

CONSTRUCTION SPECIFICATIONS

FOR

MARYLAND AVENUE BRIDGE
AT THE ARIZONA CANAL DIVERSION CHANNEL
AND UTILITIES RELOCATIONS

FCD CONTRACT NO. 89-56

CONSTRUCTION SPECIAL PROVISIONS

Prepared By:

T.Y. LIN INTERNATIONAL
1817 North Seventh Street
Phoenix, Arizona 85006

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



(Engineer's
Seal)

PREPARED FOR:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

Recommended By: Nick Karan Date: 3-16-90
Nicholas P. Karan, P.E., Chief
Engineering Division

Approved By: Stanley L. Smith Jr. Date: 3-16-90
STANLEY L. SMITH JR., P.E.
DEPUTY CHIEF ENGINEER
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.

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ATTENTION

ALL PROSPECTIVE BIDDERS

Some of the Bid Bonds previously received with bids for construction projects have not been in complete compliance with Arizona Revised Statutes (A.R.S.).

A.R.S. Sec. 34-201(A)(3) requires that every bid be accompanied by a certified check, cashier's check or surety bond for five percent (5%) of the amount of the bid.

In some cases the bond limits the five percent (5%) to the difference between the low bid and that of the next lowest responsible bidder, to whom a contract could be awarded, in the event that the low bidder failed to enter into contract within the specified time.

Bids received with limitation on the five percent (5%) will be considered as nonresponsive bids and will not be accepted or considered for award of contract.

Please take note and submit your bids accordingly.

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
FCD CONTRACT 89-56

MARYLAND AVENUE BRIDGE
AT THE ARIZONA CANAL DIVERSION CHANNEL
AND UTILITIES RELOCATIONS

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(Area to left
reserved for
Engineer's Seal)

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
INVITATION TO BID

BID OPENING DATE: April 18, 1990

LOCATION:

This project is located in Phoenix, Arizona on Maryland Avenue at the Arizona Canal Diversion Channel, (ACDC), approximately 1/2 mile east of 16th Street and immediately east of the Arizona Canal.

PROPOSED WORK:

The work includes two segments:

1. Construction of a bridge in two phases on Maryland Avenue.
2. Relocation of water, wastewater, and park water lines; 1) along Maryland Avenue, 2) from the Crossroads facility south of Ocotillo Road, and 3) from the Desert Crest facility south of Maryland Avenue.

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 the 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.

In order to determine if bidder is entitled to the provisions of A.R.S. Sec. 34-241, all bidders shall submit, as a part of their proposal, an affidavit stating whether or not taxes have been paid for two successive years as provided in A.R.S. Sec. 34-241. The affidavit shall be in the form provided herein.

In the event a bidder challenges compliance with the tax provision, the successful bidder will be required to provide proof of compliance.

CONTRACT TIME:

All work on this Contract is to be completed within one hundred fifty four (154) calendar days after date of Notice to Proceed.

MBE/WBE PARTICIPATION:

For this project, a goal of fifteen (15) 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 April 11, 1990 at 1:00 p.m. in the Flood Control District conference room, 3335 W. 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 \$30.00 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 \$37.50 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>
262	CY	4,000 psi Concrete
57,030	LB	Steel Reinforcement
17	EA	Precast Prestressed Concrete Box Girders
1,199	LF	Drilled Shaft, 36" dia. (incl. Concrete and Steel)
575	LF	Drilled Shaft, 48" dia. (incl. Concrete and Steel)
2,822	LF	8" VCP Sanitary Sewer Pipe

PROPOSAL

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

Gentlemen:

The following Proposal is made for constructing FCD 89-56; Maryland Avenue Bridge at the Arizona Canal Diversion Channel and Utilities Relocations 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, 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 the 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 154 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. These Bonds 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: Maryland Avenue Bridge at the ACDC
and Utility Locations

CONTRACT: FCD 89-56

ITEM NO.	DESCRIPTION	APPROXIMATE QUANTITY	UNIT	UNIT COST (IN WRITING) AND /100 DOLLARS	UNIT COST (NUMBERS)	EXTENDED AMOUNT
206-1	Structural Excavation	280	CY			
206-2	Structural Backfill	48	CY			
301-1	Subgrade Preparation	1,275	SY			
310-1	4" Aggregate Base Course	209	TON			
310-2	6" Aggregate Base Course	256	TON			
315-1	Bituminous Prime Coat, MC-30	0.72	TON			
321-1	Emulsified Bituminous Tack Coat	0.40	TON			
321-2	2" Asphaltic Concrete Pavement, Type D-1/2	213	TON			
321-3	1" Asphaltic Concrete Pavement, Type D-1/2	6.7	TON			
321-4	2" Asphaltic Concrete Pavement, Type C-3/4	132	TON			
340-1	Concrete Curb and Gutter, MAG Det. 220, Type "A", H=6"	42	LF			
340-2	Vertical Concrete Curb, MAG Det. 222 Type "A", H=6"	171	LF			
340-3	Concrete Sidewalk, C.O.P. Det. P-1230	316	SF			
340-4	Concrete Driveway Pavement C.O.P. Det. P-1255	1,096	SF			
345-1	Adjust Valve Box, MAG Det. 391-1 Type "A"	8	EA			

BIDDING SCHEDULE

PROJECT: Maryland Avenue Bridge at the ACDC
and Utility Locations

CONTRACT: FCD 89-56

ITEM NO.	DESCRIPTION	APPROXIMATE QUANTITY	UNIT	UNIT COST (IN WRITING) AND /100 DOLLARS	UNIT COST (NUMBERS)	EXTENDED AMOUNT
350-1	Remove A.C. Pavement	2,771	SY			
350-2	Remove Sidewalk	2,365	SF			
350-3	Remove Curb and Gutter	42	LF			
350-6	Remove Water Line	305	LF			
350-7	Remove Sanitary Sewer	235	LF			
350-8	Remove Sanitary Sewer Manhole	3	EA			
350-9	Remove 12" Gate Valve	1	EA			
350-10	Structures Demolition (Incl. Foundations)	1	LS			
401-1	Signage and Striping (Traffic Control)	1	LS			
505-1	Class "AA" Concrete (f'c = 4000)	262	CY			
505-2	Grade 60 Reinforcing Steel	57,030	LBS			
505-3	36" Diameter Drilled Shafts	1,199	LF			
505-4	48" Diameter Drilled Shafts	575	LF			
505-5	Mechanical Compression Seals	1	LS			
506-1	Precast Prestressed Conc. Box Girders	17	EA			
520-1	Pedestrian Fence (Steel)	130	LF			

BIDDING SCHEDULE

PROJECT: Maryland Avenue Bridge at the ACDC
and Utility Locations

CONTRACT: FCD 89-56

ITEM NO.	DESCRIPTION	APPROXIMATE QUANTITY	UNIT	UNIT COST (IN WRITING) AND /100 DOLLARS	UNIT COST (NUMBERS)	EXTENDED AMOUNT
610-1	12" Water Line, DIP CL 52, Std. 301, 302	160	LF			
610-2	20" Water Line, Steel, Welded Joints	160	LF			
610-3	Relocate and Replace Fire Hydrant	1	LS			
610-4	2" Water Service Connection	1	EA			
610-6	Air Relief Valve	1	EA			
615-1	4" Sanitary Sewer Service, P.V.C. Sch. 40	58	LF			
615-3	8" Sanitary Sewer, VCP	2,822	LF			
615-4	Sanitary Sewer Cleanout	1	EA			
625-1	Sanitary Sewer Manhole, MAG Det. 420 & 424	15	EA			
630-1	12" Gate Valve and Box, MAG Std. 391-1	1	EA			
775	8' Concrete Masonry Wall	87	LF			
SP-1	Temporary Concrete Barrier, ADOT Std. C-2.01	360	LF			
SP-2	Relocate Concrete Barrier	205	LF			
SP-3	4" P.V.C. Conduit	180	LF			
SP-4	Wastewater Pump Station	1	LS			

BIDDING SCHEDULE

PROJECT: Maryland Avenue Bridge at the ACDC
and Utility Locations

CONTRACT: FCD 89-56

ITEM NO.	DESCRIPTION	APPROXIMATE QUANTITY	UNIT	UNIT COST (IN WRITING) AND /100 DOLLARS	UNIT COST (NUMBERS)	EXTENDED AMOUNT
SP-5	Temporary Bituminous Sidewalk	1,015	SF			
SP-6	4" D.I. Forcemain	135	LF			
SP-7	6' Temporary Chainlink Fence	250	LF			
SP-8	6' x 8' Chainlink Gate	2	EA			
SP-9	Park Water Pump Station	1	LS			
SP-10	Traffic Barricade Std. Det. P-1106 Type B	52	LF			
SP-11	Brace Power Pole for Water and Sewer Construction	1	LS			
SP-12	Sawcut and Remove Bit Pavement in Parking Lot	85	SY			
SP-13	Replace Bit and Base in Parking Lot	85	SY			
SP-14	Concrete Driveway Replacement per Det. 1 and Notes 1 through 6 on Sheet C-20	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.

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 ___ percent (___%) 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 89-56; Maryland Avenue Bridge at the Arizona Canal Diversion Channel and Utilities Relocations in the County of Maricopa, State of Arizona.

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., 1990.

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 89-56
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>
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

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

FCD Contract 89-56

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: Maryland Avenue Bridge at the ACDC
and Utilities Relocations

Contract Number: 89-56

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, %: 15

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 _____, 1990, 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 89-56; Maryland Avenue Bridge at the Arizona Canal Diversion Channel and Utilities Relocations, 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, 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 _____, 1990, for FCD Contract 89-56; Maryland Avenue Bridge at the Arizona Canal Diversion Channel and Utilities Relocations, 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 _____, 1990.

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 _____, 1990, for FCD Contract 89-56; Maryland Avenue Bridge at the Arizona Canal Diversion Channel and Utilities Relocations, 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 _____, 1990.

AGENCY OF RECORD

AGENCY ADDRESS

BOND NUMBER

POWER OF ATTORNEY

SEAL

BY: _____

PRINCIPAL

SEAL

BY: _____

SURETY

SEAL

BY: _____

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

CERTIFICATE OF INSURANCE

CONTRACT FCD 89-56

PROJECT TITLE Maryland Ave. Bridge over the ACDC

NAME AND ADDRESS OF INSURANCE AGENCY	INSURANCE COMPANIES AFFORDING COVERAGES
	Company Letter A
	Company Letter B
	Company Letter C
	Company Letter D
	Company Letter E
	Company Letter F
NAME AND ADDRESS OF INSURED	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 PROPERTY DAMAGE each occurrence	Combined Single Limit 5,000
	COMPREHENSIVE AUTO <input checked="" type="checkbox"/> LIABILITY & NON-OWNED			SAME AS ABOVE	
	<input type="checkbox"/> EXCESS LIABILITY			NECESSARY IF UNDERLYING NOT ABOVE MINIMUM	
	<input checked="" type="checkbox"/> WORKERS' COMPENSATION AND EMPLOYERS' LIABILITY			STATUTORY each accident	\$100
	<input checked="" type="checkbox"/> ENGINEERS PROFESSIONAL LIABILITY			EACH CLAIM AND ANNUAL AGGREGATE	
	<input checked="" type="checkbox"/> OTHER In addition to the Flood Control District of Maricopa County, the City of Phoenix, Maricopa County, and T.Y. Lin International shall be named as additional insureds.				

Except for Professional Liability Insurance and 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 CONTROL DISTRICT OF MARICOPA COUNTY, CITY OF PHOENIX, MARICOPA COUNTY, AND T.Y. LIN INTERNATIONAL or any of its 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, City of Phoenix, Maricopa County, and T.Y. Lin International 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, City of Phoenix, Maricopa County, and T.Y. Lin International. The above cost of damages incurred by the Flood Control District of Maricopa County or any of its 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

SUBCONTRACTOR LISTING

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) _____

CONSTRUCTION SPECIAL PROVISIONS
 FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
 FCD CONTRACT NO. 89-56
 FOR
 MARYLAND AVENUE BRIDGE AT THE ACDC
 AND
 UTILITIES RELOCATIONS



PART 100 - GENERAL CONDITIONS

PROPOSED WORK: The work includes 2 segments:

1. Construction of a bridge in two phases on Maryland Avenue.
2. Relocation of water, wastewater, and park water lines; 1) along Maryland Avenue, 2) from the Crossroads facility south of Ocotillo Road, and 3) from the Desert Crest facility south of Maryland Avenue.

LOCATION OF WORK: This project is located in Phoenix, Arizona, on Maryland Avenue at the Arizona Canal Diversion Channel, (ACDC), approximately 1/2 mile east of 16th Street and immediately east of the Arizona Canal.

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), and the Construction Special Provisions contained herein and City of Phoenix 1986 Supplement to the MAG Standard Specifications.

PRECEDENCE OF CONTRACT DOCUMENT: The City of Phoenix 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 City of Phoenix Supplements and MAG Standard Specifications and Details. These Construction Special Provisions will govern over the City of Phoenix 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 7 (seven) calendar days after the date of the Notice To Proceed and complete all work within 154 (one hundred fifty-four) 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 and Pipe 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 & 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 102.4 - 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. During all phases of construction of this work, the Contractor shall be responsible for the avoidance of damage to the existing communications fibre-optic cables located approximately 34'-6" north of the monument line (centerline) of Maryland Avenue.

Temporary support of the cables: Prior to excavation exposing the cables, the Contractor shall contact U.S. West Communications to coordinate installation of temporary supports.

2. It is anticipated that, concurrent with this project's schedule, the Squaw Peak Parkway will also be under construction. The Contractor shall coordinate with the Resident Engineer and Construction Superintendent in order to avoid any conflict in work area, schedule and traffic control.

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 insureds as set out in the included Certificate and in 103.6.1(D) below. The certificate shall also name the additional insureds 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 T.Y. Lin International, Maricopa County, City of Phoenix, and other entities as mentioned on the included Certificate of Insurance as additional insureds.

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), attorneys' 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 cost, including attorney's fees, incurred by the indemnified parties in any lawsuit to which they are a party.

SECTION 104 - SCOPE OF WORK:

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.

SECTION 104.1.2 - MAINTENANCE OF TRAFFIC:

- A. The following shall be considered major streets:
 - Maryland Avenue
 - 20th Street
- B. All traffic and/or traffic control devices on this project shall be provided, maintained and/or controlled as specified in the City of Phoenix Traffic Barricade Manual, latest revision.
- C. Permission to restrict City streets, sidewalks, and alleys (street closure permits) shall be requested as specified in

Section III of the Traffic Barricade Manual.

D. Unless otherwise provided for in the following "Special Traffic Regulations" and SECTION 401, all traffic on this project shall be regulated as specified in Section IV of the Traffic Barricade Manual.

SPECIAL TRAFFIC REGULATIONS:

Maryland Avenue and 20th Street: A minimum of 2 lanes (1 each way) shall be maintained open to through traffic at all times on each street.

Pedestrian Access and Bike Path Requirements: Contractor shall provide and maintain clean, safe and adequate pedestrian walkways, sidewalks and crosswalks free of dirt, mud, dust, debris, equipment and material storage at all times.

Contractor shall provide "bike path" detour signing and maintain the bike path open and free of obstructions at all times. A bike path detour plan shall be submitted for approval prior to implementation.

Police Officer Requirements: The Contractor shall provide one off-duty officer to assist the contractor when it is necessary to flag traffic to allow men and equipment into or out of the work area.

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 follow:

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, 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. Wastewater Pump Station, complete.
- N. Park Water Pump Station

Review: 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 " Approved " or "Approved 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.

One copy of submitted drawings will be returned to the Contractor marked " Approved " or " Approved as Noted". If the submittal is marked " Not Approved ", a new submittal shall be made in the same manner as the original submittal.

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.

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.

Deviations or changes from plans or specifications shall be identified as such and will require review by the Engineer for approval or rejection.

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.

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 temporary relocations (minor deflections) of overhead utilities. The Contractor shall adhere to the safety precautions for aerial and underground power lines as specified in the attached Salt River Project Agriculture Improvement and Power District Exhibit A and Exhibit B.

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

- Arizona Public Service, Lois Winkler.....371-6837
- Blue Stake.....263-1100
- City of Phoenix
 - (Library & Parks Dept.), James Burke.....262-4997
 - (Streets & Traffic Dept), Marsh Hollan.....262-4986

(Water & Wastewater Dept.), Fred May.....261-8229
 Dimension Cable Service, Blair Tanner....(ext. 361).866-0072
 Maricopa County Highway Department.....262-3631
 Flood Control District of Maricopa County
 Ed Raleigh.....262-1501
 Salt River Project
 (Distribution Line Design), Chuck Hughes.....236-2090
 (Operational Support), Tim Phillips.....236-2956
 Southwest Gas Corporation, Ron Morency.....484-5306
 U.S. West Communications, Bob Friess.....842-7748
 Western Union Telegraph Company, Roland Finger (213)518-0065

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 City of Phoenix inspection and acceptance prior to final acceptance by the Engineer. City inspectors have the right to visit the site at any time, without notice. All requests or comments from the City will be made to the Engineer and the Contractor will then be notified by the Engineer.

