

CONSTRUCTION SPECIFICATIONS

FOR

NORTHERN AVENUE BRIDGE AND APPROACH ROADWAYS
AT NEW RIVER

FCD CONTRACT NO. 91-17

CONSTRUCTION SPECIAL PROVISIONS

Property of
Flood Control District of MC Library
Please Return to
2801 W. Durango
Phoenix, AZ 85009

Prepared By:

BRW, INC.
2700 North Central Avenue
Phoenix, Arizona 85004



Prepared for:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
and

Recommended By: Edward A. Raleigh Date: 6/17/91
Edward A. Raleigh, P.E., Chief
Engineering Division

Approved By: D.E. Sagramoso Date: 6-17-91
D.E. Sagramoso, P.E.
Chief Engineer and General Manager

SUPPLEMENTARY TO MARICOPA ASSOCIATION OF GOVERNMENTS UNIFORM STANDARD
SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION EDITION OF 1979 AND
REVISIONS AND SUPPLEMENTS THERETO.

A371.502

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Edward A. Raleigh

Edward A. Raleigh, P.E., Chief
Engineering Division

Date: 6/17/91

Approved By:

Stanley L. Smith
D.E. Sagramoso, P.E.
Chief Engineer and General Manager

STANLEY L. SMITH JR., P.E.
DEPUTY CHIEF ENGINEER

Date: 6-17-91

SUPPLEMENTARY TO MARICOPA ASSOCIATION OF GOVERNMENTS UNIFORM STANDARD
SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION EDITION OF 1979 AND
REVISIONS AND SUPPLEMENTS THERETO.

ATTENTION

ALL PROSPECTIVE BIDDERS

A.R.S. Sec. 34-201(A)(3) requires that every bid be accompanied by a certified check, cashier's check or surety bond in the amount of not less than a full five percent (5%) value of the bid.

Bid bonds for less than the full five percent (5%) value of the bid amount as required by A.R.S. 34-201(A)(3) will not be accepted (such as the AIA Form of Bond). Those bids will therefore be considered nonresponsive.

Please take note and submit your bids accordingly.

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
FCD CONTRACT 91-17

NORTHERN AVENUE BRIDGE AND APPROACH ROADWAYS
AT NEW RIVER

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**FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
INVITATION TO BID**

BID OPENING DATE: July 30, 1991

LOCATION:

This project is located in Maricopa County between the cities of Glendale and Peoria on Northern Avenue and crosses the New River approximately 850 feet west of 99th Avenue.

PROPOSED WORK:

This project provides for the construction of a bridge and approaches along Northern Avenue Road alignment across the New River. Work includes grading, draining, surfacing, constructing a 388 foot long and 85 foot wide precast concrete girder bridge, constructing beam guardrail and anchors, concrete barriers, relocating existing utilities, construct new water and sewer lines, construct a new sewage lift station and placing of traffic control devices. The road will be closed to traffic during construction, with access required only for local vehicles.

BIDS:

SEALED BIDS for the proposed work will be received by the Flood Control District of Maricopa County, 3335 West Durango Street, Phoenix, Arizona 85009 until 2:00 p.m. (Phoenix time) on the above date and then publicly opened and read at 3335 W. Durango St., Phoenix, AZ 85009. No bids will be received after the time specified for bid opening. All bids must be submitted on proposal forms furnished by the Flood Control District and included in the Proposal Pamphlet. The Board of Directors reserves the right to reject any and all bids and to waive any informality in any bid received.

ELIGIBILITY OF CONTRACTOR:

It is the policy of Flood Control District of Maricopa County to endeavor to ensure in every way possible that minority and women-owned business enterprises have every opportunity to participate in providing professional services, purchased goods, and contractual services without being discriminated against on the grounds of race, religion, sex, age, or national origin.

The bidder shall be required to certify that it is appropriately licensed as a Contractor in the State of Arizona for performing the before-mentioned type of work. Verification shall be on the form provided herein.

The bidder may be required to furnish an affidavit as evidence of previous satisfactory performance in the above-mentioned type of work.

CONTRACT TIME:

All work on this Contract is to be completed within two hundred (200) calendar days after date of Notice to Proceed.

MBE/WBE PARTICIPATION:

For this project, a goal of eighteen (18) percent is desired for Minority/Women-Owned Business Enterprises. Instructions and required forms are included in the Minority and Women-Owned Business Enterprise Program Section.

PRE-BID CONFERENCE:

A pre-bid conference will be held on July 16, 1991 at 11:00 a.m. in the Flood Control District conference room, 3335 West Durango Street, Phoenix, Arizona 85009. It is in the best interest of prospective bidders to attend the Pre-bid Conference.

Questions or items for clarification may be addressed to the Chief, Contracts Branch, in writing, at least ten (10) days prior to bid opening date. Where appropriate, any answers or clarifications affecting the cost may be addressed to all bidders in an addendum. Under no circumstances will verbal interpretations or clarifications be given to individual contractors.

PROJECT PLANS, SPECIAL PROVISIONS AND CONTRACT DOCUMENTS:

Plans and Construction Specifications may be obtained from Flood Control District of Maricopa County, 3335 West Durango Street, Phoenix, Arizona 85009 upon payment of \$40.00 by check, payable to the FLOOD CONTROL DISTRICT of MARICOPA COUNTY. This payment will not be refunded. Mail orders for project documents must include an additional \$7.50 for first class U.S. postage and handling. The total \$47.50 will not be refunded. Regardless of circumstances, we cannot guarantee mail delivery. Each bid must be accompanied by a Bid Bond, cashier's or certified check or postal money Order equal to 5 percent (5%) of the bid, made payable to the FLOOD CONTROL DISTRICT OF MARICOPA COUNTY as a guarantee that if the work is awarded to the bidder, the bidder will within ten (10) days of receipt of the Proposal Acceptance, enter into proper contract and bond condition for the faithful performance of the work, otherwise, said amount may be forfeited to the said BOARD OF DIRECTORS as liquidated damages.

All bids are to be marked in accordance with Section 102.9 of the Uniform Standard Specifications and addressed to the Chief Engineer and General Manager, Flood Control District of Maricopa County, 3335 West Durango Street, Phoenix, Arizona 85009.

As provided for in the Agenda Information Form authorizing the Invitation to Bid.

PRINCIPLE ITEMS AND APPROXIMATE QUANTITIES

<u>QUANTITY</u>	<u>UNIT</u>	<u>DESCRIPTION</u>
900	LF	Utility Encasement
2,600	LF	Pavement
1	EA	Lift Station
1	EA	Bridge
600	LF	Soil Cement Bank Protection

PROPOSAL

TO THE BOARD OF DIRECTORS
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
PHOENIX, ARIZONA

Gentlemen:

The following Proposal is made for constructing Northern Avenue Bridge and Approach Roadways at New River, in the County of Maricopa, State of Arizona.

The following Proposal is made on behalf of

and no others. Evidence of authority to submit the Proposal is herewith furnished. The Proposal is in all respects fair and is made without collusion on the part of any person, firm, or corporation mentioned above, and no member or employee of the Board of Directors is personally or financially interested, directly or indirectly, in the Proposal, or in any purchase or sale of any materials or supplies for the work in which it relates, or in any portion of the profits thereof.

The Undersigned certifies that the approved Plans, Supplementary General Conditions, Special Provisions, Forms of Contract, Bonds, and Sureties authorized by the Board of Directors and constituting essential parts of this Proposal, have been carefully examined and also that the site of the work has been personally inspected.

The Undersigned declares that the amount and nature of the work to be done is understood and that at no time will misunderstanding of the Plans, Construction Specifications, Special Provisions, or conditions to be overcome, be pled. On the basis of the Plans, Construction Specifications, Special Provisions, the Forms of Contract, Bonds, and Sureties proposed for use, the Undersigned proposes to furnish all the necessary machinery, equipment, tools, apparatus, and other means of construction, to do all the work and to furnish all the materials in the manner specified and to finish the entire project within the time hereinafter proposed and to accept, as full compensation therefore, the sum of various products obtained by multiplying each unit price, herein bid for the work or materials, by the quantity thereof actually incorporated in the complete project, as determined by the Engineer or Architect.

The Undersigned understands that the quantities mentioned herein are approximate only and are subject to increase or decrease and hereby proposes to perform all quantities of work, as either increased or decreased, in accordance with the provisions of the Specifications, at the unit price bid in the Bidding Schedule.

The Undersigned further proposes to perform all extra work that may be required on the basis provided in the Specifications and to give such work personal attention and to secure economical performance.

The Undersigned further proposes to execute the Contract Agreement and furnish satisfactory Bonds and Sureties within ten (10) days of receipt of Notice of Proposal acceptance, **TIME BEING OF THE ESSENCE**. The Undersigned further proposes to begin work as specified in the Contract attached hereto, and to complete the work within 200 calendar days from the effective date specified in the Notice to Proceed, and maintain at all times a Payment and Performance Bond, approved by the Board of Directors, each in an amount equal to one hundred percent of the contract amount. This Bond shall serve not only to guarantee the completion of the work on the part of the Undersigned, but also to guarantee the excellence of both workmanship and material and the payment of all obligations incurred, said Bonds and Sureties to be in full force and effect until the work is finally accepted and the provisions of the Plans, Specifications, and Special Provisions fulfilled.

A Proposal Guaranty in the amount and character named in the Invitation to Bid is enclosed amounting to not less than five (5) percent of the total bid, which Proposal Guaranty is submitted as a guaranty of the good faith of the Bidder and the Bidder will enter into written contract, as provided, to do the work, if successful in securing the award thereof; and it is hereby agreed that if at any time other than as provided in the Proposal requirements and conditions the Undersigned should withdraw his Proposal, if the Proposal is accepted and there should be failure on the part of the Undersigned to execute the Contract and furnish satisfactory Bonds and Sureties as herein provided, the Flood Control District of Maricopa County in either of such events, shall be entitled and is hereby given the right to retain the said Proposal Guaranty as liquidated damages.

The Undersigned acknowledges receipt of the following addenda and has included their provisions in the proposal:

Addendum No. _____	Dated _____

The Undersigned has enclosed the required bid security to this Proposal.

BIDDING SCHEDULE

PROJECT: Northern Avenue Bridge & Approach Roadways at New River

CONTRACT: FCD 91-17

ITEM NO.	DESCRIPTION	APPROXIMATE QUANTITY	UNIT	UNIT COST (IN WRITING) AND /100 DOLLARS	UNIT COST (NUMBERS)	EXTENDED AMOUNT
205-1	Roadway Excavation	4,955	CY			
206-1	Structure Excavation	1	LS			
206-2	Structure Backfill	1	LS			
211-1	Fill Construction	15,016	CY			
215-1	Channel Excavation	36,250	CY			
221-1	Soil Cement	7,957	CY			
221-2	Cement and Fly Ash Furnished	1,805	TON			
310-1	Aggregate Base	4,805	TON			
321-1	C-3/4 - Asphalt Concrete	2,475	TON			
345-1	Adjust Existing Valve Box and Cover	4	EA			
345-2	Adjust Existing Sanitary Sewer Manhole Frame and Cover	2	EA			
350-1	Removal of Existing Improvements	1	LS			
401-1	Traffic Control	1	LS			
402-1	3", Sch. 40, Type 2, Rigid PVC Conduit	66	LF			
403-1	No. 5 Pull Box	2	EA			
405-1	Install Right-of-Way Monuments	18	EA			
415-1	Install Metal Guardrail, BCT's, Terminals and Rub Rails	606	LF			
420-1	Chain Link Fence	852	LF			
420-2	Smooth Wire Gates	4	EA			
450-1	Signing, Striping & Marking	1	LS			
505-1	Class "A" Concrete	185.7	CY			
505-2	Class "AA" Concrete	1,845.3	CY			
505-3	Reinforcing Steel	466,855	LB			
505-4	Construct Concrete Spillway, Inlet & Outlet	4	EA			
505-5	6'-6" Dia. Drilled Shaft Foundation	1,253	LF			
505-6	U.S. West Blockouts and Inserts	1	LS			

ITEM NO.	DESCRIPTION	APPROXIMATE QUANTITY	UNIT	UNIT COST (IN WRITING) AND /100 DOLLARS	UNIT COST (NUMBERS)	EXTENDED AMOUNT
506-1	Precast Prestressed Girder AASHTO Type V Modified	36	EA			
610-1	12" Class 52 Ductile Iron Pipe & Fittings	969	LF			
610-2	12" Class 150 ACP Waterline	141	LF			
610-3	12" Class 150 C-900 Waterline	2,109	LF			
610-4	1" Service Connection & Meter	1	EA			
610-5	Concrete Encasement of 12" Waterline	400	LF			
610-6	Concrete Encasement of 6" Waterline	19	LF			
610-7	Slurry Encasement of 12" Waterline	400	LF			
610-8	12" Waterline Metering Station	1	LS			
615-1	12" Class 52 Ductile Iron Pipe & Fittings	1,157	LF			
615-2	18" Class 160 (Min.) PVC Sanitary Sewer Pipe and Fittings	127	LF			
615-3	Concrete Encasement of 12" Sanitary Sewer	19	LF			
615-4	Concrete Encasement of 18" Sanitary Sewer	16	LF			
615-5	Slurry Encasement of 12" Sanitary Sewer	404	LF			
621-1	24" I.D. Galvanized 16 Gauge Corrugated Metal Pipe	180	LF			
625-1	60" I.D. Manhole, Frame & Cover	2	EA			
625-2	Construct Lift Station - Civil Items Modified	1	LS			
625-3	Construct Lift Station - Mechanical Items	1	LS			
625-4	Construct Lift Station - Electrical Items	1	LS			
625-5	Remove and Salvage Existing Lift Station	1	LS			
625-6	Backfill Existing Wet Well and Dry Well	1	LS			
625-7	Remove and Dispose Existing Sanitary Sewer Manhole	1	EA			
625-8	Tie-in to Existing Manhole	1	EA			
630-1	12" Gate Valve, Box & Cover Type A	5	EA			

TOTAL BID AMOUNT: _____

CONTINGENT BID ITEMS

PROJECT: Northern Avenue Bridge & Approach Roadways at New River

CONTRACT: FCD 91-17

ITEM NO.	DESCRIPTION	APPROXIMATE QUANTITY	UNIT	UNIT COST (IN WRITING) AND /100 DOLLARS	UNIT COST (NUMBERS)	EXTENDED AMOUNT
351-1	Removal of Existing Landfill - Construction Debris	100	CY			
351-2	Removal of Existing Landfill - Organic Material	100	CY			
505-7	U.S. West Hangers & Conduits	1	LS			
610-9	Cast Iron Fittings in Excess of Quantity Shown in Plans	1,000	LB			
625-9	Construct Lift Station - Total Same Size & Type as Existing	1	LS			

TOTAL BID AMOUNT: _____

IF BY AN INDIVIDUAL:

(NAME - TITLE) (ADDRESS)
DATE _____
(PHONE)

IF BY A FIRM OR PARTNERSHIP:

(FIRM NAME) (FIRM ADDRESS)

BY: _____ DATE _____
(NAME - TITLE) (PHONE)

** Name and Address of Each Member:

** The name and post office address of each member of the firm or partnership must be shown.

IF BY A CORPORATION:

(CORPORATE NAME) (CORPORATION ADDRESS)

BY: _____ DATE: _____
(PHONE)

TITLE: _____

* Incorporated under the Laws of _____

Names and Addresses of Officers:

(PRESIDENT) (ADDRESS)

(SECRETARY) (ADDRESS)

(TREASURER) (ADDRESS)

* The name of the State under which the laws of the Corporation was chartered and names, title, and business address of the President, Secretary, and Treasurer must be shown.

SUBCONTRACTOR LISTING

As required in Section 102.6 of the Supplementary General Conditions, the following is a listing of Subcontractors and material suppliers that are to be used in the event the undersigned should enter into contract with the Owner. This is not an exhaustive or inclusive list.

(Signature) _____

SURETY BOND

KNOW ALL MEN BY THESE PRESENTS:

That we, _____, as Principal, (hereinafter called the Principal), and the _____, a corporation duly organized under the laws of the State of _____, as Surety, (hereinafter called the Surety), are held and firmly bound unto the Flood Control District of Maricopa County as Obligee, in the sum of five percent (5%) of the total amount of the bid of Principal, submitted by him to the Flood Control District of Maricopa County, for the work described below, for the payment of which sum, well and truly to be made, the said Principal and the said Surety, bind ourselves, our heirs, executors, and administrators, successors and assigns, jointly and severally, firmly by these presents, and in conformance with A.R.S. Sec. 34-201(A)(3).

WHEREAS, the said Principal is herewith submitting its proposal for FCD Contract 91-17, Northern Avenue Bridge and Approach Roadways at New River.

NOW, THEREFORE, if the Flood Control District of Maricopa County shall accept the proposal of the Principal and the Principal shall enter into a contract with the Flood Control District of Maricopa County in accordance with the terms of such proposal and give such Bonds and Certificates of Insurance as specified in the Standard Specifications with good and sufficient Surety for the faithful performance of such contract and for the prompt payment of labor and material furnished in the prosecution thereof, or in the event of the failure of the Principal to enter into such contract and give such Bond and Certificates of Insurance, if the Principal shall pay to the Flood Control District of Maricopa County the sum of money set forth above as liquidated damages for failure of the Principal to enter into the contract, then this obligation shall be null and void, otherwise to remain in full force and effect.

Signed and sealed this _____ day of _____, A.D., 1991.

Principal

Title

Witness:

Surety

Title

Witness:

VERIFICATION OF LICENSE

Pursuant to A.R.S. Sec. 32-1169, I hereby state that I hold a current contractor's license, duly issued by the office of the Registrar of Contractors for the State of Arizona, said license has not been revoked, that the license number is: _____; that my privilege license number (as required by A.R.S. Sec. 42-1305) is: _____; and that, if any exemption to the above licensing requirements is claimed;

(1) The basis for the claimed exemption is: _____ and;

(2) The names(s) and license number(s) of any general, mechanical, electrical, or plumbing contractor(s) to be employed on the work are:

IT IS UNDERSTOOD THAT THE FILING OF AN APPLICATION CONTAINING FALSE OR INCORRECT INFORMATION CONCERNING AN APPLICANT'S CONTRACTOR'S LICENSE OR PRIVILEGE LICENSE WITH THE INTENT TO VOID SUCH LICENSING REQUIREMENTS IS UNSWORN FALSIFICATION PUNISHABLE ACCORDING TO A.R.S. SEC. 13-2704.

DATE: _____ SIGNATURE OF LICENSEE: _____

COMPANY: _____

~~MINORITY AND WOMEN-OWNED BUSINESS ENTERPRISE PROGRAM~~

- A. The following conditions will apply in the calculation of the percentage attainment:
1. All MBE/WBE firms used in attainment of the goal must be certified with the Maricopa County Minority Business Office which is located in the Maricopa County Highway Department building, 3325 West Durango Street, Phoenix. In addition, only those firms certified at least seven calendar days prior to the bid opening will be considered in the attainment of the goal.
 2. Prime contractor subcontracts to MBE or WBE:
The MBE/WBE amount to be applied to the goal will be based on that portion (dollar value) of the contract that the MBE/WBE performs. For example, if a prime contractor subcontracts work amounting to \$100,000 of a contract for which the total project cost is \$1,000,000. the MBE/WBE participation will be credited as 10 percent.
 3. Prime Minority Contractor:
An MBE/WBE prime contractor will be credited with the MBE/WBE participation for that portion of the contract which they themselves perform plus that portions subcontracted to other MBE/WBE firms. For example, if an MBE/WBE prime contractor proposes to perform 50 percent of a project quoted at \$1,000,000 and subcontracts 25 percent to an MBE firm and 25 percent to a non-MBE/WBE firm, MBE/WBE participation will be credited as 75 Percent, or \$750,000.
 4. Minority-Non-Minority Joint Venture:
A joint venture consisting of MBE/WBE participation and non-MBE/WBE business enterprises, functioning as a prime contractor, will be credited with minority participation on the basis of the percentage of profit accruing to the MBE/WBE firm. For example, if a MBE/WBE and non-MBE/WBE joint venture proposes to perform 50 percent of a \$1,000,000 project and 50 percent of the joint venture profits (\$500,000) are to accrue to the MBE/WBE partner in the joint venture, MBE/WBE participation will be credited at 25 percent or \$250,000.
 5. Lower Tier Non-MBE/WBE Participation:
MBE/WBE subcontractors proposing to further subcontract to non-MBE/WBE contractors shall not have that portion of subcontracting activity considered when determining the percentage of MBE/WBE participation.

6. MBE/WBE Suppliers:

Any MBE/WBE supplier that manufactures or substantially alters the material or product it supplies will have that portion of activity considered when determining the percentage of MBE/WBE participation. Any MBE/WBE Wholesaler, Distributor, or Jobber that does not manufacture or substantially alter the materials or product it sells will be limited to 20 percent of the sale price when determining the percentage of MBE/WBE participation.

B. Required forms:

An affidavit is included as part of this section. The form must be completed within seven calendar days after the Notice of Award of Contract. The low bidder is required to submit a Minority/Women-Owned Business Enterprise Program MBE/WBE Participation Affidavit listing the MBE/WBE participation by MBE/WBE firm and the related dollar value of the MBE/WBE contract.

C. Requests for Pay:

Each Request for Pay must be accompanied by a Maricopa County Minority/Women-Owned Business Enterprise Program MBE/WBE Participation Report. The final pay request shall include a listing of total contract MBE/WBE participation.

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
MINORITY/WOMEN-OWNED BUSINESS ENTERPRISE PROGRAM

MBE/WBE PARTICIPATION ASSURANCES
AFFIDAVIT

The undersigned, fully cognizant of the Flood Control District of Maricopa County MBE/WBE Program requirements and of the goal established, hereby certifies that in the preparation of this bid,

(the entity submitting the bid)

(CHECK ONE)

- _____ Will meet the established goal for participation by Minority/Women-Owned Business Enterprises.
- _____ Will provide the necessary documentation to Minority Business Office to establish that a good faith effort was made.
- _____ Will not participate in the MBE/WBE Program.

The bidder will specify its MBE/WBE participation on the Intended Participation Affidavit or provide documentation of its good faith efforts not later than 4:00 p.m., the seventh calendar day following the bid opening. The required affidavit shall be obtained by the apparent first and second low bidders from the Minority Business Office, Maricopa County Highway Department Building, 3325 West Durango Street, Phoenix, Arizona 85009, following the opening and reading of bids; a sample affidavit form for reference purposes follows.

Name of Firm

Signature

Title

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
MINORITY/WOMEN-OWNED BUSINESS ENTERPRISE PROGRAM
Actual Minority/Women-owned Participation

Name of Prime Contractor

FCD 91-17 _____
Project Number

Contact Person

Total Amount of Contract

Street No.

City State Zip

<u>Minority/Women-owned Firm</u>	<u>Principal</u>	<u>Address</u>	<u>Type of Work</u>	<u>Subcontract Amount</u>
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_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

The undersigned has entered into a formal agreement with the minority contractors/suppliers listed above in the execution of this contract with the Flood Control District of Maricopa County.

Signature

Title

Date

Copy to: Minority Business Office
Maricopa County Highway Department
3325 West Durango Street
Phoenix, Arizona 85009

MARICOPA COUNTY
MINORITY/WOMEN-OWNED BUSINESS ENTERPRISES PROGRAM

MBE/WBE PARTICIPATION REPORT
(To be attached with Request for Pay)

Date: _____

Contractor: _____

Contact Person: _____

Address: _____

Telephone: _____

Project: Northern Avenue Bridge and Approach

Roadways at New River

Contract Number: 91-17

For Pay Period of: _____

Subcontractor: _____

Person to Contact: _____

Address: _____

Telephone Number: _____

Type of Firm: _____

Class of Work: _____

Subcontract Amount: _____

Amount Earned _____

(Commission) This Period: _____

Total Earned by This Subcontractor: _____

Total MBE/WBE Contract Goal, %: 18

Total Cumulative MBE/WBE _____

Participation on This Contract, %: _____

MBE/WBE subcontract payment made
during this reporting period (yes or no): _____

cc: Minority Business Office
Maricopa County Highway Building
3325 West Durango Street
Phoenix, Arizona 85009

CONTRACT AGREEMENT

THIS AGREEMENT, made and entered into this _____ day of _____, 1991, by and between FLOOD CONTROL DISTRICT OF MARICOPA COUNTY, hereinafter called the OWNER, acting by and through its BOARD OF DIRECTORS, and

_____ hereinafter called the CONTRACTOR.

WITNESSTH: That the said CONTRACTOR, for and in the consideration of the sum of _____ to be paid to him by the OWNER, in the manner and at the times hereinafter provided, and of the other covenants and agreements herein contained, hereby agrees for himself, heirs, executors, administrators, successors, and assigns as follows:

ARTICLE I - SCOPE OF WORK: The CONTRACTOR shall construct, and complete in a workmanlike and substantial manner and to the satisfaction of the Chief Engineer and General Manager, a project for the Flood Control District of Maricopa County, designated as FCD Contract 91-17; Northern Avenue Bridge and Approach Roadways at New River, and furnish at his own cost and expense all necessary machinery, equipment, tools, apparatus, materials, and labor to complete the work in the most substantial and workmanlike manner according to the Plans and Construction Specifications on file with the Flood Control District of Maricopa County, 3335 West Durango Street, Phoenix, Arizona, and such modifications of the same and other directions that may be made by the Flood Control District of Maricopa County as provided herein.

ARTICLE II - CONTRACT DOCUMENTS: The Construction Specifications (Invitation to Bid, Plans, Standard Specifications and Details, Supplementary General Conditions, Special Provisions, Addenda, if any, Proposal, Affidavits, Performance Bond, Payment Bond, Certificates of Insurance, and Change Orders, if any,) are by this reference made a part of this Contract and shall have the same effect as though all of the same were fully inserted herein.

ARTICLE III - TIME OF COMPLETION: The CONTRACTOR further covenants and agrees at his own proper cost and expense, to do all work as aforesaid for the construction of said improvements and to completely construct the same and install the material therein, as called for by this agreement free and clear of all claims, liens, and charges whatsoever, in the manner and under the conditions specified within the time, or times, stated in the proposal pamphlet.

ARTICLE IV - PAYMENTS: For and in consideration of the faithful performance of the work herein embraced as set forth in the Contract Documents, which are a part hereof and in accordance with the directions of the OWNER, through its Engineer and to his satisfaction, the OWNER agrees to pay the said CONTRACTOR the amount earned, computed from actual quantities of work performed and accepted or materials furnished at the unit bid price on the Proposal made a part hereof, and to make such payment in accordance with the requirements of A.R.S. Sec. 34-221, as amended. The CONTRACTOR agrees to discharge its obligations and make payments to its subcontractors and suppliers in accordance with A.R.S. Sec. 32-1129.

ARTICLE V - TERMINATION: The OWNER hereby gives notice that pursuant to A.R.S. Sec. 38-511(A) this contract may be cancelled without penalty or further obligation within three years after execution if any person significantly involved in initiation, negotiation, securing, drafting or creating a contract on behalf of the OWNER is, at any time while the contract or any extension of the contract is in effect, an employer agent of any other party to the contract in any capacity or a consultant to any other party of the contract with respect to the subject matter of the contract. Cancellation under this section shall be effective when written notice from the Chief Engineer and General Manager of the OWNER is received by all of the parties to the contract. In addition, the OWNER may recoup any fee for commission paid or due to any person significantly involved in initiation, negotiation, securing, drafting or creating the contract on behalf of the OWNER from any other party to the contract arising as a result of the contract.

ARTICLE VI - NEGOTIATION CLAUSE: Recovery of damages related to expenses incurred by the CONTRACTOR for a delay for which the OWNER is responsible, which is unreasonable under the circumstances and which was not within the contemplation of the parties to the contract, shall be negotiated between the CONTRACTOR and the OWNER. This provision shall be construed so as to give full effect to any provision in the contract which requires notice of delays, provides for arbitration or other procedure for settlement or provides for liquidated damages.

ARTICLE VII - COMPLIANCE WITH LAWS: The CONTRACTOR is required to comply with all Federal, State and local ordinances and regulation. The CONTRACTOR's signature on this contract certifies compliance with the provisions of the I-9 requirements of the Immigration Reform Control Act of 1986 for all personnel that the CONTRACTOR and any subcontractors employ to complete this project. It is understood that the OWNER shall conduct itself in accordance with the provisions of the Maricopa County Procurement Code.

ARTICLE VIII - MBE/WBE PROGRAM: Flood Control District of Maricopa County will endeavor to ensure in every way possible that minority and women-owned business enterprises shall have every opportunity to participate in providing professional services, purchased goods, and contractual services to the Flood Control District of Maricopa County without being discriminated against on the grounds of race, religion, sex, age, or national origin.

ARTICLE IX - ANTI-DISCRIMINATION PROVISION: The CONTRACTOR agrees not to discriminate against any employee or applicant for employment because of race, religion, color, sex, national origin, age, or handicap and further agrees not to engage in any unlawful employment practices. The CONTRACTOR further agrees to insert the foregoing provision in all subcontracts hereunder.

IN WITNESS WHEREOF: Five (5) identical counterparts of this Contract, each of which shall for all purposes be deemed an original thereof, have been duly executed by the parties hereinabove named, on the date and year first above written.

PARTY OF THE FIRST PART

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
PARTY OF THE SECOND PART

BY: _____
Printed Name

BY: _____
CHAIRMAN, BOARD OF DIRECTORS

BY: _____
Signature

DATE: _____

Title
DATE: _____

Tax Identification Number

RECOMMENDED BY:

CHIEF ENGINEER AND GENERAL MANAGER
FLOOD CONTROL DISTRICT OF
MARICOPA COUNTY

ATTEST:

CLERK OF THE BOARD

DATE: _____

LEGAL REVIEW

Approved as to form and within the powers and authority granted under the laws of the State of Arizona to the Flood Control District of Maricopa County.

BY: _____
GENERAL COUNSEL, FLOOD CONTROL
DISTRICT OF MARICOPA COUNTY

DATE: _____

STATUTORY PAYMENT BOND PURSUANT TO TITLE 34
CHAPTER 2, ARTICLE 2, OF THE ARIZONA REVISED STATUTES
(Penalty of this bond must be 100% of the Contract amount)

KNOW ALL MEN BY THESE PRESENTS:

That, _____
(hereinafter called the Principal), As Principal, and _____

_____ a corporation organized and existing under the laws of the State of _____, with its principal office in the City of _____ (hereinafter called the Surety), as Surety, are held and firmly bound unto the Flood Control District of Maricopa County, in the County of Maricopa, State of Arizona (hereinafter called the Obligee), in the amount of _____

_____ dollars (\$ _____), for the payment whereof, the said Principal and Surety bind themselves, and their heirs, administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has entered into a certain written contract with Flood Control District of Maricopa County, dated the ____ day of _____, 1991, for FCD Contract 91-17: Northern Avenue Bridge and Approach Roadways at New River, which contract is hereby referred to and made a part hereof as fully and to the same extent as if copied at length herein.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH, that if the said Principal shall promptly pay all monies due to all persons supplying labor or materials to him or his subcontractors in the prosecution of the work provided for in said contract, then this obligation shall be void, otherwise to remain in full force and effect.

