CONTRACT DOCUMENTS FOR THE

6180 SOUTH 3200 WEST SUCTION VAULT UPGRADES

PROJECT #: 4322 NOVEMBER 2023

BID DOCUMENTS & SPECIFICATIONS

OWNER

Jordan Valley Water Conservancy District 8215 South 1300 West West Jordan, Utah (801) 565-4300

ENGINEER

David Evans & Associates 10913 South River Front Parkway, Suite 150 South Jordan, Utah 84095 (385) 955-2850

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NOTICE INVITING BIDS

PROJECT NAME: 6180 South 3200 West Suction Vault Upgrades

DESCRIPTION OF WORK: The work comprises modifications of the valve vault located near 6180 South 3200 West in Taylorsville; Utah; including concrete structure, piping, valves, fittings, connecting pipes into existing system piping, other equipment as identified on the drawings, backfill with CLSM, asphalt road replacement and other surface improvements including curb, gutter and sidewalk; and all other associated work shown on the drawings, restoration of the site and facility to its preconstruction condition, and performing all Work, or other operations required for the fulfillment of the Contract in strict accordance with the Contract Documents.

DISTRICT WEB SITE AND PLANHOLDERS LIST

Prospective bidders must register at the District's web site (<u>www.jvwcd.org</u>) under "Engineering Projects". Prospective bidders are required to check the District's web site for any addenda prior to submitting a responsive bid. The District's web site will be used to publish updated information relative to the project, including a planholders list.

RECEIPT OF BIDS: Sealed bids will be received at the office of the Jordan Valley Water Conservancy District, Owner of the Work, located at 8215 South 1300 West, West Jordan, Utah 84088, until **2:00pm, on Thursday, December 14, 2023**, for construction of the 6180 South 3200 West Suction Vault Upgrades. Electronic bids may also be submitted in adobe .pdf format to <u>ellisad@jvwcd.org</u>. JVWCD requests that electronic bids be submitted 15 minutes prior to the bid opening deadline. A public bid opening will be held at the bid due time. Attendance is not required. Bid results will be posted to the District's website within 24 hours of the bid opening.

OBTAINING CONTRACT DOCUMENTS: The Contract Documents are entitled 6180 South 3200 West Suction Vault Upgrades. All Contract Documents may be obtained online at <u>www.jvwcd.org</u> under "Engineering Projects".

OPENING OF BIDS: The bids will be publicly opened and read at the time and location identified above.

NOTICE INVITING BIDS

SITE OF WORK:

1. 6180 South 3200 West, Taylorsville, Utah

PRE-BID MEETING: A non-mandatory pre-bid meeting will be held at **2:00pm on Thursday, November 30, 2023**, at the Site of Work (6180 South 3200 W). Prospective bidders with questions regarding the project are encouraged to attend to become familiar with the site and to ask any questions regarding the project.

COMPLETION OF WORK: All work shall be completed within 120 calendar days from the date of the Notice to Proceed. Work shall be sequenced and scheduled as listed Section 00001 - Summary of Work.

AWARD OF CONTRACT: An Award of Contract, if it were awarded, will be made within 60 calendar days of the opening of bids.

NOTICE TO PROCEED: A Notice to Proceed, if it were issued, will be made within 60 calendar days of the Notice of Award.

BID SECURITY: Each bid shall be accompanied by a certified or cashier's check, money order or bid bond in the amount of five percent of the total bid price payable to the Jordan Valley Water Conservancy District as a guarantee that the bidder, if its bid is accepted, will promptly execute the contract, provide evidence of worker's compensation insurance, and furnish a satisfactory faithful performance bond in the amount of 100 percent of the total bid price and a payment bond in the amount of 100 percent of the total bid price.

ADDRESS AND MARKING OF BID: The envelope enclosing the bid shall be sealed and addressed to the Jordan Valley Water Conservancy District and delivered or mailed to 8215 South 1300 West, West Jordan, Utah 84088. The envelope shall be plainly marked in the upper left-hand corner with the name and address of the bidder and shall bear the words "Bid for," followed by the title of the Contract Documents for the work and the date and hour of opening of bids. The certified or cashier's check, money order, or bidder's bond shall be enclosed in the same envelope with the bid. Electronic bids shall be submitted to the engineering administrative assistant, <u>ellisad@jvwcd.org</u> as an email attachment with the words "Bid for," followed by the title of the Contract Documents for the work and the date and hour of opening of bids in the subject line of the email.

NOTICE INVITING BIDS

PROJECT ADMINISTRATION: All questions relative to this project prior to the opening of bids shall be directed to the Engineer for the project. It shall be understood, however, that no interpretations of the specifications will be made by telephone, nor will any "or equal" products be considered for approval prior to award of contract.

ENGINEER David Evans and Associates 10913 South River Front Parkway South Jordan, Utah 84095 Telephone: (385) 955-2850 Contact: Alan McKean, PE Email: <u>Alan.McKean@deainc.com</u>

<u>OWNER</u> Jordan Valley Water Conservancy District 8215 South 1300 West West Jordan, Utah 84088 Telephone: (801) 565-4300 Project Manager: Kevin Rubow, PE Email: kevinr@jvwcd.org

OWNER'S RIGHTS RESERVED: The Owner reserves the right to reject any or all bids, to waive any informality in a bid, and to make awards in the interest of the Owner.

JORDAN VALLEY WATER CONSERVANCY DISTRICT

FORM OF BID: The bid shall be made on the bidding schedule(s) bound herein. The bid shall be enclosed in a sealed envelope bearing the name of the bidder and name of the project. In the event there is more than one bidding schedule, the bidder may bid on any individual schedule or on any combination of schedules.

DELIVERY OF BID: The bid shall be delivered by the time and to the place stipulated in the Notice Inviting Bids. It is the bidder's sole responsibility to see that his bid is received at the proper time.

WITHDRAWAL OF BIDS: Bids shall be unconditionally accepted without alteration or correction, excepting that bidder may by means of written request, signed by the bidder or his properly authorized representative withdraw his bid. Such written request must be delivered to the place stipulated in the Notice Inviting Bids for receipt of bids prior to the scheduled closing time for receipt of bids.

OPENING OF BIDS: The bids will be publicly opened and read at the time and place stipulated in the Notice Inviting Bids.

MODIFICATIONS AND ALTERNATIVE BIDS: Unauthorized conditions, limitations, or provisions attached to a bid may render it non-responsive and may cause its rejection. The completed bid forms shall be without interlineations, alterations, or erasures. Alternative bids will not be considered unless called for. Oral, telegraphic, or telephonic bids or modifications will not be considered.

DISCREPANCIES IN BIDS: In the event there is more than one bid item in a bidding schedule, the bidder shall furnish a price for all bid items in the schedule; failure to do so may render the bid non-responsive and subject to rejection. In the event there are unit price bid items in a bidding schedule and the "amount" indicated for a unit price bid item does not equal the product of the unit price and quantity, the unit price shall govern and the "amount" will be corrected accordingly, and the Contractor shall be bound by said Correction. In the event there is more than one bid item in a bidding schedule and the total indicated for the schedule does not agree with the sum of the prices bid on the individual items, the prices bid on the individual items shall govern and the total for the schedule will be corrected accordingly, and the Contractor shall be bound by said items, the prices bid on the individual items shall govern and the total for the schedule will be corrected accordingly, and the Contractor shall be bound by said correction.

BID SECURITY: Each bid shall be accompanied by a certified or cashier's check or approved bid bond in the amount stated in the Notice Inviting Bids. Said check or bond shall be made payable to the Owner and shall be given as a guarantee that the bidder, if awarded the work, will enter into a contract within 10 calendar days after receipt of the contract from the Owner, and will furnish the necessary insurance certificates, Payment Bond, and Performance Bond; each of said bonds to be in the amount stated in the Notice Inviting Bids. In case the apparent low bidder refuses or fails to enter into such contract or fails to provide the required insurance and insurance certificates, the check or bid bond, as the case may be, shall be forfeited to the Owner. If the bidder elects to furnish a bid bond as his bid guarantee, he shall use the bid bond bound herein, or one conforming substantially to it in form.

BIDDER'S EXAMINATION OF CONTRACT DOCUMENTS AND SITE

It is the responsibility of each Bidder before submitting a Bid to:

- 1. Examine Contract Documents thoroughly.
- 2. Visit the site to become familiar with local conditions that may affect cost, progress, performance, or furnishing of the work.
- 3. Consider federal, state and local laws and regulations that may affect cost, progress, and performance of furnishing of the work.
- 4. Study and carefully correlate the Bidder's observations with the Contract Documents.
- 5. Notify the Engineer of all conflicts, errors, or discrepancies in the Contract Documents.

Reference is made to the Supplemental General Conditions for identification of:

- 1. Those reports of exploration and tests of subsurface conditions at the site, which have been utilized by the Engineer in the preparation of the Contract Documents.
- 2. Those drawings of physical conditions in or relating to existing surface and subsurface conditions (except underground utilities as defined in Article 1 of the General Conditions) which are at or contiguous to the site and which were utilized by the Engineer in the preparation of the Contract Documents. Copies of such reports and drawings are available for inspection at the office of the Owner.

Information and data reflected in the Contract Documents with respect to underground facilities at/or contiguous to the site are based upon information and data furnished to the Owner and the Engineer by the owners of such underground facilities or others, and the Owner does not assume any responsibility for the accuracy or completeness thereof including any damages whatsoever that may be incurred by the Bidder or the Contractor through his reliance thereon unless it is expressly provided otherwise in the Supplemental General Conditions and/or the Technical Specifications.

Before submitting a bid, the bidder shall conduct such examination, investigations, studies and tests as are necessary to satisfy himself as to: the nature and location of the physical conditions (surface, subsurface and underground facilities), the general and local conditions particularly those bearing upon transportation, disposal, handling and storage of materials, availability of labor, availability of utilities, local weather conditions, the character of equipment and facilities required preliminary to and during the prosecution of the work; any and all other conditions that may in any way affect the cost, progress, performance or furnishing of materials in accordance with the Contract Documents. All such examination, investigation, studies, tests and the like shall be at the Bidder's expense.

Upon reasonable request in advance, the Owner shall provide each Bidder access to the site to conduct such explorations, examination, investigation and tests as each Bidder may determine necessary for the submission of a Bid. The Bidder shall fill all holes, clean and restore the site to its former condition upon the completion of such activities.

The submission of a bid hereunder shall be considered prima facie evidence that the Bidder has made such examination as is set forth in the above paragraph and is knowledgeable as to the location and site conditions surrounding the work and the conditions to be encountered in performing the work and as to the requirements, conditions and terms of the Contract and Contract Documents.

The Owner assumes no responsibility for any understanding or representations made by any of its officers or agents during or prior to the execution of this Contract, for information contained in any reports, subsurface studies, or other information which may be made available for the Contractor's information and which are not included as Contract Documents, for any understanding or representations by the Owner or by others which are not expressly stated in the Contract Documents which liability is not expressly assumed by the Owner or its representatives or Engineer in the Contract Documents. Such information shall be deemed to be for the information of the Contractor and the Contractor shall have the obligation of evaluating any such information as to its accuracy and effect the Owner will not be liable or responsible for any such information or any conclusions that may be drawn there from by the Contractor.

The lands upon which the work is to be performed, right-of-ways and easements for access thereto together with other lands designated for use by the Contractor in performing the work are identified in the Contract Documents. All additional lands and access thereto that are required for temporary construction facilities or storage of materials and equipment are to be provided by the Contractor. Easements for permanent structures or permanent changes in existing structures are to be obtained and paid for by the Owner unless

otherwise provided in the Contract Documents.

The submission of a Bid shall constitute an incontrovertible representation by the Bidder that the Bidder has complied with every requirement of this Article, and that without exception the Bid is premised upon performing and furnishing the work required by the Contract Documents in compliance with such means, methods, techniques, sequences, or procedures of construction as may be indicated in or required by the Contract Documents; and that such means, methods, techniques, sequences or procedures described in the Contract Documents are sufficient in scope and detail to indicate and convey understanding of all terms and conditions for performance and furnishing the work.

QUANTITIES OF WORK

The quantities of work or material stated in the Bid Schedule are supplied only to give an indication of the general scope of the work; the Owner does not expressly or by implication agree that the actual amount of work or material will correspond therewith. The Owner reserves the right after award of the Contract to increase or decrease the quantities of any unit price item of the work by an amount up to and including 25 percent of the quantity of any bid item, or to omit portions of such work as may be deemed necessary or expedient by the Engineer or Owner, without a change in the unit price. Such right to revise and omit shall include the right to delete any bid item in its entirety, or to add additional bid items in quantities up to and including an aggregate total amount not to exceed 25 percent of the total amount of the Contract.

The Bidders nor the ultimate Contractor on the Project shall at any time after the submittal of a bid make or have any claim for damages or anticipated profits or loss of profit or otherwise because of any difference between the quantities of work actually done and material furnished and those stated in said unit price items of the Bid.

COMPETENCY OF BIDDERS: In selecting the lowest responsible Bidder, consideration will be given to the general competency of the Bidder for the performance of the work covered by the Bid. To this end, each bid shall be supported by a statement of the bidder's experience as of recent date on the form entitled "Information Required of Bidder," bound herein. No bid for the work will be accepted from a contractor who does not hold an active Contractor's license in good standing applicable to the type of work bid upon at the time of opening bids.

After an award of the contract no substitution of the Project Manager or Project Superintendent will be allowed without the written approval by the Owner.

DISQUALIFICATION OF BIDDERS: More than one bid from an individual, firm partnership, corporation, or association under the same or different names will not be considered. Reasonable grounds for believing that any bidder is interested in more than one bid for the work contemplated will cause the rejection of all bids in which such bidder is interested. If there is reason for believing that collusion exists among the bidders, all bids will be rejected.

RETURN OF BID GUARANTEE: Within 10 calendar days after award of the contract, the Owner will return the bid guarantees accompanying such of the bids as are not considered in making the award. All other bid guarantees will be held until a Notice to Proceed has been issued and accepted. They will then be returned to the respective bidders whose bids they accompany.

AWARD OF CONTRACT: Award of the Contract, if it be awarded, will be based primarily on the lowest overall cost to the Owner, and will be made to a responsive and responsible bidder whose bid complies with all the requirements prescribed. Any such award will be made by written notice and within 60 calendar days after opening of the bids, unless a different waiting period is expressly allowed in the Notice Inviting Bids. Unless otherwise indicated, an award will not be made for less than all the bid items in an individual bidding schedule. In the event the entire work is contained in more than one bidding schedule, the Owner may award schedules individually or in combination. In the case of two bidding schedules which are alternate to each other, only one of such alternate schedules will be awarded.

EXECUTION OF CONTRACT: The Bidder to whom the award is made shall secure all insurance and shall furnish all certificates and bonds required by the specifications within ten calendar days after receipt of the Notice of Award from the Owner. The Bidder to whom the award is made shall execute a written contract with the Owner on the form of agreement provided within ten calendar days after receipt of the Agreement from the Owner. Failure or refusal to enter into a contract as herein provided or to conform to any of the stipulated requirements in connection therewith shall be just cause for annulment of the award and forfeiture of the bid guarantee. If the successful bidder refuses or fails to execute the contract, the Owner may award the contract to the second lowest responsible bidder refuses or fails to execute the contract, the Owner may award the contract, the Owner may award the contract to the third lowest responsible bidder. On the failure or refusal of such second or third lowest bidder to execute the contract, each such bidder's guarantees shall be likewise forfeited to the Owner.

ISSUANCE OF NOTICE TO PROCEED: The Owner intends to execute the Agreement and issue the Notice to Proceed specifying the Project start date within ten calendar days after its receipt of the executed Agreement, Purchase Order Assignment(s), (if applicable), bonds and insurance certificates from the successful bidder. If the Contract Time is expressed as a specific completion date in the Notice Inviting Bids and paragraph 3.1 of the Agreement rather than a specific number of successive days following the start date identified in the Notice to Proceed, then any delay by the Owner beyond the ten days in issuing the Notice to Proceed shall extend the completion date by the number of days of the delay.

LICENSES: Contractor must be licensed as a business qualified to do business within the state of Utah prior to issuance of a Notice of Award. Contractor must hold a current contractor's license with classifications appropriate to the work being contracted.

The undersigned Bidder hereby proposes to furnish all plant machinery, labor, services, materials, equipment, tools, supplies, transportation, utilities, and all other items and facilities necessary to perform all work required under the Bidding Schedule of the Owner's Contract Documents entitled "6180 South 3200 West Suction Vault Upgrades" drawings and all addenda issued by said Owner prior to opening of the bids.

Addenda are only delivered by e-mail and through the internet.

The undersigned bidder acknowledges receipt of the following addenda:

No.	Date Received	No.	Date Received

Bidder agrees that, within 10 calendar days after receipt of Notice of Award from Owner, he will execute the Agreement in the required form, of which the Notice Inviting Bids, Instructions to Bidders, Bid, Information Required of Bidder, Technical Specifications, Drawings, and all addenda issued by Owner prior to the opening of bids, are a part, and will secure the required insurance and bonds and furnish the required insurance certificates; and that upon failure to do so within said time, then the bid guarantee furnished by Bidder shall be forfeited to Owner as liquidated damages for such failure; provided, that if Bidder shall execute the Agreement, secure the required insurance and bonds, and furnish the required insurance certificates within said time, his check, if furnished, shall be returned to him within five days thereafter, and the bid bond, if furnished, shall become void. It is further understood that this bid may not be withdrawn for a period of 45 days after the date set for the opening thereof, unless otherwise required by law.

Dated:	Bidder:	
	By:	
		(Signature)
	Title:	

Bidder further agrees to complete all work required within the time stipulated in the Contract Documents, and to accept in full payment therefore the price(s) named in the abovementioned Bidding Schedule(s).

ltem No.	Description	Unit	Oty	Amount
1	Mobilization/Demobilization & Permits	Lump Sum	1	\$
2	Temporary Fencing	Lump Sum	1	\$
3	Traffic Control/Temporary Markings	Lump Sum	1	\$
4	Testing Agency Services	Lump Sum	1	\$
5	Demolition & Hauling	Lump Sum	1	\$
6	New Vault Piping & Appurtenances	Lump Sum	1	\$
7	New Vault Lid Fabrication & Installation	Lump Sum	1	\$
8	Restoration/Striping	Lump Sum	1	\$
	Bid Schedule Total:			\$

Bid Schedule: 6180 South 3200 West Suction Vault Upgrades

Total Project Bid Price including all system features shown or specified to make all project components complete and operable for the 6180 South 3200 West Suction Vault Upgrades Project in words:

_____Dollars
and _____Cents.
Bidder (Company name): ______Cents.
By: ______Dated: ______
Name: ______Title: _____

ATTACHMENTS TO THIS BID

The following documents are attached to and made a condition of this Bid:

- 1. Required Bid security in the form of Bid Bond.
- 2. Information Required of Bidder.

BID BOND

KNOW ALL MEN BY THESE PRESENTS,

That

as Principal, and

as Surety, are held and firmly bound unto the Jordan Valley Water Conservancy District (hereinafter called "Owner") in the sum of ______

dollars, (not less than five percent of the total amount of the bid) for the payment of which sum, will and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

WHEREAS, Principal has submitted a bid to Owner to perform all work required under the bidding Schedule of the Owner's Contract Documents entitled "6180 South 3200 West Suction Vault Upgrades", (hereafter called the "Project").

NOW THEREFORE, if Principal is awarded Contract by Owner for the Construction of the Project and, within the time and in the manner required under the heading "Instructions to Bidders" enters into the written contract entitled "Agreement" bound with said Contract Documents, furnishes the required certificates of insurance, and furnishes the required Performance Bond and Payment Bond within 10 calendar days after receipt of such contract from Owner, then this obligation shall be null and void, otherwise it shall remain in full force and effect. In the event suit is brought upon this bond by Owner and judgment is recovered, Surety shall pay all costs incurred by Owner in such suit, including a reasonable attorney's fee to be fixed by the court.

SIGNED AND SEALED, this ____day of _____, 20___.

Ву:		Ву:	
lts:		lts:	
	(SEAL)		(SEAL)

The Bidder shall furnish the following information. Failure to comply with this requirement may render the Bid non-responsive and subject to rejection. Additional sheets shall be attached as required.

1.	Contractor's name:
2.	Contractor's address:
	Contractor's Primary Contact:
	Email address of Contractor's primary contact:
	Contractor's telephone number:
3.	Contractor must be qualified and licensed to do business in Utah. Utah Department of Commerce Information Business Entity Number: Delinquent Date:
4.	Contractor must hold a current contractor's license, classification E100. Contractor's Utah License Number: Expiration Date: Primary Classification: Supplemental Classification held, if any:
5.	Key Personnel Qualifications and Experience
	List key personnel here and provide detailed information in Attachments A and B. More than one Project Manager and/or Project Superintendent may be proposed. Only personnel approved by the Owner will be allowed in the key positions.
	Project Manager A: Project Manager (Alternate 1): Project Manager (Alternate 2):
	Project Manager shall have successfully completed:
	 At least five (5) years construction experience.

- Two (2) projects that included underground utility vault work with pressurized pipelines.
- One (1) project that included pipeline construction within the

public right-of-way which included traffic control.

Project Superintendent A:	
Project Superintendent (Alternate 1):	
Project Superintendent (Alternate 2):	

Project Superintendent shall have successfully completed:

- At least five (5) years construction experience.
- Two (2) projects that included underground utility vault work and pressurized welded steel pipe with a diameter of at least 12-inches.
- One (1) project that included pipeline construction within the public right-of-way which included traffic control.

6. **Previous Contractor Project Experience**

Past project experience shall be provided for each requirement. The Owner shall be entitled to contact each and every reference listed by the contractor. The Contractor, by submitting a bid, expressly agrees that any information concerning the CONTRACTORS in possession of said entities and references may be made available to the owner.

Provide the information identified in Attachment C for each project which meets the minimum requirements listed below:

Requirements:

Contracting firm shall have successfully completed:

- Three (3) projects that included 12-inch diameter pressurized pipeline or larger with underground utility vault work.
- Two (2) of the projects shall have included welded steel pipeline construction.
- One (1) project that included pipeline construction within the public right-of-way which included traffic control.

Note: One project may satisfy multiple requirements.

7.	Name and title of officers of Contractor's firm:
8.	Name of person who inspected site of proposed work for your firm:
Name	e:
Date	of Inspection:
9.	Surety company who will provide the required bonds on this contract:
	Agent's Name:
	Telephone:
10.	Workers Compensation Insurance Policy #:

ATTACHMENT A (Copy as necessary – provide experience that meets the requirements listed above)

Project Manager Data Sheet

Name:		
Years experienced as Project Manager:		
Years of prior experience:	Positions:	
Qualifying Project #1 (Pressurized pip Project Summary:	eline with utility vault work):	
Year Completed:		
Total Cost:		
Owner:		
Owner Contact Person:	Telephone:	
Project Summary:		
Vear Completed:		
Total Cost:		
Owner:		· · · · · · · · · · · · · · · · · · ·
Owner Contact Person:	Telephone:	
Qualifying Project #3 (ROW):		
Project Summary:		
Year Completed:		
Total Cost:		
Owner:		
Owner Contact Person:	Telephone:	

ATTACHMENT B (Copy as necessary – provide experience that meets the requirements listed above)

Superintendent Data Sheet

Name:	
Years experienced as Superintendent:	
Years of prior experience:	Positions:
Qualifying Project #1 (WSP with utility vau Project Summary:	lt work):
Year Completed:	
Total Cost:	
Owner:	
Owner Contact Person:	Telephone:
Qualifying Project #2 (WSP with utility vau Project Summary:	lt work):
Year Completed:	
Total Cost:	
Owner:	
Owner Contact Person:	Telephone:
Qualifying Project #3 (ROW):	
Project Summary:	
Year Completed:	
Total Cost:	
Owner:	
Owner Contact Person:	Telephone:

ATTACHMENT C (Provide experience that meets the requirements listed above)

Contracting Firm Data Sheet

Name:		
Qualifying Project #1 (pressurized pip	eline with utility vault):	
Project Summary:		
Year Completed:		•••••••
Total Cost:		
Owner:		
Owner Contact Person:	Telephone:	
Qualifying Project #2 (WSP with utility	vault work):	
Project Summary:		
Year Completed		
Total Cost		
Owner:		
Owner Contact Person:	Telephone:	
Qualifying Project #3 (WSP with utility	vault work):	
Project Summary:		
Year Completed:		
Total Cost:		
Owner:		
Owner Contact Person:	Telephone:	
Qualifying Project #4 (ROW):		
Project Summary:		
Year Completed:		
Total Cost:		
Owner:		
Owner Contact Person:	Telephone:	

AGREEMENT

An Agreement made as of the _____ day of _____, 20___, by and between the Jordan Valley Water Conservancy District, a Utah special district ("OWNER"), and ______, a _____ corporation qualified to do business and doing business in the State of Utah ("CONTRACTOR").

TERMS:

OWNER and CONTRACTOR, in consideration of the mutual covenants hereinafter set forth, agree as follows:

ARTICLE I WORK

CONTRACTOR shall complete all Work as specified or indicated in the Contract Documents for the ______. The Work is generally described as follows:

Furnishing all labor, services, materials, equipment, and supplies except for such materials, equipment, and services as may be stipulated in the Contract Documents to be furnished by the OWNER; furnishing and removing all plant machinery, temporary structures, tools, supplies, transportation, utilities, and all other items, facilities and equipment, and to do everything required by this Agreement and the Contract Documents; accepting all responsibility for and paying for all loss and damage arising out of the nature of the Work aforesaid, or from the action of the elements, or from any unforeseen difficulties which may arise during the prosecution of the Work until its acceptance by OWNER, and for all risks of every description connected with the Work; also for all expenses resulting from the suspension or discontinuance of work, except as in the Contract Documents are expressly stipulated to be borne by OWNER.

ARTICLE II ENGINEER

The Project has been designed by the OWNER. The OWNER will assume all duties and responsibilities and have the rights and authority assigned to ENGINEER in the Contract Documents in connection with completion of the Work in accordance with the Contract Documents.

[ALTERNATE PARAGRAPH] The Project has been designed by _____, a _____ corporation qualified to do business and doing business in the State of Utah, who is hereinafter called "ENGINEER" and who is to act as OWNER's representative, assume all duties and responsibilities and have the rights and

CONSTRUCTION.DOC

authority assigned to ENGINEER in the Contract Documents in connection with completion of the Work in accordance with the Contract Documents.

ARTICLE III CONTRACT TIME

- 3.1 The Work shall be complete, in accordance with paragraphs 14.08 and 14.09 of the General Conditions, on or before _____.
- 3.2 Liquidated Damages: OWNER and CONTRACTOR recognize that time is of the essence of this Agreement and that the OWNER will suffer financial loss if the Work is not completed within the time specified in paragraph 3.1 above, plus any extensions thereof allowed in accordance with Article 12 of the General Conditions. They also recognize the delays, expense and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by OWNER if the Work is not completed on time. Accordingly, instead of requiring any proof of loss, OWNER and CONTRACTOR agree that as liquidated damages for delay (but not as a penalty) CONTRACTOR shall pay OWNER the amount specified in Article 14.07 of the General Conditions and in Article 18.01 of the Supplementary General Conditions for each day that expires after the time specified in paragraph 3.1 for final completion until the Work is substantially complete. And, after Substantial Completion if CONTRACTOR neglects, refuses or fails to complete the remaining Work within forty-five (45) days or any proper extension thereof granted by OWNER, CONTRACTOR shall pay OWNER the amount specified in Article 14.07 of the General Conditions and in Article 18.01 of the Supplemental General Conditions for each day that expires after the forty-five (45) days until readiness for final payment.

ARTICLE IV CONTRACT PRICE

All payments to Contractor shall be made in accordance with the Contract Documents. OWNER shall pay CONTRACTOR for completion of the Work in accordance with the Contract Documents in current funds those prices stated in the approved Bid Schedule as named in the Notice of Award.

ARTICLE V PAYMENT PROCEDURES

CONTRACTOR shall submit Applications for Payment in accordance with Article 14 of the General Conditions. Applications for Payment will be processed by ENGINEER as provided in the General Conditions.

5.1 <u>Progress Payments</u>: OWNER shall make progress payments on account of the Contract Price on the basis of CONTRACTOR's Applications for Payment

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as recommended by ENGINEER, on a monthly basis. All progress payments will be on the basis of the progress of the Work measured by the schedule of values established in the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no schedule of values, as provided in the General Conditions.

5.2 <u>Final Payment</u>: Upon final completion and acceptance of the Work in accordance with Article 14 of the General Conditions, OWNER shall pay the remainder of the Contract Price as recommended by ENGINEER as provided in Article 14.

ARTICLE VI INTEREST

All moneys not paid when due as provided in Article 14 of the General Conditions shall bear interest at the rate of twelve percent (12%) per annum.

ARTICLE VII CONTRACTOR'S REPRESENTATION

In order to induce OWNER to enter into the Agreement, CONTRACTOR makes the following representations:

- 7.1 CONTRACTOR has familiarized itself with the nature and extent of the Contract Documents, Work, site, locality, and all local conditions and Laws and Regulations that in any manner may affect cost, progress, performance or furnishing of the Work.
- 7.2 CONTRACTOR has studied carefully all exploration reports and test of subsurface conditions and drawings of physical conditions which are identified in the Supplementary General Conditions, as provided in paragraph 4.02 of the General Conditions, and accepts the Technical Data contained in such reports and drawings upon which CONTRACTOR is entitled to rely.
- 7.3 CONTRACTOR has obtained and carefully studied (or assumes responsibility for obtaining and carefully studying) all such examinations, investigations, explorations, tests, reports and studies (in addition to or to supplement those referred to in paragraph 7.2 above) which pertain to the subsurface or physical conditions at or contiguous to the site or otherwise may affect the cost, progress, performance or furnishing of the Work as CONTRACTOR considers necessary for the performance or furnishing of the Work at the Contract Price, within the Contract Time and in accordance with the other terms and conditions of the Contract Documents, including specifically the provisions of paragraph 4.02 of the General Conditions; and no additional examinations, investigations, explorations, tests, reports,

studies or similar information or data are or will be required by CONTRACTOR for such purposes.

- 7.4 CONTRACTOR has reviewed and checked all information and data shown or indicated on the Contract Documents with respect to existing Underground Facilities at or contiguous to the site and assumes responsibility for the accurate location of said Underground Facilities.
- 7.5 CONTRACTOR has correlated the results of all observations, examinations, investigations, explorations, tests, reports and studies with the terms and conditions of the Contract Documents.
- 7.6 CONTRACTOR has given ENGINEER written notice of all conflicts, errors or discrepancies that he had discovered in the Contract Documents and the written resolution thereof by ENGINEER is acceptable to CONTRACTOR.

ARTICLE VIII CONTRACT DOCUMENTS

The Contract Documents for the ______, which comprise the entire agreement between OWNER and CONTRACTOR concerning the Work, consist of the following:

- 8.1 This Agreement;
- 8.2 Performance and Payment Bonds;
- 8.3 Notice of Award;
- 8.4 Notice to Proceed;
- 8.5 General Conditions;
- 8.6 Supplemental General Conditions;
- 8.7 Notice Inviting Bids;
- 8.8 Instructions to Bidders;
- 8.9 Information Required of Bidder;
- 8.10 Technical Specifications;
- 8.11 Drawings Sheets Number One through _____;
- 8.12 Addendum Number One through _____; and,
- 8.13 CONTRACTOR's Bid, including all schedules and explanatory attachments; attached as Exhibit A.

The CONTRACTOR (1) acknowledges that he has received a copy of each document, specified above, (2) acknowledges that he has read and understands each document specified above and (3) agrees to every term, condition and contract obligation set forth in each document specified above.

There are no Contract Documents other than those listed above in this Article 8. The Contract Documents may only be amended, modified or supplemented as provided in paragraphs 3.03 of the General Conditions.

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ARTICLE IX FEDERAL REQUIREMENTS

The CONTRACTOR shall comply with federal regulations as stated in the Supplemental General Conditions, Article 21.

ARTICLE X MISCELLANEOUS

- 10.1 Terms used in this Agreement which are defined in Article 1 of the General Conditions will have the meanings indicated in the General Conditions.
- 10.2 No assignment by a party hereto of any rights under or interests in the Contract Documents will be binding on another party hereto without the written consent of the party sought to be bound; and specifically but without limitation, moneys that may become due and moneys that are due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents.
- 10.3 In the event any legal action or other proceeding is brought for the enforcement of this Agreement and/or the Contract Documents, or for damages, because of an alleged dispute, breach, default or misrepresentation in connection with any of the provisions thereof, the successful or prevailing party shall be entitled to recover reasonable attorneys' fees and other costs incurred in the action or proceeding, in addition to any other relief to which it may be entitled.
- 10.4 Any notice to be given hereunder shall be deemed given when sent by registered or certified mail, postage prepaid to the parties at their respective addresses stated below or at any other address when notice of such change of address has been given as provided in this Article 10.4.

[SIGNATURE PAGE FOLLOWS]

"OWNER":

By:

Jordan Valley Water Conservancy District 8215 South 1300 West West Jordan, Utah 84088

Utah License No	_
Ву:	

"CONTRACTOR":

Alan E. Packard Its General Manager/CEO

Its: _____

EXHIBIT A

CONTRACTOR'S BID

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PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS,

That ______, as Contractor, and ______as Surety, are held firmly bound unto the Jordan Valley Water Conservancy District hereinafter called "Owner," in the sum of \$______for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

WHEREAS, Contractor has been awarded and is about to enter into the annexed Agreement with Owner to perform all work required under the Bidding Schedule(s) of the Owner's Contract Documents entitled "6180 South 3200 West Suction Vault Upgrades".

NOW THEREFORE, if Contractor shall perform all the requirements of the Agreement required to be performed on his part, at the times and in the manner specified therein, then this obligation shall be null and void, otherwise it shall remain in full force and effect.

PROVIDED, that any alterations in the work to be done or the materials to be furnished, or changes in the time of completion, which may be made pursuant to the terms of the Agreement, shall not in any way release Contractor or Surety thereunder, nor shall any extensions of the time granted under the provisions of the Agreement release either the Contractor or Surety, and notice of such alterations or extensions of the work, materials or time to complete made under the Agreement is hereby waived by Surety. This Bond is furnished in compliance and in accordance with 14-1-18, Utah Code Ann., as amended, and 63-56-38 Utah Code Ann., as amended.

SIGNED AND SEALED, this	day of	, 20	
By:	By:		
Its:	Its:		
(SEAL)		(SEAL)	

(SEAL AND NOTARIAL ACKNOWLEDGMENT OF SURETY)

PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS,

That ______as Contractor, and _____as Surety, are held firmly bound unto the Jordan Valley Water Conservancy District hereinafter called "Owner," in the sum of \$______for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

WHEREAS, Contractor has been awarded and is about to enter into the annexed Agreement with Owner to perform all work required under the Bidding Schedule(s) of the Owner's Contract Documents entitled, "6180 South 3200 West Suction Vault Upgrades".

NOW THEREFORE, if said Contractor, or subcontractor, fails to pay for any materials, equipment, or other supplies, or for rental of same, used in connection with the performance of work contracted to be done, or for amounts due under applicable State law for any work or labor thereon, said Surety will pay for the same in an amount not exceeding the sum specified above, and, in the event suit is brought upon this bond, a reasonable attorney's fee to be fixed by the court. This bond shall inure to the benefit of any persons, companies, or corporations entitled to file claims under applicable State law.

PROVIDED, that any alterations in the work to be done or the materials to be furnished, or changes in the time of completion, which may be made pursuant to the terms of the Agreement, shall not in any way release Contractor or Surety thereunder, nor shall any extensions of time granted under the provisions of said contract release either Contractor or the Surety, and notice of such alterations or extensions of the work, materials or time to complete made under the Agreement is hereby waived by Surety. This bond is furnished in compliance and in accordance with 14-1-18 and 19 Utah Code Ann., as amended, and 63-56-38 Utah Code Ann., as amended.

SIGNED AND SEALED, this	day of, 20	
Ву:	Ву:	
Its:	Its:	
(SEAL)	(SEAL)	
(SEAL AND NOTAR	IAL ACKNOWLEDGMENT OF SURETY)	

NOTICE OF AWARD

To:

Re: 6180 South 3200 West Suction Vault Upgrades

You are hereby notified that the OWNER has accepted your bid for the above referenced project in the amount of <u>\$</u>____.

Furnish the required Contractor's Performance Bond, Payment Bond and Certificates of Insurance within ten calendar days from the date of this notice to you. An acknowledged copy of this Notice of Award, together with all future correspondence regarding this project, shall be sent to the District's Project Manager: <u>Kevin Rubow.</u>

When the Agreement is provided, sign and return it within ten calendar days from receipt of the agreement.

Dated this _____ day of _____, 20____.

Shane Swensen, PE Engineering Department Manager & Chief Engineer

ACCEPTANCE OF NOTICE

Receipt of the above Notice of Award is hereby acknowledged by:

This	_day of,	20
Signature:		
Printed Name:		
Title:		

NOTICE TO PROCEED

To:

Re: 6180 South 3200 West Suction Vault Upgrades

You are hereby notified to commence work in accordance with the Agreement dated _____, and you are to complete the work within ____ calendar days.

An acknowledged copy of this Notice to Proceed should be returned to the Owner, Attention: Kevin Rubow, Staff Engineer.

Dated this _____ day of _____.

Shane K. Swensen, P.E. Engineering Department Manager & Chief Engineer

ACCEPTANCE OF NOTICE

Receipt of the above Notice to Proceed is hereby acknowledged by:

This	dav of	. 20
	aay er	,

Signature:_____

Printed Name:_____

Title: _____

PAYN	IENT APPLICATION AND CERTIFICATE No	DATE:
		SHEETOF
PERIC	DD FROM TO,	20
PROJ	ECT: 6180 South 3200 West Suction Vault Upgrades	
JVWC	D PROJECT NO.: 4322	
CONT	RACTOR:	
ADDR	ESS:	
ENGI	NEER:	
1.	ORIGINAL CONTRACT PRICE:	\$
2.	NET CHANGE ORDERS APPROVED TO DATE: (Attach Summary Sheet)	\$
3.	REVISED CONTRACT AMOUNT:	\$
4.	TOTAL VALUE OF WORK COMPLETED TO DATE (Attached Payment Breakdown)	\$
5.	PERCENT PROJECT COMPLETE:	%
6.	LESS AMOUNT RETAINED (5%)	\$
7.	MATERIALS ON HAND (95% of Value, Listing Attached)	\$
8.	SUBTOTAL (Sum of Lines 4, Line 6 and Line 7)	\$
9.	LESS PREVIOUS PAYMENTS	\$
10.	CURRENT PAYMENT DUE:	\$

Payment Application and Certificate No _____

SHEET _____ OF _____

CONTRACTOR'S Certification:

The undersigned CONTRACTOR certifies that: (1) all previous progress payments received from OWNER on account of work done under the Contract referred to herein have been applied to discharge in full all obligations of CONTRACTOR incurred in connection with work covered by prior Applications for Payment numbered 1 through _______ inclusive; and, (2) title to all materials and equipment incorporated in said Work or otherwise listed in or covered by this Application for Payment will pass to OWNER at time of payment free and clear of all liens, claims, security interests and encumbrances (except such as covered by bond acceptable to OWNER).

Dated:	CONTRACTOR:

By: _____

Engineer's Recommendation:

This Application (with accompanying documentation) meets the requirements of the Contract Documents and payment of the amount due this application is recommended.

ENGINEER

Dated _____

Dated _____

Project Representative

Project Manager

CHANGE ORDER

Change Order No	
Date:	
Page of _	
NAME OF PROJECT: 6180 South 3200 West Suction Vault Upgrades	
PROJECT NUMBER: 4322	
CONTRACTOR:	
CONTRACT DATE:	
The following changes are hereby made to the CONTRACT DOCUMENTS:	
1)	
2)	
3)	
Total Change to CONTRACT PRICE:	\$
Original CONTRACT PRICE:	\$
Current CONTRACT PRICE adjusted by previous CHANGE ORDER(S)	\$
The new CONTRACT PRICE including this CHANGE ORDER will be	\$
The CONTRACT TIME will be increased by calendar days.	
The date for Substantial Completion will be, 20	

The Contractor agrees to furnish all labor and materials and perform all work as necessary to complete the change order items for the price named herein, which includes all supervision and miscellaneous costs. This change order constitutes full and mutual accord and satisfaction for all time and all costs related to this change. By acceptance of this change order the Contractor agrees that the change order represents an equitable adjustment to the Contract, and further agrees to waive all right to file a claim arising out of or as a result of this change. This document will become a supplement to the Contract, and all provisions will apply hereto, upon approval by the Owner.

CHANGE ORDER (CONTINUED)

		Change Order No.		
		Date:		
			Page	_ of
Recommended:				
	Engineer – David Evans and Associates		D	ate
A ()				
Accepted:				
	Contractor -		D	ate
Approved:				
	Owner - Jordan Valley Water Conservand	cy District	D	ate
CONTRACTOR'S CERTIFICATE OF SUBSTANTIAL COMPLETION

OWNER

TO: Jordan Valley Water Conservancy District 8215 South 1300 West West Jordan, Utah 84088

PROJECT: 6180 South 3200 West Suction Vault Upgrades

ATTENTION:	
_	

FROM: _

Firm or Corporation

This is to certify that I,	am an authorized official of
	working in the capacity of
	and have been properly authorized by said

firm or corporation to sign the following statements pertaining to the subject contract:

I know of my own personal knowledge, and do hereby certify, that the work of the contract described above has been substantially performed and all materials used and installed to date are in accordance with, and in conformity to, the contract drawings and specifications. A list of all incomplete work is attached.

The Contractor hereby releases the Owner and its agents from all claims of and liability to the Contractor for anything done or furnished for or relating to the work, as further provided in Article 14.08B of the General Conditions, except demands against the Owner for the remainder of progress payments retained to date, and unresolved written claims prior to this date.

The contract work is now substantially complete, ready for its intended use, and ready for your inspection. You are requested to issue a Certificate of Substantial Completion.