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.

SECTION 106 - CONTROL OF MATERIALS:

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 106.3 - PLANT INSPECTION:

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 City limits of Phoenix, Arizona.

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

Within a 50 mile radius from the City limits of Phoenix, Arizona, costs for inspection of precast concrete girders shall not be charged.

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. There is no cost for a FCDMC license.

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.

A no-charge permit is required from the City of Phoenix.

A permit from the Salt River Valley Water Users Association for work in their right-of-way will be supplied by the FCDMC.

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. This plan shall be submitted at the Pre-construction meeting.

Construction of the bridge will be phased as illustrated on the plans. The bridge structure will be constructed in two sections in a manner that will permit traffic to be maintained at all times in accordance with Section 104.1.2 - TRAFFIC REGULATIONS, SECTION 401 TRAFFIC CONTROL and the traffic control shown on the plans.

The Contractor shall complete all demolition at the Desert Crest Retirement Home within 30 calendar days of the Notice to Proceed. This demolition work includes structures, foundations, pavement, sidewalks and all other incidental demolition on the site. Additionally, the Contractor shall complete the construction of the sewer line and all other incidental construction on the Desert Crest site within 45 calendar days of the Notice to Proceed.

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 incompleted 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.

In addition to the costs in the above paragraph, the Contractor will be charged liquidated damages in the amount of \$500 per calendar day for each and every calendar day that work shall remain incomplete at the Desert Crest Retirement Home after the time specified in SECTION 108.4.

PART 200 - EARTHWORK

SECTION 201 - CLEARING & GRUBBING: The work under this item consists of removal and disposal of all trees, stumps, asphaltic pavement, and structures within the limits of the roadways and easements, as designated on the plans. Materials shall be disposed of off-site.

The area within the construction area of the DETOUR ROADWAY shall be cleared and grubbed in conformance with the MAG Standards Section 201. 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 - STRUCTURE EXCAVATION AND BACKFILL: Structure excavation and backfill shall conform to Section 206 of the MAG Standard Specifications.

The Contractor shall provide sheet piling or other means of support for excavation to protect detour road, underground utilities and private property during construction. Structure excavation and backfill shall be defined as follows:

All plan area located between 18 feet and 45 feet from the centerline of the ACDC and within 40 feet of the centerline of Maryland Avenue.

Structure backfill shall be compacted in accordance with table 601-2, Type III of the MAG Standard Specifications. All structure backfill shall consist of free-draining granular material with not more than 5% 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% of the maximum density at the optimum moisture content plus or minus 3% as determined in accordance with ASTM D-2922 and D-3017. Compaction equipment should be maintained at least two (2) feet from the structure.

Additionally, tests shall conform to ASTM D698 and D1556. Backfill located within 18 feet of the centerline of the ACDC and beyond 40 feet of centerline of Maryland Avenue may consist of selected native soils.

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 the Traffic Control

detours, temporary sidewalks and approach roadways. The material required for the construction of the fill shall be suitable material obtained from the ACDC Right-of-Way, the structure excavation or backfill material as defined in SECTION 206. All material shall be free of all debris and vegetation.

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. 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 minimum depth of eight (8) inches.

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

Compaction shall be to a minimum of 95% 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% of optimum.

Additionally, tests shall conform to ASTM D698 and D1556. No separate payment will be made for fill construction and the cost of these items shall be included in the contract price bid for related items.

The contractor shall complete the roadway excavation requirements for the DETOUR ROADWAY area in conformance with MAG Standards Section 205 to the grades, and lines as shown on the plans. This work shall be incidental to the contract.

PART 300 - STREETS AND RELATED WORK

SECTION 301 - SUBGRADE PREPARATION: ITEM 301-1 SUBGRADE PREPARATION shall conform to MAG Standards Section 301 and shall be required in areas where pavement, sidewalk, curb and gutter, driveways, or other pavement types of structures are to be constructed. Compaction below the detour roadway shall be 90 percent as called for in MAG Section 301.3. Other areas shall be as called for in the MAG Standards. Payment for this work will be made at the unit price bid per square yard for the detour roadway area only. Payment for the required subgrade preparation for items outside of the detour roadway area shall be incidental.

SECTION 310 - UNTREATED BASE:

- ITEM 310-1 AGGREGATE BASE COURSE 4"
- ITEM 310-2 AGGREGATE BASE COURSE 6"

The Contractor shall construct the aggregate base course to the grades, lines, and sections as shown on the plans and in conformance with MAG Standards Section 310. Base course material shall conform to MAG Section 702. Payment for this work will be made at the contract unit price for aggregate base course per ton for the thicknesses as shown on the plans.

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 315 - BITUMINOUS PRIME COAT: ITEM 315-1 A bituminous prime coat shall be placed on any aggregate base course prior to the placement of asphalt pavement. The prime coat shall be bituminous asphalt Grade MC - 30 and applied at the rate of 0.25 gallons per square yard. This work shall conform to MAG Standards Section 315 and will be paid for at the contract unit price per ton. The Contractor will be required to furnish the Engineer certified weight tickets covering all of the Bituminous Prime Coat placed on the project. Final pay quantities will be based upon the scale tickets accepted by the Engineer.

SECTION 321 - ASPHALT CONCRETE PAVEMENT:

- ITEM 321-1 EMULSIFIED BITUMINOUS TACK COAT
- ITEM 321-2 2" ASPHALTIC CONCRETE PAVEMENT, Type D 1/2
- ITEM 321-3 1" ASPHALTIC CONCRETE PAVEMENT, Type D 1/2
- ITEM 321-4 2" ASPHALTIC CONCRETE PAVEMENT, Type C 3/4

An emulsified bituminous tack coat shall be required prior to the placement of any asphalt onto an existing concrete or asphalt surface. This tack coat shall consist of emulsified bituminous asphalt grade SS-1H and shall be applied at the rate of 0.10 gallons per square yard. This work shall conform to MAG Standards Section 321 and will be paid for at the contract unit price per ton, diluted.

Asphalt paving shall be constructed to the grades, lines and section thickness as shown on the plans and in conformance with MAG Standard Section 321, with Phoenix supplement. A tack coat as specified above, will be required on all concrete or asphalt surfaces. A bituminous prime coat will be required on all aggregate base course subgrades prior to the placement of asphalt pavement. Payment for this work will be made at the contract unit price per ton for asphalt pavement for the type and thicknesses as shown on the plans.

The mineral aggregate shall meet the grading requirements within the range of the specified tolerances for Mix-Designation C-3/4 or D 1/2, as shown on the plans, in accordance with Section 710 of the MAG Standard Specifications and the City of Phoenix Supplement to the MAG Standard Specifications.

The Contractor shall furnish certified weight tickets covering all plant-mixed asphalt concrete placed on the project. Final pay quantities will be based upon the scale tickets accepted by the Engineer.

SECTION 340 - CONCRETE CURB & GUTTER, SIDEWALKS, DRIVEWAYS AND ALLEY ENTRANCES:

- ITEM 340-1 CONCRETE CURB AND GUTTER
- ITEM 340-2 VERTICAL CONCRETE CURB
- ITEM 340-3 CONCRETE SIDEWALK
- ITEM 340-4 CONCRETE DRIVEWAY PAVEMENT

Curb and gutter shall be MAG Standard 220 (Type A), with a curb height H = 6 inches. This work shall conform with MAG Standard Section 340. Areas where the curb and gutter is depressed or transitioned to match an existing curb and gutter will be measured and paid for as per the standard. This work will be paid for at the contract unit price per lineal foot for concrete curb and gutter of the type and size as called for on the plans. Vertical concrete curb shall be MAG Standard Section 222 (Type A) with a curb height H = 6 inches. This work shall conform with MAG Standard Section 340. Areas where the curb is depressed or transitioned to match an existing curb will be measured and paid for as per the standard. This work will be paid for at the contract unit price per lineal foot for concrete curb of the type and size as called for on the plans.

The contractor shall construct concrete sidewalk as shown on the plans and in conformance with the City of Phoenix Standard #P - 1230 and MAG Standard Section 340. Payment will be made at the contract unit price per square feet for concrete sidewalk as measured in place. Sidewalk ramps will be incidental and paid for as the same square foot unit price as the concrete sidewalk.

Concrete driveway pavement (entrance) shall be constructed as shown on the plans per detail DRIVEWAY ENTRANCE (Sheet C-4) and in conformance with the City of Phoenix Standard P-1255 and MAG Standard Section 340. Payment will be made at the contract unit price per square feet for concrete driveway pavement measured in place.

SECTION 345 - ADJUSTING FRAMES, COVERS, VALVE BOXES AND WATER METER BOXES:

ITEM 345-1 ADJUST VALVE BOX

The contractor shall adjust the existing valve boxes to match the proposed pavement. This work shall conform to MAG Detail 391-1 Type A and in conformance with MAG Standard Section 345 as supplemented by the City of Phoenix. Payment for this work will be made at the contract unit price per each for adjusting valve boxes.

SECTION 350 - REMOVAL OF EXISTING IMPROVEMENTS:

- ITEM 350-1 REMOVE A.C. PAVEMENT
- ITEM 350-2 REMOVE SIDEWALK
- ITEM 350-3 REMOVE CURB AND GUTTER
- ITEM 350-4 REMOVE WATER LINE
- ITEM 350-5 REMOVE SANITARY SEWER LINE
- ITEM 350-6 REMOVE SANITARY SEWER MANHOLE
- ITEM 350-7 REMOVE 12" GATE VALVE
- ITEM 350-10 STRUCTURES DEMOLITION (including foundations)

The removal of asphalt concrete pavement, sidewalk, curb and gutter and structures shall include the disposal of the various existing improvements as shown on the plans. This work shall conform to MAG Section 350 as supplemented by the City of Phoenix. Payment for removals will be made at the contract unit price for the items and unit as shown on the plans. All items are to be field measured by the Engineer prior to removal by the Contractor.

The indicated existing waterlines, sanitary sewer lines and sanitary sewer manholes shall be removed and disposed of at the contractor's expense in conformance with MAG Standard Section 350 as supplemented by the City of Phoenix. Included in this work shall be any appurtenant fittings or materials required for installation. Payment will be made at the contract unit price for the items and units as shown on the plans. All items are to be field measured by the engineer prior to removal by the contractor.

In addition to the items listed in Section 350.3, MISCELLANEOUS REMOVAL AND OTHER WORK, the following shall be included:

- K. Restoration of Right-of-Way and/or Temporary Construction Easements: The Contractor shall leave the easements in as good condition, or better, when work is completed. Special care shall be taken to replace any asphalt, trees, sprinklers, lights, walls, fences, etc., which were disturbed as a result of construction. Where grass is located within the easement, such as a lawn, the Contractor shall remove only that which required for construction, and replace it immediately after construction is complete.

- L. Any and all items not specifically set forth as a separate pay item.
- M. Sawcutting and matching existing pavements and curbs, gutters, etc.
- N. Relocating positions of existing signs to be staked by the Inspector.
- O. Relocating positions of existing plants within the right-of-way to be staked by the Inspector.
- P. Removing existing AC, concrete curb and gutter and adjust any existing improvements, if required, and water meter adjustment as directed by the Engineer.
- Q. Remove and replace all damaged concrete sidewalk along the Arizona Canal, now designated as a bike path, including those areas removed for sewer construction on the bike path. Remove all AC temporary sidewalk.
- R. Install PVC sleeves as detailed on the project plans in the ACDC Bridge sidewalks.
- S. Install PVC sleeves as shown on the project plans, under the approach slabs.
- T. Pavement replacement for water and wastewater line construction.

PART 400 - RIGHT-OF-WAY AND TRAFFIC CONTROLSECTION 401 - TRAFFIC CONTROL:

ITEM 401-1 TRAFFIC CONTROL shall conform to MAG Standard Section 401 as supplemented by the City of Phoenix. Included in this work shall be all signage and striping as indicated on the plans. Traffic shall access Maryland Avenue, 20th Street and the Driveway to the south at all times. Temporary traffic control shall be the responsibility of the contractor. Payment will be made at a lump sum price including all labor, signs, striping, equipment and maintenance during the duration of the project.

401.5 GENERAL TRAFFIC REGULATIONS:

- A. Maryland Avenue and 20th Street shall be considered major streets.

Access to private property and public parks is required at all times.

- B. All traffic and/or traffic control devices on this project shall be provided, maintained, and/or controlled as specified in the City of Phoenix Traffic Barricade Manual, latest revision.
- C. Permission to restrict city streets, sidewalks, and alleys (street closure permits) shall be requested as specified in Section III of the Traffic Barricade Manual.
- D. Unless otherwise specified, all traffic on this project shall be regulated as specified in Section IV of the Traffic Barricade Manual.
- E. Temporary traffic control shall be the responsibility of the Contractor.
- F. The Contractor shall provide a traffic control plan for each barricade installation used for this project.

PART 500 - STRUCTURES

SECTION 505 - CONCRETE BRIDGE 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 structure, including the approach slabs, bridge sidewalks, and parapets in accordance with the plans and Section 505 of the MAG Standard Specifications, 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 FCDMC.

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

No vehicular loads will be permitted on the bridge before the lapse of 21 (twenty-one) days from the date of the last placement of cast-in-place concrete 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 bridge properly barricaded, lighted and marked to prevent automotive traffic from crossing the new bridge structure 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 the requirements of Section 725 of the MAG Standard Specifications.

ITEM 505-1 CLASS "AA" CONCRETE f'c = 4,000 psi
Drilled shafts, abutments, &
curtain walls, approach slabs,
bridge sidewalks & parapets

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, test, place, finish and cure the concrete properly in accordance with

the requirements of these Specifications.

Coarse and fine aggregates shall conform to the requirements of Section 701 of the MAG Standard Specifications. Concrete curing materials shall conform to the requirements of Section 726 of the MAG Standard Specifications. Certificates of Compliance conforming to the requirements of Section 106.2 of the MAG Standard Specifications are required for concrete curing materials.

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.

Reinforcing Steel:

ITEM 505-2 REINFORCING STEEL

Grade 60

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 Section 106.2 of the MAG Standard Specifications 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, unless noted otherwise on the plans.

Shop drawings and lists showing the bending of reinforcing 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.

Bending 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. Tack welding of 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 $\frac{1}{4}$ 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 in 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.

Miscellaneous steel items and threaded inserts embedded in the concrete are incidental to concrete unit prices.

Load transfer dowels shall be placed in accordance with Section 605-3.04 Steel Reinforcement, Construction Requirements, Dowel Placement, of the Arizona Department of Transportation Standard Specifications for Road and Bridge Construction, Edition of 1987.

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

Payment for bridge approach slabs will be in accordance with the appropriate item listed in SECTION 505 - CONCRETE BRIDGE STRUCTURES.

DRILLED SHAFT FOUNDATIONS:

ITEM 505-3 DRILLED SHAFT FOUNDATIONS (36" Diameter)
 ITEM 505-4 DRILLED SHAFT FOUNDATIONS (48" Diameter)

Drilled shaft foundations shall conform to Section 609, Drilled Shaft Foundations, of the Arizona Department of Transportation Standard Specifications for Road and Bridge Construction, Edition of 1987, with the following exceptions:

The height of freefall for concrete placed by chute shall not exceed 6 feet. Concrete in drilled shafts shall be consolidated by vibration, in accordance with Section 505.6 of the MAG Standard Specifications. Use of drilling slurry or water shall not be permitted.

609-2.01 Concrete:

Replace "Section 1006" with "the MAG Standard Specifications and these Special Provisions."

609-2.02 Reinforcing Steel:

Replace "Section 1003" with "the MAG Standard Specifications and these Special Provisions."

609-3.04 Reinforcing Steel:

Replace "Section 605" with "the MAG Standard Specifications and these Special Provisions."

609-3.05 Concrete:

Replace "Section 601" with "the MAG Standard Specifications and these Special Provisions."

MECHANICAL COMPRESSION SEALS:

ITEM 505-5 MECHANICAL COMPRESSION SEALS

Mechanical compression seals shall be utilized at the abutments to seal the annular space between pipes and sleeves. The seals shall provide a water-tight seal to prevent intrusion of soil and moisture into the box girders. The seals shall provide electrical insulation between the pipe and sleeve to prevent cathodic reaction between these elements. The Contractor shall submit mechanical compression seal data and/or specifications for approval. Selection, assembly, and installation shall be in accordance with the manufacturer's instructions.