PROVIDED, HOWEVER, that this bond is executed pursuant to the provisions of Title 34, Chapter 2, Article 2, of the Arizona Revised Statutes, and all liabilities on this bond shall be determined in accordance with the provisions of said Title, Chapter, and Article, to the extent as if it was copied at length herein.

The prevailing party or any party which recovers judgement on this bond shall be entitled to such reasonable attorney's fees as may be fixed by the court or a judge thereof.

Witness our hands this _____ day of _____, 1991.

PRINCIPAL SEAL

BY: _____

AGENCY OF RECORD

AGENCY ADDRESS

SURETY SEAL

BY: _____

BOND NUMBER.

POWER OF ATTORNEY SEAL

BY: _____

STATUTORY PERFORMANCE BOND PURSUANT TO TITLE 34
CHAPTER 2, ARTICLE 2, OF THE ARIZONA REVISED STATUTES
(Penalty of this bond must be 100% of the Contract amount)

KNOW ALL MEN BY THESE PRESENTS:

That, _____
(hereinafter called the Principal), As Principal, and _____

_____ a corporation organized and existing under the laws of the State of _____, with its principal office in the City of _____ (hereinafter called the Surety), as Surety, are held and firmly bound unto the Flood Control District of Maricopa County, in the County of Maricopa, State of Arizona, in the amount of _____ dollars (\$ _____), for the payment whereof, the said Principal and Surety bind themselves, and their heirs, administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has entered into a certain written contract with Flood Control District of Maricopa County, dated the ____ day of _____, 1991, for FCD Contract 91-17; Northern Avenue Bridge and Approach Roadways at New River, which contract is hereby referred to and made a part hereof as fully and to the same extent as if copied at length herein.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH, that if the said Principal shall faithfully perform and fulfill all the undertakings, covenants, terms, conditions and agreements of said contract during the original term of said contract and any extension thereof, with or without notice to the Surety, and during the life of any guaranty required under the contract, and shall also perform and fulfill all the undertakings, covenants, terms, conditions, and agreements of any and all duly authorized modifications of said contract that may hereafter be made, notice of which modifications to the Surety being hereby waived; then the above obligation shall be void, otherwise to remain in full force and effect;

PROVIDED, HOWEVER, that this bond is executed pursuant to the provisions of Title 34, Chapter 2, Article 2, of the Arizona Revised Statutes, and all liabilities on this bond shall be determined in accordance with the provisions of said Title, Chapter, and Article, to the extent as if it was copied at length herein.

The prevailing party in a suit on this bond shall be entitled to such reasonable attorney's fees as may be fixed by a judge of the court.

Witness our hands this _____ day of _____, 1991.

AGENCY OF RECORD

AGENCY ADDRESS

BOND NUMBER

POWER OF ATTORNEY

BY: _____

PRINCIPAL SEAL

BY: _____

SURETY SEAL

BY: _____

CERTIFICATE OF INSURANCE

CONTRACT FCD 91-17

PROJECT TITLE Northern Ave. Bridge over The New River

NAME AND ADDRESS OF INSURANCE AGENCY	INSURANCE COMPANIES AFFORDING COVERAGES	
	Company Letter	A
	Company Letter	B
NAME AND ADDRESS OF INSURED	Company Letter	C
	Company Letter	D
	Company Letter	E
	Company Letter	F
	Company Letter	G

THIS IS TO CERTIFY THAT POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE AND ARE IN FORCE AT THIS TIME.

COMPANY LETTER	TYPE OF INSURANCE	POLICY NUMBER	EXPIRATION DATE	LIMITS OF LIABILITY IN \$1,000 MINIMUM each occurrence	
	COMMERCIAL GENERAL <input checked="" type="checkbox"/> LIABILITY FORM <input checked="" type="checkbox"/> PREMISES OPERATIONS <input checked="" type="checkbox"/> CONTRACTUAL <input checked="" type="checkbox"/> BROAD FORM PROPERTY DAMAGE <input checked="" type="checkbox"/> EXPLOSION & COLLAPSE <input checked="" type="checkbox"/> PRODUCTS/COMPLETED OPERATIONS HAZARD <input checked="" type="checkbox"/> UNDERGROUND HAZARD <input checked="" type="checkbox"/> INDEPENDENT CONTRACTORS <input checked="" type="checkbox"/> PERSONAL INJURY			BODILY INJURY per person	2,000
	<input checked="" type="checkbox"/> EXCESS LIABILITY			PROPERTY DAMAGE each occurrence	2,000
	COMPREHENSIVE AUTO <input checked="" type="checkbox"/> LIABILITY & NON-OWNED			SAME AS ABOVE	
	<input checked="" type="checkbox"/> WORKERS' COMPENSATION AND EMPLOYERS' LIABILITY			NECESSARY IF UNDERLYING NOT ABOVE MINIMUM	3,000
	<input checked="" type="checkbox"/> OTHER			STATUTORY each accident	\$100
	<input checked="" type="checkbox"/> OTHER			The Flood Control District of Maricopa County, Maricopa County, and the Cities of Peoria and Glendale shall be named as additional insureds.	
	<input type="checkbox"/> OTHER				

Except for Workers' Compensation Insurance, the Flood Control District of Maricopa County is added as an additional insured in respect to liability arising in any manner out of the performance of any contract entered into between the insured and the Flood Control District or liability arising out of any services provided or duty performed by any party as required by statute, law, purchase order, or otherwise required. It is agreed that any insurance available to the named insured shall be primary of other sources that may be available. It is further agreed that no policy shall expire, be cancelled, or materially changed to effect the coverage available to the District without thirty (30) days written notice to the District. THIS CERTIFICATE IS NOT VALID UNLESS COUNTERSIGNED BY AN AUTHORIZED REPRESENTATIVE OF THE INSURANCE COMPANY.

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
 3335 West Durango Street
 Phoenix, Arizona 85009

DATE ISSUED _____

AUTHORIZED REPRESENTATIVE _____

It is further agreed that:

The Contractor hereby agrees to indemnify and save harmless the Flood of Control District of Maricopa County, Maricopa County, and the Cities of Peoria and Glendale or any of their departments, agencies, officers or employees, from and against all loss, expense, damage or claim of any nature whatsoever which is caused by any activity, condition or event arising out of the performance or nonperformance of any of the provisions of this Agreement. The Flood Control District of Maricopa County, Maricopa County, and the Cities of Peoria and Glendale shall in all instances be indemnified against all liability, losses and damages of any nature for or on account of any injuries to or death of persons or damages to or destruction of property arising out of or in any way connected with the performance or nonperformance of this Agreement, except such injury or damage as shall have been occasioned by the negligence of the Flood Control District of Maricopa County, Maricopa County, and the Cities of Peoria and Glendale. The above cost of damages incurred by the Flood Control District of Maricopa County, Maricopa County, and the Cities of Peoria and Glendale or any of their departments, agencies, officers or employees, or others aforesaid shall include in the event of an action, court costs, expenses for litigation and reasonable attorney's fees.

Firm

Date

Principal

Title

**CONSTRUCTION SPECIAL PROVISIONS
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
FCD CONTRACT NO. 91-17
FOR
NORTHERN AVENUE BRIDGE AT NEW RIVER
WITH APPROACHES AND UTILITY RELOCATIONS**

PART 100 - GENERAL CONDITIONS

PROPOSED WORK: This Flood Control District of Maricopa County project provides for the construction of a bridge and approaches along Northern Avenue Road alignment across the New River. Work includes grading, draining, surfacing, constructing a 388 foot long and 85 foot wide precast concrete girder bridge, constructing beam guardrail and anchors, concrete barriers, relocating existing utilities, construct new water and sewer lines, construct a new sewage lift station and placing of traffic control devices. The road will be closed to traffic during construction, with access required only for local vehicles.

LOCATION OF WORK: This project is located in Maricopa County between the cities of Glendale and Peoria on Northern Avenue and crosses the New River approximately 850 feet west of 99th Avenue.

A. SPECIFICATIONS: The work described herein and as shown on the plans for the construction of this project shall be done in accordance with the Maricopa Association of Governments Uniform Standard Specifications for Public Works Construction dated 1979 and the current revisions thereto, MAG (Standard Specifications or Uniform Standard Specifications), together with the M.C.H.D. Supplement to the MAG Standard Specifications and the Special Provisions.

Work shall conform to all federal state and local building codes, electrical codes, fire codes, mechanical codes and plumbing codes, and to the Occupational Safety and Health Act (OSHA) Regulations. Nothing in these contract documents shall be interpreted as permission or direction to violate any governing code or ordinance.

Standards listed as "Reference Standards" in the various sections of these contract documents are hereby incorporated into this specification by reference.

Referenced documents shall include all revisions, amendments, supplements or addenda issued on or before the date of advertising for bids.

PRECEDENCE OF CONTRACT DOCUMENT: The Maricopa County Highway Department Supplements to MAG Standard Specifications and Details will govern over the MAG Standard Specifications and Details. In case of a discrepancy or conflict, Project Plans will govern over both the MCHD and MAG Details. These Construction Special Provisions will govern over the MCHD Supplements and MAG Standard Specifications and Details and the Project Plans.

WORK STANDARDS: The Contractor shall comply with Sections 103 and 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 327-330) as supplemented by Department of Labor Regulations (29 CFR Part 5).

CONTRACT DURATION: The Contractor shall commence work within 14 (fourteen) calendar days after the date of the Notice to Proceed and complete all work within 200 (two hundred) days after the date of the Notice to Proceed.

In the event the Contractor elects to schedule overtime, second shifts, weekend work and generally all work as specified in Section 108.5 of these specifications in order to complete the project, the Contractor is reminded that the costs associated with additional testing, additional inspection, survey, engineering or other work by the construction administrator and/or the Flood Control District of Maricopa County (FCDMC), shall be deducted from the monies due to the Contractor by the FCDMC. The cost associated with the above items shall be incidental to the unit price of items in the bid schedule.

B. NEGOTIATION CLAUSE: Recovery of damages related to expenses incurred by the Contractor for a delay for which the FCDMC is responsible, which is unreasonable under the circumstances and which was not within the contemplation of the parties to the contract, shall be negotiated between the Contractor and the FCDMC. This provision shall not be construed to void any provision in the contract which requires notice of delays, provides for arbitration or other procedure for settlement or provides for liquidated damages.

WATER, LIGHT, POWER, HEAT, TELEPHONE: All water for construction purposes, drinking water, lighting, temporary electric power, heat and telephone service shall be arranged for and provided for the requirements of the work by the Contractor at his expense.

PROGRESS SCHEDULE: The Contractor shall submit his proposed work progress schedule to the Engineer for approval before starting the work. Weekly updates to the schedule shall be submitted to the inspector at the weekly coordination meeting.

MATERIAL SOURCES: Concrete, Aggregate Base, Steel Products, Pipe and Fabric Reinforced Elastomeric Bearing Pads and other manufactured items, shall be obtained from commercial sources. The Contractor shall pay all royalties, or any other charges or expenses, incurred in connection with the securing and hauling of the material.

The Contractor will be required to furnish the Engineer with a list of his proposed commercial sources prior to use, and shall present certificates stating that the material produced from commercial sources is in accordance with the MAG Standard Specifications and these Special Provisions.

SECTION 101.2 - DEFINITIONS AND TERMS: Change the definition of Budget Project to read as follows: A project financed by funds set aside in the annual budget or otherwise approved by the Board of Directors of the FCDMC.

Change the definition of Engineer to read as follows: The Chief Engineer and General Manager of the FCDMC acting directly or through his authorized representative.

Change the definition of Owner to read as follows: The Flood Control District of Maricopa County, acting through its legally constituted officials, officers or employees.

SECTION 102 - ADDENDA AND SUBMISSION OF BIDDING SCHEDULE: It shall be the responsibility of prospective bidders to determine, prior to submission of a bid, if any addenda have been issued. This may be accomplished by calling (602) 262-1501. Any addendum issued, if not already bound into the Special Provisions, must be included as a part of the Special Provisions, and any quantities on the Bidding Schedule requiring change shall be adjusted by pen and ink to the new figure.

Bids that do not include appropriate addenda and show appropriate changes to the Bidding Schedule shall be invalid.

SECTION 102.3 - INTERPRETATIONS OF QUANTITIES IN PROPOSAL: There are five contingent bid items included in the bid proposal. The contingent bid items are described as follows:

ITEM 351-1 - REMOVAL OF EXISTING LANDFILL - CONSTRUCTION DEBRIS and
ITEM 351-2 - REMOVAL OF EXISTING LANDFILL - ORGANIC MATERIAL:
Description of these items are detailed in SECTIONS 102.4, 351 and 352 of these Special Provisions.

ITEM 505-6 - U.S. WEST HANGERS AND CONDUITS: This item includes full compensation for furnishing all labor, tools and equipment necessary to install hanger and anchor assemblies and place conduits within the limits of the new bridge for U.S. West

Communications. Note that U.S. West Communications will supply all materials for the work. This work will be included in the construction contract only upon approval by FCDMC of the lump sum contract price.

ITEM 625-9 - CONSTRUCT LIFT STATION - TOTAL - SAME SIZE AND TYPE AS EXISTING: The City of Peoria reserves the right to determine if a sanitary sewer lift station that is identical to the existing one on site, shall be constructed instead of the one shown in the project plans. For this reason, and to assist the Contractor in preparing a lump sum bid for this item, the following materials are included in this bid package. **FOR INFORMATION ONLY:**

PLAN SHEETS

A-1: Northern Avenue and New River - Sewer and Pump Back Plan - Sheet 4 of 5

A-2: Northern Avenue and New River - Sewer and Pump Back Plan - Sheet 5 of 5

SPECIAL PROVISIONS

Appendix A: Pump Station Engineering Order Custom Series

ITEM 610-8 - CAST IRON FITTINGS IN EXCESS OF QUANTITY SHOWN ON PLANS:
This Item is in accordance with MAG Section 610.18 (A) (2).

SECTION 102.4 - EXAMINATION OF SITE: The contractor shall visit the site and be familiar with the existing conditions and the proposed construction items of special note.

1. An existing high pressure gas line belonging to El Paso Natural Gas has been relocated, as shown in the plans, prior to this contract. It is the Contractor's responsibility to confirm location of this line and protect it through the duration of construction.
2. An abandoned landfill is located north and west of Northern Avenue and the New River respectively. Any refuse material uncovered during any excavation operation that is unsuitable for backfill material as determined by the Engineer, shall be disposed of off site at an appropriate disposal facility. Additional payment for disposal of unsuitable material excavated from this landfill will be made in accordance with Sections 351 and 352 of these Special Provisions.

SECTION 102.5 - PREPARATION OF PROPOSAL: The bidder's Arizona State Contractor's license number and classifications shall be shown on the proposal. The Contractor shall be appropriately licensed as a Contractor in the State of Arizona while performing the work for this project.

SECTION 103.6 - CONTRACTOR'S INSURANCE: Concurrently with the execution of the Contract, the Contractor shall furnish a Certificate of Insurance using the included Certificate or one of equal wording that names the additional insures as set out in the included Certificate and in 103.6.1(D) below. The certificate shall also name the additional insurers as Certificate Holders. The types of insurance and the limits of liability shall be as indicated on the included form.

SECTION 103.6.1(D) - Additional Insured: Add BRW, Inc., NBS/Lowry, Flood Control District of Maricopa County, Maricopa County Highway Department, City of Peoria, City of Glendale, and other entities as mentioned on the included Certificate of Insurance as additional insured.

SECTION 103.6.2 - Indemnification of the Contracting Agency Against Liability: The Contractor shall also indemnify and hold harmless the Owner, the Consultant, the Owner's Representative, any jurisdiction or agency issuing permits for any work involved in the project, and their consultants, and each of their directors, officers, employees, and agents from and against all losses, expenses, damages (including damages to work itself), attorney's fees, and other costs, including costs of defense which any of them may incur with respect to the failure, neglect, or refusal of Contractor to faithfully perform the work and all of the Contractor's obligations under the contract. Such costs, expenses, and damages shall include all costs, including attorney's fees, insured by the indemnified parties in any lawsuit to which they are a party.

SECTION 104 - SCOPE OF WORK:

SECTION 104.1.1 - General: The cost of all work required under this contract, as shown on the plans, for which there are no specific items shown on the Bidding Schedule, shall be included in the prices bid for related items.

Drawings do not show every offset or structural difficulty that may be encountered. Unless dimensions are given, locations are approximate. Do not scale drawings.

If directed by Owner's Representative, make reasonable modifications in layout as needed to prevent conflict with work by others or by other trades and to avoid structural difficulties or obstructions encountered in field.

SECTION 104.2 - BORING LOGS AND SOILS REPORT: The soil boring logs are included in the project for the Contractor's information only. No guarantee is made of the accuracy of the boring logs in the soils report. The Contractor shall make his own determination as to soil and subsurface conditions and shall complete his work in whatever material and under whatever condition he may encounter or create, without extra cost (except as modified by the MAG Standard Specifications). Existing moisture

conditions shall be no basis for claim for additional monies or time extensions. The Contractor shall manipulate the existing soil as required to achieve stable soil conditions and the required densities.

SECTION 104.2.2 – Due to Physical Conditions: Paragraph *B). In the first sentence delete the following words:

"backfill or bedding"

SECTION 105.2 – CONTROL OF WORK: PLANS AND SHOP DRAWINGS: The MAG Standard Specifications are amended to include the following:

The number of copies of plans/shop drawings required for review and/or approval shall be as follows:

Initial submittal: Three (3) copies. One (1) copy will be returned to the Contractor.
Final submittal: Seven (7) copies. Two (2) copies will be returned to the Contractor.

The Contractor shall furnish the Engineer with these copies of shop drawings, pipe layout diagrams, manufacturer's catalog data, samples and detailed information, in sufficient detail to show completed compliance with all specified requirements, covering, but not limited to, the following items:

- A. Fabricated Pipe and Design Data
- B. Pre-cast Manhole Risers
- C. Reinforcing Steel
- D. Castings
- E. Field Closures
- F. Concrete Mix Designs
- G. Precast Girders
- H. Metal Railing
- I. False Work Plans and Design Calculations, as required
- J. Structural Design Calculations and Details for All Concrete Structures, as required
- K. Utility Protection Plans
- L. Detailed Sequence of Construction for Structures
- M. Mechanical and Electrical Equipment
- N. Detailed Sequence of Construction for Sewer Lift Station and Force Main
- O. Plans for shoring, bracing, sloping and/or terracing for excavations and trenches 5 feet or greater in depth

An additional submittal to the City of Peoria Engineering Department is required for the meter and for all items of work within the boundaries of the new sanitary sewer lift station.

Submittals shall clearly note any exception to or departure from the contract documents along with justification for each exception or departure and will require review by the Engineer for approval or rejection. Otherwise, review or approval of submittals shall not constitute approval of exceptions or departures.

Coordinate location of items shown in submittals so that location conflicts are eliminated.

Each submittal shall include the following, or it will be returned without review and stamped "REJECTED":

- Project name, Owner's project number, and description
- Submittal number and revision number
- Submittal date and revision dates
- Reference to the applicable section of the specifications or MAG Uniform Standard Specifications and page number
- Name of Contractor or Subcontractor
- Contractor's stamp, initialed or signed, dated, and certifying to review of submittal, certification of field measurements and compliance with Contract
- Space for the Owner's Representative's stamp
- Identification of exceptions or departures from the contract documents

In addition, shop drawings, catalog data, installation or application instructions and operation and maintenance instructions shall include the following or they will be returned without review and stamped "REJECTED":

- Identification of equipment, product or material
- Name of supplier and manufacturer

Stock or standard drawings will not be accepted for review unless full identification and supplementary information is shown thereon in ink or typewritten form.

SUBMITTALS ON OWNER'S REQUEST

- A. **Certification of compliance** with any listed reference standards shall be submitted by manufacturers on Owner's request. When requested, the certification shall be filed with the Owner's Representative before delivery of material or equipment to the jobsite. Failure of the Owner to request certification of compliance shall not serve as a waiver of Contractor's duty to comply with reference standards.

- B. Written transcripts of results of acceptance tests performed at point of manufacture of products furnished shall be submitted by manufacturers on Owner's request.
- C. Written approval of installation of any products where submittals are required shall be submitted by authorized factory representative on Owner's request. This approval shall state that the factory authorized representative has inspected the installation and operation of the furnished equipment and found it to be in full compliance with the specified design requirements.
- D. When it is doubtful that a manufacturer's product conforms to the specifications, the Owner reserves the right to require submittal of more complete information before approval.
- E. Names and addresses of nearest local service representatives that maintain technical service representatives and a complete inventory of spare parts and accessories.

The following definitions apply:

1. **Shop Drawings:** Detailed plans, elevations, diagrams and nameplate data as required to adequately control work where details are not specifically included in plans furnished by Owner. Shop drawings shall clearly show dimensions, clearances, floor space requirements, tolerances, conduit, anchor bolt sizes and embedments, finishes, performance characteristics, and weight and type of materials or equipment. Shop drawings shall indicate the location at which the equipment or materials are to be installed, how equipment will be mounted, how it relates to adjacent structures or materials, and how connection will be made between work under this portion of the contract and work under other portions of the contract. Shop drawings shall show parts lists and details of all appurtenances to be furnished with the specified items, along with references to appropriate ASTM, Federal Specifications and other reference standards.
2. **Catalog Data:** Manufacturer's printed literature describing a product or service. Clearly indicate applicable items when several products are covered on one page. Using black ink, indicate on submitted catalog data the specification section or plan reference being satisfied.
3. **Installation or Application Instructions:** Manufacturer's instructions including warranty requirements, clearances required and proper field procedures to deliver, handle, install and prepare product for use.

4. **Operation and Maintenance Instructions:** Manufacturer's instructions for correct operation and maintenance procedures for product, along with any data which must accompany the manual as directed by current regulations of any government agency. Instructions shall include operating instructions for each piece of equipment that describes equipment function, operating characteristics, limiting conditions, operating instructions, startup procedures, normal and emergency conditions, regulation and control, and shutdown. Preventative maintenance instructions shall be included, and shall contain listing of warranty requirements, explanations and illustrations of preventative maintenance tasks, lubrication charts, lists of acceptable lubricants, trouble shooting instructions, and lists of required maintenance tools and equipment. Instructions shall include listing of recommended spare parts, their costs, and the name of one manufacturer who can supply these parts and ordering information. Instructions shall be indexed for easy reference and contain information for the installed equipment only.
5. **Engineering Calculations:** Calculations signed and sealed by a registered engineer licensed in the state of Arizona. Calculations shall be clearly legible, and shall be sufficient to demonstrate compliance with state and local codes, applicable standards, and the contract requirements.

One copy of submitted drawings will be returned to the Contractor marked "Furnish as Submitted" or "Furnish as Noted". If the submittal is marked "Revise and Resubmit" or "Rejected", a new submittal shall be made in the same manner as the original submittal.

Review: When submitted for the Engineer's review, shop drawings, line layouts, etc. shall bear the Contractor's certification that he has reviewed, checked, and approved the shop drawings, etc. and that they are in conformance with the requirements of the Contract Documents.

The Engineer will not review any submittals which do not bear the Contractor's certification.

The Contractor, at his own expense, shall make such changes in the shop drawings as may be necessary to conform to the plans and specifications. Prior to return of such drawings, marked "Furnish as Submitted" or "Furnish as Noted", any work which the Contractor may do on the fabrications covered by the same shall be at his own risk, as the FCDMC will not be responsible for any expense or delays incurred by the Contractor for changes required to make the same conform to the drawings as finally reviewed.

After the review has been completed, the above drawings, lists, samples, design calculations, and other data shall become part of the Contract documents, and the fabrications furnished shall conform to the submittal.

Review of material and layout drawings consists of review for general conformity to plans and specifications, and in no way relieves the Contractor or the supplier from responsibility for the correctness of the drawings.

Construction of this project shall not begin until the shop drawings and line layouts have been reviewed and approved.

Corrections required on the shop drawings will not constitute a valid reason for delay in the project schedule.

OPERATION AND MAINTENANCE MANUAL

Prepare and submit six copies of an Operation and Maintenance Manual containing all Shop Drawings, Catalog Data, Installation or Application Instructions, and Operation and Maintenance Instructions for all mechanical, electrical, and civil items constructed, furnished, or installed as part of the City of Peoria's sanitary sewer lift station. Copies shall be delivered in D-ring binders tabbed and indexed by specification sections. Binders shall be labeled with the project name.

Before requesting payment for the 80 percent completion point of the work associated with the City of Peoria's Sanitary Lift Station and Force Main, submit two of the six required copies of the Operation and Maintenance Manual containing copies of all material available at that time.

Within 30 days after approval by the Owner of the two-copy submittal, submit the remaining four copies of the Operation and Maintenance Manual.

SECTION 105.6 - COOPERATION WITH UTILITIES: An attempt has been made to determine the locations of all underground utilities and drainage pipes, culverts, and structures. The Contractor shall comply with the requirements of ARS 40-360-21 through 40-360-29 in notification to the interested utility owners prior to the start of construction and shall ascertain the approximate locations of the various underground utilities shown on the plans and as may be brought to his attention. The exact locations of these underground utilities shall be determined by excavations made by the Contractor prior to any trenching operations. It shall be the Contractor's responsibility to cooperate with the pertinent utility companies, so that any obstructing utility installation may be adjusted. Should the Contractor's operations result in damage to any utility, the location of which has been brought to his attention, he shall assume full responsibility for such damage.

Any facility or work which may be performed for the accommodation of any utility shall be paid for by the utility owner. The Contractor shall make all arrangements that may be necessary for the construction, and any financial agreement shall be solely between the Contractor and the utility owner.

Existing overhead power, lighting, and communications lines shall remain in place during Contractor's commencement of work. The contractor shall notify the appropriate entities for relocation of overhead utilities.

The following phone numbers, as indicated, should place the Contractor in contact with proper personnel:

- Arizona Public Service, ^{John Herrerd} ~~Ernie Cota~~ 371-~~6964~~ ⁶⁹⁴²
- Maricopa County Highway Department, Dale Wachs 262-3631
- Flood Control District of Maricopa County, R.W. Shobe 262-1501
- El Paso Natural Gas, William E. Ward 438-1675
- City of Peoria, Dan Nissen 412-7210
- City of Glendale, Glenn A. Compton 435-4152
- U.S. West Communications, ~~Dennis Welling~~ ~~233-8185~~ ^{Tom Childree} _{934 1199 pager 226-7498}

SECTION 105.8 - CONSTRUCTION STAKES, LINES AND GRADES: The project control line and bench mark elevations are shown on the drawings and will be established by the Engineer. The Contractor shall establish offset stakes and temporary bench marks for referencing the designated construction lines and grades. The Contractor shall establish all rough grade, fine grade, and structural reference lines and shall be responsible for their conformance to the plans and specifications.

Survey work shall be performed by a qualified and experienced surveyor under the supervision of a licensed land surveyor or licensed Civil Engineer and/or their bona fide employees working under their direct supervision.

The Contractor shall furnish field books to be used for recording survey data and field notes. These books shall be available for inspection by the Engineer at any time and shall become the property of the Engineer upon completion of the work.

The Engineer reserves the right to make inspections and random checks of any portion of the staking and layout work. If, in the Engineer's opinion, the work is not being performed in a manner that will assure proper control and accuracy of the work, he will order any or all of the staking and layout work redone at no additional cost.

No separate payment will be made for construction surveying, and the cost thereof shall be included in the price bid for related items of work.

SECTION 105.10 - INSPECTION OF WORK: Work will be subject to Flood Control District of Maricopa County, Maricopa County Highway Department, City of Peoria, and City of Glendale inspection and acceptance prior to final acceptance by the Engineer. County and municipal inspectors have the right to visit the site at any time, without notice. All requests or comments from the County and Cities will be made to the Engineer and the Contractor will then be notified by the Engineer.

The Owner reserves the right to inspect any manufacturing operation to ensure compliance with these contract documents. Waiver by the Owner of this right to inspect shall in no way relieve the Contractor of his duties of compliance.

The Owner's Representative will inspect products after delivery and throughout the construction process. Products shall be subject to rejection at any time on account of failure to meet the specification requirements even though samples may have been accepted as satisfactory at the place of manufacture.

The Contractor shall notify the Owner's Representative of time and place of shop tests 5 working days before they begin.

The Contractor shall request inspection by the Owner's Representative as needed to verify proper installation of buried work before backfilling.

The Contractor shall request inspection by the Owner's Representative as needed to verify that no surfaces to receive a material or product have defects or errors which could result in poor or potentially defective application or cause latent defects in workmanship.

When in the Owner's opinion, it becomes necessary to more fully describe the work to be done, or to show any required changes, "supplementary drawings" with specifications pertaining thereto will be prepared by the Owner and delivered to the Contractor. Supplementary drawings shall be added to the contract documents. Where such supplementary drawings require either less or more work than was bid, credit to the Owner or compensation to the Contractor shall be subject to the terms of the Contract.

SECTION 105.12 - MAINTENANCE DURING CONSTRUCTION: The Contractor shall maintain the work during construction and until the project is accepted. This maintenance shall constitute continuous and effective work prosecuted day by day, with adequate equipment and forces to the end so that the roadway and structures are kept in satisfactory conditions at all times.

Where connections or disruptions have been made to existing work, repair, reactivate, refill and recharge all components, restoring them to preconstruction conditions. Follow procedures of authorities having ownership or jurisdiction for all work involving existing utilities and services.

SECTION 106 - CONTROL OF MATERIALS:

SECTION 106.1 - SOURCE OF MATERIALS AND QUALITY: The Contractor shall guarantee the construction work for one year against faulty materials, faulty workmanship and failure to meet the requirements of the plans and specifications. Said guarantee by the Contractor shall not apply to damage caused by earthquakes or other acts of God, land subsidence, or faulty operations or any abuse of the structures by others.

SECTION 106.1.1 - CONTRACTOR'S QUALITY CONTROL: Where detail drawings are not included in the contract documents, supplementary drawings or Contractor's shop drawings and submittals, arrange work so as to be readily accessible and easy to operate and maintain.

Combinations of manufactured equipment shall be fully compatible and work safely and successfully as a unit. Furnish necessary mountings, couplings and appurtenances with each unit.