SIGNATURE:				
DATE:				

CONTRACTOR'S CERTIFICATE OF FINAL COMPLETION

OWNER

TO: Jordan Valley Water Conservancy District 8215 South 1300 West West Jordan, Utah 84088

PROJECT: 6180 South 3200 West Suction Vault Upgrades

ATTENTION: Project Representative: _____

FROM:

Firm or Corporation

This is to certify that I,	am an authorized official of
• • • •	working in the capacity of
	and have been properly authorized
by said firm or corporation to sign the	e following statements pertaining to the subject

by said firm or corporation to sign the following statements pertaining to the subject contract:

I know of my own personal knowledge, and do hereby certify, that the work of the contract described above has been performed and all materials used and installed to date are in accordance with, and in conformity to, the contract drawings and specifications.

The Contract work is now complete in all parts and requirements, excepting the attached list of minor deficiencies and the reasons for each being incomplete to date, for which exemption from final payment requirements is requested in conformance to Article 14.09A of the General Conditions of our Contract (if no exemptions requested, write "none") ______. The work is now ready for your final inspection. The following items required from the Contractor prior to application for final payment (such as O & M Manuals, guarantees, record drawings, etc.) are submitted herewith, if any:

I understand that neither the issuance by the Engineer of a Notice of Completion, nor the acceptance thereof by the Owner, shall operate as a bar or claim against the Contractor under the terms of the guarantee provisions of the Contract Documents.

SIGNATURE: _____

DATE: _____

CONSENT OF SURETY FOR FINAL PAYMENT

PROJECT NAME: 6180 South 3200 West Suction Vault Upgrades

LOCATION: _____

TYPE OF CONTRACT: _____

AMOUNT OF CONTRACT: _____

In accordance with the provisions of the above-named contract between the Owner and the Contractor, the following named surety:

on the Payment Bond of the following named Contractor:

hereby approves of final payment to the Contractor, and further agrees that said final payment to the Contractor shall not relieve the Surety Company named herein of any of its obligations to the following named Owner (as set forth in said Surety company's bond):

IN WITNESS WHEREOF, the Surety Company has hereunto set its hand and seal this _____ day of ______, 20____.

(Name of Surety Company)

(Signature of Authorized Representative)

(Name of Authorized Representatives)

(Title)

AFFIDAVIT OF PAYMENT

To All Whom It May Concern:

WHEREAS, the undersigned has been employed by the Jordan Valley Water Conservancy District to furnish labor and materials under a contract dated ______ for the project entitled "6180 South 3200 West Suction Vault Upgrades", in the County of Salt Lake, State of Utah, of which Jordan Valley Water Conservancy District is the Owner.

NOW, THEREFORE, this <u>_____</u> day of <u>_____</u>, 20__, the undersigned, as the Contractor for the above-named Contract pursuant to the Conditions of the Contract hereby certifies that, except as listed below, he has paid in full or has otherwise satisfied all obligations for all materials and equipment furnished, for all work, labor, and services performed, and for all known indebtedness and claims against the Contractor for damages arising in any manner in connection with the performance of the Contract referenced above for which the Owner or his property might in any way be held responsible.

EXCEPTIONS: (If none, write "None". If required by the Owner, the Contractor shall furnish bond satisfactory to the Owner for each Exception.)

Contractor (Name of sole ownership, corporation or partnership)

(affix corporate seal here)

(Signature of Authorized Representative)

Title:

ARTICLE 1 - DEFINITIONS

Wherever used in these General Conditions or in the other Contract Documents the following terms have the meanings indicated:

<u>Addenda</u> - Written or graphic instruments issued prior to the opening of Bids which make additions, deletions, or revisions to the Contract Documents.

<u>Agreement</u> - The written contract between the OWNER and the CONTRACTOR for the performance of the WORK pursuant to the Contract Documents. Documents incorporated into the contract by reference become part of the contract and of the Agreement.

<u>Application for Payment</u> - The form furnished by the ENGINEER and completed by the CONTRACTOR to request progress or final payment including supporting documentation to substantiate the amounts for which payment is requested.

<u>Bonds</u> - Performance, and Payment Bonds and other instruments which protect against loss due to inability or refusal of the CONTRACTOR to perform pursuant to the Contract Documents.

<u>Change Order</u> - A document recommended by the ENGINEER, which is signed by the CONTRACTOR and the OWNER and authorizes an addition, deletion, or revision in the WORK, or an adjustment in the Contract Price or the Contract Time, issued on or after the Effective Date of the Agreement.

<u>Contract Documents</u> - Information and Instructions, forms (including the Schedule of Prices and all required certificates and affidavits), Agreement, Performance Bond, Payment Bond, General Conditions, Supplemental General Conditions, Technical Specifications, Drawings and all Addenda and Change Orders executed pursuant to the provisions of the Contract Documents.

<u>Contract Price</u> - The total monies payable by the OWNER to the CONTRACTOR under the terms and conditions of the Contract Documents.

<u>Contract Time</u> - The number of successive Days stated in the Contract Documents for the completion of the WORK. The Contract Time begins to run on the date specified in the Notice to Proceed.

<u>CONTRACTOR</u> - The person, firm, or corporation with whom the OWNER has executed the Agreement.

<u>Cost Proposal</u> - The offer or proposal of the pipeline installation subcontractor to the CONTRACTOR to provide the work required under these Contract Documents.

Day - A calendar day of 24 hours measured from midnight to the next midnight.

<u>Defective Work</u> - Work that: is unsatisfactory, faulty, or deficient; does not conform to the Contract Documents; does not meet the requirements of any inspection, reference standard, test, or approval referred to in the Contract Documents; has been damaged prior to the ENGINEERS's recommendation of final payment.

<u>Drawings</u> - The drawings, plans, maps, profiles, diagrams, and other graphic representations which show the character, location, nature, extent, and scope of the WORK.

<u>Effective date of the Agreement</u> - The date indicated in the Agreement on which it was executed, but if no such date is indicated it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.

ENGINEER - The person, firm, or corporation named as such in the Contract Documents.

<u>Field Order</u> - A written order issued by the ENGINEER which may or may not involve a change in the WORK.

Laws and Regulations; Laws or Regulations - Laws, rules, regulations, ordinances, codes, and/or orders promulgated by a lawfully constituted body authorized to issue such Laws and Regulations.

<u>Notice of Award</u> - The OWNER's written notice to the apparent successful Bidder stating that upon compliance with the conditions precedent enumerated therein by the apparent successful Bidder within the time specified, the OWNER will enter into the Agreement.

<u>Notice to Proceed</u> - The OWNER's written notice to the CONTRACTOR authorizing the CONTRACTOR to proceed with the work and establishing the date of commencement of the Contract Time.

<u>OWNER</u> - The Jordan Valley Water Conservancy District.

<u>Partial Utilization</u> - Placing a portion of the WORK in service for the purpose for which it is intended (or a related purpose) before reaching Substantial Completion of the WORK.

<u>Project</u> - A unit of total construction of which the WORK to be provided under the Contract Documents, may be the whole, or a part thereof.

<u>Project Representative</u> - The authorized representative of the ENGINEER who is assigned to the site or any part thereof.

<u>Proposer</u> - Any person, firm or corporation submitting a proposal for the work.

<u>Schedule of Prices</u> - The offer or proposal of the CONTRACTOR setting forth the price or prices for the work to be performed.

<u>Shop Drawings</u> - All drawings, diagrams, illustrations, schedules and other data which are specifically prepared by or for the CONTRACTOR to illustrate some portion of WORK and all illustrations, brochures, standard schedules, performance charts, instruction, and diagrams to illustrate material or equipment for some portion of the WORK.

Specifications - (Same definition as for Technical Specifications hereinafter).

<u>Subcontractor</u> - An individual, firm, or corporation having a direct contract with the CONTRACTOR or with any other Subcontractor for the performance of a part of the WORK at the site.

<u>Substantial Completion</u> - That state of construction when the WORK has progressed to the point where, in the opinion of the ENGINEER as evidenced by the Certificate of Substantial Completion, it is sufficiently complete, in accordance with the Contract Documents, so that the WORK can be utilized for the purposes for which it is intended. The terms "substantially complete" and "substantially completed" as applied to any work refer to substantial completion thereof.

<u>Supplementary General Conditions</u> - The part of the Contract Documents which make additions, deletions, or revisions to these General Conditions.

Supplier - A manufacturer, fabricator, supplier, distributor, materialman, or vendor.

<u>Technical Data</u> - The factual information contained in reports describing physical conditions, including exploration method, plans, logs, laboratory test methods and factual data. Technical Data does not include conclusions, interpretations, interpolations, extrapolations or opinions contained in reports or reached by the CONTRACTOR.

<u>Technical Specifications</u> - Those portions of the Contact Documents consisting of the written technical descriptions of products and execution of the WORK.

<u>Underground Utilities</u> - All pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments and any encasements containing such facilities which have been installed under ground to furnish any of the following services or

materials: water, sewage and drainage removal, electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, traffic, or other control systems.

<u>WORK</u> - The entire construction required to be furnished under the Contract Documents. WORK is the result of performing services, furnishing labor and furnishing and incorporating materials and equipment into the construction, all as required by the Contract Documents.

ARTICLE 2 - PRELIMINARY MATTERS

- 2.01 DELIVERY OF BONDS/INSURANCE CERTIFICATES
 - A. The CONTRACTOR shall deliver to the OWNER the Agreement, Bonds, Insurance Policies and Certificates required by the Contract Documents within ten (10) days after receiving the Notice of Award from the OWNER.
- 2.02 COPIES OF DOCUMENTS
 - A. The OWNER shall furnish the CONTRACTOR 5 copies of the Contract Documents, together with 5 sets of full-scale Drawings. Additional quantities of the Contract Documents will be furnished at reproduction cost.
- 2.03 STARTING THE PROJECT
 - A. The CONTRACTOR shall begin construction of the WORK within 10 days after the commencement date stated in the Notice to Proceed, but shall not commence construction prior to the commencement date.
- 2.04 BEFORE STARTING CONSTRUCTION
 - A. Before undertaking each part of the WORK, the CONTRACTOR shall carefully study and compare the Contract Documents to check and verify pertinent figures and dimensions shown thereon with all applicable field measurements. The CONTRACTOR shall promptly report in writing to the ENGINEER any conflict, error, or discrepancy which the CONTRACTOR may discover and shall obtain a written interpretation or clarification from the ENGINEER before proceeding with any work affected thereby.
 - B. The CONTRACTOR shall submit to the ENGINEER for review those documents called for in each section of the Technical Specifications.

2.05 PRECONSTRUCTION CONFERENCE

A. The CONTRACTOR shall attend a preconstruction conference with the OWNER, the ENGINEER and others as appropriate to discuss the construction of the WORK in accordance with the Contract Documents.

2.06 FINALIZING SCHEDULES

A. At least 7 days before the CONTRACTOR's submittal of its first Application for Payment, the CONTRACTOR, the ENGINEER, and others as appropriate will meet to finalize the schedules submitted in accordance with the Technical Specifications.

ARTICLE 3 - CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

3.01 INTENT

- A. The Contract Documents comprise the entire agreement between OWNER and CONTRACTOR concerning the WORK. The Contract Documents are complementary, what is called for by one is as binding as if called for by all. The Contract Documents will be construed in accordance with the law of the place of the Project.
- B. It is the intent of the Contract Documents to describe the WORK, functionally complete, to be constructed in accordance with the Contract Documents. All work, materials, or equipment that may be reasonably inferred from the Contract Documents as being required to produce the completed work shall be supplied whether or not specifically called for. When words which have a well-known technical or trade meaning are used to describe work, materials, or equipment such words shall be interpreted in accordance with that meaning. Reference to standard specifications, manuals, or codes or any technical society, organization, or association, or to the Laws or Regulations of any governmental authority, whether such reference be specific or by implication, shall mean the latest standard specification, manual, code, or Laws or Regulations in effect at the time of opening of Bids, except as may be otherwise specifically stated. However, no provision of any referenced standard specification, manual, or code (whether or not specifically incorporated by reference in the Contract Documents) shall be effective to change the duties and responsibilities of the OWNER, the CONTRACTOR, or the ENGINEER or any of their consultants, agents, or employees from those set forth in the Contract Documents.
- C. If, during the performance of the WORK, the CONTRACTOR finds a conflict, error or discrepancy in the Contract Documents, the CONTRACTOR shall immediately report it to the ENGINEER in writing and before proceeding with the work affected thereby. The ENGINEER shall then make a written interpretation, clarification, or correction from the ENGINEER.

3.02 ORDER OF PRECEDENCE OF CONTRACT DOCUMENTS

- A. In resolving conflicts resulting from conflicts, errors, or discrepancies in any of the Contract Documents, the order of precedence shall be as follows:
 - 1. Change Orders
 - 2. Agreement
 - 3. Addenda
 - 4. Contractor's Bid (Bid Form)
 - 5. Supplemental General Conditions
 - 6. Notice Inviting Bids
 - 7. Instructions to Bidders
 - 8. General Conditions
 - 9. Technical Specifications
 - 10. Referenced Standard Specifications
 - 11. Drawings
- B. With reference to the Drawings the order of precedence is as follows:
 - 1. Figures govern over scaled dimensions
 - 2. Detail drawings govern over general drawings
 - 3. Addenda/change order drawings govern over general drawings
 - 4. Contract Drawings govern over standard drawings

3.03 AMENDING AND SUPPLEMENTING CONTRACT DOCUMENTS

A. The Contract Documents may be amended by a Change Order (pursuant to Article 10) to provide for additions, deletions or revisions in the WORK or to modify terms and conditions.

3.04 REUSE OF DOCUMENTS

A. Neither the CONTRACTOR, Subcontractor, Supplier, nor any other person or organization performing any of the WORK under a contract with the OWNER shall have or acquire any title to or ownership rights in any of the Drawings, Technical Specifications, or other documents used on the WORK, and they shall not reuse any of them on the extensions of the Project or any other project without written consent.

ARTICLE 4 - AVAILABILITY OF LANDS; PHYSICAL CONDITIONS: REFERENCE POINTS

4.01 AVAILABILITY OF LANDS

The OWNER shall furnish the lands, rights-of-way and easements upon Α. which the WORK is to be performed and for access thereto, together with other lands designated for the use of the CONTRACTOR in the Contract Documents. Easements for permanent structures or permanent changes in existing major facilities will be obtained and paid for by the OWNER, unless otherwise provided in the Contract Documents. Nothing contained in the Contract Documents shall be interpreted as giving the CONTRACTOR exclusive occupancy of the lands or rights-of-way provided. The CONTRACTOR shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment. The CONTRACTOR shall not enter upon nor use any property not under the control of the OWNER until a written temporary construction easement agreement has been executed by the CONTRACTOR and the property owner, and a copy of the easement furnished to the ENGINEER prior to its use. Neither the OWNER nor the ENGINEER shall be liable for any claims or damages resulting from the CONTRACTOR's unauthorized trespass or use of any properties.

4.02 PHYSICAL CONDITIONS - SUBSURFACE AND EXISTING STRUCTURES

- A. <u>Explorations and Reports</u>: The paragraph entitled "Physical Conditions" of the Supplementary General Conditions identifies exploration reports and subsurface conditions tests at the site that have been utilized by the ENGINEER in the preparation of the Contract Documents. The CONTRACTOR may rely upon the accuracy of the Technical Data contained in these reports. The CONTRACTOR is responsible for the interpretation, extrapolation or interpolation of all technical as well as nontechnical data and its reliance on the completeness, opinions and interpretation of the reports.
- B. <u>Existing Structures</u>: The paragraph entitled "Physical Conditions" of the Supplementary General Conditions identifies the drawings of physical conditions in or relating to existing surface and subsurface structures (except Underground Utilities referred to in Paragraph 4.04 herein) which are at or contiguous to the site that have been utilized by the ENGINEER in the preparation of the Contract Documents. The CONTRACTOR is responsible for the interpretation, extrapolation or interpolation of all technical as well as nontechnical data and its reliance on the completeness, opinions and interpretation of the reports.

4.03 DIFFERING SITE CONDITIONS

- A. The CONTRACTOR shall notify the ENGINEER upon encountering any of the following unforeseen conditions, hereinafter called "differing site conditions," during the prosecution of the WORK. The CONTRACTOR's notice to the ENGINEER shall be in writing and delivered before the differing site conditions are disturbed, but in no event later than 14 days after their discovery.
 - 1. Subsurface or latent physical conditions at the site of the WORK differing materially from those indicated, described, or delineated in the Contract Documents including those reports and documents discussed in Paragraph 4.02; and
 - 2. Physical conditions at the site of the WORK of an unusual nature differing materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents including those reports and documents discussed in Paragraph 4.02.
- B. The ENGINEER will review the alleged differing site conditions, determine the necessity of obtaining additional explorations or tests with respect to verifying their existence and extent and advise the OWNER in writing of the ENGINEER's findings and conclusions.
- C. If the OWNER concludes that because of newly discovered conditions a change in the Contract Documents is required, a Change Order will be issued as provided in Article 10 to reflect and document the consequences of the differing site conditions.
- D. In each such case, an increase or decrease in the Contract Price or an extension or shortening of the Contract Time, or any combination thereof, will be allowable to the extent that they are attributable to the differing site conditions. If the OWNER and the CONTRACTOR are unable to agree as to the amount or length of the Change Order, a claim may be made as provided in Articles 11 and 12.
- E. The CONTRACTOR's failure to give written notice of differing site conditions within 14 days of their discovery and before they are disturbed shall constitute a waiver of all claims in connection therewith, whether direct or consequential in nature.

4.04 PHYSICAL CONDITIONS - UNDERGROUND UTILITIES

- Α. Shown or Indicated: The information and data shown or indicated in the Contract Documents with respect to existing Underground Utilities at or contiguous to the site are based on information and data furnished to the OWNER or the ENGINEER by the owners of Underground Utilities or by others. Unless it is expressly provided in the Supplementary General Conditions and/or the Section entitled "Protection and Restoration of Existing Facilities" of the Technical Specifications, the OWNER and the ENGINEER shall not be responsible for the accuracy or completeness of any Underground Utilities information or data. The CONTRACTOR's responsibility relating to underground utilities are: review and check all information and data, locate all Underground Utilities shown or indicated in the Contract Documents, coordinate the WORK with the owners of Underground Utilities during construction, the safeguard and protect the of Underground Utilities, and repair any damage to Underground Utilities resulting from the WORK. The cost of all these activities will be considered as having been included in the Contact Price.
- B. <u>Not Shown or Indicated</u>: If an Underground Utility not shown or indicated in the Contract Documents is uncovered or revealed at or contiguous to the site and which the CONTRACTOR could not reasonably have been expected to be aware of, the CONTRACTOR shall give written notice to the OWNER of that utility and the ENGINEER, specifying the location of the utility in question.

4.05 REFERENCE POINTS

- A. The ENGINEER will provide one bench mark, near or on the site of the WORK, and will provide two points near or on the site to establish a base line for use by the ENGINEER for alignment control. Unless otherwise specified in the Technical Specifications, the CONTRACTOR shall furnish all other lines, grades, and bench marks required for proper execution of the WORK.
- B. The CONTRACTOR shall preserve all bench marks, stakes, and other survey marks. In case of their removal or destruction by its own employees or by its subcontractor's employees, the CONTRACTOR shall be responsible for the accurate replacement of reference points by professionally qualified personnel at no additional cost to the OWNER.

ARTICLE 5 - BONDS AND INSURANCE

5.01 PERFORMANCE AND OTHER BONDS

- A. The CONTRACTOR shall furnish Performance and Payment Bonds, each in the amount set forth in the Supplementary General Conditions as security for the faithful performance and payment of all the CONTRACTOR's obligations under the Contract Documents. All insurance companies, sureties, and bond companies shall have an AM Best rating of A- or better, with a Financial Size Category of XII or better. Sureties shall also be listed on the Department of the Treasury's Circular 570, with an acceptable underwriting limitation limit. The Performance Bond shall remain in effect at least until one year after the date of Notice of Completion, except as otherwise provided by Law or Regulation or by the Contract Documents. After the ENGINEER issues the Notice of Completion, the amount of the Performance Bond may be reduced to 10 percent of the Contract Price, or \$1,000, whichever is greater. The CONTRACTOR shall also furnish such other Bonds as are required by the Supplementary General Conditions.
- B. If the surety on any Bond furnished by the CONTRACTOR is declared a bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the WORK is located, the CONTRACTOR shall within 7 days after written approval by the OWNER of a substitute Bond and Surety substitute the approved Bond and Surety.

5.02 INSURANCE

- A. The CONTRACTOR shall purchase and maintain the insurance required under this paragraph. All insurance companies, sureties, and bond companies shall have an AM Best rating of A- or better, with a Financial Size Category of XII or better. Sureties shall also be listed on the Department of the Treasury's Circular 570, with an acceptable underwriting limitation limit. This insurance shall include the specific coverages set out herein and be written for not less than the limits of liability and coverages provided in the Supplementary General Conditions, or required by law, whichever is greater. The CONTRACTOR's liabilities under the Agreement shall not be deemed limited in any way to the insurance coverage required.
- B. The CONTRACTOR shall furnish the OWNER and ENGINEER with certificates indicating the type, amount, class of operations covered, effective dates and expiration dates of all policies. All insurance policies purchased and maintained (or the certificates or other evidence thereof) shall contain a provision or endorsement that the coverage afforded will not be canceled, materially changed, or renewal refused until at least 30 days' prior written

notice has been given to the OWNER by certified mail. All insurance shall remain in effect until the ENGINEER issues the Notice of Completion and at all times thereafter when the CONTRACTOR may be correcting, removing, or replacing defective work in accordance with Paragraph 13.06 or completing punch list items required by the Notice of Completion. In addition, the insurance required herein (except for Worker's Compensation and Employer's Liability) shall name the OWNER, the ENGINEER, and their officers, agents, and employees as "additional insured" under the policies.

- 1. Workers' Compensation and Employer's Liability: This insurance shall protect the CONTRACTOR against all claims under applicable state workers' compensation laws. 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. This policy shall include an "all states" endorsement. The CONTRACTOR shall require each subcontractor similarly to provide Workers' Compensation Insurance for all of the latter's employees to be engaged in the WORK unless its employees are covered by the protection afforded by the CONTRACTOR's Workers' Compensation Insurance. In the event a class of employees is not protected under the Workers' Compensation Statute, the CONTRACTOR or Subcontractor, as the case may be, shall provide adequate employer's liability insurance for the protection of its employees not protected under the statute.
- 2. <u>Comprehensive General Liability</u>: This insurance shall be written in comprehensive form and shall protect the CONTRACTOR against all claims arising from injuries to persons other than its employees and damage to property of the OWNER or others arising out of any act or omission of the CONTRACTOR or its agents, employees or subcontractors. The policy shall include the following endorsements: (1) Protective Liability endorsement to insure the contractual liability assumed by the CONTRACTOR under the indemnification provisions in these General Conditions; (2) Broad Form Property Damage endorsement; (3) Personal Injury endorsement to cover personal injury liability for intangible harm. The Comprehensive General Liability coverage shall contain no exclusion relative to blasting, explosion, collapse of building, or damage to underground structures.
- 3. <u>Comprehensive Automobile Liability</u>: This insurance shall be written in comprehensive form. The policy shall protect the CONTRACTOR against all claims for injuries to employees, members of the public and

damage to property of others arising from the use of CONTRACTOR's motor vehicles, whether they are owned, non-owned, or hired, and whether used or operated on or off the site. The motor vehicle insurance required under this paragraph shall include: (a) motor vehicle liability coverage; (b) personal injury protection coverage and benefits; and (c) uninsured motor vehicle coverage.

- 4. <u>Subcontractor's Insurance</u>: The CONTRACTOR shall require each of its subcontractors to procure and to maintain Comprehensive General Liability Insurance and Comprehensive Automobile Liability Insurance of the type and in the amounts specified in the Supplementary General Conditions or insure the activities of its subcontractors in the CONTRACTOR's own policy, in like amount.
- 5. Builder's Risk: This insurance shall be of the "all risk" type, shall be written in completed value form, and shall protect the CONTRACTOR, the OWNER, and the ENGINEER against damage to buildings, structures, materials and equipment. The amount of this insurance shall not be less than the insurable value of the WORK at completion. Builder's risk insurance shall provide for losses to be payable to the CONTRACTOR, the OWNER, and the ENGINEER as their interests may appear. The policy shall contain a provision that in the event of payment for any loss under the coverage provided, the insurance company shall have no rights of recovery against the CONTRACTOR, the OWNER, and the ENGINEER. The Builder's Risk policy shall insure against all risks of direct physical loss or damage to property from any external cause including flood and earthquake. Allowable exclusions, if any, shall be as specified in the Supplementary General Conditions.

ARTICLE 6 - CONTRACTOR'S RESPONSIBILITIES

- 6.01 SUPERVISION AND SUPERINTENDENCE
 - A. The CONTRACTOR shall supervise and direct the WORK competently and efficiently, devoting the attention and applying the skills and expertise necessary to perform the WORK in accordance with the Contract Documents. The CONTRACTOR shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction and safety precautions and programs incidental thereto. The CONTRACTOR shall be responsible to see that the finished WORK complies accurately with the Contract Documents.
 - B. The CONTRACTOR shall employ the Superintendent named in "Information Required of Bidder" on the work site at all times during the progress of the WORK. The superintendent shall not be replaced without the OWNER's written consent. The superintendent will be the CONTRACTOR's representative at the site and shall have authority to act on behalf of the CONTRACTOR. All communications given to the superintendent shall be as binding as if given to the CONTRACTOR. The CONTRACTOR shall issue all its communications to the OWNER through the ENGINEER.
 - C. The CONTRACTOR's superintendent shall be present at the site of the WORK at all times while work is in progress. Failure to observe this requirement shall be considered suspension of the WORK by the CONTRACTOR until the superintendent is again present at the site.
- 6.02 LABOR, MATERIALS, AND EQUIPMENT
 - A. The CONTRACTOR shall provide skilled, competent and suitably qualified personnel to survey and lay out the WORK and perform construction as required by the Contract Documents. When required in writing by the OWNER or ENGINEER, the CONTRACTOR or any subcontractor shall discharge any person who is, in the opinion of the OWNER or ENGINEER, incompetent, disorderly, or otherwise unsatisfactory and shall not again employ the discharged person on the WORK without the consent of the OWNER or ENGINEER. The CONTRACTOR shall at all times maintain good discipline and order at the site.
 - B. Except in connection with the safety or protection of persons the WORK, or property at the site or adjacent thereto, all work at the site shall be performed during regular working hours, and the CONTRACTOR will not permit overtime work or the performance of work on Saturday, Sunday or any legal holiday without the OWNER's written consent given after prior written notice

to the ENGINEER. Except as otherwise provided in this Paragraph, the CONTRACTOR shall receive no additional compensation for overtime work, i.e., work in excess of 8 hours in any one calendar day or 40 hours in any one calendar week, even though such overtime work may be required under emergency conditions and may be ordered by the ENGINEER in writing. Additional compensation will be paid the CONTRACTOR for overtime work in the event extra work is ordered by the ENGINEER and the Change Order specifically authorizes the use of overtime work, but only to the extent that the CONTRACTOR pays overtime wages on a regular basis being paid by for overtime work of a similar nature in the same locality.

- C. All costs of inspection and testing performed during overtime work approved solely for the convenience of the CONTRACTOR shall be borne by the CONTRACTOR. The OWNER shall have the authority to deduct the costs of all inspection and testing from any partial payments otherwise due to the CONTRACTOR.
- D. Unless otherwise specified in the Contract Documents, the CONTRACTOR shall furnish, erect, maintain and remove the construction plant, and temporary works and assume full responsibility for all materials, equipment, labor, transportation, construction equipment, machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities and all other facilities and incidentals necessary for the furnishing, performance testing, start-up and completion of the WORK.
- E. All materials and equipment incorporated into the WORK shall be of new and good quality, except as otherwise provided in the Contract Documents. If required by the ENGINEER, the CONTRACTOR shall furnish satisfactory evidence (including reports of required tests) as to the kind and quality of materials and equipment. The CONTRACTOR shall apply, install, connect, erect, use, clean, and condition all material and equipment in accordance with the instructions of the manufacturer and Supplier except as otherwise provided in the Contract Documents.

6.03 ADJUSTING PROGRESS SCHEDULE

A. The CONTRACTOR shall submit any adjustments in the progress schedule to the ENGINEER for acceptance in accordance with the provisions for "Contractor Submittals" in the Technical Specifications.

6.04 SUBSTITUTES OR "OR-EQUAL" ITEMS

- A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or-equal" item or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be submitted to ENGINEER for review under the circumstances described below:
 - 1. "Or-Equal" Items: If in ENGINEER's sole discretion an item of material or equipment proposed by CONTRACTOR is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by ENGINEER as an "or-equal" item, in which case review and approval of the proposed item may, in ENGINEER's sole discretion, be accomplished without compliance with some or all of the requirements for approval of proposed substitute items. For the purposes of this paragraph 6.04.A.1, a proposed item of material or equipment will be considered functionally equal to an item so named if:
 - a. in the exercise of reasonable judgment ENGINEER determines that: (i) it is a least equal in quality, durability, appearance, strength, and design characteristics; (ii) it will reliably perform at least equally well the function imposed by the design concept of the completed Project as a functioning whole, and;
 - b. CONTRACTOR certifies that: (i) there is no increase in cost to the OWNER; and (ii) it will conform substantially, even with deviations, to the detailed requirements of the item named in the Contract Document.
 - 2. Substitute Items
 - a. If in ENGINEER's sole discretion an item of material or equipment proposed by CONTRACTOR does not qualify as an "or-equal" item under paragraph 6.04.A.1, it will be considered a proposed substitute item.
 - b. CONTRACTOR shall submit sufficient information as provided below to allow ENGINEER to determine that the item of material or

equipment proposed is essentially equivalent to that named and an acceptable substitute therefore. Requests for review of proposed substitute items of material or equipment will not be accepted by ENGINEER from anyone other than CONTRACTOR.

- c. The procedure for review by ENGINEER will be as set forth in paragraph 6.04.A.2.d, as supplemented in the Technical Specifications and as ENGINEER may decide is appropriate under the circumstances.
- d. CONTRACTOR shall first make written application to ENGINEER for review of a proposed substitute item of material or equipment that CONTRACTOR seeks to furnish or use. The application shall certify that the proposed substitute item will perform adequately the functions and achieve the results called for by the general design, be similar in substance to that specified, and be suited to the same use as that specified. The application will state the extent, if any, to which the use of the proposed substitute item will CONTRACTOR's achievement of preiudice Substantial Completion on time, whether or not use of the proposed substitute item will require a change in any of the Contract Documents (or in the provisions of any other direct contract with OWNER for work on the Project) to adapt the design to the proposed substitute item, and whether or not incorporation or use of the substitute item is subject to payment of any license fee or royalty. All variations of the proposed substitute item from that specified will be identified in the application, and available engineering, sales, maintenance, repair, and replacement services will be indicated. The application will also contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change, all of which will be considered by ENGINEER in evaluating the proposed substitute item. ENGINEER may require CONTRACTOR to furnish additional data about the proposed substitute item.
- B. Substitute Construction Methods or Procedures: If a specific means, method, technique, sequence, or procedure of construction is shown or indicated in and expressly required by the Contract Documents, CONTRACTOR may furnish or utilize a substitute means, method, technique, sequence, or procedure of construction approved by ENGINEER. CONTRACTOR shall submit sufficient information to allow ENGINEER, in

ENGINEER's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The procedure for review by ENGINEER will be similar to that provided in subparagraph 6.04.A.2.

- C. Engineer's Evaluation: ENGINEER will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to paragraphs 6.04.A and 6.04.B. ENGINEER will be the sole judge of acceptability. No "or-equal" or substitute will be ordered, installed or utilized until ENGINEER's review is complete, which will be evidenced by either a Change Order for a substitute or an approved Shop Drawing for an "or equal." ENGINEER will advise CONTRACTOR in writing of any negative determination.
- D. Special Guarantee: OWNER may require CONTRACTOR to furnish at CONTRACTOR's expense a special performance guarantee or other surety with respect to any substitute.
- E. ENGINEER's Cost Reimbursement: ENGINEER will record time required by ENGINEER and ENGINEER's Consultants in evaluating substitute proposed or submitted by CONTRACTOR pursuant to paragraphs 6.04.A.2 and 6.04.B and in making changes in the Contract Documents (or in the provisions of any other direct contract with OWNER for work on the Project) occasioned thereby. Whether or not ENGINEER approves a substitute item so proposed or submitted by CONTRACTOR, CONTRACTOR shall reimburse OWNER for the charges of ENGINEER and ENGINEER's Consultants for evaluation each such proposed substitute.
- F. CONTRACTOR'S EXPENSE: CONTRACTOR shall provide all data in support of any proposed substitute or "or-equal" at CONTRACTOR's expense.

6.05 CONCERNING SUBCONTRACTORS, SUPPLIERS, AND OTHERS

- A. The CONTRACTOR shall be responsible to the OWNER and the ENGINEER for the acts and omissions of its subcontractors and their employees to the same extent as the CONTRACTOR is responsible for the acts and omissions of its own employees. Nothing contained in this paragraph shall create any contractual relationship between any subcontractor and the OWNER or the ENGINEER nor relieve the CONTRACTOR of any liability or obligation under the Agreement.
- 6.06 PERMITS

- A. Unless otherwise provided in the Supplementary General Conditions, the CONTRACTOR shall obtain and pay for all construction permits and licenses from the agencies having jurisdiction, including furnishing the insurance and bonds required by such agencies. The costs incurred by the CONTRACTOR in compliance with this paragraph shall not be made the basis for claims for additional compensation. The OWNER shall assist the CONTRACTOR, when necessary, in obtaining such permits and licenses. The CONTRACTOR shall pay all governmental charges and inspection fees necessary for the prosecution of the WORK, which are applicable at the time of opening of Bids, including all utility connection charges for utilities required by the WORK.
- В. The CONTRACTOR shall pay all license fees and royalties and assume all costs when any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others when issued in the construction of the WORK or incorporated into the WORK. If a particular invention, design, process, product, or device is specified in the Contract Documents for incorporation into or use in the construction of the WORK and if to the actual knowledge of the OWNER or the ENGINEER its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of these rights shall be disclosed by the OWNER in the Contract Documents. The CONTRACTOR shall indemnify. defend and hold harmless the OWNER and the ENGINEER and anyone directly or indirectly employed by either of them from and against all claims, damages, losses, and expenses (including attorneys' fees and court costs) arising out of any infringement of patent rights or copyrights incident to the use in the performance of the WORK or resulting from the incorporation in the WORK of any invention, design, process, product, or device not specified in the Contract Documents.

6.07 LAWS AND REGULATIONS

A. The CONTRACTOR shall observe and comply with all federal, state, and local laws, ordinances, codes, orders, and regulations which in any manner affect those engaged or employed on the WORK, the materials used in the WORK, or the conduct of the WORK. If any discrepancy or inconsistency should be discovered in the Contract Documents in relation to any law, ordinance, code, order, or regulations, the CONTRACTOR shall report the same in writing to the ENGINEER. The CONTRACTOR shall indemnify, defend and hold harmless the OWNER, the ENGINEER and their officers, agents, and employees against all claims and from violation of any law, ordinance, code, order, or regulation, whether by CONTRACTOR or by its employees or subcontractors. Any particular law or regulation specified or

referred to elsewhere in the Contract Documents shall not in any way limit the obligation of the CONTRACTOR to comply with all other provisions of federal, state, and local laws and regulations. Where an individual State act on occupational safety and health standards has been approved by Federal authority, then the provision of said State act shall control.

6.08 EQUAL OPPORTUNITY

A. The Contractor agrees to abide by: the provisions of Title VII of the Civil Rights Act of 1964 (42USC § § 2000e et seq.), which prohibits discrimination against any employee or applicant for employment on the basis of race, religion, color, or national origin; Executive Order No. 11246, as amended, which prohibits discrimination on the basis of sex; 45 CFR 90, which prohibits discrimination on the basis of sex; 45 CFR 90, which prohibits discrimination Act of 1973, (42 USC § 794), which prohibits discrimination on the basis of handicap; Utah Executive Order dated June 30, 1989, which prohibits sexual harassment in the workplace; and the Americans with Disabilities Act (42 USC § § 12111 et seq.), which prohibits discrimination against qualified employees and applicants with a disability.

6.09 TAXES

A. The CONTRACTOR shall pay all sales, consumer, use, and other similar taxes required to be paid by the CONTRACTOR in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the WORK.

6.10 USE OF PREMISES

Α. The CONTRACTOR shall confine construction equipment, stored materials and equipment, and other operations of workers to (1) the Project site, (2) the land and areas identified for the CONTRACTOR's use in the Contract Documents, and (3) other lands whose use is acquired by Laws and Regulations, rights-of-way, permits, and easements. The CONTRACTOR shall be fully responsible to the owner and occupant of such lands for any damage to the lands or areas contiguous thereto, resulting from the performance of the WORK or otherwise. Should any claim be made against the OWNER or the ENGINEER by owner or occupant of lands because of the performance of the WORK, the CONTRACTOR shall promptly settle the claim by agreement, or resolve the claim through litigation. The CONTRACTOR shall, to the fullest extent permitted by Laws and Regulations, indemnify, defend, and hold the OWNER and the ENGINEER harmless from and against all claims, damages, losses, and expenses (including, but not limited to, fees of engineers, architects, attorneys, and other professionals and court costs) arising directly, indirectly, or consequentially out of any action, legal or equitable, brought by any owner or occupant of land against the OWNER or the ENGINEER to the extent the claim is based or arises out of the CONTRACTOR's performance of the WORK.

6.11 SAFETY AND PROTECTION

- A. The CONTRACTOR shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the WORK. The CONTRACTOR shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:
 - 1. All employees on the WORK and other persons and organizations who may be affected thereby.
 - 2. All the WORK and materials and equipment to be incorporated therein, whether in storage on or off the site; and

- 3. Other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction.
- B. The CONTRACTOR shall comply with all applicable Laws and Regulations (whether referred to herein or not) of any public body having jurisdiction for the safety of persons or property or to protect them from damage, injury, or loss and shall erect and maintain all necessary safeguards for such safety and protection. The CONTRACTOR shall notify owners of adjacent property and utilities when prosecution of the WORK may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property.
- C. Unless the CONTRACTOR otherwise designates in writing a different individual as the responsible individual, the CONTRACTOR's superintendent shall be CONTRACTOR's representative at the site whose duty shall be the prevention of accidents.

6.12 SHOP DRAWINGS AND SAMPLES

- A. After checking and verifying all field measurements and after complying with the applicable procedures specified in the Technical Specifications, the CONTRACTOR shall submit all shop drawings to the ENGINEER for review and approval in accordance with the approved schedule for shop drawings submittals specified in the Technical Specifications.
- B. The CONTRACTOR shall also submit to the ENGINEER for review and approval all samples in accordance with the approved schedule of sample submittals specified in the Technical Specifications.
- C. Before submitting shop drawings or samples, the CONTRACTOR shall determine and verify all quantities, dimensions, specified performance criteria, installation requirements, materials, catalog numbers, and similar data with respect thereto and review or coordinate each shop drawing or sample with other shop drawings and samples and with the requirements of the WORK and the Contract Documents.

6.13 CONTINUING THE WORK

A. The CONTRACTOR shall carry on the WORK and adhere to the progress schedule during all disputes or disagreements with the OWNER. No work shall be delayed or postponed pending resolution of any dispute or disagreement, except as the CONTRACTOR and the OWNER may otherwise mutually agree in writing.

6.14 INDEMNIFICATION

- A. To the fullest extent permitted by Laws and Regulations, the CONTRACTOR shall indemnify, defend, and hold harmless the OWNER, the ENGINEER, and their officers, agents, and employees, against and from all claims and liability arising under or by reason of the Agreement or any performance of the WORK, but not from the sole negligence or willful misconduct of the OWNER and/or the ENGINEER. Such indemnification by the CONTRACTOR shall include but not be limited to the following:
 - 1. Liability or claims resulting directly or indirectly from the negligence or carelessness of the CONTRACTOR or its agents in the performance of the WORK, or in guarding or maintaining the same, or from any improper materials, implements, or appliances used in its construction, or by or on account of any act or omission of the CONTRACTOR or its agents;
 - 2. Liability or claims arising directly or indirectly from or based on the violation of any law, ordinance, regulation, order, or decree, whether by the CONTRACTOR or its agents;
 - 3. Liability or claims arising directly or indirectly from the use or manufacture by the CONTRACTOR, its agents, or the OWNER in the performance of this Agreement of any copyrighted or uncopyrighted composition, secret process, patented or unpatented invention, article, or appliance, unless otherwise specifically stipulated in this Agreement.
 - 4. Liability or claims arising directly or indirectly from the breach of any warranties, whether express or implied, made to the OWNER or any other parties by the CONTRACTOR or its agents;
 - 5. Liabilities or claims arising directly or indirectly from the willful misconduct of the CONTRACTOR or its agents; and,

- 6. Liabilities or claims arising directly or indirectly from any breach of the obligations assumed herein by the CONTRACTOR.
- B. The CONTRACTOR shall reimburse the OWNER, and the ENGINEER for all costs and expense, (including but not limited to fees and charges of engineers, architects, attorneys, and other professional and court costs) incurred by the OWNER, and the ENGINEER in enforcing the provisions of this Paragraph.
- C. The indemnification obligation under this Paragraph shall not be limited in any way by any limitation of the amount or type of damages, compensation, or benefits payable by or for the CONTRACTOR or any such subcontractor or other person or organization under workers' compensation acts, disability benefit acts, or other employee benefit acts.

6.15 CONTRACTOR'S DAILY REPORTS

A. The CONTRACTOR shall complete a daily report indicating manpower, major equipment, subcontractors, weather conditions, etc., involved in the performance of the WORK. The daily report shall be completed on forms prepared by the CONTRACTOR and acceptable to the ENGINEER, and shall be submitted to the ENGINEER at the conclusion of each work day.

6.16 ASSIGNMENT OF CONTRACT

A. The CONTRACTOR shall not assign, sublet, sell, transfer, or otherwise dispose of the Agreement or any portion thereof, or its right, title, or interested therein, or obligations thereunder, without the written consent of the OWNER except as imposed by law. If the CONTRACTOR violates this provision, the Agreement may be terminated at the option of the OWNER. In such event, the OWNER shall be relieved of all liability and obligations to the CONTRACTOR and to its assignee or transferee, growing out of such termination.

