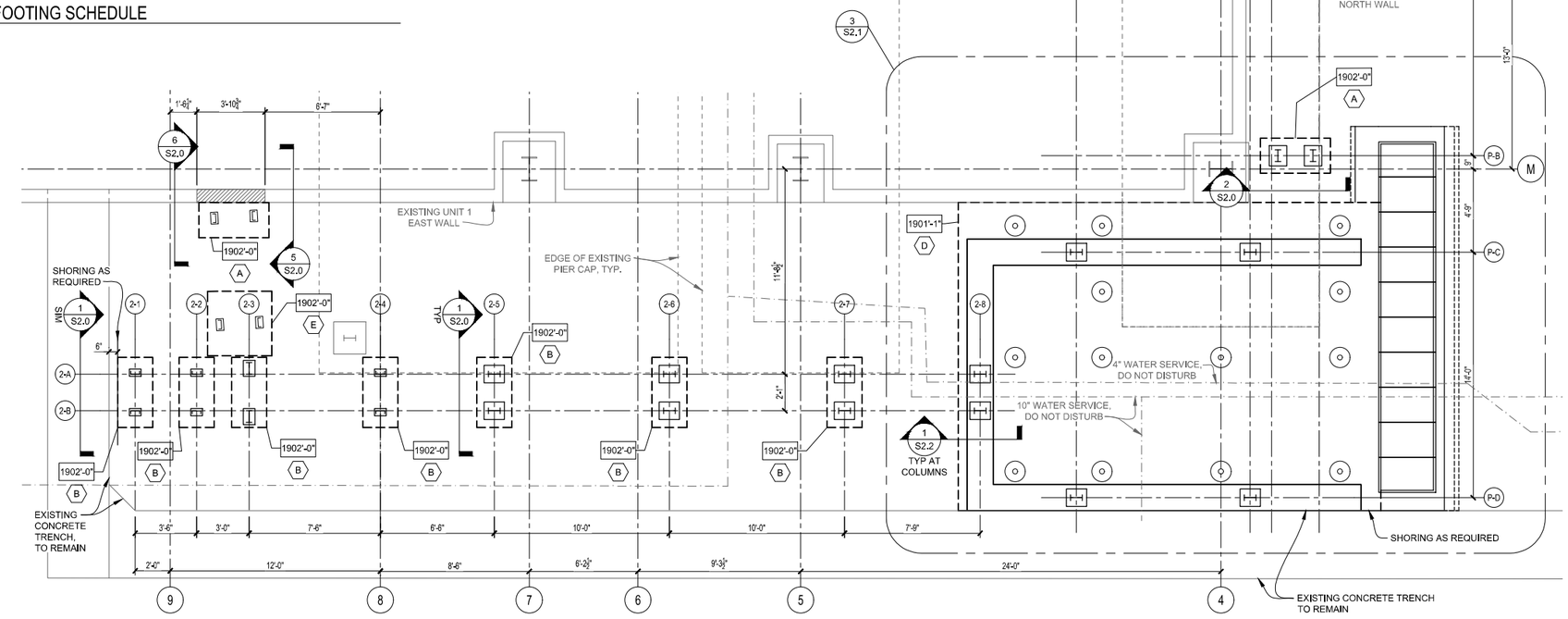
COLUMN PAD FOOTING SCHEDULE

CONCRETE PAD FOOTING				ALLOWABLE SOIL BEARING CAPACITY (PSF)
PAD MARK	SIZE	REINFORCING	DOWELS	
A	4'-0"x2'-0" x4'-6" Deep	4-#5's Top & Bottom w/ #5 Ties @ 12" O.C.	----	1,800
B	4'-0"x2'-0" x8'-0" Deep	10-#5's Verts w/ #5 Horiz Ties @ 16" O.C.	----	1,800
C	3'-8"x3'-8" x4'-6" Deep	7-#5's Each Way Top & Bottom	----	1,800
D	24'-0"x17'-7" x3'-5" Deep	See Details	----	1,800
E	4'-0"x4'-0" x7'-0" Deep	7-#5's Each Way Top & Bottom	----	1,800

NOTE:
SEE SHEET S1.0 FOR ADDITIONAL NOTES.