If equipment or materials are furnished which differ from that shown, and which require changes to enclosures, mounting and support structures, power and control circuitry or any other work to accommodate the furnished product, provide the changes required at no additional cost to the Owner and of the same quality as shown.

If relocation or adjustment of existing facilities is noted in the contract documents, relocate or adjust items appurtenant to the noted piece of work as needed. If appurtenant items are lost or damaged during construction, replace them with new items of equal or better quality.

SECTION 106.3 - PLANT INSPECTIONS:

Off-Site Inspection: The Contractor shall be responsible for all expenses, including but not limited to travel and per diem expenses, for required inspections by the Engineer and/or the cost of inspection and testing by an independent testing laboratory as required by and at the discretion of the Engineer for any inspection of precast concrete girders manufactured outside of a 50 (fifty) mile radius from the center of Phoenix, Arizona.

Costs associated with the above work will be deducted from the monies due to the Contractor as noted in Section 108.5.

Within a 50 mile radius from the center of Phoenix, Arizona, costs for inspection of precast concrete girders shall be included in the regular construction contract of the Inspector.

SECTION 106.4 - TRADE NAMES AND SUBSTITUTIONS: Lists of acceptable manufacturers for contract items are not intended to be exclusive unless so stated.

Products accepted as "equals" shall, in the Owner's opinion, meet the following requirements:

1. Products shall be standard products of a reputable manufacturer having regularly been engaged for 5 years in the manufacture of items furnished.
2. Products shall have a reputation for assuring long-lasting trouble-free service.
3. Authorized, factory trained and competent service personnel, and stocked service parts shall be available within a 150-mile radius of the installation.
4. The manufacturer shall be capable of furnishing certification of compliance with all listed reference standards.

Similar items on the project shall be products of the same manufacturer.

SECTION 106.5 - CONTRACTOR'S MARSHALING YARDS: Contractor shall obtain approval of the Engineer when using vacant property to park and service equipment and store material for use.

A. The Contractor shall notify adjacent property owners/residents of this proposed use.

- B. Any use of vacant property adjacent to or near the project for parking or servicing equipment and/or storing material will require the contractor to obtain written approval from the property owner. This approval shall contain any requirements which are a condition of this approval.
- C. A signed letter with the property owner's approval shall be submitted along with the Contractor's request to the Engineer for approval for use of the marshaling yard in connection with the project. An appropriate distance from adjacent property will be set by the Engineer on a case-by-case basis based on the size and type of equipment to be used on the project.
- D. The yard shall be fenced and adequately dust-proofed in a manner as to preclude tracking of mud onto paved City streets.
- E. Work in yard shall be scheduled so as to comply with City Noise Ordinance.
- F. Equipment, materials, etc., shall be located so as to minimize impact on adjacent properties. A sound barrier may be required if deemed necessary by the Engineer.
- G. The Contractor shall clean up property promptly upon completion of the use.
- H. Contractor's request for approval shall specify in detail how he or she proposes to comply with D through G above.

In the event the Contractor uses FCDMC property for these uses, he shall obtain a license from the FCDMC.

SECTION 106.6 - HANDLING MATERIALS: Delivery, storage and handling are the Contractor's responsibility.

The Contractor shall maintain records for Owner's review of deliveries to show Contractor's order number, purchase order number and equipment number. Labeling or shipping tag shall be included in records.

Deliver products to the jobsite in manufacturer's original, unopened, labeled packaging. Adequately protect products against moisture, dust, debris, tampering, vandalism, ultraviolet radiation, or damage from improper handling, storage or exposure.

Handle materials with care and using proper equipment. Do not drop, drag, bump or handle products in a manner that causes bruises, cracks, scratches or other damage. Improper handling shall be cause to reject mishandled products.

All items furnished shall be capable of fulfilling their intended purpose in the environment in which they are installed. Allowances shall be made for local temperature extremes and climactic conditions where necessary to ensure proper functioning of any furnished item.

SECTION 106.7 - UNACCEPTABLE MATERIALS: Notify Owner's Representative and regulating authorities 3 days before all field tests.

Perform field tests in the presence of the Owner's Representative who will record the results.

Repair, correct or replace all work failing tests or inspection. Repeat tests until results satisfy these specifications. Repair any damages resulting from tests.

Remove items failing tests or inspection from the jobsite within 24 hours if repairs cannot be made.

SECTION 106.8 - FURNISHED MATERIALS: Materials and equipment shall be new and of current manufacture, free from all defects and imperfection that might affect the serviceability of the product for its intended purpose.

Corresponding parts of identical materials or equipment shall be interchangeable.

Design and fabricate materials and equipment to withstand all stresses and loads which may occur during testing, installation, start-up and normal operation.

Furnish guides, bearing plates, flanges, anchor and attachment bolts, saddles, supports, pads and skids necessary to securely mount mechanical and electrical products and equipment.

Install products according to manufacturer's installation and warranty requirements. Install products to tolerances recommended by manufacturer.

Refer variances between manufacturer's installation instructions and contract documents to Owner's Representative.

Install equipment true and level using precision gauges and levels.

When completed, all work shall have been durably and substantially built and shall present a neat workmanlike appearance.

Repair damage to work that is not cause for rejection.

Welds, unless otherwise shown, shall be continuous, watertight, and shall conform to the Structural Welding Code of the American Welding Society. Welds shall be free of sharp points or edges.

Pipework, valves, fittings, tanks and appurtenances shall have no leaks at design pressures.

Exposed surfaces shall be finished in appearance. Grind smooth all exposed welds. Round or chamfer corners of exposed structural shapes for personal protection.

Unless otherwise shown, prime and paint exposed surfaces of all ferrous equipment, piping, conduit, and materials except for stainless steel or galvanized or sherardized surfaces. After installation, clean painted surfaces and touch up bare or marred spots with finish to match factory finish.

Painted or coated surfaces shall be free from blisters, holidays and holes. Painting or coating shall adhere to surface at all temperatures encountered in field, shall be smooth, not brittle when cold, and shall not become sticky when exposed to the sun.

Provide two quarts of paint compatible with finish coats for touch-up.

Clean and protect machined surfaces and shafting from corrosion using proper type and amount of coating to assure protection to 1 year after final acceptance.

Oil lubricated gearing, bearings and other lubricated components shall be shipped with oil soluble protective coating as recommended by manufacturer. Coating shall provide protection for 1 year after final acceptance.

SECTION 107.2 - PERMITS: The Contractor shall be responsible for obtaining all permits and licenses, pay all charges, fees, and taxes, and give all notices necessary and incidental to the due and lawful execution of the work. Permits for earth moving may be obtained from the Bureau of Air Pollution Control, Maricopa County Department of Health Services, 1845 East Roosevelt, telephone number 258-6381.

SECTION 108.4 - CONTRACTOR'S CONSTRUCTION SCHEDULE: Construction of utilities relocations shall be coordinated with bridge construction to avoid disruption of service and conflict with the bridge. The Contractor shall prepare and submit a construction sequence plan for approval by the Engineer.

Construction of the bridge will be sequenced as illustrated on the plans.

SECTION 108.5 - LIMITATION OF OPERATIONS: Should the Contractor or subcontractor elect to perform any work before or after regular working hours, on weekends, or legal holidays, any charges incurred by the FCDMC for inspection of the work, surveys, or tests of materials will be deducted from monies due or to become due to the Contractor, including cost included in SECTION 106.3.

SECTION 108.9 - FAILURE TO COMPLETE ON TIME: The actual cost per calendar day incurred by the FCDMC for Consultant Administrative and Inspection Services on this project will be added to the daily charges as indicated by TABLE 108, LIQUIDATED DAMAGES, as shown in the MAG Standard Specifications (not in the Phoenix Supplement), and will be deducted from monies due or to become due to the Contractor for each and every calendar day that work shall remain incomplete after the time specified for the completion of the work in the proposal, or as adjusted by the Engineer. Nothing contained in this provision shall prohibit the FCDMC from deducting from monies due or to become due to the Contractor for any other costs incurred by the FCDMC directly attributable to the delay in completing this contract.

PART 200 - EARTHWORK

SECTION 201 - CLEARING AND GRUBBING: The work under this item consists of removal and disposal of all trees, stumps, and structures within the limits of the roadways and easements, as designated on the plans. Materials shall be disposed of off-site in a landfill authorized by the Engineer.

Prior to starting this work the contractor must verify the location of existing utilities which may be damaged during this work. The contractor shall adjust and/or otherwise protect these utilities from damage as shown on the plans, as directed by the engineer or as otherwise determined by the utility owner. This work shall be considered incidental to the contract.

SECTION 206 - STRUCTURES EXCAVATION AND BACKFILL: Structure excavation and backfill shall conform to Section 206 of the Uniform Standard Specifications.

The Contractor shall provide sheet piling or other means of support for excavation to protect underground utilities and private property during construction.

Structure backfill behind the abutments and wing walls shall be compacted in accordance with Table 601-2, Type III of the Uniform Standard Specifications. Hand operated compaction equipment will be used adjacent to structures.

All backfill behind the bridge abutments and wing walls shall consist of free-draining granular material with not more than 5 percent passing a #200 sieve and a PI less than 7. Backfill shall be placed in horizontal lifts consistent with the maximum material size and type of compaction equipment in use and compacted to a minimum of 95 percent of the maximum density at the optimum moisture content plus or minus 3 percent as determined in accordance with ASTM D-2922 and D-3017. Compaction equipment or methods which may cause excessive displacement or may damage structures, shall not be used.

Backfill against front face of abutment walls and wing walls may consist of selected native soils, as authorized by the Engineer.

Structure excavation shall be paid for at the lump sum contract price bid for **ITEM 206-1 - STRUCTURE EXCAVATION**. Structure backfill shall be paid for at the lump sum contract price for **ITEM 206-2 - STRUCTURE BACKFILL**.

SECTION 211 - FILL CONSTRUCTION: The work under this section consists of constructing embankments for approach roadways. The material required for the construction of the fill shall be suitable material obtained from the New River Channel, the structure excavation or backfill material shall be as defined in SECTION 206. All material

shall be free of all debris and vegetation. Excavation from the New River Channel for roadway embankment material, shall not extend below the planned invert elevation of the river.

Prior to the placement of fill material, all loose soil, vegetation, any roadside debris, concrete pavement, and existing structures within the proposed fill areas shall be completely removed unless noted on plans to remain in place. Depressions and ditches shall be cleaned of all loose or wet soils and widened to accommodate compaction equipment. Sloping surfaces shall be benched to provide a level surface for fill placement.

All exposed subgrade surfaces shall be scarified, brought to the proper moisture content and compacted for a maximum depth of eight (8) inches.

The fill shall be compacted in horizontal lifts to sub-base level. The depth of the compacted lifts shall not exceed eight (8) inches.

Compaction shall be to a minimum of 95 percent of the maximum density as determined in accordance with ASTM D-2922 and D-3017 within a moisture content range of plus or minus 3 percent of optimum.

Payment will be made for fill construction at the unit price bid per cubic yard for: **ITEM 211-1 - FILL CONSTRUCTION.**

SECTION 221 - SOIL-CEMENT BANK PROTECTION:

SECTION 221.1 - DESCRIPTION: The work shall consist of furnishing all materials and constructing soil-cement bank protection required by the Plans, including toe trench excavation, backfill, and dewatering for the construction of all soil-cement falling below the proposed channel bed profile.

SECTION 221.2 - MATERIALS:

SECTION 221.2.1 - Portland Cement: Portland Cement shall comply with the latest Specifications as approved by the Engineer, for Portland Cement (ASTM C150, Type II [low alkali]), and shall conform to the requirements of Subsection 725.2 of the Standard Specifications.

SECTION 221.2.2 - Water: Water shall be clear and free from injurious amount of oil, acid, alkali, organic matter, or other deleterious substances. Water shall contain not more than 1,000 parts per million of chlorides as CL or of sulfates as SO^4 . Water shall be sampled and tested in accordance with the requirements of AASHTO T26.

SECTION 221.2.3 - Aggregate: Soil aggregate for use in soil-cement may be produced by the Contractor by processing, screening, crushing and/or blending soils obtained from the required excavations, and/or may be furnished by the Contractor from Contractor - furnished borrow. Soil aggregate for soil-cement shall contain no deleterious material. Before mixing as soil-cement the soil shall be stockpiled and sampled, and shall be approved by the Engineer, in accordance with the requirements of Sections 106 and 221.10 of these Special Provisions. The distribution and gradation of materials in the soil-cement lining shall not result in lenses, pockets, streaks, or layers of material differing substantially in texture or gradation from surrounding material.

The maximum allowable plasticity index for soil-cement aggregate shall be five (5). Soil aggregate for soil-cement shall conform to the following gradation requirements when tested in accordance with ASTM C-136 and C-117:

<u>Sieve</u>	<u>Percent Passing, By Dry Weight</u>
1-1/2"	98% to 100%
No. 4	60% to 80%
No. 200	5% to 15%

Soil aggregate for soil-cement shall not contain clay/silt lumps larger than one-half (1/2) in.

Blending of soil aggregate by combining soil from separate soil stockpiles shall be performed by utilization of separate storage feed bins at the plant, to the satisfaction of the Engineer.

SECTION 221.2.4 - Fly Ash: Fly ash shall conform to the requirements of ASTM C-618 for Class F except that the pozzolanic activity index with lime shall be reduced to a minimum of 650 psi at seven days. The Blaine fineness shall have an average value of at least 2,800 with a minimum value of 2,600 for any one sample. The average value shall be determined on the last five consecutive samples. The loss on ignition shall not exceed 3.0 percent.

SECTION 221.3 - PROPORTIONING: The Contractor shall use the soil aggregate content, fly ash content, cement content, and moisture content determined by the Engineer by tests performed by the Engineer in accordance with the procedure specified in Subsection 221.11 herein.

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The Contractor shall allow a minimum of fourteen (14) days from the Engineer's approval of each soil aggregate stockpile for the cement and fly ash content results. During the course of the work, the Engineer shall adjust the job mix proportions whenever necessary

X | in order to achieve the minimum design strength shown in Subsection 221.8. Changes in the cement and fly ash contents shall be made promptly by the Contractor at the direction of the Engineer.

SECTION 221.4 - EQUIPMENT: The soil-cement bank protection may be constructed with any combination of machines and/or equipment, except as noted herein, that will produce a completed soil-cement meeting the requirements for soil pulverization, cement and fly ash and water application, mixing, transporting, placing, compacting, finishing, and curing as provided in these Specifications.

SECTION 221.5 - CONSTRUCTION REQUIREMENTS:

SECTION 221.5.1 - Required Contractor Submittals: Prior to the start of construction, the Contractor shall submit, in writing, for approval, the following items:

1. The approximate length of soil-cement bank protection to be placed prior to starting compaction operations.
2. The type of compaction equipment to be used.
3. The number and type of watering equipment to be used.
4. The method to be used to keep surfaces continually moist until subsequent layers of soil-cement are placed.
5. The method to be used to cure permanently exposed soil-cement surfaces.
6. The proposed source(s) of soil to be used in soil-cement.
7. The proposed size and number of soil aggregate stockpiles.
8. The proposed sources of cement and fly ash.

Such approval shall not relieve the Contractor of the responsibility for achieving the desired result of constructing sound soil-cement, free from defects, according to the specifications and plans, or as directed by the Engineer. Changes in the source(s) of cement or fly ash will not be permitted without the prior approval of the Engineer.

SECTION 221.5.2 - Preparation: Before soil-cement processing begins, the area on which soil-cement will be placed shall be graded and shaped to lines and grades as shown on the Plans or as directed by the Engineer.

The top ten (10) inches of subgrade shall be compacted to a minimum of 95 percent of the maximum density. Optimum moisture and maximum density shall be determined in accordance with the ASTM D-698 or AASHTO T-99. Field density tests shall be performed in accordance with ASTM D-1556 "Sand Cone Method" or AASHTO T-238 "Nuclear Method". Moisture contents shall be measured and reported to the nearest 0.1%.

Immediately prior to placement of the soil-cement mixture, the subgrade shall be moistened. Soft or yielding subgrade shall be corrected and made stable before construction proceeds.

Excavation and backfill of toes, and any dewatering necessary to construct soil-cement bank protection below the channel bed profile elevations shown on the plans shall be considered incidental to the construction of the soil-cement and included in the cost of **ITEM 221-1 SOIL CEMENT** (bank protection).

SECTION 221.5.3 - Mixing: Soil-cement shall be mixed in an approved central-type plant having a stationary twin shaft pugmill mixer of the continuous-mixing type or an approved batch-type pugmill. The mixing plant shall be designed, coordinated and operated to produce a soil-cement mixture of the proportions specified within the required tolerances. The plant shall be equipped with positive means for controlling and maintaining a constant time of mixing. Twin shaft pugmills shall also be equipped with a positive means for maintaining a constant speed of rotation of the shafts. The plant shall be equipped with screening, feeding, and weighing and metering measuring devices that will add the soil, cementitious materials(s) and water into the mixer in the specified quantities. The blades of twin shaft continuous pugmill mixers shall be adjustable for angular position on the shaft and reversible to retard the flow of the mix.

When the quantity of water is controlled by metering, provisions shall be made by the Contractor whereby the quantity of water delivered through the meter can be readily converted to weight. A water storage tank may be required to prevent the adverse effects created by surge drawdown.

The soil aggregate feed rate shall be controlled by a variable speed belt or a remotely operated gate calibrated to accurately deliver any specified quantity of material. The feed rate shall be readily adjustable from the control panel to compensate for changes in the moisture content of the soil or to change soil aggregate proportions when blending is required and separate bins are utilized. The belt scale shall operate automatic controls which will govern the proportions of cementitious material and water as ratios of the total soil aggregate, with provisions for ready changing of the proportions.

When a continuous mixing plant with a fixed soil aggregate feed rate system is used, the belt shall travel at a constant speed. The feed system shall continuously deliver aggregate to the mixer at a constant feed rate, calculated on a dry weight basis, at any locked gate setting. The feed system shall be mechanically interlocked with all other feed devices. The soil aggregate feed monitoring system shall provide and record the rate of and total quantity of soil aggregate fed into the mixture.

The plant shall be equipped with a hydraulically or mechanically operated discharge holding bin having a minimum capacity of twenty (20) tons.

Mixing shall be sufficient to secure a homogeneous, intimate, uniform mixture of the soil, cement, fly ash, and water within the specified tolerances. Soil and cementitious material shall be mixed sufficiently to prevent cementitious balls from forming when water is added.

Mixing shall not proceed when the soil aggregate or the area on which the soil-cement is to be placed is frozen. Soil-cement shall not be mixed or placed when the air temperature is below 45°F (7°C), unless the air temperature is at least 40°F (5°C) and rising.

Free and safe access to the plant must be provided to the Engineer at all times for inspection of the plant's operation, and for sampling the soil-cement mix and its components.

The contractor shall provide and install a safe sampling device on the combined soil aggregate feed and shall provide safe access to a platform to the Engineer for obtaining samples of the combined soil aggregate. The sampling device shall obtain the sample by catching the full stream of soil aggregate from the combined feed. Alternately, the Contractor may provide for the Engineer to take belt samples by stopping the feed and providing the Engineer safe access to a belt-sampling platform. The frequency of the Engineer's sampling of the combined soil aggregate feed shall be at the discretion of the Engineer, but will not be less than once a day or once for each 1,000 cubic yards of soil-cement produced.

The mixing procedure shall provide a uniform, thorough, and consistent blend of cement and fly ash. The blending method and operation shall be approved by the Engineer prior to the commencement of the soil-cement production. In the blending of the cementitious materials, the percent of fly ash content shall not vary by more than ± 0.50 percent of the contents specified by the Engineer.

Weighing devices are required at both the cement and fly ash feeds. At the direction of the Engineer, an additional weighing device may also be required when the cement and fly ash are pre-blended at the site. In the production of soil-cement, the percent of cementitious material shall not vary by more than ± 0.3 percent of the contents specified by the Engineer.

Silos and feeders shall be equipped and operated so as to provide uniform rates of feed and prevent caking. Provisions shall be made to allow for ready, safe sampling of the cementitious material(s).

The weighing and metering systems shall include digital readouts which continuously display, and shall provide an hourly printed record of, the following information:

1. The total discharged quantity per hour of each weighed or metered material.
2. The cumulative total discharged quantity of each weighed or metered material.
3. The moisture content of the combined soil aggregate currently entering the mixer.
4. The cumulative total discharged weight of soil aggregate moisture.

Copies of the hourly printed records of discharged quantities and soil aggregate moisture information shall be given to the Engineer by the Contractor at the end of each day of soil-cement mixing.

Measuring devices shall be calibrated, at the Contractor's expense, and the calibration shall be approved by the Engineer.

Each measuring device shall be calibrated throughout its range to within an accuracy between plus/minus two (2.0) percent and shall be inspected and calibrated as often as the Engineer deems necessary to assure their accuracy.

The Contractor shall notify the Engineer at least 48 hours in advance of the initial plant calibration. Prior to, or at the time of, this notification the Contractor shall provide a Plant Operating Manual to the Engineer.

SECTION 221.5.4 - Required Moisture: At the time of compaction, the moisture content of the soil-cement shall not be more than 2.0 percent below optimum and shall not be above optimum when the mean air temperature during construction hours does not exceed 90°F. The relationship between the soil-cement's moisture content and its optimum moisture content will be determined in accordance with the ASTM D-558 or AASHTO T-134. When the mean air temperature does exceed 90°F, or there is a breeze

or wind which promotes the rapid drying out of the soil-cement mixture, the moisture content of said mix shall be increased as needed at the direction of the Engineer, but shall be less than that quantity that will cause the soil-cement to become unstable during compaction and finishing operations.

SECTION 221.5.5 - Handling: The soil-cement mixture shall be transported from the mixing area to the embankment in clean equipment provided with suitable protective devices in unfavorable weather. The total elapsed time between the addition of water to the mixture and the start of compaction shall be the minimum possible. In no case shall the total elapsed time exceed thirty (30) minutes. (This time may be reduced by the Engineer when the air temperature exceeds 90°F or when there is a breeze or wind which promotes rapid drying of the soil-cement mixture.)

The Contractor shall take all necessary precautions to prevent damage to completed soil-cement by the equipment and to prevent the deposition of raw earth or foreign materials between layers of soil-cement. Earth ramps crossing completed soil-cement must have at least two (2) foot compacted thickness. Where ramps are constructed over soil-cement that is not to grade, all foreign materials and the upper-most one (1) in. of the previously placed soil-cement mixture must be removed prior to continuation of the soil-cement construction.

SECTION 221.5.6 - Placing: The mixture shall be placed on the moistened subgrade, embankment, or previously completed soil-cement with spreading equipment that will produce layers of such widths and thicknesses as are necessary for compaction to the required dimensions of the completed soil-cement layers. The compacted layers of soil-cement shall not exceed eight (8) in. in thickness, nor be less than four (4) in. in thickness.

The maximum depth of compacted soil cement that shall be placed per day will be 4 (four) feet.

Each successive layer shall be placed as soon as practicable after the compaction of the preceding layer has been verified by the Engineer.

The Contractor shall schedule placement of all soil-cement above channel bottom such that the placement of soil-cement protection at each location will be completed from channel bottom to plan top of soil-cement within five (5) calendar days, unless otherwise approved by the Engineer, or unless prevented by inclement weather.

All soil-cement surfaces that will be in contact with succeeding layers of soil-cement shall be kept continuously moist by fog spraying until placement of the subsequent layer,

except that the Contractor will not be required to keep such surfaces continuously moist for a period longer than seven (7) days.

Mixing shall not proceed when the soil aggregate or the area on which the soil-cement is to be placed is frozen. Soil-cement shall not be mixed or placed when the air temperature is below 45°F (7°C), unless the air temperature is at least 40°F (5°C) and rising.

SECTION 221.5.7 - Compaction: Soil-cement shall be uniformly compacted to a minimum of 98 percent of maximum density as determined by field density tests. Optimum moisture and maximum density shall be determined in accordance with the ASTM D-558 or AASHTO T-134. Field density tests shall be performed in accordance with ASTM D-1556 "Sand Cone Method" or AASHTO T-238 "Nuclear Method". Moisture contents shall be measured and reported to the nearest 0.1%.

Wheel rolling with hauling, grading, spreading or watering equipment shall not be an acceptable method of compaction. Vibratory compaction methods or equipment shall not be used when their use contributes to sloughing or caving of the soils which the soil-cement is to be placed against.

At the start of compaction, the mixture shall be in a uniform, loose condition throughout its full depth. Its moisture content shall be as specified in Subsection 221.5.4 herein. No section shall be left undisturbed for longer than thirty (30) minutes during compaction operations. Compaction of each layer shall be done in such a manner as to produce a dense surface, free of compaction planes, in not longer than one (1) hour from the time water is added to the mixture. Whenever the Contractor's operation is interrupted for more than two (2) hours, the top surface of the completed layer, if smooth, shall be scored to a depth of at least one (1) in. with a spike-tooth instrument, or by other means approved by the Engineer, prior to placement of the next lift. The spacing of scores shall not exceed 18 in., measured across the direction of soil-cement placement. The surface, after said scoring, shall be swept using a power broom or other method approved by the Engineer to completely free the surface of all loose material prior to actual placement of the soil-cement mixture for the next lift.

SECTION 221.5.8 - Finishing: After compaction, the top surface of the soil-cement shall be shaped to the required lines and grades, and cross sections and rolled to a reasonable smooth surface.

SECTION 221.5.9 - Curing: Temporarily exposed surfaces shall be kept moist as set forth in Subsection 221.5.6.

Care shall be exercised to ensure that no curing material other than water is applied to surfaces that will be in contact with succeeding layers of soil-cement.

Permanently exposed surfaces shall be kept in a moist condition for seven (7) days, or they may be covered with a suitable curing material, subject to the Engineer's approval. Any damage to the membrane provided by an approved curing material occurring within the initial seven (7) days of placement shall be repaired immediately to the satisfaction of the Engineer.

Regardless of whether water or an approved curing material is used, the permanently exposed surfaces of the soil-cement shall be kept moist during the seven-day cure period until the protective membrane is applied. Curing material is to be applied as soon as practicable, within a maximum time of twenty-four (24) hours, between the finishing of the surface and the application of the protective membrane. Whenever atmospheric temperatures are expected to drop below 30°F, soil-cement shall be protected from freezing for seven (7) days after its construction by a covering of loose earth, straw, or other suitable material approved by the Engineer.

SECTION 221.5.10 - Construction Joints: At the end of each day's work, or whenever construction operations are interrupted for more than two (2) hours, a transverse construction joint shall be formed in the last-placed lift by cutting back into the complete lift to form a full-depth vertical face.

SECTION 221.5.11 - Maintenance: The Contractor shall be required, within the limits of the Contract, to maintain the soil-cement in good condition until all work is completed and accepted. Maintenance shall include immediate repairs of any defects that may occur. This work shall be done by the Contractor at his own expense and repeated as often as necessary. Faulty work shall be replaced for the full depth of the layer.

SECTION 221.6 - INSPECTION AND TESTING: The Engineer, with the assistance and cooperation of the Contractor, will make such inspections and tests as he deems necessary to verify the conformance of the work to the Contract Documents. These inspections and tests will include, but will not be limited to: (1) the taking of test samples of the soil-cement and its individual components at all stages of processing and after completion, and (2) the close observation of the operation of all equipment used on the work. Only those materials, machines, and methods meeting the requirements of the Contract Documents will be approved by the Engineer.

All testing of soil-cement or its individual components, unless otherwise provided specifically in the Contract Documents, shall be in accordance with the latest applicable test methods in effect as of the date of advertisement for bids on the project.

Testing for proper compaction shall be done on at least every other lift of compacted soil-cement and at least once for every 500 CY of soil-cement. Test locations shall be chosen by the Engineer. If the lift being tested does not pass the minimum 98 percent density requirements, it must be reworked as directed by the Engineer until it passes or be removed by the Contractor at the Contractor's expense. The Contractor shall not be permitted to continue placing lifts of soil-cement on any lift which has failed the compaction tests until such time as that lift has been reworked, retested, and passed as to meeting density and moisture content requirements.

The initial acceptance of material shall in no way preclude further examination and testing at any time, during the course of construction or subsequent warranty period, if the Engineer suspects that the material is no longer properly represented by the acceptance sample. The acceptance at any time of any material incorporated into the work shall not bar its future rejection if it is subsequently found to be defective in quality or uniformity.

SECTION 221.7 - MEASUREMENT AND PAYMENT:

SECTION 221.7.1 - Measurement: This work shall be measured (1) in cubic yards of completed-in-place soil-cement bank protection between the limits shown by the specified lines, grades, and cross sections shown on the Plans; and (2) in tons of cement and tons of fly ash incorporated into the soil-cement used for tests and for the bank protection between the limits shown on the plans in accordance with the instructions of the Engineer.

SECTION 221.7.2 - Payment: This work shall be paid for at the Contract unit price per cubic yards for **ITEM 221-1 - SOIL-CEMENT** and at the Contract unit price per ton of **ITEM 221-2 - CEMENT AND FLY ASH FURNISHED**, multiplied by the quantities obtained in accordance with Subsection 221.7.1. Such payment shall constitute full reimbursement for performing all work and for furnishing all equipment, labor and materials necessary to complete the soil-cement bank protection, dewatering, trench excavation and backfill toe, watering, mixing, placing, compacting, curing, inspection and testing assistance, and all other incidental operations. Any waste of fly ash, cement and/or soil-cement by the Contractor during the handling, mixing, placing, etc., operations shall not be paid for.

SECTION 221.8 - MIX DESIGN METHODOLOGY: The design requirements for the soil-cement bank protection shall be such that it has a compressive strength of 750 psi at the end of seven (7) days. The contractor shall determine the mix proportions of the aggregate, flyash, cement and water, and shall furnish soil cement conforming to the requirements specified herein. The job-mix design with the supporting test results shall be submitted to the Engineer for approval, prior to incorporating any of the material into the work. OK

Included in the job-mix design data shall be the brand of cement, brand of flyash, and source of aggregate. A new mix design shall be submitted for approval any time the contractor requests a change in materials, or proportioning of the materials, from that given in the approved mix designs.

SECTION 221.9 – MIX DESIGN FOR THIS PROJECT: For bidding purposes only, the estimated mix design for this project shall include 10% Base Cementitious Material.

The percent of cementitious material (cement and fly ash) to be used in the mix shall be calculated to be the weight of cementitious material (cement and fly ash) divided by the total weight of the dry soil-cement mix. The actual mix design used on this project shall be determined by laboratory tests on each soil aggregate stockpile after construction of the stockpile has been completed in accordance with Section 106 – Control of Material.