ARTICLE 7 - OTHER WORK

7.01 RELATED WORK

- A. The OWNER may perform other work related to the Project at the site by the OWNER's own forces, have other work performed by utility owners, or let other direct contracts for the performance of the other work which may contain General Conditions similar to these. If the fact that such other work is to be performed was not noted in the Contact Documents, written notice thereof will be given to the CONTRACTOR prior to commencing any other work.
- B. The CONTRACTOR shall afford each utility owner and other contractor who is a party to a direct contract (or the OWNER, if the OWNER is performing the additional work with the OWNER's employees) proper and safe access to the site and a reasonable opportunity for the introduction and storage of materials and equipment and the execution of the other work. The CONTRACTOR shall properly connect and coordinate the WORK with the other work. The CONTRACTOR shall do all cutting, fitting, and patching of the WORK that may be required to make its several parts come together properly and integrate with the other work. The CONTRACTOR shall not endanger any work of others by cutting, excavating, or otherwise altering their work and shall only cut or alter their work with the written consent of the ENGINEER and the others whose work will be affected.
- C. If the proper execution or results of any part of the CONTRACTOR's work depends upon the integration of work with the completion of other work by any other contractor or utility owner (or the OWNER), the CONTRACTOR shall inspect and report to the ENGINEER in writing all delays, defects, or deficiencies in the other work that renders it unavailable or unsuitable for proper integration with the CONTRACTOR's work. Except for the results or effects of latent or nonapparent defects and deficiencies in the other work, the CONTRACTOR's failure to report will constitute an acceptance of the other work as fit and proper for integration with the CONTRACTOR's work and as a waiver of any claim for additional time or compensation associated with the integration of the CONTRACTOR's work with the other work.

7.02 COORDINATION

A. If the OWNER contracts with others for the performance of other work on the Project at the site, a coordinator will be identified to the extent that the coordinator can be identified at this time, in the Supplementary General Conditions and delegated the authority and responsibility for coordination of the activities among the various contractors. The specific matters over which the coordinator has authority and the extent of the coordinator's authority and responsibility will be itemized in the Supplementary General Conditions or in a notice to the CONTRACTOR at such time as the identity of the coordinator is determined.

ARTICLE 8 - OWNER'S RESPONSIBILITIES

- 8.01 COMMUNICATIONS
 - A. The OWNER shall issue all its communications to the CONTRACTOR through the ENGINEER.
- 8.02 PAYMENTS
 - A. The OWNER shall make payments to the CONTRACTOR as provided in Paragraphs 14.05 and 14.09.
- 8.03 LANDS, EASEMENTS, AND SURVEYS
 - A. The OWNER's duties with respect to providing lands and easements and providing engineering surveys to establish reference points are set forth in Paragraphs 4.01 and 4.05. The OWNER shall identify and make available to the CONTRACTOR copies of exploration reports and subsurface conditions tests at the site and in existing structures which have been utilized by the ENGINEER in preparing the Drawings and Technical Specifications as set forth in Paragraph 4.02
- 8.04 CHANGE ORDERS
 - A. The OWNER shall execute approved Change Orders for the conditions described in Paragraph 10.01D.
- 8.05 INSPECTIONS AND TESTS
 - A. The OWNER's responsibility with respect to inspection, tests, and approvals is set forth in Paragraph 13.03B.
- 8.06 SUSPENSION OF WORK
 - A. In connection with the OWNER's right to stop work or suspend work, see Paragraphs 13.04 and 15.01. Paragraphs 15.02 and 15.03 deal with the OWNER's right to terminate services of the CONTRACTOR under certain circumstances.

ARTICLE 9 - ENGINEER'S STATUS DURING CONSTRUCTION

- 9.01 OWNER'S REPRESENTATIVE
 - A. The ENGINEER will be the OWNER's representative during the construction period. The duties, responsibilities and the limitations of authority of the ENGINEER as the OWNER's representative during construction are set forth in a separate agreement with the OWNER and are summarized hereafter.
- 9.02 VISITS TO SITE
 - A. The ENGINEER will make visits to the site during construction to observe and inspect the progress and quality of the WORK and to determine, in general if the WORK is proceeding in accordance with the Contract Documents.

9.03 PROJECT REPRESENTATION

A. The ENGINEER will furnish a Project Representative to observe and inspect the performance of the WORK. The Project Representative and/or other authorized agents of the Engineer shall serve as the chief Owner/Engineer contact(s) with the Contractor during the construction phase. All submittals shall be delivered to and communications between the Engineer and the Contractor shall be handled by the Project Representative and/or other authorized agents. The Project Representative shall be the chief authorized representative of the Owner and the Engineer at the site of the work in all onsite relations with the Contractor.

9.04 CLARIFICATIONS AND INTERPRETATIONS

A. The ENGINEER will issue with reasonable promptness written clarifications or interpretations of the requirements of the Contract Documents (in the form of Drawings or otherwise) as the ENGINEER may determine necessary, which shall be consistent with or reasonably inferable from the overall intent of the Contract Documents.

9.05 AUTHORIZED VARIATIONS IN WORK

A. The ENGINEER may authorize minor variation in the WORK as described in the Contact Documents when such variations do not involve an adjustment in the Contract Price or the Contract Time and are consistent with the overall intent of the Contract Documents. These variations shall be accomplished by issuing a Field Order. The issuance of a Field Order requires the CONTRACTOR to perform the work described in the order promptly. If the
CONTRACTOR believes that a Field Order justifies an increase in the Contract Price or an extension of the Contract Time and parties are unable to agree as the amount or extent thereof, the CONTRACTOR may make a claim therefor as provided in Article 11 or 12.

9.06 REJECTION OF DEFECTIVE WORK

A. The ENGINEER is authorized to reject work which the ENGINEER believes to be defective and require special inspection or testing of the WORK as provided in Paragraph 13.03G, whether or not the WORK is fabricated, installed, or completed.

9.07 CONTRACTOR SUBMITTALS, CHANGE ORDERS, AND PAYMENTS

- A. The ENGINEER will review for approval all Contractor submittals, including shop drawings, samples, substitutes, and "or equal" items, etc., in accordance with the procedures set forth in the Technical Specifications.
- B. In connection with the ENGINEER's responsibilities as to Change Orders, see Articles 10, 11, and 12.
- C. In connection with the ENGINEER's responsibilities with respect to Applications for Payment, see Article 14.

9.08 DECISIONS ON DISPUTES

- A. All claims, disputes, and other matters concerning the acceptability of the WORK, the interpretation of the requirements of the Contract Documents pertaining to the performance of the WORK, and claims for changes in the Contract Price or Contract Time under Articles 11 and 12 will be referred to the ENGINEER in writing with a request for formal decision in accordance with this paragraph. The ENGINEER will render a decision in writing within 30 days of receipt of the request. Written notice of each claim, dispute, or other matter will be delivered by the CONTRACTOR to the ENGINEER promptly (but in no event later than 30 days) after the occurrence of the event. Written supporting data will be submitted to the ENGINEER with the written claim unless the ENGINEER allows an additional period of time to ascertain more accurate data in support of the claim.
- B. When reviewing the claim or dispute, the ENGINEER will not show partiality to the OWNER or the CONTRACTOR and will incur no liability in connection with any interpretation or decision rendered in good faith. The ENGINEER's rendering of a decision with respect to any claim, dispute, or other matter (except any which have been waived by the making or acceptance of final

payment as provided in Paragraph 14.12) shall be a condition precedent to the OWNER's or the CONTRACTOR's exercise of their rights or remedies under the Contract Documents or by Law or Regulations with respect to the claim, dispute, or other matter.

9.09 LIMITATION ON ENGINEER'S RESPONSIBILITIES

- A. Neither the ENGINEER's authority to act pursuant to its agreement with the OWNER, nor the description of that authority under this Article 9, nor any other description of the ENGINEER's responsibility in the Contract Documents, nor any decision made by the ENGINEER in good faith either to exercise or not exercise its authority, shall give rise to any duty or responsibility on the part of the ENGINEER to the CONTRACTOR, any Subcontractor, any Supplier, any surety or any other person or organization performing any part of the WORK.
- B. Whenever in the Contract Documents the terms "as ordered," "as directed," "as required," as allowed," "as reviewed," "as approved," or terms of like effect or import are used, or the adjectives "reasonable," "suitable," "acceptable," "proper," or "satisfactory" or adjectives of like effect or import are used to describe a requirement, direction, review, or judgement of the ENGINEER as to the WORK, it is intended that such requirement, direction, review, or judgment will be solely to evaluate the WORK for compliance with the Contract Documents, unless there is a specific statement indicating otherwise. The use of any such term or adjective shall not be effective to assign to the ENGINEER any duty or authority to supervise or direct the performance of the WORK or any duty or authority to undertake responsibility contrary to the provisions of its agreement with the OWNER.
- C. The ENGINEER will not be responsible for the CONTRACTOR's means, methods, techniques, sequences, or procedures of construction not specified in the Contact Documents or the safety precautions and programs incident thereto.
- D. The ENGINEER will not be responsible for the acts or omissions of the CONTRACTOR nor of any subcontractor, supplier, or any other person or organization performing any of the WORK to the extent that such acts or omissions are not reasonably discoverable considering the level of observation and inspection required by the ENGINEER's agreement with the OWNER.

ARTICLE 10 - CHANGES IN THE WORK

10.01 GENERAL

- A. Without invalidating the Agreement and without notice to any surety, the OWNER may at any time or from time to time, order additions, deletions, or revisions in the WORK; these will be authorized by a written Field Order and/or a Change Order issued by the ENGINEER. Upon receipt of any of these documents, the CONTRACTOR shall promptly proceed with the work involved pursuant to the applicable conditions of the Contract Documents.
- B. If the OWNER and the CONTRACTOR are unable to agree upon the increase or decrease in the Contract Price or an extension or shortening of the Contract Time, if any, that should be allowed as a result of a Field Order, a claim may be made therefor as provided in Articles 11 or 12.
- C. The CONTRACTOR shall not be entitled to an increase in the Contract Price nor an extension of the Contract Time with respect to any work performed that is not required by the Contact Documents as amended, modified, or supplemented by Change Order, except in the case of an emergency and except in the case of uncovering work provided in the Paragraph 13.03G.
- D. The OWNER and the CONTRACTOR shall execute appropriate Change Orders covering:
 - 1. Changes in the WORK which are ordered by the OWNER pursuant to Paragraph 10.01A;
 - 2. Changes required because of acceptance of defective work under Paragraph 13.06;
 - 3. Changes in the Contract Price or Contact Time which are agreed to by the parties; or
 - 4. Any other changes agreed to by the parties.
- E. If the provisions of any Bond require notice of any change to be given to a surety, the giving of these notices will be the CONTRACTOR's responsibility. The CONTRACTOR shall provide for the amount of each applicable Bond to be adjusted accordingly.

10.02 ALLOWABLE QUANTITY VARIATIONS

- A. Whenever a unit price and quantity have been established for a bid item in the Contract Documents, the quantity stated may be increased or decreased to a maximum of 25 percent with no change in the unit price. An adjustment in the quantity in excess of 25 percent will be sufficient to justify a change in the unit price. Changes in the quantity of all bid items established in the Contract Documents, regardless of whether the changes are more or less than 25 percent and at the unit price established in the Contract Documents or adjusted otherwise, shall be documented by Change Orders.
- B. In the event a part of the WORK is to be entirely eliminated and no lump sum or unit price is named in the Contract Documents to cover the eliminated work, the price of the eliminated work shall be agreed upon in writing by the OWNER and the CONTRACTOR. If the OWNER and the CONTRACTOR fail to agree upon the price of the eliminated work, the price shall be determined in accordance with the provisions of Article 11.

ARTICLE 11 - CHANGE OF CONTRACT PRICE

11.01 GENERAL

- A. The Contact Price constitutes the total compensation payable to the CONTRACTOR for performing the WORK. Except as directed by Change Orders, all duties, responsibilities, and obligations assigned to or undertaken by the CONTRACTOR shall be at its expense without change in the Contract Price.
- B. The Contract Price may only be changed by a Change Order. Any claim for an increase in the Contact Price shall be based on written notice delivered by the CONTRACTOR to the ENGINEER promptly (but in no event later than 30 days) after the occurrence of the event giving rise to the claim and stating the general nature of the claim. Notice of the amount of the claim with supporting data shall be delivered with the claim, unless the ENGINEER allows an additional period of time to ascertain more accurate data in support of the claim, and shall be accompanied by the CONTRACTOR's written statement that the amount claimed covers all known amounts (direct, indirect, and consequential) to which the CONTRACTOR is entitled as a result of the occurrence of the event. If the OWNER and the CONTRACTOR cannot otherwise agree on the amount involved, all claims for adjustment in the Contract Price shall be determined by the ENGINEER in accordance with Paragraph 9.08A. No claim for an adjustment in the Contact Price will be valid if not submitted in accordance with this Paragraph 11.01B.
- C. The value of any work covered by a Change Order or of any claim for an increase or decrease in the Contact Price shall be determined in one of the following ways:
 - 1. Where the work involved is covered by unit prices contained in the Contract Documents, by application of unit prices to the quantities of the items involved.
 - 2. By mutual acceptance of a lump sum, which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 11.04.
 - 3. On the basis of the cost of work (determined as provided in Paragraphs 11.02 and 11.03) plus a CONTRACTOR's fee for overhead and profit (determined as provided in Paragraph 11.04).

11.02 COST OF WORK (BASED ON TIME AND MATERIALS)

- A. <u>General</u>: The term "cost of work" means the sum of all costs necessarily incurred and paid by the CONTRACTOR for labor, materials, and equipment in the proper performance of work. Except as otherwise may be agreed to in writing by the OWNER, such costs shall be in amounts no higher than those prevailing in the locality of the Project.
- B. <u>Labor</u>: The cost of labor used in performing work by the CONTRACTOR, a subcontractor, or other forces will be the sum of the following:
 - 1. The actual wages paid plus any employer payments to, or on behalf of workers for fringe benefits including health and welfare, pension, vacation, and similar purposes. The cost of labor may include the rates paid to foremen when determined by the ENGINEER that the services of foremen do not constitute a part of the overhead allowance.
 - 2. All payments imposed by state and federal laws including, but not limited to, compensation insurance, and social security payments.
 - 3. The amount paid for subsistence and travel required by collective bargaining agreements, or in accordance with the regular practice of the employer.

At the beginning of the extra work and as later requested by the ENGINEER, the CONTRACTOR shall furnish the ENGINEER proof of labor compensation rates being paid.

- C. <u>Materials</u>: The cost of materials used in performing work will be the cost to the purchaser, whether CONTRACTOR or subcontractor, from the supplier thereof, except as the following are applicable:
 - 1. Trade discounts available to the purchase shall be credited to the OWNER notwithstanding the fact that such discounts may not have been taken by the CONTRACTOR.
 - 2. For materials secured by other than a direct purchase and direct billing to the purchaser, the cost shall be deemed to be the price paid to the actual supplier as determined by the ENGINEER. Markup except for actual costs incurred in the handling of such materials will not be allowed.

- 3. Payment for materials from sources owned wholly or in part by the purchaser shall not exceed the price paid by the purchaser for similar materials from these sources on extra work items or current wholesale price for the materials delivered to the work site, whichever is lower.
- 4. If in the opinion of the ENGINEER the cost of material is excessive, or the CONTRACTOR does not furnish satisfactory evidence of the cost of the material, then the cost shall be deemed to be the lowest current wholesale price for the quantity concerned, delivered to the work site less trade discount. The OWNER reserves the right to furnish materials for the extra work and no claim shall be made by the CONTRACTOR for costs and profit on such materials.
- D. <u>Equipment</u>: The CONTRACTOR will be paid for the use of equipment at the rental rate listed for the equipment specified in the Supplementary General Conditions. The rental rate will be used to compute payments for equipment whether the equipment is under the CONTRACTOR's control through direct ownership, leasing, renting, or another method of acquisition. The rental rate to be applied for use of each item of equipment shall be the rate resulting in the least total cost to the Owner for the total period of use. If it is deemed necessary by the CONTRACTOR to use equipment not listed in the Supplementary General Conditions an equitable rental rate for the equipment will be established by the ENGINEER. The CONTRACTOR may furnish cost data which might assist the ENGINEER in the establishing the rental rate.
 - 1. All equipment shall, in the opinion of the ENGINEER, be in good working condition and suitable for the purpose for which the equipment is to be used.
 - 2. Before construction equipment is used on the extra work, the CONTRACTOR shall plainly stencil or stamp an identifying number thereon at a conspicuous location, and shall furnish to the ENGINEER, in duplicate, a description of the equipment and its identifying number.
 - 3. Unless otherwise specified, manufacturers' ratings and manufacturer approved modifications shall be used to classify equipment for the determination of applicable rental rates. Equipment which has no direct power unit shall be powered by a unit of at least the minimum rating recommended by the manufacturer.
 - 4. Individual pieces of equipment or tools having a replacement value of \$100 or less, whether or not consumed by use, shall be considered to be small tools and no payment will be made therefore.

- 5. Rental time will not be allowed while equipment is inoperative due to breakdowns.
- E. Equipment on the Work: The rental time to be paid for equipment used on the WORK shall be the time the equipment is in productive operation on the extra work being performed and, in addition, shall include the time required to move the equipment to the location of the extra work and return it to the original location or to another location that requires no more moving time than that required to return it to its original location. Moving time will not be paid if the equipment is used on other than the extra work, even though located at the site of the extra work. Loading and transporting costs will be allowed, in lieu of moving time, when the equipment is moved by means other than its own power. However, no payment will be made for loading and transporting costs when the equipment is used on other than the extra work even though located at the site of the extra work. The following shall be used in computing the rental time of equipment on the WORK.
 - 1. When hourly rates are listed, any part of an hour less than 30 minutes of operation shall be considered to be 1/2-hour of operation, and any part of an hour in excess of 30 minutes will be considered one hour of operation.
 - 2. When daily rates are listed, any part of a day less than 4 hours operation shall be considered to be 1/2-day of operation. When owner-operated equipment is used to perform extra work to be paid for on a time and materials basis, the CONTRACTOR will be paid for the equipment and operator, as set forth in Paragraph (3), (4), and (5), following.
 - 3. Payment for the equipment will be made in accordance with the provisions in Paragraph 11.02D, herein.
 - 4. Payment for the cost of labor and subsistence or travel allowance will be made at the rates paid by the CONTRACTOR to other workers operating similar equipment already on the WORK, or in the absence of such labor, established by collective bargaining agreements for the type of workmen and location of the extra work, whether or not the operator is actually covered by such an agreement. A labor surcharge will be added to the cost of labor described herein in accordance with the provisions of Paragraph 11.02B, herein, which surcharge shall constitute full compensation for payments imposed by state and federal laws and all payments made to on behalf of workers other than actual wages.

5. To the direct cost of equipment rental and labor, computed as provided herein, will be added the allowances for equipment rental and labor as provided in Paragraph 11.04, herein.

11.03 SPECIAL SERVICES

- A. Special work or services are defined as that work characterized by extraordinary complexity, sophistication, or innovation or a combination of the foregoing attributes which are unique to the construction industry. The following may be considered by the ENGINEER in making estimates for payment for special services:
 - 1. When the ENGINEER and the CONTRACTOR, by agreement, determine that a special service or work is required which cannot be performed by the forces of the CONTRACTOR or those of any of its subcontractors, the special service or work may be performed by an entity especially skilled in the work to be performed. After validation of invoices and termination of market values by the ENGINEER, invoices for special services or work based upon the current fair market value thereof may be accepted without complete itemization of labor, material, and equipment rental cost.
 - 2. When the CONTRACTOR is required to perform work necessitating special fabrication or machining process in a fabrication or a machine shop facility away from the job site, the charges for that portion of the work performed at the off-site facility may by agreement, be accepted as a special service and accordingly, the invoices from the work may be accepted without detailed itemization.
 - 3. All invoices for special services will be adjusted by deducting all trade discounts offered or available, whether the discounts were taken or not. In lieu of the allowances for overhead and profit specified in Paragraph 11.04, herein, an allowance of 5 percent will be added to invoices for special services.
- B. All work performed hereunder shall be subject to all of the provisions of the Contract Documents and the CONTRACTOR's sureties shall be bound with reference hereto as under the original Agreement. Copies of all amendments to surety bonds or supplemental surety bonds shall be submitted to the OWNER for review prior to the performance of any work hereunder.

11.04 CONTRACTOR'S FEE

A. WORK ordered on the basis of time and materials will be paid for at the actual necessary cost as determined by the ENGINEER, plus allowances for overhead and profit. For extra work involving a combination of increases and decreases in the WORK the actual necessary cost will be the arithmetic sum of the additive and deductive costs. The allowance for overhead and profit shall include full compensation for superintendence, bond and insurance premiums, taxes, office expenses, and all other items of expense or cost not included in the cost of labor, materials, or equipment provided for under Paragraphs 11.02B, C, and D, herein including extended overhead and home office overhead. The allowance for overhead and profit will be made in accordance with the following schedule:

ACTUAL NECESSARY COST OVERHEAD AND PROFIT ALLOWANCE

Labor	10 percent
Materials	10 percent
Equipment	10 percent

B. It is understood that labor, materials, and equipment may be furnished by the CONTRACTOR or by the subcontractor, the allowance specified herein shall be applied to the labor, materials, and equipment costs of the subcontractor, to which the CONTRACTOR may add 5 percent of the subcontractor's total cost for the extra work. Regardless of the number of hierarchical tiers of subcontractors, the 5 percent increase above the subcontractor's total cost which includes the allowances for overhead and profit specified herein may be applied one time only for each separate work transaction.

ARTICLE 12 - CHANGE OF CONTRACT TIME

12.01 GENERAL

- Α. The Contract Time may only be changed by a Change Order. Any claim for an extension of the Contract time shall be based on written notice delivered by the CONTRACTOR to the ENGINEER promptly (but in no event later than 30 days) after the occurrence of the event giving rise to the claim and stating the general nature of the claim. Notice of the extent of the claim with supporting data shall be delivered within 30 days after such occurrence (unless the ENGINEER allows an additional period of time to ascertain more accurate data in support of the claim) and shall be accompanied by the CONTRACTOR's written statement that the adjustment claimed is the entire adjustment to which the CONTRACTOR has reason to believe it is entitled as a result of the occurrence of said event. All claims for adjustment in the Contract Time shall be determined by the ENGINEER in accordance with Paragraph 9.08 if the OWNER and the CONTRACTOR cannot otherwise agree. No claim for an adjustment in the Contract Time will be valid if not submitted in accordance with the requirements of this Paragraph 12.01A.
- B. The Contract Time will be extended in an amount equal to time lost if the CONTRACTOR makes a claim as provided in Paragraph 12.01A and the ENGINEER determines that the delay was caused by events beyond the control of the CONTRACTOR. Examples of events beyond the control of the CONTRACTOR include acts or neglect by the OWNER or others performing additional work as contemplated by Article 7, or by acts of God or of the public enemy, fire, floods, epidemics, quarantine restrictions, strikes, labor disputes, sabotage, or freight embargoes.
- C. All time limits stated in the Contract Documents are of the essence.
- D. None of the aforesaid time extensions shall entitle the CONTRACTOR to any adjustment in the Contract Price or any damages for delay. Furthermore, the CONTRACTOR hereby indemnifies and holds harmless the OWNER and ENGINEER, their officers, agents and employees from and against all claims, damages, losses and expenses (including lost property and attorney's fees) arising out of or resulting from the temporary suspension of work whether for the OWNER's convenience as defined in Article 15.01 (a) or for whatever other reasons including the stoppage of work by the ENGINEER for the CONTRACTOR's failure to comply with any order issued by the ENGINEER.

12.02 EXTENSIONS OF THE TIME FOR DELAY DUE TO INCLEMENT WEATHER

- A. "Inclement weather" is any weather condition or conditions resulting immediately therefrom, causing the CONTRACTOR to suspend construction operations or preventing the CONTRACTOR from proceeding with at least 75 percent of the normal labor and equipment force engaged on the WORK.
- B. Should the CONTRACTOR prepare to begin work at the regular starting time at the beginning of any regular work shift on any day on which inclement weather, or its effects on the condition of the WORK prevents work from beginning at the usual starting time and the crew is dismissed as a result thereof, the CONTRACTOR will not be charged for a working day whether or not conditions change thereafter during the day and the major portion of the day could be considered to be suitable for construction operations.
- C. The CONTRACTOR shall base its construction schedule upon the inclusion of the number of days of inclement weather specified in the paragraph entitled "Inclement weather delays" of the Supplementary General Conditions. No extension of the Contract Time due to inclement weather will be considered until after the stated number of days of inclement weather has been reached. However, no reduction in Contract Time will be made if the number of inclement weather days is not reached.

12.03 EXTENSIONS OF TIME FOR OTHER DELAYS

- If the CONTRACTOR is delayed in completion of the WORK beyond the time Α. named in the Contract Documents for the completion of the WORK, by acts of God or of the public enemy, fire, floods, epidemics, guarantine restrictions, strikes, labor disputes, industry-wide shortage of raw materials, sabotage or freight embargoes, the CONTRACTOR shall be entitled to an adjustment in the Contract Time. No such adjustment will be made unless the CONTRACTOR shall notify the ENGINEER in writing of the causes of delay within 15 calendar days from the beginning of any such delay. The ENGINEER shall ascertain the facts and the extent of the delay. No adjustment in time shall be made for delays resulting from noncompliance with the Contract, accidents, failure on the part of the CONTRACTOR to carry out the provisions of the Contract including failure to provide materials, equipment or workmanship meeting the requirements of the Contract Documents; the occurrence of such events shall not relieve the CONTRACTOR from the necessity of maintaining the required progress.
- B. In the event that Contract completion is delayed beyond the Contract Time named in the Specifications by reason of shortages of raw materials required for CONTRACTOR-furnished items, the CONTRACTOR shall be entitled to

an adjustment in the Contract Time in like manner as if the WORK had been suspended for the convenience and benefit of the OWNER; provided, however, that the CONTRACTOR shall furnish documentation acceptable to the OWNER and ENGINEER that he placed or attempted to place firm orders with suppliers at a reasonable time in advance of the required date of delivery of the items in question, that such shortages shall have developed following the date such orders were placed or attempts made to place same, that said shortages are general throughout the affected industry, that said shortages are shortages of raw materials required to manufacture CONTRACTOR-furnished items and not simply failure of CONTRACTOR's suppliers to manufacture, assemble or ship items on time, and that the CONTRACTOR shall, to the degree possible, have made revisions in the sequence of his operations, within the terms of the Contract, to offset the expected delay. The CONTRACTOR shall notify the ENGINEER, in writing, concerning the cause of delay, within 15 calendar days of the beginning of such delay. The validity of any claim by the CONTRACTOR to an adjustment in the Contract Time shall be determined by the OWNER acting through the ENGINEER, and his findings thereon shall be based on the ENGINEER's knowledge and observations of the events involved and documentation submitted by the CONTRACTOR, showing all applicable facts relative to the foregoing provisions. Only the physical shortage of raw materials will be considered under these provisions as a cause for adjustment of time and no consideration will be given to any claim that items could not be obtained at a reasonable, practical, or economical cost or price, unless it is shown to the satisfaction of the OWNER that such items could have been obtained only at exorbitant prices entirely out of line with current rates taking into account the guantities involved and the usual practices in obtaining such quantities.

C. If the CONTRACTOR is delayed in completion of the WORK by reason of changes made under the provisions of Article 10 or changed conditions as provided under Article 4.03, or by failure of the OWNER to acquire or clear right-of-way as provided under Article 15.01, or by any act of the ENGINEER or of the OWNER, not contemplated by the Contract, an adjustment in the Contract time will be made by the OWNER in like manner as if the WORK had been suspended for the convenience and benefit of the OWNER, except, that if the WORK is increased as a result of changes, the OWNER, at his sole discretion, may grant an adjustment in the number of calendar days for completion of the Contract. In the event of such delay, the CONTRACTOR shall notify the ENGINEER in writing of the causes of delay within 15 calendar days from the beginning of any such delay.

ARTICLE 13 - WARRANTY AND GUARANTEE; TESTS AND INSPECTIONS; CORRECTION, REMOVAL, OR ACCEPTANCE OF DEFECTIVE WORK

13.01 WARRANTY, GUARANTEE AND MAINTENANCE PERIOD

- A. The CONTRACTOR warrants and guarantees to the OWNER and the ENGINEER that all work, equipment, materials and workmanship are in accordance with the Contract Documents and are not defective. Prompt notice of defects discovered by the OWNER or ENGINEER shall be given to the CONTRACTOR. All defective work, whether or not in place, may be rejected, corrected, or accepted as provided in this Article 13.
- If within one (1) year after the date of Final Completion, as set by the B. Engineer's Notice of Completion, or a longer period of time prescribed by Laws or Regulations or by the terms of any applicable special guarantee or specific provisions of the Contract Documents, any work is found to be defective, the OWNER shall notify the CONTRACTOR in writing and the CONTRACTOR shall promptly, without cost to the OWNER and in accordance with the OWNER's written notification, either correct the defective work, or, if it has been rejected by the OWNER, remove it from the site and replace it with non-defective work. In the event the CONTRACTOR does not promptly comply with the notification, or in an emergency where delay would cause serious risk of loss or damage, the OWNER may have the defective work corrected or rejected work removed and replaced. All direct, indirect, and consequential costs of the removal and replacement including but not limited to fees and charges of engineers, architects, attorneys and other professionals will be paid by the CONTRACTOR. This paragraph shall not be construed to limit nor diminish the CONTRACTOR's absolute guarantee to complete the WORK in accordance with the Contract Documents.

13.02 ACCESS TO WORK

A. The ENGINEER, other representatives of the OWNER, testing agencies, and governmental agencies with jurisdictional interests shall have access to the work at reasonable times for their observation, inspections, and testing. The CONTRACTOR shall provide proper and safe conditions for their access.

13.03 TESTS AND INSPECTIONS

- A. The CONTRACTOR shall give the ENGINEER timely notice of readiness of the WORK for all required inspections, tests, or approvals.
- B. If Laws or Regulations of any public body other than the OWNER, with jurisdiction over the WORK require any work to be specifically inspected, tested, or approved, the CONTRACTOR shall pay all costs in connection therewith. The CONTRACTOR shall also be responsible for and shall pay all costs in connection with any inspection or testing required in connection with the OWNER's or the ENGINEER's acceptance of a Supplier of materials or equipment proposed as a substitution or-equal to be incorporated in the WORK and of materials or equipment submitted for review prior to the CONTRACTOR's purchase for incorporation in the WORK. The cost of all inspections, tests, and approvals with the exception of the above which are required by the Contract Documents shall be paid by the OWNER (unless otherwise specified).
- C. The ENGINEER will make, or have made, such inspections and test as the ENGINEER deems necessary to see that the WORK is being accomplished in accordance with the requirements of the Contract Documents. The Contractor without additional cost to the OWNER, shall provide the labor and equipment necessary to make the WORK available for inspections. Unless otherwise specified in the Supplementary General Conditions or the OWNER-ENGINEER Agreement, all other costs of inspection and testing will be borne by the OWNER. In the event the inspections or tests reveal noncompliance with the requirements of the Contract Documents, the CONTRACTOR shall bear the cost of corrective measures deemed necessary by the ENGINEER, as well as the cost of subsequent reinspection and retesting. Neither observations by the ENGINEER nor inspections, tests, or approvals by others shall relieve the CONTRACTOR from the CONTRACTOR's obligation to perform the WORK in accordance with the Contract Documents.
- D. All inspections, tests, or approvals other than those required by Laws or Regulations of any public body having jurisdiction shall be performed by properly licensed organizations selected by the OWNER.

- E. If any work (including the work of others) that is to be inspected, tested, or approved is covered without the ENGINEER's written authorization, it must, if requested by the ENGINEER, be uncovered for testing, inspection, and observation. The uncovering shall be at the CONTRACTOR's expense unless the CONTRACTOR timely notified the ENGINEER of the CONTRACTOR's intention to cover the same and the ENGINEER failed to act with reasonable promptness in response to the notice.
- F. In any work is covered contrary to the written request of the ENGINEER, it must, if requested by the ENGINEER, be uncovered for the ENGINEER's observation and replaced at the CONTRACTOR's expense.
- G. If the ENGINEER considers it necessary or advisable that covered work be observed, inspected or tested by the ENGINEER or others, the ENGINEER shall direct the CONTRACTOR to uncover, expose, or otherwise make available for observation, inspection, or testing that portion of the work in question. The CONTRACTOR shall comply with the ENGINEER's direction and furnish all necessary labor, material, and equipment. If found the work is defective, the CONTRACTOR shall bear all direct, indirect and consequential costs of uncovering, exposure, observation, inspection, and testing and of satisfactory reconstruction of the work, including but not limited to fees and charges for engineers, architects, attorneys, and other professionals. However, if the work is not defective, the CONTRACTOR shall be allowed an increase in the Contract Price or an extension of the Contract Time, or both. The increase in Contract Time and Contract Price shall be the CONTRACTOR's actual time and costs directly attributable to uncovering and exposing the work. If the parties are unable to agree as to the amount or extent of the changes, the CONTRACTOR may make a claim therefor as provided in Articles 11 and 12.

13.04 OWNER MAY STOP THE WORK

A. If the WORK is defective, or the CONTRACTOR fails to perform work in such a way that the completed WORK will conform to the Contract Documents, the OWNER may order the CONTRACTOR to stop the WORK, or any portion thereof, until the cause for the order has been eliminated. This right of the OWNER to stop the WORK shall not give rise to any duty on the part of the OWNER to exercise this right for the benefit of the CONTRACTOR or any other party.

13.05 CORRECTION OR REMOVAL OF DEFECTIVE WORK

A. When directed by the ENGINEER, the CONTRACTOR shall promptly correct all defective work, whether or not fabricated, installed, or completed, or, if the

work has been rejected by the ENGINEER, remove it from the site and replace it with non-defective work. The CONTRACTOR shall bear all direct, indirect and consequential costs of correction or removal, including but not limited to fees and charges of engineers, architects, attorneys, and other professionals made necessary thereby.

13.06 ACCEPTANCE OF DEFECTIVE WORK

A. If, instead of requiring correction or removal and replacement of defective work, the OWNER prefers to accept the work, the OWNER may do so. The CONTRACTOR shall bear all direct, indirect, and consequential costs attributable to the OWNER's evaluation of and determination to accept the defective work. If any acceptance of defective work occurs prior to final payment, a Change Order will be issued incorporating the necessary revisions in the Contact Documents with respect to the WORK, and the OWNER shall be entitled to an appropriate decrease in the Contract Price.

ARTICLE 14 - PAYMENTS TO CONTRACTOR, LIQUIDATED DAMAGES AND COMPLETION

14.01 SCHEDULE OF VALUES (LUMP SUM PRICE BREAKDOWN)

A. The schedule of values or lump sum price breakdown established as provided in the Technical Specifications shall serve as the basis for progress payments and will be incorporated into the form of Application for Payment included in the Contract Documents.

14.02 UNIT PRICE BID SCHEDULE

A. Progress payments for unit price work will be based on the number of units completed.

14.03 APPLICATION FOR PROGRESS PAYMENT

- A. Unless otherwise prescribed by the Owner, on the 25th of each month, the CONTRACTOR shall submit to the ENGINEER for review and approval, an Application for Payment completed and signed by the CONTRACTOR covering the WORK completed as of the date of the Application and accompanied by such supporting documentation as required by the Contract Documents.
- B. The Application for Payment shall identify, as a sub-total, the amount of the CONTRACTOR's Total Earnings to Date, plus the Value of Materials at the Site which have not yet been incorporated in the WORK, and less a deductive adjustment for materials installed which were not previously incorporated in the WORK, but for which payment was allowed under the provisions of payment for Materials Stored at the Site but not yet incorporated in the WORK.
- C. The Net Payment Due to the CONTRACTOR shall be the above-mentioned sub-total, from which shall be deducted the retainage amount and the total amount of all previous payments made to the CONTRACTOR.
- D. The OWNER may withhold and retain 5% of each approved progress payment to the CONTRACTOR. The total retention proceeds withheld shall not exceed 5% of the total construction price. All retention proceeds shall be placed by the OWNER in an interest-bearing account. The interest accrued shall be for the benefit of the CONTRACTOR and its subcontractors, and it shall be paid after the WORK has been completed and accepted by the OWNER. CONTRACTOR shall ensure that any interest accrued on the

retainage is distributed by the CONTRACTOR to its subcontractors on a pro rata basis.

- E. Any retention proceeds withheld, and any accrued interest, shall be released by the OWNER pursuant to an Application for Payment from the CONTRACTOR within 45 days from the later of:
 - 1. the date the OWNER receives the final Application for Payment from the CONTRACTOR;
 - 2. the date that a certificate of occupancy or final acceptance notice is issued to:
 - (a) the Contractor who obtained the building permit from the building inspector or from a public agency;
 - (b) the OWNER; or
 - (c) the ENGINEER.
 - 3. the date the CONTRACTOR accepts final payment for the Work; or
 - 4. the date that a public agency or building inspector having authority to issue its own certificate of occupancy does not issue the certificate but permits partial or complete occupancy of a newly constructed or remodeled building; provided, however, that if only partial occupancy of a building is permitted, any retention proceeds withheld and retained, and any accrued interest, shall be partially released in direct proportion to the value of the part of the building occupied.

Each Application for Payment from the CONTRACTOR shall include documentation of lien releases or waivers.

- F. Notwithstanding any other provision in this Article to the contrary,
 - 1. If the CONTRACTOR is in default or breach of the terms and conditions of the Contract Documents, the OWNER may withhold from payment to the CONTRACTOR for so long as reasonably necessary an amount necessary to cure the breach or default of the CONTRACTOR; or
 - 2. If the WORK or a portion of the WORK has been substantially completed, the OWNER may retain until completion up to twice the

fair market value of the WORK of the CONTRACTOR that has not been completed:

- (a) in accordance with the Contract Documents; or
- (b) in the absence of applicable provisions in the Contract Documents to generally accepted craft standards.
- 3. If the OWNER refuses payment under subparagraphs (F)(i) or (ii), it shall describe in writing within 45 days of withholding such amounts what portion of the WORK was not completed according to the standards specified in the Contract Documents.
- G. The CONTRACTOR shall distribute retention proceeds as outlined below:
 - 1. Except as provided in Paragraph 14.03.G.2, below, if the CONTRACTOR receives retention proceeds, it shall pay each of its subcontractors from whom retention has been withheld each subcontractor's share of the retention received within ten days from the day that all or any portion of the retention proceeds is received from the OWNER.
 - 2. Notwithstanding Paragraph 14.03.G.1, above, if a retention payment received by the CONTRACTOR is specifically designated for a particular subcontractor, payment of the retention shall be made to the designated subcontractor.
- Η. Except as otherwise provided in the Supplementary General Conditions, the value of materials stored at the site shall be valued at 95 percent of the value of the materials. This amount shall be based upon the value of all acceptable materials and equipment stored at the site or at another location agreed to in writing by the OWNER; provided, each individual item has a value of more than \$5,000 and will become a permanent part of the WORK. The Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that the CONTRACTOR has received the materials and equipment free and clear of all liens, charges, security interests, and encumbrances (which are hereinafter in these General Conditions referred to as "Liens") and evidence that the materials and equipment are covered by appropriate property insurance and other arrangements to protect the OWNER's interest therein, all of which will be satisfactory to the OWNER.

14.04 CONTRACTOR'S WARRANTY OF TITLE

A. The CONTRACTOR warrants and guarantees that title to all work, materials, and equipment covered by an Application for Payment, whether incorporated in the WORK or not, will pass to the OWNER no later than the time of final payment free and clear of all liens.

14.05 REVIEW OF APPLICATIONS FOR PROGRESS PAYMENT

- A. The ENGINEER will, within 7 days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to the OWNER, or return the Application to the CONTRACTOR indicating in writing the ENGINEER's reasons for refusing to recommend payment. In the later case, the CONTRACTOR may make the necessary corrections and resubmit the Application. Thirty days after presentation of the Application for Payment with the ENGINEER's recommendation, the amount recommended will (subject to the provisions of Paragraph 14.05B) become due and when due will be paid by the OWNER to the CONTRACTOR.
- B. The OWNER may refuse to make payment of the full amount recommended by the ENGINEER to compensate for claims made by the OWNER on account of the CONTRACTOR's performance of the WORK or other items entitling the OWNER to a credit against the amount recommended, but the OWNER must give the CONTRACTOR written notice within 7 days (with a copy to the ENGINEER) stating the reasons for such action.

14.06 PARTIAL UTILIZATION

- A. The OWNER may utilize or place into service any item of equipment or other usable portion of the WORK at any time prior to completion of the WORK. The OWNER shall notify the CONTRACTOR in writing of its intent to exercise this right. The notice will identify the equipment or specific portion or portions of the WORK to be utilized or otherwise placed into service.
- B. It shall be understood by the CONTRACTOR that until such written notification is issued, all responsibility for care and maintenance of all items or portions of the WORK to be partially utilized shall be borne by the CONTRACTOR. Upon the issuance of a notice of partial utilization, the ENGINEER will deliver to the OWNER and the CONTRACTOR a written recommendation as to division of responsibilities between the OWNER and the CONTRACTOR with respect to security, operation, safety, maintenance,

heat, utilities and insurance. Upon the OWNER's acceptance of these recommendations, the ENGINEER's aforesaid recommendation will be binding on the OWNER and the CONTRACTOR until final payment.

C. The CONTRACTOR shall retain full responsibility for satisfactory completion of the WORK, regardless of whether a portion thereof has been partially utilized by the OWNER and the CONTRACTOR's one year correction period shall commence only after the date of Final Completion for the WORK.