KEY:
1902'-0" = TOP OF FOOTING ELEVATION, TYP.
B = NEW CONCRETE FOOTING TYPE, TYP. SEE SCHEDULE

3 FOOTING SCHEDULE



2 PARTIAL CONVEYOR FOOTING PLAN
1/4" = 1'-0"

JEO CONSULTING GROUP
1-800-723-9967

2023
NORTH
WHELEN ENERGY CENTER UNIT 1
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ENLARGED FOUNDATION PLANS

PROFESSIONAL CIVIL ENGINEER
STEVEN W. ARENS
E-14723
11/17/2023
STATE OF NEBRASKA

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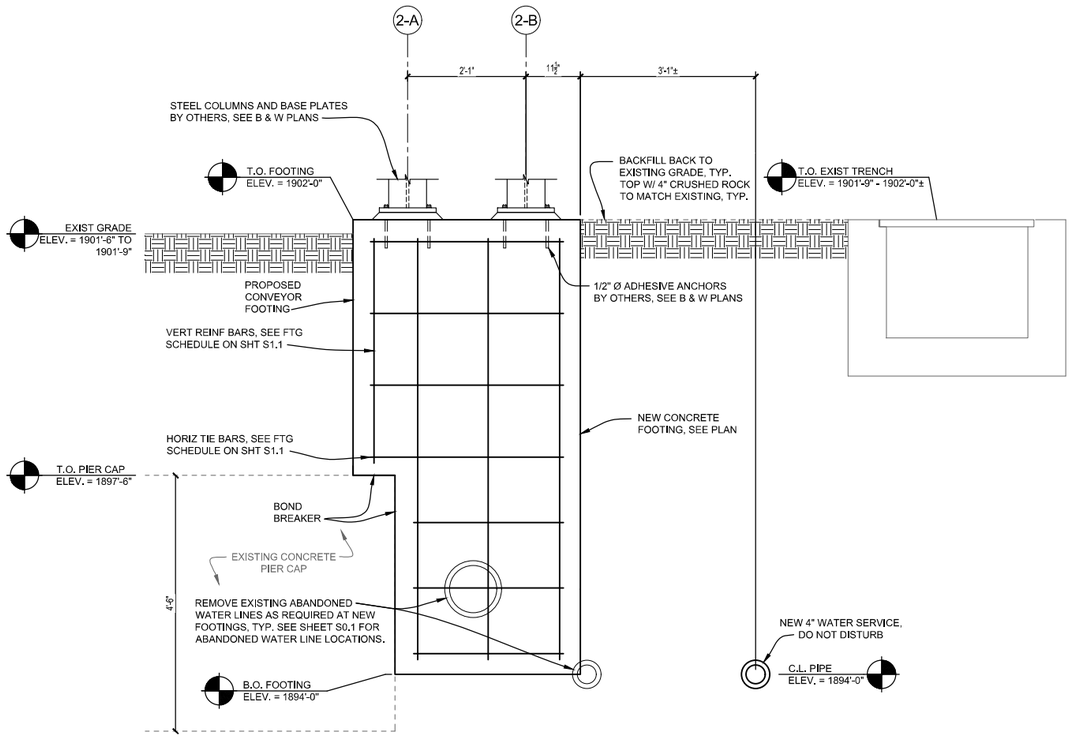
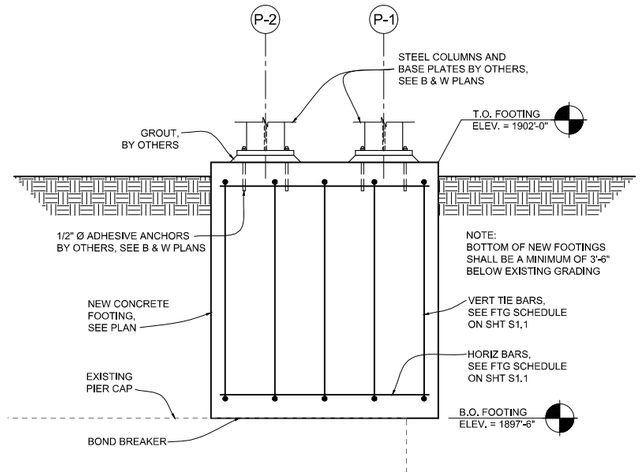
REVISIONS	

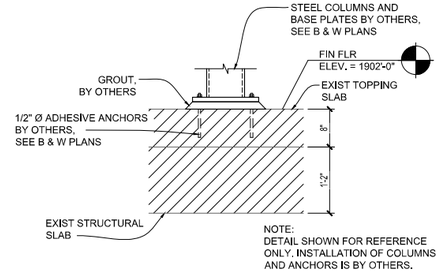
S1.1



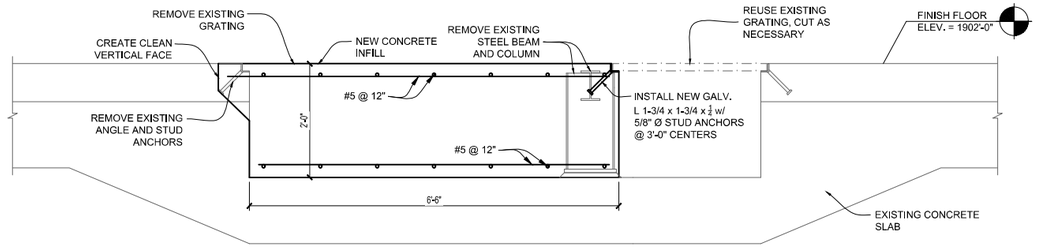
1 SECTION DETAIL
3/4" = 1'-0"