Fly ash shall be included in the soil-cement at the discretion of the Engineer, based upon evaluation of the prices bid per ton for cement and for fly ash. Up to seventeen and one-half (17.5) percent of the total weight of cementitious material may be fly ash. Storage for fly ash and an additional scale for fly ash shall be provided by the Contractor conforming to Section 221.5.3 – Mixing, of these Special Provisions. Full compensation for equipping the batch plant with fly ash storage silo and fly ash scales shall be considered as included in the contract unit price paid for Soil-Cement (bank protection), and no additional compensation will be allowed therefore whether or not fly ash is included in the soil-cement mix design by the Engineer.

SECTION 221.10 – STOCKPILING OF AGGREGATE: Soil aggregate stockpiles shall be constructed on level, firm ground free of brush, trees, stumps, roots, rubbish, debris, and other objectionable or deleterious material and shall be located so as to provide a distance of not less than fifty (50) feet from the outside bottom edge of conical stockpiles built up under processing plant conveyors or any other existing stockpiles. The stockpiles shall be constructed in layers, each layer not exceeding two (2) feet in thickness. Ramps formed for stockpile construction shall be of the same material as that being stockpiled, and will be considered a part of the stockpile. Before steepening a ramp, any contaminated surface material shall be removed.

Stockpiled material shall be thoroughly mixed throughout its depth, width, and length before utilization. The material shall be homogeneous and uniform in color, gradation, and moisture throughout. Stockpiled material shall conform to the requirements of Section 106 – Control of Material, as revised by these Special Provisions.

Sampling of stockpiles will be done by the Engineer. After the stockpiles have been sampled and approved, material shall not be added to them.

Each stockpile shall be completed and approved at least fourteen (14) days prior to start of soil-cement production from the stockpile. Mix design will then be performed by the Engineer to determine job mix proportions.

**SECTION 221.11 – TESTING PROCEDURE FOR DETERMINATION OF CEMENT
CONTENT REQUIRED FOR SOIL-CEMENT MIXTURES:**

SECTION 221.11.1 – Description:

- (A) This method of test is intended for determining the percentage of portland cement and fly ash required in developing soil-cement mixtures by the determination of the compressive strength of molded specimens at varying cement contents.
- (B) Equipment Required:
- (1) Mold – A cylindrical metal mold having a capacity of 1/30 cubic foot with an internal diameter of 4.0 plus/minus .005 in. and a height of 4.585 plus/minus .005 in. equipped with a detachable collar approximately 2-1/2 in. in height.
 - (2) Rammer – A metal rammer manually or mechanically operated having a 2 in. diameter circular face and weighing 5.5 lbs. The rammer shall be equipped with a suitable arrangement to control the height of drop to a free fall of 12 in. above the elevation of the cement treated mixture.
 - (3) Balance – A balance or scale of at least 5 kg. capacity sensitive to 0.5 gm.
 - (4) Drying Oven – A thermostatically controlled drying oven capable of maintaining a temperature of 230°F plus/minus 9°F (110°C plus/minus 5°C).
 - (5) Straightedge – A rigid steel straightedge 12 in. in length having one beveled edge.
 - (6) Sieve – 3/4 in. sieve conforming to the requirements of the Specifications for Sieves for Testing Purposes (ASTM E-11-81 and AASHTO M92).

- (7) Miscellaneous mixing tools and pans.
- (8) Speedy Moisture Tester (optional).
- (9) Equipment required for the determination of the Compressive Strength of Cylindrical Concrete Specimens (ASTM C39, C42, C511).

SECTION 221.11.2 - Sample Preparation:

- (A) Prepare the soil aggregate sample in accordance with Section 6.1 of ASTM D-558, Method B; except that sufficient sample shall be prepared to mold twenty-four (24) separate test charges; and except that all references to the 3-in. (75-mm) sieve shall be considered to be the 1-1/2 in. (37.5-mm) sieve.
- (B) Select and prepare sufficient quantity of soil aggregate for 24 separate test charges of dry soil-cement of approximately 2500 gm. each. Three strength samples and the maximum density/optimum moisture samples shall be made for every cementitious material (cement and fly ash) percentage selected.
- (C) Add the first of the cementitious material (cement and fly ash) contents to be used and mix thoroughly together.

Example: If the percent of cementitious material selected is 10%, then,

Dry Soil Weight	= 2250 gms. (90%)
Portland Cement	= 206.25 gms. (8.25%)
Fly Ash	= 43.75 gms. (1.75%)
TOTAL	= 2500 gms. (100%)

- (D) The moisture content to be added to each test charge shall be determined by making a maximum density-optimum moisture determination for each cementitious material content (according to ASTM D-558, Method B) and using this developed optimum moisture thereafter for all specimens prepared with that cementitious content.

SECTION 221.11.3 - Compaction:

- (A) Form a specimen by compacting a prepared mixture in the mold with the collar attached in three equal layers to give a total compacted depth of 5 in. Compact each layer by applying 25 uniformly distributed blows from a 5.5 lb. (2.5 mg.) rammer dropping free from a height of 12 in. (305 mm). Following compaction, remove the extension collar, carefully trim the compacted mixture even with the top of the mold by means of a straightedge and weigh. Multiply the weight of the specimen (in gms.) by 0.06614 to obtain the wet weight per cubic foot. The factor 0.06614 is valid only if the volume of the mold is 1/30 cubic foot. If calibration shows any change in volume, a new factor shall be calculated.

NOTE: Assuming the mold has a volume of 1/30 (0.0333) cubic foot the factor is derived as follows:

$$.06614 = \frac{1}{0.0333 \text{ cu. ft.} \times 453.6 \text{ g/lb.}}$$

In case of a change in volume of the mold 0.0333 cu. ft. shall be replaced by the decimal fraction for the new volume.

- (B) Compact two more specimens in the same manner as Step (A).
- (C) Determine the moisture content of the prepared samples from the residue.
- (D) Extrude the three specimens from their respective molds using caution and place on glass or non-absorptive plates and store for curing in a moist condition, (i.e., a moist cabinet or a Moist Room meeting the requirement of ASTM C511-80).
- (E) Determine the Wet Density and Dry Density of the samples.
- (F) Repeat steps (A) through (D) on additional samples with increased cementitious material content (in 2% increments) until a complete bracketing of specification requirements is met.

SECTION 221.11.4 - Determination of Compressive Strength:

- (A) All specimens must be cured as specified in a moist condition for six (6) days and then immersed for a period of 24 hours in water maintained at 73.4°F plus/minus 3°F (23°C plus/minus 1.7°C).

- (B) Specimens shall then be prepared for the compression test in accordance with ASTM C617.
- (C) The compressive strength of the cylinders shall then be determined in accordance with ASTM C39 and ASTM C42.
- (D) A minimum of two cylinders shall be taken for testing purposes per 1000 cubic yards of material placed, but not less than two cylinders per day shall be made.

SECTION 225 - WATERING: The work under this item shall be in accordance with Section 225 of the MAG Standard Specifications.

PART 300 - STREETS AND RELATED WORK

SECTION 310 - UNTREATED BASE: ITEM 310-1 AGGREGATE BASE shall conform in its entirety to the requirements of Section 310 of the Uniform Standard Specifications. Aggregate Base shall be crushed in accordance with Section 702.2.

The Contractor will be required to furnish the Engineer certified weight tickets covering all of the Aggregate Base placed on the project. Final pay quantities will be based upon the scale tickets accepted by the Engineer.

SECTION 321 - ASPHALT CONCRETE PAVEMENT: Asphalt concrete pavement shall consist of furnishing and placing a plant-mixed asphalt concrete road surfacing material to the compacted thickness shown on the plans and in accordance with Section 321 of the Uniform Standard Specifications.

The mineral aggregate shall meet the grading requirements within the range of the specified tolerances for Mix-Designation C-3/4 in accordance with Section 710 of the Uniform Standard Specifications.

The Contractor shall furnish certified weight tickets covering all plant-mixed asphalt concrete placed on the project.

Payment for this item will be made at the contract unit price bid per ton for **ITEM 321-1-C-3/4 - ASPHALT CONCRETE.**

SECTION 350 - REMOVAL OF EXISTING IMPROVEMENTS: ITEM 350-1 of this project shall conform in its entirety to Section 350 of the MAG Standard Specifications. In addition to the items listed in the MAG Standard Specifications, Section 350.3 Miscellaneous Removal and Other work, the following shall be included:

- (K) Any and all items not specifically set forth as a separate pay item.
- (L) Sawcutting and matching existing pavements and curbs, gutters, etc.
- (M) Relocating positions of existing plants within the right-of-way to be staked by the Inspector.
- (N) Removing existing AC, concrete curb and gutter and adjust any existing improvements, if required.
- (O) Removing existing concrete bank protection and existing drainage structures within the river channel.

Materials shall be disposed of off-site in a landfill authorized by the Engineer.

SECTION 351 - REMOVAL OF EXISTING LANDFILLS

351.1 - DESCRIPTION: This work shall consist of removing and disposing of all existing man-made landfills from within the embankment fill and soil-cement bank protection areas defined herein. Landfill is defined as all man-made waste including "Construction Debris" and "Organic Material"; separate pay items shall be used for each classification. Unless otherwise directed by the Engineer, the Contractor shall remove all existing landfills that lie within fifty (50) feet of the channel side face of soil-cement measured toward the nearest right-of-way line. The extent of excavation beneath the bottom of the soil-cement bank will be determined as necessary by the field Engineer. Within this area, the existing landfill materials shall be removed to expose the undisturbed natural ground surface before constructing embankment fill or soil-cement bank protection.

351.2 - DISPOSAL

351.2.1 - Construction Debris: All existing landfill materials removed by the Contractor shall be taken from the site and disposed of in a designated landfill site, or as approved by the Engineer. The Contractor shall be responsible for obtaining all necessary permits and shall submit proof of such permits to the District or its Engineer prior to the disposal of any material.

351.2.2 - Organic Material: The Contractor may be able to obtain permits to use the Glendale Municipal Sanitary Landfill site located at 115th Avenue and Glendale Avenue, (telephone number 931-5622) for disposal of organic material. This site is currently open between the hours of 5:30 a.m. to 4:30 p.m., Monday through Friday, 9:00 a.m. to 4:00 p.m. on Saturdays. It is the Contractor's responsibility to contact this site for more specific information regarding opening hours, allowable materials, and costs. The Contractor should assure himself as to the types of waste that may be disposed of at this site; it is not possible to dispose of certain materials including hazardous chemicals or waste.

Hazardous wastes, if encountered, shall be handled per Section 352 - Landfill Excavation Monitoring.

341.3 - MEASUREMENT AND PAYMENT: Field estimates have not been made of the quantities of construction debris and organic waste landfill material that may be encountered on the project. Exact measurements cannot be made at this time and will be determined in the field. Quantities will be measured by the cubic yard, as measured in place. Payment for construction debris and organic waste removal and disposal will be paid for using separate unit prices as indicated in the Bid Schedule. Field surveyed cross-sections shall be the basis for quantity estimates.

The contract unit price shall include the costs of furnishing all equipment, labor and materials as necessary to remove landfill material, transport and dispose of this material either through compaction at a designated landfill site, or hauling to a municipal waste

site. No separate payment shall be made for removal or disposal of construction debris landfill material that would otherwise require removal in the normal course of soil-cement placement, toe excavation, or channel excavation. Such payment is considered as paid for under Section 215 - Channel Excavation. All organic waste landfill material will be paid for at the contract unit price, regardless of location within the channel or channel bank.

SECTION 352 - LANDFILL EXCAVATION MONITORING

352.1 - DESCRIPTION: The Contractor shall establish and maintain an effective landfill excavation monitoring system. The landfill excavation monitoring system shall consist of plans, procedures, and organization necessary to provide monitoring and reporting operations which comply with contract requirements. The system shall cover monitoring of excavation operations in the landfill areas, as identified by the Engineer, and shall be keyed to the proposed construction sequence.

352.2 - LANDFILL EXCAVATION MONITORING PLAN: The Contractor shall furnish for approval by the Engineer, not later than thirty (30) calendar days after receipt of Notice to Proceed, the Landfill Excavation Monitoring Plan. The plan shall identify personnel, procedures, instructions, records, and forms to be used; the Contractor or his subconsultants will need to make arrangements for implementation of a clean-up program for hazardous wastes, should it be necessary.

Before start of construction, the Contractor shall meet with the District and the Engineer to discuss the Contractor's Landfill Excavation Monitoring system. During the meeting, a mutual understanding of the system details shall be developed, including the requirements for reporting the Landfill Excavation Monitoring operations, control activities, testing, administration of the system for both on-site work and off-site testing, and the interrelationship of Contractor's Inspection and control with the Government's Inspection. Minutes of the meeting shall be prepared and signed by both the Contractor and the Contracting Officer. The minutes shall become a part of the contract file.

This plan shall include as a minimum, the following:

- (i) A description of the Landfill Excavation Monitoring organization individual or subconsultant;
- (ii) the name, qualifications, duties, responsibilities, and authorities of each person assigned Landfill Excavation Monitoring and/or testing functions;
- (iii) procedures and subconsultants intended to be used in the event of emergencies or the encounter of hazardous wastes during excavations;

- (iv) reporting procedures to document the type and number of control activities, results of control activities, proposed remedial action (if any), and corrective actions taken; and
- (v) the individual, within his organization at the site of the work, who shall be responsible for overall management of Landfill Excavation Monitoring and have the authority to act in all monitoring matters for the Contractor.

Acceptance of the Contractor's plan will be required prior to the start of landfill excavation. Acceptance is conditional and will be predicated on satisfactory performance during the construction. The District reserves the right to require the Contractor to make changes in his Landfill Excavation Monitoring plan and operations as necessary to obtain the monitoring specified.

352.3 - MEASUREMENT AND PAYMENT: No separate payment shall be made for providing monitoring of existing landfills, the cost being assumed to be incidental to the cost of Removal of Existing Landfills. Should hazardous chemicals or waste be encountered during the course of these inspections, the Engineer shall be notified immediately, with a follow-up notification in writing. The cost of implementation of cleanup will be based upon Actual Cost Work as described in Section 109 - Measurements and Payments

PART 400 - RIGHT-OF-WAY AND TRAFFIC CONTROL

SECTION 401 - TRAFFIC CONTROL: Traffic control shall conform with these Special Provisions, part VI of the "Manual on Uniform Traffic Control Devices for Streets and Highways" (US DOT Federal Highway Administration) with current revisions and/or as directed by the Traffic Engineer or his representative. Payment for **ITEM 401-1 - TRAFFIC CONTROL** will be paid on a lump sum basis.

It shall be the contractor's responsibility to provide, erect and maintain all necessary signs, barricades, barriers, berms, lights, delineators, Uniformed Officers, flagmen and other devices necessary to properly mark and control the construction areas. The approval of the contractors method of application of all traffic control measures, shall not relieve the contractor of the responsibility for protecting the work, the workmen and the traveling public.

A road closure is authorized. All advance warning construction signs shall be mounted on channels driven into the ground. Signing shall be placed at the intersections of 107th Avenue, 103rd/Glen Harbor Blvd., 99th Avenue as well as at the bridge construction site. Local access to business and residences shall be maintained at all times.

Prior to any excavation or construction, the Contractor shall install and maintain deceleration sand berms (approximately five feet high) on each approach of traffic to the bridge construction site. Sand berms shall remain until the road is open to traffic or construction presents less of a hazard than the berms.

At the time of the pre-job conference, the Contractor shall submit for review and approval a traffic control plan detailing the use and placement of temporary traffic controls, signs, barricades and other safety measures. Plan shall detail construction equipment access that does not require the moving of closure signing. The traffic control plan must be approved by the Maricopa County Highway Department.

The Contractor shall provide and maintain all necessary signs, barricades and center line vertical panels for five working days beyond any construction concrete cure time or acceptance of the project by the County which ever is greater.

SECTION 402 - ELECTRICAL CONDUIT: The work under this section shall consist of furnishing and installing underground PVC conduit, including excavation, backfill, compaction and landscaping necessary to complete the work at the locations specified on the plans or as directed by the Traffic Engineer or his representative.

All PVC conduit and fittings shall be of the size indicated on the project plans and be rigid polyvinyl chloride (PVC) non-metallic type, conforming to the requirement of UL 651 for rigid non-metallic conduit. PVC conduit and fittings shall be Schedule 40 heavy wall and rated for use at 90 degrees centigrade.

All conduit and conduit fittings to be installed above ground shall be rigid metal type manufactured of galvanized steel conforming to the requirements of UL 6 for rigid metal conduit.

Conduit installed in protected areas such as behind curbs, in sidewalks, etc. that are not subject to any vehicular traffic shall be at a minimum depth of 24 inches below final grade. Conduits installed under roadways, driveways or any open areas where it is possible for vehicles to drive shall be at a minimum of 30 inches below final grade. When conduit cannot be installed at the minimum depth, it shall be completely encased in 3 inches of concrete.

Field PVC conduit bends shall be made without crimping or flattening, using the longest radius practical, but not less than that specified by the National Electrical Code, Article 347-13. Collapsed conduit, no matter how small, is not acceptable and shall be replaced at the Contractor's expense. The number of bends between pull boxes or between a Pull box and foundation shall not contain more than the equivalent of two (2) quarter bends (180 degrees, total), including the bends at the pull boxes or foundations, Article 347-14 of the National Electric Code. All conduit cuts shall be square and trimmed after cutting to remove all rough edges. All connections shall be of the solvent weld type or approved equal.

PVC conduit entering a pull box or foundation shall be fitted with a factory made 90 degree elbow with minimum sweep radius per the table below. Conduit shall enter pull boxes near the sides and ends and extend no more than 4 inches above the bottom of the pull box including the length of the conduit bell end.

<u>PVC Sizes</u>	<u>Radius</u>
1 in.	5.75 in.
1 1/2 in.	8.25 in.
2 in.	9.50 in.
2 1/2 in.	10.50 in.
3 in.	13.00 in.

Each run of conduit which terminates within a pull box shall be capped (not glued) with PVC caps.

Each run of conduit shall be installed containing a continuous run of one No. 8 AWG bare copper wire to be used as a pull wire. The wire shall be at least two (2) feet longer than the run of conduit. Each run of the wire shall be spring coiled and inserted into the conduit so as to be recoverable at a later date. Nylon rope 1/4" in size shall be acceptable in lieu of No. 8 AWG bare copper pull wire and the extra length fastened to the inside of the cap.

The Contractor shall place warning tape in all open trenches in which conduit is placed. All warning tape shall be buried at a depth of 6 to 8 inches below final grade.

Conduit warning tape shall be 4 mil inert plastic film specially formulated for prolonged use underground and shall be a minimum of 3 inches wide. All tape shall be highly resistant to alkalis, acids and other destructive agents found in the soil.

The tape shall have a continuous printed message warning of the location of underground conduits. The message shall be in permanent ink formulated for prolonged underground use and shall bear the words **CAUTION - ELECTRIC LINE BURIED BELOW** in black letters on a yellow or red background.

Conduit will be measured by the lineal foot from the center of the pull boxes and the edge of foundations along the runs installed and accepted. Conduit inside pull boxes and foundations will not be measured for payment.

Payment for this item shall be made at the contract unit price bid per lineal foot per **ITEM 402-1 - 3", SCH. 40, TYPE 2, RIGID PVC CONDUIT**, type and length as shown on the plans and as specified in the Bidding Schedule, which price shall be full compensation for the item, complete in place, including all necessary excavation, backfill, labor, materials and miscellaneous incidentals necessary to complete the work.

SECTION 403 - PULL BOXES: The work under this section shall consist of furnishing and installing all pull boxes, including excavation, backfill, compaction and landscaping necessary to complete the work at the locations specified on the plans or as directed by the Traffic Engineer or his representative.

Pull box sizes shall be as specified on the project plans and shall comply with the applicable ADOT Standard T.S. 1-1, T.S. 1-2, or T.S. 1-4.

At the request of the Engineer, the Contractor shall furnish pull box drawings and specifications which specify steel reinforcement and concrete used.

Pull boxes shall be set on an 18 inch bed of one inch rock and adjusted so that they are level at curb or sidewalk grade. When no grade is established, pull boxes shall be set as directed by the Engineer. A 1/2 inch felt expansion joint shall be installed on all sides of pull boxes set in concrete. Pull box covers shall be secured with the "L" bolts, nuts and washers before final acceptance of the project.

Pull boxes will be measured by the number of units of each type specified, complete in place, in accordance with the project plans and specifications.

Payment for this item shall be made at the contract unit price bid each per **ITEM 403-1 - NO. 5 PULL BOX, M.C.H.C. STD. DWG S-201-1**, type and size as shown on the plan and as specified in the Bidding Schedule, which price shall be full compensation for the item complete in place, including all labor, materials and equipment to include covers, bolts, nuts, washers, and steel grid frames (if required).

SECTION 415 - FLEXIBLE METAL GUARDRAIL: Work under this section shall conform with MAG Section 415 in its entirety and in addition shall include Metal Guardrail to Barrier Transitions, Rub Rail Assemblies and Breakaway Cable Terminal Assemblies (BCT) as detailed in the plans.

Measurement for railing will be by the linear foot from end to end along the face of the railing including terminal, BCT, Rub Rail and Transition Assemblies.

Payment for furnishing materials and installing guardrails complete, in place will be made at the unit price bid per linear foot for **ITEM 415-1 - INSTALL METAL GUARDRAIL, BCT'S, TERMINALS AND RUB RAILS.**

SECTION 420 - CHAIN LINK FENCE: The work under this section consists of constructing chain link fence railing on the bridge deck and wingwalls as shown on the plans in accordance with Section 420 of the Uniform Standard Specifications.

The materials used shall be as noted on the plans with posts, rails, braces and bars conforming to Subsection 772.2 Type A of the Uniform Standard Specifications.

Payment for this item will be made at the contract price bid per lineal foot for **ITEM 420-1 - CHAIN LINK FENCE.**

Also included in this section is the construction of Gates with Smooth Wire at the locations and according to details as noted on the plans.

Measurement will be made by each Gate and Payment shall include all Materials and Equipment required to construct the gates complete and in place. Payment for each Gate completed and accepted by the FCDMC Engineer shall be made at the contract price for **ITEM 420-2 - SMOOTH WIRE GATE.**

SECTION 450 - INSTALLATION OF TRAFFIC MARKINGS: The work under this section shall consist of installing striping and raised pavement markers in accordance with the striping plans and these Special Provisions.

Applications shall be in accordance with Arizona Department of Transportation (A.D.O.T.) **SECTION 708 - PERMANENT PAVEMENT MARKINGS (PPM708, 6, 12/30/86).**

Samples of the chlorinated rubber traffic paint will be given, upon request, to the County and at the expense of the Contractor it will be sent to be tested to confirm the paint conforms to the "Specifications".

All striping shall be either white or yellow chlorinated rubber traffic paint. Except where noted on the plans.

Maricopa County requires that all paint, that is parallel to the edge of the pavement be installed at a minimum of fifteen mils thick. The following pavement marking items will be installed at thirty mils thick: (A) Crosswalks; (B) Arrows; (C) Stop Bars (D) Railroad pavement markings and (E) Any type of "Wording" that might go on the Pavement. Any other markings will be noted on the plans.

All striping shall be installed at a minimum of four inches in width, except where noted on the plans or in these specifications.

Lane Lines shall be fifteen feet long with a space of twenty-five feet.

Holding Bars and Squeeze Bars shall an eight inch white line.

Crosswalk Lines, white or yellow, shall be twelve inches in width and shall be spaced ten feet apart.

Stop Bars shall be twenty-four inches in width. When a stop bar is combined with a crosswalk line, it shall be no more than twenty-four inches in width.

Maricopa County normally requires only one pavement marking arrow to be installed in all left or right turn lanes. It shall be installed in the center of the lane with the bottom of the arrow even with the end of the holding bar. If more than one arrow is require, it shall be noted on the plans. Arrows shall be constructed according to A.D.O.T. Signing and Marking Standard, Drawing No. 4-M-1.16.

The raised non-reflective pavement markers shall conform to A.D.O.T. Revised 6/88 Standard 4-M-2.02, Type A for white and Type AY for yellow.

They are to be placed at the following locations; (A) every deflection angle of the paint; (B) at the beginning and the end of holding bars, left or right turn lanes, no passing zones and lane drops. Any other location will be noted on the plans. White buttons to go on white stripes and yellow buttons to go on yellow stripes, as specified on plans and they shall be secured to the pavement by a hot flexible marker adhesive. Do not use epoxy!!

The raised reflective pavement markers shall be Stimsonite Life-Lite No. 911-AY for yellow both sides, No. 911-AW for white both sides, No. 911-ERW for white on one side and red on the other, and No. 911-ERY for yellow on one side and red on the other. They shall be non-adhesive with an abrasive resistant surface.

When it comes to Two-Way Left Turn Lanes; Center Lines; Lane Lines or No Passing Zones, in one direction, these markers are to be places in the middle of the twenty-five spacing on straight away roads and forty foot on center, and must stay in accordance with the Engineering plans. On Double Yellow lines they are to be placed on both sides of the yellow at forty foot spacing. On edge lines they go in at forty foot on center. When dealing with horizontal or vertical curves these markers will be placed twenty foot on center and Engineering judgement will be used in the placement in the field.

They are to be placed no less than four inches and no more than six inches, to the outside and or inside of the stripe as specified on the plans, with the reflectorized portion of the marker facing the oncoming traffic.

They shall be secured to the pavement by a hot flexible marker adhesive. DO NOT use epoxy!

Reflectorized "Guardrail and Barrier Delineator Markers" shall be Stimsonite No. P/N 965Y for yellow and P/N 965W for white.

The placement of these, in the field, will be determined by the Engineer. They shall be secured to the guardrail and or barrier by using Stimsonite adhesive, tube, part no. #2205-005.

In accordance with the striping plans, it shall be the Contractor's responsibility to properly mark and spot at five foot intervals, all striping and or pavement markers. This shall include the marking of pavement arrows and no passing zone (N.P.Z.) locations.

Any N.P.Z. that is very critical in placement will be noted on the plans and will be laid out in the field by the Engineer.

All pavement marking requirements of Section 460 shall be completed prior to any spotting.

The Contractor shall refer any questions regarding traffic markings to the Engineer.

An inspection, of the layout in the field, by the Engineer shall be required prior to any permanent striping applications.

The Contractor shall notify the Engineer that the road is ready for inspection after the layout and spotting of the entire project is completed.

The County has three working days to inspect the project and to notify the Contractor of any corrections.

Any pavement marking under Section 450 that is not in accordance with the plans or that has not been approved by the Engineer shall be removed under the requirements of Section 460 and reinstalled at the Contractor's expense.

Approximate quantities of chlorinated rubber traffic paint and various raised pavement markers are shown on the plans. No measurement of separate items will be made.

Payment for all work under this section shall be made at the contract lump sum price bid per **ITEM 450-1 - SIGNING, STRIPING AND MARKING**, which price shall be full compensation for all items, complete in place, including all necessary labor, materials and equipment.

SECTION 460 - PAVEMENT MARKING REMOVAL: The work under this section shall consist of; (A) removing all conflicting pavement markings; (B) raised pavement markers; (C) and preparing these surfaces for striping in accordance with provisions, conditions and the project limits contained on the striping plans and these Special Provisions.

If a conflict exists between the plans and the Special Provisions, the Special Provisions shall apply.

APPROVED METHODS FOR THE REMOVAL OF "CHLORINATED RUBBER TRAFFIC PAINT":

PREFERRED METHODS:

- 1) Sandblasting.
- 2) Steel Shot Method (Turbo-Blaster).
- 3) Asphaltic Overlay. The asphaltic overlay thickness and dimensions shall meet the requirements of the Engineer.

Alternative methods of removal are:

- A) Chip Seal. When using this method the entire pavement area shall be covered.
- B) Slurry Seal. When using this method **ONLY** the existing striping will be covered. Do not cover the entire pavement area.

Alternative methods (A),(B) and any other method that might be used to remove paint must be approved by the Engineer first.

APPROVED METHODS FOR THE REMOVAL OF "TAPE PAVEMENT MARKINGS":

- 1) Grinding.
- 2) Burning / Heat Method.
- 3) Asphaltic Overlay. The asphaltic overlay thickness and dimensions shall meet the requirements of the Engineer.

Any method other than (1),(2) or (3) for the removal of tape markings must be approved by the Engineer first.

Methods NOT APPROVED for the removal of tape pavement markings:

- A) Chip Seal.
- B) Slurry Seal.

APPROVED METHODS FOR THE REMOVAL OF "THERMOPLASTIC PAVEMENT MARKINGS":

- 1) Heat / Grinding Combination.
- 2) Heat / Steel Shot (Turbo-Blaster) Combination.
- 3) Grinding / Steel Shot (Turbo-Blaster) Combination.

Any method other than (1),(2) or (3) for the removal of thermoplastic markings must be approved by the Engineer first.

Methods NOT APPROVED for the removal of thermoplastic markings:

- A) Chip Seal.
- B) Slurry Seal.

APPROVED METHODS FOR THE REMOVAL OF "RAISED PAVEMENT MARKERS":

- 1) Grinding.
- 2) Hammer / Chisel Method.
- 3) Blade (use of Heavy Duty Equipment).

Any method other than (1),(2) or (3) for the removal of raised pavement markers must be approved by the Engineer first.

It shall be the Contractor's responsibility to determine what type of pavement markings currently exist, on this project, and determine the appropriate method of removal.

Any hole(s) or other damage to the pavement caused by the method of removal shall be repaired by the Contractor at his expense. The method of repair or correction shall meet the approval of the Engineer prior to the repair work.

Payment for all work in Section 460, which includes all necessary labor, equipment and materials for removal shall not be made separately, but shall be included in the contract lump sum price bid for **ITEM 450-1 - SIGNING, STRIPING AND MARKING.**

All markings whether traffic paint, thermoplastic paint, tape and raised pavement markers, shall be included in the removal.

PART 500 - STRUCTURES

SECTION 505 - CONCRETE STRUCTURES: The work under this section shall consist of furnishing all labor, materials and equipment for the construction of the cast-in-place concrete portions of the bridge structures, including the approach slabs, concrete catch basins in accordance with the plans and Section 505 of the Uniform Standard Specifications for Public Work Construction, except as specified in these Construction Special Provisions.

General: It shall be the Contractor's responsibility to protect the structure and construction site from damage that may occur during the construction period and until final acceptance of the completed bridge by the Flood Control District.

Upon completion of the construction, the Contractor shall clear the work area of all debris.

No vehicular loads will be permitted on the bridges before the lapse of twenty-one (21) days from the date of the last pour of concrete for the bridge deck and approach slabs, unless approval is obtained in writing from the Engineer. In no case shall traffic be allowed on the structure until the specified concrete strength has been attained. The Contractor shall take special precautions to keep the area around the bridges properly barricaded, lighted and marked to prevent automotive traffic from crossing the new bridge structures prior to the Engineer's approval.