14.07 LIQUIDATED DAMAGES

- Α. The CONTRACTOR shall pay to the OWNER the amount specified in the Supplemental General Conditions, not as a penalty but as liquidated damages, if he fails to complete the WORK or specified parts of the WORK within the time or times agreed upon. The periods for which these damages shall be paid shall be the number of Days from the agreed date or Contract Time as contained in the Agreement, or from the date of termination of any extension of time approved by the OWNER, to the date or dates on which the ENGINEER certifies Substantial Completion of WORK or specified parts of the WORK as provided in Article 14.08, herein. The OWNER may deduct the amount of said damages from any monies due or to become due the CONTRACTOR. After Substantial Completion, if the CONTRACTOR fails to complete the remaining WORK within 45 days or any proper extension thereof granted by OWNER, CONTRACTOR shall pay OWNER the amount stated in the Supplemental General Conditions as liquidated damages for each day that expires after the 45 days until readiness for final payment.
- B. The said amount is fixed and agreed upon by and between the CONTRACTOR and the OWNER because of the impracticability and extreme difficulty of fixing and ascertaining the actual damages the OWNER would sustain; and said amount is agreed to be the amount of damages which the OWNER would sustain. Said damages are not in lieu of but in addition to other actual or consequential damages to which the OWNER may be entitled.
- C. All times specified in the Contract Documents are hereby declared to be of the essence.

14.08 SUBSTANTIAL COMPLETION

A. When the CONTRACTOR considers the WORK ready for its intended use, and the CONTRACTOR has delivered to the ENGINEER all maintenance and operating instructions, schedules, guarantees, bonds, certificates of

inspection, marked-up record documents and other documents, all as required by the Contract Documents, the CONTRACTOR may notify the OWNER and the ENGINEER in writing that the WORK is substantially complete and request that the ENGINEER prepare a Certificate of Substantial Completion. Within a reasonable time thereafter, the OWNER, the CONTRACTOR, and the ENGINEER shall make an inspection of the WORK to determine the status of completion. If the ENGINEER does not consider the WORK substantially complete, the ENGINEER will notify the OWNER and CONTRACTOR in writing giving the reasons therefor. If the ENGINEER considers the WORK substantially complete, the ENGINEER will prepare and deliver to the OWNER for its execution the Certificate of Substantial Completion signed by the ENGINEER and CONTRACTOR, which shall fix the date of Substantial Completion.

- Β. The Certificate of Substantial Completion shall be a release by the CONTRACTOR of the OWNER and its agents from all claims and liability to the CONTRACTOR for anything done or furnished for, or relating to, the WORK or for any act or neglect of the OWNER or of any person relating to or affecting the WORK, to the date of Substantial Completion, except demands against the OWNER for the remainder of the amounts kept or retained from progress payments and excepting pending, unresolved claims filed in writing prior to the date of Substantial Completion. At the time of delivery of the Certificate of Substantial Completion, the ENGINEER will deliver to the OWNER and the CONTRACTOR, if applicable, a written recommendation as to division of responsibilities between the OWNER and the CONTRACTOR with respect to security, operation, safety, maintenance, heat, utilities and insurance. Upon the OWNER's acceptance of these recommendations, the ENGINEER's recommendation will be binding on the OWNER and the CONTRACTOR until final payment.
- C. The OWNER, upon written notice to the CONTRACTOR, shall have the right to exclude the CONTRACTOR from the WORK after the date of Substantial Completion, and complete all or portions of the WORK at the CONTRACTOR's expense.

14.09 COMPLETION AND FINAL PAYMENT

- Α. Upon written certification from the CONTRACTOR that the WORK is complete (if a Certificate of Substantial Completion has been issued this certification must occur within 45 days of that date), the ENGINEER will make a final inspection with the OWNER and the CONTRACTOR. If the OWNER and ENGINEER do not consider the WORK complete, the ENGINEER will notify the OWNER and the CONTRACTOR in writing of all particulars in which this inspection reveals that the WORK is incomplete or The CONTRACTOR shall immediately take the measures defective. necessary to remedy these deficiencies. If the ENGINEER and OWNER consider the WORK complete, the CONTRACTOR may proceed to file its application for final payment pursuant to this Article. At the request of the CONTRACTOR, the ENGINEER may recommend to the OWNER that certain minor deficiencies in the WORK that do not prevent the entire WORK from being used by the OWNER for its intended use, and the completion of which will be unavoidably delayed due to no fault of the CONTRACTOR, be exempted from being completed prerequisite to final payment. These outstanding items of pickup work, or "punch list items", shall be listed on the ENGINEER's Notice of Completion, together with the recommended time limits for their completion, and extended warranty requirements for those items and the value of such items.
- Β. After the issuance of the Notice of Completion and after the CONTRACTOR has completed corrections that have not been exempted to the satisfaction of the ENGINEER and delivered to the ENGINEER all required additions and modifications to maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, marked-up record documents and other documents, all as required by the Contract Documents; and after the ENGINEER has indicated that the WORK is acceptable, the CONTRACTOR may make application for final payment following the procedure for progress payments. The final application for payment shall be accompanied by all documentation called for in the Contract Documents and other data and schedules as the OWNER or ENGINEER may reasonably require, including an affidavit of the CONTRACTOR that all labor, services, material, equipment and other indebtedness connected with the WORK for which the OWNER or his property might in any way be responsible, have been paid or otherwise satisfied, and a consent of the payment bond surety to final payment, all in forms approved by the OWNER.

14.10 FINAL APPLICATION FOR PAYMENT

- A. If, on the basis of the ENGINEER's observation of the WORK during construction and final inspection, and the ENGINEER's review of the final application for payment and accompanying documentation, all as required by the Contract Documents, the ENGINEER is satisfied that the WORK has been completed and the CONTRACTOR has fulfilled all of his obligations under the Contract Documents, the ENGINEER will, within ten days after receipt of the final application for payment, indicate in writing his recommendation of payment and present the application to the OWNER for payment. Thereupon, the ENGINEER will give written notice to the OWNER and the CONTRACTOR that the WORK is acceptable by executing the ENGINEER's Notice of Completion. Otherwise, the ENGINEER will return the application to the CONTRACTOR, indicating in writing the reasons for refusing to recommend final payment, in which case the CONTRACTOR shall make the necessary corrections and resubmit the application.
- B. Within 45 calendar days after the ENGINEER's filing of the Notice of Completion, the OWNER will make final payment including all deducted retainage (except as noted below) to the CONTRACTOR. The OWNER's remittance of final payment shall be the OWNER's acceptance of the WORK if formal acceptance of the WORK is not indicated otherwise. The final payment shall be that amount remaining <u>after</u> deducting all prior payments and all amounts to be kept or retained under the provisions of the Contract, including the following items:
 - 1. Liquidated damages, as applicable.
 - 2. All amounts retained by the OWNER under Paragraph 14.03(F).

14.11 CONTRACTOR'S CONTINUING OBLIGATIONS

A. The CONTRACTOR's obligation to perform and complete the WORK in accordance with the Contract Documents shall be absolute. Neither recommendation of any progress or final payment by the ENGINEER, nor the issuance of a Certificate of Substantial Completion or Notice of Completion, nor payment by the OWNER to the CONTRACTOR under the Contract Documents, nor any use or occupancy of the WORK or any part thereof by the OWNER, nor any act of acceptance by the OWNER nor any failure to do so, nor any review of a shop drawing or sample submittal, will constitute an acceptance of work or materials not in accordance with the Contract Documents or a release of the CONTRACTOR's obligation to perform the WORK in accordance with the Contract Documents.

14.12 FINAL PAYMENT TERMINATES LIABILITY OF OWNER

A. Final payment is defined as the last progress payment made to the CONTRACTOR for earned funds, less deductions listed in Paragraph 14.10B herein. The acceptance by the CONTRACTOR of the final payment referred to in Paragraph 14.10 herein, shall be a release of the OWNER and its agents from all claims of liability to the CONTRACTOR for anything done or furnished for, or relating to, the work or for any act or neglect of the OWNER or of any person relating to or affecting the work, except demands against the OWNER for the remainder, if any, of the amounts kept or retained under the provisions of Paragraph 14.10 herein; and excepting pending, unresolved claims filed prior to the date of the Certificate of Substantial Completion.

ARTICLE 15 - SUSPENSION OF WORK AND TERMINATION

15.01 SUSPENSION OF WORK BY OWNER

- Α. The OWNER acting through the ENGINEER may, by written notice to the Contractor, temporarily suspend the WORK, in whole or in part, for a period or periods of time, but not to exceed 90 days, for the convenience and benefit of the OWNER upon the occurrence of any one or more of the following: (1) unsuitable weather; (2) delay in delivery of OWNER- furnished equipment or materials, or such other conditions as are considered unfavorable for prosecution of the work; (3) Shortfall in construction funds; (4) Constraints imposed by public entities, public utilities, property owners or legal proceedings; (5) Failure or delay in acquisition of easements or right-of-way by the OWNER; or (6) Other conditions which, in the opinion of the OWNER, warrant a delay in the WORK. Suspended WORK shall be resumed by the CONTRACTOR within 10 calendar days of receipt from the ENGINEER of written notice to proceed. Whenever the OWNER temporarily suspends work for any conditions enumerated in this Article 15.01 A, the CONTRACTOR shall be entitled to an adjustment in the Contract Time as specified in Article 12.03 C.
- B. The suspension of work shall be effective upon receipt by the Contractor of the written order suspending the work and shall be terminated upon receipt by the Contractor of the written order terminating the suspension.
- C. The CONTRACTOR hereby indemnifies and holds harmless the OWNER and ENGINEER, their officers, agents and employees, from and against all claims, damages, losses and expenses, including lost profits and attorney's fees, arising out of or resulting from the temporary suspension of the WORK, whether for the OWNER's convenience described in this Article or for whatever other reasons, including the stoppage of work by the ENGINEER for the CONTRACTOR's failure to comply with any order issued by the ENGINEER.

15.02 TERMINATION OF AGREEMENT BY OWNER (CONTRACTOR DEFAULT)

A. In the event of default by the CONTRACTOR, the OWNER may give written notice to the CONTRACTOR of OWNER's intent to terminate the Agreement. The notice shall state the event of default and the time allowed to remedy the default. It shall be considered a default by the CONTRACTOR whenever the CONTRACTOR shall: (1) declare bankruptcy, become insolvent, or assign its assets for the benefit of its creditors; (2) fail to provide materials or workmanship meeting the requirements of the Contract Documents; (3) disregard or violate provisions of the Contract Documents or ENGINEER's

instructions, (4) fail to prosecute the WORK according to the approved progress schedule; or, (5) fail to provide a qualified superintendent, competent workmen, or materials or equipment meeting the requirements of the Contract Documents. If the CONTRACTOR fails to remedy the conditions constituting default within the time allowed, the OWNER may then issue a Notice of Termination.

B. In the event the Agreement is terminated in accordance with Paragraph 15.02A, the OWNER may take possession of the WORK and may complete the WORK by whatever method or means the OWNER may select. The cost of completing the WORK shall be deducted from the balance which would have been due the CONTRACTOR had the Agreement not been terminated and the WORK completed in accordance with the Contract Documents. If such cost exceeds the balance which would have been due, the CONTRACTOR shall pay the excess amount to the OWNER. If such cost is less than the balance which would have been due, the difference.

15.03 TERMINATION OF AGREEMENT BY OWNER (FOR CONVENIENCE)

A. The OWNER may terminate the Agreement at any time if it is found that reasons beyond the control of either the OWNER or CONTRACTOR make it impossible or against the OWNER's interests to complete the WORK. In such a case, the CONTRACTOR shall have no claims against the OWNER except: (1) for the value of the work, as determined by the engineer, performed by the Contractor up to the date the Agreement is terminated; and, (2) for the cost of materials and equipment on hand, in transit, or on definite commitment, as of the date the Agreement is terminated, which would be needed in the WORK and which meet the requirements of the Contact Documents. The value of work performed and the cost of materials and equipment delivered to the site, as mentioned above, shall be determined by the ENGINEER in accordance with the procedure prescribed from making the final application for payment and final payment under Paragraphs 14.09 and 14.10.

15.04 TERMINATION OF AGREEMENT BY CONTRACTOR

A. The CONTRACTOR may terminate the Agreement upon 10 days written notice to the OWNER, whenever: (1) the WORK has been suspended under the provisions of Paragraph 15.01, for more than 90 consecutive days through no fault or negligence of the CONTRACTOR, and notice to resume work or to terminate the agreement has not been received from the OWNER within this time period; or, (2) the OWNER should fail to pay the

CONTRACTOR any monies due him in accordance with the terms or the Contract Documents and within 60 days after presentation to the OWNER by the CONTRACTOR of a request therefor, unless within said 10-day period the OWNER shall have remedied the condition upon which the payment delay was based. In the event of such termination, the CONTRACTOR shall have no claims against the OWNER except for those claims specifically enumerated in Paragraph 15.03, and as determined in Accordance with the requirements of that paragraph.

ARTICLE 16 - MISCELLANEOUS

16.01 GIVING NOTICE

A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended, or if delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

16.02 TITLE TO MATERIALS FOUND ON THE WORK

A. The OWNER reserves the right to retain title to all soils, stone, sand, gravel, and other materials developed and obtained from excavations and other operations connected with the WORK. Unless otherwise specified in the Contract Documents, neither the CONTRACTOR nor any subcontractor shall have any right, title, or interest in or to any such materials. The CONTRACTOR will be permitted to use in the WORK, without charge, any such materials which meet the requirements of the Contract Documents.

16.03 RIGHT TO AUDIT

If the CONTRACTOR submits a claim to the OWNER for additional Α. compensation, the OWNER shall have the right, as a condition to considering the claim, and as a basis for evaluation of the claim, and until the claim has been settled, to audit the CONTRACTOR's books. This right shall include the right to examine books, records, documents, and other evidence and accounting procedures and practices, sufficient to discover and verify all direct and indirect costs of whatever nature claimed to have been incurred or anticipated to be incurred and for which the claim has been submitted. The right to audit shall include the right to inspect the CONTRACTOR's plants, or such parts thereof, as may be or have been engaged in the performance of the WORK. The CONTRACTOR further agrees that the right to audit encompasses all subcontracts and is binding upon subcontractors. The right to examine and inspect herein provided for shall be exercisable through such deems representatives as the OWNER desirable during the CONTRACTOR's normal business hours at the office of the CONTRACTOR. The CONTRACTOR shall make available to the OWNER for auditing, all relevant accounting records and documents, and other financial data, and upon request, shall submit true copies of requested records to the OWNER.

16.04 ASBESTOS

A. If the CONTRACTOR during the course of work observes the existence of asbestos in any structure or building, the CONTRACTOR shall promptly notify the OWNER and the ENGINEER. The OWNER shall consult with the ENGINEER regarding removal or encapsulation of the asbestos material and the CONTRACTOR shall not perform any work pertinent to the asbestos material prior to receipt or special instruction from the OWNER through the ENGINEER.

ARTICLE 17- GENERAL

17.01 GENERAL

- 1. These Supplemental General Conditions amend or supplement the General Conditions of the Contract and any other provisions of the Contract Documents as indicated herein. All provisions which are not so amended or supplemented remain in full force and effect.
- 2. The terms used in these Supplemental General Conditions which are defined in the General Conditions of the Contract have the meanings assigned to them in the General Conditions of the Contract herein.

17.02 SUPPLEMENTAL DEFINITIONS

1. ENGINEER

The "Engineer" is

David Evans and Associates 10913 South River Front Parkway South Jordan, Utah 84095 Telephone: (385) 955-2850

17.03 TESTING COSTS

1. Paragraph 13.03 of the General Conditions is amended as follows: the CONTRACTOR shall pay all testing costs. The Owner reserves the right to have additional tests performed by a testing organization selected by the OWNER and at the OWNER's expense.

ARTICLE 18 - AMOUNTS OF LIQUIDATED DAMAGES, BONDS AND INSURANCE

18.01 AMOUNT OF LIQUIDATED DAMAGES

A. As provided in Article 14.07 of the General Conditions, the Contractor shall pay to the Owner as liquidated damages the amount of \$1,000 for each calendar day's delay beyond the Contract Time for substantial completion, liquated damages shall apply to each site stipulated in the Contract Documents. The Contractor shall pay to the Owner as liquidated damages the amount of \$200 for each calendar day's delay beyond 45 calendar days from the date of substantial Completion until the Engineer issues the Notice of Final Completion.

18.02 PERFORMANCE AND OTHER BOND AMOUNTS

- A. The CONTRACTOR shall furnish a satisfactory Performance Bond in the amount of 100 percent of the Contract Price and a satisfactory Payment Bond in the amount of 100 percent of the Contract Price.
- 18.03 INSURANCE AMOUNTS

The limits of liability for the insurance required by Paragraph 5.02 of the General Conditions shall provide for not less than the following amounts or greater where required by Laws and Regulations:

- A. <u>Workers' Compensation</u> under Paragraph 5.02B.1 of the General Conditions:
 - 1. State: Utah

Statutory

- B. <u>Comprehensive General Liability</u>: (under Paragraph 5.02B.2 of the General Conditions):
 - 1. Bodily Injury (including completed operations and products liability):

<u>\$ 500,000</u>	Each Occurrence
\$ <u>1,000,000</u>	Annual Aggregate

Property Damage:

\$<u>500,000</u> \$<u>1,000,000</u> or a combined single limit of Each Occurrence Annual Aggregate \$<u>1,000,000</u>

- 2. Property Damage liability insurance including, Explosion, Collapse and Underground coverages, where applicable.
- 3. Personal Injury, with employment exclusion deleted

\$<u>1,000,000</u> Annual Aggregate Comprehensive Automobile Liability: (Under Paragraph 5.02B.3 of the General Conditions:) 1. **Bodily Injury** \$ 500,000 Each Person \$ 1,000,000 Each Occurrence 2. Property Damage: \$ 500,000 Each Occurrence or combined single limit of \$<u>1,000,000</u>

D. Builders Risk: Not required.

C.

ARTICLE 19 - PHYSICAL CONDITIONS AND WEATHER DELAYS

19.01 INCLEMENT WEATHER DELAYS

A. The Contractor's construction schedule shall be based upon the inclusion of at least five (5) day(s) of inclement weather delays. Reference Article 12, paragraph 12.02 of the General Conditions for additional requirements.
SUPPLEMENTAL GENERAL CONDITIONS

ARTICLE 20 - SUBCONTRACT LIMITATIONS

20.01 SUBCONTRACT LIMITATIONS

A. In addition to the provisions of Paragraph 6.05 of the General Conditions, the CONTRACTOR shall perform not less than 20 percent of the WORK with its own forces (i.e., without subcontracting). The 20 percent requirement shall be understood to refer to the WORK, the value of which totals not less than 20 percent of the Contract Price.

ARTICLE 21 - MISCELLANEOUS

21.01 PATENTS AND COPYRIGHTS

The Contractor shall indemnify and save harmless the Owner, the Engineer, and their officers, agents, and employees, against all claims or liability arising from the use of any patented or copyrighted design, device, material, or process by the Contractor or any of his subcontractors in the performance of the work.

SPECIFICATIONS

SUMMARY OF WORK

PART 1. GENERAL

1.1 GENERAL

A. The work to be performed under this project shall consist of furnishing all labor, materials, and equipment necessary or required to complete the work in all respects as shown on the Drawings and as herein specified. All work, materials, and services not expressly shown or called for in the Contract Documents which may be necessary to complete the construction of the work in good faith shall be performed, furnished, and installed by CONTRACTOR as though originally so specified or shown, at no increase in cost to OWNER.

1.2 WORK COVERED BY THE CONTRACT DOCUMENTS

A. The work comprises modifications of the valve vault located near 6180 South 3200 West in Taylorsville; Utah; including concrete structure, piping, valves, fittings, connecting pipes into existing system piping, other equipment as identified on the drawings, backfill with CLSM, asphalt road replacement and other surface improvements including curb, gutter and sidewalk; and all other associated work shown on the drawings.

1.3 SCHEDULE OF WORK

- A. Any work requiring waterline shutdown or isolation shall by completed by April 1st, 2024.
- B. Work will be required to be completed by the timeframe listed above. The water at the site can be shut off for a period of three weeks and turned back on during the last week for testing and backfilling.
 - 1. Owner Shutdowns may not completely turn off the water. Contractor shall anticipate some of the valves may leak and prepare for pumping and/or removal of bypass water.
 - 2. Surface restoration to be completed in the Spring of 2024, weather permitting.

1.4 CONTRACT METHOD

A. The work hereunder will be constructed under a single lump sum contract for modifications to each of the valve vaults and an "each" price for additive alternates.

1.5 CONTRACTOR USE OF PROJECT SITE

A. Contractor's use of the project site shall be limited to its construction operations, including on-site storage of materials and on-site construction of facilities.

1.6 **PROJECT SECURITY**

A. Contractor shall make all necessary provisions to protect the project, and Owner's and Contractor's facilities from fire, theft, and vandalism, and the public from unnecessary exposure to injury.

1.7 CHANGES IN THE WORK

A. It is mutually understood that it is inherent in the nature of public works construction that some changes in the plans and specifications may be necessary during the course of construction to adjust them to unforeseen field conditions, and that it is of the essence of the Contract to recognize a normal and expected margin of change. ENGINEER shall have the right to make such changes, from time to time, in the plans, in the character if the work, and in the scope of the project as may be necessary or desirable to ensure the completion of the work in the most satisfactory manner without invalidating the Contract.

PART 2. PRODUCTS (NOT USED)

PART 3. EXECUTION (NOT USED)

END OF SECTION

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TRAFFIC REGULATION

PART 1. GENERAL

1.1 MATERIALS AND CONTRACT

A. Signs, warnings, light signals, bypass layouts, scheduling and routes shall conform to the requirements of U.S. Department of Transportation Federal Highway Administration "Manual on Uniform Traffic Control Devices", latest edition, as amended by local or state agency.

1.2 SUBMITTALS

- A. Approved Traffic Control Plan
- B. Approved City of Taylorsville Excavation Permit

1.3 MAINTENANCE OF TRAFFIC

- A. The Contractor shall conduct his work so as to interfere as little as possible with public travel, and shall at his own expense provide and maintain suitable bridges, detours, or other temporary facilities for the accommodation of public or private travel including mail delivery, and shall give reasonable notice to the owners of private drives before interfering with them; provided, however, that such maintenance of traffic will not be required where the Contractor has obtained permission from the owners or tenants of private property, or the proper public authority, or both, to obstruct traffic within the said limits and time agreed upon.
- B. Access for firefighting equipment, police and ambulance services shall be provided at all times and the Contractor shall keep the local authorities informed at all times of the location of construction operations and fire lanes.
- C. The Contractor shall also notify the authorities in charge of any municipal, private, or school transportation systems at least 48 hours in advance, of road closures that will force a change in the regular routing of the transportation system. The Contractor shall also provide maintain suitable detour routes for the system.
- D. Highway and arterial crossings shall be made in such a way that no more than half of the roadway is closed to traffic at any time, except where suitable detours or other arrangements are agreed to by the agency having jurisdiction.

1.4 COMPLIANCE WITH LOCAL REQUIREMENTS

- A. The Contractor shall comply with all applicable state and local requirements for closure of streets.
- B. The Contractor shall provide barriers, guards, lights, signs, temporary bridges, flagmen and watchmen, advising the public of detours and construction hazards.
- C. The Contractor shall also be responsible for compliance with additional public safety requirements which may arise during construction.
- D. The Contractor shall furnish and install, and upon completion of the work, promptly remove all temporary signs and warning devices.
- E. All usage of the right-of-way shall be for a lawful purpose and shall not breach the peace or adversely interfere with public use of the right-of-way. The location, time and date of the use must be in accordance with requirements. All temporary signs for directional control and warning must be approved, properly erected and removed immediately after termination of the use. The Contractor shall be liable for any expense, damages or cost required to return right-of-way to its condition prior to use by the Contractor or to an improved condition if specifically required by the conditions of the permit. Police escorts, control and inspections may be required. All materials used in use-related structures shall be of fireretardant materials and subject to Fire Department requirements. Other conditions may be imposed at the discretion of the right-of-way inspector.
- F. Construction in arterial right-of-way is only authorized between 9:00 a.m. and 3:00 p.m., Monday through Friday, without prior approval.
- G. Construction in residential street right-of-way is only authorized between 7:00 a.m. and 7:00 p.m., Monday through Friday, without prior approval.
- H. Unless otherwise authorized, the Contractor shall maintain at least one lane open at all times.
- I. Countermanded traffic signals shall require the use of a Police Officer for traffic control.

1.5 TRAFFIC CONTROL PLAN

A. Temporary traffic control to ensure the traffic safety during construction activities must be provided. An approval plan is required prior to starting construction activities.

- B. The traffic control plan shall minimize disruption to pedestrians. In the event of pedestrian disruption, the plan shall contain adequate pedestrian connections and clear signage.
- C. Not less than ten days before beginning construction, the Contractor shall prepare and submit a general construction traffic control plan for the entire project, showing how detour routes will be signed and controlled.
- D. The traffic control plan shall include and make provision for at least the following items:
 - 1. Maintain at least one lane of traffic during construction in all streets and roads wherever possible.
 - 2. Employ flag persons to direct traffic as required assuring safe vehicular traffic.
 - 3. Provide for the protection of pedestrians at all times.
 - 4. Where road closure is approved, provide, install and maintain all signs, barricades, posts, guards and notices whenever a street must be completely closed.
 - 5. Provide, install, and maintain all signs, barricades, posts, guards, and notices whenever a street must be completely closed.
 - 6. Provide for passage of local vehicles to businesses and homes.
 - 7. Provide for passage and access of emergency vehicles, police, fire, and disaster units at all times. Assume liability for any damages resulting from failure to provide said access.
 - 8. Revise and update specific traffic control plan to reflect changes in the project schedule as required by the Owner.
 - 9. Compliance with locally required bypass and construction sequence.

1.6 STORAGE OF MATERIALS AND EQUIPMENT

- A. Materials or equipment shall not be stored where it will interfere with the free and safe passage of public traffic.
- B. During work hours, only materials and equipment necessary for construction are allowed in the roadway. Materials or equipment shall not be stored where it will be hazardous.
- C. During nonworking hours, the project site is to be left in a manner that is safe and protected from the public using the right-of-way. The Contractor shall remove all equipment and other obstructions from that portion of the roadway to be opened for use by public traffic at the end of each day's work and at other times when construction operations are suspended for any reason. Equipment and materials are not allowed in the right-of-way unless they are placed in a safe location or protected by permanent guardrails, lighted barricades or temporary concrete barriers (permitted only if approved by the right-of-way inspector).

- D. Materials or other obstructions shall not be placed within 20 feet of fire hydrants, which shall at all times be readily accessible to the fire department, nor within ten feet of United States mailboxes.
- E. The location for parking and staging of materials and equipment shall be as agreed upon with the Owner or as arranged with private property owners. Use and restoration of private property used for parking, staging or storage of materials and equipment shall be the responsibility solely of the Contractor.

1.7 MAINTENANCE OF POSTAL SERVICE

- A. The Contractor shall be responsible for determining and complying with the United States Postal Department's requirements for maintaining postal service within the project area and along related detour routes.
- B. Where required by street closures or excessive interferences, the Contractor shall move mailboxes to temporary locations designated by the postal service and, when such closures are terminated, shall return the mailboxes to locations and conditions satisfactory to the owners and the postal service.
- C. Other mailboxes removed or damaged by the Contractor shall be placed to the satisfaction of the owners and the postal service within 24 hours of their removal or damage.

1.8 TEMPORARY STREET CLOSURES

- A. Signs shall be posted in a conspicuous place at each end of the roadway to be closed and at all intersections associated and/or adjacent to the closed segment of the street.
- B. The signs shall be posted no later than three (3) calendar days prior to the proposed closure.
- C. Any residential street closures will require a detour plan, signage and a public notice published in the newspaper-of-record three (3) calendar days prior to the proposed closure.
- D. For all nonemergency arterial street closures, the publication of the closure is required in addition to posting signs a minimum of three (3) calendar days in advance, regardless of the length of closure.
- E. The Contractor shall also notify authorities in charge of any municipal, private or school transportation system at least three (3) days in advance of road closures that will force a change in the regular routing of the transportation system. The Contractor shall also provide and maintain suitable detour routes for the system.

- F. For all street closures described above, the Contractor is required to notify in writing the following agencies a minimum of three (3) calendar days prior to the closure:
 - 1. The Police Department
 - 2. The Fire Department
 - 3. The School District
- G. All temporary street closures, signage and notices must be approved in advance.
- H. These standards shall be considered minimum; other notifications may be required as appropriate.

END OF SECTION

SUBSURFACE INVESTIGATION

PART 1. GENERAL

- A. Any data on soil and/or subsurface conditions shown in the Plans or Specifications is not to be taken as a representation, but is based on limited information and is at best only an opinion; consequently, such data cannot be considered precise or complete and there is no guarantee as to its completeness, accuracy, or precision.
- B. Additional Investigation:
 - 1. Contractor should visit the site and acquaint himself with site conditions before submitting a bid and the submission of a bid will be prima facie evidence that he has done so.
 - 2. Prior to bidding, Contractor may make his own subsurface investigations to satisfy himself with site and subsurface conditions.

1.2 QUALITY ASSURANCE

- A. The Contractor shall readjust work performed that does not meet technical or design requirements.
- B. The Contractor shall make no deviations from the Contract Documents without specific and written approval of the Owner.
- C. The Contractor shall be responsible for obtaining approval from responsible agency or property owner before performing any exploratory excavations.

END OF SECTION

DEMOLITION

PART 1. GENERAL

1.1 **PROTECTION**

- A. Streets, roads, adjacent property and other work to remain shall be protected throughout the work.
- B. Pavement may be cut only where authorized and only to the extent specified.
- C. Anything not identified to be demolished or removed, damaged by Contractor's operations, shall be replaced as new by Contractor at Contractor's expense.

1.2 CUTTING PAVEMENT, CURBS AND WALKS

A. Unless specified otherwise by the authority having control over the pavement, curbs and walks, cutting and replacement shall be as specified in Section 02575.

1.3 PRIVATE DRIVEWAYS, CULVERTS AND MISCELLANEOUS

- A. Pipe laying operations in certain areas may necessitate temporary removal of mail boxes, private driveways, drains, service lines, conduits, etc. to facilitate construction. In the event that the Contractor finds it necessary to remove the above mentioned items, it is to be understood that it will be his responsibility to restore these items in a manner equal to their original condition. The Contractor shall maintain adequate temporary provisions for domestic deliveries and utilities service and access to firefighting equipment.
- B. The preceding requirement will be the same for any temporary removal of road culverts, whether under state, county or private jurisdiction.
- C. The cost of the above described work shall be included in the price bid for pipe and no additional compensation shall be made to the Contractor.
- D. The Contractor shall make every effort to prevent blocking private driveways for more than a reasonable time and shall make such driveways immediately accessible on order of the Owner.

1.4 REMOVAL OF STRUCTURES

- A. The Contractor shall raze, remove, and dispose of all buildings and foundations, structures, fences, and other obstructions that are indicated in the drawing.
- B. Remove foundations to a depth of at least 5 feet below finished ground elevation or subgrade elevation, whichever is lower.
- C. Break up basement floors to promote drainage.
- D. Fill basements or other cavities left by the removal of structures to match the level of surrounding ground.
- E. When salvageable material is to remain the Owner's property, the Contractor shall remove it and deliver it to site designated by the Engineer or project documents. Any material not designated as the Owner's property will belong to the Contractor. The Contractor shall store or dispose of such material at suitable disposal site or at his storage yard.
- F. Work crews shall be provided with proper protective clothing and equipment.
- G. Waste and abandoned asbestos materials and materials, clothing, etc. used in asbestos handling and removal shall be disposed of in a manner consistent with the regulations and provisions cited above.
- H. All costs associated with the demolition and abandonment of asbestos material shall be considered incidental to the work; no additional compensation will be made to the Contractor.
- I. The Contractor (person or organization removing asbestos with certified asbestos workers) shall assume ALL risk and all liability for the removal and disposal of the asbestos and the Contractor shall comply with all federal, state and local laws, statutes and regulatory agency regulations and requirements including but not limited to the requirements relating to environmental pollutants and the requirements relating to the removal and disposal of asbestos. The Contractor shall insure that the asbestos removal is pursuant to all state and federal laws and regulations. The Contractor shall be responsible for any and all fines or penalties which may be levied due to the Contractor's violation of any of the aforementioned laws and regulations.

END OF SECTION

SECTION 02050 DEMOLITION

DEWATERING

PART 1. GENERAL

1.1 QUALITY CONTROL

- A. It shall be the sole responsibility of the Contractor to control the rate and effect of the dewatering in such a manner as to avoid all objectionable settlement and subsidence.
- B. The Contractor shall employ an independent qualified Professional Engineer with experience in similar dewatering problems to review and approve the Contractor's proposed method of dewatering and to at least weekly, inspect the Contractor's operations and provide a report to the Engineer.
- C. All dewatering operations shall be adequate to assure the integrity of the finished project and shall be the responsibility of the Contractor.
- D. Where critical structures or facilities exist immediately adjacent to areas of proposed dewatering, reference points should be established and observed at frequent intervals to detect any settlement which may develop. Should significant settlement be observed, recharge wells could be placed between the structure and the trench and water pumped under pressure back into the soil.
- E. The responsibility for conducting the dewatering operation in a manner which will protect adjacent structures and facilities rests solely with the Contractor. The cost of repairing any damage to adjacent structures and restoration of facilities shall be the responsibility of the Contractor.

PART 2. PRODUCTS

2.1 EQUIPMENT

A. Before operations begin, the Contractor shall have available on the site of work sufficient pumping equipment and/or other machinery to ensure that the operation of the dewatering system can be maintained.

PART 3. EXECUTION

3.1 METHODS

- A. Dewatering shall be done by such method as the Contractor may elect.
- B. Dewatering, sufficient to maintain the groundwater level at or below the surface of trench bottom or base of the foundation gravel shall be accomplished prior to excavation and placing of pipeline or concrete. The dewatering operation, however accomplished, shall be carried out so that it does not destroy or weaken the strength of the soil under or alongside the excavation.
- C. The normal water table shall be restored to its natural level in such a manner as to not disturb the pipe, its foundation and structures.
- D. If well points or wells are used, they shall be adequately spaced to provide the necessary dewatering and shall be sand packed and/or other means used to prevent pumping of fine sands or silts from the subsurface. A continual check by the Contractor shall be maintained to ensure that the subsurface soil is not being removed by the dewatering operation.
- E. Dewatering of the excavations shall be considered as incidental to the construction and all costs thereof shall be included in various unit contract prices in the Bid Form.
- F. Dispose of water so as not to cause injury to public or private property or to cause a nuisance or menace to the public and in accordance with the requirements of regulatory agencies.
- G. Construction of temporary facilities to dispose of water shall be incidental to the construction.
- H. Permanent piping systems shall not be incorporated in the dewatering system.

END OF SECTION

SHORING

PART 1. GENERAL

1.1 QUALITY ASSURANCE

A. Where the depth of excavation is less than 20 (twenty) feet, the Contractor shall provide, place and maintain responsibility for shoring, sheeting, bracing, sloping or otherwise support the sides of trenches and excavations, including embankments by a means of sufficient strength to protect employees. Such shoring and associated responsibilities shall be in accordance with federal, state and local safety requirements (the most stringent requirement prevailing).

PART 2. PRODUCTS

2.1 SHORING SYSTEMS

A. Materials used shall be at the Contractor's option.

PART 3. EXECUTION

3.1 SAFETY REQUIREMENTS

A. Shoring shall be placed in accordance with federal, state and local safety requirements (the most stringent requirement prevailing)

3.2 SHORING SYSTEMS

- A. Unless otherwise provided, the Contractor shall provide all shoring systems needed to protect the work, adjacent property and improvements, utilities, pavement, etc., and to provide safe working conditions in the trench.
- B. Removal of any or all shoring systems from the trench shall be accomplished in such a manner as to fulfill all the above requirements and shall also be accomplished in such a manner as to prevent any damage to the work.
- C. Damages resulting from improper shoring or from failure to shore shall be the sole responsibility of the Contractor.
- D. Whether shoring systems shall be left in place or removed shall be at the option of the Contractor, provided that removal of any and all shoring used in trench or structure excavation shall be accomplished in the manner as

to prevent the settlement of the pipes or other work and to prevent increased backfill loading which might overload the pipe or walls of the structure.

- E. Shoring shall be removed to a minimum of 5 feet below the final grade.
- F. Should the Owner order that any shoring be left in place, the Contractor shall not remove the same but will receive payment for the materials left in place at the market value thereof.

3.3 SPECIAL REQUIREMENT FOR FLEXIBLE PIPE

- A. Shoring to be removed, or moveable trench shields or boxes, shall be located at least 2 pipe diameters away from the pipe if the bottom of the shoring, shield or box extends below the top of flexible pipe, unless a satisfactory means of reconsolidating the bedding or side support material disturbed by shoring removal can be demonstrated.
- B. Damages resulting from improper shoring or failure to shore shall be the sole responsibility of the Contractor.

END OF SECTION

GRADING

PART 1. GENERAL

1.1 QUALITY CONTROL ASSURANCE

- A. Soils and Backfill: Moisture density standard ASTM D1557 or AASHTO T-180 method unless otherwise specifically approved.
- B. In place Density Determination: Sandcone method ASTM D1556 or Nuclear method ASTM D2922.
- C. Classification of Soils ASTM D2487.
- D. Quality control monitoring of subgrade backfill and embankment materials and construction by certified independent laboratory approved by Engineer, secured and paid for by the Contractor.

1.2 SUBMITTALS

- A. Import backfill gradation and moisture density compaction curve test reports.
- B. Embankment and native backfill materials gradations and moisture density standards curve test reports.
- C. Certification of gradation and compliance with referenced standards, and moisture density standards test reports.
- D. Density test results in approved format.

PART 2. PRODUCTS

2.1 WASTE MATERIAL

- A. Foreign materials, buried rubble, abandoned pipes and native soil materials that cannot be processed to uniform moisture and texture necessary to achieve specified densities shall be disposed of by the Contractor at the appropriate waste site.
- B. Approved waste site shall be provided by the Contractor.

PART 3. EXECUTION

3.1 WORK SEQUENCE

- A. Notify Engineer of any discrepancies between contractual requirements and site conditions prior to start of work.
- B. Maintain backfill embankment and subgrade zones or lifts open until approval of testing is secured from the Engineer. Any work covered up prior to approval shall be excavated and reconstructed at Contractor's expense.
- C. Work in inclement wet weather at Contractor's risk.
- D. Any materials which become unstable as the result of improper selection of techniques, equipment, or operations during inclement wet weather shall be replaced at Contractor's expense with imported material.
- E. Excavations shall be accomplished in such a manner that drainage is maintained at all times.

3.2 STOCKPILING NATIVE MATERIALS FOR REUSE

- A. Material suitable for topsoil shall be deposited in protected, maintained piles separate from other materials and readily available.
- B. Upon completion, all material storage areas shall be restored to substantially their original condition.

3.3 EXCAVATION

- A. Remove all materials required regardless of type or character.
- B. Excavate to lines and grades as necessary.
- C. Transport all materials to embankment areas or to waste as required.

3.4 PREPARATION OF GROUND SURFACE FOR FILL

- A. All vegetation, such as roots, brush, heavy sods, heavy growth of grass, and all decayed vegetable matter, rubbish, and other unsuitable materials within the area upon which fill is to be placed, shall be stripped or otherwise removed before the fill is started.
- B. Sloped ground surfaces steeper than one vertical to four horizontal on which fill is to be placed, shall be plowed, stepped (benched), or broken up in such manner that the fill material will bond with the existing surface.
- C. The original ground surface shall be plowed or scarified to a depth of at least six (6) inches and compacted as specified herein.

D. Soft, wet soils shall be excavated and replaced or allowed to dry before placing fill.

3.5 EMBANKMENT

- A. Construct of materials specified, conditioned to proper moisture and texture necessary to assure specified densities.
- B. Loose thickness lifts not to exceed 8 inches.
- C. Maintain drainage at all times.

3.6 COMPACTION

A. Compact each lift to meet the maximum density at optimum moisture content requirements as set forth by the authority having jurisdiction or 95% minimum modified proctor whichever is greater.

3.7 FINISH ELEVATIONS

- A. Contours illustrated are intended as a general guide to achieve proper aesthetics and drainage control.
- B. Control grid and spot elevations to be established by Contractor.
- C. Vary control grid spacing to accurately define slope, rounding of mounds and depressions.
- D. Field staking of certain intermediate grid points at locations where slopes are uniform may, at Engineer's discretion, be eliminated.
- E. Finished surface shall be smooth, compacted and free from irregular surface change so as to drain readily.
- F. The degree of finish shall be that ordinarily obtainable from blade grader operations, except as otherwise specified. The finished surfaces not to be paved shall be not more than 0.15 feet above or below the established grade or approved cross section. All areas to be paved shall be finished as required for pavement subgrade.

3.8 DENSITY TEST RECORD DOCUMENTATION

- A. Location of horizontal and vertical grid and datum.
- B. Density and percent of referenced standard computation.
- C. Material description and appropriate compaction control standard.

3.9 DENSITY TEST FREQUENCY

- A. Foundation embankment under structures and pipelines, top two feet of road subgrade, and 10 foot wide backfill zone around structures for each one foot of vertical embankment or backfill height, conduct one test for every 300 square feet.
- B. Other embankment under structures and pipelines, top two feet of road subgrade, and 10 foot wide backfill zone around structures for each one foot of vertical embankment or backfill height, conduct one test for every 600 square feet, except as required by Section 02222.
- C. Additional tests as required by the Engineer, if tests indicate compaction deficiency or as required by the authority having jurisdiction.

END OF SECTION

EXCAVATING, BACKFILLING AND COMPACTING FOR UTILITIES

PART 1. GENERAL

1.1 CLASSIFICATION

- A. All excavation is unclassified unless separate bid item is included in bid form.
- B. The terms earthwork or excavation include all materials excavated or removed regardless of material characteristics.
- C. The Contractor shall make his own estimate of the kind and extent of materials which will be encountered in the excavation.

1.2 QUALITY CONTROL ASSURANCE

- A. Soils and Backfill: Moisture density standard ASTM D1557 or AASHTO T-180 method unless otherwise specifically approved.
- B. In place Density Determination: Sandcone method ASTM D1556 or Nuclear method ASTM D6938.
- C. Classification of Soils: ASTM D2487.
- D. Quality control monitoring of subgrade backfill and embankment materials and construction by certified independent laboratory approved by Engineer and secured and paid for by the Contractor.