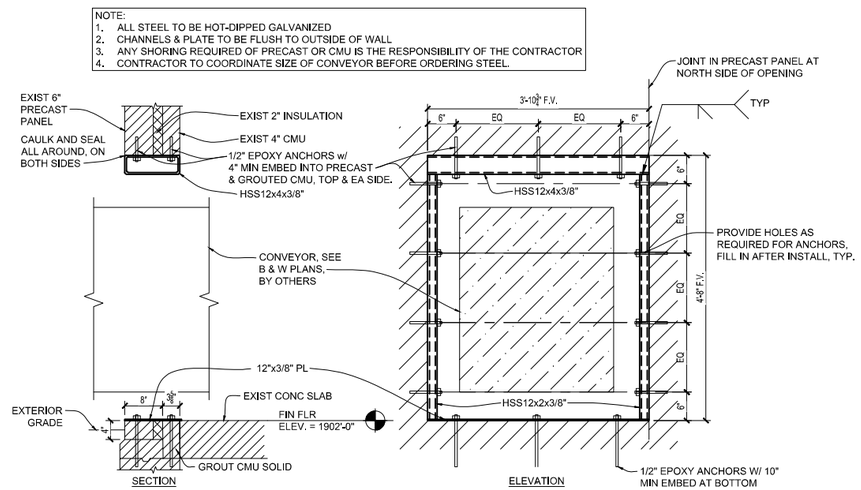
2 TYP PAD FOOTING DETAIL
3/4" = 1'-0"



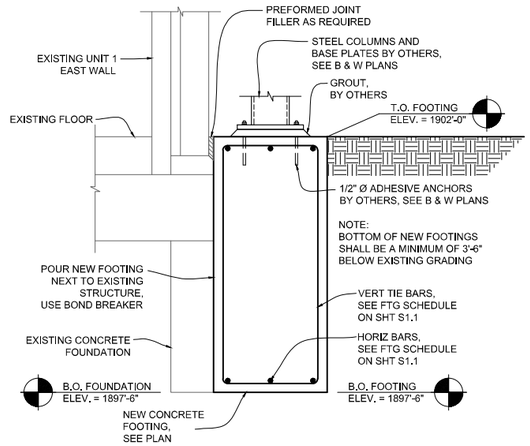
3 CONVEYOR CONN. TO EXIST SLAB
3/4" = 1'-0"



4 TYP TRENCH INFILL DETAIL
3/4" = 1'-0"



5 LINTEL DETAIL @ NEW OPENING FOR CONVEYOR
3/4" = 1'-0"



6 PAD FOOTING DETAIL
3/4" = 1'-0"

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2023
NORTH
WHELEN ENERGY CENTER UNIT 1
BOTTOM ASH REMOVAL SYSTEM
HASTINGS, NEBRASKA