The installation of any necessary conduits, brackets, or piping or any other facility or work which may be performed for the accommodation of any utility, other than as shown on the plans, shall be paid for by the utility owner. The Contractor shall make all arrangements that may be necessary for the construction and any financial agreement shall be solely between the Contractor and the utility owner.

Portland Cement concrete, ITEMS 505-1 and 505-2 shall conform to Section 725 of the MAG Uniform Standard Specifications.

ITEM 505-1	CLASS "A" CONCRETE Barrier, Approach slab and curb.	$f_c = 3,000$ psi
ITEM 505-2	CLASS "AA" CONCRETE Superstructure, abutments and wingwalls, columns, caps.	$f_c = 4,000$ psi

The Contractor shall determine the mix proportions and shall furnish concrete which conforms to the requirements of these specifications. All concrete shall be sufficiently workable, at the slump proposed by the Contractor within the specified range, to allow proper placement of the concrete without harmful segregation, bleeding, or incomplete consolidation. It shall be the responsibility of the Contractor to proportion, mix, place, finish, and cure the concrete properly in accordance with the requirements of these specifications.

Admixtures:

The Contractor shall furnish Certificates of Compliance conforming to the requirements of MAG Subsection 106.2 for each type of admixture furnished. Admixtures containing chlorides will not be acceptable for concrete containing uncoated reinforcing steel or embedded metal items.

All concrete admixtures shall be stored in suitable containers in accordance with the manufacturer's recommendations. All liquid admixtures shall be protected from freezing.

Air-entraining admixtures shall conform to the requirements of AASHTO M 154.

Water reducing admixtures shall conform to the requirements of AASHTO M 194.

Fly ash shall conform to the requirements of ASTM C 618 for Class F, except that the pozzolanic activity index with lime shall be reduced to a minimum of 650 pounds per square inch at seven days. The Blaine fineness shall have an average value of at least 2,800 with a minimum value of 2,600 for any one sample. The average value will be determined on the last five consecutive samples. The loss on ignition shall not exceed 3.0 percent.

Design of Concrete Mix:

Portland Cement Concrete shall comply with SECTION 726 of the MAG Uniform Standard Specifications for Public Works Construction.

A fly ash admixture may be used at the option of the Contractor only when portland cement is used. A maximum of 15 percent of the required weight of portland cement may be replaced with a fly ash admixture. A minimum of 1.2 pounds of fly ash shall replace each 1.0 pound of portland cement removed.

Concrete shall have a compressive strength not less than that shown on the project plans. Unless otherwise shown on the project plans, the (f_c) of Class A and Class AA concrete shall be the required 28-day compressive strength.

The coarse aggregate size designation for concrete shall be chosen by the Contractor and approved by the Engineer and shall conform to the size designation and grading requirements of AASHTO M 43. In choosing the size designation, the maximum size of coarse aggregate shall not be larger than 1/5 of the narrowest dimension between sides of adjacent forms, or 2/3 of the minimum clear spacing between reinforcing bars, or 1/3 the depth of the slab, whichever is least.

The proposed slump shall be chosen by the Contractor. Concrete at the proposed slumps shall be sufficiently workable to allow proper placement without harmful segregation, bleeding, or incomplete consolidation.

Air-entraining admixtures will be required for all classes of concrete. The amount of entrained air in the concrete mixture shall not be less than four percent nor more than 7 percent by volume.

Unless specifically required, water reducing admixtures may be used at the option of the Contractor.

At least two weeks prior to the appropriate concreting operation, the contractor shall furnish a mix design for each strength of concrete for review and approval. More than one mix design for each strength of Class A and Class AA concrete may be submitted for approval providing specific items and locations of intended uses accompany the mix design. The Contractor shall substantiate each mix design by furnishing test data and providing all details of the mixtures proposed for use.

The complete solid volume mix design submitted for approval shall include all weights and volumes of all ingredients. The brand, type, and source of hydraulic cement admixtures, the coarse aggregate size number designation, source of aggregates, the specific gravities of all ingredients, the proposed slump, a code number to identify the mix design, and the intended use of each mix design shall be an integral part of each mix design.

No changes in the approved mix designs or code numbers shall be made by the Contractor except by the approval of the Engineer. A new mix design shall be submitted for approval any time the Contractor requests a change in materials or proportioning of the materials from that given in each approved mix design. In no case shall the approval of a mix design relieve the Contractor of the responsibility for the results obtained by the use of such approved mix design.

Mix designs from previous or concurrent projects may be submitted for approval. The engineer may waive trial batches at any time.

The Contractor may obtain concrete for each strength of concrete from an approved commercial source.

For each strength of concrete, the Contractor shall furnish an invoice for each batch of concrete. The minimum items required of each invoice shall be the mix design code number, date, time batched, truck identification or number, and name of identification of batch plant.

Testing for consistency shall be in accordance with the requirements of AASHTO T 119 to determine the consistency in slump. The Contractor shall be responsible for furnishing concrete at the slump shown on the approved mix designs with a permissible variation of ± 1 inch. Concrete that fails to conform to the consistency requirements will be rejected.

Bridge Deck:

The placing of concrete will not be permitted until the Engineer is satisfied that the rate of producing and placing concrete shall be sufficient to complete the proposed pour and finishing operations within the scheduled time, that experienced concrete finishers are available to finish the deck and that all necessary finishing tools and equipment are on hand at the site of the work and are in satisfactory condition for use.

Concrete shall be placed for the full width of the panel to be poured. After the concrete has been placed it shall be consolidated and then struck off by means of self-propelled screen equipment.

Screen equipment shall be designed to operate as close as practicable to bridge curbs.

Screen equipment shall travel on steel rails. Rails shall be substantially supported by adjustable steel supports of adequate size securely fastened in place and spaced at sufficiently close intervals to prevent any appreciable deflection in the rails. Steel supports shall be of such types and installed in such manner that when the rail and adjustable support have been removed, there will be no void in the concrete.

The steel rails for placing of finishing equipment shall be set to the correct elevation shown on the project plans or as established by the Engineer. The rails shall extend beyond both ends of the scheduled length for placement a sufficient distance that will permit the screen and finishing equipment to reach all areas of the concrete placed.

Screen beams or rollers shall be made of metal, or the bottom of the beam shall be metal clad. Roller screeds shall be so constructed and of such length that there will be no sag or deflection in the screeds.

Screen assemblies equipped with vibrators shall be so designed that the vibrating units do not contact any reinforcing steel. Vibration shall be transmitted to the concrete in such a manner that when the motion of the machine is stopped, all vibration will cease.

A slight excess of concrete shall be maintained in front of the screen at all times during the screeding operation. The screen shall make as many passes over the slab as necessary to obtain a uniform surface.

The Contractor shall furnish a minimum of two transverse work bridges from which floating, straight edging, and curing operations may be accomplished. The work bridges shall be reasonably rigid and free of excessive deflections. The self-propelled mechanical bridge used for texturing the bridge deck may be substituted for one of the required work bridges.

The floating operation shall follow the screeding if required. The float shall have a minimum diameter of three inches and have a minimum length of 12 feet. The float shall be constructed so that the surface will be maintained true at all times.

Prior to placing concrete, the screen shall be traversed the length of the proposed pour and the clearance from the screen to the reinforcing steel and deck thickness shall be checked. The method of determining the clearance shall be approved by the Engineer prior to making such checks. The clearance shall be as indicated on the project plans with a permissible variation of plus or minus 1/4 inch. Deflection of the screen rails as a result of the weight of the screen equipment will not be permitted. All corrections necessary as a result of this operation shall be performed prior to beginning the pour.

The Contractor may submit and alternate for the equipment detailed above. Use of alternate equipment shall not be allowed without approval of the Engineer.

Finishing Bridge Deck:

Bridge sidewalks shall be finished to a light broomed texture.

The bridge deck shall be textured with an artificial turf drag in accordance with the requirements of Section 505.9.1 of the MAG Uniform Standard Specifications.

Hand brooms shall be provided and available at the job site at all times when texturing plastic concrete.

The finishing operation shall be completed before the water sheen disappears. Water shall not be applied to the deck surface at any time during floating or finishing except in the form of a fog spray.

Fogging equipment shall be capable of applying water to the concrete in form of a fine fog mist in sufficient quantity to curb the effects of rapid evaporation of mixing water from the concrete on the deck resulting from wind, high temperature, or low humidity, or a combination of these factors.

The finished surface of the concrete shall be tested by means of a ten-foot straightedge placed on the deck surface. The surface plane shall not vary more than 1/8 inch, as measured from the bottom of the straightedge, on deck surfaces exposed directly to traffic.

Areas showing deviations greater than those specified shall be corrected in a manner approved by the Engineer. All corrected areas shall be textured to match the finish of the surrounding deck surface.

All areas corrected shall not show deviations in excess of that specified when tested with a ten-foot straightedge.

Concrete curing shall be accomplished with both white pigmented curing compound and water curing in accordance with Section 505 and 726 of the Standard Specifications.

Dimensional Tolerances:

Construction dimensional tolerances shall be in accordance with Section 601-4, concrete Structures, Tests on Finished Structures, of the Arizona Department of Transportation Standard Specifications for Road and Bridge Construction, Edition of 1987 (revised to date).

Reinforcing Steel:

Reinforcing steel shall be furnished in the sizes, shapes, and lengths, shown on the plans and in conformance with the requirements of these Special Provisions. Certificates of Compliance conforming to the requirements of MAG Subsection 106.2 shall be submitted.

When reinforcing steel is delivered to the site of the work, the Contractor shall furnish the Engineer with three copies of all shipping documents. Each shipping document shall show the sizes, lengths and weights of the reinforcing steel separately for each structure.

Steel bars used as reinforcement in concrete shall be deformed and shall conform to the requirements of ASTM A 615, Grade 60.

Shop drawings and lists showing the bending of reinforcement bars shall be submitted by the Contractor to the Engineer for approval, but such approval shall not relieve the Contractor of responsibility for the correctness of such drawings and lists.

Any discrepancy or error found by the Contractor in checking a bending diagram shown on the project plans or in preparing shop drawings or lists shall be reported immediately to the Engineer, and the discrepancy or error shall be corrected in advance of fabrication and delivery of materials.

When bending is required, it shall be done without the use of heat, and bars having cracks or splits at the bends will be rejected.

Reinforcement shall be accurately fabricated and placed as shown on the plans and shall be firmly held in place by wire ties at all intersections and splices with 16 gauge or heavier tie wire and by using precast mortar blocks or ferrous metal chairs, spacers,

metal hangers, supporting wires or other approved supports. Where reinforcement spacing is less than 12 inches in each direction alternate intersections may be tied. Tack welding or reinforcement will not be permitted unless approved in writing by the Engineer.

Distances from the forms shall be maintained so that the reinforcement does not vary from the position indicated on the plans by more than 1/4 inch. Reinforcement in any member shall be placed, inspected and approved before any concrete is placed.

All reinforcement shall be furnished in the full lengths indicated on the project plans. Splicing of bars, except as shown on the plans, will not be permitted without the Engineer's approval. Splices shall be staggered as far as possible. The type and method of splices or connections shall be approved by the Engineer.

In lapped splices, the bars shall be placed on contact with one another and wired together in such a manner as to maintain a clearance of not less than the minimum clear distance to other bars and the minimum distance to the surface of the concrete, as specified in the AASHTO Standard Specifications for Highway Bridges. Lap lengths shall be as shown on the plans.

Payment for all work under this section will be made at the unit price bid per cubic yard for **ITEM 505-1 - CLASS "A" CONCRETE** and **ITEM 505-2 - CLASS "AA" CONCRETE** and the unit price bid per pound for **ITEM 505-3 - REINFORCING STEEL**.

Payment will be made at the unit, price bid per each **ITEM 505-4 - CONSTRUCT CONCRETE SPILLWAY, INLET AND OUTLET** including all labor and materials.

DRILLED SHAFT FOUNDATIONS: ITEM 505-5 - 6'-6" DIA. DRILLED SHAFT FOUNDATION of the Bidding Schedule shall conform to the following:

Description: The work under this section consists of furnishing all materials and equipment necessary to construct reinforced concrete columns formed within a drilled excavation in reasonably close conformity with the details, dimensions, and locations shown on the project plans and the requirements of these special provisions. These Special Provisions contain requirements of the use of drilling slurry and metal casing. Neither the slurry or the casing is required, unless caving of the shaft occurs.

When the terms "caisson" and "shaft" are used hereinafter or on the project plans, they shall construed to mean drilled shaft foundation and drilled excavation, respectively.

General Requirements: Prior to constructing any caissons, including any test caissons, the Contractor shall submit to the Engineer a list of all major equipment, with respective capacities, that will be used to construct the caissons and the proposed construction procedure. The submission shall indicate, in detail, the techniques to be used in drilling the shaft and inspecting the completed excavation and reinforcing and concreting the caissons.

The Engineer will review the submission. If at any time during the construction of caissons or test caissons, the Engineering determines that the equipment, materials or procedures, either singly or in combination, are such that defects in the work may occur, the Engineer may stop the work until appropriate changes are made by the Contractor. In no case shall the Contractor be relieved of his responsibility for constructing acceptable caissons.

After constructing one or more caissons or test caissons, the Contractor may make minor modifications to the equipment, materials or procedures, either singly or in combination, and shall advise the Engineer of the changes in writing. The Engineer will review the proposal and may require the Contractor to construct another test caisson in order to test the proposed changes prior to constructing any additional bridge foundation caissons.

An acceptable test caisson (if a test caisson is required) or an acceptable bridge foundation caisson shall be constructed prior to the construction of any other caissons for the bridge foundation.

The decision of the Engineer as to the acceptability of completed caissons is final.

Materials:

Concrete: Concrete shall be Class "AA" ($f_c = 4,000$ psi) conforming to the requirements of Section 725 for the strength of portland cement concrete shown on the project plans. Where concrete is placed in shafts containing bentonite slurry or water, the cement content of the concrete shall be between 658 and 752 pounds per cubic yard and the size of the coarse aggregate shall not exceed 1 inch. Water reducing and air entraining agents may be used.

Reinforcing Steel: Reinforcing steel shall conform to the requirements of ASTM A 615, Grade 60.

Metal Casing: Casing shall be of unit or sectional construction and shall prevent seepage of water. Casing shall be of sufficient strength to withstand handling stresses, the pressure of concrete and of the surrounding earth. Casings are not required except as a temporary measure if caving of the shaft should occur.

Shaft Forms: If the size of the shafts adjacent to the channel cannot be maintained within 2 inches of the shaft diameter as shown on the plans for the depth of the proposed channel or if over drilling will narrow the channel width, sonotube or an approved method shall be used to control the shaft diameter and location shown on the plans.

Construction Requirements:

Excavation: The Contractor shall perform all excavation required for the shafts, rock sockets or belled footings, through whatever substances encountered, to the dimensions and elevations shown on the project plans or required by the site conditions. The maximum deviation from plumb, the maximum variation of the center axis of any shaft at the top, and the maximum deviation in diameter shall be as specified on the project plans.

The anticipated subsurface conditions and depths where satisfactory bearing material may be encountered are indicated on the project plans, however, no warranty of the subsurface conditions and depths where satisfactory bearing material may be encountered shall be inferred.

The bottom elevation of an caisson may be raised or lowered from that shown on the project plans as ordered by the Engineer. No reinforcing steel or concrete shall be placed in a shaft until the final elevation has been determined.

The Contractor shall protect the shaft from caving in at the surface either by constructing a concrete slab or by placing a temporary casing or by other methods as approved by the Engineer. The Contractor shall either drill or form a circular opening at the center of the slab. The slab shall be broken up and removed at the completion of the caisson construction. If a casing is used, it shall be removed after the concreting of the shaft is completed and while the concrete is still fluid. Casing shall not be left in place except as indicated on the project plans or as approved by the Engineer.

Casing specified on the project plans or approved by the Engineer to remain in place shall be installed in such a manner that there will be no voids between the earth and the casing.

When caving conditions are encountered, drilling shall cease until modifications to the equipment, materials or procedures are made that will prevent such caving. If a steel casing is used, it shall be clean and shall extend to the top of the shaft. The inside diameter of the casing shall not be less than the specified size of the caisson.

Material excavated from shafts and ^{NO BELLS} bells and not used elsewhere on the project shall be disposed of as approved by the Engineer.

When the project plans indicate that shafts are to be drilled within embankments, the embankments shall be constructed as shown on the project plans and thoroughly compacted in accordance with the requirements of Section 206 prior to drilling, except as otherwise approved by the Engineer.

Open excavations that are deemed to be potentially hazardous by the Engineer shall be covered at the end of each shift in a manner approved by the Engineer.

Reinforcing Steel: The reinforcing steel cage shall consist of the longitudinal bar and spiral hoop reinforcement. The cage shall be completely assembled and placed into the shaft as a unit.

Unless otherwise indicated on the project plans, or approved by the Engineer, splicing of reinforcing steel will not be permitted. Lap splices in spiral hoop reinforcement shall be in accordance with the details shown on the project plans or as approved by the Engineer and only at locations approved by the Engineer.

The reinforcing steel cage shall not be placed until immediately before concreting operations are to be started and shall be placed in accordance with the details shown on the project plans.

The cage shall be adequately supported and anchored from the top to prevent movement during the concrete placement and for at least four hours thereafter. The exact length of time will be determined by the Engineer. The support shall be concentric and shall support at least one-half of the vertical bars. Spacers shall be at sufficient intervals along the shaft to insure minimum concrete cover for the entire length of the caisson. The type of spacer used shall be approved by the Engineer.

If the shaft is deepened and the project plans indicate full depth reinforcement, the bars in the lower portion of the caisson shall be extended accordingly, as directed by the Engineer, to the bottom of the shaft. These bars shall be lap spliced, spliced by butt welding or by other connecting procedures approved by the Engineer to the proper length in accordance with the requirements of Section 605. If the project plans indicate spiral or tie reinforcement for the full depth of the caisson, the spiral or tie reinforcement shall also be extended to the bottom of the shaft as directed by the Engineer.

Concrete:

General: Concrete shall be placed as soon as possible after completion of the shaft and the placement of the reinforcing steel cage. Any sloughage or other loose material shall be machine cleaned from the shaft prior to placing reinforcing steel and concrete. An accumulation of loose soils, mud, etc., at the bottom of the shaft will not be allowed at the time of placing steel or concrete. A flight auger shall not be used for cleaning purposes.

Concrete placement shall be continuous in the shaft to the top elevations or to construction joints shown on the project plans and shall be in accordance with the requirements of Section 505 and as specified herein. Concrete in drilled shafts shall be consolidated by vibration.

Prior to the placing of concrete, the Contractor shall have made all the necessary arrangements to assure the uninterrupted delivery of concrete so that each caisson will be constructed without cold joints.

The Contractor shall exercise care so that no damage to a completed caisson will occur. The Contractor shall not begin construction of the footings, formed columns or cap beams or remove the concrete pad until at least 48 hours after the concreting of the shaft is completed for the respective caisson.

Placement in Dry Excavations: Concrete shall be placed by means of a gravity-fed tremie pipe or a combination concrete pump and tremie pipe. The tremie pipe shall be of a rigid, watertight pipe for the full length of the caisson and shall not be less than six inches in diameter.

Casing Removal: During removal of any casing, a sufficient head of not less than 5 feet of fluid concrete shall be maintained above the bottom of the casing except at the top of the shaft. All contaminated concrete below the top of the caisson shall be removed.

If the removal of the casing causes an upward movement of the concrete and/or reinforcing steel cage of 1 inch or less, the casing may continue to be pulled provided no further movement occurs and if the concrete is vibrated or rodded to reconsolidate the concrete. Vibration or rodding of the concrete shall not be used to attempt to break the casing loose for excavation.

If the upward movement is greater than 1 inch, the casing shall be left in place as a permanent sleeve at the Contractor's expense. A load test may be required by the Engineer to determine the adequacy and acceptability of the caisson.

Test Caisson: Unless otherwise directed by the Engineer, a test caisson is not required.

Inspection and Tests: After completion of a shaft and prior to placement of the reinforcing steel cage and concrete, the shaft will be inspected by the Engineer. The Contractor shall provide suitable equipment for the Engineer to inspect the completed excavation.

Caisson Repair: After the inspection the Engineer determines, that the integrity of the bridge foundation has been compromised, the Engineer will order the Contractor to make such repairs as are deemed necessary by the Engineer.

Method of Measurement: Caissons will be measured by the linear foot. Measurement will be made from the top of the accepted caisson to the bottom, as indicated on the project plans or as directed by the Engineer.

Basis of Payment: The accepted quantities of caissons, measured as provided above, will be paid for at the contract unit price per linear foot for the diameter designated in the bidding schedule, complete in place, including excavation, drilling slurry, metal casing, steel reinforcing, portland cement concrete, concrete slabs, and any needed forming, curing and finishing. No additional payment will be made for metal casing that is to remain in place.

The contract unit price shall also include the cost of exposing, by excavation, the upper length of the test caissons, the drilling and/or backfilling of any additional shafts and the construction of any additional test caissons.

The contract unit price shall also include the cost of the core drilling or exposing of concrete and the subsequent repair of caissons as hereinbefore specified under "Caisson Repairs" for caissons which are deemed to be unacceptable.

The contract unit price shall also include the cost of furnishing all materials, equipment and labor necessary for the splicing of reinforcing steel and for the radiographic testing of welds and the testing of butt splices and threaded splices.

If the Contractor is ordered by the Engineer to core drill or otherwise expose the caisson for inspection and no voids, unconsolidated concrete or other condition that will compromise the integrity of the bridge foundation is determined by the Engineer to exist, the cost of such work and the cost of the subsequent repairs will be paid for in accordance with the requirements of Subsection 109.04 of ADOT Standard Specifications.

No measurement of direct payment will be made for the reinforcing steel extending from the top of the drilled shaft foundation into the cap, the price being considered as included in the cost of the respective drilled shaft foundation.

When load tests are required by the Engineer to determine the adequacy and acceptability of drilled shafts, payment for load tests for drilled shafts determined to be adequate and acceptable will be made in accordance with the provisions of Subsection 109.4 of MAG Uniform Standard Specifications.

Load tests for drilled shafts determined to be inadequate and unacceptable will be at the Contractor's expense.

SECTION 506 - PRECAST PRESTRESSED CONCRETE GIRDERS: The work under this section shall consist of furnishing and erecting the bridge girders as shown on the plans and in accordance with AASHTO Standard Specifications for Highway Bridges dated 1989 and Section 106.3 of these Special Provisions.

All materials and construction of prestressed bridge girders shall conform to Section 506 of the Uniform Standard Specifications, except as modified by these Construction Special Provisions.

Portland Cement Concrete for Prestressed Girders shall conform to Section 506.2 of the Uniform Standard Specifications and these Construction Special Provisions. It shall have a minimum compressive strength equal to $f_c = 6,000$ psi.

The elastomeric bearing pads shall meet the requirements of Section 25 - Elastomeric Bearings of the AASHTO Standard Specifications for Highway Bridges dated 1989. Bearing pads shall have a durometer hardness of not less than 60.

No separate payment will be made for the elastomeric bearing pads, anchor bolts, prestressing or post-tensioning steel, reinforcing steel or other embedded items necessary to the furnishing of the girders complete-in-place.

Payment will be made at the unit price bid per each for:

**ITEM 506-1 - PRECAST PRESTRESSED GIRDER AASHTO TYPE 5
MODIFIED**

PART 600 - WATER AND SEWER

SECTION 601 - TRENCH EXCAVATION, BACKFILLING, AND COMPACTION:

SECTION 601.2.1 - General: is amended to add the following paragraph.

"No extra compensation or additional time will be authorized for claims that soil conditions differ from those anticipated or those indicated by soil logs and/or reports. It is the Contractor's responsibility to make his own determination as to actual existing conditions."

SECTION 601.2.2 - Trench Width: is amended to add the following paragraph.

"If the Contractor elects to slope the trench walls in lieu of shoring, sheeting or other wall support measures, he shall be responsible for any and all problems encountered and costs incurred as a result of the increased trench width. Furthermore, no increase in contract time will be allowed as a result of sloping trench walls."

SECTION 601.2.5 - Over Excavation: is amended to add the following paragraph.

"When the Engineer determines that over excavation and backfilling, below the normal foundation and bedding depth, are required as a result of unsuitable material, it will be considered extra work. Payment and construction time extension will be negotiated with the Contractor or as otherwise provided for in these contract documents. As a condition of the Contractor receiving payment, agreement on method of payment and construction time extension shall be reached prior to start of work unless otherwise authorized in writing by the Engineer."

SECTION 601.2.8 - Grading and Stockpiling: Add the following paragraph:

"Excavated material shall not be considered as unsuitable due to an excessive moisture content or an inadequate moisture content for proper compaction. The Contractor shall take whatever measures are required at his own expense to add or remove moisture from material to be used as backfill in order that proper compaction can be obtained within the limits set in Section 601.4."

The Contractor may elect, at no cost to the Contracting Agency, to haul off and dispose of excessively wet or dry material and replace it with material conforming to the specifications for backfill.

In either event, the proper compaction shall be obtained. There will be no additional payment or time extension for this work.

SECTION 601.4.3 – Backfill: Delete the fourth paragraph in its entirety, and substitute the following:

"When mechanical compaction is to be used, the Contractor will provide a test section demonstrating his proposed method and equipment to be used. Upon agreement with the Engineer as to the acceptability of the Contractor's proposed method and equipment, they shall not be changed without prior approval of the Engineer. Mechanical compacted lifts in excess of one foot will not be allowed without the express written consent of the Engineer."

SECTION 601.4.3 – Backfill: is amended to add the following paragraphs:

"Backfill material shall be within the range of +2% to -4% of the optimum moisture content, prior to placing the material in the trench. The moisture content shall be uniform throughout the backfill material. Material not meeting these requirements may be required to be removed from the trench and moisture added or removed to correct the deficiencies prior to replacement, all at no increase in cost to the contract."

It shall be the Contractor's responsibility to blend excavated material, removing or adding moisture as may be necessary to meet the requirements of the specifications, all at no increase in cost to the contract.

The moisture content requirements contained herein are waived when granular material is used and water settled.

The Engineer may require all or any part of the trench to be load tested for stability with Contractor's equipment prior to placement of asphalt pavement. Unstable areas as determined by the Engineer shall be corrected by the Contractor at no increased in cost to the contract."

LIMITS TO BACKFILL TYPE

- Type I: Road right-of-way and to 10' above pipes in the New River right-of-way.
- Type II: Will not be used.
- Type III: For all structures.

SECTION 601.4.10 – Submittal: The Contractor shall submit his plan, methods and procedures for protecting existing utilities prior to beginning construction. Approval of the plan does not limit the Contractor's responsibility for utility protection, and the Contractor shall implement all additional utility protection measures as determined to be necessary in the field.

SECTION 610 - WATER LINE CONSTRUCTION - ITEMS 610-1 through 610-8 inclusive shall conform to MAG Standard Section 610 and as here in modified and detailed on the plans. All ductile iron water line shall be class 52 with gray iron or ductile iron fittings with a minimum pressure rating of 250 psi. All ductile iron pipe and fittings shall have restrained joints at all locations. Restrained joints shall be manufactured by "US Pipe, TR Flex" or an approved equal. All restrained joints shall be designed for a working pressure of 350 psi. Where shown on the plans, the water lines shall be concrete encased according to the appropriate of MAG Details 402 or 404. Payment for concrete encasement of water lines shall be made at the unit price bid per lineal foot for:

ITEM 610 - 4 - CONCRETE ENCASUREMENT OF 12" WATER LINES

Payment shall be compensation in full for all materials, equipment, excavation, form work, concrete and reinforcing steel necessary to construct encasement at the locations shown on the plans, complete and in place.

Slurry encasement of waterlines and sewer lines shall be in accordance with SECTION 610.1 of these Special Provisions.

SECTION 610.1 - SLURRY CEMENT ENCASUREMENT: Slurry cement encasement shall consist of a fluid, workable mixture of aggregate, cement and water.

When slurry cement encasement is used, the width of the excavation may be reduced so that the clear distance between the outside of the pipe and the side of the excavation on each side of the pipe, is a minimum of 6 inches. Where necessary, earth plugs shall be compacted at each end of the pipe prior to placing encasement in a manner that will completely contain the slurry in the pipe trench.

Cement shall be portland cement conforming to the provisions in MAG Section 725.2, "Portland Cement," except that testing will not be required.

Water used for slurry cement encasement shall be free from oil, salts and other impurities which would have an adverse effect on the quality of the encasement material.

At the option of the Contractor, aggregate shall be either (1) material selected from excavation, imported material, or a combination thereof, which is free of organic material and other deleterious substances, or (2) commercial quality concrete sand. Material selected from excavation, imported material, or a combination thereof, shall meet the following grading:

<u>Sieve Sizes</u>	<u>Percentage Passing</u>
1 1/2"	100
1"	80-100
3/4"	60-100
3/8"	50-100
No. 4	40-80
No. 100	10-40

The aggregate, cement and water shall be proportioned either by weight or by volume. Not less than 188 pounds of cement shall be used for each cubic yard of material produced. The water content shall be sufficient to produce a fluid, workable mix that will flow and can be pumped without segregation of the aggregate while being placed.

Materials for slurry cement encasement shall be thoroughly machine-mixed in a pugmill, rotary drum, or other approved mixer. Mixing shall continue until the cement and water are thoroughly dispersed throughout the material. Slurry cement encasement shall be placed in the work within one hour after mixing.

Slurry cement encasement shall be placed in a uniform manner that will prevent voids in, or segregation of, the encasement, and will not float or shift the pipe. Foreign material which falls into the trench prior to or during placing of the slurry cement shall be immediately removed.

Backfilling over or placing any material over slurry cement encasement shall not commence until 4 hours after the slurry cement has been placed.

Payment for slurry encasement of water lines shall be made at the unit price bid per lineal foot for:

ITEM 610-5 - SLURRY ENCASEMENT OF 12" WATER LINES

Payment shall be compensation in full for all materials, equipment, and labor necessary to construct the slurry encasement at the locations shown on the plans, complete and in place.

SECTION 610.2 - WATER METER CONSTRUCTION: ITEM 610-7 - 12" WATERLINE METERING STATION shall include construction of a two-way water meter, meter vault, two 12-inch isolation gate valves and all appurtenant work.

REFERENCE STANDARDS

- AWWA C700 "Cold-Water Meters - Displacement Type"
- AWWA C704 "Cold-Water Meters - Propeller Type for Main Line Applications"

SUBMITTALS

Submit shop drawings, catalog data, installation instructions, and operation and maintenance instructions on meters.