Payment for mechanical compression seals will be made at the lump sum price bid for ITEM 505-5.

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 1983 and Section 106.3 of these Special Provisions.

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

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.

Portland Cement Concrete for prestressed Girders shall have a minimum 28-day compressive strength of $f'c = 5,000$ psi and shall conform to Section 505 of the MAG Standard Specifications and these Construction Special Provisions.

The elastomeric bearing pads shall meet the requirements of Section 25 - Elastomeric Bearings of the AASHTO Standard Specifications for Highway Bridges dated 1983 (revised to date). Bearing pads shall have a durometer hardness of not less than 60.

The structural steel anchors shall conform to Section 515, STEEL STRUCTURES, of the MAG Standard Specifications.

No separate payment will be made for elastomeric bearing pads, sleeves, inserts, miscellaneous steel, threadbar and appurtenances, prestressing 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 CONCRETE BOX GIRDERS (PRETENSIONED)
AASHTO/PCI Type B2-48 (D = 33") (Length = 53'-2½")
(Skew = 30° 10' 33" Left)

SECTION 520 - PEDESTRIAN HANDRAIL: The work under this section consists of the construction of a pedestrian railing (fence) on the bridge and abutment parapets as shown on the plans in accordance with Section 520 of the MAG Standard Specifications. The railing shall be painted with #4 paint (2 coats) after fabrication in accordance with Section 530 and 790 of the MAG Standard Specifications.

Payment for this item will be made at the contract unit price bid per lineal foot for ITEM 520-1 - PEDESTRIAN HANDRAIL.

PART 600 WATER AND SEWERSECTION 601 - TRENCH EXCAVATION, BACKFILLING, AND COMPACTION:

- A. CITY OF PHOENIX SUPPLEMENT 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."

- B. 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."

- C. SECTION 601.2.5 Overexcavation: 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."

- D. 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."

- E. 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."

- F. 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.

"Excavated material when used for backfill shall meet the requirements of the preceding paragraph.

"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 or Portland cement concrete pavement. Unstable areas as determined by the Engineer shall be corrected by the Contractor at no increase in cost to the contract."

LIMITS OF BACKFILL TYPE

- Type I : Canal right-of-way, street rights-of-way and to 10' above pipes in the ACDC right-of-way.
 Type II : Will not be used.
 Type III : For all structures.

- G. 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 - WATERLINE CONSTRUCTION:

- ITEM 610-1 12" WATER LINE
- ITEM 610-2 20" WATER LINE (FULLY WELDED JOINTS)
- ITEM 610-3 RELOCATE AND REPLACE FIRE HYDRANT
- ITEM 610-4 2" WATER SERVICE CONNECTION
- ITEM 610-6 AIR RELIEF VALVE

All waterline construction and remove and replace fire hydrant shall conform to MAG Standard Section 610 as supplemented by the City of Phoenix and as here in modified and detailed on the plans. All ductile iron waterline shall be Class 52 with gray-iron or ductile iron fittings with a minimum pressure rating of 250 psi. All steel waterlines shall be Class D with welded steel joints conforming to AWWA C-2071208. The 12 inch ductile iron pipe and fittings shall have restrained joints at all locations. Restrained joints shall be as 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 waterlines are to be placed inside a steel casing pipe (sleeve). This work shall conform to the details shown on the plans. Payment will be made at the contract unit price for the size and type as indicated and measured in place. Payment for the labor and materials to place waterline within casing pipe will be included in the per lineal foot payment for the size and type of waterline as indicated on the plans.

SECTION 615 - SEWER LINE CONSTRUCTION:

- ITEM 615-1 4" SANITARY SEWER
- ITEM 615-3 8" SANITARY SEWER
- ITEM 615-4 SANITARY SEWER CLEANOUT

All sanitary sewer line construction 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. Payment for sleeved sanitary sewer will be per lineal foot at the contract unit price. Such payment shall include the cost for the steel casing pipe and any and all appurtenant items including all materials, labor and equipment. Where indicated on the plans, the steel casing pipe shall be bored and jacked and shall be considered incidental to the payment for sanitary sewer sleeved.

SECTION 625 - MANHOLE CONSTRUCTION AND DROP SEWER CONNECTION:

ITEM 625-1 SANITARY SEWER MANHOLES AND DROP CONNECTIONS

Sanitary sewer manholes and drop connections shall be constructed in accordance with MAG Standard Section 625 as supplemented by the City of Phoenix. Manholes shall be constructed as per MAG Standard Detail 420 with a cast iron frame and lid per Standard Detail #424. The drop sewer connection shall be constructed as per Standard Detail #426, manhole steps may be plastic, mechanically lock type as specified by MAG Standard Detail 428. Payment will be made at the contract unit price per each for sanitary manholes and drop connections.

SECTION 630 - TAPPING SLEEVES, VALVES AND VALVE BOXES ON WATERLINES:**ITEM 630-1 12" GATE VALVE AND BOX**

The contractor shall install gate valves and boxes as shown on the plans and in conformance with MAG Standard Section 630 as supplemented by the City of Phoenix. Included in this work shall be any appurtenant fittings required for installation. The contractor shall coordinate this work with the City of Phoenix Water Division and may not shut down any water mains without the City's prior approval. Prior to cutting into a new valve or fitting, the contractor must excavate the existing watermain and verify the size and material type. All required fittings, adapters, etc. must be on site and ready for installation prior to water main shut down. Payment will be made at the contract unit price per each gate valve including box for the size as shown on the plans.

SECTION 775 - BRICK AND CONCRETE BLOCK:**ITEM 775-1 MASONRY FENCE 8' CONCRETE BLOCK**

A 8 foot concrete masonry fence shall conform to MAG Standard Section 775.6 and constructed in conformance with ADOT B-30.20 and shall be placed as indicated and shown on the plans. Payment will be made at the contract unit price per lineal foot as shown.

SPECIAL 1 - TEMPORARY CONCRETE BARRIER:

- ITEM SP-1. TEMPORARY CONCRETE BARRIER

The contractor shall install a temporary concrete barrier per Arizona Department of Transportation 4-C-2.01 (Signage and Markings STD Drawing), to the lines shown on the plans. This work must be coordinated with the City of Phoenix Traffic Division and the Engineer. All work shall conform with the City of Phoenix MAG Supplement Section 401 which replaces MAG Standard Section 401 in its entirety. This work will be paid for at the contract unit price per lineal foot for temporary concrete barrier as called for on the plans and proposal as measured in place. This payment shall be deemed compensation in full for any and all cost to the contractor associated with this pay item including any traffic control related work.

SPECIAL 2 - RELOCATE CONCRETE BARRIER:

ITEM SP-2 RELOCATE CONCRETE BARRIER

Upon completion of the permanent roadway surface and with the consent of the engineer the temporary concrete barrier shall be relocated to the location as shown on the plans. This work shall be coordinated with the engineer and City of Phoenix Traffic Division for traffic control requirements. All work shall conform to the City of Phoenix MAG Supplement Section 401. Payment for this work will be made at the contract unit price for relocating concrete barrier as measured in place. Measurement for payment will only include the barrier remaining in place for the remainder of the construction. The excess barriers shall be removed from the site at the contractor's expense.

SPECIAL 3 - FOUR INCH PVC CONDUIT:

ITEM SP-3 4" Ø PVC CONDUIT

A four inch PVC pipe shall be placed behind the bridge abutments as indicated and as shown on plans for future utility use. Ends shall be capped and marked for future use. Payment will be made at the contract unit price per lineal foot as shown on the plans.

SPECIAL 4 - WASTEWATER PUMP STATION:

ITEM SP-4 WASTEWATER PUMP STATION

1. GENERAL INFORMATION

This item shall include all construction, labor, and materials to provide an operational and functional station as shown on plan sheet C-17 and includes all work within the 8-foot concrete

masonry fence enclosure, as well as, those items identified in the notes which lie outside this area, unless they are specifically called out as a separate construction item.

All construction shall be in accordance with MAG "Uniform Standard Details and Specifications for Public Works Construction" and the "City of Phoenix Supplements" to those items.

A shop drawing of the pump/wet well enclosure and piping vault enclosure should be approved by the engineer before construction. All other shop drawings and product/equipment specifications must be submitted/approved by the engineer, even though exact technical information may be lacking from the plans. This is to protect the owner from having deficient equipment installed in the project. The contractor is responsible for verifying sizes and dimensions and informing the engineer, in writing, if a discrepancy occurs.

2. PUMPS

GENERAL: Furnish and install two submersible non-clog sewage pumps. Each pump shall be capable of delivering 150 GPM at 17 feet TDH with a shut off head of 24 feet TDH (minimum). The pump motor shall be 1,150 RPM, 1.8 HP (minimum), 3 phase, 60 Hertz, 230 volts. The pumps shall be manufactured by a company regularly engaged in the manufacturing and assembly of similar units for a minimum of five (5) years in the United States. The pumps shall be Peabody Barnes model 103 or an approved equal.

PUMP AND LIFT-OUT DESIGN: Each pump shall be capable of handling raw, unscreened domestic sewage consisting of water, fibrous materials, and three (3) inch maximum diameter spherical solids. The pumps shall be capable of handling liquids with temperatures to 160 degrees F, and shall be capable of running dry to extended periods of time without damage to the motor and/or seals. The discharge connection elbow shall be permanently installed in the wet well along with the discharge piping. The pumps shall be automatically connected to the discharge connection elbow when lowered into place, and shall be easily removed for inspection and service. There shall be no need for personnel to enter the wet well. Sealing of the pumping unit to the discharge connection shall be accomplished by a simple linear downward motion of the pump. A sliding guide bracket shall be an integral part of the pump unit and shall engage a minimum of 20 inches of the guide rails at any one time. The guide bracket shall wrap around the guide rails in excess of 180 degrees. The entire weight of the pumping unit shall be guided by no less than two guide rails and pressed tightly against the discharge elbow with metal to metal contact. The mating faces of the sliding guide bracket and discharge elbow shall be dissimilar metals to prevent seizing. The stationary face shall be 16 gauge, 300 series stainless steel or better; the movable face shall be cast iron. Sealing of the faces by means of a diaphragm, o-ring, or other

sealing device shall not be acceptable. No portion of the pump(s) shall bear directly on the floor of the wet well.

START-UP: The pumps shall be tested at start-up by a qualified representative of the manufacturer. A start-up report as provided by the manufacturer shall be completed before final acceptance of the pumps.

PUMP CONSTRUCTION: The pump body, seal plates, impeller, and motor housing shall be constructed of high quality ASTM Class 30 cast iron or better. A coat of air dry enamel shall be applied before and after assembly. All exposed hardware shall be 300 series stainless steel. All gaskets shall be of the compression square ring type eliminating critical slip fits and the possibility of damage during service associated with sliding o-ring sealing arrangements. The pump construction shall contain no points of critical clearance nor require periodic adjustment or replacement to maintain reasonable operating efficiency. The pump case shall be designed to provide unobstructed passage of three (3) inch diameter solids. Discharge connection shall be a standard 125 pound, four (4) inch flange.

The impeller shall be of the two vane, non-clog design with pressure vanes on the back side and of the key drive design. The impeller shall be dynamically balanced and shall be capable of handling solids, fibrous materials, and other matter found in normal sewage applications.

The double mechanical shaft seal shall be of the single spring design operation in an oil-filled seal cavity. Pump-out vanes in the back of the impeller shroud shall develop a radially increasing pressure differential shall be transmitted by means of a rubber diaphragm to the oil in the seal cavity, thus producing a higher pressure inside the seal cavity than immediately adjacent to the seal face in the pump case forcing the oil in the seal cavity to be the seal face lubricant. The materials of construction shall be carbon for the rotating faces and ceramic for the stationary faces, lapped and polished to a tolerance of one light band, stainless steel hardware, and with all rubber parts of Buna-N. Seals which are lubricated by the liquid being pumped shall not be considered equal. A moisture sensor detection system shall be integrated as standard within the oil-filled seal chamber.

The motor shall be the standard product of an established American motor manufacturer. The motor shall be designed to be non-overloading over the entire pump curve. The rotor and stator assembly shall be of the standard frame design and secured to the pump seal plate by four threaded fasteners allowing for easy serviceability. Motor design incorporation shrink or press fit assembly of the stator and motor housing shall not be acceptable. The motor housing shall be of submersible construction with the windings operating in a sealed environment containing a dielectric oil, making it capable of operating in a tot

partially or non-submerged condition for extended periods of time without damage due to the heat being generated. Air-filled motors shall not be acceptable. The motor windings shall be of Class F insulation rated at 155 degrees C. The motor shall meet the standard for enclosure, type of mounting and basic electric design for NEMA Design B. The motor shaft shall be of 416 stainless steel. The thrust bearing shall be of the double row ball type with the upper radial bearing of the single row ball type.

Thermal sensors shall be used to monitor stator temperatures. The stator shall be equipped with a thermal switch embedded in the end coil of the stator winding. This shall be used in conjunction with and supplemental to external motor overload protection and wired to the control panel.

The pump shall be equipped with 25 feet of type 10/4 SO power cable, and 25 feet of sensor cable type 18/5 SO. The cable entry design shall be such that it precludes specific torque requirements to ensure a watertight and submersible seal. All incoming lead wires shall be spliced in the motor terminal housing. After splicing, the terminal housing shall be filled with epoxy to seal the outer cable jacket and the individual strands to prevent water from entering the motor housing. A secondary rubber pressure grommet shall be provided as an additional sealing point and strain relief at the point of cable entry. Cable entry designs utilizing terminal boards to connect power cord leads with motor leads shall not be acceptable.

PUMP TEST: The pump manufacturer shall perform the following inspections and test before shipment from the factory on all pumps:

1. A check of the voltage and frequency shall be made as shown on the name plate.
2. A motor and cable insulation test for moisture content or insulation defects shall be made.
3. The pump shall be completely submerged and run to determine that the unit meets three pre-determined performance points.
4. A vibration test shall be run on each unit at maximum RPM with maximum velocity values not to exceed 1.0 Mils peak-to-peak.
5. A written report shall be provided showing the aforementioned test have been performed in accordance with the specifications.

PUMP WARRANTY: The pump manufacturer shall warrant the units being supplied to the owner against defects in workmanship and material for a period of 12 months from start-up under normal use, operation, and service. The warranty shall be in printed form and apply to all similar units.

DOCUMENTATION: The manufacturer, if requested, will supply a minimum of six sets of standard submittal drawings, operation and

maintenance manuals and parts lists. Standard submittals will consist of:

- a. Pump Outline Data
- b. Control Data
- c. Access Frame Data
- d. Typical Installation Guides and Drawings
- e. Technical Manuals
- f. Parts Lists
- g. Accessory Data

3. MISC. WET WELL/PIPING VAULT EQUIPMENT

ACCESS FRAME AND COVER FOR WET WELL: Furnish and install 30" x 48" access frame in aluminum material with a load rating of 150 pounds/square foot. Access cover shall be complete with hinged and flush locking mechanism and shall be securely placed, mounted above the pumps. Lower guide bar holders shall be integral with the pump discharge connection. Guide bars shall be standard weight stainless steel 1-1/4 inch pipe. The guide bars shall not support any portion of the weight of the pump. Access doors shall be of the skid proof design.

All anchor bolts, hinges and other metal items located in the wet well shall be stainless steel.

PIPING VAULT COVER: This cover shall be an Aluminum I-Beam Grating as manufactured by Puritan Manufacturing, Inc. or an approved equal. The top and bottom flanges of the bearing bars are to be grooved to resist slippage. Grating to be Type U16-4-2" with bearing bars @ 1/2" on center and crossbars @ 4" on center. The finish shall be a clear anodized finish. The grating shall be fastened to the concrete walls of the piping vault as recommended by the manufacturer.

CONTROLS: Furnish and install one Peabody Barnes Versatrol Standard panel model 65611 in NEMA 3R or equal enclosure for 230 volts, three phase, 60 Hertz power supply. For each pump motor there shall be included: a combination circuit breaker/overload unit providing overload protection, short-circuit protection, reset and disconnect for all phases; across-the-line magnetic contactors; hand-off-automatic selector switch; overload relay properly sized for motor characteristics and factory sealed to ensure trip setting is tamper proof; 120 volt control panel pilot circuitry. A 120 volt control transformer with fused overload protection for external pilot circuitry shall be included. For duplex stations an automatic electric alternator shall be included to provide alternating operation of the pumps under normal conditions, or simultaneous operation in cases of high level. Single phase panels shall be provided with a start capacitor, run capacitor, and start relay for each pump motor if not provided in the pump. A high-water alarm light shall be included to indicate extreme high levels of liquid in the wet well. A panel-mounted moisture sensor relay and warning light shall be included to indicate moisture in the pump seal cavity.