FOUNDATION DETAILS

PROFESSIONAL CIVIL ENGINEER
STEVEN W. ARENS
E-14723
11/17/2023
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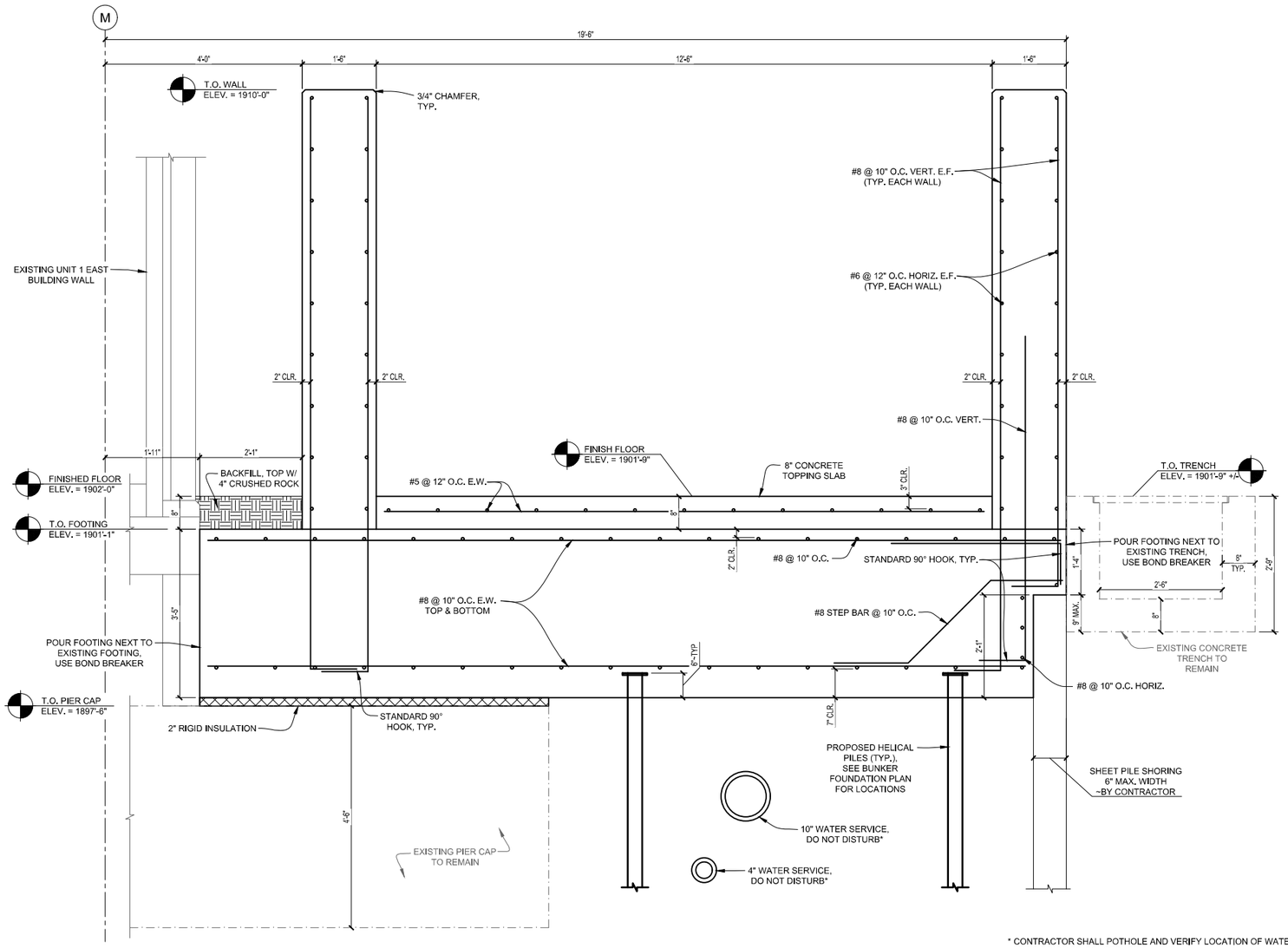
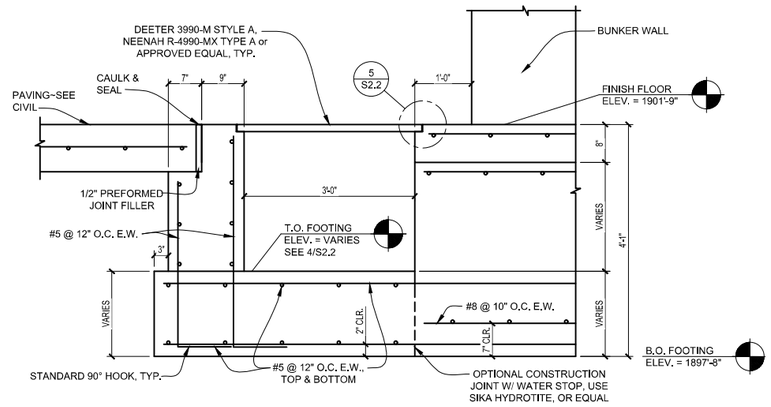
95 PERCENT REVIEW DATE	########
REVISIONS	