ACCEPTABLE MANUFACTURERS

Flow Meters - Displacement Type
To be furnished by City of Peoria.

Flow Meters - Propeller Type
Water Specialties Corp, Porterville, CA - Model ML-04

Flow Meter Totalizer, Indicator and Transmitter
Water Specialties Corp, Porterville, CA - Model CN-01-2

EQUIPMENT

Flow Instrumentation shall include propeller meter, indicator, totalizer and transmitter.

Displacement meters shall conform to AWWA C700. Meter will be furnished by City of Peoria and installed by Contractor. Contractor shall furnish meter box, saddle, corp stops and all appurtenant work.

Propeller meters shall conform to AWWA C704.

Isolation valves shall be 12-inch resilient wedge gate valves, class 150.

PREPARATION

Flush new pipelines and service lines before installing meters.

INSTALLATION

Do not use meters to straighten misaligned pipes. If necessary, add a spool piece of proper length to assure alignment of pipe for meter installation.

After installing meters, fill line and meter with water by slowly opening the inlet valves and allowing trapped air to be released slowly at the highest point available. Avoid rapid expulsion of large slugs of entrained air.

SCHEDULES

Displacement Meters

Location	Water Service
Quantity	1
Size	3/4" x 5/8"
Pressure	150 psi
Water Temperature	100 F
Materials	Standard
End Style	Match Existing Pipe
Registration Units	Confirm with City of Peoria

Propeller Meter

Location	Water Line
Quantity	1
Size	12-inch
Working Pressure	150 psi
Water Temperature	100 F
Flow Range	
Minimum	150 gpm
Maximum	3,000 gpm
Intermittent	3,500 gpm
Accuracy	2%
Full Scale Indication	Confirm with City of Peoria
Indicator Direction	Two way
Totalizer Units	1,000 gallons
Totalizer Direction	Two way
Outputs	
Style	
Materials	
Main Casing	Standard
Protective Coating	Epoxy
End Style	Flanged
Meter Position	Horizontal Flow
Options	
Straighten Vanes	Yes
Hermetic Seal on Register	Yes
Register Test Hand	Yes
Register Extension	Yes
Length	2 feet
Lining	Epoxy
Lining Thickness	6 mils

Payment for construction of the metering station as detailed on the plans and these specifications shall be on a lump sum basis and shall be compensation in full for all materials, equipment and labor required to install the meter and all appurtenant items complete and in place.

SECTION 615 – SEWER LINE CONSTRUCTION – ITEMS 615-1 through 615-5 shall conform to MAG Standard Section 615, as supplemented by the City of Phoenix. This work shall be completed in accordance with the detailed on the plans. Payment will be made at the contract unit price as bid per lineal foot of sanitary sewer as measured in place for the size and type as indicated.

All ductile iron sanitary sewer pipe shall conform to SECTION 615.1 of these Special Provisions. All ductile iron pipe and fittings shall have restrained joints at all locations. Restrained joints shall be manufactured by "US Pipe, TR Flex", or an approved equal. All restrained joints shall be designed for working pressure of 350 psi.

All 12-inch Ductile Iron Sewer Line installed for the City of Peoria Force Main shall be pressure tested and leakage tested in accordance with and to the same tolerance as defined in MAG Section 610.14.

Where shown on the plans, the sanitary sewer shall be concrete encased according to the appropriate of MAG Details 402 or 404. Payment for encasement of sanitary sewer shall be made at the unit price bid per lineal foot for:

**ITEM 615-3 – CONCRETE ENCASEMENT OF 12" SANITARY SEWER and
ITEM 615-4 – CONCRETE ENCASEMENT OF 18" SANITARY SEWER**

Payment shall be compensation in full for all materials, equipment, excavation, formwork, concrete and reinforcing steel necessary to construct encasement at the locations shown on the plans, complete and in place.

Slurry encasement of sewerlines shall be in accordance with SECTION 610.1 of these Special Provisions.

Payment for slurry encasement of sewer lines shall be made at the unit price bid per lineal foot for:

ITEM 615-5 – SLURRY ENCASEMENT OF 12" SEWER LINES

Payment shall be compensation in full for all materials, equipment and labor necessary to construct the slurry encasement at the locations shown on the plans, complete and in place.

SECTION 615.1 - DUCTILE IRON PIPE:**REFERENCE STANDARDS**

ANSI B1.1	"Uniform Screw Threads"
ANSI B16.1	"Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250, and 800"
ANSI B16.21	"Non-metallic Flat Gaskets for Pipe Flanges"
ANSI B18.2.1	"Square and Hex Bolts and Screws Inch Series Including Hex Cap Screws and Lag Screws"
ANSI B18.2.2	"Square and Hex Nuts"
ASTM A47	"Malleable Iron Castings"
ASTM A193	"Alloy-Steel Bolting Material for High Temperature Service"
ASTM A194	"Carbon and Alloy Steel Nuts for High Pressure and High Temperature Service"
ASTM A261	"Heat Treated Carbon Steel Bolting Material"
ASTM A307	"Carbon Steel Externally Threaded Standard Fasteners"
ASTM A536	"Ductile Iron Castings"
AWWA C104	"Cement-Mortar Lining for Ductile-Iron and Gray-Iron Pipe and Fittings for Water"
AWWA C110	"Ductile-Iron and Gray-Iron Fittings, 3 In. through 48 In., for Water and Other Liquids"
AWWA C115	"Flanged Ductile-Iron and Gray-Iron Pipe with Threaded Flanges"
AWWA C151	"Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water or Other Liquids"
AWWA C153	"Ductile-Iron Compact Fittings, 3 In. through 16 In. for Water and Other Liquids"
AWWA C600	"Installation of Ductile-Iron Water Mains and Appurtenances"

Fed. Spec. TT-V-51F "Varnish, Asphalt"

SUBMITTALS

Submit fully dimensioned drawings of piping layouts, including schedules of all pipe, fittings, valves, expansion joints, transition fittings for dissimilar flange connections and other appurtenances. Where special design of fittings are required, show the work in large detail and completely described and dimensioned.

Submit installation instructions.

DELIVERY, STORAGE, AND HANDLING

Conform to manufacturer's installation instructions and/or applicable provisions of AWWA standards for installing pipelines and appurtenances.

Store gaskets in a proper manner to prevent deterioration.

At all times when pipe laying is not in progress, close the open ends of the pipeline using a temporary water-tight bulkhead, plug or other means approved by the Owner's Representative.

ACCEPTABLE MANUFACTURERS

Ductile Iron Pipe

American Cast Iron Pipe Company, Birmingham, AL
Clow Water Systems Co., Coshocton, OH
McWane Cast Iron Pipe Co., Birmingham, AL
Pacific States Cast Iron Pipe Co., Provo, UT
United States Pipe and Foundry Co., Birmingham, AL

Cast Iron / Ductile Iron Fittings

Dayton Casting Co., Dayton, OH
EBAA Iron Inc., Eastland, TX
Sigma
Standard International
Stockham Valves & Fittings, Birmingham, AL
Trinity Valley Iron & Steel Co., Fort Worth TX
Tyler Pipe Industries, Inc., Tyler TX
Union Foundry Co.
United States Pipe and Foundry Co., Birmingham, AL

Gaskets

Crane Company, King of Prussia, PA
Garlock Blue-Gard Style 3200/3400
Klinger, Richard Inc., Sidney, OH

MATERIALS

Ductile iron pipe shall be designed in accordance with AWWA C150 and manufactured in accordance with AWWA C151. Flanged ductile iron pipe shall conform to AWWA C115. Unless otherwise indicated, pipe shall have a minimum thickness of Class 50 for sizes up through 16-inch, and Class 51 for larger sizes, except that the thickness of pipe with threaded flanges or vicalvic grooves shall not be less than Class 53. Ductile Iron Pipe shall have a 1 mil thick asphaltic coating (shall have the standard outside coating specified in ANSI A21.6 Section 6-8.1.), and shall have a uniform cement mortar lining of double thickness in accordance with AWWA C104. Do not coat or paint pipe which is to be encased in concrete. Paint weight and class designation conspicuously in white on each pipe, fitting or special casting after the shop coat has hardened.

Ductile iron, gray iron and cast iron fittings shall be rated for 250 psi or 350 psi working pressure depending on joint size and pipe size per AWWA C110. Fittings shall have a 1 mil thick asphaltic coating. Fittings shall have a uniform cement mortar lining of double thickness in accordance with AWWA C104. A radial outlet at 45 degrees to the horizontal may be substituted for tangential outlets on ductile iron pipe.

Flanges for ductile iron pipe shall be screwed on the threaded end of the pipe in the shop. Resurface the face of the flange and the end of the pipe together. No leakage shall occur through the pipe threads. Design flanges to prevent corrosion of threads from the outside. Flanges shall meet the requirements of ANSI B16.1, 125 pound or 250 pound as shown, and shall be faced and drilled to that standard, unless special drilling is called for or required to mate with adjacent flanges. Face flanges accurately at right angles to the pipe axis. Drill flanges smooth and true, so that bolt circle drilling is to a tolerance of $\pm 1/16$ inch, bolthole spacing is to a tolerance of $\pm 1/32$ inch and eccentricity of bolt circle with respect to bore is $1/32$ inch maximum. Cover flanges with zinc dust and tallow or equivalent material immediately after facing and drilling. Where tap or stud bolts are required, flanges shall be tapped. Where dissimilar flanges are shown to be connected together, furnish specially fabricated transition fittings as needed to implement the connection. Flanges shall be ductile iron. Do not use cast iron flanges.

Bolts and studs shall, unless otherwise shown, conform to ANSI B18.2.1, ASTM A193, or ASTM A261. Nuts shall, unless otherwise specified, conform to ANSI B18.2.2 or ASTM A194. Steel shall be ASTM A307 grade B. Bolts and nuts shall be heavy hexagon series. Threads shall conform to ANSI B1.1 Class 2 except that Class 3 fit shall be used in holes tapped for studs. Between $1/4$ inch and $3/8$ inch shall project through the nut when drawn tight.

Gaskets for flanged joints shall be of the full faced type meeting the requirements of ANSI B16.21. Flange Gaskets shall be rubber with cloth insertion.

Nylon insulating pipe bushings, unions or couplings shall be used to isolate pipe or fittings made of nonferrous metals from ferrous metals.

EXECUTION

Flange joint faces shall bear uniformly on the gasket. Bolts shall be tightened uniformly.

Ductile Iron Pipe

Pipe Material	Ductile Iron Pipe
Diameter	24-inch
Class	50 above ground, 52 below ground
Lining	Sulfide resistant epoxy lining - coal tar epoxy-16 mil or fusion bonded epoxy 40 mil
Coating	16 mil coal tar epoxy finish
Joints	Flanged

SECTION 625 - SANITARY SEWER LIFT STATION CONSTRUCTION: All portions of work associated with the construction of a sanitary sewer lift station for the City of Peoria will be paid for under **ITEMS 625-2 through 625-4.**

Payment may be withheld for work completed on any bid item if the finished product as installed fails to fulfill its intended purpose as stated herein or in manufacturer's printed literature, in a trouble-free and reliable manner.

Final payment will not be made until all work has been tested as a unit, demonstrating to the Owner's satisfaction that all structural, mechanical and electrical equipment functions successfully as a unit. Final acceptance will be made after this system demonstration has been completed.

To justify partial payments on any lump sum bid items, the Contractor shall submit an itemized breakdown of the contract price of lump sum bid items to the Owner's Representative for approval. The breakdown shall include such milestones, quantities, unit prices, or other information in sufficient detail to be used by the Owner's Representative in preparing monthly progress estimates. Progress payments on lump sum bid items may be withheld until this breakdown is submitted by the Contractor and approved by the Owner's Representative.

SECTION 625-1 - LIFT STATION - CIVIL ITEMS: Work under this item shall include construction of a 96-inch diameter Wet Well, a 12' x 18'-6" concrete Pump Pad, a six foot high masonry block wall and 14' redwood sliding gate, and all appurtenant work.

Pump Pad shall be cast-in-place concrete conforming to MAG Section 725 Type A with a 28-day compressive strength of 3,000 psi. Steel Reinforcement shall be Grade 40 conforming to MAG Section 727.

Masonry Block Wall shall be constructed according to the details shown on the plans and per MAG Section 510.

Redwood Gate shall be constructed according to the details shown on the plans. Redwood shall conform to MAG Section 778, Concrete shall conform to MAG Section 725, Type C with a 28-day compressive strength of 2,000 psi.

Construction of the 96-inch diameter wet well for the City of Peoria's sanitary sewer lift station shall be in accordance with SECTION 625.1.1 of these Special Provisions.

Measurement and payment for **ITEM 625-1 - LIFT STATION - CIVIL ITEMS** shall be on a lump sum basis and shall be compensation in full for providing all materials, equipment, labor, tools, excavation, backfill, form work, and all appurtenant work necessary for the construction of all items complete and in place.

SECTION 625.1.1 - WET WELLS:

REFERENCE STANDARDS

- ACI 305 "Hot Weather Concreting"
- ACI 306 "Cold Weather Concreting"
- ASTM C32 "Sewer and Manhole Brick (Made from Clay or Shale)"
- ASTM C33 "Concrete Aggregates"
- ASTM C62 "Building Brick (Solid Masonry Units made from Clay or Shale)"
- ASTM C94 "Ready-Mixed Concrete"
- ASTM C150 "Portland Cement"
- ASTM C443 "Joints for Circular Concrete Sewer and Culvert Pipe Using Rubber Gaskets"

ASTM C478 "Precast Reinforced Concrete Manhole Sections"

SUBMITTALS

Submit shop drawings for manhole bases, risers, frames and covers.

DELIVERY, STORAGE, AND HANDLING

Handle precast manhole components using suitable lifting slings and plugs that will not damage the precast manhole lip.

Repair and patch minor breaks by chipping and scarifying the defective areas before applying grout. Allow sufficient time for curing before precast sections are lifted.

ACCEPTABLE MANUFACTURERS

Butyl Sealing Compound

Ram-Nek manufactured by K.T. Snyder Company, Inc.
or approved equal

Cover and Frame Assemblies

Alhambra Foundry Company, Alhambra, CA
or approved equal

Gaskets

Dura-Seal III manufactured by Dura-Tech
or approved equal

Precast Concrete Manholes

B&W Construction Company, San Marcos, CA
Mar-Con Products, San Marcos, CA
Smith Pre-Cast, Phoenix, AZ

PVC Liner with Protrusions for Concrete Embedment

A-Lok Products, Inc., Tullytown, PA
Ameron Protective Coatings Division, Brea, CA
Atlas Steuler Division of Atlas Minerals & Chemicals, Mertztown, PA
Hydro Can, Phoenix, AZ

MATERIALS

Cast-in-place bases shall be constructed of cast-in-place non-reinforced concrete, consisting of manhole bottom including the shaped invert and walls extending at least 6

inches above the top of the highest inflowing pipe. Form bases, including bottoms, inverts, and walls in standard metal forms designed specifically for this use.

Manholes shall be precast concrete. Precast risers shall be constructed of precast reinforced concrete manhole sections conforming to ASTM C478.

Manhole covers and frames shall conform to MAG Specification section 787. Castings shall be close-grained, tough gray iron, free from cracks, holes, swells, and cold shuts. The quality shall be such that a blow from a hammer will produce an indentation on a rectangular edge of the casting without flaking the metal. Manhole castings shall be made accurately to the pattern and to the dimensions shown with carefully machined bearing surfaces. Make allowances in the patterns so that specified thicknesses are not reduced. Lids which rock will be rejected and shall be replaced with adequate lids. No plugging, burring in, or filling will be allowed. Covers shall fit frames in any position. Weight and dimensional tolerances shall not exceed those permitted by ASTM Standards. Manhole covers shall be of watertight construction. A neoprene or composition-type gasket shall provide a seal between the manhole cover and frame.

Joints shall be designed to permit effective joining and placement without irregularities in the interior manhole wall surface. The top of base walls, the ends of reinforced concrete risers, and the bottom ends of precast tops shall be formed to make a continuous manhole when risers and tops are assembled with the base.

Manhole joint seals shall ensure watertight joints. Use an outer circular seal consisting of a butyl compound and an inner seal consisting of cement mortar or grout for each joint.

PREPARATION

Wet well bases shall rest upon and be uniformly supported by a 6 inch mat of compacted screened gravel placed over a base of sound, level, undisturbed earth.

INSTALLATION

Set pipes entering precast sections of wet wells securely in the precast opening at the correct line and grade.

Do not set wet well sections by wedging or placing shims to secure proper levels.

In constructing wet wells, keep groundwater away from newly grouted pipe and rings or freshly laid brick work until cement has set and until a watertight job is obtained. Repair manholes which admit groundwater.

Seal joints between concrete wet well sections with grout, rubber gaskets, or other sealing compounds to ensure watertight joints. The type of sealant and joint seal procedure shall be approved by the Owner's Representative.

SCHEDULES

Wet Well Construction

Location	Wet well
Diameter	96 inches
Concrete Materials	Class A concrete 3000 psi fc
Portland Cement Type	Type V Portland cement - sulfide resistant
Finish Class	MAG 505 Class 1
Steel Reinforcement	Grade 60
Access	
Ladder	none
Steps	none
Access Frame	Standard Manhole Frame and Cover
Vent	in manhole cover
Interior Coating	PVC liner
Exterior Coating	16 mil coal tar epoxy in 2 coats

Gray Iron Castings

Item	Cast iron manhole cover
Diameter	24-inches
Venting	vented manhole
Weight	400 lbs minimum for frame plus cover
Agency Identification	"PEORIA SEWER" 2 inches high raised 1/8 inch
Finish	paint or dip in commercial quality asphaltum paint

SECTION 625.1.2 - REINFORCED UNIT MASONRY

QUALITY ASSURANCE

Prior to deliver of masonry units to the site, select by random sampling consisting of nine individual whole units proposed for use. Select units free from cracks or other structural defects. Test in accordance with ASTM C140 and ASTM C426.

REFERENCE STANDARDS

ASTM A82	"Steel Wire, Plain, for Concrete Reinforcement"
ASTM A116	"Zinc-Coated (Galvanized) Steel Tie Wires"
ASTM A615	"Deformed and Plain Billet-Steel Bars for Concrete Reinforcement"

- ASTM C5 "Quicklime for Structural Purposes"
- ASTM C33 "Concrete Aggregates"
- ASTM C39 "Compressive Strength of Cylindrical Concrete Specimens"
- ASTM C90 "Hollow Load-Bearing Concrete Masonry Units"
- ASTM C91 "Masonry Cement"
- ASTM C94 "Ready Mixed Concrete"
- ASTM C140 "Sampling and Testing Concrete Masonry Units"
- ASTM C144 "Aggregate for Masonry Mortar"
- ASTM C150 "Portland Cement"
- ASTM C207 "Hydrated Lime for Masonry Purposes"
- ASTM C270 "Mortar for Unit Masonry"
- ASTM C330 "Lightweight Aggregates for Structural Concrete"
- ASTM C331 "Lightweight Aggregates for Concrete Masonry Units"
- ASTM C404 "Aggregates for Masonry Grout"
- ASTM C426 "Drying Shrinkage of Concrete Block"
- ASTM C780 "Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry"
- ASTM C952 "Bond Strength of Mortar to Masonry Units"

Fed. Spec. FF-S-325 "Shield, Expansion, Nail, Expansion, and Nail, Drive Screw (Devices, Anchoring, Masonry)"

MAG Standard Specifications

SUBMITTALS

Submit the following samples

- (a) Anchors and Ties – Two of each type proposed for use.
- (b) Concrete Masonry Units – Five stretcher units showing full range of color and texture and one of each special shape. Submit per MAG Specifications Section 775.

Submit manufacturer's certificates for the following attesting that materials meet the specified requirements.

- (a) Concrete Masonry Units
- (b) Flashing
- (c) Lime
- (d) Mortar Coloring
- (e) Reinforcing Bars

Submit certified laboratory test reports of tests listed below:

- (a) Concrete Masonry Units – Compressive strength, linear drying shrinkage, unit weight, and absorption of each type of unit. Popout and staining properties of lightweight aggregates used in the units.
- (b) Cement – Mill test reports of each lot.
- (c) Laboratory proportions and test reports of mortar and grout.

Submit shop drawings for reinforcing bars, including plans, elevations, and details showing treatment of reinforcing at turns and offsets; intersections of similar and dissimilar materials; tops, bottom and ends of walls; control and expansion joints; and wall openings. Show details of positioning devices for vertical reinforcing bars.

DELIVERY, STORAGE, AND HANDLING

Handle, store and protect masonry unit to avoid chipping, breakage or contact with the soil. Keep anchors, ties, steel reinforcing bars and joint reinforcement free of rust and loose scale. Reject rusted steel reinforcing, anchors, ties and joint reinforcement. Deliver cement and lime in unbroken bags, barrels, or other sealed containers. Keep cementitious materials dry. Store and handle cement in a manner which will prevent the inclusion of foreign materials. Store aggregates in a manner to avoid contamination or segregation. Plainly mark and label containers with the manufacturer's names and brands.

PROJECT CONDITIONS

Fog-spray erected masonry for 48 hours after installation when the ambient air temperature is more than 99 degrees F. in the shade, and the relative humidity is less than 50 percent.

Brace walls against wind and other forces during construction. Allow sufficient time between lifts to preclude displacement of solid masonry units or cracking of face shells of hollow masonry units. If blowouts, misalignment, or cracking of face-shells should occur during construction, tear down and rebuild the wall.

MATERIALS

Sources of materials shall not be changed if this will affect the appearance of the finished work after the work has started. Permission of the Owner's Representative shall be required to change source of materials.

Other admixtures may be used in mortar or grout provided that the admixture does not adversely affect bond or compressive strength of mortar or grout. Do not use anti-freeze or air entraining compounds, calcium chloride salts or any other chemical that will adversely affect metals or the coatings of metals embedded in the mortar or grout.

Aggregate for mortar shall meet ASTM C144. Aggregate used in mortar for joints $\frac{1}{4}$ inch or less shall conform to Note 1 of ASTM C144.

Fine aggregate for grout shall meet ASTM C404, Size 2 or ASTM C144.

Pea gravel aggregate for grout shall meet ASTM C404 except 100 percent shall pass the $\frac{3}{8}$ inch screen and not more than 5 percent shall pass the No. 8 sieve.

Course aggregate for grout shall meet ASTM C404, Size No. 8 or ASTM C33, $\frac{3}{4}$ inch maximum size as specified in grading Table 1 herein.

Lightweight aggregate shall meet ASTM C330 except gradation shall conform to ASTM C33 or C404.

Portlant cement shall meet ASTM C150, Type II, low alkali.

Lime putty shall be slaked according to manufacturer's instructions.

Hydrated lime shall be ASTM C207, Type S.

Pulverized quicklime shall meet ASTM C5 except 100 percent shall pass the No. 20 sieve and 90 percent shall pass the No. 50 sieve.

Lime paste shall be made with pulverized quicklime or hydrated lime. Hydrated lime processed by the steam shall be allowed to soak not less than 24 hours. Quicklime and other hydrated lime shall be allowed to soak not less than 72 hours. In lieu of hydrated lime paste for use in mortar, the hydrated lime may be added in the dry form.

Mortar coloring shall be chemically inert, finely ground limeproof pigment, furnished in accurately pre-measured and packaged units that can be added to a measured amount of cement.

Water shall be potable.

Masonry anchors shall meet Fed Spec FF S325, Group II, Type 3, Class 3 approved for the use in grouted masonry construction.

Crimped metal or wire inserts shall be provided in soaps at wall opening heads to provide mechanical attachment of soaps to the bond beam.

Aggregates for concrete masonry units shall meet ASTM C33 or C331 except grading of aggregates as stipulated in ASTM C33 and testing of lightweight aggregates for drying shrinkage as stipulated in ASTM C331 will not be required. Not to exceed 0.065 percent when tested in accordance with ASTM C426.

Masonry kinds and shapes of the various kinds shall conform to the specifications referenced below. Include closer, jamb, lintel and bond beam units and special shapes and sizes to complete the work as indicated.

Wire devices shall be factory fabricated from not less than 9 gauge steel wire conforming to ASTM A82. Fabricate wire devices in exterior walls from wire that has been zinc coated in accordance with ASTM A116, Class 1.

Wall ties shall be not less than 4 inches in width and with a length 2 inches plus or minus $\frac{1}{8}$ inch less than the thickness of the wall in which it is to be placed.

Centering clips shall prevent displacement of reinforcing bars during the course of construction.

Wire anchors for use with embedded slots or wire inserts shall be fabricated from not lighter than 6 gauge wire, looped and closed. Anchors shall be a minimum $\frac{7}{8}$ -inch wide.

Deformed reinforcing bars shall be ASTM A615, Grade 40 minimum.

EQUIPMENT

Grout pumps shall not pump through aluminum tubes. Operate pumps to produce a continuous stream of grout without air pockets. Upon completion of each days pumping, eject grout from pipeline without contamination or segregation of the grout. Remove waste materials and debris from the equipment. Dispose of waste materials, debris, and all flushing water outside the masonry.

Internal vibrators shall maintain a speed of not less than 5,000 impulses per minute when submerged in the grout. Apply vibrators at uniformly spaced points not further apart than the visible effectiveness of the machine. Limit duration of vibration to time necessary to produce satisfactory consolidation without causing segregation.

MIXES

Mortar shall be Type S in accordance with the proportion specifications of ASTM C270. The mortar shall have a flow, after suction, of 70 percent or more when tested for water retention in accordance with ASTM C91 except mortar shall be mixed to an initial flow of 125 to 135 percent.

Grout shall be mixed in laboratory established proportions to attain a compressive strength at 28 days of not less than 2,000 pounds per square inch when tested in accordance with ASTM C91 for fine aggregate and ASTM C39 for grout containing coarse aggregate. Grout shall be classified as fine and low lift as specified below.

Fine grout shall be Portland cement, fine aggregate, a sufficient water to obtain a pouring consistency without segregation of the constituents. Slump shall be approximately 5 inches.

Low-lift grout shall be Portland cement, lime paste or hydrated lime, fine aggregate and coarse aggregate and sufficient water to obtain a pouring consistency without segregation of the constituents. Slump shall be between 8 and 10 inches.

Batching and mixing shall conform to the applicable requirements of ASTM C94.

PREPARATION

Clean laitance, dust, dirt, oil, organic matter or other foreign materials from concrete surface upon which reinforced masonry is to be placed. Use sand blasting, if necessary to remove laitance from pores and to expose the aggregate.

Where required, construct forms to the shapes, lines and dimensions of the members indicated. Construct forms sufficiently rigid to prevent deflections which may result in cracking or other damage to supported masonry and sufficiently tight to prevent leakage of mortar and grout. Do not remove supporting forms or shores until the supported masonry has acquired sufficient strength to support safely its weight and any construction loads to which it may be subjected. In no case shall supporting forms or shores be removed in less than 10 days. Wait at least 16 hours after grouting masonry columns or walls before applying uniform loads and wait an additional 48 hours before applying concentrated loads.

INSTALLATION/APPLICATION/ERECTION

Do not wet concrete masonry units. Do not lay units having a film of water, ice or frost on the surface.

Build in anchors, ties, wall plugs, accessories, flashings, pipe sleeves and other items required to be built-in as the masonry work progresses. Fill cells receiving anchor bolts and cells of the first course below bearing plates with mortar or grout. Fill spaces around metal door frames and other built-in items with mortar. Point openings around flush-mounted electrical outlet boxes, including the flush joint above the box with mortar. Do not embed any aluminum items.

Hollow masonry units shall be laid so as to preserve the vertical continuity of cells filled with grout. The minimum clear horizontal dimensions of vertical cores shall be 2 inches by 3 inches. Masonry bond units at corners. Anchor intersections by reinforcing bars or stirrups as indicated. Adjust each unit to its final position while mortar is still soft and plastic. In any unit is disturbed after mortar has stiffened, remove and relay in fresh mortar. Keep chases, raked out joints, and spaces to be grouted free from mortar and other debris. Keep units in exposed masonry surfaces free from chipped edges or other imperfections detracting from the appearance of the finished work when viewed from a distance of ten feet.

Cutting and fitting shall be avoided, wherever possible, by using full units of the proper size in lieu of cut units. Use power masonry saws for cutting and fitting. Concrete masonry units shall be wet cut. Make cut edges clean, true and sharp. Make openings carefully so that wall plates, cover plates or escutcheons required by the installation will completely conceal the openings and will be aligned at the bottom with the masonry joints. Cut webs of hollow masonry units to the minimum required for proper installation. Provide reinforced masonry lintels, above openings over 12 inches wide for pipes, ducts, and cable trays unless steel sleeves are used.

Bed joints shall be spread with mortar for the full thickness of the face shells. Butter head joints for the full thickness of the face shell and place the units. Avoid fins of mortar that protrude into cells to be grouted.

Flush joints shall be used in concealed masonry surfaces and joints above electrical outlet boxes. Make flush cut joints by cutting off the mortar flush with the face of the wall.

Tooled joints shall be used in exposed exterior and interior masonry surfaces slightly concave. Use a jointer slightly larger than the joint width so that complete contact is made along the edges of the unit. Perform tooling so that the mortar is compressed and the joint surface is sealed. Use a jointer of sufficient length to obtain a straight and true mortar joint. Tool joints when the mortar is thumbprint hard. Tool vertical joints first.

Brush joints to remove all loose and excess mortar. Mortar joints shall be finished as follows:

Joint widths shall be $\frac{3}{8}$ inch wide.

Placing reinforcement steel shall be done prior to placing grout. Clean all reinforcement of loose, flaky rust, scale, grease, mortar, grout, or other coating which might destroy or reduce its bond with the grout. Details of reinforcement shall be in conformance with ACI 315. Do not bend or straighten reinforcing in a manner injurious to the steel. Do not use bars with kinks or bends not shown on the drawings. Placement of reinforcement shall be inspected and approved prior to placing grout. Provide one piece vertical bars extending from floor to roof above.

Position vertical bars accurately at the centerline of the wall. Maintain a minimum clearance between the bars and masonry units of $\frac{1}{2}$ inch and between parallel bars of one diameter of the reinforcement. Hold vertical reinforcing in place using metal supports, centering clips, spacers, ties or caging devices located near the ends of each bar and at intermediate intervals of not more than 192 diameters of the reinforcement. Wire column and pilaster ties in position around the vertical steel. Laying ties in mortar joints will not be permitted.

Splices shall be located only as indicated. Stagger splices in adjacent bars at least 24 inches. Lap bars a minimum of 40 diameters of the reinforcement or two feet, whichever is greater. Welded or mechanical connections shall develop the full strength of the reinforcement.