1.3 SUBMITTALS

- A. Import aggregate gradation and moisture density relationship curves.
- B. Embankment and native backfill materials gradations and moisture density relationship curves.
- C. Certification of gradation and compliance with referenced standards and moisture density relationship curve standards.
- D. Density test results in approved format.
- E. At any time the Contractor shall change the source and/or stockpile from which materials are obtained, certificates of gradation for these new sources will also be required. The Contractor shall make allowances in

his unit prices bid for these items to cover expenses incurred in having this certification made and no additional compensation will be allowed.

- F. During construction, the Owner may elect to have further gradation testing completed on the materials being furnished by the Contractor. This testing will be at the expense of the Owner, however, the Contractor shall provide material samples as may be necessary to complete this testing and these material samples will be furnished from material available on the job site or from the Contractor's source and/or supplier.
- G. Controlled Density Fill (CDF): Furnish a certificate with each truckload of CDF product delivered to the site, indicating the composition and quality of the mix. Include size and weight of each aggregate, amount of cement, amount of water and amount and kind of any additives.

PART 2. PRODUCTS

2.1 CRUSHED ROCK

A. Crushed rock shall be manufactured from ledge rock, talus, or gravel. The materials shall be uniform in quality and substantially free from wood, roots, bark, and other extraneous material and shall meet the following quality test requirements:

Los Angeles Wear, 500 Rev.	35% max
Degradation Factor – Top Course	25 min.
Degradation Factor – Base Course	15 min.

B. Crushed rock shall meet the following requirements for grading and quality:

Percent	Passing	by	Weight
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Sieve Size	Base Course	Top Course and Keystone
1¼"	100	
1"	80-100	
3/4"		100
⁵ /8"	50-80	
1/2"		80-100
No. 4	25-45	46-66
No. 40	3-18	8-24
No. 200	7.5 max.	10.0 max.
% Fracture	75 min.	75 min.
Sand Equivalent	40 min.	40 min.

C. The fracture requirement shall be at least one fractured face and will apply to the combined aggregate retained on the No. 4 sieve in accordance with field operating procedures for AASHTO TP 61.

D. The portion of crushed rock retained on a No. 4 sieve shall not contain more than 0.15 percent wood waste.

2.2 GRAVEL BEDDING

A. Gravel bedding shall consist of crushed, processed, or naturally occurring material that is granular and well-graded. It shall be free from various types of wood waste or other extraneous or objectionable materials. It shall have such characteristics of size and shape that it will compact and shall meet the following quality and gradation, when tested in accordance with ASTM D422:

Sieve Size	Percent Passing by Weight
3/4"	99-100
3/8"	70-100
No. 4	55-100
No. 40	10-55
No. 200	3.0 max.
Sand Equivalent	35 min.

2.3 BACKFILL GRAVEL

- A. All backfill gravel to be furnished under this Contract shall consist of naturally occurring screened or crushed gravel.
- B. Gravel shall be essentially free from wood waste or other extraneous or objectionable materials.
- C. Gravel shall have such characteristics of size and shape that it will compact readily, and the maximum particle size shall not exceed $\frac{2}{3}$ of the depth of the layer being placed.
- D. Gravel shall meet the following requirements for grading and quality:

<u>Sieve Size</u>	Percent Passing by Weight
2 1⁄2 "	75-100
No. 4	22-100
No. 200	0-10
Dust Ratio	⅔ max.
Sand Equivalent	30 min.

E. Gravel material retained on a No. 4 sieve shall contain not more than 0.2 percent by weight of wood waste.

2.4 NATIVE MATERIAL

A. Material shall be selected soil free from roots or other organic material, debris, or frozen material.

- B. The maximum size of the material shall be 6 inches with no stone larger than 4 inches in the upper 6 inches of fill.
- C. Native material shall be free of excess moisture.
- D. The material shall be processed to the uniform measure and texture necessary to obtain the specified density.

2.5 TRENCH FOUNDATION GRAVEL

- A. At least two basic trench bottom conditions commonly cause problems: (1) where silty soils or fine sandy soils are encountered, they will usually flow in the presence of a stream of water, and (2) where clays, peats, or other soft materials are encountered, they may become saturated with water, but do not usually break down into fine particles and flow as do the silts or sands mentioned above.
- B. Trench foundation gravel shall be used when over-excavation, as described in the Pipe Foundations paragraph under Execution in this section, is required.
- C. Condition (1) material: Where Condition (1) is encountered, the following trench foundation gravel has been found by experience usually to be adequate: clean bank run sand and gravel, free from dirt, roots, topsoil, and debris and containing not less than 35% retained on a No. 4 sieve and with all stones larger than 2 inches removed. Such gravel shall only be used in a dry trench bottom, free from quicksand or running sand.
- D. Condition (2) material: Where Condition (2) is encountered, Class A or Class B trench foundation gravel has been found by experience usually to be adequate. Other material may, however, be found more desirable by the Contractor:

Sieve Size	Class A	Class B	
21/2"	98-100	95-100	
2"	92-100	75-100	
11⁄2"	72-87	30-60	
3/4"	27-47	0-5	
³ /8"	3-14	_	
No. 4	0-5	_	

Percent Passing by Weight

1. Trench foundation gravel shall contain no pieces larger than 5 inches, measured along the line of greatest dimension.

2.6 FILTER ROCK

A. Filter rock shall conform to the following gradation:

Sieve Size	Percent Passing by Weight
1"	100
³ /4"	95-100
³ /8"	10-55
No. 4	5 max.
No. 200	0-1.5

B. Rock material retained on a No. 4 sieve shall contain no more than 0.2 percent by weight of wood waste.

2.7 **RIGID INSULATION**

- A. Insulation shall be closed-cell, extruded polystyrene foam.
- B. The insulation shall have a typical five year aged thermal conductivity, k factor of 0.2 Btu/hr/sq.ft./°F/in when tested at 75° F mean temperature in accordance with ASTM C518.
- C. Minimum compressive strength of 25 psi when tested in the vertical direction in accordance with ASTM D1621.
- D. Maximum water absorption of 0.3% by volume when tested in accordance with ASTM C272.

2.8 CONTROLLED DENSITY FILL (CDF)

- A. CDF shall be a mixture of Portland cement, fly ash, aggregates, water, and admixtures proportioned to provide a non-segregating, selfconsolidating and free-flowing material which will result in a hardened, dense, non-settling and excavatable fill.
- B. CDF shall be used as fill above utilities wherever non-settling backfill is required or as a hydraulic barrier between coarse and fine grained soil.
- C. CDF shall be a mixture of Portland cement, fly ash, aggregates, water, and admixtures which have been batched and mixed in accordance with Section 6-02.3 of the WSDOT/APWA Specifications. Materials are as follows:

1.	Portland Cement	AASHTO M 85 OR WSDOT/APWA 9-01
2.	Fly Ash	Class F
3.	Aggregates	WSDOT/APWA 9-03.1(2)B
4.	Water	WSDOT/APWA 9-25
5.	Admixtures	WSDOT/APWA 9-23.6

- D. CDF shall be used in the following proportions for one cubic yard. Batch weights may vary depending on specific weights of aggregates.
- E. Maximum gallons of mixing water per cubic yard: 50.
- F. Lbs. of cement per cubic yard: 50.
- G. Lbs. of fly ash per cubic yard: 250.
- H. Lbs. of dry aggregate per cubic yard, Class 1 or 2 sand as per WSDOT/APWA 9-03.1(2)B: 3200.
- I. CDF shall be batched to provide a flowing, non-segregating mix with a slump between 6" to 8".

PART 3. EXECUTION

3.1 TRENCHING

- A. Material shall be excavated from trenches and piled adjacent to the trench and maintained so that the toe of the slope of the spoil material is at least 2 feet from the edge of the trench or hauled from the trench to an approved disposal or storage site.
- B. Material shall be piled in such a manner that will cause a minimum of inconvenience to public travel.
- C. Free access shall be provided to all fire hydrants, water valves and meters, and clearance shall be left to enable the free flow of storm water in all gutters, conduits, and natural watercourses.
- D. Ledge rock, boulders, or stones shall be removed to provide a minimum clearance of 6 inches under and around the pipe to be installed.
- E. Contractor shall keep excavations free of water in accordance with Section 02140.
- F. Contractor is responsible for shoring in accordance with Section 02150.

3.2 TRENCHING FOR WATER LINES

- A. Trenching shall be dug to true and smooth bottom grades in accordance with the lines given by the Engineer.
- B. Trench widths shall not exceed 30 inches maximum or 1.5 times outside diameter of the pipe plus 18 inches whichever is greater.
- C. Standard excavation equipment shall be adjusted so as to excavate the narrowest ditch possible.

- D. Depth of trenching for water mains shall be such as to give a minimum cover of 36 inches over the top of the pipe unless otherwise specified.
- E. Deeper excavation may be required due to localized breaks in grade, or to install the new main under existing culverts or other utilities where necessary.
- F. Where profile of pipeline and ground surface is shown on the Plans, pipeline shall be laid to elevation shown, regardless of depth.
- G. Excavation shall be to such depth that the minimum cover over the valve nuts shall be one foot.
- H. The length of trench excavated in advance of pipe laying shall be kept to a minimum
- I. Trenches shall be over excavated below the specified grade to provide for bedding material specified.

3.3 TRENCHING FOR SEWERS AND DRAINS

- A. Trenches must be of sufficient width to permit proper jointing of the pipe and backfilling of material along the sides of the pipe.
- B. Trench width at the surface of the ground shall be kept to the minimum amount necessary to install the pipe in a safe manner.
- C. Trenches wider than the maximum specified may result in a greater load of overburden than the pipe is designed for, and consequently, if the maximum trench width is exceeded by the Contractor, the Contractor shall at his own expense, provide pipe of higher strength classification, or provide a higher class of bedding where necessary to assure that the pipe will not be overloaded.
- D. The normal maximum permissible trench width, at the bottom of the trench and up to a point at the crown of the pipe, shall be 1.5 times the inside diameter plus 18 inches, or a total of 40 inches, whichever is greater.
- E. Excavation for manholes and other structures shall be sufficient to provide a minimum of 12 inches between their outside surfaces and the sides of the excavation.
- F. The length of trench excavated in advance of the pipe laying shall be kept to a minimum, and in no case shall it exceed 150 feet unless specifically authorized by the Engineer.
- G. Trenches shall be excavated below the barrel of the pipe a sufficient distance to provide for bedding material specified.

3.4 TRENCHING FOR SEWER FORCE MAINS

- A. Trenches shall be dug to true and smooth bottom grade and in accordance with the lines given by the Engineer.
- B. Trench widths shall not exceed 30 inches maximum or 1.5 times outside diameter of the pipe plus 18 inches whichever is greater.
- C. Standard excavation equipment shall be adjusted so as to excavate the narrowest ditch possible.
- D. The depth of trenching shall be such as to give a minimum cover of 48 inches over the top of the pipe unless otherwise specified.
- E. Where profile of pipeline and ground surface is shown on the Plans, pipeline shall be laid to elevation shown regardless of depth.
- F. No additional compensation will be allowed for small amount of deeper excavation which may be required, due to localized breaks in grade, or installing the force main under existing culverts or other utilities or where necessary for adjustment in grade required providing cover over air release valves.
- G. Trench shall be graded so that there is an upward slope at all times from low point to high point.
- H. The length of trench excavated in advance of the pipe laying shall be kept to a minimum and in no case shall length of open trench exceed 400 feet unless otherwise specifically authorized by the Engineer.
- I. Trenches shall be over excavated below the specified grade to provide for bedding material specified.

3.5 PIPE FOUNDATIONS

- A. Where the trench bottom is in a material which is unsuitable for foundation or which will make it difficult to obtain uniform bearing for the pipe, such material shall be removed and a stable foundation provided
- B. Proper preparation of foundation and placement of foundation material, where required, shall precede the installation of all pipe.
- C. Proper preparation includes bringing the native trench bottom and/or the top of the foundation material to a uniform grade so that the entire length of pipe rests firmly on suitable, properly compacted material.

- D. Gravel to be used for foundation purposes shall be of a type and gradation to provide solid compact bedding in the trench. Because trench conditions vary, foundation gravel requirements will change.
- E. Neither approval nor disapproval of the foundation material proposed by the Contractor shall relieve him of his responsibility to provide adequate pipe foundation and to guarantee his work as elsewhere required by the Contract.
- F. Unsuitable material for foundation purposes below the depth required for the specified bedding shall be removed and replaced with suitable foundation gravel.
- G. Excavated materials shall be disposed of at an approved waste site and all costs involved in the excavating and wasting of this material shall be considered as incidental to the pipe installation.

3.6 PIPE BEDDING

A. Placement of gravel bedding in the pipe zone shall be as specified in the section regarding the pipeline being constructed.

3.7 BACKFILLING

- A. Gravel bedding to 6 inches over the top of the pipe shall be completed before backfilling operations are started.
- B. The Contractor shall take all necessary precautions to protect the pipe from any damage, movement or shifting. In general, backfilling shall be performed by pushing the material from the end of the trench into, along and directly over the pipe so that the material will be applied in the form of a rolling slope rather than by side filling which may damage the pipe. Backfilling from the sides of the trench will be permitted after sufficient material has first been carefully placed over the pipe to such a depth as to protect the pipe.
- C. Compaction equipment used above the pipe zone shall be of a type that does not injure the pipe.
- D. Provide for the proper maintenance of traffic flow and accessibility as may be necessary.
- E. Make adequate provisions for the safety of property and persons.
- F. Temporary shoring shall be removed unless specifically authorized in writing.
- G. Dewatering shall be continued until the trench is completely backfilled.

- H. Brush, stumps, logs, planking, disconnected drains, boulders, etc., shall be removed from the material to be used for backfilling the trench.
- I. Where native material excavated is unsuitable for trench backfill, backfill gravel, or specified material shall be placed.
- J. The unsuitable material shall be removed to an approved disposal area. Backfill gravel shall be used for backfill only where original material is unsuitable and upon approval by the Engineer.
- K. Where it is required that a blanket of import material be placed on top of the native backfill, the backfill shall be placed to the elevations shown on the Plans, or to the elevation the Engineer may direct, and shall be leveled to provide for a uniform thickness of the import material. Compaction of the native material shall be as required by the Owner.
- L. Backfill Gravel: Wherever a trench is excavated in a paved roadway, sidewalk or other area where minor settlements would be detrimental and where the native excavated material is not suitable for compaction as backfill, the trench shall be backfilled to such depth as the Engineer may direct with backfill gravel or specified material.
- M. Controlled Density Fill: Controlled density fill shall be placed as shown on the drawings or wherever mechanical compaction cannot be achieved due to physical space and/or clearance limitations (not allowing access for mechanical compaction equipment) and where additional excavation to provide the required space and/or clearance is not practical or possible. CDF shall be used as fill above utilities wherever non-settling backfill is required as directed by the Owner.

3.8 GENERAL COMPACTION REQUIREMENTS

- A. Requirements of this section shall apply unless more stringent requirements are established by the local agency involved.
- B. When working in an existing traveled roadway, restoration and compaction must be achieved as the trench is backfilled so as to maintain traffic.
- C. Trench backfill under roadway shall be mechanically compacted to a minimum 95% of maximum density.
- D. When working in areas outside of the right-of-way or on easements, backfill compaction shall be achieved throughout the entire depth of the trench by mechanical compaction to 90% density.

3.9 MECHANICAL COMPACTION

A. Method of compaction shall be at Contractor's option.

- B. The Contractor shall be responsible to provide the proper size and type of compaction equipment and select the proper method of utilizing said equipment to attain the required compaction density.
- C. In place compaction tests may be made. Contractor shall remove and recompact material that does not meet specified requirements.

3.10 CONTROLLED DENSITY FILL (CDF)

- A. Haul excavated material immediately to waste, install and bed pipe per Section 02660 and other applicable sections.
- B. Mix and deliver CDF in commercial concrete ready mix trucks. CDF shall be discharged from the mixer by any reasonable means (which does not segregate the material) into the area to be filled.
- C. Contain CDF at either end of the excavation by bulkhead or earth fill.
- D. Place CDF using suitable equipment to avoid injury to or displacement of installed utility lines, manholes, and other structures. CDF shall not be placed on frozen ground.
- E. Vibrate fill with concrete vibrators during placement for complete consolidation, 95% minimum.
- F. Provide steel plates to span utility trench and prevent traffic contact with the CDF for at least 12 hours, but not more than 24 hours or until fill has set sufficient to prevent rutting.
- G. Placement of CDF shall be scheduled during favorable weather conditions. At the time of placement, CDF must have a temperature of at least 40° F. Mixing and placing shall stop when the temperature is 38° F or less and falling. Each filling stage shall be as continuous an operation as practical.

END OF SECTION

SEDIMENTATION CONTROL

PART 1. GENERAL

1.1 QUALITY CONTROL

- A. Conform to regulatory requirements.
- B. Sedimentation control systems depicted on drawings are intended to be minimum requirements to meet anticipated site conditions.

1.2 SCHEDULE

- A. Required sedimentation control facilities must be constructed and in operation prior to land clearing and/or other construction to ensure that sediment-laden water does not enter the natural drainage system or otherwise be discharged from the site.
- B. Sediment facilities shall be maintained in a satisfactory condition until such time that clearing and/or construction is completed and potential for on-site erosion has passed.
- C. The implementation, maintenance, replacement and additions to erosion/sedimentation control systems shall be the responsibility of the Contractor.

PART 2. PRODUCTS

2.1 STRAW

- A. Be in an air dried condition free of noxious weeds, weed seeds, and other materials detrimental to plant life.
- B. Be seasoned before baling or loading and shall be acceptable to the Engineer.

2.2 JUTE MATTING

- A. Be of a uniform open plain weave of unbleached, single jute yarn treated with a fire retardant chemical.
- B. The yarn shall be of a loosely twisted construction and shall not vary in thickness by more than 1/2 of its normal diameter.
- C. Furnished in rolled strips 48 inches wide by approximately 50 yards long.

D. Average weight of 0.92 pounds per square yard with an allowable tolerance of plus or minus 1 inch in width and 5% in weight.

2.3 FILTER FABRIC

A. Filter fabric for the erosion protection barriers shall be Mirafi 140, or equivalent.

2.4 WIRE

A. Wire for the erosion protection barriers shall be 2 x 2 mesh, 14 gauge galvanized wire.

2.5 SUPPORT POSTS

A. Support posts for the erosion protection barriers shall be 2 inch by 4 inch, Doug-FR No. 1 or better wood posts or 1-1/2 inch by 48 inch medium weight steel fence posts.

2.6 CLEAR PLASTIC COVERING

A. Clear plastic covering for protection of slopes and cuts shall meet the requirements of the NBS Voluntary Product Standard, PS 17 for Polyethylene sheeting having a minimum thickness of 6 mil.

2.7 SEDIMENT RETENTION WATTLE

A. Wattles shall be a straw-filled tube of flexible netting material exhibiting the following properties. It shall be a machine-produced tube of compacted rice straw that is Certified Weed Free Forage, by a manufacturer whose principle business is wattle manufacturing. The netting shall consist of seamless, high-density polyethylene and ethyl vinyl acetate and contain ultra violet inhibitors

PART 3. EXECUTION

3.1 EROSION CONTROL

- A. Erosion control provisions shall meet or exceed the requirements of the local agency having jurisdiction.
- B. When provisions are specified and shown on the Drawings, they are the minimum requirements.
- C. Contractor shall not permit sediment laden waters to enter drainage facilities or be discharged from the site.
- D. As construction progresses and seasonal conditions dictate, more siltation control facilities may be required. It shall be the responsibility of the

Contractor to address new conditions that may be created and to provide additional facilities over and above minimum requirements as may be required.

3.2 SILTATION/SEDIMENTATION PONDS

- A. Siltation/sedimentation ponds shall be installed on site to de-silt all stormwater or water pumped from excavations.
- B. If additional siltation control is required, check dams or silt fences may be placed in ditches receiving stormwater from areas disturbed by construction.
- C. Siltation/sedimentation ponds shall be constructed in accordance with the requirements of the agencies having jurisdiction over the project area and/or the facilities that will receive discharge from siltation/sedimentation ponds.

3.3 FILTER FABRIC FENCES

- A. Filter fabric fence shall consist of filter fabric fastened to wire fabric with staples or wire rings.
- B. Wire shall be fastened to posts set at 4-foot centers.
- C. Fabric shall be buried into ground approximately 8 inches to prevent silt from washing under fabric.
- D. Fence shall be located to catch silt and prevent discharge to drainage courses.

3.4 STRAW BALE FILTER

- A. Installed in drainage way to catch silt.
- B. Dig bales into ground approximately 6 inches and stake in place with 2 wooden stakes in each bale.
- C. Bales to extend above anticipated surface of stream.

3.5 SEDIMENT RETENTION WATTLE

A. Install wattles in the trench, insuring that no gaps exist between the soil and the bottom of the wattle. The ends of adjacent wattles should be tightly abutted so that no opening exists for water or sediment to pass through. Alternately, wattles may be lapped, 6" minimum to prevent sediment passing through the field joint.

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B. Wooden stakes should be used to fasten the wattles to the soil. When conditions warrant, a straight metal bar can be used to drive a pilot hole through the wattle and into the soil.

3.6 PLACING JUTE MATTING

- A. Seed and fertilizer shall be placed prior to placing of matting.
- B. Jute matting shall be unrolled parallel to the flow of water. Where more than 1 strip of jute matting is required to cover the given area, it shall overlap the adjacent mat a minimum of 4 inches. The ends of matting shall overlap at least 6 inches with the upgrade section on top.
- C. The up-slope end of each strip of matting shall be staked and buried in a 12-inch wide by 6-inch deep trench with the soil firmly tamped against the mat. Three stakes per width of matting (1 stake at each overlap) shall be driven below the finish ground line prior to backfilling of the trench.
- D. The Engineer may require that any other edge exposed to more than normal flow of water or strong prevailing winds be staked and buried in a similar manner.
- E. Check slots shall be placed between the ends of strips by placing a tight fold of the matting at least 6 inches vertically into the soil. These shall be tamped and stapled the same as upslope ends. Check-slots must be spaced so that one check slot or one end occurs within each 50 feet of slope.
- F. Edges of matting shall be buried around the edges of catch basins and other structures as herein described. Matting must be spread evenly and smoothly and in contact with the soil at all points.
- G. Matting shall be held in place by approved wire staples, pins, spikes or wooden stakes driven vertically into the soil. Matting shall be fastened at intervals not more than 3 feet apart in 3 rows for each strip of matting, with 1 row along each edge and 1 row alternately spaced in the middle. All ends of the matting and check slots shall be fastened at 6-inch intervals across their width. Length of fastening devices shall be sufficient to securely anchor matting against the soil and driven flush with the finished grade.

3.7 PLACING CLEAR PLASTIC COVERING

- A. Clear plastic covering shall be installed on erodible embankment slopes as shown in the plans or as designated by the Engineer.
- B. The clear plastic covering shall be installed immediately after completion of the application of roadside seeding.

- C. The Contractor shall maintain the cover tightly in place by using sandbags or tires on ropes with a minimum 10-foot grid spacing in all directions. All seams shall be taped or weighted down full length. There shall be at least a 12-inch overlap of all seams.
- D. The Contractor shall be responsible to immediately repair all damaged areas.
- E. The clear plastic covering shall be replaced or removed within 6 months of installation.

3.8 EXISTING DRAINAGE FACILITIES

A. Should a storm sewer or culvert become blocked or have its capacity restricted due to discharge siltation from Contractor's operations, the Contractor shall make arrangements with the jurisdictional agency for the cleaning of the facility at no additional expense to the Owner.

3.9 DRAINAGE DIVERSION

- A. Contractor shall divert the surface runoff water around the site as may be required.
- B. Drainage shall be restored to condition existing prior to construction unless otherwise shown on the Drawings.

END OF SECTION

SECTION 02575

PAVEMENT REPAIR AND RESURFACING

PART 1. GENERAL

1.1 QUALITY ASSURANCE

A. Qualifications of Asphalt Concrete Producer: Use only materials which are furnished by a bulk asphalt concrete producer regularly engaged in production of hot mix, hot laid asphalt concrete.

1.2 PAVING QUALITY REQUIREMENTS

- A. General: In addition to other specified conditions, comply with following minimum requirements:
 - 1. Comply with requirements of Road Agency having jurisdiction.
 - 2. Provide final surfaces of uniform texture, conforming to required grades and cross-sections.
 - 3. Patches shall match existing grade and cross-section unless otherwise directed by the Road Agency.
 - 4. Pavement cuts parallel to street alignment shall be restored for the full width in accordance with agency specifications.
 - 5. Unsatisfactory restoration work shall be redone promptly by the Contractor. This includes immediately replacing failed patches.
 - 6. Cleanup of excavation and debris material shall be accomplished concurrently with the burying operation.
 - 7. Any temporary restoration work shall be made permanent within thirty (30) calendar days from the date of the temporary restoration.
- B. Surface Smoothness:
 - 1. Test finished surface of each asphalt concrete course for smoothness, using a 10 foot straight edge applied parallel to and at right angles to centerline of paved areas.
 - 2. Surfaces will not be acceptable if exceeding 0.25 inch in 10 feet unless more rigid requirements are established by the Road Agency.

1.3 SUBMITTALS

- A. Certify that materials comply with specification requirements.
- B. Certificate to be signed by asphalt concrete producer and Contractor.
- C. Submit concrete mix design.

1.4 JOB CONDITIONS

JORDAN VALLEY WATER CONSERVANCY DISTRICT

PR #4322

- A. Weather Limitations:
 - 1. Construct only when temperatures are above minimum specified in State Highway Standard Specifications unless waived by Road Agency having jurisdiction.
 - 2. Do not construct pavement or base when the base surface is wet or contains an excess of moisture which would prevent uniform distribution and the required penetration.
- B. Grade Control: Establish and maintain the required lines and grades, including crown and cross-slope, for each course during construction operations.
- C. Traffic Control:
 - 1. Maintain vehicular and pedestrian traffic during paving operations, as required for other construction activities.
 - 2. Provide flagmen, barricades, warning signs, and warning lights for movement of traffic and safety and to cause the least interruption of work.
 - 3. See Section 01570 for additional requirements.

1.5 ROAD AND STREET RESTORATION REQUIREMENTS

- A. The Contractor's responsibility as to road restoration shall include, but not be limited to, proper backfill and compaction of excavation, shaping and general restoration of the roadway, restoration of public and private improvements when damaged by construction, restoration of drainage facilities, scarification of existing surfacing, if required, removal of debris and surplus material and all other requirements of these Specifications. In addition, upon completion of the above restoration, backfill gravel or crushed rock shall be placed where required, in the opinion of the Engineer.
- B. Unless otherwise specifically authorized by the authority responsible for the roadway, the final grade and cross-section shall conform to applicable Road Agency standard cross sections. In case of existing private roads, they shall conform to the roadway that existed prior to construction. The removal and disposal of existing materials necessary to fulfill the above requirements shall be considered incidental to the construction and the costs thereof shall be included in the items for which payment is provided.
- C. Manhole rings, valve boxes and monument cases shall be adjusted as necessary to be flush with the restored surface.
- D. The Contractor shall comply with all requirements of all permits for installation of pipelines in authorized right-of-way.

- E. The Contractor will place and maintain sufficient and proper lights and barricades at all locations on roads not accepted by the Road Agency involved.
- F. After completion of pipeline installation, the Contractor shall clean up drainage ditches and restore all existing drainage structures that he may have damaged during the course of construction. He shall also comply with all drainage requirements of the agency involved upon which the agency's acceptance of the roads is conditioned.
- G. The Contractor shall restore any private improvement on road right-of-way including, but not limited to, culverts, driveways, curbs, sidewalks, parking strips, parking areas, or other permanent improvements, whether or not a permit for such improvements has been obtained.
- H. On streets where the pipeline is located on the shoulder alongside existing bituminous or concrete surfacing, no payment shall be made for cost of restoring street surfacing which may be damaged by the Contractor's operations. If the Engineer requires crushed rock spread on the shoulder it shall be paid under the restoration bid item.
- I. All streets in the construction area as well as any unpaved streets used by Contractor's trucks or any other equipment hauling material to and from the area, whether within the construction area or adjacent thereto, and any unpaved streets used as detours during the construction shall be serviced with self-propelled pickup street sweepers to prevent the transport of sediment and other debris off the project site. Street sweepers shall be designed and operated to meet air quality standards
- J. It is specifically understood and agreed that the Contractor is responsible for complying with all requirements of the Road Agency necessary to obtain written acceptance of the roads by the agency concerned, and for such work the Contractor will be paid only for the items included in this Contract.
- K. Until accepted in writing by the Road Agency, the Contractor will maintain all roads in a condition satisfactory to the agency concerned. This shall include periodic grading of all streets on which traffic is allowed wherever in the opinion of the Engineer, such grading is required. A suitable motor grader shall be available for this work.
- L. Any settlement which occurs during the first year after final contract acceptance shall be repaired by the Contractor at his expense.

PART 2. PRODUCTS

2.1 CRUSHED ROCK

A. Crushed rock shall be as specified in Section 02222.

2.2 ASPHALT CONCRETE PAVEMENT

A. Asphalt concrete pavement shall conform to the Technical Requirements of the state highway department in which the project is located for plant mix asphalt concrete unless otherwise set forth in the Special Provisions or if superseded by the local Road Agency.

2.3 ASPHALT TREATED BASE

A. Asphalt treated base shall conform to the Technical Requirements of the state highway department in which the project is located for asphalt treated base unless otherwise set forth in the Special Provisions or if superseded by the local Road Agency.

2.4 CONCRETE

A. Concrete specifications shall meet the requirements of the local Road Agency.

PART 3. EXECUTION

3.1 GENERAL PAVEMENT REPAIR REQUIREMENTS

- A. Pavement patching shall be scheduled to accommodate the demands of traffic and shall be performed as rapidly as possible to provide maximum safety and convenience to public travel.
- B. The placing and compaction of the trench backfill, and the preparation and compaction of the subgrade shall be in accordance with the requirements of Section 02222 of these Specifications.
- C. Prior to trench excavation in pavement surfaces, straight vertical trim lines shall be cut in order to minimize breakage and cracking of the remaining surfacing.
- D. Before the patch is constructed all pavement cuts shall be trued so that the marginal lines of the patch will form a rectangle with straight edges and vertical faces.
- E. After completion of the patches, the entire roadway surface shall be cleaned by brooming or such other methods as may be required. The early completion of this phase of the restoration is required, not only to facilitate public relations, control dust and traffic problems, but also to prevent the further break-up and cracking of the existing asphalt mat. If, in

the opinion of the Engineer, the Contractor is not diligently pursuing the work in such a manner as to place the patch as soon as reasonably possible, the Contractor may be required to re-trim and remove any and all cracked areas in such a manner to produce a straight uniform edge.

- F. Finished grade and cross section of patch shall match grade and crosssection of existing pavement.
- G. All incidental work required to complete the patching of street surfaces as specified, including joints where required, shall be considered as incidental to the patching and the costs thereof shall be included in the items for which payment is provided.

3.2 ASPHALT CONCRETE PAVEMENT TRENCH PATCH

- A. Preparation:
 - 1. As soon after compacting the trench backfill and placing and compacting backfill material, where required, the Contractor shall place and compact crushed rock in the trench area to a minimum depth of four (4) inches or depth to match the original cross-section, whichever is greater.
 - 2. A tack coat of asphalt applied at the rate of 0.02 to 0.08 gallon per square yard of retained asphalt shall be applied through the use of mechanical equipment to all surfaces on which any course of asphalt concrete is to be placed or abutted. The spreading equipment shall be capable of uniformly distributing asphalt materials over any area in controlled amounts and shall be equipped with hand operated spray equipment for use only on inaccessible and irregularly shaped areas.
 - 3. The tack coat shall be a heated cutback asphalt, or emulsified asphalt, mixing grade. The emulsified asphalt may be mixed with water at the rate of 1 to 2 parts water to 1 part of emulsified asphalt.
 - 4. If a temporary trench patch has been used it shall be removed and disposed of properly.
- B. Two Lift Patch:
 - 1. Immediately after completion of placing the base course, the Contractor shall place a two inch minimum compacted thickness of asphalt concrete surfacing.
 - 2. A single lift of asphalt shall be at least 1 $\frac{1}{2}$ " thick and not more than 3 $\frac{1}{2}$ " thick.
 - 3. The Contractor may substitute an equal amount of asphalt treated base for crushed rock and first lift of asphalt concrete.
 - 4. When ordered by the Owner or when required in the Special Provisions, the Contractor shall begin the placement of the second lift. A tack coat shall be placed over the patch area. Asphalt concrete modified so that maximum size aggregate is 1/2 inch shall

be placed over the tack coat. Prior to rolling, the aggregate in the asphalt concrete shall be hand raked back from the edges and rolled in such a manner to produce a uniform "feather" edge over the existing surface. The minimum compacted thickness of the second lift over the trench area shall be $1 \frac{1}{2}$ ".

- 5. Where excess settlement of the first patch occurs, a leveling course shall be used to prevent the thickness of the second lift from exceeding 2 $\frac{1}{2}$ " thickness.
- 6. The edge of the patch shall be sealed by painting with a cutback asphalt or CSS-1 emulsion and immediately covered with sand and heated.
- C. Single Lift Patch:
 - 1. Immediately after completion of placing the base the Contractor shall place a two-inch minimum thickness of asphalt concrete surfacing.
 - 2. If the existing pavement is more than two inches the asphalt concrete shall be of the same depth as the existing pavement, depths greater than 3" shall require a Two Lift Patch as described in paragraph B above..
 - 3. The edge shall be hand raked to produce a smooth edge where the patch abuts the existing pavement.
 - 4. The thickness shall be adjusted so that a smooth uniform grade exists after rolling.
 - 5. The edge of the patch shall be sealed by painting with a cutback asphalt or CSS-1 emulsion and immediately covered with sand and heated.

3.3 CEMENT CONCRETE PAVEMENT PATCH

- A. After the subgrade for the pavement has been compacted and constructed to line and grade, the cement concrete pavement patch shall be placed, compacted and struck off to the grade of the adjacent pavement.
- B. Minimum thickness shall be eight inches or the thickness of the existing pavement plus two inches, whichever is greater.
- C. Through and dummy joints shall be placed and edged to match existing joints.
- D. The surface shall be finished and brushed with a fiber brush.
- E. Approved curing compound shall be placed on the finished concrete immediately after finishing.
- F. Concrete used in patches shall be in accordance with the latest edition of the UDOT Standard Specifications or as required by the Road Agency

3.4 RIGID TYPE PAVEMENT RESURFACED WITH ASPHALT CONCRETE

- A. Cement concrete patch shall be placed as specified above for cement concrete pavement patch except that the surface of the cement concrete portion of the patch shall be left low enough to accommodate the asphalt portion of the patch. Brush finishing will not be required.
- B. Curing shall be accomplished with an asphalt emulsion cut back with water.
- C. Asphalt concrete or bituminous plant mix shall not be placed until the day after the cement concrete has been placed.
- D. The edges of the existing asphalt pavements and castings shall be painted with hot asphalt cement or asphalt emulsion immediately before placing the asphalt patching material.
- E. The asphalt concrete pavement shall then be placed leveled and compacted to conform to the adjacent paved surface.
- F. All joints between the new and original asphalt pavement shall be painted with hot asphalt or asphalt emulsion and be covered with dry paving sand before the asphalt solidifies.

3.5 ASPHALT CONCRETE PAVEMENT

- A. Full width asphalt concrete pavement shall conform to the Technical Requirements of the standard specifications of the State Highway Department in which the project is located.
- B. After the subgrade has been properly prepared and compacted, a minimum of two inches of Hot Mix Asphalt shall be placed and compacted.
- C. If the existing pavement is more than two inches thick, asphalt concrete shall be of the same depth as existing pavement prior to construction.
- D. The edges of the existing asphalt pavements and castings shall be painted with hot asphalt cement or asphalt emulsion immediately before placing the asphalt patching material.
- E. The asphalt concrete pavement shall then be placed, leveled, and compacted to conform to established cross-section and grade and to match adjacent paved surface.
- F. The edge of the new pavement shall be sealed by painting with a cutback asphalt or CSS-1 emulsion and immediately covered with sand and heated.

3.6 ASPHALT CONCRETE OVERLAY

- A. Before construction of an asphalt concrete pavement overlay on an existing surface, all fatty asphalt patches, grease drippings, and other objectionable matter shall be removed from the existing pavement. Excess asphalt joint filler shall be removed and pre-molded joint filler shall be removed to at least ½ inch below the surface of the existing pavement. Existing pavement or bituminous surfaces shall be thoroughly cleaned by sweeping to remove dust and other foreign matter.
- B. Prior to placing asphalt concrete, a tack coat shall be applied using heated cut back asphalt or emulsified asphalt at the rate of 0.02 to 0.05 gallons per square yard.
- C. When the surface of the existing pavement or old base is irregular, it shall be brought to uniform grade and cross section as required by the Road Agency involved. Pre-leveling of uneven or broken surfaces over which asphalt concrete is to be placed is required and may be accomplished by the use of asphalt concrete placed with a motor patrol grader, a paving machine, by hand raking, or by a combination of these methods. After placement, the asphalt concrete used for pre-leveling shall be compacted with rollers.
- D. When asphalt concrete pavement is to be constructed over an existing paved or oiled surface, in addition to the preparation as outlined hereinbefore, all holes and small depressions shall be filled with an appropriate class of asphalt concrete mix. The surface of the patched area shall be leveled and compacted thoroughly. All previous patches that have settled shall be pre-leveled so that depth of overlay does not exceed two inches in thickness.
- E. After preparation of the base a one inch minimum compacted full width layer of asphalt concrete shall be placed on top of an existing paving surface. Surfacing shall be placed in such a manner as to prevent disturbing existing drainage. Surfacing shall be feathered out as required to meet existing driveways, catch basins, traffic control pads, street intersections, etc., and shall include thickened edge paving where it is now existing.
- F. The edges of the overlay shall be sealed by painting with a cutback asphalt or CSS-1 emulsion and immediately covered with dry sand and heated.

3.7 BITUMINOUS SURFACE TREATMENT REPLACEMENT

A. Unless otherwise specified, all light bituminous surface treatment shall be replaced with a one-inch asphalt concrete overlay over a crushed rock base.

B. Base shall consist of four inches of crushed rock.

3.8 CRUSHED ROCK

- A. Existing crushed rock shall be replaced with new material.
- B. Thickness of course shall be as directed by the Owner.
- C. When the utility line is along the shoulder of a roadway, the Contractor may be directed to place a course of crushed rock along shoulder of the roadway. Thickness shall be as required by the Road Agency.
- D. During dry periods, the Engineer may require water sprinkling prior to and during the placement of crushed rock. The cost of such sprinkling shall be included in the unit bid for crushed rock.

3.9 TEMPORARY TRENCH PATCH

- A. The Contractor may be required to furnish and install a temporary trench patch only when specifically directed by the Owner or as provided on the Plans.
- B. Area to be patched shall be cleaned out and graded to the bottom of the base course. Any loose asphalt shall be removed.
- C. Place a patch consisting of 2-inch minimum course of crushed rock base and a 2-inch minimum course of cold asphalt plant mix placed over the trench area.
- D. Both the base and surface course shall be placed and compacted so that the finished surface will match the grade and cross-section of the existing pavement.
- E. Surface of pavement shall be cleaned of all dirt and debris before opening to traffic.
- F. The Contractor shall maintain temporary patch until the permanent patch is installed.

3.10 CEMENT CONCRETE CURBS AND GUTTERS

- A. The concrete in the curbs and gutters shall be air entrained concrete in accordance with the requirements of the local agency with jurisdiction.
- B. Side forms shall rest throughout their length on firm ground and shall be full depth of the curb. They shall be either metal of suitable gauge for the work or surfaced "construction" grade lumber not less than two (2) inches (commercial) in thickness. Forms shall be cleaned and well-oiled prior to

use. Forms used more than one time shall be cleaned thoroughly and any forms which have become worn, splintered, or warped shall not be used again. Forms shall be adequately supported to prevent deflection or movement.

- C. The foundation shall be watered thoroughly before the concrete is placed.
- D. Concrete shall be well tamped and spaded or vibrated in the forms.
- E. Exposed surfaces shall be finished full width with a trowel and edger. Remove forms of all roadway face of curbs within 24 hours or placement of concrete and treat with a float finish. The curb and gutter finish shall meet the Road Agency requirements.
- F. Joints shall be spaced to match joints in the abutting pavement. If the abutting pavement is not jointed or the curb or gutter is not abutting pavement, joints in the curb and gutter shall be spaced at 15-foot intervals. These joints shall be 1/8-inch minimum thickness and constructed to a minimum depth of 1 inch by sawing or scoring with a tool which leaves the corners rounded and destroys aggregate interlock to a depth specified. Expansion joints, filled to full cross-section with filler 1/4 inch thick shall be placed in the curb and gutter to match joints in the abutting pavement, at structures, curb returns and where shown in the plans.
- G. Cure for 72 hours by one of the methods specified in the latest edition of the UDOT Standard Specifications or as required by the Road Agency
- H. Curb and gutter may be constructed using slip form equipment provided the completed curb or gutter retains its shape, grade, and line. Finishing, joints, and curing shall be as provided above.
- I. Top of the form shall not depart from grade more than 1/8 inch when checked with a 10-foot straight edge. Alignment shall not vary more than 1/4 inch in 10 feet.

3.11 ASPHALT CONCRETE CURBS AND GUTTERS

- A. Placed, shaped and compacted true to line and grade, with machine capable of shaping and compacting the materials, to the required cross-section.
- B. Provide tack coat of asphalt applied to the surface upon which asphalt concrete curb is to be placed immediately prior to placing of curb.

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3.12 CEMENT CONCRETE SIDEWALKS

- A. The concrete in the sidewalks shall be air entrained concrete in accordance with the requirements of the local agency with jurisdiction.
- B. Forms shall be of wood or metal and shall extend for the full depth of the concrete. All forms shall be straight, free from warp and of sufficient strength to resist the pressure of the concrete without springing. Bracing and staking of forms shall be such that the forms remain in both horizontal and vertical alignment until their removal.
- C. The foundation shall be brought to the grade required and well wetted before placing the concrete.
- D. Place concrete in the forms and strike off with a heavy iron shod straight edge, trowel surface smooth with a steel trowel as soon as surface can be worked. After troweling and before jointing or edging, the surface of the walk shall be lightly brushed in a transverse direction with a soft brush. On grades of over 4%, the surface shall be finished with a stipple brush.
- E. Joints shall be constructed at the locations and of the sizes as required by the Road Agency.
- F. Cured for at least 72 hours by means of moist burlap or quilted blankets. Exclude all traffic, both pedestrian and vehicular, during curing period.