The control panel assembly and all components therein shall be UL listed.

LIQUID LEVEL SENSORS: Furnish and install four Peabody Barnes Model 73612 or equal liquid level sensors with 25 feet of SJTO-W/A cable. Level sensors shall be mercury type pilot duty devices mounted in a corrosion resistant polypropylene housing.

CHECK VALVES: Furnish and install two Peabody Barnes ball check valves or equal. Each valve shall be 3 inches in size and shall consist of just three major components; body, access plate, and ball. The design of the valve shall be such that it keeps solids, stringy material, grit, rags, etc., moving without the need for back flushing. In the operating mode, the ball shall not impede flow through the valve. The operating flow area shall be equal to the nominal size of the valve. The ball shall clear the water way providing "full flow" equal to the nominal size. It shall be non-clog in design. There shall not be outside levers, weights, springs, dash pots or other accessories required for a swing (clapper) type check valve. The ball shall be rubber covered hollow iron, and be resistant to material normally found in sewage. The body and access plate shall be grey cast iron, ASTM Class 30, or better. All fasteners shall be stainless steel. Flanges shall be drilled in accordance with ANSI B16-1, Class 125.

4. ODOR CONTROL SYSTEM

GENERAL: An odor control system shall be provided for removing hydrogen sulfide and organic odors which are vented from the wastewater lift station wet well. The system shall be modular, compact, and corrosion resistant, and shall be designed to contain 150 pounds minimum of IVP granular activated carbon for treatment of air up to a rate of 100 cfm.

The odor control system shall have the following general characteristics:

1. Construction shall be corrosion resistant.
2. Unit shall contain a minimum of 150 pounds of IVP granular activated carbon.
3. Unit shall contain no moving parts.
4. Unit shall provide continuous treatment.
5. Unit shall require no outside energy source.
6. Maximum head loss at 100 cfm shall be 14.0 inches water column.
7. Unit shall equal or be similar to Calgon's "VentSorb".

ACTIVATED CARBON: The activated carbon for use in the odor control system shall be virgin granular product, produced from bituminous coal and chemically impregnated with NaOH as manufactured by Calgon Carbon Corporation, or equal, suitable for control of wastewater odors. Approximately 150 pounds of IVP granular activated carbon is required per unit.

The carbon shall have the following performance specifications:

Carbon Substrate

CCl₄ Number, % by Weight 60
(per ASTM D-3467)

Iodine Number, Minimum 1,000

Mean Particle Diameter, Minimum 3.6 mm

Impregnated Carbon

Apparent Density (1) 0.55 g/cc, Minimum

Hardness Number, Minimum 95

Moisture, Maximum (2) 15%

Maximum Head Loss (W.C.) at 50 fpm 1.9" W.C./Ft. Bed Depth
Linear Velocity (through a dense packed bed) (3)

H₂S Breakthrough Capacity, Minimum (4) 0.12 g H₂S Removed/cc
Carbon

- (1) As determined by ASTM D-2862 on a dry basis. The delivered apparent density will range from 0.55 to 0.64f/cc.
- (2) Calculated on a total product basis.
- (3) Dense packing as defined by procedure for apparent density determination where a glass 100 milliliter graduated cylinder is filled through a funnel with 15/16 inches inside diameter stem at a uniform rate of note exceeding 1 milliliter per second. Pressure drop is measured across a 3-foot deep carbon bed, at least 5 inches in diameter.
- (4) The determination of H₂S breakthrough capacity will be made by passing a moist (85% R.H.) air stream containing 1% H₂S at a rate of 1,450 cc/min through a 19 millimeter diameter by 9-inch deep bed of uniformly packed activated carbon and monitored to 50 ppm breakthrough. Results are expressed in grams H₂S removed per cc of carbon.

5. AUTO DIALER

The Contractor shall provide and install an automatic dialing,

remote monitoring unit as manufactured by RACO, Chatterbox Model CB-4, or equal compatible with similar units previously provided to the City of Phoenix by RACO.

The unit shall be enclosed in a vandal-proof NEMA 4X or equal enclosure together with padlock and keys (3).

Emergency power batteries shall be provided for 24 hour duration. A local alarm relay output shall be provided. The unit shall accept four dry contact inputs to indicate alarm condition when these remote contacts are in the closed position. A custom extended vocabulary shall be provided. The auto dialer shall operate on 120 volts AC, 60 hertz and be complete with battery charger.

Anti-condensation heaters shall be provided, surge protection equipment shall be provided for phone, power and signal lines. The unit shall operate at a temperature of 20 degrees F to 130 degrees F, 0-95 percent humidity noncondensing. The unit shall operate over a standard telephone leased line. Programming shall be performed by the manufacturer to the City of Phoenix requirements. Loss of power indication shall be provided.

6. INSTRUMENTATION

6.1 STRIP CHART RECORDER

The strip chart recorder shall be capable of recording up to three points on a 100mm wide roll chart, 32 meters long, or a 100mm wide z-fold chart, 16 meters long. The unit will be fully programmable and capable of being configured without circuit or component change to accept DC voltage, millivolts, milliamps, thermocouples and RTD inputs. All non-linear inputs including square root, $3/2$, and $5/2$ power signals will be linearized and provision made for customer enterable special linearizations. In addition to recording the unit will have a 40 character vacuum fluorescent display (VFD) and will be capable of displaying 16-character tags and messages per channel or a selectable alternate display of groups of 3 channels with value and customer entered engineering units. The recorder shall be capable of user entered customized math calculations and also contain standard formulae for mass flow, % RH, high-low signal select, high and low peak value, and others. The result of all calculations may be assignable to pens for recording and/or to the VFD for display. Provisions for up to six integrators must be made, each integrator being configurable as reset or non-reset type and assignable to the VFD for display as a nine digit number and/or to an internal log. Each channel will be capable of having 4 alarms selectable as absolute, rate of change or deviation and assignable to any of 16 internal alarm relays. The recorder shall be capable of retransmitting linearized input or calculated values as a 4-20 mA signal or as serial bi-directional communications. The recorder shall fit a standard DIN cutout and shall be Chessell Model 345 or approved equal.

6.2 MAGNETIC FLOW SENSORS

Magnetic flow sensors shall be furnished and installed as required, complete with associated instrumentation, interfaces, cabling, and, as a minimum, shall consist of the following:

6.3 MAGNETIC FLOWMETERS

Magnetic flowmeters shall be high impedance pulsed DC type constructed with polyurethane liners and 316 stainless steel electrodes suitable for the intended use and capable of withstanding a partial vacuum of 10 feet negative head. No ultrasonic cleaning equipment shall generally be required. Should the manufacturer require ultrasonic cleaning it shall be of the continuous cleaning type integral with the magmeter.

Unless otherwise indicated on Plans, the power supply to the meters shall be 120 volts, 60 hertz. It shall be installed in accordance with these Contract Documents and in conformity with the recommendations of the manufacturer of the meter.

The meters shall be splashproof and shall be able to withstand accidental submergence in water (30 feet). The meters shall be coated with a corrosion-proof epoxy paint.

The output of the meter shall be linear and directly proportional to the average velocity of the fluid flowing through the meter tube. Neither turbulence nor variation in velocity profile within the flowing fluid shall affect the accuracy of the transmitter in its ability to measure the average flow. The meter shall also not be affected by a concentric buildup of slime which has the same conductivity as the flowing fluid.

The unit shall be self-zeroing with no adjustment necessary of provided.

Each magnetic flowmeter shall be grounded to a 10 foot long by 5/8-inch diameter copper clad ground rod, or an individual concrete encased ground electrode, or an existing grounding electrode conductor.

Stainless steel grounding rings shall be provided to bond liquid to meter, if required by the manufacturer.

Meter sizes and calibrations shall be as shown on Plans and/or elsewhere in these Contract Documents.

The standard calibrated accuracy of the entire system, including readout, shall not be less than @ 0.5 percent of maximum flow or 1 percent of rate for all metered velocities between 3 and 30 feet per second. The meter shall give no "ghost readings" under a condition of zero flow. The repeatability of the scale reading shall not be less than 0.5 percent of full scale reading and

shall not be affected by fluctuations of line voltages of @ 10 percent or frequency of @ 1 percent.

A 4-20 mA DC signal, together with power supply, shall be provided.

A $\frac{1}{2}$ percent rate accuracy for scaled pulse signal for high accuracy billing register metering shall be provided as required elsewhere in the Contract Documents.

The flowmeters shall be KROHNE; Fischer & Porter; or equal. The manufacturer shall have had a meter of the same design and similar size continuously metering like fluid for a period of time to the satisfaction of the Engineer.

6.4 SIGNAL CONVERTERS

The signal converter assemblies shall be mounted in NEMA 4X enclosures or NEMA 4 enclosures with corrosion-proof epoxy paint. They shall have a 4-20 mA DC and pulse output to be used to totalize, indicate, and control. All converters shall be mounted where they are easily accessible for repair and calibration. If it is required that the flowmeter be mounted in an area where accessibility may be difficult, the electronics portion should be remotely located for ease of service.

Where called for on the Plans, a local flow indicator shall be provided, scaled in engineering units.

Cable and conduit between flowmeters and signal converters shall be furnished and installed. The size and type of cable and conduit shall be in accordance with the meter manufacturer's recommendations.

The signal converters shall be the same manufacturer as the magmeter.

6.5 CALIBRATOR

One portable secondary calibrator shall be furnished for the magnetic flowmeters. The calibrator shall be a passive device designed to simulate the flow signal from the flowmeter. It shall have a multi-position switch and/or a fully adjustable vernier dial for different flow velocities. An electrical adaptor shall be provided for use with the calibrator, for use with low conductivity systems.

The calibrator shall be of the same make as the flowmeters and shall be specifically designed for the type of flowmeter furnished. It shall be the same manufacturer as the magmeter.

7. PAYMENT

This item "Wastewater Pump Station" shall be paid for on a lump

sum (L.S.) basis, per the contract price, for a complete, operational unit.

SPECIAL 5 - TEMPORARY BITUMINOUS SIDEWALK:

ITEM SP-5 TEMPORARY BITUMINOUS SIDEWALK

A temporary 5 foot wide sidewalk shall be constructed as indicated and as shown on the plans. Prepare subgrade in a satisfactory manner to receive 2 inches of A.C. (C-3/4) to be removed after the duration of the construction of the bridge. The bituminous sidewalk shall butt the existing bridge as shown. Payment will be made at the contract unit price per square yards as measured in the field.

SPECIAL 6 - FOUR INCH DUCTILE IRON FORCEMAIN

ITEM SP-6 4" Ø D.I. FORCEMAIN

Furnish and install 4 inch ductile iron forcemain as shown on the plans. Work shall conform with MAG Standard Section 750 and the City of Phoenix Standards. Where shown on the plans the ductile iron forcemain is to be placed inside a steel casing pipe (sleeve). This work shall conform to the details shown on the plans. Forcemain is to be lined ductile iron pipe as follows:

Coal tar epoxy lining compound must be a catalyzed two-component coal tar epoxy compound capable of at least 40 mils dry film thickness in an application process whereby delamination will not occur. The material must also meet the following minimum performance requirements:

- A. A direct impact resistance is measured by ASTM D 2794 at 35 mils dry film thickness on ductile iron panels. The material shall pass 60 inch pounds of impact.
- B. An abrasion resistance of 25 liters of sand per mil as measured by ASTM D 968.
- C. The coal tar epoxy used shall meet the requirements of Military Specification DOD-P-23236A (SH), Type I, Class 2.

All coal tar epoxy lining shall be done by the pipe manufacturer at the location of manufacture of the pipe, or by a qualified applicator selected and inspected by the pipe manufacturer to do the lining. In the latter case, the applicator may do the coal tar epoxy lining at his place of business and shall have a five-year history of doing this particular type of lining for ductile iron or steel pipe.

The Contractor shall be solely responsible for both the quality of the pipe and the quality of the lining.

All surface areas which will be exposed to sewer liquids and/or

gases shall be cleaned so as to remove all deleterious materials. After cleaning, the lining compound shall be applied to all surface areas which will be exposed to the sewer liquids and/or gases. The lining compound shall be applied so as to obtain a continuous and relatively uniform and smooth integral lining.

The lining in the barrel area shall have a nominal thickness of 40 mils and a minimum thickness of 35 mils. However, the lining in the bell area may transition from a 35 mil minimum thickness at the edge of the barrel area to a 10 mil minimum thickness at the edge of the gasket socket. The 10 mil linings shall extend into the gasket socket area to a point where the gasket would overlap the lining when it is compressed due to pipe assembly during construction. The 10 mil lining shall also continue from inside the barrel area, around the spigot end of the pipe and along the outside of the pipe to a point where the center of the gasket of the next pipe section would contact the edge of the lining on the spigot end of the previous pipe section. This is a minimum requirement. The thickness of linings shall be determined by using a dry film thickness magnetic gauge at four quadrants.

Because of the extremely rough profile of ductile iron pipe and to ensure adequate protection, the amount of material required to achieve the desired film thickness shall be calculated and that amount shall be applied to the surface. Lining material must pass the following immersion tests (35 mil minimum dry film thickness) without disintegration, blistering, or cracking:

Test	Temperature	Duration Hours	
		Polyethylene	Coal Tar Epoxy
10% Sulfuric Acid	70 Degrees	432	2,160
36% Hydrochloric Acid	70 Degrees	720	432
3% Sulfuric Acid	112 Degrees	---	384
25% Sodium Hydroxide	112 Degrees	---	1,560

Each piece of pipe shall be tested and shall have an absence of holidays when tested by a suitable holiday detector. In all cases, the barrel area of the pipe shall be tested using both a voltage of 7500 volts and a dry conductive probe.

Where coal tar epoxy is used in the bell area or on the exterior of the spigot end, that area shall be tested using both a voltage of 67.5 volts and wet sponge. The pipe manufacturer shall issue a certification that states that the lining meets the specifications. This certification shall state specifically the following items:

- a. All ductile iron pipe and fittings have coal tar epoxy interior lining of 40 mils (35 mils minimum) in the barrel area, 10 mils minimum in the bell area and 10 mils minimum on the exterior of the

- spigot end.
- b. Each piece of pipe and each fitting have been checked for holidays utilizing a testing voltage of 7500 volts with a dry conductive probe in the barrel area and a testing voltage of 67 1/2 volts with a wet sponge in both the bell area and the exterior of the spigot end, and no holidays were found.
 - c. The coal tar epoxy lining shall extend from the bottom of the gasket socket in the bell to a point on the exterior of the spigot end of the pipe where the next pipe gasket would overlap the lining.
 - d. All coal tar epoxy used meets the current specifications.

When pipe is supplied that cannot meet the certification requirements for holiday testing and minimum lining thickness in the bell area or on the exterior of the spigot end, neoprene caulking will be required when the pieces of pipe are assembled during construction.

This caulking must be applied in sufficient quantity and at the proper location such that when the spigot end of the pipe is inserted into the bell end of another pipe, an impermeable seal is developed between the spigot end of one pipe section and the barrel to bell transition point of the other pipe section. The use of this caulking is only a substitute for certifications dealing with holidays and lining thickness in the bell area and the exterior spigot end. All other certification requirements must be complied with. It should also be noted that the Engineer may require the use of neoprene caulking during construction of all DIP when deemed appropriate.

If the contractor makes a field cut of coal tar epoxy lined pipe, he shall comply with the recommendations of the pipe manufacturer in applying a coal tar epoxy coating to the pipe end and in allowing proper drying time before pipe assembly. In all cases, as a minimum, a 10 mil coating of coal tar epoxy shall be applied to the pipe end and shall overlap the coal tar epoxy lining by 4 inches and extend around the end of the pipe and along the outside of the pipe a minimum of 10 inches. The coating shall be allowed to dry before assembly. In addition, the overlapped surface of the coal tar epoxy lining shall be rouged up to produce a 3 to 5 mil profile over the entire surface. The end result of this process is to secure proper adhesion for the coal tar epoxy.

Holiday testing may be required by the Engineer after pipe assembly when deemed appropriate. The testing and repair requirements shall follow the procedures called for in these specifications.

Repair: Repair of the damaged sections of the coal tar epoxy

lining shall be in accordance with the lining manufacturer's recommendations or as specified above so that the repaired area is equal to the undamaged lined area in all respects. All damaged lined areas and holidays shall be repaired immediately. There will be no other provisions for repair of DIP. Payment will be made at the contract unit price for the size and type as indicated and measured in place.

Payment for the labor and materials to place the ductile iron within casing pipe (skids, steel strapping, compression seal, etc.) will be included in the per lineal foot payment as indicated on the plans.