S2.0

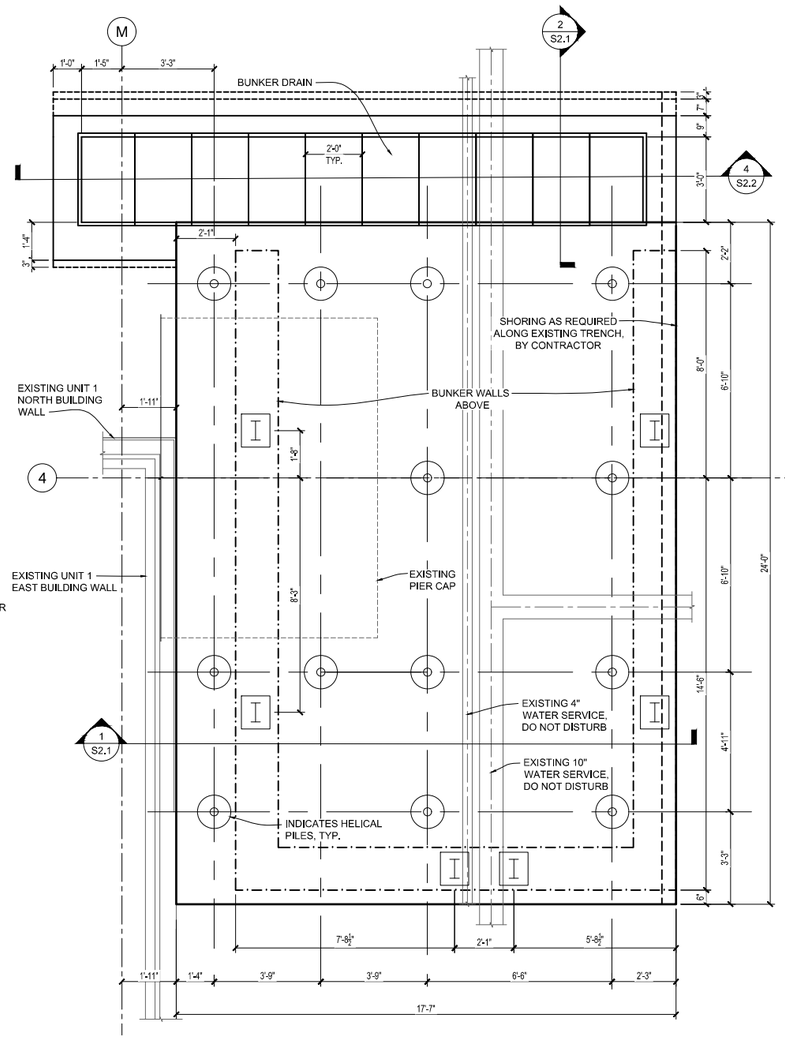


* CONTRACTOR SHALL POTHOLE AND VERIFY LOCATION OF WATER LINES PRIOR TO CONSTRUCTION, TYP.

1 TYP BUNKER SECTION DETAIL
3/4" = 1'-0"



2 TYP BUNKER DRAIN SECTION
3/4" = 1'-0"



3 BUNKER FOUNDATION PLAN
3/8" = 1'-0"

JEO CONSULTING GROUP
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2023
NORTH
WHELEN ENERGY CENTER UNIT 1
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HASTINGS, NEBRASKA

FOUNDATION DETAILS

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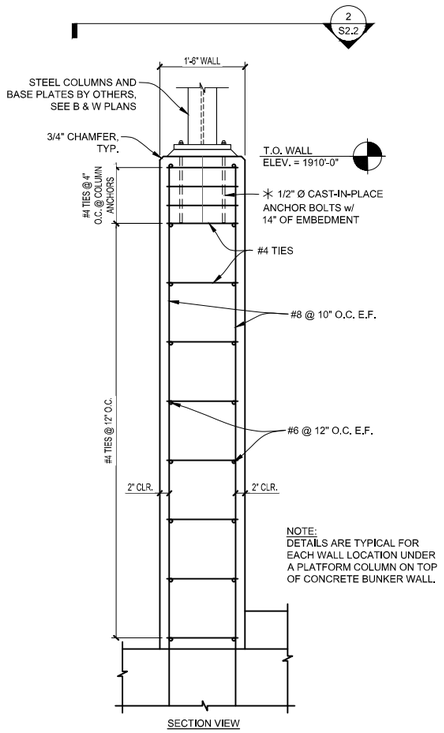
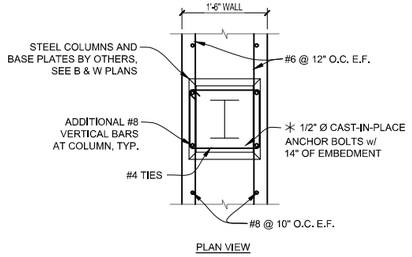
95 PERCENT REVIEW INITIALS / DATE	########
REVISIONS	

S2.1

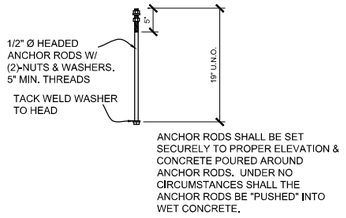


1 BUNKER WALL REINFORCING @ PLATFORM COLUMN
3/4" = 1'-0"



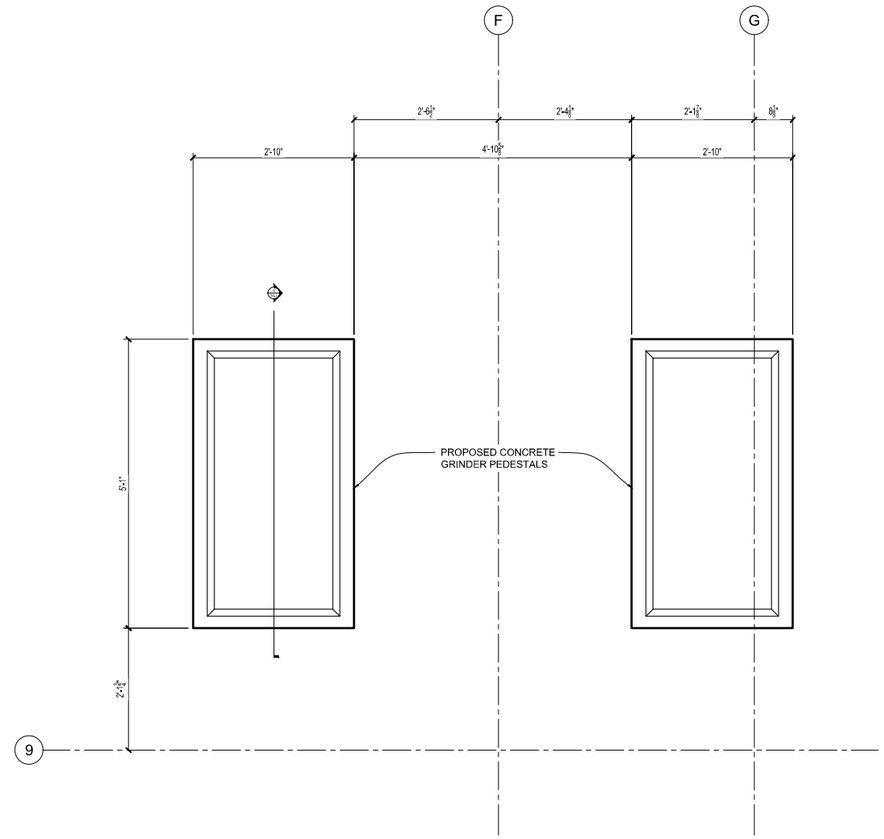
2 BUNKER WALL REINFORCING @ PLATFORM COLUMN
3/4" = 1'-0"