Cleanout holes shall be provided at the bottom of every pour in cores containing vertical reinforcement when the height of the grout pour exceeds 48 inches. Construct cleanout courses with open-bottom bond beam units inverted to permit cleaning of all cells by flushing. Establish a new series of cleanouts if grouting operations are stopped for more than four hours. Cleanouts shall be not less than 3-by-4-inch openings cut from one face shell. Manufacturer's standard cut-out units may be used at the Contractor's option. Do not plug cleanout holes until masonry work, reinforcement, and final cleaning of the grout spaces have been completed and inspected.

Grout holes shall be provided in slabs, spandrel beams and other in-place overhead construction. Locate holes over vertical reinforcing bars. Provide additional openings spaced not more than 16 inches on centers where grouting of all hollow unit masonry is indicated. Openings shall not be less than 4 inches in diameter or 3-by-4 inches in horizontal dimensions. Upon completion of grouting operations, plug grouting holes and finish to match surrounding surfaces.

Grout placement shall be done using a hand bucket, concrete hopper or grout pump. Place grout in final position within 1- $\frac{1}{2}$ hours after mixing. Where grouting is

discontinued for more than one hour, stop the grout one inch below the top of a course to form a key at pour joints. Place grout so as to completely fill the grout spaces without segregation of the aggregates. Do not insert vibrators into lower pours that are in a semi-solidified state.

Low lift grout method shall place grout as masonry is erected at a rate that will not cause displacement of the masonry due to hydrostatic pressure of the grout. If mortar has been allowed to set prior to grouting, remove all fins protruding more than ½ inch into the grout space. Rod or puddle grout during placement using a long 1 inch by 2 inch wood stick or a mechanical vibrator.

FIELD QUALITY CONTROL

Employ proportions testing laboratory to proportion and test mortar and grout. Do not change laboratory established proportions or use materials with different physical or chemical characteristics in mortar and grout.

When admixtures are proposed for use, submit test reports before beginning construction indicating the advantages to result. The laboratory that designed the mortar or grout mix shall perform the tests. Make six test specimens from the mixture without admixture, as control specimens, and six test specimens from the mixture containing admixture. The mixture used in this testing shall be identical except for the admixture, and shall be designed and mixed from identically graded aggregates and from the same brand and type of cement, in strict conformance to the properties specified herein before for mortar or grout. The mixture with and without the admixture shall have the same aggregate ratio, water retention, and compressive strength as stipulated. Admixture shall be used in conformance with manufacturer's recommendations. Test each of the mortars for bond strength in conformance with ASTM C952, and test for water retention and compressive strength in conformance with ASTM C270. Test each of the grouts for compressive strength.

Strength test of mortar shall require at least two specimens of mortar each day, one within two hours of commencing work and one within two hours of completing the day's work. Spread a layer of mortar ½-inch to ¾-inch thick on the masonry units and allow to stand for one minute. Remove the mortar and place it in a 2-inch diameter by 4-inch high cylinder in two layers, compressing the mortar into the cylinder using a flat end stick or fingers. Lightly tap the mold on opposite sides, level off and immediately cover molds and keep them damp until taken to the laboratory. After 48 hours, remove molds and place specimens in a fog room until tested in the damp condition. Test samples in accordance with the applicable portions of ASTM C39. Samples shall exhibit a minimum ultimate compressive strength of 2,000 pounds per square inch.

Strength testing of grout shall require at least two specimens of grout each day, one within two hours of commencing work and one within two hours of completing the day's

work. On a flat non-absorbent base, form a space approximately 3 inches by 3 inches by 6 inches using masonry units having the same moisture conditions as those being laid. Line the space with a permeable paper or porous separator so that water may pass through the liner into the masonry units. Thoroughly mix or agitate grout to obtain a fully representative mix and place into molds in two layers. Puddle each layer with a one inch by 2 inch puddling stick to eliminate air bubbles. Level off and immediately cover molds and keep them damp until taken to the laboratory. After 48 hours, remove molds and place specimens in a fog room until tested in the damp condition. Test samples in accordance with the applicable portions of ASTM C39. Samples shall exhibit a minimum ultimate compressive strength of 2,000 pounds per square inch.

Efflorescence tests shall be performed on brick and mortar materials which will be exposed to weathering. Tests shall be scheduled far enough in advance of starting masonry work to permit retesting if necessary.

Efflorescence tests on mortar shall require a 3 ounce mortar specimen of each proposed mix, using as little water as possible. While specimen is still in plastic condition and prior to its initial set, place it in a glass or glazed receptacle, and mix 4 ounces of distilled water with the mortar and stir thoroughly for five minutes. Use a receptacle of such a size that when the mortar specimen and water are combined in solution, and a masonry unit is placed in it, the solution will have a depth of $\frac{1}{2}$ to one inch. Place a masonry unit, which has been tested and found free of efflorescence on end in the solution and maintain the water level at $\frac{1}{2}$ to one inch with distilled water. Leave the masonry unit in the solution indoors at normal temperature for seven days. Remove the masonry unit from the solution and air dry for 24 hours. Compare the masonry unit with an untreated unit, and if the difference due to efflorescence is noticeable when viewed at a distance of 10 feet, the mortar components shall be tested in separate receptacles, each containing a masonry unit which has been tested and found free of efflorescence. Thoroughly mix each mortar component with 4 ounces of distilled water, using one ounce of each cementitious material and 3 ounces of each aggregate. Maintain the water level at a depth of $\frac{1}{2}$ to one inch with distilled water. Leave the masonry unit in the solution indoors at normal temperatures for 7 days. Remove the masonry units from the solution and observe for efflorescence, as specified herein before. Reject the component causing efflorescence.

Lay masonry plumb, true to line, with courses level. Keep bond pattern plumb throughout. Lay masonry within the following tolerances.

Maximum variation from the plumb in the lines and surfaces of columns, walls and arises:

- (a) In adjacent masonry units - $\frac{1}{8}$ inch.
- (b) In 10 feet - $\frac{1}{4}$ inch.
- (c) In any story or 20 feet maximum - $\frac{3}{8}$ inch.
- (d) In 40 feet or more - $\frac{1}{2}$ inch.

Maximum variations from the plumb for external corners, expansion joints and other conspicuous lines:

- (a) In any story or 20 feet maximum - $\frac{1}{4}$ inch.
- (b) In 40 feet or more - $\frac{1}{2}$ inch.

Maximum variations from the level or grades indicated on the drawings for exposed lintels, sills, parapets, horizontal grooves and other conspicuous lines:

- (a) In any bay or 20 feet maximum - $\frac{1}{4}$ inch.
- (b) In 40 feet or more - $\frac{1}{2}$ inch.

Maximum variations of the linear building lines from established position in plan and related portion of columns, walls and partitions:

- (a) In any bay or 20 feet maximum - $\frac{1}{2}$ inch.
- (b) In 40 feet or more - $\frac{3}{4}$ inch.

Maximum variation in cross sectional dimensions of columns and in thickness of walls:

- (a) Minus - $\frac{1}{4}$ inch.
- (b) Plus - $\frac{1}{2}$ inch.

ADJUSTING AND CLEANING

Point and clean after mortar joints have attained their initial set but prior to hardening. Completely remove mortar and grout daubs or splashings from exposed masonry surfaces. Before completion of the work, rake out all defects in joints in exposed masonry surfaces, fill with mortar and tool to match existing joints. Immediately after grout work is completed, remove scum and stains which have percolated through the masonry using a high pressure stream of water and a stiff bristled brush. Do not use metal tools or metal brushes for cleaning.

Dry brush exposed concrete masonry unit surfaces at the end of work each day and after any required pointing. Use stiff-fiber bristled brushes only.

PROTECTION

Protect all adjoining work from mortar and grout. Remove stains on walls immediately. Do not saturate walls with water for curing or any other purpose.

SCHEDULES**Mortar**

Type	M
Compressive Strength (f'm)	1,500 psi
Percent Solid	50%

Masonry Units

Dimensions	8"x8"x16" Concrete Masonry Units
Compressive Strength	1,900 psi
Color	Standard - Block will be painted

Reinforcing Steel

Reinforcing Steel Grade	40 ksi
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Special Inspection Not required

Drainage Knockouts Required

SECTION 625.2 - LIFT STATION - MECHANICAL ITEMS: Work under this item shall include construction, or installation of mechanical items for the Lift Station including, but not limited to, above ground pipe, fittings, flanges, spools, well casing vent, sounding tube, sampling tap, appurtenance taps, thrust restraint, goosenecks, well pump, motor, discharge head, column pipe, column shaft, plug valves, operator, check valves, valve support and all appurtenant work to all items.

Measurement and payment for **ITEM 625-2 - LIFT STATION- MECHANICAL ITEMS** shall be on a lump sum basis and shall be compensation in full for providing all materials, equipment, labor, tools and appurtenant work required to construct or install all items complete and in place.

Furnishing and Installing all mechanical equipment for the City of Peoria's sanitary sewer lift station shall be in accordance with **SECTION 625.2.1** through **SECTION 625.2.5** of these Special Provisions.

SECTION 625.2.1 - GENERAL MECHANICAL REQUIREMENTS:**QUALITY ASSURANCE**

Before shipping, operate valves, motors, pumps, actuators and all mechanical equipment at the factory to ensure that products are complete and in working condition.

SUBMITTALS

Submit wiring diagrams for all electrically operated mechanical equipment.

Submit schedule for lubrication and run-in procedures 2 weeks before beginning procedures.

Submit noise test results.

DELIVERY, STORAGE, AND HANDLING

Do not accept delivery of any equipment not meeting Contract requirements.

WARRANTY

In addition to the manufacturer's standard warranty, furnish the services of a factory-authorized and factory-trained serviceman to promptly provide repair service for mechanical equipment for the period of one year from the date of final acceptance. This service shall include the cost of all replacement parts required during that period.

MATERIALS

Where dissimilar metals are used in conjunction with each other, provide suitable insulation between adjoining surfaces to eliminate direct contact and any resultant current. Insulation shall be bituminous impregnated felt, heavy bituminous coatings, nonmetallic separators, washers, or other approved materials.

EQUIPMENT

Provide securely fastened, inscribed, stainless steel nameplates in conspicuous locations for all mechanical equipment having moving parts. Indicate manufacturer's name, year of manufacture, serial number, principal rating data and equipment item number. Nameplates shall be in English and use American units of measure.

Grease fittings shall be standard button-head type. All grease fittings shall be serviceable by a single type of grease gun. Extend fittings as necessary to provide easy access, or as directed by Owner's Representative.

Furnish any special tools, wrenches and appliances needed to adjust, operate, maintain or repair mechanical equipment supplied.

INSPECTION

Upon request by the Owner, during the performance test, furnish the services of a factory-authorized manufacturer's representative to inspect and approve, in writing, the installation of all mechanical equipment furnished by that manufacturer, to place it into operation, to assist in necessary adjustments and tests and to instruct operating personnel in equipment operation and maintenance.

FIELD QUALITY CONTROL

Operate and check all equipment to ensure that it is correctly installed and ready for use. A successful 3-day performance test shall be required to demonstrate to the satisfaction of the Owner's Representative that the mechanical equipment furnished and installed can meet specified performance requirements.

Test motor- or engine-driven equipment for noise generation after installation.

Failures of installed equipment to meet specified performance requirements shall be corrected, at no expense to the Owner, prior to final acceptance.

PROTECTION

Lubricate mechanical equipment in accordance with manufacturer's instructions. Lubricating oils and greases shall be of type and viscosity recommended by manufacturer. Lubricants shall be furnished with flushing oils as recommended by manufacturer. Following flushing, fill oil lubrication system with "run-in" oil as recommended by manufacturer. Run in equipment at no load condition for 2 hours. Drain and flush equipment again with flushing oil and refill with lubricant recommended by manufacturer.

OPERATION AND MAINTENANCE INSTRUCTION

After installation has been accepted by Owner, provide instruction to Owner's personnel in proper operation and maintenance of mechanical equipment. Training shall include on-site operation training, classroom training, safety and emergency drills conducted by qualified technical personnel familiar with equipment operations and maintenance.

SECTION 625.2.2 - CHECK VALVES:

QUALITY ASSURANCE

Valve shall close drip tight when in the closed position.

All valves and fittings shall have a minimum working pressure equal to or higher than the class of pipe to which they are attached, or 150 psi, whichever is greater.

Ends of valves match ends of adjacent pipe.

Valves 3 inches and larger shall be marked to show name of manufacturer, year of manufacture, size of valve, maximum working pressure, and arrow to indicate direction of flow.

REFERENCE STANDARDS

AWWA C508 "Swing Check Valves for Waterworks Service 2 in through 24 In. NPS"

SUBMITTALS

Submit catalog data, installation instructions and operation and maintenance instructions.

DELIVERY, STORAGE AND HANDLING

Lift valves with eyebolts or rods through the flange holes and chain hooks at the ends of ports. Do not lift valves with slings or chains around the operating shaft or through the waterway.

Before accepting delivery of valves, check valves for damage during shipment, check opening and closing of valves.

ACCEPTABLE MANUFACTURERS

Swing Check Valves:

American-Darling Div., American Cast Iron Pipe Co., Birmingham, AL

APCO Valve & Primer Corp., Schaumburg, IL

Clow Corp. - Valve Division, Oskaloosa, IA

Crane Valves & Fittings Division, Elmsford, NY

Empire Specialty Co. Inc (GA Industries, Inc.), Mars, PA

M & H Valve Company, Anniston, AL

Mueller Co., Decatur, IL

Waterous Company, South St Paul, MN

EQUIPMENT

Check valves shall close drip tight at both high and low pressures to prevent backflow.

Swing check valves shall conform to AWWA C508.

INSTALLATION

Before installation, clean valve flanges or joints. Check valves for damage, paying special attention to cracked or missing parts and accessories, and any other evidence of mishandling.

When installing valves, support adjacent piping as needed to avoid stress on the valve body. The valve to pipe joint shall not deflect. Do not use the valve as a jack to pull the pipe into alignment.

All valves shall receive proper and adequate thrust restraint to withstand the full design pressure of the valve.

FIELD QUALITY CONTROL

Before field hydrostatic testing, verify that all valves operate easily and smoothly. Repair or replace any valve that fails to open and close smoothly and easily. Inspect all pressure containing bolting for tightness before pressure testing.

SCHEDULES**Check Valves**

Location	Lift Station Discharge
Quantity	2
Size	12-inch
Working Pressure	150 psi
Style	Swing check valve—outside lever and spring with dashpot
Materials	Standard for wastewater service
End Style	Flanged
Valve Position	Horizontal flow
Lining	Coal tar epoxy
Lining Thickness	16 mil

SECTION 625.2.3 - PLUG VALVES:**QUALITY ASSURANCE**

Valves shall close drip tight when in the closed position.

All valves and fittings shall have a minimum working pressure equal to or higher than the class of pipe to which they are attached or 150 psi whichever is greater.

Ends of valves shall match ends of adjacent pipe.

Valves 3 inches and larger shall be marked to show name of manufacturer, year of manufacture, size of valve, maximum working pressure, and arrow to indicate direction of flow.

SUBMITTALS

Submit catalog data, installation instructions and operation and maintenance instructions.

DELIVERY, STORAGE, AND HANDLING

Lift valves with eyebolts or rods through the flange holes and chain hooks at the ends of ports. Do not lift valves with slings or chains around the operating shaft or through the waterway.

Before accepting delivery of valves, check valves for damage during shipment, check opening and closing of valves and check direction of opening of valves.

Store valves in the closed position. Cover as necessary to prevent debris from entering the valve.

ACCEPTABLE MANUFACTURERS

Eccentric Plug Valves:

Clow Corp. - Valve Division, Oskaloosa, IA

DeZURIK - General Signal, Sartell, MN

Keystone/Drum-Owen Valve Co., Lehigh Valley, PA - "Homestead Ballcentric"

M & H Valve Company, Anniston AL

Lubricated Plug Valves

Keystone/Drum Owen Valve Co., Lehigh Valley, PA - "Newman-Milliken"

Resun Manufacturing Company, Tomball, TX

Rockwell International (Plug Valve Center) Sulphur Springs TX

Tapered Plug Valves:

DeZURIK - General Signal, Sartell, MN - "Permaseal"

Rockwell International Flow Control Division, Pittsburgh, PA - "Nordstrom"

INSTALLATION

Before installation, clean valve flanges or joints. Check valves for damage, paying special attention to bent stems, broken handwheels, cracked or missing parts and accessories, and any other evidence of mishandling. Check bolting between actuators and valves,

and, if loose, tighten bolting firmly. Open and close valve to ensure proper operation and seating. Record the number of turns to open and close. If number of turns to open and close valve differs from manufacturer's published values by more than one turn, check for and remedy damage or foreign materials at seats or seals of valve. Close valve before installation.

When installing valves, support adjacent piping as needed to avoid stress on the valve body. The valve to pipe joint shall not deflect. Do not use the valve as a jack to pull the pipe into alignment.

All valves shall receive proper and adequate thrust restraint to withstand the full design pressure of the valve.

FIELD QUALITY CONTROL

Before field hydrostatic testing, verify that all valves operate easily and smoothly without excessively hard operation. Repair or replace any valve that fails to open and close smoothly and easily or that differs from manufacturers published data for number of turns to open and close by more than one turn. Inspect all pressure containing bolting for tightness before pressure testing.

SCHEDULES

Plug Valves

Location	Pump Station discharge
Quantity	2
Size	12-inch
Pressure	150 psi
Pressure Class	150
Materials	Standard for wastewater service
End Style	Flanged
Valve Position	Horizontal flow
Valve Operation	Manual
Accessories	
Position Indicator	Yes
Lining and Coating	Coat tar epoxy
Exterior Coating Thickness	12 mil
Interior Lining Thickness	16 mil

SECTION 625.2.4 - INDUCTION MOTORS:

WORK INCLUDED

Vertical motors to drive pumps.

QUALITY ASSURANCE

Motors shall be supplied by the manufacturer of the driven equipment.

Motors shall be designed and built in accordance with the listed reference standards.

Motors shall be fabricated, assembled, checked and tested at the factory in accordance with NEMA MG-1.

Should any motor exhibit indication of questionable performance, the Owner's Representative, at his discretion, may request information or load test at any time after delivery of motor to the job-site. If any motor proves defective, all costs of testing and repair or replacement of defective motor shall be borne by the Contractor. If any motor proves to be in accordance with the specifications and manufacturer's published tolerances, the cost of testing shall be borne by the Owner.

Insulation resistance tests shall be performed by the Contractor. Tests for acceptability shall be made using a 1000 volt megohm meter (megger). Interpretations of test results for minimum acceptable values of insulation resistance will be made per IEEE Publication 43.

REFERENCE STANDARDS

ANSI Requirements for Numbering and Schematic Representation

IEEE Publication 43

IEEE Standards for Electric Motors

NEC Environmental Operating Requirements

NEMA MG1

UL Requirements for motors and their appurtenances

SUBMITTALS

Submit catalog data, installation instructions, operation and maintenance instructions and shop drawings.

Submit the following information in tabular form:

- Motor locked rotor and full load currents
- Power factors and efficiencies at full load, 3/4 load and 1/2 load
- Motor housing material and winding material
- NEMA design letter, NEMA code letter, NEMA insulation class
- Ambient temperature and maximum elevation for which motor is designed to operate continuously
- Service factor
- Temperature rise
- Type of enclosure
- Voltage
- Bearing life
- Dynamic balance
- Nameplate data
- Speed/torque/current at 100% voltage

Submit certified copies of test reports on actual motors being provided.

Submit wiring diagrams showing internal and typical external connections.

ACCEPTABLE MANUFACTURERS

Motors

- Toshiba International Corp., Houston, TX
- United States Motor Corp. (Emerson), Oshkosh, WI
- Westinghouse Motor Company, Round Rock, TX

Couplings

- Dodge Div. Reliance Electric Co., Mishawaka, IN
- Wood's, T.B. Sons Co., Chambersburg, PA

EQUIPMENT

Motors shall be squirrel cage, induction motors. The maximum applied load shall not exceed the nameplate horsepower. The amperage at maximum applied load shall not exceed the full nameplate amperage value.

Each motor shall be greased or oil lubricated as applicable. Thrust bearings shall be oil lubricated. A visual level indicator and accessible filling plug shall be provided for oil lubricated motors. The lubrication system shall be designed to provide the correct quantity of lubricant with minimum foaming or aeration. Each motor shall have a stainless steel plate, indicating all essential lubrication information such as type or viscosity.

Windings shall be copper.

Motor Bearings shall be anti-friction type capable of sustaining all operating radial and thrust loads due to operation of pump and motor. Motor bearings shall be selected to have a B-10 rated average life of 10 years, (3 years minimum) when operated continuously at the rated speed of the motor and at total dead weight plus the hydraulic thrust load imposed on the motor by the pump, when pumping at any design point.

Conduit Box shall be provided with a grounding terminal.

Enclosure and Frame shall be cast iron or heavy fabricated steel, with a lifting attachment. Outdoor motors shall have enclosures which meet NEMA weather protected Type 1 with screens to prevent the entrance of rodents, reptiles, and other intruders.

End shields shall be of cast iron.

Stainless Steel Nameplate shall be attached to each motor showing speed, and horsepower in addition to information itemized in the section entitled "General Mechanical Requirements"

FIELD QUALITY CONTROL

Submit field recorded current data. Data shall show full load current for each motor, and current rating for the overload relay in each motor, starter and controller.

PROTECTION

Pump motors, starters, and casing shall be finished with a high grade machinery enamel in accordance with the manufacturer's recommendations.

SCHEDULES

Motor

Location	Sewage pumps
Quantity	2
Type	Squirrel Cage Induction Motors
Position	Vertical
Shaft	Hollowshaft
Type of Power	
Available	3 Phase / 60 Hz / 460 V
Materials	Standard
Rated Output Power	50 hp
Synchronous Speed	1800 rpm
Duty Rating	Continuous
Efficiency	premium

Service Factor	1.15
Estimated Thrust	521 lbf
Bearing Life	3 year minimum - 10 year average

SECTION 625.2.5 - VERTICAL TURBINE SOLIDS HANDLING PUMPS:

QUALITY ASSURANCE

Test reports and procedures for pumps shall conform to the applicable requirements of the Hydraulic Institute Standards and AWWA E101.

REFERENCE STANDARDS

AWWA E101 "Vertical Turbine Pumps - Line Shaft and Submersible Types

Hydraulic Institute Standards

SUBMITTALS

Submit catalog data, installation instructions, operation and maintenance instructions and shop drawings.

Submit certified pump curves and total thrust load at shutoff data at time of bid for approval of Owner's Representative. Curves shall show capacity, head, efficiency, required horsepower and required NPSH from shutoff to maximum capacity of the pump. Pump curves shall reflect data secured during actual test runs and shall be signed by a responsible representative of the pump manufacturer. Pump curves shall show the make and model of the pump and the size of the impeller. Pump characteristics shall be plotted for intervals of 200 gpm.

Submit letter to Owner certifying that all pumping and motor equipment was inspected, operation checked, and installation approved by the respective pumping equipment supplier.

ACCEPTABLE MANUFACTURERS

Vertical Turbine Solids Handling Pumps:
Fairbanks Morse, Kansas City, KS

EQUIPMENT

Vertical Turbine Pumps shall have head capacity curves rising continually to the left.

Impellers shall be accurately fitted, smoothly finished, and dynamically balanced at normal pump speeds.

Pump Bearings shall be easily removable, and shall be at least 2.5 times the diameter of the shaft.

Discharge Columns shall be steel pipe designed for applicable pressures with screwed connections.

Discharge Head shall be free from excessive vibration under all operating conditions. The fabricated discharge head shall be sand blasted and coated with one coat of red lead primer. The interior waterways shall be coated with epoxy.

Stainless Steel Nameplate shall be attached to each pump showing speed, capacity and head per stage, and impeller size in addition to information itemized in the section entitled "General Mechanical Requirements"

EXTRA STOCK/SPARE PARTS

The following spare parts shall be provided for each size pump in the quantities shown:

Each Size Bearing	1
Sets all Gaskets	2
Sets Wear Rings for each Pump	1
Sets Mechanical Seals	2
Shaft Sleeve	1

SCHEDULES

Vertical Turbine Solids Handling Pumps

Location	99th and Northern Lift Station
Quantity	2
Liquid Pumped	Domestic Sewage
Line Shaft Lubrication	Water Lube - Open Lineshaft
Type of Discharge	Ground
Pump Column	
Column Length	25 feet
Column Pipe	10-inch
Wall Thickness	0.279 inch
Seals	Mechanical seals
Impeller	Non-clog impeller
Discharge Connection	Flange

Operating Conditions

	Q (gpm)	TDH (ft)	efficiency (%)	horsepower (hp)
Shutoff (Min.)			105	
Point #1	1600	74	75	40.0
Point #2	2400	61	83	44.5
Point #3	3200	44	78	45.6

Notes

See Fairbanks Morse 10" VTSH
9-inch impeller

Materials

Suction Inlet	Bell type
Bowl	Enameled Cast Iron
Impeller	Bronze
Column Assembly	Steel
Column Pipe Lining	Coal Tar Epoxy - 16 mil
Column Pipe Coating	Coal Tar Epoxy - 16 mil
Lineshaft	Threaded Carbon Steel
Discharge Head	Steel or Cast Iron

Controls

Level Switches	Diaphragm type level switch
High Discharge Cut-in	Yes
Low Level Cut-out	Yes
Timer	Timed start and stop

SECTION 625.2.6 - PAINTING AND COATING:**WORK INCLUDED**

Surface preparation, painting and protective coating of all specified surfaces, including surface preparation, pre-treatment, paint and coating application, touch-up of factory-coated surfaces, protection of surfaces not painted or coated, clean-up, and appurtenant work.

QUALITY ASSURANCE

The term "paint", "coatings", or "finishes", as used herein, shall include surface treatments, emulsions, enamels, primer, intermediate coat, and finish coat.

Materials for a complete paint system, including primer, finish coats, thinners, cleaners and drying agents, and other additives shall be the end products of one manufacturer to ensure product compatibility and unit responsibility.

Paint shall be homogeneous, free of contaminants, and of consistency suitable for the specified use. Pigment shall be finely ground and properly dispersed in the vehicle according to the requirements of the paint. This dispersion shall be such that the pigment does not settle appreciably, does not cake or thicken in the container, or become granular or curdled.

Use only compatible materials in the work. Pay particular attention to compatibility of primer and finish coats. If necessary, subject to the approval of the Owner's Representative, apply a barrier coat between all existing prime coat and subsequent field coats to insure compatibility.

Test industrial and elastomeric coatings using the methods specified in ASTM or methods set in Federal Standard 141B. In the absence of any such methods, other suitable methods may be designed and used by the Owner's Representative. Testing and inspection of coatings, or, in the case of holiday detection devices, supervision of the inspection shall be performed by an independent testing laboratory approved by the Owner's Representative. All costs for testing shall be borne by the Contractor.

Check thickness of paint and other coatings on steel surfaces using a non-destructive, magnetic type thickness gage. Make dry film thickness gages and National Bureau of Standards certified thickness calibration plates available for inspection at all times while coating is being done. Thickness measurements will be made at least 8 hours after application of coating.

Furnish, until final acceptance of coatings, inspection devices in good working condition for the detection of holidays. Holiday detectors shall not exceed the voltage recommended by the coating system manufacturer. For thicknesses between 10 and 20 mils, add a non-sudsing type wetting agent to the water before wetting the detector sponge. Provide the services of a factory approved, trained operator of the holiday detection devices until the final acceptance of such coatings; holiday detection devices shall be operated only the supervision of a recognized testing laboratory, approved by the Owner's Representative.

Operate inspection devices in strict accordance with the manufacturer's printed instructions.

Damaged coatings, pinholes, and holidays shall have the edges feathered and repaired in accordance with the recommendations of the paint manufacturer, as reviewed by the Owner's Representative.

Fusion bonded coatings shall be as recommended by the original applicator, who shall provide liquid repair kits for this purpose.

Clean repair and refinish all damage to surfaces resulting from the work hereunder to the complete satisfaction of the Owner's Representative at no cost to the Owner.

REFERENCE STANDARDS

AWWA C550 "Protective Epoxy Interior Coatings for Valves and Hydrants"

Federal Specification TT-P-0035 "Paint, Cementitious, Powder, White and Colors (For Interior and Exterior Use)"

Federal Standard 141B "Paint, Varnish, Lacquer and Related Materials: Methods for Sampling and Testing"

MIL-P-24441 "Pictorial Surface Preparation Standards for Painting Steel Surfaces" published by Steel Structures Painting Council.

SSPC SP1 "Solvent Cleaning: Removal of oil, grease, dirt, soil, salts, and contaminants by cleaning with solvent, vapor, alkali, emulsion, or steam"

SSPC SP2 "Hand Tool Cleaning: Removal of loose rust, loose mill scale, loose paint and other loose detrimental foreign matter by hand chipping, scaping, sanding, and wire brushing"

SSPC SP 3 "Power Tool Cleaning: Removal of loose rust, loose mill scale, loose paint and other loose detrimental matter by power tool chipping, de-scaling, sanding, wire brushing and grinding"

SSPC SP5 "White Metal Blast Cleaning: Blast removal of all visible residues"

SSPC SP6 "Commercial Blast Cleaning: Blast cleaning until at least 2/3 of each element of surface area is free of all visible residues"

SSPC SP7 "Brush-Off Blast Cleaning: Blast removal of all visible grease, dirt, dust, loose mill scale, loose rust, and loose paint"

SSPC SP8 "Pickling: Removal of rust, mill scale and foreign material by chemical reaction or electrolysis in chemical solutions"

SSPC S10 "Near-white Blast Cleaning: Blast cleaning nearly to white metal cleanliness until at least 95% of each element of surface area is free of all visible residues"

"Steel Structures Painting Manual, Volume 2, Systems and Specifications" published by the Steel Structures Painting Council

SUBMITTALS

Submit samples of all paint, finishes and other coating materials specified herein as required by the Owner for color selection. Submit paint or coating samples on 8½ inch by 11 inch sheet metal or plywood coupon as directed by the Owner's Representative.

Submit catalog data, application instructions, and other information as necessary to describe generic coating system type including solids by volume, performance criteria, and recommended dry film thickness.

DELIVERY, STORAGE, AND HANDLING

Deliver paint and paint materials to the job site in new, unopened, air-tight containers, appropriately identified with the manufacturer, type of paint or paint material, product number, and lot or batch.

Only paint of approved manufacturers shall be delivered and stored at the site.

Seal paint materials when not in use, and protect from temperature extremes.

Store material in a protected area at a temperature between 35 F and 110 F.

PROJECTED CONDITIONS

Do not apply paint or coatings when temperatures or atmospheric conditions (dust, humidity, smoke) do not fall within manufacturer's recommended conditions for application. In the absence of manufacturer's data, acceptable painting temperatures shall be assumed to 50 F to 90 F.