SPECIAL 7 - TEMPORARY SIX FOOT CHAIN LINK FENCE

ITEM SP-7 6' TEMPORARY CHAIN LINK FENCE

A temporary 6 foot chain link fence shall be placed as indicated and shown on the plans. The fence shall be maintained during the duration of the project or to be removed as directed by the engineer. Payment for this item will include all labor and material for placing and maintenance of the fence for the contract unit price per lineal foot as measured in place.

SPECIAL 8 - SIX FOOT BY EIGHT FOOT CHAIN LINK GATES

ITEM SP-8 6' x 8' CHAIN LINK GATES

Furnish and install all materials and labor for two 6 foot wide by 8 foot high gates to provide a 12 foot opening to the pumping station. Gates shall be attached to the 8 foot concrete masonry wall as shown on the plans with a lock and be made of metal and wood to provide strength and screening. A shop drawing of the gates shall be made and approved by the engineer. Payment will be made at the contract unit price per each gate for all materials and labor to attach the gate to the masonry wall.

SPECIAL 9 - PARK WATER PUMP STATION

ITEM SP-9 PARK WATER PUMP STATIONS

GENERAL - The park water pump station, which is used to fill the reservoirs in Granada Park, shall be a self contained, package pump station designed for subsurface installation. A schematic layout of the pump station is given on City Of Phoenix Water & Sewers Department Standard Detail Number S-39, "Duplex Submersible Pump Station" (Exhibit D). The pump station shall employ existing control systems comprised of a low-supply-level lock out switch and automatic-water-level switches. Shop drawings shall be submitted for approval by the engineer.

The pump station shall be housed in a "wet well" and shall be equipped with a manhole frame and locking cover per MAG Standard Detail 425. The approximate elevation of the top of cover shall

be 1243.7 feet which is approximately at the existing maintenance road grade. The approximate high water elevation of the Arizona Canal is 1240.9 feet. The pump station shall have a back-up supply of City of Phoenix water via a 2" line. Contractor shall locate, salvage, and reinstall existing meter, shut off valve, and backflow preventers per the plans and City of Phoenix standards.

The lump sum payment for the item SP - 9 PARK WATER PUMP STATION shall include materials and labor for the following, comprising the complete Park Water Pump Station system:

- * Inlet pipe and trashrack,
- * Repair Arizona Canal lining damaged during old inlet removal and new inlet installation,
- * Complete duplex pump station (civil, electrical, mechanical),
- * Steel discharge piping across the Maryland Avenue / ACDC Bridge,
- * In-line flow meter and covered box,
- * PVC conveyance piping along the ACDC,
- * Reconnection specialties at the existing RGRCP fill pipe,
- * Reconnection of 2" \emptyset metered back-up water supply, shut-off valve and back-flow preventers,
- * Reconnection of low-supply-level lock out switch (Elevation 1239.8).

MOTORS - Motors shall comply with the requirements of Exhibit E Electrical Specifications. They shall be equipped with moisture sensors and an epoxy-sealed cable which extends a minimum of 15 feet outside the top of the pump station.

NON-CLOG SUBMERSIBLE PUMPS - The duplex pumps shall be submersible type non-clog centrifugal pumps, intended for wastewater applications. Each pump shall be capable of delivering 300 gallons per minute at 40 feet total head. They shall include "break-away flanges" (slide-away couplings) to permit pump installation or removal without wet well entry. The Contractor shall submit pump manufacturer's product information, specifications and performance data to the Engineer for approval.

MECHANICAL EQUIPMENT - All mechanical equipment furnished as components for the park water pump station shall be in accordance with the provided City Of Phoenix Water & Sewers Department Standard Detail Number S-39, "Duplex Submersible Pump Station," or approved equivalents. The Contractor shall furnish manufacturer's product information and specifications for all mechanical equipment to the Engineer for approval.

PIPING, VALVES, GATES, AND SPECIALTIES - All piping, fittings, valves, gates, supports, and other specialties furnished as components for the park water pump station shall be in accordance with the provided City Of Phoenix Water & Sewers Department Standard Detail Number S-39, "Duplex Submersible Pump Station," or approved equivalents. The Contractor shall furnish

manufacturer's product information and specifications for the above listed items to the Engineer. Installation of the water conveyance system shall be in accordance with PART 600, WATER AND SEWER, of the MAG Standard Specifications.

FLOW METER - The measurement of flow taken from the Arizona Canal shall be measured using a Sparling Series 300 saddle-mounted low pressure propeller meter, or equal, installed per manufacturer's recommendations. The meter shall be housed in a covered concrete water meter box.

PUMP STATION TRANSFER - The existing park water pump station shall remain in service during construction of the replacement pump station. The Contractor shall schedule the construction such that the interruption in service during transfer from the existing pump station to the new pump station does not exceed 72 (seventy two) hours. The monies due or to become due to the Contractor will be reduced at the rate of \$300 (three hundred) per day or portion thereof exceeding the allotted 72 hour transfer period. Upon transfer, the Contractor shall contact the City of Phoenix Library and Parks Department (see Section 105.6) for removal and salvage of existing pump station components.

SPECIAL 10 - PERMANENT TRAFFIC BARRICADE TYPE B

ITEM SP-10 PERMANENT TRAFFIC BARRICADE TYPE B

A permanent traffic barricade shall be constructed and placed as indicated and shown on the plans. This work shall be completed in accordance with COP Detail P-1106. Payment will be made at the contract unit price as bid per lineal foot of Traffic Barricade Type B as measured in place.

SPECIAL 11 - BRACE POWER POLE FOR WATER AND SEWER CONSTRUCTION

ITEM SP-11 BRACE POWER POLE FOR WATER & SEWER CONSTRUCTION

During the excavation and construction of the 8" temporary sewer line from manhole "A" to manhole "B" and the construction of the 20" water line it may be necessary to brace the new power pole at Sta. 22+05 34 ft. Rt. Bracing of the pole will be done by the Salt River Project personnel. Per letter dated February 5, 1990 from C. Hughes, Sr. Power Consultant of SRP to Dan Shiosaka of T.Y. Lin the cost to the contractor will be \$1,150.00. Payment will be made at the unit price L.S. of \$1,150.00. The letter from Salt River Project is on file at the Flood Control District and is available on request.

SPECIAL 12 - SAW CUT AND REMOVE BIT PAVEMENT IN PARKING LOTITEM SP-12 SAW CUT AND REMOVE BITUMINOUS PAVEMENT IN
PARKING LOT

Within the Cross Roads parking lot the bituminous pavement shall be sawcut to maintain a neat straight line cut and excavation area. Payment for the sawcut and bituminous removal will be made at the contract unit price as bid per s.y. as shown on the plans. Area to be field measured by the engineer prior to sawcut and removal by the contractor.

SPECIAL 13 - REPLACE BITUMINOUS AND BASE IN PARKING LOT

ITEM SP-13 REPLACE BITUMINOUS AND BASE IN PARKING LOT

Within the Cross Roads parking lot backfill and compact the area excavation for sewer construction to 90% density. Replace the 4" aggregate base course and 2" bituminous (C-3/4) mix. Payment for the aggregate base course and 2" bituminous will be made at the contract unit price as bid per s.y. as shown on the plan.

EXHIBITS

E X H I B I T A

NOTE: The Salt River Project Agricultural Improvement and Power District (District) maintains energized aerial electrical power lines in the immediate vicinity of this project. Do not consider these lines to be insulated. Construction personnel working in proximity to these lines are exposed to an extreme hazard from electrical shock. Contractors, their employees, and all other construction personnel working on this project must be warned of the danger and instructed to take adequate protective measures, including maintaining following minimum clearances between the lines and all construction equipment and personnel:

1. For persons or any tools or materials used by such persons:
 - a. for lines rated 50kV or less, six feet of clearance.
 - b. for lines rated over 50kV, six feet plus $\frac{4}{10}$ of an inch for each kV over 50kV.
2. For mechanical equipment or hoisting equipment, or any load of such equipment, any part of which is capable of vertical, lateral or swinging motion:
 - a. for lines rated 50kV or less, ten (10) feet of clearance.
 - b. for lines rated over 50kV, ten (10) feet plus $\frac{4}{10}$ of an inch for each kV over 50kV.

See A.R.S. 40-360.42

Contractors must promptly notify the District at 236-8888 to arrange to have the necessary safety precautions undertaken before commencing any work. See A.R.S. 40-360.43. The cost of such arrangements will be borne by the Contractor. The District can often respond to such requests if two (2) days advance notice is given, but some situations may require up to sixty (60) days lead time for relocation or other arrangements.

EXHIBITA.DOC

E X H I B I T B

NOTE: The Salt River Project Agricultural Improvement and Power District (District) maintains certain energized, underground electrical power lines in the immediate vicinity of this project, and these lines have been noted herein as potential conflicts. These power lines represent an extreme hazard from electrical shock to any construction personnel or equipment coming in contact with them. Arizona Law requires all parties planning excavations to contact all utility firms for location of their underground facilities. See A.R.S. 40-360.22. Contractors should call the Blue Stake Center at (263-1100) for such location service. Contractors, their employees, and all other personnel working near any underground power lines must be warned to take adequate protective measures. (See: OSHA Standard 1926-651(a)). As an additional safety precaution, Contractors should also call the Salt River Project at 236-8888 to arrange, if possible, to have these lines de-energized when the work reaches their immediate vicinity. The cost of such temporary arrangements would be borne by the Contractor. If de-energization is feasible, the Contractor must give the Salt River Project at least two (2) days' advance notice of their requirement. Contractors must, after proper location and marking of underground utility lines, make any excavations in a careful, prudent manner. Failure to do so may result in liability for any damages to the utility or third parties. See A.R.S. 40-360.23.

EXHIBITB.DOC

E X H I B I T C

See Item SP-11 on Page 43 of the Construction Special Provisions.

Letter from Salt River Project dated February 5, 1990, is available at the Flood Control District on request.

EXHIBIT D

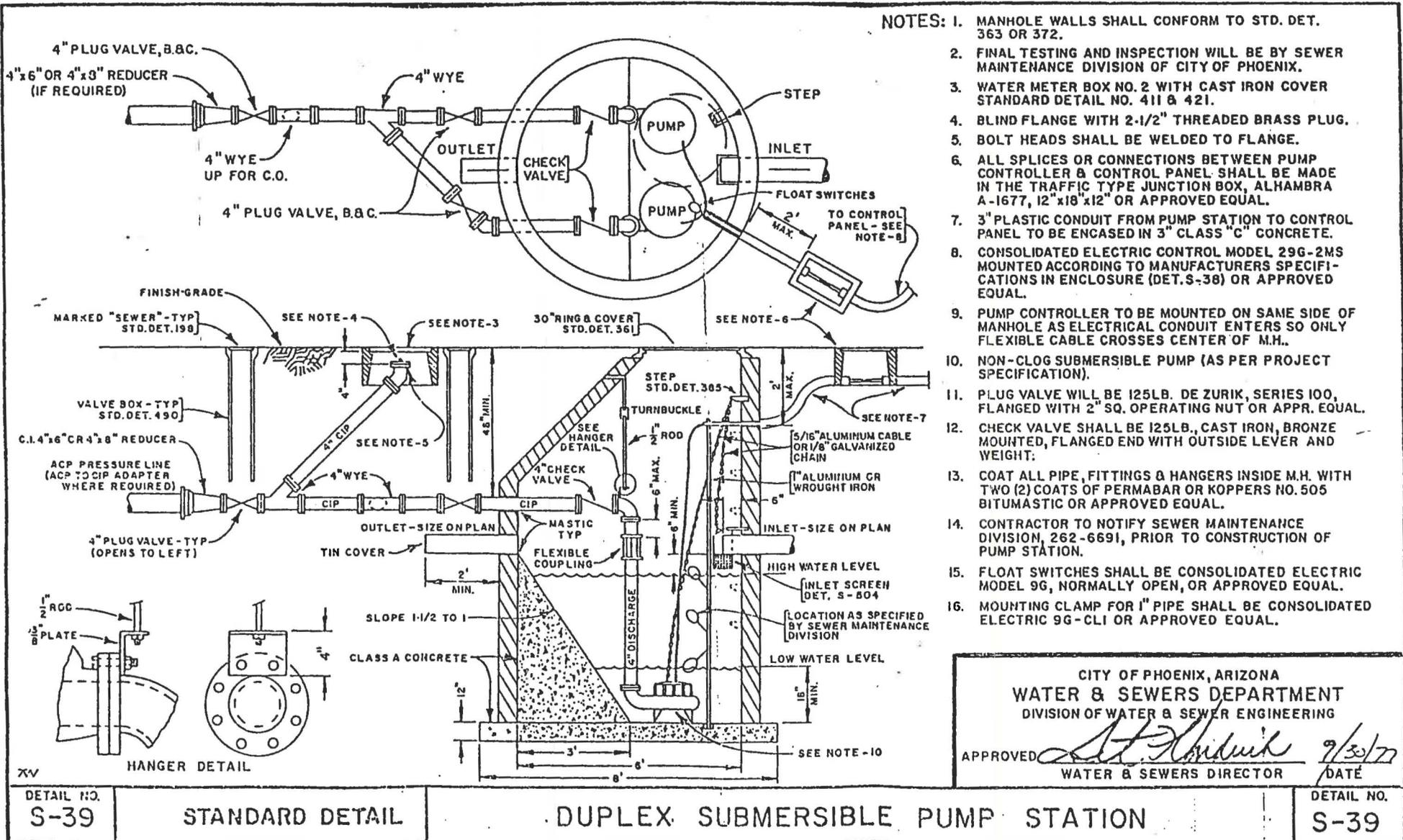


EXHIBIT E

MARYLAND AVENUE BRIDGE PROJECT

FLOOD CONTROL DISTRICT 88-39

ELECTRICAL SPECIFICATIONS

C R ENGINEERS, INC.

FEBRUARY 26, 1990

ELECTRICAL SPECIFICATIONS

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DIVISION 16

ELECTRICAL

16100 GENERAL

It is the intent of this part of the Contract Documents to cover all work and materials necessary for erecting complete, ready for continuous use, a tested and working electrical system, substantially as indicated on the Plans and as hereinafter specified.

16101 GENERAL PROVISIONS

Minimum sizes of equipment, electric devices, etc., are indicated but it is not intended to show every offset and fitting, nor every structural or mechanical difficulty that will be encountered during the installation of the work.

All work indicated on the Plans is approximately to scale, but actual dimensions and detailed drawings should be followed as closely as field conditions permit. Field verification of scale dimensions on Plans is governed by field conditions.

Discrepancies indicated on different Plans, between Plans and actual field conditions, or between Plans and Contract Documents shall be promptly brought to the attention of the Engineer for a decision.

The alignment of equipment and conduit shall be varied due to architectural changes, or to avoid work of other trades, without extra expense to the Owner.

The Contractor shall furnish and install all parts and pieces necessary to the installation of equipment in accordance with the best practice of the trade and in conformance with the requirements of these Contract Documents.

All items not specifically mentioned in these Contract Documents or noted on the Plans or accepted shop drawings, but which are obviously necessary to make a complete working installation, shall be deemed to be included herein.

The Contractor shall lay out and install electrical work prior to placing floors and walls. He shall

furnish and install all sleeves and openings through floors and walls required for passage of all conduits. Sleeves shall be rigidly supported and suitably packed or sealed to prevent ingress of wet concrete.

The contractor shall furnish and install all inserts and hangers required to support conduits and other electrical equipment. If the inserts, hangers, sleeves, etc. are improperly placed or installed, the Contractor shall do all necessary work, at his own expense, to rectify the errors.

All electrical equipment shall be capable of operating successfully at full-rated load, without failure, at an ambient air temperature of 60 degrees C, and specifically rated for an altitude of 1100 feet.

The Contractor shall submit shop drawings, data and details to the Engineer on all controls, fixtures, wiring, electrical equipment, conduit, etc. for review and acceptance prior to use of any components in the work.

16102 UTILITY SERVICE AND EQUIPMENT

Contractor shall be responsible for contacting electrical and telephone utilities to coordinate all requirements for bringing power and telephone services as called for on the plans. Contractor shall also submit copies of all service entrance shop drawings, per utility submittal requirements, prior to submittal to the engineer. The contractor shall obtain written approval from the power utility that the service entrance equipment is acceptable prior to release for fabrication. A copy of the approval letter shall be transmitted to the engineer along with the submittal.

16103 REGULATIONS AND CODES

Electrical work, including connection to electrical equipment integral with mechanical equipment, shall be performed in accordance with the latest published regulations of the National Electrical Code (NEC), State and local codes, and according to the latest Institute of Electrical and Electronic Engineers (IEEE); American National Standards Institute (ANSI); American Society for Testing and Materials (ASTM); Insulated Cable Engineers Association (ICEA); National Electrical Manufacturers Association (NEMA) Standards; and the latest published regulations of the Federal

Occupational Safety and Health Act (OSHA). When applicable, the material used in the performance of the electrical work shall be listed by the Underwriters' Laboratories, Inc. (UL) for the class of service for which they are intended.