✳ CONTRACTOR SHALL INSTALL THESE CAST-IN-PLACE BOLTS AT TOP OF BUNKER WALL COLUMNS PRIOR TO POURING WALL, TYPICAL.

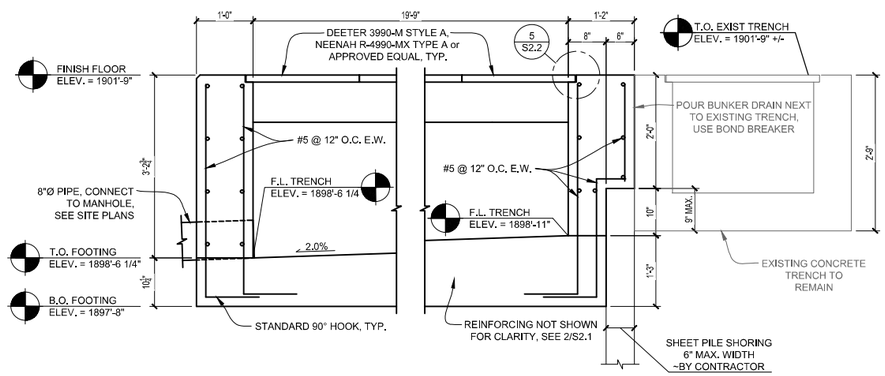


ANCHOR RODS SHALL BE SET SECURELY TO PROPER ELEVATION & CONCRETE POURED AROUND ANCHOR RODS. UNDER NO CIRCUMSTANCES SHALL THE ANCHOR RODS BE "PUSHED" INTO WET CONCRETE.

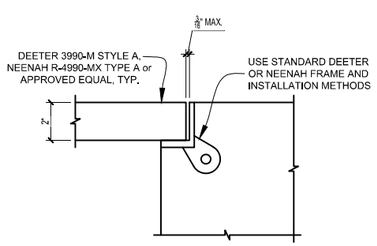
7 ANCHOR BOLT DETAIL
3/4" = 1'-0"



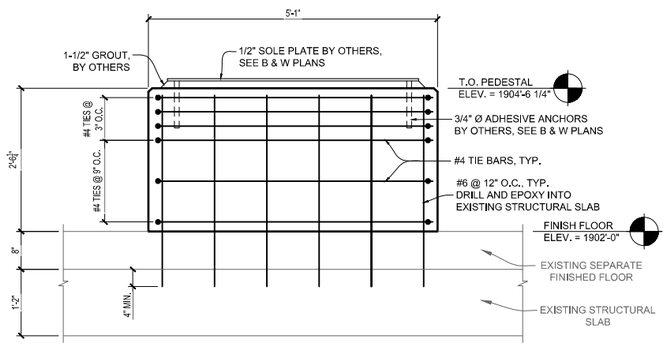
3 GRINDER PLAN VIEW
3/4" = 1'-0"



4 BUNKER DRAIN SECTION
3/4" = 1'-0"



5 BEARING ANGLE DETAIL
3" = 1'-0"



6 GRINDER SECTION
3/4" = 1'-0"

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2023
NORTH
WHELEN ENERGY CENTER UNIT 1
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FOUNDATION DETAILS

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STEVEN W. ARENS
E-14723
11/17/2023
STATE OF NEBRASKA