3.13 PAVEMENT MARKINGS

- A. The Contractor shall restore any and all pavement striping and traffic buttons damaged during construction under this Contract.
- B. Restoration shall be in accordance with the current standards of the Road Agency involved.

3.14 ADJUSTING MANHOLES TO GRADE

- A. The Contractor shall adjust manhole castings to final grade by adding concrete rings and/or mortar under the casting and patching with asphalt concrete. Paving adjusting rings will not be used unless specifically authorized by the road agency.
- B. The Contractor shall exercise extreme care in preventing foreign material from entering the manhole.
- C. All manholes shall be adjusted to grade after the asphalt concrete surfacing has been placed. Disturbed area around cover shall be patched and sealed to the satisfaction of the Road Agency having jurisdiction.

- D. The Contractor shall take care not to extend the manholes above finished grade.
- E. In concrete pavement areas, castings shall be adjusted to grade prior to concrete placement.

3.15 ADJUSTING MONUMENT CASES AND VALVE BOXES TO GRADE

- A. Monument cases and/or valve boxes shall be adjusted to final grade and patched with asphalt concrete or cement concrete to match the roadway material and as designated by the Road Agency.
- B. Adjustment shall be made after the resurfacing.
- C. Patching around monument cases and/or valve boxes shall be done to the satisfaction of the Road Agency having jurisdiction.
- D. Valve boxes shall be adjusted to the satisfaction of the utility having jurisdiction.
- E. The Contractor shall take care not to extend the monument cases and/or valve boxes above the finished grade.
- F. In concrete pavement areas, castings shall be adjusted to grade prior to concrete placement.

END OF SECTION

SECTION 02640

VALVES

PART 1. GENERAL

1.1 QUALITY ASSURANCE

- A. Testing by Manufacturer:
 - 1. Manufacturer shall test all materials as required by these specifications and the standards referenced.
 - 2. Manufacturer shall submit to the Engineer two (2) copies of all test results which shall include a certification that materials to be delivered are represented by the samples tested and that such delivered materials meet or exceed the specification requirements.
 - 3. No materials shall be delivered until test results and certifications are in the hands of the Engineer.
 - 4. Engineer shall have free access to all testing and records pertaining to materials to be delivered to the job site.
 - 5. The Engineer may elect to be present at any or all materials testing operations.

PART 2. PRODUCTS

2.1 BUTTERFLY VALVES

A. Two thirty-inch butterfly valves will be pre-procured by the District and made available to the Contractor. The Contractor is responsible for picking the valve up from the District and providing the labor and equipment necessary to transport the valve to the project site.

2.2 STEM EXTENSION

A. Provide stem extension with standard operating nut and self centering rock plate support for all valves with operating nut more than 4 feet below grade to raise operating nut to within 36 inches of the ground surface.

2.3 VALVE BOXES

- A. Provide for all valves.
- B. Valve boxes and tops shall be cast iron 2 piece slip joint type.
- C. Lengths suitable for the particular project or as specified.
- D. Valve box shall be cast into the new concrete vault lid per the Plans.

E. Cover shall have the word "Water" cast on it.

PART 3. EXECUTION

3.1 BUTTERFLY VALVE INSTALLATION

- A. Valves shall be accurately set at places designated on the drawings.
- B. Inspect each valve for defects.
- C. Adjust stuffing boxes to ensure water tightness without binding the stem.
- D. Set valve and valve box plumb.
- E. Cast valve box into new concrete vault lid.
- F. Tamp backfill around valve box to a minimum distance of 3 feet on all sides or to face of trench.
- G. Set valve box cover flush with surface.

3.2 TESTING

A. Test valves along with pipeline in which they are installed.

END OF SECTION

SECTION 02660

WATER PIPE AND FITTINGS

PART 1. GENERAL

1.1 SUMMARY

A. Section Includes: The requirements for furnishing and installing welded steel pipe and fittings as shown in the Contract Drawings

1.2 REFERENCES

- A. This Section incorporates by reference the latest revisions of the following documents.
 - 1. ASME International (ASME)
 - a. ASME B36.10M Welded and Seamless Wrought Steel Pipe
 - b. ASME BPVC SEC VIII Div. 1, Rules for Construction of Pressure Vessels
 - c. ASME BPVC SEC IX Welding and Brazing Qualifications
 - 2. American Society for Nondestructive Testing Inc. (ASNT)
 - a. ASNT SNT-TC-1A Recommended Practice for Personnel Qualification and Certification in Nondestructive Testing
 - 3. American Water Works Association (AWWA)
 - a. AWWA C200 Steel Water Pipe 6 In. (150 mm) and Larger
 - b. AWWA C206 Field Welding of Steel Water Pipe
 - c. AWWA C207 Steel Pipe Flanges for Waterworks Service -Sizes 4 In. Through 144 In. (100 mm Through 3,600 mm)
 - d. AWWA C208 Dimensions for Fabricated Steel Water Pipe Fittings
 - e. AWWA C210 Liquid Epoxy Coatings and Linings for Steel Water Pipe and Fittings
 - f. AWWA C213 Fusion Bonded Epoxy Coatings and Linings for Steel Water Pipe and Fittings
 - g. AWWA C604 Installation of Buried Steel Water Pipe 4 In. (100 mm) and Larger
 - h. AWWA C651 Disinfecting Water Mains
 - i. AWWA M11 Steel Pipe A Guide for Design and Installation
 - 4. American Welding Society (AWS)
 - a. AWS D1.1/D1.1M Structural Welding Code Steel
 - b. AWS QC 1 Specification for AWS Certification of Welding Inspectors
 - 5. ASTM International (ASTM)
 - a. ASTM A20/A20M Standard Specification for General Requirements for Steel Plates for Pressure Vessels

- b. ASTM A53/A53M Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
- c. ASTM A106/A106M Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service.
- d. ASTM A516/A516M Standard Specification for Pressure Vessel Plates, Carbon Steel, for Moderate- and Lower-Temperature Service
- e. ASTM A770/A770M Standard Specification for Through-Thickness Tension Testing of Steel Plates for Special Applications
- f. ASTM A1018/A1018M Standard Specification for Steel, Sheet and Strip, Heavy-Thickness Coils, Hot-Rolled, Carbon, Commercial, Drawing, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength
- 6. International Organization for Standardization (ISO)
 - a. ISO 9001:2000 Quality Management Systems Requirements
- 7. NSF International (NSF):
 - a. NSF 61 Drinking Water System Components Health Effects

1.3 **DEFINITIONS**

- A. Fittings: Including, but not limited to, closure pieces, bends, reducers, tees, wyes, bifurcations, crosses, outlets, manifolds, nozzles, wall sleeves, bulkheads, and other piping and appurtenances fabricated from steel plate, sheet, or coils as required to provide the Work, complete. Fittings shall include piping above ground or inside structures.
- B. Acronyms:
 - 1. CJP: Complete Joint Penetration
 - 2. CWI: Certified Welding Inspector
 - 3. MT: Magnetic Particle Testing
 - 4. NDE: Nondestructive Examination
 - 5. NDT: Nondestructive Testing
 - 6. PJP: Partial Joint Penetration
 - 7. PQR: Procedure Qualification Record
 - 8. RT: Radiographic Testing
 - 9. UT: Ultrasonic Testing
 - 10. VT: Visual Testing
 - 11. WPQ: Welder/Welding Operator Performance Qualification
 - 12. WPS: Welding Procedure Specification

1.4 SUBMITTALS AND TRANSMITTALS

- A. Submit the following:
 - 1. Shop Drawings showing pipe layout.

- 2. Material list and steel reinforcement schedules for materials specified.
- 3. Fabrication Information:
 - a. Pipe and fitting details for temporary and permanent facilities indicating:
 - 1) Cylinder thickness
 - 2) Manufacturing tolerances
 - 3) Maximum angular deflection limitations of field joints
 - Closure sections and cutoffs for field length adjustment
 - 5) Welded outlets and plugs
 - 6) Stulling size, spacing, and layout
 - Welded joint details including:
 - 1) Butt joints
 - 2) Miter-cut ends for alignment conformance
 - 3) Lap joints
 - 4) Butt strap joints
- B. Transmit the following:

b.

- 1. Product data for Welded Steel Pipe and Fittings:
 - a. Material Data
 - 1) Steel designated to meet the requirements of ASTM A139 and/or API 5L PSL1 are specifically excluded from use in this project.
 - Chemical and physical test reports showing data consistent with specified requirements for each heat of steel proposed for use.
 - 3) Shop tests for steel material and welds conforming to requirements of AWWA C200 must be annotated with the coil number(s) to which the shop test applies to enable complete traceability. State the function of the shop testing on the report(s).
- 2. Certificates:
 - a. Manufacturer's Certificate of Compliance
 - Lining Materials: Certificate that lining system is currently approved for potable water contact in accordance with NSF 61 and satisfies current applicable governmental health and safety requirements for use in potable water.
- 3. Pipe Manufacturer's written Quality Assurance/Quality Control Plan
- 4. Statements of Qualification:
 - a. Pipe manufacturer
 - b. Fittings fabricator
 - c. Contractor's Shop Inspector
 - d. Contractor's Field Inspector
 - e. Contractor's shop CWI Certifications
 - f. Contractor's field CWI Certifications
 - g. NDT Quality Control Personnel Certifications

- 5. Procedures:
 - a. Shop and field welding information; at a minimum include complete welding code paper trail with linkage to Shop Drawings
 - b. Welder Qualifications and Welding Procedures shall comply with steel pipe welding requirement as stated elsewhere in the Contract Documents, and as specified below:
 - 1) Provide complete joint dimensions and details showing bevels, groove angles, root face, and root openings for all welds.
 - 2) Notch-tough welding procedures are required. For shop welding, address supplementary essential variables in addition to essential variables as indicated in ASME Section IX, QW-251.2. For field welding, comply with AWS D1.1/D1.1M, Table 4.6.
 - PQRs shall document heat-input control by monitoring Volts, Amps, and Travel speed. Charpy V-notch tests shall be conducted on weld metal and heat affected zone. Test coupons shall be oriented transverse to final direction of rolling. Full size Charpy specimen test acceptance shall be same as base metal specified herein.
 - b) All WPSs shall include a heat-input table for welder guidance.
 - 3) Written NDT procedures
 - 4) Written description of proposed sequencing of events or special techniques such as:
 - a) Controlling pipe wall temperature stress during installation
 - b) Minimizing distortion of steel
 - c) Shop-Applied Lining: Include description of machine to be used and list of similar projects where machine was used. Identify pipe size and total footage.
 - 5) Written weld repair procedures for the Work
 - 6) Field coating application and repair
 - 7) Field lining application and repair
- 6. Reports:
 - a. Source Quality Control Test Reports:
 - 1) Nondestructive test reports
 - 2) Steel impact tests using Charpy V-notch method
 - 3) Shop tests for steel material and welds conforming to requirements of AWWA C200 must be annotated with the coil number(s) to which the shop test applies to

enable complete traceability. State the function of the shop testing on the report(s).

- b. Field Quality Control Test Reports:
 - 1) CWI and Nondestructive Weld tests, including re-examination of repaired welds

1.5 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Pipe Manufacturer:
 - a. Experienced in fabricating pipe of similar diameters, lengths, and wall thickness required for the Work.
 - b. Steel Pipe Fabricators Association (SPFA), Lloyd's Registry Certification, or ISO 9001:2000 Certification.
 - c. Experience shall include successful fabrication to AWWA C200 standards of at least 1,000 linear feet of 30 -inch diameter or larger pipe, with wall thickness of 1/2 inches or greater, within past 5-year period.
 - d. Experience shall be applicable to fabrication plant facilities and personnel, not company or corporation that currently owns fabrication facility or employs personnel.
 - e. Production of Pipe and Fittings must be controlled under the oversight of one manufacturer through whom all submittals and certifications and processes and testing, is furnished.
 - 2. Fittings Fabricator:
 - a. Experienced in fabricating fittings of similar diameters and wall thickness required for the Work.
 - b. Steel Pipe Fabricators Association (SPFA), Lloyd's Registry Certification, or ISO 9001:2000 Certification
 - c. Demonstrate current production capability for volume of work required for this Project.
 - Experience shall include successful fabrication to AWWA C200 and AWWA C208 standards of at least 25 fittings of 30-inch or larger pipe, with wall thickness 1/2 inch or greater, within past 5-year period.
 - e. Production of Pipe and Fittings must be controlled under the oversight of one manufacturer through whom all submittals and certifications and processes and testing, is furnished.
 - 3. Welders and Welding Operators:
 - a. Shop Welders: In accordance with ASME BPVC SEC IX.
 - b. Field Welders: In accordance with AWS D1.1/D1.1M.
- B. Contractor's Field Inspector: In accordance with AWWA C206 and AWS D1.1/D1.1M
 - 1. Responsibilities:
 - a. Verify conformance to use of specified materials and their proper storage

- b. Monitor conformance to approved WPS
- c. Evaluate welder performance and conformance to welder WPQs
- d. Provide 100 percent VT before, during, and after field welding
- e. Monitor conformance of required nondestructive testing, help coordinate NDT work and review test results.
- f. Maintain records and prepare report confirming results of inspection and testing.
- C. Prefabrication Meeting: Hold prior to fabrication of pipe and fittings between representatives of Owner, Contractor, Resident Engineer, and pipe fabricator to review following:
 - 1. Project scope
 - 2. Submittal requirements
 - 3. Testing
 - 4. Inspection responsibilities
 - 5. Shop welding re quirements
 - 6. Field welding requirements
 - 7. Shop and field coating and lining requirements
 - 8. Production and delivery schedule
 - 9. Other issues pertinent to the Work

1.6 DELIVERY, HANDLING AND STORAGE

- A. Pipe Marking:
 - 1. Legibly mark installation sequence number on all pipe and fittings in accordance with piping layout using 4" high characters.
 - 2. Fittings shall be marked at each end with notation "TOP FIELD CENTERLINE".
 - 3. The word "TOP" shall be painted or marked on outside top spigot of each fitting in 4" high characters.
 - 4. Mark "TOP MATCH POINT" for compound bends per AWWA C208 so end rotations can be easily oriented in field.
- B. Delivery:
 - 1. Securely bulkhead or otherwise seal ends of pipe and fittings prior to loading at manufacturing site.
 - 2. Pipe ends shall remain sealed until installation.
 - 3. Damage to pipe and fittings, including linings and coatings, found upon delivery to Site shall be repaired to Resident Engineer's satisfaction or removed from Site and replaced. Pipe and fittings having any truck or other exhaust residue on lining shall be removed from the site.

- C. Storage:
 - 1. Support and block pipe securely off the ground on dunnage to prevent accidental rolling and to avoid contact with mud, water, or other deleterious materials.

1.7 SEQUENCING AND SCHEDULING

- A. Notify Resident Engineer in writing of the following:
 - 1. Pipe Manufacturing: Not less than 14 days prior to starting.
 - 2. Not less than 5 days prior to start of each of the following:
 - a. Welding
 - b. Coating application
 - c. Lining application
 - d. Shop hydrostatic testing

PART 2. PRODUCTS

2.1 REQUIREMENTS

- A. Welding Procedure Specification (WPS)
 - 1. Use notch-tough welding procedures qualified by testing, by the Contractor, and in accordance with ASME BPVC SEC IX for shop welds and AWS D1.1/D1.1M for field welds.
 - 2. PQRs conducted on unassigned base metals, which are base metals that are not listed in ASME BPVC Section IX, Table QW/QB-422 or AWS D1.1/D1.1M, Table 3.1, shall be traceable to heat lots. See additional limitations of ASME BPVC SEC IX, QW-424.1 and Table 4.8.
 - 3. Written WPS required for all shop and field welds.
- B. Stulling (Strutting): Design for pipe, fittings, lining and coatings such that over-deflection and damage is avoided during handling, storage, and installation, including backfill and compaction.

2.2 GENERAL

- A. Pipe Manufacturer:
 - 1. Production of Pipe and Fittings must be controlled under the oversight of one manufacturer.
 - 2. Responsibility shall include, at minimum, coordinating work of other suppliers for fittings.
- B. Pipe Size:
 - 1. Prior to ordering new pipe the Contractor shall:
 - a. Prior to any excavation, coordinate the activity with the Resident Engineer. Carefully excavate and expose the existing pipe at the connection points shown on the plans and confirm the following:

- 1) Locate (if present) existing dresser couplings on the existing pipe
- 2) Measure the pipe OD at the connection points
- 3) Check to determine the location of existing joints and if the joints are restrained, including how they are restrained (welded, flanged, concrete blocked, etc.)
- 4) Verify the type of coating
- 5) Either backfill the excavation or cover with steel plates (if they are acceptable at the location excavation is made).
- 6) Submit the data to the Engineer to verify work was performed and whether design should be modified
- 7) Verify the pipe and fittings that are required to make the relocation proposed in this project
- 8) Submit any revised pipe and fitting information to the Engineer
- 9) Proceed with fabrication of the new pipe and fittings upon approval of the Engineer

2.3 PIPE BARREL

- A. Steel: Coil or Plate complying with AWWA C200 and as follows:
 - 1. Specified Minimum Yield Strength: 36,000 psi.
 - 2. Specified Minimum Tensile Strength: 53,000 psi.
 - 3. Minimum Elongation in 2-inch Gauge Length: 21 percent.
 - 4. Steel Quality as follows:
 - a. Coils:
 - Continuous cast process, fully-killed, fine grained practice conforming to physical, manufacturing and testing requirements of ASTM A1018/A1018M, HSLAS-F Grade 50.
 - b. Plate:
 - 1) Fully-killed, conforming to ASTM A20/A20M, fine grained practice conforming to physical, manufacturing and testing requirements of ASTM A516/A516M, Grade 70.
 - c. Toughness:
 - Charpy V-notch Acceptance Criteria: Transverse specimen orientation, full size specimens, 25 foot-pounds energy at test temperature of 30 degrees Fahrenheit.
 - 5. Minimum nominal wall thickness as shown on Drawings. For thicknesses not shown on the Drawings, thicknesses shall be as stated in Table 1 (herein) and as approved by the Engineer.
 - 6. Pipe Pressure Rating. All new steel pipe shall have a minimum pressure rating not less than 250 psi.

2.4 FITTINGS

A. Fabrication

- 1. Shop fabricate. No field fabrication will be allowed, unless approved by the Engineer.
- 2. Fabricate bends from materials or straight pipe in conformance with specified requirements and dimensions of AWWA C208, unless otherwise indicated.
- 3. Grooved Couplings
 - a. Grooved couplings as called for in the Plans shall be Victaulic AGS Vic-Ring Systems, Style W77
 - b. Victaulic Type "D" Vic-Rings shall be carbon steel per ASTM A 105 or equivalent
 - c. Housing shall be ductile Iron conforming to ASTM A536, Grade 65-45-12
 - d. Coating shall be liquid epoxy per AWWA C210
 - e. Gaskets shall be EPDM
 - f. All bolts, nuts and washers shall be high strength, 316 stainless steel
- B. Wall Thickness
 - 1. General:
 - a. Water Main
 - Wall thickness shall be minimum 3/8-inch

2.5 JOINTS

- A. Shop Welded
 - 1. Fabricate in accordance with AWWA C200 as modified herein.
 - 2. Complete joint penetration (CJP) butt joints shall be used for longitudinal, girth, and spiral welds, unless otherwise indicated.
 - 3. Lengths of pipe shall not be shop-joined using lap joints.
- B. Preparation of Joints for Field Welding
 - 1. Complete joint penetration (CJP) welds, unless otherwise indicated.
 - 2. Butt Strap Joint Welded:
 - a. Plain ends beveled as required by AWWA C200 and Contractor's field WPS.
 - b. Provide protection for factory beveled pipe ends so ends are not damaged during transport.
 - 3. Miter End Cuts:
 - a. Maximum Total Allowable Angle: 2.5 degrees per pipe joint
- C. Grooved

a. Grooved couplings as called for in the Plans shall be Victaulic AGS Vic-Ring Systems, Style W77

- b. Victaulic Type "D" Vic-Rings shall be carbon steel per ASTM A 105 or equivalent
- c. Housing shall be ductile Iron conforming to ASTM A536, Grade 65-45-12
- d. Coating shall be liquid epoxy per AWWA C210
- e. Gaskets shall be EPDM
- f. All bolts, nuts and washers shall be high strength, 316 stainless steel

2.6 FLANGES

A. Flanges, bolting materials, and flange gaskets for steel flanges shall conform to AWWA C207, Class D unless otherwise noted.

2.7 COATING

- A. General
 - 1. Notify Engineer at least 5 days prior to application of coating products.
 - Holdback of and coating from field-welded joints shall be as follows:
 a. For butt weld and butt strap joints, 6 inches
- B. Steel Pipe Coating
 - 1. General
 - a. Pipe coatings shall be polyurethane in accordance with AWWA Standard C222-08, liquid epoxy in accordance with AWWA Standard 210 or fusion bonded epoxy in accordance with AWWA Standard C213, unless otherwise shown or specified.
 - b. All coatings shall be shop-applied except field repairs and holdback areas. Engineer or Owner may be present during application of any or all coatings. Damage to the coated materials during shipping and handling shall be repaired in accordance with the applicable AWWA standard at no additional cost to Owner.
 - c. Surface preparation shall be Near White Blast Cleaning SSPC-SP-10.
 - d. Coating thickness shall be 40 mils (MDFT) for polyurethane and 16 mils for epoxy coatings.
 - e. Do not coat the machined surfaces of flanges.
 - 2. Field Applied
 - a. Butt Strap Joints
 - Apply shrink sleeves in accordance with AWWA C216. Heat shrink sleeve shall be high recovery material. Minimum sleeve thickness shall be 100 mils. Provide manufacturer's recommended sleeve model, thickness, length, and size required for the specific

type of joint and pipe. Aqua-Shield[™] as manufactured by Canusa-CPS is an acceptable product for Heat Shrink Sleeves.

- 2) Prepare sound, intact coating in accordance with heat shrink sleeve manufacturer recommendations.
- Overlap sound, intact coatings with heat shrink sleeve, 10 to 12-inches minimum after final applications.

2.8 LINING

- A. Epoxy Lining
 - 1. General:
 - a. Notify Engineer at least 5 days prior to application of lining products.
 - b. Holdback of lining from field-welded joints shall be as follows:
 - 1) For butt-weld and butt-strap joints, 6 inches
 - 2. Shop-Applied:
 - a. Submit Epoxy Coating material data for review and acceptance.
 - b. All exterior surfaces of steel pipe, specials, and fittings must be coated, inspected, and repaired in accordance with AWWA standard C210 or C213 as applicable and must be certified to meet NSF 61 requirements for potable water use and must be certified by the manufacturer to impart no taste or odors to the potable water.
 - c. All coatings must be shop-applied except field repairs and field-welding holdback areas. Damage to the coated materials during shipping and handling must be repaired in accordance with the applicable AWWA Standard C210 or C213 and the Coating Manufacturer's written instructions.
 - d. Surface preparation must be Near White Blast Cleaning SSPC-SP-10.
 - e. Coating thickness must be 16 mils (MDFT).
 - f. Coating must be tested to be holiday-free according to AWWA C210 Section 5.5
 - g. Flange faces must not be coated.
 - 3. Field-Applied:
 - a. All interior surfaces of steel pipe must be lined, inspected, and repaired in accordance with AWWA Standard C210 or C213 as applicable.
 - b. At connection locations field applied epoxy lining must overlap the existing lining a minimum of 3 inches.

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2.9 SOURCE QUALITY CONTROL

- A. Shop Hydrostatic Pressure Test: In accordance with AWWA C200 Section 5.2, except as follows:
 - 1. General: Unless specified otherwise, testing of pipe and fittings shall be performed before lining and coating is applied.
 - 2. Pipe: Maintain test pressure for minimum of 5 minutes.
 - 3. Test fittings at the shop after welding. Install temporary test heads as required for testing. Remove test heads after successful pressure test.
 - 4. Test Pressure shall be 250 psi.
- B. Shop Nondestructive Testing:
 - 1. Welds: 100 percent visually examined by Contractor's Shop Inspector to criteria in ASME BPVC SEC VIII, Division 1.
 - 2. CJP Groove Welds: Contractor's SNT-TC-1A, Level II RT inspector shall spot radiographically examine 25 percent of all butt joint groove welds pipe in accordance with ASME BPVC SEC VIII, Div. 1, Paragraph UW-51. Welds that, in opinion of Resident Engineer, cannot readily be radiographed, shall be ultrasonically examined in accordance with paragraph UW-53.
 - a. Welds at joints shall be 100 percent ultrasonically examined by Contractor's SNT-TC-1A, Level II UT inspector.
 - 3. Fillet Welds: Contractor's SNT-TC-1A, Level II MT inspector shall 100 percent examine fillet welds using magnetic particle inspection method in accordance with ASME BPVC SEC VIII, Division 1, Appendix 6.
 - 4. Air test collars and wrappers in accordance with AWWA C206.
 - 5. Dye penetration tests shall not be used.

PART 3. EXECUTION

3.1 INSTALLATION

- A. General:
 - 1. Joints and related work for field assembly of fittings shall conform to requirements for straight pipe, unless otherwise shown.
 - 2. Inspect pipe and fittings before installation. Clean ends thoroughly, remove foreign matter and dirt from inside.
 - 3. Make minor field adjustments by pulling butt strap joints.
 - 4. Horizontal deflections or fabricated angles shall fall on alignment, as shown within tolerances below.
 - 5. Vertical deflections shall fall on alignment, and pipe angle point locations shall match those indicated on Drawings within tolerances below.

- 6. Pipeline Alignment Tolerances:
 - a. Plan: 0.5 inch
 - b. Elevation: 0.5 inch
- B. Install grooved joints and coupling hardware in accordance with AWWA C606 and manufacturer's written directions.

3.2 WELDING

- A. Perform welding only in presence of Contractor's Field Inspector.
- B. Conform to AWS D1.1/D1.1M, AWWA C206, approved welding procedures, steel pipe welding requirements as stated elsewhere in the Contact Documents, and referenced welding codes. In case of conflict AWS D1.1/D1.1M shall govern.
- C. Rejectable weld defects shall be repaired or redone, and retested until sound weld metal has been deposited.

3.3 REPAIR OF SHOP-APPLIED FUSION BONDED EPOXY COATINGS

- A. Exterior surfaces of steel pipe and fittings shall be inspected upon delivery to Site and just prior to backfilling trench.
- B. Repair of Fusion Bonded Epoxy Coating: Field repairs shall be made using 98 to 100 percent liquid solids epoxy in accordance with AWWA C210; Liquid Epoxy Coatings and Linings for Steel Water Pipe and Fittings. Follow manufacturer's repair coating surface preparation instructions. Repair coating color shall be similar to fusion bonded epoxy coating color.

3.4 COATING OF FIELD-WELDED JOINTS

A. Refer to Section 2.07, herein.

3.5 LINING OF FIELD-WELDED JOINTS

- A. Polyurethane for Lining and Coating Repair;
 - Polyurethane for Lining and Coating Repair shall be a solventless elastomeric aromatic polyurethane, chemical cured, per ASTM D16 Type V. Polyurethane for Lining and Coating Repair shall conform materially to, and be applied in accordance with AWWA C222 and shall be certified to meet NSF 61 requirements for potable water use and shall be certified by the manufacturer to impart no taste or odors to the potable water. It shall be compatible for use to protect properly prepared interior steel water main surfaces.
 - 2. Applicator of Polyurethane for Lining and Coating Repair shall be fully trained, certified, and authorized to install the Polyurethane for

Lining and Coating Repair manufacturer's products. Provide certification letter from lining manufacturer indicating that applicator training requirements have been met. Polyurethane for Lining and Coating Repair shall be placed in conformance with the lining manufacturer's recommended surface preparation, humidity range, mixing methods, and placement instructions. Do not apply lining in temperatures outside the recommended minimum or maximum values, in dust or smoke-laden atmosphere, or in damp or humid weather. Any foaming or bubbling in lining due to presence of water or high humidity or other reasons during application, shall be cause for rejection of lining repair and will require its removal and reinstallation.

- 3. Polyurethane for Lining and Coating Repair shall be placed in two dissimilar-colored coats with a total build thickness of 40mils DFT and be holiday free.
- 4. Polyurethane for Lining and Coating Repair shall be LifeLast DuraShield 310-61 JARS, or approved equal.
- B. Repair of shop-applied fusion bonded lining
 - 1. Remove loose lining, feather edges and roughen surface of intact fusion bonded lining 2-inches from edge, as recommended by the repair coating manufacturer
 - 2. Perpare bare steel surfaces by power tool cleaning to bare metal, SSPC SP-11
 - 3. Solvent clean
 - 4. Apply one coat of 98 to 100-percent solids epoxy, NSF 61 certified for potable water contact, 40 mils minimum dry film thickness.
 - a. Sherwin Williams DuraPlate UHS, or approved equal.
 - 5. Overlap intact fusion bonded epoxy 2-inches
 - 6. Allow to dry and cure in accordance with manufacturer's instructions before immersion.

3.6 FIELD QUALITY CONTROL

- A. Field Welding:
 - 1. All welds, 100 percent Visual Inspection by Contractor's Field Inspector and marked to indicate acceptance or rejection.
 - 2. CJP Welds:
 - a. Inspect 100 percent of all groove welds using UT.
 - 3. Fillet Welds: 100 percent MT inspection is required.
 - 4. Weld Acceptance:
 - a. Welds to be inspected, if less than 100 percent rate, shall be selected at random by Engineer.
 - b. Visual Testing: Perform VT per AWS D1.1/D1.1M Paragraph 9.25, and Table 9.16.
 - c. Ultrasonic Testing: Comply with AWS D1.1/D1.1M, Paragraph 9.27

- d. Magnetic Particle Testing: Comply with AWS D1.1/D1.1M Paragraph 6.10
- e. Caulking or peening of defective welds is not permitted. Remove in manner that permits proper and complete repair by welding.
- f. Retest unsatisfactory welds.
- g. Dye Penetration Testing shall not be used.
- Verification Testing: Owner may conduct random nondestructive inspections of field-welded joints. Inspections will be of an appropriate type for weld being evaluated. Possible types of inspection include, but are not limited to, RT, UT, MT, and VT. Testing will be performed and evaluated per AWS D1.1/D1.1M. Provide Owner's Verification Inspector access to the Work.
- B. Field Hydrostatic Testing:
 - 1. Pipeline:
 - a. General:
 - Field hydrostatic testing to be performed per Jordan Valley Water Conservancy District requirements. Contractor to coordinate field hydrostatic testing with the District prior to any work being performed. Hydrostatic testing is to be limited to visual leak inspection under operating pressure once the pipeline is ready to be placed into service.
 - 2) Any leaks or defects in the construction of the system that may develop shall be repaired and the test continued until the system is practically watertight.
 - No provision of this Section shall be construed as waiving any provision of the Contractor's guarantee.
- C. Flushing, Disinfection and Bacteriological Testing
 - 1. All testing to be performed per District requirements. Contractor to coordinate flushing, disinfection and testing requirements with the District prior to any work being performed.
 - 2. The chlorinating procedure to be followed shall be as specified in AWWA Standard C651. All closure fittings shall be swabbed with a very strong chlorine solution at least as strong as liquid household bleach (5-6% Cl).

END OF SECTION

SECTION 02760

EXISTING UTILITIES/FACILITIES UNDERGROUND AND OVERHEAD

PART 1. GENERAL

1.1 LEGAL REQUIREMENTS UNDERGROUND FACILITIES

- A. The Contractor shall, before commencing excavation in any area, comply with the any applicable laws relating to or governing the identification, location, marking, and responsibility for protecting and repairing of underground facilities.
- B. Whenever there may be a conflict between the provisions of any law and the provisions of these specifications, the provisions of law shall control.

1.2 **DEFINITIONS**

- A. Utility means any facility or item placed above or below ground for use in connection with the storage or conveyance of water, sewage, electronic, telephonic, or telegraphic communication, cablevision, electric energy, petroleum products, gas, gaseous vapors, hazardous liquids, or other substances and including, but not limited to pipes, sewers, conduits, cables, valves, lines, wires, manholes, and attachments.
- B. Pipe zone is defined as extending from the bottom of the required excavation to six (6) inches over the top of the pipe.

1.3 IDENTIFICATION

- A. All underground utilities known by the Owner to be in the proposed area of excavation are identified on the project plan.
- B. The underground utilities identified on the plans have not and cannot be precisely located by the Owner or its agents or engineers and location is approximate only because such information is within the control of the owners of the underground utilities. The Owner, under this Contract, does not warrant the location of underground utilities.
- C. NOTICE: Overhead electrical service lines are generally not shown on the drawings. Electrical transmission lines shown on the drawings are located by point to point, power pole to power pole connections. The transmission cables or wires may be located on either side of the drawing location depending upon the configuration of the crossarms on the power poles or towers. Line voltage is not shown.

D. Other overhead utility lines are generally not shown on the drawings.

1.4 NOTIFICATION

- A. It is the responsibility of the Contractor to give notice to the Owner or owners of any utilities known or suspected to be within the area of any proposed excavation or construction activities.
- B. The Contractor is responsible to have the locations of underground utilities marked by the utility owners prior to beginning excavation.
- C. The Contractor is responsible for determining the extent of any hazard created by electrical power in all areas and shall follow procedures during construction as required by law and regulation. Prior to construction, the Contractor shall meet with utility owners and determine the extent of hazards and remedial measures and shall take whatever precautions may be required.
- D. The Contractor's attention is directed to federal, state, and local safety codes relative to limitations of work in proximity to overhead power lines.

1.5 QUALITY ASSURANCE

- A. The Contractor will be required to have available a pipe finder and a person capable in its use and to utilize same to satisfy himself as to the exact location of such underground facilities in the interest of avoiding unnecessary damage, maintenance costs, and to insure continuity of customer service.
- B. Contractors shall cooperate with utility owners to aid in locations and maintenance of existing utilities.

1.6 ELECTRICAL TRANSMISSION AND SERVICE LINES

- A. Since neither the Engineer nor the Owner can anticipate the construction methods or techniques and equipment to be used by the Contractor in performing the work, the extent of the possibility of the Contractor's equipment and personnel coming in contact with electrical transmission lines cannot be fully anticipated, and there is no representation that all electrical transmission lines are shown on the plans.
- B. The Contractor is charged with the responsibility of observing and investigating the presence of any electrical transmission lines which might impinge on his work whether overhead or underground and shall consult with and utilize the information given by utility owners and operators to determine the extent of any hazards and remedial measures required, and follow appropriate safety procedures.

1.7 ABOVE GROUND UTILITIES

A. Existing above ground utilities, whether shown on the drawings or not, shall be maintained, relocated, rerouted, removed and restored as may be necessary by the Contractor in a manner satisfactory to owners and operators of the utilities.

1.8 UTILITY SERVICE LATERALS

- A. Minor underground utility service lines, including but not limited to sanitary sewer services, gas services, water services, house or yard drains, and electricity or telephone services and driveway culverts shall be maintained, relocated, rerouted, removed and restored by the Contractor with the least possible interference with such services.
- B. Even though the presence of minor underground utility service lines may be deemed changed or differing conditions, in no case shall the interference of such service lines be the basis for extra compensation except in the case of a conflict, not shown on the plans, with sanitary sewer service occurring at an elevation between the top and bottom of the proposed pipeline or structure together with the pipe zone, the Contractor will be reimbursed for costs thereof in accordance with Article 13 of the General Conditions.

1.9 RESTORATION BY UTILITY OWNER

- A. The right is reserved by owners of public utilities and franchises to enter upon any street, road, right-of-way, or easement for the purpose of maintaining their property and for making necessary repairs or adjustments caused by the Contractor's operations.
- B. The Contractor shall save the Owner harmless of any costs so incurred in restoration of a utility damaged by the Contractor except in special cases outlined above, and subject to the provisions of any law.

1.10 RESTORATION OF DRAINAGE FACILITIES

- A. Where it is necessary for drainage facilities to be removed and replaced, existing pipe and catch basins may be reinstalled when approved by the agency having jurisdiction.
- B. The materials shall be cleaned.
- C. When it is necessary to replace existing pipe or catch basins, the new materials shall be of equal strength and similar design to existing materials.

- D. Installation shall be in accordance with the applicable provisions of these specifications.
- E. All costs, whether new or existing facilities are installed, shall be considered to be included in the unit prices bid for the various items and no additional payment shall be allowed.

END OF SECTION

SECTION 03055

PORTLAND CEMENT CONCRETE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Portland Cement Concrete.

1.2 RELATED SECTIONS Not used

1.3 REFERENCES

- A. AASHTO M 6: Fine Aggregate for Hydraulic Cement Concrete
- B. AASHTO M 80: Coarse Aggregate for Hydraulic Cement Concrete
- C. AASHTO M 85: Portland Cement
- D. AASHTO M 154: Air-Entraining Admixtures for Concrete
- E. AASHTO M 194: Chemical Admixtures for Concrete
- F. AASHTO M 295: Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
- G. AASHTO T 121: Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete
- H. AASHTO T 160: Length Change of Hardened Hydraulic Cement Mortar and Concrete
- I. AASHTO T 176: Plastic Fines in Graded Aggregates and Soils by Use of the Sand Equivalent Test
- J. AASHTO T 325: Estimating the Strength of Concrete in Transportation Construction by Maturity Tests
- K. AASHTO T 358: Surface Resistivity Indication of Concrete's Ability to Resist Chloride Ion Penetration
- L. AASHTO TP 137: Box Test in Slip Form Paving of Fresh Portland Cement Concrete

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- M. ACI 301: Specification for Structural Concrete
- N. ACI 305: Hot Weather Concreting
- O. ACI 306: Cold Weather Concreting
- P. ASTM C 260: Air-Entraining Admixtures for Concrete
- Q. ASTM C 595: Blended Hydraulic Cements
- R. ASTM C 1116: Fiber-Reinforced Concrete
- S. ASTM C 1157: Hydraulic Cement
- T. ASTM C 1567: Determining the Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method)
- U. ASTM C 1602: Mixing Water Used in the Production of Hydraulic Cement Concrete
- V. ASTM C 1609: Flexural Performance of Fiber-Reinforced Concrete (Using Beam With Third-Point Loading)
- W. UDOT Materials Manual of Instruction
- X. UDOT Minimum Sampling and Testing Requirements
- Y. UDOT Quality Management Plan
- Z. ICC Evaluation Service (ICC-ES) AC32: Concrete with Synthetic Fibers

1.4 **DEFINITIONS**

- A. Cold Weather Protection Period The protection period is the amount of time recommended to prevent concrete from being adversely affected by exposure to cold weather during construction as per ACI 306.
- B. Fibrillated Microfiber Fibrillated synthetic fibers with diameters or equivalent diameters less than 0.012 inch.
- C. Macrosynthetic Fiber Synthetic fibers with diameters or equivalent diameters greater than 0.012 inch.

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1.5 SUBMITTALS

- A. Mix design for all AAA, AA, and A concrete classes to be used for approval.
 - 1. The Department approves concrete mix designs based on trial batch test results or on Department project history.
 - 2. Include at least the following:
 - a. The proposed mix design.
 - b. Target slump value.
 - c. Trial batch test results.
 - d. Test results verifying that coarse and fine aggregates meet this Section, Article 2.2, paragraph B.
 - e. Test results for the proposed mix design for potential reactivity of coarse and fine aggregates according to UDOT Quality Management Plan 506: Ready-Mix Concrete.
 - f. Test results demonstrating the ability of the combinations of cementitious materials and aggregates to control the reactivity when using potentially reactive aggregates in a mix design.
 - g. Written plan for admixtures. Refer to this Section, Article 2.2, paragraph D.
 - h. Well-graded combined aggregate gradation for the mix design when used.
 - Provide targets for each required sieve (listed in Table 6) for control and acceptance.
 - Include the sum of the percent retained on the #8, #16 and #30 sieves. Submit the sum of the percent retained on each of the #30-200 sieves listed in Table 6.
 - 3) Identify the aggregate size and number of component stockpiles.
 - 4) Provide gradations for each component stockpile and the target percentages of each stockpile used to achieve the total combined gradation.
 - i. Test results establishing a density (unit weight) target of freshly mixed concrete according to AASHTO T 121 when using Class AA(LSF) and AA(ES) concrete.
 - j. Flexural strength test results when mix uses synthetic fiber reinforcement.
- B. Mix design, manufacturer's product data, or manufacturer's labeling for Class B concrete for review.

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- C. Cold Weather Concreting Plan and Hot Weather Concreting Plan for review.
 - 1. Include the following:
 - a. Detailed procedures for protection from adverse weather conditions during: placement, curing, and temperature monitoring of concrete during cold and hot weather.
 - b. Procedures to be implemented upon abrupt changes in weather conditions or equipment failures.
 - c. Refer to this Section, Article 3.1, paragraph D for cold weather concreting requirements and Article 3.1, paragraph E for hot weather concreting requirements.
 - 2. Not required for precast concrete members provided by prequalified suppliers.
- D. Construction Documentation.
 - 1. Concrete surface temperature monitoring, if required in the Cold weather concreting plan. Refer to this Section, Article 3.1D4.
- E. Obtain approval from the Engineer for the project specific application of an approved mix design.

1.6 ACCEPTANCE

- A. Sampling and testing for strength, air entrainment, and slump is according to UDOT Minimum Sampling and Testing Requirements.
 - 1. The following exceptions apply when using Class AA(LSF) and AA(ES) concrete mixes:
 - a. Slump tests are suspended.
 - b. Test fresh concrete density (unit weight) according to AASHTO T 121 at the same frequency as Air Content and Concrete Temperature.
 - 1) Batch fails if the unit weight of the fresh concrete in the field varies more than ± 5 lb/ft³ from the target density for fresh concrete established by the mix design.
 - c. Reject batch if water/cementitious ratio exceeds the water/cementitious ratio established in the trial batch.
 - B. The Department may accept the item at a reduced price when concrete is below specified strength and does not have a separate strength pay factor.
 - 1. The pay factor will be applied to the quantity of the pay item that is represented by the strength tests that fall below a specified strength.