16103.10 EQUIPMENT ASSEMBLIES

Equipment assemblies, such as Service Entrance Sections, Switchgear, Switchboards, Control and Distribution Panels, etc., shall bear a UL label as a complete assembly. The UL label on the individual components making up the assembly will not be considered sufficient to meet the present requirement. Whenever a generic UL label does not apply for the assembly, a serialized UL label shall be affixed to the assembly and the serial number shall be submitted with the assembly shop drawings.

16105 TEMPORARY POWER

The Contractor shall furnish, install and maintain all temporary power and lighting systems needed for construction. This temporary system shall include weatherproof panel(s) for the Contractor's main breakers and distribution system. Ground fault interrupting equipment shall be installed. All connections shall be watertight with wiring done with Type SO portable cable. After construction is completed, the Contractor shall remove all temporary power equipment and devices.

16106 CUTTING AND REPAIRING

Where it becomes necessary to cut into existing work for the purpose of making electrical installations, core drills shall be used for making circular holes. Other demolition methods for cutting or removing shall be reviewed by the Engineer prior to starting the work.

The Contractor shall repair all damage caused thereby and restore damaged areas to original condition.

16107 CORROSION PROTECTION

Wherever dissimilar metals, except conduit and conduit fittings, come in contact, the Contractor shall isolate these metals as required with neoprene washers, 9 mil

polyethylene tape, or gaskets. Where fastening conduit, electro plated, or equivalent fasteners and stainless steel bolts shall be used.

Factory finishes damaged and/or rusting shall be restored to original new condition.

All electrical panels, switchgear, motor control centers, etc. shall be shipped in sealed dust and moisture proof plastic sheet enclosures and the seal maintained until units are installed. Said units shall be new and free of any dirt, dust, water, grease, rust, damaged parts, components, etc. All relay, starter, circuit breaker, switches, etc., contacts, insulators, mechanisms, and buses shall be free of dust, dirt, oil, moisture, metal shavings, etc. before testing and energizing.

Once equipment is installed, it shall be protected at all times with plastic sheet covers until the area is secure from dirt, dust, workers, paint spray, water, etc. Heat shall be provided to eliminate condensation.

16108

COORDINATION OF THE ELECTRICAL SYSTEM

The Contractor shall verify all actual equipment and motor full-load and locked-rotor current ratings. The necessary minimum equipment, wire, and conduit sizes are indicated on the Plans. If the Contractor furnishes equipment of different ratings, the Contractor shall coordinate the actual current rating of equipment furnished with the branch circuit conductor size, the over current protection, the controller size, the motor starter, and the branch circuit over current protection. The branch circuit conductors shall have a carrying capacity of not less than 125 percent of the actual full-load current rating. The size of the branch circuit conductors shall be such that the voltage drop from the over current protection devices up to the equipment shall not be greater than 2 percent when the equipment is running at full-load and rated voltage.

The motor running over current protection devices shall be rated or selected to trip at no more than 125 percent of the motor full-load current rating for motors marked to have a temperature rise not over 50 degrees C or motors marked with a service factor not less than 1.15 and at no more than 115 percent for all other types of motors. The motor controller size shall be coordinated to the current rating and horsepower

size of the installed motor.

The motor-branch-circuit over current protection device shall trip open in 30 seconds or less on locked-rotor current of the motor. This device shall also protect the motor-branch-circuit conductors and the motor control apparatus against over current due to short-circuits or grounds. The motor control circuits shall have over current protection of the type indicated on the Plans.

16109 TEST

The electrical work shall be free from improper grounds and from short circuits. The correctness of the wiring shall be verified first by visual comparison of the conductor connections with connection diagrams. Individual circuit continuity checks shall next be made by using electrical circuit testers. Last, the correctness of the wiring shall be verified by the actual electrical operation of the electrical and mechanical devices. Any deviation from the wiring indicated on the Plans or accepted drawings shall be corrected and indicated on the Plans.

16110 CONFORMS TO RECORD DOCUMENTS DRAWINGS

Prior to completion of the Contract, the Contractor shall furnish the Engineer with a set of electrical plans marked with any changes, deviations or additions to any part of the electrical work.

Each conductor shall be identified as required by the Contract Documents. This identification shall be indicated on the record documents drawings to enable rapid and accurate circuit tracing by maintenance personnel.

16111 SINGLE LINE DIAGRAMS

Single line diagrams, as indicated on the Plans, show circuit voltages, circuit protection rating, and other pertinent data. Where conflicts exist on the Plans, the single line diagrams shall take precedence. Grounding conductors are not necessarily indicated. See grounding requirements specified elsewhere herein.

16112 CIRCUIT IDENTIFICATION

The 3-phase wires shall be identified at the switchgear, panelboards and motor control centers as Phases A, B, and C. Phase A shall be red, Phase B shall be black, and Phase C shall be blue. The neutral shall be white.

In addition to color coding all conductors, each conductor shall be identified in each pull box, manhole, panelboard, cable tray, or termination with circuit identification markers. This identification is applicable to all power, control, alarm, and instrumentation conductors and these markings shall be recorded on the Record Documents. Markers shall be slip-on PVC sleeve type as manufactured by Brady, Seaton, or equal.

Markers for other cabling shall be B-292 vinyl as manufactured by Brady, Seaton, or equal.

16113 NAMEPLATES

Where indicated elsewhere in these specifications or on the Plans, the Contractor shall furnish and install nameplates which shall be black laminate with white letters. The nameplates shall be fastened to the various devices with round head brass screws. Each disconnect means for service, feeder, branch, or equipment conductors shall have nameplates indicating its purpose.

16114 AUTOMATIC EQUIPMENT WARNING SIGNS

Permanent warning signs shall be mounted at all

mechanical equipment which may be started automatically or from remote locations. Signs shall be in accordance with OSHA regulations and shall be suitable for exterior use. The warning signs shall be fastened with round head brass screws or bolts, located and mounted in a manner acceptable to the Engineer.

Warning signs shall be 7 inches high by 10 inches wide, colored yellow and black, on not less than 18 gauge vitreous enameling stock. Sign shall read:

CAUTION
THIS EQUIPMENT STARTS
AUTOMATICALLY
BY REMOTE CONTROL

16116 CONDUCTOR FASTENERS

Glue-on type conductor fasteners shall not be used in any panels, panelboards, switchboards, switchgear, motor control centers, or other enclosures containing electrical devices and/or conductors.

16200 GENERAL MATERIALS AND METHODS

16201 GENERAL

All materials, equipment, and parts comprising any unit or part thereof specified or indicated on the Plans shall be new and unused, of current manufacture, and of highest grade consistent to the state of the art. Damaged materials, equipment and parts are not considered to be new and unused and will not be accepted.

Field verification of scale dimensions on Plans is directed since actual locations, distances, and levels will be governed by actual field conditions. The Contractor shall also review architectural, structural, yard, mechanical and other Plans, and the accepted electrical and mechanical shop drawings, and shall adjust his work to conform to all conditions indicated thereon.

The fabricator of major components, such as distribution panelboards, switchgear, motor control centers, shall also be the manufacturer of the major devices therein.

16202 RACEWAYS

Raceways include rigid metal conduit, rigid nonmetallic conduit, or any other channel for holding wires, cables, or bus bars that is designed for, and used solely for, this purpose.

16202.10 CONDUIT

16202.11 GENERAL

All conduit shall be rigid steel unless specifically indicated otherwise on the Plans. All wiring, except as otherwise noted, shall be in conduit. Conduit size shall not be less than the National Electrical Code (NEC) size required for the conductors therein and shall not be smaller than 3/4-inch. No underground conduit shall be less than one inch.

Conduit runs are schematic only, and shall be modified as required to suit field conditions, subject to review and acceptance by the Engineer.

Conduit shall run continuously between outlets and shall be provided with junction boxes where connections are made. Couplings, connectors, and fittings shall be acceptable types designed and manufactured for the purpose and shall provide a firm mechanical assembly and electrical conductivity throughout.

Conduit runs shall be straight and true; elbows, offsets, and bends shall be uniform and symmetrical. Changes in direction shall be made with long radius bends or with fittings of the conduit type. Conduit type fittings shall be Crouse-Hinds, Appleton, or equal with wedge nut covers.

Conduit runs in buildings and structures shall be exposed except as specifically noted or accepted by the Engineer.

Conduit runs shall not interfere with the proper and safe operation of equipment and shall not block or interfere with ingress or egress, including equipment removal hatches.

Exposed conduits shall be securely fastened with clamps or straps intended for conduit use. All exposed

conduit shall be run on the walls and ceiling only and shall be parallel to the planes of the walls or ceiling. No diagonal runs will be permitted. Flexible conduit shall be used only for short lengths required to facilitate connections between rigid conduit and motors or control equipment. The maximum length of flexible conduit shall be 5 feet. Where flexible conduit is used, it shall be grounding type, weatherproof and watertight as manufactured by American Brass Company, General Electric, or equal. All condulets located outdoors or in wet locations shall be weather tight.

Conduit runs on water-bearing walls shall be supported one inch away from the wall on an accepted channel. When channel galvanizing or other coating is cut or otherwise damaged, it shall be field coated to original condition. No conduit shall be run in water-bearing walls, unless specifically designated otherwise.

All conduit shall be thoroughly reamed after the threads have been cut to remove burrs. All joints shall be made with conduit sealing compound and shall be watertight.

Bushings or conduit fittings shall be used at all conduit terminals. The total of all bends in any run between pull boxes or junction boxes shall not exceed 360 degrees. Pull boxes shall be installed at points acceptable to the Engineer. Conduits brought into pull boxes, condulets, and other openings shall be capped until used to prevent the entrance of moisture. All spare conduits shall be capped and shall contain a suitable plastic pulling tape.

Joints shall be set up tight. Hangers and fastenings shall be secure and of a type appropriate in design and dimensions for the particular application.

Conduit runs shall be cleaned and internally sized (obstruction tested) so that no foreign objects or obstructions remain in the conduit prior to pulling in conductors.

After installation of complete conduit runs 2 inches and larger, conduits shall be snaked with a conduit cleaner equipped with a cylindrical mandrel of a diameter not less than 85 percent of the nominal diameter of the conduit. Conduits through which the mandrel will not pass shall not be incorporated as part of the contract.

Couplings, connectors, and fittings shall be standard types specifically designed and manufactured for the purpose. They shall be installed to provide a firm mechanical assembly and electrical conductivity throughout.

Expansion fittings shall be installed across all expansion joints and at other locations where necessary to compensate for thermal expansion and contraction. Expansion fittings shall be OZ type AX with jumper for exposed locations and type DX at structural expansion joints, Spring City, or equal.

Shop drawings shall be submitted for review and acceptance showing routing, conduit size, and number and size of wires in each conduit before installation of conduit.

16202.12 RIGID STEEL

Conduit and couplings shall be hot-dipped galvanized with zinc coated threads and outer coating of zinc bichromate as manufactured by Jones & Laughlin Steel Corporation, Allied Tube & Conduit Corporation, or equal.

Steel conduit shall not be buried in earth without concrete encasement.

16202.16 RIGID NONMETALLIC - PVC

Where specifically indicated on the Plans, or elsewhere specified, conduit may be high density Schedule 40, 90 degrees C, heavy-duty PVC. The conduit shall be manufactured from virgin polyvinyl chloride compound which meets ASTM standards. Smoke emissions shall be limited to less than 6 grams per 100 grams of material tested.

Where conduit concrete encasement is indicated on the Plans, conduit supports shall be installed at 2-1/2 foot intervals. PVC conduit shall be manufactured by Carlon, Triangle Conduit & Cable, or equal.

16202.17 INTERMEDIATE METAL CONDUIT

Conduit and couplings shall be galvanized intermediate metal conduit manufactured in accordance with UL 1242 and as manufactured by Allied Tube & Conduit

Corporation, Jones & Laughlin Steel Corporation, or equal.

Intermediate metal conduit shall not be buried without concrete encasement. Un-threaded couplings and connectors shall not be used.

16202.30 METAL PULL BOXES

16202.31 GENERAL

Furnish and install pull boxes as indicated on the Plans and specified herein.

Installation of pull boxes shall be such that access to the pull boxes is not restricted by obstructions such as pipes, valves, ladders, etc. Exact locations and sizes shall be submitted to the Engineer for review and acceptance prior to fabrication and installation.

Additional pull boxes shall be installed as required to meet cable manufacturer's pulling tension requirements.

Covers shall be secured with 316 stainless steel screws or bolts with coated threads.

16202.32 CONSTRUCTION

Pull boxes shall be compatible with the type of conduit systems on which they are used. Pull boxes shall be fabricated from 11-gauge (minimum) steel or aluminum and shall be completely weatherproof with gasketed removable covers. Weatherproof conduit hubs shall be furnished for all conduit connections to pull boxes.

16202.33 FINISH

All metal surfaces shall be phosphatised and primed with a rust-resistant paint. Finish shall be two coats of enamel paint.

16202.35 SIZING

Pull boxes shall be sized according to code and shall be sized to provide room for the future conduits and cables indicated on the Plans.

16202.50 CONCRETE PULL BOXES

The Contractor shall furnish and install precast concrete pull boxes in the locations indicated on the Plans and as required.

The pull boxes shall be installed on 12 inches of compacted gravel and shall be installed in such a manner that the cover of the pull box will be flush with finished grade.

The pull boxes shall be designed for traffic conditions, and the pull box and cover shall be designed for heavy traffic bridge loading. The pull boxes shall be a minimum of 3' x 2' x 30" deep or as indicated on the plans. The pull boxes shall be constructed of reinforced Class A concrete.

The pull boxes shall be Quikset, Utility Vault Co., or equal, with covers. The covers shall be engraved "ELECTRICAL".

16203 CONDUCTORS

16203.01 GENERAL

All wiring shall be as indicated on the Plans. Wires shall be new and shall be soft drawn copper with not less than 97 percent conductivity. The wire and cable shall have size, grade of insulation, voltage, and manufacturer's name permanently marked on the outer covering at not more than 2-foot intervals. All wires shall conform to the latest Standards of the ASTM AND ICEA and shall be tested for their full length by these Standards. Insulation thickness shall be not less than that specified by the National Electrical Code.

Wire sizes shall be American Wire Gauge sizes with Class B stranded construction. No. 12 and No. 10 AWG may be solid conductor.

No. 2 AWG and smaller shall be factory color coded with a separate color for each phase and neutral, which shall be used consistently throughout the system. Larger cables shall be coded by the use of colored tape.

As far as practical, all circuits shall be continuous from origin to termination without splices in intermediate pull boxes. Sufficient slack shall be

left at the termination to make proper connections. In no case shall a splice be pulled into the conduit.

16203.02 PULLING LUBRICANT

All cables shall be properly coated with pulling compound recommended by the cable manufacturer before being pulled into conduits so as to prevent mechanical damage to the cables during installation.

Other lubricants to be substituted must be accompanied by a statement from the cable manufacturer as to its acceptable use with the cable being installed.

16203.20 600 VOLT CLASS CABLE

Individual or multiple conductor cables for power, control, and alarm circuits of 480 volts or less shall be insulated for not less than 600 volts and shall have Type XHHW insulation. Cable tray conductors shall have Type TC insulation. Where wire size is not indicated, they shall be of the size required by the NEC, except that no wire external to panels and motor control centers shall be less than No. 12 AWG, unless specifically noted on the Plans. Panel control wiring shall not be less than No. 14 AWG. Wire and cable shall be as manufactured by General Electric Company, Cablec Company, or equal.

The pulling tension and side-wall pressures, as recommended by the cable manufacturer, shall not be exceeded.

16203.21 TERMINATIONS AND SPLICES (600 VOLT AND LESS)

Terminations shall be terminal board type with set-screw pressure connectors. Splicing shall join conductors mechanically and electrically to provide a complete circuit prior to installation of insulation. Conductors, including grounding conductors, of different sizes shall be spliced and then soldered or welded. Splices in wet locations and all splices below grade shall be waterproof heat shrink type as manufactured by Elastimold, Thomas-Betts, or equal.

16204 GROUNDING

The grounding systems shall consist of concrete encased ground conductors and/or ground rods. Each duct bank shall contain a concrete encased system bare copper ground conductor. The system ground conductors shall run continuously in duct banks, through manholes, hand holes, and other raceway boxes. The system ground shall be connected to the structure grounding systems to provide a continuous ground system. Each metallic raceway, panel, switchboard, and other metallic devices associated with the electrical and instrumentation systems shall be bonded to this grounding system.