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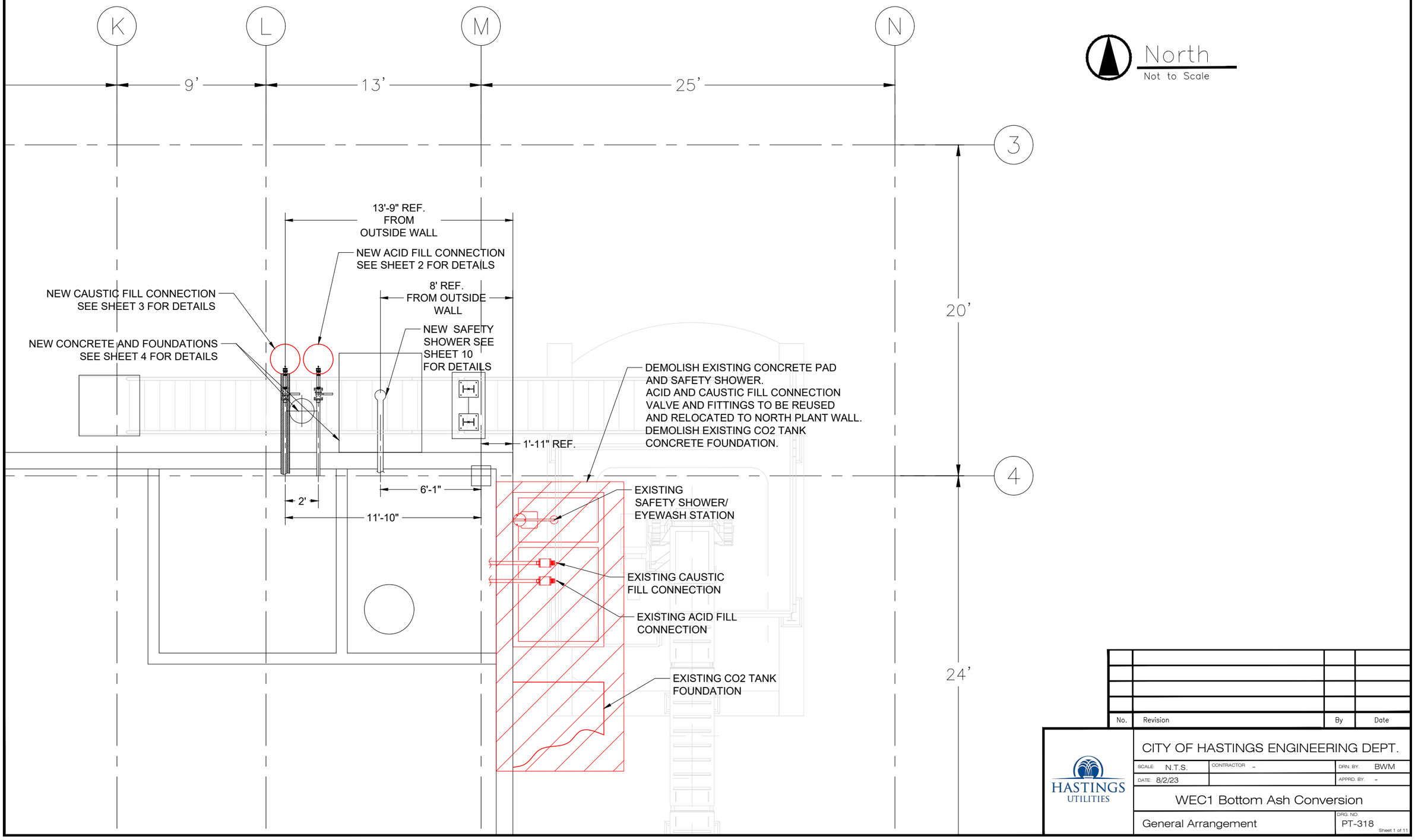
95 PERCENT REVIEW DATE	########
REVISIONS	

S2.2



No.	Revision	By	Date

HASTINGS UTILITIES

CITY OF HASTINGS ENGINEERING DEPT.