Portland Cement Concrete 03055 – Page 4 of 17 2. Department will calculate the pay factor using Table 1 based on 28 day compressive strength.

Table 1						
Price Reduction for 28 Day Compressive Strength						
AAA(AE), AA(LSF) Concrete	AA(AE), A(AE), AA(P) Concrete Classes					
PSI below Specified	Pay Factor	Pay Factor				
Strength		-				
1-100	0.95	N/A				
101-200	0.90	N/A				
201-300	0.85	N/A				
301-400	0.80	N/A				
More than 400	Reject	N/A				
More than 500	Reject	Reject				

3. The Engineer may accept a "reject" lot based on an engineering analysis. The Department applies a 0.50 pay factor if a reject lot is allowed to remain in-place.

1.7 QUALITY ASSURANCE

- A. Uncontrolled mix designs
 - 1. The Department will monitor approved mix designs on the performance of compressive strength on all projects according to the UDOT Materials Manual of Instruction
 - 2. Mix designs showing strength test variability with no determined root cause are considered uncontrolled.
 - 3. Suspend use of uncontrolled mix designs when directed by the Department.

PART 2 PRODUCTS

2.1 CONCRETE CLASSES AND MIX REQUIREMENTS

- A. Use only concrete mixes that have a Department approved mix design.
 - 1. Refer to the requirements in Table 2.

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[Table 2				
Concrete Classes and Mix Requirements							
Class	Coarse Aggregate Size	Maximum Water / Cementi- tious Ratio****	Maximum Percent Shrinkage at 28 days AASHTO T 160	Chloride Ion Penetration AASHTO T 358 Table 1	Air Content Percent (%) *	Mix Design Compressive Strength f`cr (psi)	28 Day Minimum Compressive Strength f'c (psi) **
AAA(AE)	1" to No. 4 ¾" to No. 4	0.40	N/A	N/A	5.0 - 7.5	6,200 or f'c +1200	5,000 or as shown
AA(LSF)	1" to No. 4 ¾" to No. 4	0.42	0.035	Low to Negligible	5.0 - 7.5	5,200	4,000
AA(LS)	1" to No. 4 ¾" to No. 4	0.40	0.035	Low to Negligible	5.0 - 7.5	5,200	4,000
AA(P)	2" to No. 4 1½" to No. 4 1" to No. 4	0.44	0.042	N/A	4.0 - 7.0 4.5 - 7.5 5.0 - 7.5	5,200	4,000
AA(ES)***	1½" to No. 4 1" to No. 4 ¾" to No. 4	0.42	0.035	Low to Negligible	4.5 - 7.5 5.0 - 7.5 5.0 - 7.5	5,200	4,000
AA(AE)	2" to No. 4 1½" to No. 4 1" to No. 4 ¾" to No. 4	0.44	N/A	N/A	4.0 - 7.0 4.5 - 7.5 5.0 - 7.5 5.0 - 7.5	5,200	4,000
A	1½" to No. 4 1" to No. 4 ¾" to No. 4	0.53 0.53 0.48	N/A	N/A	N/A	3,900	3,000
A(AE)	1 ¹ / ₂ " to No. 4 1" to No. 4 ³ / ₄ " to No. 4	0.53 0.53 0.48	N/A	N/A	4.5 - 7.5	3,900	3,000
B or B(AE)		0.62	N/A	N/A	N/A 3.0 - 6.0	3,250	2,500

Table 2 Notes:

* Values listed represent in-place air content. Make necessary adjustments for impacts to air content due to placement.

** For f'c over 4,000 psi, design and proportion mixes according to ACI Manual of Concrete Practice 301: Specifications for Concrete and project specific criteria. Use air content percent in Table 2 for these mixes according to the class specified and the coarse aggregate size.

*** For Class AA(ES), achieve at least 3,000 psi at 24 hr.

****The Water/Cementitious ratios in this table are the maximum allowed. The mix design w/c ratio is established in the trial batch and will remain within the tolerances of this Section Article 2.6 during production.

Acronym Definitions:

AE = air-entrained LSF = low shrinkage with fiber LS = low shrinkage P = pavement ES = high early strength

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- B. Maximum nominal size of coarse aggregate:
 - 1. Not larger than 1/5 the narrowest dimension between sides of forms.
 - Not larger than $\frac{1}{3}$ the depth of slabs. 2.
 - 3. Not larger than ³/₄ the minimum clear distance between reinforcing bars or between bars and forms, whichever is less.
- C. Do not exceed water/cementitious ratio.
 - Calculate the water/cementitious ratio (w/c) by weight according to 1. the following formula:

$$\frac{W}{c} = \frac{Water}{Cement + Pozzolan}$$

- Do not exceed 30 percent total pozzolan in any mix unless otherwise D. specified.
- E. Use 94 lb additional cementitious material per cubic yard to the amounts determined in the mix design for concrete deposited in water.
- F. Slump tolerance
 - 1. Establish the target slump by mix design trial batch.
 - The target slump tolerance is the acceptable variation from the 2. maximum target slump.
 - Do not exceed a 9 inch slump. 3.

Target Slump Tolerance (inch)							
Target Slump							
	3 inch or less More than 3 inch						
Plus tolerance	0	0					
Minus tolerance	1 ½ inch 2 ½ inch						

- G. Class AA(LSF) and AA(ES) concrete mixes require the following in addition to the requirements in Table 2:
 - Synthetic Fiber Reinforcement according to this Section, paragraph 1. 2.2F.
 - a. Provide fibrillated microfibers and macrosynthetic fibers
 - 2. A well-graded combined aggregate gradation according to this Section, paragraph 2.2 B3.
- Η. Class AA(P) concrete mixes require the following in addition to the requirements in Table 1:
 - 1. Meet a 28 day flexural strength of 650 psi verified through trial batch.

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- 2. Meet a minimum Sand Equivalent of 75. Refer AASHTO T 176, alternate method 2, pre-wet method (test the sample in the wet condition).
- 3. Meet a maximum estimated voids ranking of 2 and a maximum average edge slump of ¼ inch verified through trial batch. Refer to AASHTO TP 137.

2.2 MATERIALS

- A. Cement
 - 1. Use Type II Portland Cement or equivalent according to Table 4 unless otherwise specified. Type III Portland Cement or equivalent may be used for precast items.
 - 2. Blended Hydraulic Cement
 - a. Blended hydraulic cement substituted for Portland Cement:
 - 1) Use ASTM C 1567 to verify that expansion is less than 0.1 percent 14 days after the zero reading.
 - 2) Refer to the equivalent cements listed in Table 4.
 - b. Do not exceed 30 percent total pozzolan limit when adding fly ash to a blended hydraulic cement.
 - 1) Submit documentation of the total pozzolan content with the mix design.

I able 4						
Portland Cement/Blended Hydraulic Cement Equivalencies						
AASHTO M 85						
Equivalent Alkalis	ASTM C 595	ASTM C 1157				
0.80 max percent						
*Type I	IP, IL, IT	GU				
Type II	IP(MS), IT(MS)	MS				
Type III	-	HE				
*Type V	IP(HS), IT(HS)	HS				

-

*Use only when specified

- 3. Do not mix cements originating from different sources.
- 4. Do not use air-entrained cement.

B. Aggregate

- 1. Coarse Aggregate
 - a. Use coarse aggregate that meets AASHTO M 80 physical properties. Use one of the gradations in Table 5.
 - b. Do not exceed percentages of deleterious substances as specified in AASHTO M 80, Table 2, for Class A aggregates.

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	Table 5								
C	Coarse Aggregate Gradations - Percent Passing (by weight)								
Aggregate Size (inches or sieve size)	2 ½	2	1½	1	3/4	1⁄2	³ ⁄8	No. 4	No. 200
2 to No. 4	100	95-100		35-70		10-30		0-5	0-1
1½ to No. 4		100	95-100		35-70		10-30	0-5	0-1
1 to No. 4			100	95-100		25-60		0-10	0-1
¾ to No. 4				100	90-100		20-55	0-10	0-1

- - -

2. Fine Aggregate

- Use fine aggregate that meets AASHTO M 6 physical a. properties. Use the gradation in Table 6.
- Do not exceed percentages of deleterious substances as b. specified in AASHTO M 6, Table 2, for class A aggregates, using option "b" for material finer than the No. 200 sieve.

Table 6				
Fine Aggregate Gradation				
Sieve Size Percent Passing (by weight				
¾ inch	100			
No. 4	95 to 100			
No. 16	45 to 80			
No. 50	10 to 30			
No. 100	2 to 10			
No. 200	0 to 3.0			

- 3. A well-graded combined aggregate gradation is required for AA(LSF), AA(ES) and AA(P) concrete classes and may replace the gradation requirements in Tables 5 and 6 for other concrete classes when designed and approved as such.
 - Proportion well-graded combined aggregates to meet the a. Tarantula Curve Gradation Band in Table 6. The combined gradation must be within the boundary limits for each sieve size. Refer to the UDOT Materials Manual of Instruction, Section 975: Guidelines for Well-Graded Combined Aggregate Gradations for a graphical representation of the Tarantula Curve.
 - 1) Slip formed pavements: retain at least 15 percent on the sum of the #8, #16 and #30 sieves.
 - 2) Slip formed pavements: retain between 24 and 34 percent of fine sand on the sum of the #30 through #200 sieves.

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- 3) Flowable applications: retain at least 20 percent on the sum of the #8, #16 and #30 sieves.
- 4) Flowable applications: retain between 25 and 40 percent of fine sand on the sum of the #30 through #200 sieves.

Table 7					
Tarantula Curve Gradation Band					
Sieve Size	Individual Percent				
	Retained				
2 in.	0				
1 ½ in.	0 to 5				
1 in.	0 to 16				
³⁄₄ in.	0 to 20				
1∕₂ in.	4 to 20				
3/8 in.	4 to 20				
No. 4	4 to 20				
No. 8	0 to12				
No. 16	0 to 12				
No. 30	4 to 20				
No. 50	4 to 20				
No. 100	0 to 10				
No. 200	0 to 2.3				

- C. Water
 - 1. Use potable water or water that meets ASTM C 1602, including Table 2.
- D. Admixtures
 - 1. Do not use calcium chloride.
 - Air Entrainment according to ASTM C 260 as modified by AASHTO M 154 including the optional uniformity requirements in ASTM C 260, Section 5.
 - 3. Water Reducing Agents
 - a. Refer to AASHTO M 194.
 - b. High Range Water Reducer (HRWR) Include details regarding HRWR ingredients, production methods, handling, and placing in the written plan for admixtures.
 - 4. Accelerators Refer to AASHTO M 194.
 - 5. Set Retarding and Hydration Stabilizing Admixtures Refer to AASHTO M 194.
 - a. Establish and inform the Engineer of the effective life of the set-retarding or stabilizing admixture by trial batch if admixtures are required due to haul times exceeding the time limitations in this Section, Article 3.1, paragraph A.

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- b. Do not exceed manufacturer's recommendations for the use of the set retarding admixture.
- c. Do not re-dose the concrete with additional set retarding admixture.
- d. Add admixture at the batch plant at the time of initial batching operations.
- e. Show on batch tickets the amount of admixture used.
- f. Time of placement is established by the trial batch and supersedes the requirements in this Section, Article 3.1, paragraph A.
- 6. Site-added air-entrainment Refer to AASHTO M 154.
 - a. Limit the use of site-added air-entraining agents to one addition per load, regardless of quantity.
 - b. Use pre-measured admixtures.
 - c. Record amount used on batch ticket.
 - d. Rotate the drum at least 30 revolutions at the mixing speed recommended by the manufacturer.
- E. Pozzolan
 - 1. Fly Ash
 - a. Class F according to AASHTO M 295 except modify Table 2 with the following.
 - 1) Loss on Ignition (LOI) Not to exceed 3 percent.
 - 2) Allowable CaO content Not to exceed 15 percent.
 - b. Label the storage silo for fly ash to distinguish it from cement.
 - c. Use different size unloading hoses and fittings for cement and fly ash.
 - 2. Natural Pozzolan (Class N)
 - a. Refer to AASHTO M 295.
 - b. May use instead of fly ash provided that the expansion does not exceed 0.1 percent. Refer to ASTM C 1567.
- F. Synthetic Fiber Reinforcement
 - 1. Conform to ASTM C 1116, Type III and the requirements of ICC-ES AC32 Section 3.1.1 (plastic shrinkage reinforcement) and Section 3.1.2 (shrinkage and temperature reinforcement).
 - 2. Fibrillated microfiber
 - a. Use fibrillated polypropylene fibers at 1 lb/yd³ of concrete mix.
 - 3. Macrosynthetic fiber
 - a. Use 4 lb/yd^3 of concrete mix.
 - b. Provide a minimum flexural strength ratio $(R_{e,3})$ of 25 percent when tested according to ASTM C 1609.

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- 4. Store the fibers in a dry, covered area, free of contamination.
- 5. Evaluate trial batches to verify workability of the concrete.

2.3 MIX DESIGN

- A. Design mixes to meet the requirements of this Section and project specific criteria.
- B. The Contractor assumes responsibility for the compatibility of admixtures with the mix design and their potential effects on concrete properties.
- C. Design the cementitious system to mitigate potential alkali-aggregate reactivity.
 - 1. Use at least 20 percent pozzolan by weight of the total cementitious system.

2.4 TRIAL BATCHES

- A. Use the same components in the trial batches that will be used in the project.
 - 1. Accelerators and site-added air-entrainment can be incorporated in the trial batch but are not required.
- B. Use Department certified TTQP Concrete and Concrete Strength Testing personnel to perform trial batches and strength tests.
- C. The Department or its certified representative may witness the trial batch.
- D. Mix concrete trial batches according to the UDOT Materials Manual of Instruction 974: Guidelines for Portland Cement Concrete Mix Design Trial Batches.
- E. Use a Department qualified laboratory to verify trial batch compressive and flexural strength testing.

2.5 AGGREGATE STOCKPILES

- A. Construct stockpile platforms so that subgrades are prevented from intruding into aggregates.
- B. Build stockpiles at least two days before use.
- C. Provide an operator and front-end loader to help the Engineer take aggregate samples.
- D. Provide separate stockpiles for coarse and fine aggregates.

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- E. Construct stockpiles to minimize segregation of aggregates
- F. Allow washed aggregates to drain to uniform moisture content before use (12 hours minimum).

2.6 BATCH MATERIALS

- A. Batch Tolerances. Refer to AASHTO M 157.
 - 1. Cementitious Material: ± 1 percent of the required mass
 - 2. Aggregate: ± 2 percent of the required mass
 - 3. Total Water: ± 3 percent of the required mix amount

B. Batch Size

- 1. Do not load trucks in excess of their rated mixing capacity.
- 2. Maintain an accurate and legible truck load-rating plate on the truck.
- 3. Maintain a minimum individual batch size of 2 yd³.
- C. Cement with fiber reinforcement
 - 1. Do not introduce fibers at the same time as the cement is being introduced.
 - 2. Mix for at least five minutes after the addition of the fibers.

PART 3 EXECUTION

3.1 LIMITATIONS

- A. Timing Deliver, place, and consolidate concrete as follows unless otherwise specified:
 - 1. Within 90 minutes of batching when the air temperature is below 80 degrees F.
 - 2. Within 75 minutes of batching when the air temperature is between 80 and 85 degrees F.
 - 3. Within 60 minutes of batching when the air temperature is above 85 degrees F.
- B. Concrete Temperature Place concrete when the concrete temperature is between 50 and 90 degrees F or as described in the authorized hot or cold weather protection plan.

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- C. Pumping and Conveying Equipment
 - 1. Do not use equipment or a combination of equipment and the configuration of that equipment that causes a loss of entrained air content that exceeds one-half of the range of air content allowed by specification.
 - a. Replace, reconfigure, or repair equipment that does not meet this requirement.
 - 2. Contractor is responsible to verify and monitor air loss.
- D. Cold Weather Comply with the following when placing, finishing, curing, and protecting concrete exposed to cold weather during the protection period. Cold weather applies when the temperature is forecast to fall below 35 degrees F during the protection period.
 - 1. Provide necessary cold weather protection for placing, finishing, curing and protecting in-place concrete such as covers, insulation, and heat.
 - a. Follow the authorized Cold Weather Concreting Plan when placing cast-in-place concrete.
 - b. Follow the prequalified supplier's approved Quality Control Plan when fabricating precast concrete members.
 - 2. Concrete materials
 - a. Do not use chemical anti-freeze additives in the concrete. This does not apply to normal accelerators. Refer to AASHTO M 194.
 - b. Remove and replace concrete damaged by frost action at no additional cost to the Department.
 - c. Heating Aggregate and Water
 - 1. Provide and operate heating devices when heated aggregates are required.
 - 2. Use aggregates free of ice.
 - 3. Heat aggregates uniformly, avoid overheating or developing hot spots.
 - 4. Use either steam or dry heat
 - 3. Determine the concrete compressive strength by one of the following methods:
 - a. Field cured cylinders cured and protected the same as the concrete being protected.
 - b. Maturity method. Refer to AASHTO T 325.

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- 4. Monitor and maintain the temperature of the concrete at or above 50 degrees F during and after placement until the end of the protection period.
 - a. Measure the specified concrete temperature at the concrete surface. Use surface thermometers insulated from the surrounding air.
 - b. Submit records of the concrete surface temperature readings daily through the cold weather protection period.
- 5. Placing concrete
 - a. Do not place concrete during adverse weather including rain, snow, and high winds without adequate protection.
 - b. Do not proceed with concrete placement if the temperature of any contact surface, such as reinforcement or formwork, is less than 36 degrees F.
 - c. Cease placement operations when the ambient temperature is 40 degrees F and decreasing unless adequate precautions are taken according to the authorized Cold Weather Concreting Plan.
- 6. Protection of in-place concrete
 - a. Maintain the concrete above 50 degrees F during placement and until the end of the protection period.
 - 1) The Cold Weather protection period is the time required for the concrete to reach a compressive strength of at least 3,500 psi.
 - 2) Extend the duration of the Cold Weather protection period at least 24 hours beyond the termination of the cure before exposing the concrete to freezing temperatures when curing by the water method.
 - b. Comply with the following when heating is required.
 - 1) Adequately vent combustion-type heaters that produce carbon monoxide.
 - 2) Position heaters and ducts so the hot dry air does not cause areas of the concrete surface to overheat or dry.
 - Keep concrete surfaces moist to avoid excessive loss of moisture from the concrete when applying external heat.
- 7. Termination of protection
 - a. Do not allow the temperature of the concrete surfaces to drop by more than 40 degrees F during any 24 hour period.

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- E. Hot Weather Comply with the following when placing, finishing, curing, and protecting concrete exposed to hot weather.
 - 1. Hot weather limitations apply at any time of the year when a combination of high ambient temperature, high concrete temperature, low relative humidity, and high wind speed have the potential to impair the quality of freshly mixed or hardened concrete by accelerating the rate of moisture loss and the rate of cement hydration, or otherwise causes detrimental results.
 - 2. Monitor site conditions, including air temperature, relative humidity, and wind speed, to assess the need for evaporation control measures.
 - a. Begin monitoring no later than 1 hour before beginning concrete placing operations.
 - b. Continue to monitor site conditions at intervals of 20 minutes or less until required curing procedures are applied.
 - 3. Provide necessary hot weather protection.
 - a. Follow the authorized Hot Weather Concreting Plan when placing cast-in-place concrete.
 - b. Follow the prequalified supplier's approved Quality Control Plan when fabricating precast concrete members.
 - c. Initiate evaporation control measures when concrete and air temperatures, relative humidity of the air, and wind speed have the capacity to evaporate free water from the fresh concrete surface at a rate equal to or greater than 0.2 lb/ft²/hr.
 - 1) Determine the evaporation rate of surface moisture using the NRMCA Nomograph in Appendix B of ACI 305.1.
 - 4. Cool all surfaces that will come in contact with the concrete to below 95 degrees F.
 - a. Do not proceed with concrete placement if the temperature of any contact surface, such as reinforcement or formwork, is greater than 95 degrees F.

3.2 CYLINDER STORAGE DEVICE

- A. Provide and maintain cylinder storage device.
 - 1. Maintain cylinders at a temperature range of 60 degrees F to 80 degrees F for the initial 16 hour curing period.
 - 2. Do not move the cylinders during this period.
 - 3. Equip the storage device with an automatic 24 hour temperature recorder that continuously records on a time/temperature chart with an accuracy of ±1 degree F.
 - 4. Have the storage device available at the point of placement at least 24 hours before placement.

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- Stop placement of concrete if the storage device is not provided or cannot accommodate the required number of test cylinders. Cylinder strength results may not be disputed if storage devices are not provided.
- 6. Use water containing hydrated lime if water is to be in contact with cylinders.
- 7. The Engineer may require a 24 hour test run to determine the storage device capability to maintain and record temperature.

END OF SECTION

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SECTION 03211

REINFORCING STEEL AND WELDED WIRE

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Reinforcing steel, steel welded wire reinforcement, dowelled anchors, T-headed bars, mechanical couplers, and grouted splice couplers.
- B. Coating for reinforcing steel, steel welded wire reinforcement, and dowelled anchors.

1.2 RELATED SECTIONS Not Used

1.3 **REFERENCES**

- A. AASHTO M 31: Deformed and Plain Carbon and Low-Alloy Steel Bars for Concrete Reinforcement
- B. AASHTO M 336: Steel Wire and Welded Wire, Plain and Deformed, for Concrete Reinforcement
- C. AASHTO T 106: Compressive Strength of Hydraulic Cement Mortar (Using 50-mm or 2-in Cube Specimens)
- D. ASTM A 108: Steel Bar, Carbon and Alloy, Cold-Finished
- E. ASTM A 641: Zinc-Coated (Galvanized) Carbon Steel Wire
- F. ASTM A 493: Stainless Steel Wire and Wire Rods for Cold Heading and Cold Forging
- G. ASTM A 706: Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement
- H. ASTM A 767: Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement
- I. ASTM A 775: Epoxy-Coated Steel Reinforcing Bars
- J. ASTM A 884: Epoxy-Coated Steel Wire and Welded Wire Reinforcement

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> 2024 Standard Specifications Latest Revision: <u>November 18, 2021</u>

- K. ASTM A 934: Epoxy-Coated Prefabricated Steel Reinforcing Bars
- L. ASTM A 955: Deformed and Plain Stainless-Steel Bars for Concrete Reinforcement
- M. ASTM A 970: Headed Steel Bars for Concrete Reinforcement
- N. ASTM A 1060: Zinc-Coated (Galvanized) Steel Welded Wire Reinforcement, Plain and Deformed, for Concrete
- O. ASTM D 3963: Fabrication and Jobsite Handling of Epoxy-Coated Steel Reinforcing Bars
- P. ASTM E 3121: Field Testing of Anchors in Concrete or Masonry
- Q. ACI 355.4: Qualification of Post-Installed Adhesive Anchors in Concrete
- R. American Welding Society (AWS) Standards
- S. Concrete Reinforcing Steel Institute (CRSI) Manual of Standard Practice

1.4 DEFINITIONS Not Used

1.5 SUBMITTALS

- A. Working Drawings
 - 1. Detailed shop drawings for review of the following:
 - a. Field bending procedure if required. Provide the seal of a Professional Engineer (PE) or Professional Structural Engineer (SE) licensed in the State of Utah.
 - b. Mechanical butt splice shop drawings when proposed details differ from the plans and specifications.
 - 1) Show number and location of mechanical butt splices.
 - 2) Provide two samples of mechanical butt splices and test to destruction in the presence of the Engineer.
- B. Material Submittals
 - 1. Certificate of Compliance from the manufacturer for the following products.
 - a. Reinforcing steel
 - b. Grouted splice couplers

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- 2. Continuous butt welded reinforcing hoops.
 - a. Manufacturer's Quality Control (QC) procedures for the hoop fabrication for review. Include the following as a minimum:
 - 1) The pre-production procedures for the qualification of material and equipment.
 - 2) The methods and frequencies for performing QC procedures during production.
 - 3) The calibration procedures and calibration frequency for all equipment.
 - 4) The welding procedure specification (WPS) for resistance welding.
 - 5) The method for identifying and tracking lots.
 - b. Two samples of welded splices for verification testing.
- 3. Grouted Splice Couplers
 - a. Independent test report for review confirming coupler compliance for each supplied coupler size with the following:
 - 1) Develop 150 percent of the specified yield strength of the connected bar.
 - 2) Determine by testing the amount of time and grout compressive strength required to provide 100 percent of the specified minimum yield strength of the attached reinforcing bar. Use this value to determine when to release bracing.
 - 3) Use the same grout in the testing that will be used in the construction.
 - 4) Requirements for the grout including required strength gain to develop the specified minimum yield strength of the connected reinforcing bar.
- 4. Post-installed adhesive anchor information for review
 - a. Product data indicating product characteristics, storage and handling requirements and limitations
 - 1) The manufacturer's product data must document that the adhesive used is compatible with the type and extent of the anchor coating or corrosion resistant material used.
 - b. Manufacturer's Printed Installation Instructions (MPII)
 - c. Current ICC-ES Evaluation Report in the name of the proposed adhesive anchor system to be used
 - d. Material Safety Data Sheets
 - e. List of locations where post-installed adhesive anchors will be installed in an overhead or upwardly inclined orientation

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- C. Continuous resistance butt welded hoop welder certifications for information.
 - 1. Include welder test reports for each operator, process, and position as required by AWS specifications.
 - 2. Include a letter that states the certified welders have been using the process without an interruption of more than six months since being certified.
- D. Grouted splice coupler quality assurance qualifications for information
 - 1. Grouted splice coupler installer qualifications
 - a. Provide names and state experience or training of personnel responsible for installation of the grouted splice couplers.
 - 1) Include a certificate or statement of training with the names of the trained individuals signed by the manufacturer's representative
 - 2. Grouted splice coupler manufacturer's technical support representative qualifications. Include at least the following:
 - a. Company name
 - b. Name and phone number of the technical support representative
 - c. List of projects using the submitted grouted splice coupler with at least two years of satisfactory performance. List the following for each project:
 - 1) Project name
 - 2) Bridge location (state routes and bridge identifiers)
 - 3) Scope of work
 - 4) Products used
- E. Post-installed adhesive anchor installer qualifications for information when anchors are to be installed in an overhead or upwardly inclined orientation.
 - 1. Provide current certification for qualified adhesive anchor installer according to the ACI Adhesive Anchor Installer Certification program, or equivalent.

1.6 QUALITY ASSURANCE

- A. Grouted splice coupler manufacturer's technical support representative
 - 1. Provide a technical support representative onsite during preparation and grouting of the grouted splice coupler

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- B. Grouted splice coupler installers
 - 1. Installers must be familiar with installation and grouting of splice couplers and that have completed at least two successful projects in the last two years.
 - a. Train new personnel within three months of installation by a manufacturer's technical representative as an acceptable substitution for the experience.

PART 2 PRODUCTS

2.1 REINFORCING STEEL

- A. Deformed or plain carbon steel bars
 - 1. Refer to AASHTO M 31, Grade 60.
- B. Deformed or plain low-alloy steel bars1. Refer to ASTM A 706, Grade 60.
- C. Deformed or plain stainless steel bars
 - 1. Refer to ASTM A 955, Type XM-28.

2.2 WIRE AND WIRE REINFORCEMENT

- A. Refer to AASHTO M 336 for cold drawn steel wire.
- B. Refer to AASHTO M 366 for steel welded wire reinforcement.

2.3 T-HEADED BARS

- A. Use T-headed bars consisting of deformed rebar with steel plates friction welded to one end of the rebar. Friction welding conforms to the authorized quality control manual and AWS C6.2, Friction Welding of Metals.
 - 1. Headed Bars that meet the requirements of ASTM A 970 may be substituted.
- B. Use deformed rebar according to ASTM A 706, Grade 60.
- C. Cut plate heads for T-headed bars from flats of hot-rolled steel according to ASTM A 108.

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2.4 COATINGS

- A. Epoxy Coating
 - 1. Reinforcing steel
 - a. Refer to ASTM A 775 or ASTM A 934.
 - 2. Wire and wire reinforcement
 - a. Refer to ASTM A 884.
- B. Galvanized Coating
 - 1. Reinforcing steel
 - a. Refer to ASTM A 767.
 - 2. Wire and wire reinforcement.
 - a. Coat welded wire after fabrication.
 - b. Refer to ASTM A 1060.
- C. Coat bars as described.
 - 1. Maintain epoxy coating thickness between 8 and 12 mils.
 - 2. Maintain galvanized coating thickness according to ASTM A 767.
 - 3. Coat bars after bending unless the fabricator can show that satisfactory results can be obtained by coating before bending.
 - 4. Do not use bent bars with visible cracks or damage in the coating.
- D. Coating Repair Materials
 - 1. Meet requirements of ASTM D 3963 for repair of epoxy coatings.
 - 2. Use Inorganic Zinc-Rich Paint with 65 to 69 percent metallic zinc by weight, or greater than 92 percent metallic zinc by weight in dry film for repair of galvanized coatings.

2.5 DOWELLED ANCHORS

- A. Post-Installed Adhesive Anchors
 - 1. Use adhesive anchoring system satisfying the assessment criteria of ACI 355.4.
 - a. Meet anchor category 1 or 2 as documented in the ICC-ES evaluation report for the selected anchor system.
 - 1) Anchor category 1 corresponds to a strength reduction factor with no supplemental reinforcement of $\phi_d = 0.65$.
 - 2) Anchor category 2 corresponds to a strength reduction factor with no supplemental reinforcement of $\phi_d = 0.55$.
 - 2. Use adhesive anchoring system with qualifications for use in seismic loading and overhead applications.

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- 3. Use galvanized anchors in adhesive anchoring system unless ICC-ES report explicitly states compatibility with the coating or corrosion resistant materials used for the anchor.
- 4. Meet the following minimum characteristic bond stresses at or above the maximum short term temperature shown regardless of anchor diameter:
 - a. τ_{cr}: 475 psi
 - b. τ_{uncr}: 840 psi
 - c. Provide the minimum characteristic bond stresses for a maximum short term temperature of at least 160 degrees F, if not shown.
- 5. Supply the adhesive anchor product as a complete system including:
 - a. New adhesive cartridge
 - b. Clean mixing nozzle
 - c. Extension tube
 - d. Dispensing gun
 - e. Piston plug
 - f. Manufacturer recommended supplies for cleaning the drilled hole
- B. Use reinforcing steel, bolts, and anchors as shown.

2.6 BAR SUPPORTS AND TIE WIRE

- A. Provide epoxy coated, galvanized, plastic coated, or plastic bar supports and tie wire that meet the following requirements when not in contact with stainless steel:
 - 1. Meet the requirements of Table 1.
 - 2. Remove contaminants that affect the adhesion of the coating to the wire.
 - 3. Use an electrostatic spray method, fluidized bed, or flocking to apply an epoxy coating.
 - 4. Apply plastic coating by spraying, dipping, or using as a powder.
 - 5. Provide galvanized coating according to ASTM A 641
 - 6. Use patching material according to the manufacturer's recommendation to repair damaged coating.
 - a. Use patching material that is compatible with the coating and that is inert in concrete.
 - b. Do not repair hanger marks on the coated bar supports that result from the coating application process. Hanger marks are not considered damaged coating.
 - 7. Use 16 gauge coated tie wire.
 - a. Do not use galvanized tie wire with epoxy coated reinforcing steel.

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- B. Precast concrete block bar supports that conform to the following:
 - 1. Provide minimum 28-day compressive strength of 2,500 psi.
 - 2. Use three inch thick supports with sides ranging from 4 to 6 inch with a minimum ground contact area of 24 in².
- C. Provide bar supports and tie wires for use with stainless steel bars that meet the following:
 - 1. Meet the requirements of Table 1.
 - 2. Provide bar supports that are plastic or stainless steel conforming to the requirements of ASTM A 493, Type 316.
 - 3. Provide tie wires that are plastic or stainless steel conforming to the requirements of ASTM A 493, Type 316, annealed.

2.7 MECHANICAL SPLICE COUPLER

- A. Elastic capacity couplers:
 - 1. Use reinforcing steel mechanical splice couplers capable of developing in tension 125 percent of the specified yield strength of the reinforcing steel bar.
- B. Ultimate strength couplers:
 - 1. Use where shown.
 - 2. For Grade 60 reinforcing steel bars
 - a. Use reinforcing steel mechanical splice couplers capable of transferring at least 95 ksi in tension between the spliced reinforcing steel bars.
- C. Use coated couplers with the same type of coating as the reinforcing steel being spliced.
- D. Use stainless steel splice coupler with stainless steel reinforcement.

2.8 GROUTED SPLICE COUPLER

- A. Use grouted splice couplers to join precast elements as shown.
 - 1. Provide couplers that use cementitious grout placed inside a steel casting. Grout is part of the proprietary system and is provided by the coupler manufacturer.
- B. Use one of the following grouted splice coupler manufacturers according to the requirements of this Section. Use one of the following providers:
 - NMB Splice Sleeve Splice Sleeve North America, Inc. 38777 West Six Mile Road, Suite 205 Livonia, MI 48152 Reinforcing Steel and Welded Wire 03211 – Page 8 of 20

- 2. Sleeve-Lock Grout Sleeve System Dayton Superior Corporation 1125 Byers Road Miamisburg, OH 45342
- Lenton Interlok Pantair USA
 34600 Solon Road Solon, OH 44139
- C. Use grouted splice couplers that provide 150 percent of the specified yield strength of the connected bar.
- D. Use grout supplied by the manufacturer of the coupler and that matches the certified test report for the coupler.
- E. Use the same coating system as used for the reinforcing steel.
 - 1. Use grouted splice couplers that join the reinforcing steel without removal of the epoxy coating on the spliced bar when using epoxy coated reinforcing steel.

2.9 CONTINUOUS RESISTANCE BUTT WELDED HOOPS

- A. Weld only reinforcing steel conforming to ASTM A 706 as shown.1. Use resistance butt welded splices for continuous hoops.
- B. Refer to AWS D1.4: Structural Welding Code Reinforcing Steel.
- C. Change welding procedures to reflect chemical composition of the steel.
 - 1. Welders must have correct mill test report (chemical analysis) from the heat in which the steel was made.
- D. Apply coating after all welding has been completed.

2.10 FABRICATION

- A. Use Department Prequalified Suppliers for all reinforcing steel products.
- B. Bend reinforcement to the shapes as shown. Refer to CRSI Manual of Standard Practice.
- C. Do not heat the bars during the bending operations.

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PART 3 EXECUTION

3.1 DELIVERY, STORAGE, AND HANDLING

- A. Protect the bars and the coating during handling and storage.
 - 1. Use systems with padded contact areas when handling epoxy coated bars.
 - 2. Pad all bundling bands for epoxy coated bars.
 - 3. Lift all bundles with strong-back, multiple supports, or a platform bridge.
 - 4. Do not drop or drag bars.
- B. Store bars above the ground surface on wooden or padded supports.
 - 1. Place timbers between bundles when stacking is necessary.
 - 2. Space the supports close enough to prevent sags in the bundles.
- C. Cover epoxy coated reinforcing steel with an opaque covering upon delivery to the project site.
 - 1. Protect epoxy coated reinforcing steel that has been partially embedded in concrete or placed in formwork.
 - a. Cover with an opaque covering before 30 days exposure to sunlight.
 - 2. Place the opaque coverings to provide air circulation and prevent condensation on the reinforcing steel.
- D. Ship, handle, and store stainless reinforcing steel so it does not come in contact with carbon steel.
 - 1. Cover stainless reinforcing steel with tarps during outdoor storage.
 - 2. Separate bundles of stainless reinforcing steel from other types of reinforcing steel with wooden spacers.
 - 3. Store stainless reinforcing steel on wooden supports off the ground or floor.
- E. Store post-installed adhesive anchor adhesive in a cool, dry and dark place before use, according to the MPII.

3.2 COATING REPAIR

- A. General
 - 1. Follow product manufacturer recommendations for repairs.
 - 2. Clean and dry repair area.
 - 3. Protect nearby surfaces from overspray.
 - 4. Allow at least 45 minutes of drying time before encasing repaired reinforcing bar in concrete.

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- B. Epoxy Coatings
 - 1. Do not apply repair materials at temperatures below 50 degrees F except where application instructions explicitly state lower temperatures are allowed.
 - 2. Apply multiple coats when using spray applied coating repair materials.
 - a. Allow a few minutes between coats to avoid drips and runs.
- C. Limits for Repair
 - 1. Repair minor damage to coatings and cut reinforcing steel bar ends with specified coating repair materials before placement.
 - a. Refer to this Section, Article 3.2.
 - 2. Do not use bars with moderate damage to coatings within any one foot length of the reinforcing steel bar or as determined by the Engineer.
 - a. Cut ends are not considered damage for this purpose.
 - 3. Replace installed reinforcing steel bars that have significant damage to coatings within any one foot length of the reinforcing steel bar or as determined by the Engineer.

3.3 PLACEMENT

- A. Maintain a clean surface keeping all reinforcing steel free from loose mill scale, loose or thick rust, dirt, paint, oil, or grease.
- B. Place and secure reinforcing steel in its designated position.
 - 1. Placing Tolerances
 - a. Decks or members 10 inches or less in thickness
 - 1) Cover: $-\frac{1}{8}$ inch, $+\frac{1}{4}$ inch.
 - 2) Longitudinal spacing for individual bars: ±1 inch.
 - a) Clear spacing between bars: not less than the greater of $1\frac{1}{2}$ inches, $1\frac{1}{2}$ bar diameters, and $1\frac{1}{2}$ times the maximum aggregate size.
 - 3) Average spacing for 10 bars: $+^{1}/_{16}$ inch.
 - a) Do not use tolerance to decrease number of bars or increase bar spacing.
 - b. Members 10 to 20 inches in thickness
 - 1) Cover: $\pm \frac{1}{4}$ inch.
 - 2) Longitudinal spacing for individual bars, stirrups, or ties: ±1 inch.
 - a) Clear spacing between bars: not less than the greater of $1\frac{1}{2}$ inches, $1\frac{1}{2}$ bar diameters, and $1\frac{1}{2}$ times the maximum aggregate size.

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- 3) Average spacing for 10 bars: $+^{1}/_{16}$ inch.
 - a) Do not use tolerance to decrease number of bars or increase bar spacing.
- c. Members greater than 20 inches in thickness
 - 1) Cover: $-\frac{1}{4}$ inch, $+\frac{1}{2}$ inch.
 - 2) Spacing for stirrups or ties: ±3 inches.
 - a) Clear spacing between bars: not less than the greater of 1½ inches, 1½ bar diameters, and 1½ times the maximum aggregate size.
 - 3) Longitudinal bar spacing ±3 inches.
 - a) Clear spacing between bars: not less than the greater of 1½ inches, 1½ bar diameters, and 1½ times the maximum aggregate size.
 - 4) Average spacing for 20 bars: $+\frac{1}{4}$ inch.
 - a) Do not use tolerance to decrease number of bars or increase bar spacing.
- d. Length of bar laps -1 inch
- e. Embedment length -1 inch
- C. Tie bars together with ties at intersections except when spacing is less than 9 inches in each direction, in which case tie at alternate intersections.
 - 1. Tie bundled bars together at not more than 6 ft centers.
- D. Maintain the required distance from the forms and between layers of reinforcing steel with prefabricated chairs, ties, hangers, or other devices.
- E. Do not tack weld reinforcing bars in place.
- F. Overlap at least one panel of welded wire reinforcement sheets to each other and fasten at the ends and edges.
- G. Support reinforcing steel for concrete "T" beams, pier caps, approach slabs, and deck slabs on metal chairs or bar supports according to this Section, Article 2.6.
- H. Space chairs for supporting the top steel and bolsters for supporting the bottom steel not more than 4 ft on center of the bar in each direction.
- I. Tie deck steel to beams or forms at regular intervals of not more than 5 ft on center along the beams to prevent steel movement during concrete placement.

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- J. Support reinforcing steel for slabs on grade on metal chairs attached to a sand plate or use precast concrete block supports according to this Section, Article 2.6.
 - 1. Precast concrete block supports may only be used to support the bottom mat of bars.
 - a. Do not use blocks that are cracked or damaged.
- K. Place stainless steel reinforcing steel so that it does not come in contact with carbon steel.
 - 1. Do not tie stainless steel to uncoated or coated carbon steel reinforcing steel, galvanized attachments, or galvanized conduits.
 - a. Maintain at least 1 inch clearance between the metals using nylon or polyethylene spacers when stainless steel reinforcing or dowels must be near coated or uncoated reinforcing, or galvanized metals.
 - 1) Bind using nylon cable ties.
 - 2) Maintain at least 1 inch clearance unless insufficient space exists.
 - a) Either bar may be sleeved with a ¹/₈ inch minimum thick insulator material, such as polyethylene, nylon or rubber tube, extending at least 1 inch in either direction past the point of closest contact between the two dissimilar bars.
 - b) Sleeves are not allowed for bars that run parallel to each other.
- L. Do not place concrete until the Engineer has verified the reinforcing steel placement and fastening.

3.4 FIELD CUTTING

- A. Saw or shear coated bars that are specified to be cut in the field.
 1. Do not flame cut.
- B. Repair the coating at the sawed or sheared end using the specified patching or repair material.

3.5 SPLICING

- A. Furnish all reinforcing steel in the lengths shown.
- B. Do not splice bars except where shown.

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- C. Stagger splices as far as possible.
- D. Place and tie lapped splices to maintain the clearance to the surface of the concrete shown.
- E. Do not allow lap splices in vertical column reinforcing bars unless shown.
- F. Do not lap splice No. 14 and No. 18 bars.
 - 1. Use mechanical splice couplers.
- G. Use mechanical splice couplers when shown.
 - 1. Follow the manufacturer's published recommendations for equipment and splicing procedures.

3.6 FIELD BENDING

- A. Do not field bend reinforcing steel unless shown.
- B. Follow the authorized field bending procedures.
- C. Use methods that do not damage coatings.
- D. Do not heat the bars during the bending operations.
- E. Do not bend bars partially embedded in concrete except as shown or preapproved by the Engineer.
 - 1. Do not field straighten or re-bend fabricated bent bars.