All equipment cases, devices, etc. shall be grounded. Ground rods shall be driven or concrete encased conductors installed before a building or structure is built and ground conductors brought through the concrete to accessible points for grounding equipment. These systems shall be installed at each structure where switchgear, motor control centers, switchboards, panelboards, etc. are installed.

Where ground conductors are not sized, the NEC shall govern. Driven ground rods shall be Copperweld, or equal, 5/8-inch in diameter and not less than 10 feet in length.

All connections of ground cable to rods or to cable shall be thermoweld type or wedge type (as manufactured by AMP) connections. Maximum allowable ground resistance shall be 5 ohms.

Tests shall be conducted by the Contractor and witnessed by the Engineer to determine the ground resistance for the entire system and at each building where there is switchgear, motor control, etc.

It is the intent of these Contract Documents that all device and equipment grounds shall be run as a separate conductor in the conduit from the equipment to the motor control center or system ground. All wireways, enclosures, etc. shall be properly bonded and grounded, and ground conductors shall be run for all circuits.

16204.10 MAGNETIC FLOWMETER GROUND

An individual ground system shall be installed for each magnetic flowmeter. Grounding to be done per flowmeter manufacturer's recommendations.

16205 OUTLET, SWITCH, PULL AND JUNCTION BOXES

16205.01 GENERAL

Unless otherwise specified or indicated on the Plans, device boxes and junction boxes shall be heavy-duty cast and shall be compatible with the location and conduit system being used, rigid steel or rigid copper free aluminum device boxes and junction boxes and shall be as manufactured by Crouse-Hinds, Appleton, or equal, with stainless steel cover screws and with cover gaskets. Device boxes shall be FD type.

16205.10 FASTENERS

Fasteners used with wiring devices shall be aluminum or stainless steel and all screws, nuts, bolts, etc. shall be stainless steel.

16207 RECEPTACLES

16207.01 GENERAL

Duplex receptacles shall be 2-pole, 3-wire grounded, 120 volts, industrial, rated at 20 amperes, and shall be as manufactured by Hubbell, General Electric, or equal. Special receptacles, covers, etc. shall be as specified herein or as indicated on the Plans.

16207.20 OUTDOOR

Enclosures shall be weatherproof with yellow "fiberglass" lift cover plates or equal.

16208 PUSH-BUTTON STATIONS

16208.01 GENERAL

Push buttons, selector switches, and pilot lights shall be heavy-duty, oil tight Square D Company, General Electric Company, or equals. Control stations shall be in NEMA 4 enclosures for outdoor and NEMA 12 for indoor installations.

"Start-Lockout-Stop" push-button stations shall be

installed adjacent to every motor unless specifically indicated otherwise.

16209 TRANSFORMERS - DRY TYPE

16209.10 DISTRIBUTION TRANSFORMERS -
LOW VOLTAGE LIGHTING AND POWER

Transformers shall be of the premium high efficiency quiet type and shall be installed where indicated on the Plans. The primary winding of the transformers shall have two 2-1/2 percent taps above and below normal.

The transformers shall have a BIL of 10 kv with a temperature class of 185 degrees C for transformers up to 25 kva and a temperature class of 220 degrees C for transformers rated at 30 kva and larger.

The sound level shall not exceed 44 dba measured at 5 feet from the transformer after installation. Core and coil assemblies 30 kva and larger shall be mounted on rubber vibration isolators designed specifically to reduce 120 HZ sound and multiple harmonics.

Transformer standards shall be submitted to the Engineer prior to purchase and installation.

Transformers shall be of the types manufactured by General Electric Company, Westinghouse Corp., or equal.

16210 RELAYS

16210.10 CONTROL RELAYS

Control relays shall be General Electric, Westinghouse, Square D Company, or equal, industrial 600 volt, 10 amperes type with contact arrangement and operating coils of the proper voltage as required by the control circuit sequence. Each relay shall have a minimum of 4 reversible pole contacts. The coils shall be sealed by pressure molding.

16210.11 INTRINSICALLY SAFE RELAYS

Intrinsically safe relays shall allow the use of any type of remote pilot device located in Class 1

hazardous areas by providing a pilot circuit incapable of releasing sufficient electrical energy to ignite gasses and vapors classified in Groups A, B, C, and D.

The unit shall have an output relay with double pole, double throw contacts rated at least 16 amperes at 120 volts AC, resistive load, and 24 volts DC. They shall operate on the AC supply voltage indicated on the Plans.

They shall be Cutler-Hammer, BW Series, or equal.

16211 TIMERS

16211.01 GENERAL

Timers which require pins or other removable trip devices shall be provided with at least one pin or trip device for each possible time setting.

16211.10 RESET TIMERS AND REPEAT CYCLE TIMERS

Timers of this type shall be heavy-duty industrial timers as manufactured by Eagle, Paragon, or equal.

16211.20 TWENTY-FOUR HOUR TIMERS

Timers of this type shall be heavy-duty industrial timers as manufactured by Paragon, Tork, or equal.

16211.30 TIMING RELAYS

Timing relays shall be heavy-duty industrial 600 volt, 10 amperes as manufactured by Square D Company, Westinghouse, or equal.

16212 ENCLOSURES

16212.01 GENERAL

This specification includes enclosures to house electrical controls, instruments, terminal blocks, etc. If not indicated otherwise they shall be NEMA 12 for indoor and NEMA 4 for outdoor installations.

16212.10 CONSTRUCTION - STEEL

Enclosures shall be from 14 gauge steel with seams that are continuously welded. Doors shall have full length piano hinges with the door removable by pulling the hinge pin. They shall be as manufactured by Hoffman, Fischer & Porter, or equal.

A rolled lip shall be provided around three sides of the door and around all sides of the enclosure opening. The gasket shall be attached with oil-resistant adhesive and held in place with steel retaining strips. Exterior hardware, such as clamps, screws, and hinge pins, shall be of stainless steel for outdoor installations. A hasp and staple shall be provided for padlocking. Each enclosure shall have a print pocket.

16212.11 FINISH - STEEL

Finish shall be white enamel interior, light grey enamel, ANSI 61 exterior, over phosphatised surfaces. Special finishes and colors shall be furnished for wet locations. Plans should be checked for special conditions.

16212.20 CONSTRUCTION - FIBERGLASS

Enclosures shall be heavy-duty, compression molded, fiberglass reinforced polyester, high impact, heat resistant, NEMA 4X, and shall be Crouse-Hinds, Carlon, or equal.

16212.30 CONTROL PANELS

Control panel(s), unless otherwise indicated, shall be vertical rack type with full length hinged doors to open as shown on the Plans. The panel dimensions shall be as indicated on the Plans and as required for the equipment furnished. Sufficient working space shall be provided around all installed equipment. The panels shall be formed of not less than 10-gauge cold-rolled steel. The framework shall be made of not less than 20-inch by 2-inch by 3/16 inch thick steel angle.

The control panels shall be furnished, designed, shop painted, assembled and wired, shop tested, field tested, and placed in satisfactory operation by the supplier and major manufacturer of the instrumentation equipment.

The panels shall be complete with instruments, meters, switches, controls, indicating lights, wires, wireways, grounding, nameplates, and all other accessories and appurtenances required for complete panels. The controls and components to be included on the panels are as shown.

The following drawings of each panel shall be supplied by the panel manufacturer for acceptance before fabrication:

1. Panel front view showing equipment arrangement and dimensional information.
2. Panel floor plan and side view showing dimensions, doors, and equipment layout inside the panel.
3. Drawing showing structural details.
4. Diagrams showing all external devices connected to the panel.
5. Wiring diagrams.
6. Panel bill of material with detailed description of components.

Instruments shall be securely braced and secured by a supporting framework such that a minimum load is put on the panel face.

Joints shall be welded and ground smooth. All hardware shall be non-corroding metal. All anchor bolts, nuts, and washers required for secure anchorage to steel channel bases shall be provided. Panel enclosures shall be shipped with nameplates mounted, and all equipment mounted and wired.

The exterior of the panels shall be selected by the Engineer and the interior shall be white. Both finishes shall be applied over bonderizing.

The fabrication of the enclosures shall be subject to the Engineer's acceptance. Proposed panel layouts are, in general, shown on the Plans; however, these shall be modified as required to facilitate equipment furnished.

Enclosures shall be NEMA 1 gasketed or as indicated on the Plans.

All punching, reaming, cutting, and other fabricating

work shall be done before the finish is applied. All electrical connections shall terminate at terminal strips, which shall be labeled with appropriate identifying data. All terminal strips shall be provided with a minimum of 25 percent spare terminals. Panels shall be delivered with all instruments and controls installed and completely wired and piped. Panels shall be shipped with complete wiring and piping diagrams and instructions to identify instrumentation inside the panel, as well as internal wiring and piping diagrams.

Each device requiring power or neutral connection shall be arranged so that when the wires are removed from any unit, no other shall be interfered with.

All electrical wiring within the panels shall be color coded, bundled, and bound with plastic strip lock straps and terminated on numbered terminal strips. All external connections shall be properly identified by function and number in accordance with ISA standards. Power to the panel shall be 120 volt, 60 hertz, single phase.

If the instruments are series wired, only one receiver in the loop shall be grounded while the others shall accept a floating input. Also, current-to-current converters shall be provided as required for load boosting in order to accommodate the appropriate number of instruments. If the instruments are parallel wired, all receivers shall be referenced to the same common.

All signal connections for outgoing 4-20 ma DC signals shall be equipped with adequate signal retransmission devices. For parallel wired systems, voltage-to-current transducers shall be provided and shall be referenced to the same common as all other receiving instruments. For series wired systems, fully isolated current-to-current transducers shall be provided to maintain loop continuity and eliminate grounding problems.

All lights, instruments, push buttons, and other equipment mounted in or on the panels shall have engraved identification and function nameplates. The nameplates shall be black laminate plastic with white letters and shall be fastened with round head brass screws. Equipment mounted inside the panels shall be labeled with identification which correlates with Plan identification.

16213 SWITCHBOARDS, SWITCHGEAR, PANELBOARDS

16213.10 CIRCUIT BREAKER SWITCHBOARD(S)

16213.11 GENERAL

The switchboard(s) shall be single panel, frame, or assembly of panels, on which shall be mounted on the face or back, or both, circuit breakers and instrumentation as indicated.

16213.12 ENCLOSURE

The switchboard shall be dead-front with front accessibility. Each section shall have individual removable top and bottom plates for installation and termination of raceways. All metal surfaces and structural parts shall be given a phosphatising, or equal, treatment prior to painting. The switchboard(s) shall then be given a gun-metal gray undercoat, which is equal to zinc chromate. The exterior of the enclosure shall be furnished in a color selected by the Engineer.

16213.13 BUSING

Bus shall be silver or tin plated copper with an ampacity rating as indicated and shall be braced to have a short circuit current rating as indicated on the plans.

16213.14 CIRCUIT BREAKERS

Circuit breakers shall be as specified elsewhere herein.

16213.15 SWITCHBOARD(S)

The switchboard(s) shall be as manufactured by General Electric, Westinghouse, or equal.

16213.30 PANELBOARDS

16213.31 GENERAL

Dead-front panelboards, including lighting distribution and control panels, shall be furnished and installed as indicated on the Plans. All bus shall be copper. Mounting and type of enclosures shall be as indicated on the Plans. Where not indicated, indoor enclosures shall be NEMA 12 and outdoor enclosures shall be NEMA 4. The minimum interrupting capacity of any device shall be as indicated on the plans.

16213.32 INTERIORS

Protective devices shall be such that they can be replaced without disturbing adjacent units. Wire connectors shall be suitable for wire sizes indicated. Branch circuits shall be numbered as indicated on the Plans and a complete typed circuit schedule shall be furnished under a transparent cover and affixed to the panel. Phase busing shall be full height without reduction. Full size neutral bars shall be included and shall have suitable lug for each outgoing circuit requiring neutral connection. Spaces for future protective devices provided in lighting panels shall be bused for the maximum device that can be fitted into them.

16213.33 ENCLOSURES

Panelboards shall be finished with a primer, rust-resistant phosphate undercoat and two coats of oven-baked enamel with finish color to be accepted by the Engineer. They shall have sufficient size to provide a minimum of 4 inches of gutter space on all sides. Doors shall be such that they:

1. In making switching devices accessible, shall not uncover any live parts;
2. Are hinged and have latches that require no tool to operate; and
3. Can be locked. Lock and two keys shall be furnished.

16213.34 IDENTIFICATION

Each panelboard shall have, on the outside of the door, a laminate nameplate with 3/4 inch letters as specified

elsewhere in these Contract Documents.

Panelboards shall be as manufactured by Westinghouse, General Electric, or equal.

16215 THERMOSTATS

Thermostats shall be heavy-duty thermostats with full load rating of 120 volt, 16 amps and shall be Honeywell T6051 Series, Rockwell, or equal.

16218 TERMINAL BLOCKS

Terminal blocks shall be Square D Co., Buchanan, or equal. Terminal blocks shall be of the size required for conductors therein and a minimum of 50 percent spares shall be provided in each terminal box.

16219 DISCONNECT SWITCHES

Disconnect switches shall be heavy-duty safety switches with a quick-make, quick-break operating mechanism, full cover interlock and indicator handle. The disconnect switches shall be furnished with fuses of the size indicated on the Plans. One set of spare fuses shall be furnished for each fused disconnect switch.

Disconnect switches shall be as manufactured by Square D, Westinghouse, or equal.

16300 ELECTRICAL METERING AND RELAYING

16300.01 GENERAL

Instruments, relays, and other devices for panels shall be flush or semi-flush mounted with cases of similar design.

Instruments shall have anti-glare glass fronts, anti-parallax scales, and white faces with black numerals and markings. Instruments shall be selected with the full-load reading at approximately 75 percent of full scale, unless otherwise specified or accepted. Accuracy of instruments shall be one percent of full scale values. Transformer accuracies shall be suitable for relays and meters.

16300.20 CURRENT TRANSFORMERS

Current transformers shall be indoor, dry type insulated for the voltage for which it is used and rated as required for the equipment furnished. They shall have sufficient thermal and mechanical capacity to withstand the maximum momentary current rating of the associated circuit breaker

16311 CIRCUIT BREAKERS - LOW VOLTAGE

16311.01 GENERAL

All circuit breaker frame and trip ratings shall be as indicated on the Plans, except that they shall be coordinated with the ratings of the equipment actually furnished and shall be modified where necessary to suit this equipment. Circuit breakers to be used in motor control centers shall be as indicated on the Plans. Where no indication of type is given on the Plans, the following shall govern:

Circuit breakers protecting motors shall be motor circuit protectors, all other circuit breakers shall be molded case circuit breakers.

Circuit breakers shall be as manufactured by Westinghouse, General Electric, or equal.

16311.10 MOLDED-CASE CIRCUIT BREAKERS

Circuit breaker for mounting in motor control centers or for separate mounting shall be of the air-break type, quick-make and quick-break, 600 volt, with number of poles as indicated on the Plans. The minimum frame size shall be 100 amperes.

Each pole of these breakers shall provide inverse time delay and instantaneous circuit protection.

The breakers shall be operated by a handle and shall have a quick-make, quick-break switching mechanism that is mechanically trip free from the handle so that the contacts cannot be held closed against short circuits and abnormal currents. Tripping due to overload or short circuit shall be clearly indicated by the handle automatically assuming a position between the manual ON and OFF positions. All latch surfaces shall be ground and polished. All poles shall be so constructed that

they open, close and trip simultaneously.

Breakers must be completely enclosed in a molded case. Noninterchangeable trip breakers shall have their covers sealed; interchangeable trip breakers shall have the trip unit sealed to prevent tampering. Ampere ratings shall be clearly visible. Contacts shall be of non-welding silver alloy. Arc extinction must be accomplished by means of arc chutes. The minimum interrupting ratings of the circuit breakers shall be at least equal to the available short circuit at the line terminals.

Circuit breakers shall conform to the applicable requirements of NEMA Standards Publication No. AB1.

Circuit breaker ratings, modifications, etc. shall be as indicated on the Plans.

Molded case circuit breakers shall be ambient compensating that provides inverse time delay overload and instantaneous short circuit protection by means of a thermal magnetic element. Compensation shall be accomplished by a secondary bimetal that will allow the breaker to carry rated current between 25 degrees C and 50 degrees C with tripping characteristics that are approximately the same throughout this temperature range.

On breakers with interchangeable, thermal, adjustable magnetic trip, the accessibility and position of the adjustment knob shall not be changed from those on the standard breaker.

16311.20 MOTOR CIRCUIT PROTECTORS

Electrical circuits shall be protected by motor circuit protectors (MCP) as manufactured by Westinghouse Electric Corporation, General Electric, or equal.