WARRANTY

Warranty inspection shall be conducted during the eleventh month following completion of all coating and painting work. Any location where coating or paint has peeled, bubbled or cracked, and any location where rusting is evident shall be considered a failure of the system. Defective work identified during the warranty inspection shall be repaired, by removing the deteriorating coating or paint system, cleaning the surface, and recoating or repainting with the same system. All repaired areas shall then be electrically tested. If the area of failure exceeds 25% of the total coated or painted surface for any paint system on any structure, the entire coating or paint system may be required to be removed and recoated in accordance with the original specification.

The Owner shall establish the date for the warranty inspection and shall notify the Contractor at least 30 days in advance. If an inspection date has not been established within 12 months after the coating and painting work was completed, the first anniversary inspection shall be considered to be waived.

ACCEPTABLE MANUFACTURERS

Industrial Coating

Ameron Protective Coatings, Brea, CA
Carboline Coatings Company, St. Louis, MO
Devoe & Raynolds Company, Louisville, KY
Engard Coatings Company, Huntington Beach, CA
Glidden Company, Cleveland, OH
Hemple Coatings, San Francisco, CA
Imperial Coatings, New Orleans, LA
Kopcoat Company, Inc., St. Louis, MO
Matcote Company, Houston, TX
Napko Corporation, Houston, TX
Plas-Chem Coatings, St. Louis, MO
Porter Coatings, Louisville, KY
Reliance Universal, Inc., Houston, TX
Rustoleum Corporation, Evanson, IL
Standard Paint Company, Harvey, LA
Tnemec Coatings, Kansas City, MO
United Coatings, Spokane, WA
Valspar, Los Angeles, CA
Wisconsin Protective Coatings, Green Bay, WI

Fusion Bonded Liquid Epoxy Coatings (Non-Potable Water Applications)

Carboline Coatings Company, St. Louis, MO - 890
Keysite 740
Kopcoat Company, Inc., Pittsburgh, PA - Kop-Coat Hi-Guard

Fusion Bonded Powder Epoxy Coatings

3M Company, St. Paul, MN - Scotchcoat No. 134
Morton Chemical Division - Product No. 10-4073 Red

Holiday Testing Devices

KD - "Bird-Dog", thicknesses less than 20 mils
Tinker & Razor, San Gabriel, CA - Model M-1, thicknesses less than 20 mils
Tinker & Razor, San Gabriel, CA - Model AP, 6,000 to 16,000-volt holiday detectors
for coatings thicker than 20 mils

Thickness Testing Devices**"Inspector"**

Nordson Corporation, Anaheim, CA - "Mikrotest"

"Positest"**MATERIALS - INDUSTRIAL COATING**

Aluminous paint shall be single component, coal tar pitch based, 68% minimum solids volume.

Chlorinated rubber finish shall be exterior grade, 30% minimum solids by volume.

Coal-tar epoxy shall be amine or polyamide type, 68% minimum solids by volume, suitable for immersion service.

Epoxy aggregated non-skid finish shall be polyamide or amine converted epoxy with aggregate, 70% minimum solids by volume. Aggregate may be packaged separately.

Inorganic zinc primer shall be solvent or water based, minimum 14 pounds per gallon metallic zinc content.

Organic zinc rich primer shall be converted epoxy/phenolic or urethane type, minimum 14 pounds per gallon metallic zinc content.

Polyamide anti-corrosive epoxy coating shall be converted epoxy primer, 46% minimum solids by volume, containing rust inhibitive pigments.

Polyamide epoxy coatings shall meet MIL-P-24441, Formulas 150, 151 and 152, Section 1.

Polyamide epoxy, high solids shall be 80% minimum solids by volume, suitable for immersion service.

Polyamide high-build epoxy shall be capable of 4 to 8 mils MDFT per coat.

Polyurethane enamel shall be 2-component aliphatic or acrylic based polyurethane, 60% minimum solids by volume, high gloss finish.

Styrene primer shall be vinyl butyral acid.

Water base epoxy shall be 2-component polyamide epoxy emulsion, 35% minimum solids by volume.

MATERIALS – ARCHITECTURAL PAINT, STAIN, VARNISH AND SEALER

Acrylic latex finish shall be high gloss single component, 25% minimum solids by volume.

Acrylic latex flat paint shall be 34% minimum solids by volume.

Acrylic sealer shall be clear acrylic, 10% minimum volume solids.

Alkyd enamel shall be optimum quality gloss finish medium long oil, 45% minimum solids by volume.

Alkyd semi-gloss shall be 47% minimum solids by volume.

Alkyd wood primer shall be flat alkyd, 47% minimum solids by volume.

Block filler shall be primer-sealer designed for rough masonry surfaces.

Canvas sealer shall be single package latex or alkyd primer for canvas surfaces.

Cementitious acrylic emulsion shall be 2-component (liquid and aggregate filler).

Cementitious coating shall be pigmented, cementitious, non-metallic, aggregate type, waterproof base coat meeting Federal Specification TTP-0035. Cementitious coating shall not support fungus growth when tested per Federal Test Method 6271.1, Standard No. 141. Apply coating with an acrylic base bonding agent with 25% minimum solids composed of 100% acrylic polymers that are internally plasticized. Bonding agent shall not reemulsify.

Rust inhibitive primer shall be single package steel primer with anti-corrosive pigment loading, 40% minimum solids by volume. Primer may be alkyd, vinyl, epoxy ester, or chlorinated rubber.

Sanding sealer shall be co-polymer oil, clear dull luster.

Silicone/Silicone acrylic shall be elevated temperature type, minimum 20% solids by volume.

Stain shall be stain luster, linseed oil, 48% minimum solids by volume.

Varnish shall be nonpigmented vehicle based on a variety of resins (alkyd, phenolic, urethane) available in gloss, semi-gloss and flat finishes.

MATERIALS - OTHER

Colors shall be formulated with colorants free of lead, lead compounds or materials which are affected by chlorine, hydrogen sulfide or other gases which may be present in the project area.

Fusion bonded coating shall be 100% solids, thermosetting, fusion bonded, dry powder epoxy or polyurethane resin.

MIXES

Multiple component coatings shall be prepared using all of the contents of the container for each component as packaged by the paint manufacturer. Partial batches are not permitted. Do not use multiple-component coatings after their pot life has expired. Provide small quantity kits for touch-up painting and for painting small areas.

INSPECTION

Shop primed or factory finished items shall be inspected at the jobsite before further painting or coating. Areas of chipped, peeled or abraded coating shall be hand or power sanded, feathering the edges, then spot primed with the specified primer.

All colors and shades of colors of all coats of paint shall be as selected by the Owner's Representative from submitted paint samples of the manufacturer's standard colors. Each coat shall be of a slightly different shade, as directed by the Owner's Representative, to facilitate inspection of surface coverage of each coat.

PREPARATION

Remove or mask hardware, fixtures, switchplates, aluminum, plastic and fiberglass surfaces, motor openings, machined surfaces, nameplates, and similar items not intended to be painted or coated, prior to surface preparation and painting or coating. Following painting or coating, reinstall all removed items. Removal and reinstallation shall be done by workmen skilled in the respective trades involved.

Clean all surfaces to receive paint or other coatings. Remove all oil, grease, welding fluxes, and other surface contaminants before blast cleaning or priming. Cleaning shall use steam, open flame, hot water, or cold water with an appropriate detergent, followed with clean water rinsing, and shall satisfy requirements of paint or coating manufacturer. Examine for defects before applying any painting or coating material. Touch up marred or abraded spots on shop-primed and on factory-finished surfaces prior to any other painting or coating application.

Masonry surface preparation shall not begin until 14 days after completion of masonry work. Remove grease, oil, dirt, salts or other chemicals, loose materials or other foreign matter by solvent, detergent, or other suitable cleaning methods. Use brush-off blast cleaning, water blasting or nonmetallic fiber brushes and commercial muriatic acid followed with a clean water rinse to remove loose mortar, grout and surface deposit.

Steel surface preparation shall conform to the listed standard of the Steel Structures Painting Council. Grind, peen or chamfer welds and sharp edges, removing sharp edges and burrs before painting. Do not perform abrasive blast cleaning when relative humidity exceeds 85%, or when surface temperature is less than 5 degrees above the dew point of the ambient air. Wet or vacu-blast methods may be required if OSHA, EPA or State regulations preclude standard abrasive blast cleaning. Use hand tools to clean areas that cannot be cleaned by other methods. Following blast cleaning, air blast the cleaned surface to remove dust and residual particles. Reblast surfaces that show rust spots before they are primed.

Wood surface preparation shall replace or repair damaged wood surfaces in a manner acceptable by the Owner's Representative. Solvent clean knots and other resinous areas to remove pitch, and then coat knots with shellac or other knot sealer. Round sharp edges by light sanding. Fill cracks, holes and other surface irregularities with wood putty approved by the paint manufacturer for the paint system. For stained or natural surfaces, use a cellulose type putty matching the color of the finished wood.

Shop primed surface preparation shall include removal of dirt, oil and grease, followed by a mist coat, 1.0 mil MDFT of the specified primer. Holdback areas for welding shall be prepared and primed after welding.

Preparation of surfaces for epoxy coating to obtain maximum adhesion, shall use grit blasting with grit coarse enough to impart a tooth in the metal equal to 25% of the thickness of the coating to be applied. Clean the metal after sandblasting with clean, dry compressed air. Use of rags to remove residual dust after sandblasting will not be permitted.

Surfaces to be painted or coated shall be dry, with the exception of porous concrete or masonry surfaces to receive a water base coating, which shall be damp, but free of running water.

Use clean drop cloths to protect adjacent floor, counter or equipment surfaces.

APPLICATION

Strictly follow the coating manufacturer's printed recommendations and instructions for thinning, mixing, handling, applying, and protecting his painting or coating materials, for preparation of surfaces for painting and coating, and for all other procedures relative to

painting and coating. Use coating and painting equipment designed for application of the specified materials. Substitutions or deviations will require written permission of the Owner's Representative.

Painting and coating shall be done in a workmanlike manner so as to produce an even film of uniform thickness. Pay special attention to edges, angles, flanges, corners, crevices, and joints to insure that they have been thoroughly cleaned and that they receive the specified thickness of paint or coating. The finished surfaces shall be free from runs, drops, ridges, waves, shiners, laps, brush marks, and variations in color, texture and finish. The hiding shall be so complete that the addition of another coat would not increase the hiding. Apply all coats so as to produce a film of uniform thickness.

Apply prime coat to all cleaned surfaces the same day they are cleaned, and prior to deterioration or oxidation of the surfaces.

Allow sufficient time between successive coats to permit satisfactory recoating, but, once commenced, complete the entire coating operation on the same workday. No additional coating of any structure, equipment, or other item shall be undertaken until the previous coating has been completed for the entire structure, piece of equipment, or other item, without specific permission of the Owner's Representative.

The mil-thickness specified in the "Painting and Coating Schedule" shall mean minimum dry-film thickness (MDFT) unless otherwise noted. All coating shall be achieved and verified for each coat.

Paint wall surfaces to be concealed by equipment before installing equipment.

Paint structural supports, fasteners attached electrical conduits, piping, fittings and valves to match equipment or piping to which they are appurtenant. If necessary, remove or separate bolted together pieces to ensure that painting or coating does not seal parts together.

Repair defective coating systems per written recommendations of the coating manufacturer.

Powder epoxy coatings shall be applied where the size of the valve or other item is not too large. Application of powder epoxy shall conform to AWWA C550.

Liquid epoxy coatings shall be used where the size of the valve or other item is too large to be coated by the powder epoxy method. Prepare surfaces to be coated in accordance with the requirements specified herein. Coatings shall conform to AWWA C550.

ADJUSTING AND CLEANING

Cleaning and painting or coating shall be so programmed that dust and other contaminants from the cleaning process will not fall on wet, newly painted or coated surfaces.

Place cloths and cotton waste that might constitute a fire hazard in fire-resistant closed metal containers daily.

Remove staging, scaffolding and containers from the jobsite upon completion of work.

PROTECTION

Protect paints and coating materials from exposure to hot and cold weather temperature extremes. Thoroughly stir, strain, and keep materials at a uniform consistency during application. Do not mix paints or coatings of different manufacturers. Thinning of paint prior to application, shall only be permitted when in accordance with the manufacturer's printed directions.

INDUSTRIAL COATING SCHEDULE**Concrete Tank Lining - Domestic Sewage**

Location	Wet well floor
Surface preparation	Concrete surface preparation
Primer	Manufacturer's recommended primer
Second Coat	Coal-tar epoxy
MDFT	14 mils

Submerged Metal Lining or Coating - Domestic Sewage

Location	Metal surfaces to 1 ft. above maximum liquid surface
Surface Preparation	SP 5
Primer	Polyamide anti-corrosive epoxy primer
MDFT	2.5 mils
Second and third coat	Coal-tar epoxy
MDFT	16 mils

Fusion Bonded Coatings

Location	
Surface preparation	SP 10 or SP 8
Second coat	Fusion bonded 100% solids epoxy or polyurethane
MDFT	6 mils

ARCHITECTURAL/INSTITUTIONAL PAINT SCHEDULE**Flat or Semi-Gloss Concrete Masonry Finish**

Location	Masonry wall
Surface preparation	Masonry surface preparation
Primer	Block filler
Application rate	75 sfpq
Second and third coat	Flat or semi-gloss acrylic latex
Application rate	240 sfpqpc

Exposed Metal Finish - Atmospheric

Location	Above ground piping
Surface preparation	SP 6
Primer	Rust-inhibitive primer
MDFT	2 mils
Second and third coat	Alkyd enamel
MDFT	4 mils

Exterior Wood Stain

Location	Redwood Gate
Surface preparation	Wood surface preparation
Second and third coat	Oil stain
Application rate	250 sfpqpc

COLOR SCHEDULE**Equipment**

Safety Equipment	OSHA Safety Green
Physical hazards in normal operating area	OSHA Safety Yellow
Dangerous parts of machines and engines	OSHA Safety Orange
Fire protection equipment and piping	OSHA Safety Red

Piping and Conduit Systems

Sewage – raw	Dark gray canterbury tan (Tnemec #62)
Water – potable	Dawn Blue
Telephone conduits	White
Electrical conduits	Gray

SECTION 625.3 – LIFT STATION – ELECTRICAL ITEMS: Measurement and payment for **ITEM 625-3 – LIFT STATION – ELECTRICAL ITEMS** shall be on a lump sum basis and shall include full compensation for on and off-site electrical work according to the Contract Documents including, but not limited to, panels, wiring, conduit, controls and instrumentation, marker posts, concrete pad for electrical panel, lights, poles and foundations, with the result being a complete and operable electrical system in accordance with these Contract Documents and the Plans.

All electrical work associated with the City of Peoria's sanitary sewer lift station shall be performed in accordance with SECTION 625.3.1 through SECTION 625.3.4 of these Special Provisions.

SECTION 625.3.1 – GENERAL ELECTRICAL REQUIREMENTS:**SYSTEM DESCRIPTION**

Finished electrical system shall operate all electric powered fixtures and equipment safely and successfully.

Furnish all necessary trenching, backfill, compaction, concrete pads, raceways, conduit, wiring, cable, boxes and connections for electric service.

Furnish complete power distribution, including distribution boards, panels, switches, over current protection, feeders, branch circuits, grounding, controls and all necessary testing and commissioning of system.

REFERENCE STANDARDS

Within their respective service areas, the Electric Service Requirements of Arizona Public Service (APS) or the Salt River Project (SRP) are hereby incorporated into this specification by reference.

Electrical work, including connection to electrical equipment integral with mechanical equipment described elsewhere, shall be performed in accordance with the latest published regulations of the following codes and standards:

American Iron and Steel Institute "Design Manual on Steel Electrical Raceways"

American National Standards Institute

American Society for Testing and Materials

Federal Standards

Institute of Electrical and Electronics Engineers

Insulated Power Cable Engineers Association

JIC Standards

National Board of Fire Underwriters

National Electric Code

National Electrical Manufacturers Association

National Fire Protection Association

State Department of Industrial Safety

State and local codes, ordinances and inspecting authorities

State Public Utilities Commission

Underwriters Laboratories Inc.

SUBMITTALS

Submit wiring and interconnection diagrams showing terminal blocks of all distribution and control assemblies, all power, control and signal raceways, junction and pull boxes, outlets, devices, interconnection circuits, and the current status of control circuits as reflected on the control diagrams. Show conductor tag numbers, control wire color code, and power wire and cable sizes. Identify motor control centers by MCC number and name, and number of equipment. The outgoing power and control wires shall be run as single lines representing the control devices that may be located in the raceway system or tapped off the raceway along the route. Identify all raceways showing the proposed tag inscription. Wires are to be fanned out and labeled at each point showing the terminal number of the wire and typical wire tags. For factory wired equipment, both the factory terminal numbers as well as the terminal numbers shown on the contract control diagrams shall be shown. If additional space is required, more than one sheet may be used for the connection diagram.

For each motor, compile the following data in neatly tabulated form. Data shall be obtained from the equipment as provided on the job.

- Equipment driven
- Nameplate amperes
- Service factor
- Overload device catalog number
- Overload device current range and setting.

WARRANTY

Furnish manufacturer's statements accepting unit responsibility for each submittal package for each group of new connected equipment. The purpose of this provision is to ensure compatibility of all components specified and to provide sole source responsibility for system performance and maintenance. Notwithstanding these provisions, the Contractor is not relieved of his responsibility for the indicated portions of the work.

ACCEPTABLE MANUFACTURERS

Conduit:

- Jones Laughlin
- National Electric Company
- Republic
- Triangle

Wire and Cable:

- Anaconda
- Circle
- Crescent
- General Cable
- General Electric
- Hatfield
- Kaiser
- Okonite
- Paranite
- Phelps Dodge
- Rome
- Simplex
- Southwire

Cast Outlet Boxes

Appleton
Crouse-Hinds

MATERIALS

Materials and equipment used shall be fully UL approved for the class of service for which they are intended prior to submittal of shop drawings.

All wiring shall be copper.

Batteries shall be suitable for high temperature exposure.

INSPECTION

Joints and connections in conductors #6 AWG and larger shall be inspected by the Owner's Representative after the joints have been made and prior to application of any tape.

Tests and adjustments shall be made prior to acceptance of the electrical installation by the Owner's Representative and a certificate of inspection and acceptance of the electrical installation by local inspection authorities shall be provided.

PREPARATION

The Contractor shall, at his own expense, make arrangements for the purchase of power or portable power.

The Contractor shall, at his own expense, provide for the extension of utility lines to the point of usage.

INSTALLATION

Stub conduits up as close as possible to equipment terminals and within the concrete base for the equipment or within a separate concrete curb.

FIELD QUALITY CONTROL

Protective devices shall be properly set and operative during the testing period. Before testing and energizing a system, all necessary precautions shall be taken to ensure the safety of personnel and equipment. All conductors and all electrical equipment shall be properly insulated and enclosed. All enclosures for conductors and equipment shall be

properly grounded. Insulation resistance measurements shall be made and approved on all conductors and energized parts of electrical equipment.

After visual inspection of joints and connections and the application of tape and other insulating materials, all sections of the complete system of wiring shall be thoroughly tested for shorts and grounds.

Test all wires and cables to be used as feeders, branch circuit wiring, control circuits and other wiring with an insulation resistance tester rated 500 ohms DC and capable of measuring 100 megohms (Biddle Company Megger). Single conductor wires and cable shall have a resistance to ground not less than 10 megohms. Conductors of multiple conductor cables shall have a resistance to ground of not less than 1 megohm.

Each polyphase motor shall have its insulation resistance to ground measured with 1000 volt "Megger" prior to connection. Values of resistance less than 10 megohms shall be cause for equipment rejection.

SECTION 625.3.2 - ELECTRICAL SERVICE AND DISTRIBUTION:

WORK INCLUDED

Equipment and installation related to the transmission, distribution and control of electric current 600 volt and below including switchboards, panelboards, bus ducts, transformers and motor controls.

SUBMITTALS

Submit shop drawings covering all electrical panels and wiring systems, and all components therein.

Catalog data for electrical components, indicating manufacturer's type and designation, rated capacity, efficiency, rated output and other characteristics.

Installation Instructions

Operation & Maintenance Instructions

Installation Certificates

ACCEPTABLE MANUFACTURERS

Electric Panel

ITT

Siemens

Square D

EQUIPMENT

Motor starters shall be protected against the following, with an alarm for each condition:

Lightning and Surge

Phase failure

Phase reversal

Phase unbalance.

FIELD QUALITY CONTROL

The insulation resistance of each circuit phase to phase and phase to ground shall be measured for the following:

1. Motor feeders shall be measured with the motor disconnected.
2. Control circuits shall be measured with push buttons, interlocking relays, instruments, overcurrent devices and the like connected.
3. Lighting feeders to panelboards shall be measured with the branch circuit breakers open. The test shall be made with the branch breakers closed, and with receptacles and fixtures mounted, but before lamping.
4. Power feeders shall be measured with switches and circuit breakers in place.
5. Perform the following equipment tests on control panels and motor control centers.
6. "Megger" the main bus and all power and control circuits.
7. Check wire terminals. Clean connections.
8. Check all control switches, alarm devices and indicating instruments for proper operation under normal and simulated abnormal conditions.
9. Check the thermal overload heaters for each motor and the reset mechanism.
10. Check the motor nameplate full-load current as the basis for checking the heater selection.

- 11. The thermal overload heaters shall be in accordance with the starter manufacturer's heater tables for motor enclosure and starter enclosure.

Phase Rotation: The connections of all equipment shall be checked for correct phase rotation.

Circuit Breakers: The following tests shall be performed:

- 1. Inspect each circuit breaker.
- 2. Check for loose connections.
- 3. Operate each circuit breaker manually.
- 4. Set the adjustable trips to the values specified.

SCHEDULES

Wiring

Conductor	copper
Insulation	THWN

Conduit

Underground (customer side)	Schedule 40 PVC with concrete encasement
Underground (utility side)	per utility requirements
Above ground	rigid galvanized steel

Enclosures

NEMA 3R

Overcurrent Protection

Dual element time-delay fuse

Utility Panel

120/240 VAC panel

SECTION 625.3.3 - LIGHTING:

WORK INCLUDED

site lighting

SUBMITTALS

submit cut sheets for lighting fixtures.

MATERIALS

Wire shall be concealed within fixture construction.

Ballasts shall be the high power factor type, and shall have internal automatic resetting thermal protection. Ballasts shall be CBM-ETL Class "P". In those ballast ratings where internal protection is not available, provide dual element external fusing at ratings recommended by the ballast manufacturer.

Fixtures shall be free of light leaks, warps, dents or other irregularities.

INSTALLATION

Install lighting equipment complete, including hickies, casings, sockets, holders, reflectors, ballasts, diffusing materials, louvers, lamp, recessing boxes, and foundations, all wired, assembled and ready for operation. Provide supporting brackets as required.

SECTION 625.3.4 - CONTROLS AND INSTRUMENTATION:

WORK INCLUDED

Electrical control systems for vertical turbine solids handling pumps. Instruments, gages, meters, and alarms for telemetry.

SYSTEM DESCRIPTION

General pump control sequence: There are two pumps to be installed in the wet well. When the water level reaches the level of the lead pump switch setting, the lead pump shall begin pumping. If the water level continues to rise, the lag pump shall also activate when the water level reaches the level of the lag pump switch. Both pumps shall stop when the water level is pumped below the pump shutoff switch. A low low water level switch shall stop both pumps in the event of a failure of the pump shutoff switch to interrupt the motor current.

Hand-off-automatic (HOA) switch shall allow for either automatic or hand operation of each individual motor. Hand operation shall retain control logic functions considered as safety interlocks.

Manual lead and lag pump switch shall allow manual selection of which pump operates as lead, and which pump operates as lag pump.

Indicating lights shall be mounted on motor control center panel to show the following for each motor:

- Red - Motor Failure
- Green - Motor On
- Amber - Power On

Safety interlock cutouts on motor shall open motor circuits in the event of any of the following:

- motor overload
- motor overheating
- motor short circuit

Motor safety interlock cutouts shall ensure the motor remains locked out until the system is manually reset.

Safety interlock cutouts on hydraulics shall open motor circuits in the event of any of the following:

- high discharge pressure, initially set at 100 psi
- low low water level
- low discharge flow with pump running

Hydraulic safety interlock cutouts shall ensure the motor remains locked out until the system is manually reset.

Annunciators shall indicate the following conditions until the system is reset manually.

- motor overload
- motor overheating
- motor short circuit
- low low water level
- operation of lag pump
- low discharge flow with pump running

Alarm contacts shall be provided with terminal strips for telemetry for the following:

- power failure
- station entry (intrusion)
- pump or motor malfunction
- low low water level or operation of lag pump
- pump status (on/off/no flow) 2 pumps
- signal failure

Timer switches shall control motor start and stop on all pumps. Timer switches shall be settable from 0 to 3 minutes.

Automatic restart shall attempt to start the pump three times in each of the following events:

- pump motor fails to start
- pump cut out due to low level or pressure
- power failure

SUBMITTALS

Submit shop drawings, catalog data, installation instructions, and operation and maintenance instructions on pressure and level sensors and transducers

Submit ladder diagram for control logic or wiring, and for terminal board.

ACCEPTABLE MANUFACTURERS

Motor Contactors

General Electric Co., Fairfield, CT

Elapsed Time Meters

General Electric Co., Fairfield, CT

Control Relays

Eaton Corp. Controls Div., Carol Stream, IL - Cutler Hammer Type M 26M

Overload Current Relays

Allen Bradley Co., Inc., Milwaukee, WI

Time Delay Relays

Agastat

Level Switches

Consolidated Electric Company, St. Paul, MN -
Model 157GSC Submersible Level Transducer

EQUIPMENT

Elapsed time meters shall be installed on each pump motor.

Level instrumentation shall be submersible level transducer as manufactured by Consolidated Electric Company Model 157GSCD.

Level Controller shall be as manufactured by Consolidated Electric Company Model D152.

Relays used for instrumentation work shall be plug-in types using standard socket configuration plugs. Sockets shall be heavy duty, surface mounted, industrial type with barrier protected screw type terminals and shall be a one-piece melamine plastic molding. The socket shall have a rating of less than 5 amps at 125 rms working volts.

Relays for general purpose use shall have, as a minimum double pole, single throw (DPDT) contacts. They shall be rated at 10 amps at 120 volts AC and 28 volts DC. The relay frame shall be constructed of laminated phenolic and shall be provided with a clear polycarbonate dust cover. Relays for switching high level signal circuits (4 to 20 milliamps shall be similar to the above, except that contacts shall be rated at 3 amperes and the relay shall be hermetically sealed.

Time delay relays shall consist of a control relay as specified above and a solid state timing circuit packaged similarly to the above relays with a solid state output for operating the control relay. Time delay periods shall be adjustable by a cover mounted knob and calibrated dial. The relay shall have a time delay uncertainty of plus or minus 1 percent of full scale or better, and reset time shall be 60 milliseconds or less. The relay shall not falsely operate in case of interrupted timing sequences. Time delay relays for periods in excess of 3 minutes shall be plug-in synchronous motor driven units and shall be provided with industrial type screw terminal sockets.

INSTALLATION/APPLICATION/ERECTION

Mount instruments between 48 and 60 inches above the floor or work platform unless otherwise directed by Owner's Representative.

Relocate telemetry at existing lift station to new lift station. Remount and rewire equipment to the satisfaction of the City of Peoria.

Appendix A:

FOR INFORMATION ONLY

PUMP STATION ENGINEERING ORDER
CUSTOM SERIES

(PAGE 1 OF 1)
Form No. 04-06-82 (Rev. 8/80)

LOCATION <u>PEORIA, AZ.</u>	STATION SERIAL NO. <u>08-7912-V</u>
OWNER <u>Pipeline Specialists</u>	ENGINEER <u>Brown Eng. Co., Inc.</u>

1. Station Size Custom (Dia.) 8'-0" Height 8'-0" inside Sump Pump Part No. 8L1
2. Suction Piping (P.E.) (Stl.) (~~Box~~) Pump 1 10" Pump 2 10" Pump 3 _____ Pump 4 _____
3. Suction (Gate) (~~Box~~) Valve Pump 1 10" Pump 2 10" Pump 3 _____ Pump 4 _____
4. Pump Discharge (Gate) (~~Box~~) Valve Pump 1 8" Pump 2 8" Pump 3 _____ Pump 4 _____
5. Common Discharge Outlet (P.E.) (Stl.) (~~Box~~) Size 10"
6. Entrance Tube 36" Dia. x 14'-0" Long
7. Main Conduit Size 1 1/2" Aux. Conduit (1) 1 1/2" (Describe) Alarm Blower Part No. 7L277
8. Electrical Service System Data: 3 Phase 60 Cycle 460 Volts 4 Wire
9. 110V Single Phase Current (~~not~~) available Yes KVA Trans. Req'd. No V to 120 VAC
10. Depth of Bury Ground Elevation to Base Pad 21' - 1" Base Reinforcing Package (Yes) (No)

PUMP & MOTOR DATA

PUMP DATA	PUMP 1	PUMP 2	PUMP 3	PUMP 4
Design Characteristics (GPM@TDH)	1225 @ 18 1/2'	1225 @ 18 1/2'		
Pump Model	6B3A	6B3A		
Impeller Diameter	12 1/16"	12 1/16"		
Rotation (CW) (CCW)	CW	CCW		
S&L Mech. Seal-Filter Ass'y (Size)	1 7/8"	1 7/8"		
Pump Serial Number				
MOTOR DATA (INVENTORY CODE)				
Horsepower	7 1/2	7 1/2		
R. P. M.	875	875		
Phase/Cycle/Volts	3/60/460	3/60/460		
Motor Serial No. (Code Ltr.)				
Squirrel Cage (SC) or Wound Rotor (WR)	SC	SC		
Special Modifications				
Across-The-Line (AL) or Part Winding (PW) Start	AL	AL		

CONTROL PANEL DATA TYPE NEMA 1 WIRING DIAGRAM NO. _____

MOTOR CONTROL EQUIPMENT	PUMP 1	PUMP 2	PUMP 3	PUMP 4
Circuit Breaker - Trip Rating - Amps <u>30</u>	4L258CB	4L258CB		
Magnetic Starter - Nema Size <u>1</u>	4L330B	4L330B		
O.L. Coil No. FH <u>42</u>	3) 4L331BR	3) 4L331BR		

AUXILIARY CIRCUIT BREAKERS	LIGHTS	BLOWER DEHUMIDIFIER	SUMP PUMP	AIR COMPRESSORS & CONTROL	TRANSFORMER
Trip Rating-Amps	15	20	15	15	-