SCALE: N.T.S.	CONTRACTOR -	DRN. BY. BWM
DATE: 8/2/23		APPRD. BY. -

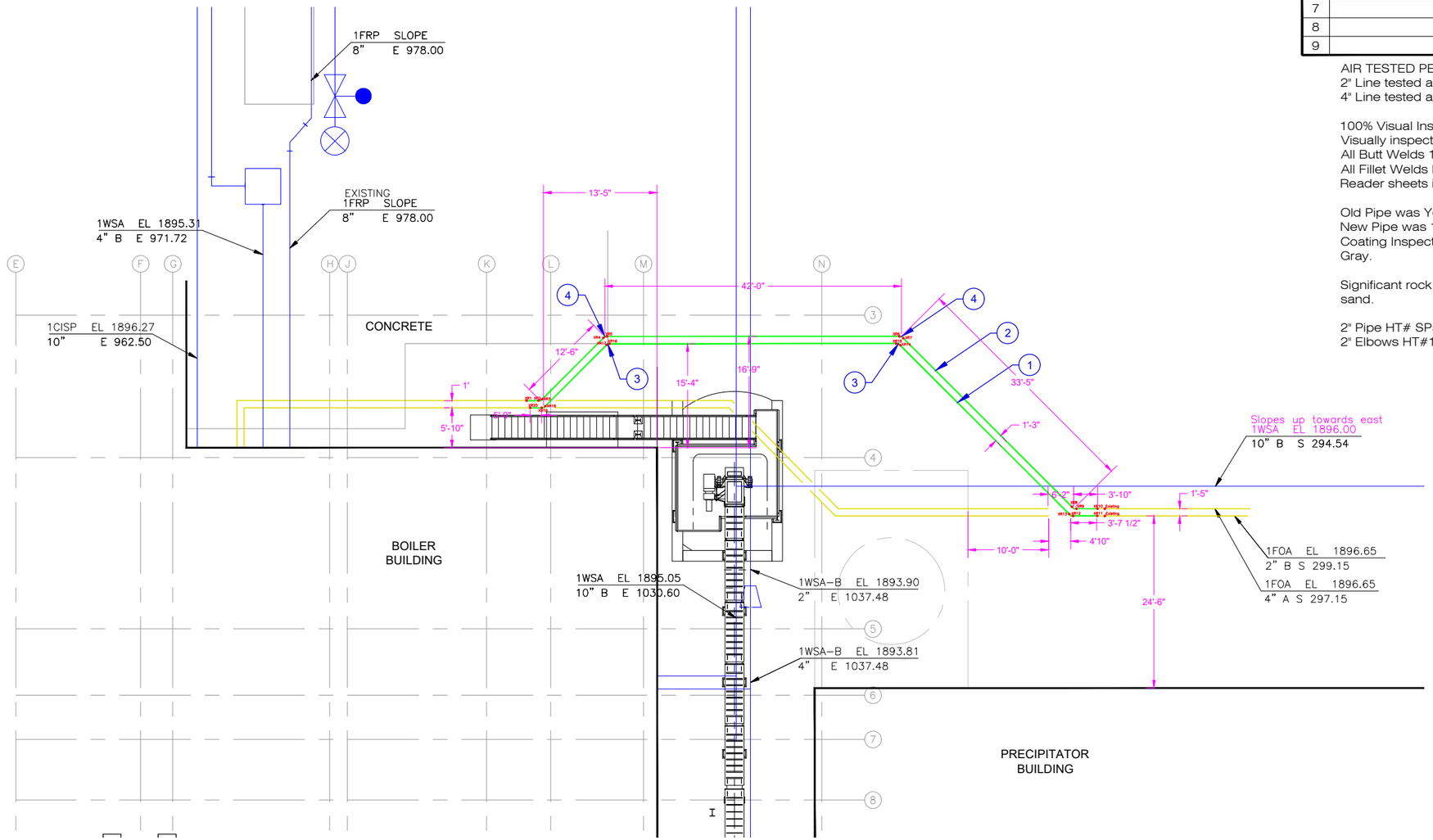
WEC1 Bottom Ash Conversion

General Arrangement

DRG. NO. PT-318

Sheet 1 of 11

North
Not to Scale



LIST OF MATERIALS & CONNECTIONS (THIS SHEET ONLY)

No.	Description	Unit	QTY
1	Pipe, 2", Grade B API 5L-X42, Sch 80, ERW, FBE Coated	LF	126
2	Pipe, 4", Grade B API 5L-X42, Sch 40, ERW, FBE Coated	LF	126
3	Butt Weld Elbow, 2", Long Radius 45°, XH/Sch80,A234	EA	2
4	Butt Weld Elbow, 4", Long Radius 45°, Std Wall, A234	EA	2
5		EA	1
6		EA	2
7		LF	15
8		EA	1
9		EA	1

AIR TESTED PER ASME B31.3 ON 10/31/23
2" Line tested at 92psig 07:10 to 07:23
4" Line tested at 91psig 07:36 to 07:46

100% Visual Inspection and NDT. All Welds TIG welded with ERS-70-S6
Visually inspected by Derek (AWS CWI) and Olson & Associated NDT Level II
All Butt Welds 100% RT
All Fillet Welds Liquid Dye Penetrant (was only on WEC2 Side)
Reader sheets in project file, film in Derek's Office with WEC2 film.

Old Pipe was Yellow Jacket Coating
New Pipe was 14-16 mils of FBE, holiday tested by Derek (Level I NACE Coating Inspector). Welds and holidays coated with OmniPrime and TapeCoat Gray.

Significant rock contaminated backfill materials, so bedded and padded with sand.

2" Pipe HT# SP52508, 4" Pipe HT# G62904
2" Elbows HT#18327202, 4" Elbows HT#A2116

Asbuilt 11-3-2023

NOTES:
1.) COLUMN LINES E-N AND 3-9 PROVIDED FOR REFERENCE. SEE DRAWING A1001.7 FOR FULL PLANT COORDINATE SYSTEM.

No.	Revision	By	Date

HASTINGS UTILITIES

CITY OF HASTINGS ENGINEERING DEPT.

SCALE: N.T.S.	CONTRACTOR: DeWine Mechanical	DRN. BY: DDP
DATE: 11/3/23		APPRD. BY: –

WEC1 FUEL OIL LINE RELOCATION FOR BOTTOM ASH SYSTEM

GENERAL ARRANGEMENT

DRG. NO. PT-321 Sheet 1 of 1