3.7 INSTALLATION OF DOWELLED ANCHORS

- A. Install doweled anchors according to the authorized Manufacturer's Printed Installation Instructions, applicable specifications, and as shown.
- B. Post-Installed Adhesive Anchors
 - 1. Do not use post-installed adhesive anchors in sustained tension applications.
 - 2. Installation
 - a. The qualified anchor installer is responsible to perform all cleaning and installation operations for post-installed adhesive anchors for overhead or upwardly inclined anchors.

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- b. Drilling holes
 - 1) Locate existing reinforcing steel using a nondestructive method before drilling.
 - a) Notify the Engineer of location conflicts between existing reinforcing steel and new adhesive anchors
 - 2) Use a rotary impact drill.
 - 3) Do not use a lubricant.
 - 4) Drill hole to the diameter and depth described in the MPII.
 - 5) Blow debris and dust out the hole with compressed air.
 - 6) Brush the full depth of the hole.
 - 7) Blow dust out of the brushed hole with compressed air.
 - 8) Do not install dowelled anchors until the holes are verified by the Engineer.
- c. Installing anchors
 - 1) Install the epoxy from the bottom of the hole outward.
 - 2) Twist the anchor as it is being inserted to prevent the formation of air bubbles
 - 3) Secure anchors to prevent displacement while adhesive cures.
 - 4) Follow MPII for set times
- d. Limitations
 - Do not install anchors until the concrete has cured at least 21 days or until concrete achieves 100 percent of the specified 28 day minimum compressive strength based on field cured cylinders.
 - Do not install anchors unless concrete temperature is expected to be at least 50 degrees F for the three hours immediately after installation.
 - 3) Do not install anchors if concrete temperature is over 100 degrees F.
- 3. Proof test post-installed adhesive anchors as specified and when shown, in the presence of the Engineer and as directed by the Engineer:
 - a. Test anchors installed in an overhead or upwardly inclined position.
 - Test 25 percent of the first 40 anchors installed and 10 percent of anchors installed thereafter unless shown otherwise.
 - b. Allow anchor adhesives to cure at least 48 hours before proof testing.

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- c. Tension test according to ASTM E 3121.
 - 1) Test in the confined condition.
 - 2) Tension anchors to 80 percent of the anchor yield strength.
 - 3) Hold tension at the specified load for at least 30 seconds.
 - a) Measurable displacement of anchor is a failure condition regardless of final tension.
 - 4) Notify the Engineer if concrete cracking occurs in the vicinity of the anchor after loading.

3.8 CONNECTIONS USING GROUTED SPLICE COUPLERS

- A. Use grouted splice coupler installers according to the submitted grouted splice coupler installer qualifications.
- B Remove and clean all debris from the joints before grout application.
- C. Keep bonding surfaces free from laitance, dirt, dust, paint, grease, oil, or any contaminants other than water.
- D. Embed rebar anchor dowels to the minimum coupler embedment required by the manufacturer.
- E. Saturate Surface Dry (SSD) all concrete surfaces in the joint before connecting the elements.
- F. Use shims to verify that the reinforcing extensions are within the manufacturers recommended tolerance.
- G. Maintain a minimum grout and sleeve temperature of 50 degrees F until the temporary bracing is removed.
- H. Mix structural grout and coupler grout just before use according to the manufacturer's instructions.
- I. Follow the manufacturer's recommendations for coupler installation and grouting.
- J. Monitor the grouting operation to verify that all sleeves have been filled.
- K. Protect sleeves from vibration, shock, or other excessive movement until temporary bracing is removed.

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- L. Conform to the following when installing couplers above a horizontal joint:
 - 1. Determine the thickness of shims to provide the specified elevation within tolerance.
 - 2. Follow non-shrink grout manufacturer's recommendations for mixing, joint surface preparation, and application.
 - 3. Place non-shrink grout on the interface between the two elements being joined before setting the element.
 - a. Crown the thickness of the grout toward the center of the joint so that the grout can be displaced outward as the element is lowered onto the joint.
 - b. Prevent the grout from entering the coupler above elements by using grout dams or seals.
 - 4. Set the element in place.
 - a. Engage all couplers in the joint.
 - b. Allow the grout to seep out of the joint.
 - 5. Trowel off excess grout to form a neat joint once the element is set, plumbed, and aligned.
 - a. Pack grout into any voids around the joint perimeter.
 - 6. Flush out the coupler with clean potable water.
 - 7. Mix the special coupler grout according to the manufacturer's recommendations for methods and proportions of mix and water.
 - 8. Make four sets of three 2 inch cube specimens for testing.
 - a. Cure the specimens according to AASHTO T 106.
 - b. Test one set of cubes for compressive strength to determine when to release bracing. Refer to this Section, Article 1.5 paragraph B3a2.
 - c. Test one set of cubes at 28 days for acceptance.
 - d. Store extra sets for longer term testing if necessary.
 - e. Use a Department qualified laboratory to take the samples and perform the tests.
 - 9. Pump the coupler grout into the coupler that is cast into the element.
 - a. Start from the lower port.
 - b. Pump until the grout is flowing freely from the upper port.
 - c. Cap the upper port first and then remove the nozzle to cap the lower port.
 - 10. Cure the joint according to the grout manufacturer's recommendations.
- M. Conform to the following when installing couplers below a horizontal joint:
 - 1. Determine shim thickness to provide the specified elevation within tolerance.

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- 2. Before setting the element:
 - a. Mix the coupler grout paying strict attention to the manufacturer's recommendations for methods and proportions of mix and water.
 - b. Clean debris from the interior using compressed air.
 - 1) Remove any rain water using a vacuum that can remove water from the confined space in the coupler.
 - c. Place the coupler grout into the coupler by pouring or pumping.
 - d. Place grout on the interface between the two elements being joined.
 - 1) Crown the thickness of the grout toward the center of the joint so that the grout can be displaced outward as the element is lowered onto the joint.
- 3. Trowel off excess grout to form a neat joint once the element is set, plumbed, and aligned.
 - a. Pack grout into any voids around the joint perimeter.
- N. Conform to the following when installing couplers in vertical joints (horizontal bar/coupler connection):
 - 1. Establish a method to provide the specified elevations, alignment, and spacing within tolerance.
 - 2. Use washers or seals to prevent mixing the joint grout and the coupler grout.
 - 3. Apply epoxy adhesive to the interface between the two elements being joined.
 - 4. Set the element in place.
 - a. Engage all couplers in the joint.
 - 5. Flush out the couplers with clean potable water once the element is set, plumbed, and aligned.
 - 6. Mix the coupler grout paying strict attention to the manufacturer's recommendations for methods and proportions of mix and water.
 - 7. Pump the coupler grout into the coupler that is cast into the element.
 - a. Start from the port closest to the joint.
 - b. Pump until the grout is flowing freely from the other port.
 - c. Cap the port farthest from the joint first and then remove the nozzle to cap the other port.
 - 8. Form the edges of the joint and place grout into the joint.
 - 9. Cure the joint according to the grout manufacturer's recommendations.

3.9 FIELD QUALITY CONTROL

A. Inspect coated bars for damage to the coating after the bars are in place and immediately before concrete placement.

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Bar Supports							
	Turnen and			and Coometry			
I ypes and Sizes				Nominal	ind Corbon Coometry		
Symbol	Illustration	Support	Sizes	Height	Stee	/11 	Geometry
	muotration	Cappoir	01200	noight	Top	Leas	
SB ¹	5"	Slab Bolster	³ ⁄ ₄ , 1, 1½, and 2 inch heights in 5 ft and 10 ft lengths	All	4 ga. Corrugated	6 ga.	Legs Spaced 5 inches on Center, Vertical Corrugations Spaced 1 inch on Center (See Note 3)
	6 <u>70)</u>	Beam	1, 1½, and 2 inch: over	Up to 1½	7 ga.	7 ga.	Legs Spaced 2 ¹ / ₂ inches
BB ¹	2 ¹ / ₂ " TYP	Duster	2 inch to 5 inch heights in	Over 1 ¹ / ₂ inch to 2 inches incl.	7 ga.	7 ga.	
			of ¼ inch lengths of 5 ft.	Over 2 inches to 3 ¹ / ₂ inches incl.	4 ga.	4 ga.	
				Over 3½ inch	4 ga.	4 ga.	
BC	M	Individual Bar Chair	³ ⁄ ₄ , 1, 1½, and 1¾ inch heights	All		7 ga.	(See Note 3)
JC	m A	Joist Chair	4, 5, and 6 inch widths and $\frac{3}{4}$, 1, and $\frac{11}{2}$ inch heights	All		6 ga.	(See Note 3)
нс		Individual High Chair	2 inch to 15 inch heights in	2 inches to 3 ¹ / ₂ inches incl.		4 ga.	Legs at 20 degree or less with vertical. When height exceeds 12
or HPC*	JA AA		increments of 1/4 inch.	Over 3 ¹ / ₂ inches to 5 inches incl.		4 ga.	inches, legs are reinforced with welded crosswires or encircling
	* SAND PLATE NEED NOT BE COATED			Over 5 inches to 9 inches incl.		2 ga.	wires (See Note 4)
				Over 9 inches to 15 inches incl.		0 ga.	
снс		Continuous High Chair	Same as HC in 5 ft and 10 ft	2 inches to 3½ inches incl.	2 ga.	4 ga.	Legs at 20 degree or less with vertical. All legs 8¼ inches on
	8"		lengths	Over 3½ inches to 5 inches incl.	2 ga.	4 ga.	center maximum, with leg within 4 inches of end of chair, and spread between legs not less
				Over 5 inches to 9 inches incl.	2 ga.	2 ga.	than 50 percent of nominal height. (See Note 5)
				Over 9 inches to 15 inches incl.	2 ga.	0 ga.	

Table 1

Notes and Bar Supports Table, see next page.

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- 1. Provide top wire on continuous supports, not otherwise designated as corrugated, which may be straight or corrugated at the option of the manufacturer.
- 2. Provide minimum wire sizes that are American steel and wire gauges.
- 3. Provide adequate stability against overturning. The leg spread measured between points of support on the minor axis must be at least 70 percent of the nominal height.
- 4. Provide adequate stability against overturning. The leg spread measured between points of support on the minor axis must be at least 55 percent of the nominal height.
- 5. Provide adequate stability against overturning and adequate load capacity. The leg spread measured between points of support on the minor axis must not exceed the minimum and maximum percentages of the nominal height as shown.

Table 2						
Support Axis						
Nominal Height	Distance Between Supports as a Percent of Nominal Height					
(inches)	Minimum	Maximum				
Under 4	70	No Limit				
4	70	95				
6	65	90				
8	60	85				
10	55	80				
12	50 75					
Over 12	50	50 75				

END OF SECTION
SECTION 03310

STRUCTURAL CONCRETE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Cast-in-place concrete construction in concrete structures such as bridges, culverts, and miscellaneous structures.

1.2 RELATED SECTIONS

- A. Section 02056: Embankment, Borrow, and Backfill
- B. Section 02317: Structural Excavation
- C. Section 02701: Pavement Smoothness
- D. Section 03055: Portland Cement Concrete
- E. Section 03056: Self-Consolidating Concrete SCC
- F. Section 03057: Structural Concrete Lightweight
- G. Section 03152: Concrete Joint Control
- H. Section 03211: Reinforcing Steel and Welded Wire
- I. Section 03390: Concrete Curing
- J. Section 07105: Waterproofing Membrane
- K. Section 07921: Sealing Existing Concrete Slope Protection Joints

1.3 REFERENCES

- A. AASHTO M 111: Zinc (Hot-dip Galvanized) Coatings on Iron and Steel Products
- B. AASHTO M 235: Epoxy Resin Adhesives
- C. AASHTO LRFD Bridge Construction Specifications Section 3 (Temporary Works)

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- D. ASTM C 578: Rigid, Cellular Polystyrene Thermal Insulation
- E. UDOT Quality Management Plans

1.4 **DEFINITIONS**

A. Finishing Machine – a bridge deck finishing machine or bridge deck paver with automated systems to spread, compact, and finish concrete.

1.5 SUBMITTALS

- A. Working Drawings
 - 1. Drawings for Temporary Works.
 - 2. Deck Overhang Bracing for review when shown and when screed rails are supported on forms. Refer to this Section, Article 3.1, paragraph C2.
 - a. Include supporting calculations.
 - b. Provide the seal of a Professional Engineer or Professional Structural Engineer licensed in the State of Utah on drawings and calculations.
- B. Concrete Placing and Finishing Plan for review when placing cast-in-place concrete in bridge decks and approach slabs.
 - 1. Include at least the following:
 - a. Description of equipment, materials, methods, and personnel for placing, finishing, and curing concrete
 - b. Quality control plan
 - c. Placement schedule for each bridge, including placement rates, time of day, duration, placement sequence, and placement direction
 - c. Screed elevations for deck and approach slabs of each bridge

PART 2 PRODUCTS

2.1 CONCRETE

- A. Bridge Decks, Approach Slabs, and Concrete Diaphragms cast with bridge decks:
 - 1. Standalone pedestrian, shared use or multi-use overpass or underpass structures.

a. Use Class AA(AE). Refer to Section 03055.

- 2. Other bridge types.
 - a. Use Class AA(LSF). Refer to Section 03055.

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- 1) Includes top slabs and approach slabs of box culverts with traffic directly on the slabs.
- 3. Use Structural Concrete Lightweight where shown. Refer to Section 03057.
 - a. Use the concrete class shown.
- 4. Use Class AA(ES) only where shown for closure pours with fulldepth precast concrete deck panels. Refer to Section 03055.
- B. Concrete Slope Protection:
 - 1. Class A(AE). Refer to Section 03055.
- C. Other Structural Elements:
 - 1. Use Class AA(AE), unless shown otherwise. Refer to Section 03055
 - 2. Use Structural Concrete Lightweight where shown. Refer to Section 03057.
 - a. Use the concrete class shown.
 - 3. Self-Consolidating Concrete (SCC) may be used at the Contractor's option. Refer to Section 03056.
 - a. Use the concrete class shown.
 - 4. Use Class AA(ES) only where shown. Refer to Section 03055.

2.2 REINFORCING STEEL AND WELDED WIRE

A. Refer to Section 03211.

2.3 JOINT FILLER AND SEALANT

- A. Preformed Joint Filler Refer to Section 03152.
- B. Silicone Joint Sealer Refer to Section 03152.
- C. Self Leveling Silicone Joint Sealer Refer to Section 03152.
- D. Joint Sealer (Structures) Refer to Section 03152.

2.4 BACKER ROD

- A. Refer to Section 03152.
- B. Size the diameter of the backer rod to a minimum of 1/4 inch larger than the groove in which it is placed.

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2.5 WATERSTOPS

A. Refer to Section 03152.

2.6 RIGID PLASTIC FOAM

A. Preformed, extruded, cellular polystyrene thermal insulation material that has a water absorption property of 0.3 or less. Refer to ASTM C 578.

2.7 FORMS

- A. Plywood, wood, metal, glass, or a combination of these materials.
- B. Use mortar-tight concrete forms, true to the dimensions, lines, and grades of the structure and of sufficient rigidity to prevent objectional distortion of the formed concrete surface caused by pressure of the concrete and other loads incidental to the construction operations.
- C. Discontinue using a form or forming system that produces a concrete surface with excessive undulations until modifications have been made.
 - 1. Undulations are excessive if they exceed either $\frac{1}{8}$ inch over 10 feet or $\frac{1}{270}$ of the center-to-center distance between studs, joints, forms, fasteners, or wales.
- D. Countersink all bolt and rivet holes when using metal forms for exposed surfaces so that a plane smooth surface of the desired contour is obtained.
- E. Use lumber that is free of knotholes, loose knots, cracks, splits, warps, or other defects that affect the strength or appearance of the structure.
 - 1. Rough lumber may be used for forming surfaces if visible rough surfaces do not show on the final structure.
- F. Form exposed element surfaces of a concrete structure with the same forming material or with materials that produce a concrete surface that is uniform in texture, color, and appearance.
- G. Do not use stay-in-place metal deck forms unless otherwise specified.

2.8 MISCELLANEOUS STEEL ITEMS

A. Galvanize all miscellaneous steel items permanently cast into structural concrete elements. Refer to AASHTO M 111.

2.9 EPOXY ADHESIVE

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A. Refer to AASHTO M 235, Type V, Grade 3

2.10 WATERPROOFING MEMBRANE

A. Refer to Section 07105

PART 3 EXECUTION

3.1 PREPARATION

A. Falsework

- 1. Design and construct falsework according to the AASHTO LRFD Bridge Construction Specifications, Section 3 (Temporary Works).
 - a. Design falsework so that loads imposed on existing, new, or partially completed portions of structures due to construction operations do not exceed the load carrying capacity of the structure or portion of the structure.
 - b. Brace and tie girders to resist forces that would cause rotation or torsion in the girders from the placing of concrete for diaphragms or decks, or show girders to be adequate for those effects.
 - c. Do not weld falsework support brackets or braces to structural steel members or to reinforcing steel.
- 2. Footing Construction
 - a. Build falsework on a solid footing that is safe against undermining, protected from softening, and capable of supporting imposed loads.
 - b. Demonstrate that the soil bearing values do not exceed the supporting capacity of the soil.
 - Conduct load tests or have soils investigation conducted by a professional engineer licensed in the State of Utah.
 - c. Use piling or drilled shafts to support falsework that cannot be founded on a solid footing.
 - d. Space, drive, and remove piles according to the authorized falsework drawings.
- 3. Construction
 - a. Use materials able to sustain the stresses required by the falsework design.
 - b. Use suitable jacks or wedges to set the forms to the grade or camber required, and to prevent settling.
 - c. Produce a finished structure of the specified camber and built to the lines and grades indicated.
- B. Forms

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- 1. Clean the inside surfaces of dirt, mortar, and foreign material before concrete placement.
- 2. Use form oil that permits the ready release of the forms and does not discolor the concrete.
- 3. Do not place concrete in the forms until:
 - a. All work connected with form construction has been completed.
 - b. All embedded materials have been placed.
 - c. All dirt, chips, sawdust, water, and other foreign materials have been removed.
 - d. Inspection and approval have been obtained.
- 4. Do not use stay-in-place deck forms unless otherwise specified.
- C. Footings, Box Culverts, and Headwalls
 - 1. Excavation and Backfill Refer to Section 02317.
 - 2. The Engineer may direct written changes in dimensions or elevations necessary to secure a satisfactory foundation.
 - 3. Do not dewater by pumping during concrete placement or for 24 hours thereafter unless pumping is outside the enclosure.
 - 4. Do not use well points to dewater footing.
- D. Bridge Decks
 - 1. Reinforcing Steel
 - a. Pass the screed over the area with a screed face device to measure the cover before concrete placement.
 - b. Relocate and tie reinforcing steel that projects above the specified level before placing the concrete.
 - c. Adjust and support reinforcing steel that does not meet the placement tolerances defined in Section 03211 before placing the concrete.
 - 2. Screeds
 - a. Firmly support screed rails for bridge deck slabs to prevent movement during concrete placement.
 - b. Support the machine rails on the bridge beams when using a finishing machine.
 - c. Do not place the machine rails on the forms unless the form supports have been strengthened to prevent deflection and the Engineer gives authorization.
 - 3. Hold a pre-activity meeting before placing cast-in-place concrete in bridge decks and approach slabs.
 - a. Contractor, Department, and supplier personnel involved with completing the work must attend the pre-activity meeting.
 - b. Conduct pre-activity meeting no more than seven calendar days before the first scheduled concrete placement.

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- c. Provide notification of the meeting to the Engineer at least seven calendar days in advance.
- d. Discuss at least the following items specific to the concrete work for each bridge deck and approach slab:
 - 1) Material requirements
 - 2) Schedule, quality control procedures, and verification testing.
 - 3) Authorized concrete placing and finishing plan
 - 4) Placement sequence and limits (including pouring sequence, direction of pour)
 - 5) Construction details (for example, bridge skew angle, superelevation, and transitions)
 - 6) Locations of finishing machine rail supports and construction joints (for example, grade control)
 - 7) Concrete conveyance, placement equipment and methods, and rates (including haul distance, haul time, and placement)
 - 8) Special equipment
 - 9) Finishing methods
 - 10) Curing plan (equipment and application rates)
 - 11) Method of verifying placement and clearances of reinforcing steel
 - 12) Contingency plans
- e. Additional meetings may be required as determined by the Engineer.
- E. Miscellaneous Construction
 - 1. Drainage and Weep Holes
 - a. Construct drainage and weep holes at locations shown or as directed.
 - b. Place ports or vents for equalizing hydrostatic pressure below low water.
 - c. Use non-corrosive materials for weep hole forms.
 - d. Paint exposed surfaces of metal drains as shown.
 - 2. Anchor Bolts
 - a. Securely and accurately set anchor bolts in bent caps, abutments, or pedestals before the concrete is placed.
 - b. Use templates to maintain location and plumbness.

3.2 PLACE CONCRETE

- A. Do not place concrete without authorization from the Engineer.
- B. Do not deviate from the deck placing sequence shown without written authorization from the Engineer.

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- C. The Engineer may postpone placement operations if the concrete cannot be protected during adverse weather.
- D. Handling concrete:
 - 1. Avoid segregation of the ingredients.
 - 2. Arrange chutes, troughs, or pipes used as aids in placing concrete so the concrete does not separate.
 - 3. Use metal or metal-lined chutes and troughs. Do not use aluminum.
 - 4. Equip chutes with baffle boards or a reversed section at the end of the outlet when placing on steep slopes.
 - 5. Extend open troughs and chutes down inside the forms or through holes left in the forms. Terminate the ends in vertical downspouts.
 - 6. Thoroughly flush all chutes, troughs, and pipes with water before and after each placement.
 - 7. Do not allow the free fall of concrete to exceed 10 ft for thin walls (maximum 10 inch thickness) or 5 ft for other types of construction without the use of a tremie or a flexible metal spout.
 - 8. Use flexible metal spout sections composed of conical sections not more than 3 ft long, with the diameter of the outlet and the taper of the various sections so the concrete fills the outlet and retards concrete flow.
- E. Placing concrete:
 - 1. Deposit concrete as close as possible to its final position without allowing it to flow laterally in the form.
 - 2. Spread fresh concrete in horizontal layers with thickness not greater than what can be compacted with vibrators.
 - 3. Do not use vibrators to flow concrete laterally.
 - 4. Limit placement interruptions to 45 minutes.
 - 5. Place and vibrate each layer before the preceding layer has taken initial set.
 - 6. Do not place concrete in flowing water.
- F. Consolidating concrete:
 - 1. Use high frequency internal vibrators to consolidate all concrete for structures except concrete placed under water.
 - 2. Use enough vibrators to consolidate the fresh concrete to the desired degree within 15 minutes after it is deposited in the forms.
 - 3. Supply at least two vibrators for structures involving more than 25 yd³ of concrete.
 - 4. Do not attach vibrators to or against the forms or the reinforcing steel.
 - 5. Do not allow vibrators to penetrate layers of concrete that have taken initial set.

Structural Concrete 03310 – Page 8 of 20 6. Use spades or wedge-shaped tampers to secure a smooth and even texture of the exposed surface.

3.3 PLACE CONCRETE UNDER WATER

- A. Place and deposit concrete under water as shown.
- B. Seal the forms or cofferdams watertight.
- C. Do not pump water while placing concrete or disturb the concrete until it has set at least 24 hours or attained at least 50 percent of the specified 28 day minimum compressive strength based on field cured cylinders.
- D. Regulate placing to keep surfaces approximately horizontal at all times.
- E. Place the concrete by beginning at one end of the form and progressing in a zig-zag movement from side to side across the length of the form.
- F. Place the concrete using a tremie or concrete pumping equipment.
- G. Placing concrete with a tremie:
 - 1. Use an 8 inch to 12 inch diameter steel tube tremie constructed with watertight connections, a hopper to receive concrete, and a device at the bottom to exclude water from entering the tube.
 - 2. Use support that permits the discharge end to move over the entire top work surface and permits the tremie to be rapidly lowered to stop or retard flow when necessary.
 - 3. Minimize the number of tremie location shifts for continuous placement.
 - 4. Keep the tremie tube full to the bottom of the hopper during placement.
 - 5. Slightly raise the tremie when a batch is dumped into the hopper but do not raise it out of the concrete at the bottom until the batch discharges to the bottom of the hopper.
 - a. Re-plug the end and refill the tube with concrete if the concrete seal around the tube is lost.

3.4 PUMP CONCRETE

- A. Use a prequalified concrete pumping contractor. Refer to UDOT Quality Management Plan 511 – Concrete Pumping.
 - 1. Replace pump that causes excessive or erratic loss of air entrainment.
 - 2. Use a pump that produces a continuous stream of concrete without air pockets.
 - 3. Do not add water to the concrete in the pump hopper.

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- B. Do not allow pump vibrations to damage freshly placed concrete.
- C. Do not use concrete contaminated by priming or cleaning the pump.

3.5 LIMITATIONS

- A. Light the work site so all operations are plainly visible if mixing, placing, or finishing occurs after daylight hours.
- B. Keep all traffic off concrete bridges and culverts for 14 days after final concrete placement, until all concrete is fully cured, and until all concrete achieves 100 percent of the specified 28 day minimum compressive strength based on field cured cylinders.
- C. Keep all traffic off bridge deck and approach slab closure pours for at least 7 days after final concrete placement, until all concrete is fully cured, and until all concrete achieves 100 percent of the specified 28 day minimum compressive strength based on field cured cylinders.
 - 1. High-early strength concrete used in bridge deck and approach slab closure pours may be opened to traffic at least 3 days after final concrete placement and after concrete achieves 100 percent of the specified 28 day minimum compressive strength based on field cured cylinders.

3.6 CONSTRUCTION JOINTS

- A. Make construction joints where shown.
- B. Obtain Engineer's authorization when additional construction joints are desired and meet the following requirements:
 - 1. Place and construct without impairing strength and appearance.
 - 2. Place in planes perpendicular to the principal lines of stress and at points of minimum shear.
 - 3. Make monolithic structures by extending the reinforcing across the joint.
 - 4. Avoid construction joints through paneled wing walls or large surfaces that are to be treated architecturally.
 - 5. Make a straight line joint across the face of the pour for the full width of the bridge deck.
 - 6. Leave a rough surface to increase the bond with the concrete placed later.
 - 7. Form tapered sections with an insert so that the succeeding layer of concrete ends in a section at least 6 inches thick.

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- 8. Place a bulkhead from the surface to the top mat of steel to establish a straight vertical face. Shape the concrete below the top steel to a near vertical face in line with the bulkhead.
- 9. Establish a straight vertical face by saw cutting to a minimum depth of 1 inch when a bulkhead cannot be placed.
 - a. Shape the concrete below the saw cut to a near vertical face.
- C. Meet the following before resuming concrete placement:
 - 1. Re-tighten forms.
 - 2. Roughen the surface of hardened concrete without leaving loosened particles or damaged concrete.
 - 3. Clean off concrete surface of foreign matter and laitance by sandblasting.
 - 4. Saturate concrete surface with water.
 - 5. Apply epoxy adhesive to face of construction joints.

3.7 CONCRETE SURFACE FINISHING CLASSIFICATIONS

- A. Ordinary Surface Finish A true and uniform finished surface.
- B. Rubbed Finish A surface smooth in texture and uniform in appearance free of form marks and irregularities.
- C. Wire Brush or Scrubbed Finish
 - 1. A finished surface with the cement surface film completely removed and the aggregate particles exposed leaving an even-pebbled texture.
 - 2. An appearance ranging from fine granite to coarse conglomerate depends on the size and grading of the aggregate used.
- D. Floated Surface Finish
 - 1. Flat work Strike off and use a floated surface finish.
 - 2. Bridge decks and approach slabs use a finishing machine unless otherwise permitted.

3.8 CONCRETE SURFACE FINISHING

- A. Give all formed concrete surfaces at least an ordinary surface finish except as specified otherwise.
- B. Use other types of finishes as required in addition to the ordinary surface finish.

Structural Concrete 03310 – Page 11 of 20 C. Provide a rubbed finish for repaired surfaces that cannot meet ordinary surface finish requirements due to irregularities, honeycombing, excessive surface voids, discoloration, and other defects.

3.9 CONCRETE SURFACE FINISHING PROCEDURES

- A. Ordinary Surface Finish
 - 1. Řemove all fins and projections after removing forms.
 - a. Clean, point, and true all honeycomb spots, broken corners or edges, cavities made by form ties, and other holes and defects.
 - b. Keep all areas to receive mortar saturated with water for at least 30 minutes before mortar placement.
 - 2. Use a mortar of cement and fine aggregate for pointing, not more than one hour old, mixed in the proportions used in the grade of concrete being finished.
 - 3. Cure the mortar patches and rub to blend with surrounding concrete.
 - 4. Tool and free all joints of mortar and concrete.
 - a. Leave the full length of the joint filler exposed with clean and true edges.
- B. Rubbed Finish
 - 1. Wet the concrete surface as soon after form removal as conditions permit, paint with grout, and rub with a wooden float until the surface is covered with a lather of cement and water.
 - a. A thin grout of one part cement, one part fine sand may be used in the rubbing.
 - b. Let this lather set for at least three days then rub lightly with a fine carborundum stone until smooth.
 - 2. Use a mechanically operated carborundum stone to finish the surface of hardened concrete at least four days after placing.
 - a. Finish in the same manner as ordinary surface finish.
 - 1) Let the lather set for at least 7 days before lightly rubbing with a fine carborundum stone until smooth.
 - 3. Commercial grade rubbing mortar may be used if authorized by Engineer.
- C. Wire Brush or Scrubbed Finish
 - 1. Scrub the surface with stiff wire or fiber brushes using a solution of muriatic acid one part acid, four parts water as soon as forms are removed and while the concrete is relatively green.
 - 2. Wash the entire surface once the scrubbing produces the desired texture.
 - a. Use water mixed with 5 percent by volume ammonium hydroxide to remove all traces of the acid.

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- D. Floated surface finish on flat work other than bridge decks and approach slabs:
 - 1. Striking Off
 - a. Carefully rod and strike off the surface with a strike board following the cross sections and grades shown after compaction.
 - b. Allow for camber as required.
 - c. Operate the strike board longitudinally or transversely and move it forward with a combined longitudinal and transverse motion so that neither end is raised from the side forms during the process.
 - d. Keep a slight excess of concrete in front of the cutting edge at all times.
 - 2. Floating
 - a. Use longitudinal or transverse floating or both to create a uniform surface.
 - b. Longitudinal floating is required except in places where it is not feasible.
 - 3. Longitudinal Floating
 - a. Work the longitudinal float operated from foot bridges with a sawing motion while holding it parallel to the road centerline.
 - b. Pass gradually from one side of the pavement to the other.
 - 1) Move the float forward $\frac{1}{2}$ of its length and repeat operation.
 - c. Substitute machine floating if equivalent results are produced.
 - 4. Transverse Floating
 - a. Operate the transverse float across the concrete surface by starting at the edge and slowly moving to the center and back again to the edge.
 - 1) Move the float forward $\frac{1}{2}$ of its length and repeat the operation.
 - b. Preserve the crown and cross section of the concrete surface.
 - 5. Straightedging
 - a. Test the concrete surface for trueness with a straightedge after the longitudinal floating has been completed and the excess water has been removed while the concrete is still plastic.
 - b. Furnish and use an accurate 10 ft straightedge held parallel to the road centerline in contact with the surface.
 - c. Check the entire area immediately filling depressions with freshly mixed concrete, then strike off, consolidate, and refinish.
 - d. Cut down and refinish high areas.

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- e. Continue the straightedge testing and re-floating until the concrete surface is at the required grade and contour.
- E. Floated Surface Finish for Bridge Decks and Approach Slabs
 - 1. Use a finishing machine on exposed surfaces unless otherwise permitted.
 - 2. Finish concrete by striking off and floating the surface.
 - 3. Allow the Engineer enough time to inspect finishing machines during daylight hours before concrete placement.
 - 4. Provide lighting facilities that adequately light the work area when placing and finishing operations are not completed during daylight hours.
 - 5. Extend finishing machine rails beyond both ends of the scheduled placement and allow sufficient distance to permit the float to fully clear the concrete.
 - 6. Use adjustable rails set to provide the finished grade elevations shown, installed to prevent springing or deflection under the weight of the finishing equipment, and placed to operate without interruption over the entire surface being finished.
 - 7. Place finishing machine parallel to the abutments and bents within 10 degrees.
 - 8. Support screed rails to prevent movement during placing of the concrete.
 - 9. Attach a measuring device to the screed face and pass it over the area.
 - 10. Place concrete in a uniform heading approximately parallel to the finishing machine.
 - 11. Limit the rate of placing to allow enough time to finish the surface before initial set.
 - 12. Continuously place concrete the full length of the structure or superstructure unit unless otherwise shown or authorized.
 - 13. Provide sufficient material, equipment, and manpower to place deck concrete at a rate of at least 25 yd³/hour.
 - 14. Strike off the surface to the required elevations with the finishing machine immediately after placing and consolidating the concrete.
 - 15. Do not add water to the concrete in front of or behind the screed.
 - 16. Obtain authorization for the strike-off method and equipment.
 - a. Maintain satisfactory performance.
 - b. Use equipment capable of finishing concrete within the surface tolerances specified.
 - c. Maintain satisfactory consolidation and surface tolerance to prevent shutdown and rejection of the equipment.
 - 17. Furnish a 10 ft straightedge to check the surface tolerance, placed both longitudinally and transversely, immediately behind the finishing machine and in hand-finished areas.

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- 18. Correct irregularities greater than ½ inch from the straightedge, before additional placement, and immediately fill depressions with concrete and refinish.
- 19. Cut down and refinish high areas.
- 20. Continue straightedge testing and corrective measures until the entire surface is free of observable departures from the straightedge.
- F. Final texturing for bridge decks and approach slabs a textured hardened finish:
 - 1. Use a texture process that produces regular $\frac{1}{6}$ inch wide transverse grooves spaced randomly from $\frac{1}{2}$ inch to $\frac{3}{4}$ inch on centers and $\frac{1}{8}$ inch deep.
 - 2. Keep the finished surface free from porous spots and surface irregularities.
 - 3. Furnish a work bridge that follows the finishing machine to facilitate texturing and application of the curing compound.
 - 4. Check the surface smoothness for acceptance after the concrete has hardened.
 - 5. Remove irregularities by grinding if the surface deviates more than ¹/₈ inch from a 10 ft straightedge. Refer to Section 02701.
 - a. Depth of grinding must be authorized by the Engineer before any grinding operations begin.

3.10 CONCRETE CURING

A. Refer to Section 03390.

3.11 FORM REMOVAL

- A. Obtain authorization from the Engineer before removing forms.
- B. Remove struts, stays, and braces that hold the forms in correct shape and alignment when no longer necessary.
- C. Remove all forms from the concrete surfaces.
 - 1. Do not use a method of form removal likely to cause overstressing of the concrete.
- D. Remove supports to permit the concrete to uniformly and gradually take the stresses due to its own weight.
- E. Do not remove forms used in ornamental work, railings, parapets, and exposed vertical surfaces for at least twelve hours after placement.

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- F. Always remove forms before removing shoring from beneath beams and girders to determine the condition of columns.
- G. Removing Falsework
 - 1. Do not remove falsework supporting the deck of rigid frame structures until the fill has been placed in back of the vertical legs.
 - 2. Keep falsework and forms in place under slabs, beams, and girders for 14 days after the day of last concrete placement.
 - a. Slab forms with a clear space of less than 10 ft may be removed after seven days.
 - 3. Keep forms and falsework in place in cold weather according to the authorized cold weather concreting plan.
- H. Patch formed surfaces within 24 hours after form removal.
 - 1. Cut back and remove all projecting wire or metal devices used for holding the forms in place and that pass through the body of the concrete at least 1 inch beneath the surface of the concrete.
 - 2. Remove lips of mortar and irregularities caused by form joints.
 - 3. Fill small holes, depressions, and voids with cement mortar mixed in the same proportions as that used in the body of the work.
 - 4. Obtain a solid uniform surface by chipping away coarse or broken material to patch larger holes or honeycombs.
 - a. Cut away feathered edges to form faces perpendicular to the surface.
 - b. Apply epoxy adhesive to patch area according to manufacturer's recommendations.
 - c. Fill the cavity with stiff mortar composed of one part portland cement to two parts sand thoroughly tamped into place.
 - d. Pre-shrink the mortar by mixing it approximately 20 minutes.
 - 1) Vary the time according to manufacturer's recommendations, temperature, humidity, and other local conditions.
 - e. Float the surface of this mortar with a wooden float before initial set.
 - f. Keep the patch wet for five days.
 - g. Rub patches on exposed surfaces to blend them with surrounding concrete after curing.
 - h. Add coarse aggregate to the patching material when patching large or deep areas.
 - i. Make a dense, well-bonded, and properly cured patch.
- I. Areas with extensive honeycombing will be rejected.
- J. Apply the following requirements after fully removing all the closure joint forms if inserts are placed along the bottom edges of the precast concrete deck panels to form the closure pour joints:

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- 1. Cut off cast-in-place anchors at least 1 inch below the face of slab and repair according to this Section, Article 3.12, paragraph H.
- 2. Fill all voids with dry-pack mortar flush with the bottom of slab.
- 3. Fill voids created by the removal of re-usable concrete anchors with dry-pack mortar flush with the bottom of slab.
- 4. Dry-pack mortar will be composed of one part portland cement to two parts sand.

3.12 SUPERSTRUCTURE

- A. Bridge decks and approach slabs
 - 1. Follow the authorized concrete placing and finishing plan when placing cast-in-place concrete.
 - 2. Do not place parapet forms or parapet for at least seven days after deck placement and until the deck has attained the specified 28 day minimum compressive strength based on field cured cylinders, unless falsework is left in place and is designed to carry the additional loads that are part of the parapet placement process.
 - a. Do not allow the installation of the parapet and parapet forms to interrupt the curing of the deck and approach slabs when installed before curing is complete.
- B. Slab Span
 - 1. Place concrete in one continuous operation.
- C. Cast-In-Place T-Beams
 - 1. Place concrete in one or two continuous operations first to the top of the girder stems and second to completion, unless otherwise shown.
 - 2. Obtain a bond between the stem and slab that is positive and mechanical and secured by means of shear keys or roughened surface in the top of the girder stem.
- D. Do not place the approach slab until the sleeper slab concrete has been in place at least seven days or has attained 75 percent of the specified 28 day compressive strength based on field cured cylinders.

3.13 SUBSTRUCTURE

- A. Concrete in Columns and Bent Stems
 - 1. Allow footing concrete to set until it has attained 75 percent of the specified 28 day minimum compressive strength based on field cured cylinders before placing column forms when column is being placed on a footing.
 - 2. Place concrete in one continuous operation.

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- 3. Allow concrete to set at least two days and until it has attained 75 percent of the specified 28 day minimum compressive strength based on field cured cylinders before placing caps.
- 4. Do not place concrete in the superstructure until the columns have been stripped and authorized.
- B. Substructure Concrete
 - 1. Do not place the superstructure load on the bents or abutments until they have been in place at least seven days and attained 75 percent of the specified 28 day minimum compressive strength based on field cured cylinders.
- C. Do not backfill abutments, wingwalls, and retaining walls until all concrete has been in place at least 7 days and has attained 100 percent of the specified 28 day minimum compressive strength based on field cured cylinders.
 - 1. Do not interfere with curing.

3.14 BOX CULVERTS

- A. Allow base slab and footing to attain 75 percent of the specified 28 day minimum compressive strength based upon field cured cylinders before constructing the remainder of the culvert.
- B. Construct side walls and top slab monolithically unless the wall height exceeds 10 ft.
 - 1. Keep the construction joints vertical and at right angles to the axis of the culvert.
- C. Construct shear keys in the top of the side walls for anchoring the top slab when side walls and top slab are not placed monolithically.
- D. Construct wingwalls monolithically.
- E. Do not backfill until the concrete has been in place at least 7 days and has attained 100 percent of the specified 28 day minimum compressive strength based on field cured cylinders.
- F. Apply a waterproofing membrane to the top slab and side walls of all concrete box culverts for the full length of the structures.

3.15 HEADWALLS

A. Allow apron and pipe collar to attain 75 percent of the specified 28 day minimum compressive strength based on field cured cylinders before the remainder of the headwall is constructed.

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- B. Construct wingwalls monolithically.
- C. Do not backfill headwalls and wingwalls until all concrete has been in place at least 7 days and has attained 100 percent of the specified 28 day minimum compressive strength based on field cured cylinders.

3.16 CONCRETE SLOPE PROTECTION

- A. Preparing Subgrade
 - 1. Prepare the area to be paved by smoothing and shaping the berms and slopes and excavating for the cut-off walls.
 - 2. Fill and compact subgrade Refer to Section 02056.
 - a. Furnish extra material to properly finish the slopes when required.
 - b. Compact all soft and yielding material resulting in a firm and substantial subgrade of uniform density.
 - 3. Thoroughly spray the area with water before placing the concrete.
 - 4. Obtain the Engineer's authorization for all surfaces before placing concrete.
- B. Placing Concrete
 - 1. Do not place concrete upon spongy, frozen, or unstable surfaces.
 - 2. Provide concrete of a consistency that it can be placed on the slopes without deformation.
 - 3. Complete all horizontal grooves and vertical joints as shown.
 - 4. Complete the entire slope protection in one placement if possible or terminate the placement with a construction joint located in the horizontal grooves or vertical joints.
 - 5. Finish concrete using a Floated Surface Finish according to this Section, Article 3.10.
- C. Seal Joints and Closures Refer to 07921.

3.17 RETAINING WALLS

- A. Allow footing concrete to set until it has attained 75 percent of its specified 28 day minimum compressive strength based on field cured cylinders before placing wall forms.
- B. Do not backfill walls until all concrete has been in place at least 7 days and has attained 100 percent of the specified 28 day minimum compressive strength based on field cured cylinders.

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3.18 MISCELLANEOUS CONSTRUCTION

A. Bearing Areas

- 1. Finish bridge seat bearing areas high and rub or grind to grade level within an allowable tolerance of $\pm 1/_{16}$ inch and within a tolerance of $\pm 1/_{8}$ inch of the elevation shown.
- 2. Do not grout under bearing plates.

3.19 CLEANUP

A. Remove falsework and falsework piling to 2 ft below the finished ground line, rubbish, and temporary building materials before final inspection.

END OF SECTION