The MCP shall be operated by a handle and shall have a quick-make, quick-break switching mechanism that is mechanically trip free from the handle so that the contacts cannot be held closed against short circuits and abnormal currents. Tripping shall be clearly indicated by the handle by automatically assuming a position between the manual ON and OFF positions. All latch surfaces shall be ground and polished. All poles shall be so constructed that they open, close, and trip simultaneously.

MCP's must be completely enclosed in a molded case. MCP's shall have the trip unit sealed to prevent tampering. Ampere ratings shall be clearly visible. Contacts shall be of non-welding silver alloy. Arc extinction must be accomplished by means of arc chutes.

Each pole of these MCP's shall provide instantaneous short circuit protection by means of a single adjustable magnetic only element. The single adjustment screw shall adjust all poles simultaneously.

Provision shall be furnished in the MCP for locking the maximum achievable trip setting to values less than maximum obtainable trip setting. Each adjustment shall have 8 main setting points and mid-setting points following a linear scale so that each point has a significant value within calibration tolerances.

MCP's shall be suitable for use with current limiters, having 100,000 ampere interrupting capacity and a built-in trip indicator, that are fully coordinated with the MCP so that the MCP will open all 3 phases if the limiter operates. Current limiters shall be so constructed that they can only be replaced by an identical or similar limiter having the same interrupting capacity.

The minimum interrupting ratings of the MCP shall be at least equal to the available short circuit at the line terminals.

MCP ratings, modification, etc., shall be as indicated on the Plans.

16311.40 MODULAR OVERLOAD RELAYS

Where called for on the Plans, modular overload relays shall be provided with the motor starters. The modular overload relays shall be 3-pole solid state devices set by one plug-in heater and shall protect all 3 phases of the motor in ambient temperatures ranging from -20 degrees to +70 degrees C.

The jam modules shall plug in the modular overload relays and shall provide for instantaneous trip of the overload relay should the current exceed a preset value at any time after the motor has accelerated. The modules shall be adjustable to any value between 150 percent and 400 percent of the motor full-load current.

The underload modules shall plug in the MOR and shall provide for overload relay trip whenever the current falls below a set value after the motor has accelerated. The modules shall be adjustable between 50 percent and 90 percent of the full load value of the motor full load current.

Each module shall provide individual trip indication and reset for each trip condition, visible without opening the motor control center compartment door. Each module shall provide an auxiliary contact for remote trip indication.

All solid state circuits shall be completely protected from damage arising from line transients and voltage spikes.

They shall be as manufactured by Westinghouse, Square D Co., or equal.

16320 MOTOR CONTROL - LOW VOLTAGE

16320.01 GENERAL

Starters Size 2 and larger shall have arc quenchers on all load breaking contacts. Starters shall be suitable for the horsepower ratings specified, except the Contractor shall verify the motor ratings and coordinate the starter and overload trip ratings with the actual horsepower ratings of the motors installed. Extended overload reset buttons shall be mounted so as to be accessible for operation without opening the door of the enclosure.

Magnetic contactors shall be factory adjusted and shall be chatter free. Magnetic contactors shall have bimetallic type overload relays in each line conductor as indicated on the Plans.

Starters shall be furnished complete with a 120-volt control transformer unless otherwise noted.

Where above normal ambient temperatures are encountered, circuit breaker trip elements and starter overload trip elements shall be supplied to meet such conditions and shall be acceptable to the Engineer.

Control circuit fuses shall be furnished both on the primary and secondary of the control circuit transformer. If there is no transformer, all live

control power supply wires shall be fused.

The magnetic contactors shall not be smaller than the size indicated on the Plans. Starters shall be sized to handle motors furnished even if motors should be larger than indicated on the Plans.

The minimum size starter shall be NEMA Size 1.

16320.20 MAGNETIC STARTERS

16320.21 FULL VOLTAGE

Across-the-line full voltage magnetic starters for up to 600V shall have electrical characteristics indicated on the Plans.

Magnetic starters shall have: NEMA 12 enclosures unless otherwise noted; positive, quick-make, quick-break mechanisms; padlockable enclosure doors; 3 bimetallic overload relays +15 or -15 percent adjustment from nominal heater rating on the overload relay; cover mounted reset button; and at least 3 reversible contacts in addition to the hold-in contact.

Magnetic starters shall be built in accordance with the latest NEMA Standards and shall be manufactured by Westinghouse Electric Corporation, General Electric, or equal.

16320.30 MOTOR PHASE LOSS/REVERSAL PROTECTOR (INDIVIDUAL)

The protector shall detect voltage values below a predetermined value, single phasing, and phase reversal. The unit shall automatically de-energize the control circuits of the motors to be protected when all three lines drop to an average value of 90% of rated voltage. The unit shall have a nominal trip delay time of two seconds and a reset time of two seconds. The motor shall automatically restart upon restoration of the line voltage for a period of time field adjustable up to 300 seconds. Units shall be Motor savers, as manufactured by Time Mark Corporation, or equal.

16325 MINI POWER CENTER

The Contractor shall furnish and install Mini Power Center(s), as indicated on the Electrical Plans.

Single phase transformers shall be 480 volt primary and 240/120 volt secondary. Three phase transformers shall be 480 volt primary and 208Y/120 volt secondary.

All transformers shall have a minimum of 2-5% full capacity primary taps below normal and shall be rated 115 degree temperature rise above 40 degree maximum ambient. All insulating materials are to be in accordance with current ANSI C89.2 and NEMA ST20 standards for a 185 degree UL component recognized insulation system. Transformers are to be encapsulated using a sand-epoxy resin mixture to provide maximum protection against moisture, dust and corrosive environments.

Enclosures shall be cleaned, phosphatised and electrostatic powder coated and shall be UL Listed for indoor and outdoor use.

Mini Power Center Unit(s) shall include integrally mounted and wired primary and secondary main circuit breakers in accordance with National Electrical Code requirement. These breakers and all branch circuit breakers shall be bolt-on type and as specified elsewhere within these specifications. Minimum A/C rating shall be as indicated on Plans.

A hinged access door shall be provided which maintains itself in the open position when desired, and which has padlock provisions to prevent unauthorized entry. All live parts are to be fully enclosed for personnel protection when installation is completed. The transformer and panelboards shall be constructed with separate enclosures capable of being assembled or disassembled as independent units.

The Mini Power Center(s) shall be UL Listed for use as service equipment.

The Mini Power Center(s) shall be as manufactured by Square D Company or equal.

16330 LIGHTING

16330.01 GENERAL

Lighting fixtures shall be as described below and as indicated on the Plans.

Fixtures shall include lamps, ballasts, poles, mounting hardware, etc. to provide complete operating units.

Lamps shall be as manufactured by Westinghouse, Sylvania, or equal. High pressure sodium lamps shall be color corrected.

Fluorescent fixtures shall be rapid start type.

Catalog data including applicable coefficients of utilization tables, isolux chart of illumination on a horizontal plane, beam efficiency, horizontal and vertical beam spread, and beam lumens shall be submitted to the Engineer for review and acceptance for all fixtures before fixtures are manufactured. Substitutions will be permitted only if acceptable to the Engineer.

16330.20 INSTALLATION

Surface and flush mounted fixtures shall be solidly connected to a junction box. Suspended fixtures shall be hung utilizing pendant mounting or stainless steel chains and hooks. Each suspended fixture, shall be electrically connected by a length of Type SO flexible cord, 3 conductor No. 14 AWG, minimum, with a twist-lock plug to a twist-lock receptacle mounted in an individual junction box. Plugs and receptacles shall be as manufactured by Hubbell, General Electric Company, or equal.

Pole mounted fixtures shall be mounted on steel or aluminum poles as indicated on the Plans. All metal poles shall be bonded to the plant ground system. Poles shall have adequate hand holes and weatherproof receptacles where indicated.

All anchor bolts and nuts shall be stainless steel. Contractor shall paint all steel poles with aluminum paint or other color in accordance with these Contract Documents.

16400 STANDBY ELECTRICAL GENERATOR(S) (OUTDOOR)

16400.10 DIESEL

16400.11 GENERAL

The installation of a standby electric generating system shall include a Caterpillar, Kohler, Onan, or equal, rated for standby service at minimum kilowatts as indicated on the plans, delivered at 0.8 power factor, voltage, number of phases and wires as indicated on the plans, 60 hertz, for temperature and elevation as indicated elsewhere in these specifications, without exceeding NEMA MG1 - temperature rise limits.

The system shall be a package of:

1. A diesel engine driven electric plant to provide standby electric power.
2. Engine mounted control system.
3. An automatic load transfer switch for switching of the load and control to provide automatic starting and stopping of the engine generator system.
4. Mounted accessories as specified.
5. Integral fuel and exhaust systems.
6. All others equipment as required to provide a complete and operable system.

The engine-generator set and all its accessories shall be constructed for outdoor installation operation and all electrical components shall be housed in NEMA 3-R or NEMA-4 enclosures.

All materials, equipment, and parts comprising the units specified herein, shall be new and unused, of current manufacture and of the highest grade.

The engine, generator and all major items of auxiliary equipment shall be manufactured in the U.S. by manufacturers currently engaged in the production of such equipment. The unit shall be factory assembled and tested by the engine manufacturer and shipped to the job site by his authorized dealer having a parts and service facility in the area. The performance of the electric plant shall be certified by manufacturer as to the plant's full power rating, stability, and voltage and frequency regulation, and field load tested at site.

The units offered under these Contract Documents shall

be covered by the manufacturer's standard warranty or guarantee on new machines and shall be a minimum of two years.

Before the equipment is installed, a factory certified test log of the generator set showing a minimum of 3/4 hour testing with 1/2 hour at 100 percent rated load, continuously, shall be submitted to the Engineer. This generating system shall be full-load tested at site in the presence of the Engineer for a period of 8 hours, with supplier providing necessary resistive load banks. Any defects which become evident during this test shall be corrected by the Contractor at his own expense.

On completion of the installation, start-up shall be performed by a factory-trained dealer service representative. Operating and maintenance instruction books shall be supplied upon delivery of the unit and procedures explained to operating personnel.

16400.12 ENGINE

The engine shall be water cooled in-line or Vee-type four stroke cycle compression ignition diesel. It shall meet specifications when operating on No. 2 fuel oil. Diesel engines requiring premium fuels will not be considered. The engine shall be equipped with fuel, lube oil, and intake air filters; lube oil coolers, fuel transfer pump, fuel priming pump, and gear driven water pump.

The engine governor shall maintain frequency regulation not to exceed 3 percent from no load to full rated load.

The unit shall be mounted on a structural steel sub-base and shall be provided with suitable vibration isolators.

Safety shut offs for high water temperature, low oil pressure, over speed, and engine over-crank shall be provided. An engine-mounted radiator with blower type fan shall be sized to maintain safe operation at 115 degrees F maximum ambient temperature. The radiator shall be equipped for a duct adapter flange. Air flow restriction from the radiator shall not exceed 0.5 inch of water.

The engine cooling system shall be filled with a solution of 50 percent ethylene glycol.

Provide a residential type silencer as manufactured by Kittel, Maxim, or equal, including stainless steel flexible exhaust fitting, properly sized and installed, according to the manufacturer's recommendation. Mounting shall be provided as part of the generator set assembly. Silencer shall be mounted so that its weight is not supported by the engine. Exhaust pipe size shall be sufficient to ensure that measured exhaust back pressure does not exceed the maximum limitations specified by the generator set manufacturer.

Exhaust piping shall have stainless steel automatic exhaust cap, and shall be coated with not less than 6 mils of inorganic zinc after sandblasting to "white metal".

The fuel storage tank, gauges, piping, fittings, and valves shall be supplied as part of the generator set.

The tank shall be provided with a level gauge and appurtenances for remote level indication in the standby power generation room.

The tank shall be of sufficient capacity to run the generator set at full load for 12 hours.

After installation the tank shall be filled with No. 2 fuel oil. The tank shall be refilled after the 8-hour on-site test.

The level gauges shall be Liquidometer industrial type as manufactured by Hersey Products Company, Petro-Meter Company, or equal.

An engine-mounted fuel filter, fuel pressure gauge, and engine fuel priming pump shall be provided.

A DC electric starting system with positive engagement drive shall be furnished.

Fully automatic generator set start-stop controls in the generator control panel shall be provided. Controls shall provide two auxiliary contacts for activating accessory items. Controls shall include a 30 second cranking cycle limit with lockout. (Three 10 second cranks or a single 30 second crank.)

A unit mounted thermal circulation type water heater shall be furnished to maintain engine jacket water to 90 degrees F in an ambient temperature of zero degrees F. The heater shall be single phase, 60 hertz, 120

standard published curves. Special ratings or maximum ratings are not acceptable.

A generator mounted vibration isolated 14 gauge steel control panel shall be provided.

Panel shall contain, but not be limited to the following equipment:

- Voltmeter, 3-1/2 inch, 2 percent accuracy
- Ammeter, 3-1/2 inch, 2 percent accuracy
- Voltmeter/Ammeter phase selector switch
- Frequency meter, 3-1/2 inch, dial type
- Automatic starting controls
- Panel illumination lights and switch
- Voltage level adjustment rheostat
- Engine oil pressure gauge
- Engine water temperature gauge
- Dry contacts for remote alarms wired to terminal strips
- Fault indicators for low oil pressure, high water temperature, over-speed, and over-crank
- Four position function switch marked AUTO, MANUAL, OFF/RESET, and STOP
- Battery charge rate ammeter if not furnished on separate charger
- Running time meter

A generator mounted main line molded case circuit breaker shall be installed as a load circuit interrupting and protection device. It shall operate both manually for normal switching function and automatically during overload and short circuit conditions.

Generator exciter field circuit breakers do not meet the above electrical standards and are unacceptable for line protection.

16470 AUTOMATIC TRANSFER SWITCH

16470.10 GENERAL

Automatic transfer switch(es) shall be furnished and installed, as indicated on the Plans, with full load current rating as indicated on the Plans. The switch(es) shall be capable of switching all classes of load, and shall be rated for continuous duty when installed in a non-ventilated enclosure. Withstand current rating shall be as indicated on the plans.

The transfer switch shall be double throw, actuated by a single electrical operator momentarily energized with a total transfer time not to exceed one-sixth second. The switches shall be capable of transferring successfully in either direction with 70 percent of rated voltage applied to the terminals.

The normal and standby contacts shall be positively interlocked mechanically and electrically to prevent simultaneous closing. Main contacts shall be mechanically locked in position in both the normal and standby positions without the use of hooks, latches, or magnets, and shall be silver alloy protected by arcing contacts, with magnetic blowouts on each pole. Parallel main contacts are not acceptable.

The transfer switch(es) shall be equipped with a manual operator that is designed to prevent injury to personnel if the electrical operator should become energized during manual transfer.

The transfer switch(es), including all parts and supports, shall meet a seismic loading equal to their weights multiplied by a force factor, C_p , of 1.00. The directions of force, simultaneously and separately, shall be in any horizontal and vertical planes. The switches shall be capable of normal operation during and after a seismic loading. Seismic loading shall not cause false operation. The force factor, C_p , shall be as defined in the Uniform Building Code.

16470.20 ACCESSORIES

The transfer switch(es) shall be equipped with the following:

1. Nominal 1 to 3 second time delay to override momentary outages.
2. Field adjustable 2 to 25 minutes time delay to retransfer to normal source with 5 minute unloaded running time of standby plant. A switch shall be provided to bypass this feature with transfer to normal source made manually. Time delay shall be nullified if standby power fails and normal power is available.
3. Differential protection on 3 phases. Dropout and pickup.

4. Test switch.
5. Auxiliary contacts which close when normal source fails.
6. Auxiliary contacts which open when normal source fails.
7. Auxiliary contacts on main contacts, closed on normal.
8. Auxiliary contacts on main contacts, closed on emergency.
9. Voltage and frequency lockout relay.
10. Six indicating lights - each indicating power on phases of normal and/or standby power sources.
11. To avoid excessive inrush currents, an integrally mounted phase monitor shall prevent transfer or retransfer until the phase angle between the two power sources is within ten electrical degrees within a frequency differential of two hertz. The monitor shall not require any control wiring to the generator. The monitor shall be bypassed if the load carrying source fails and the alternate power source is available.

16470.30 OPERATIONAL TESTING

A means shall be provided to automatically start and run the standby generating set for a set period of time for the purpose of testing or exercising the complete engine, generator, and load transfer control. After completion of the set period of time for testing and exercising, the standby source shall be automatically shut down. Such periods for testing or exercising shall be adjustable in multiples of 15 minutes per period with the period repeated on any combination of days over a cycle of 7 days before recycling. During the period of testing or exercising, standby power shall not automatically assume its load.

16470.40 TESTING

When conducting temperature rise tests in accordance with UL-1008, the manufacturer shall include post-endurance temperature rise tests to verify the ability of the switches to carry full rated current.

after completing the overload and endurance tests.

The transfer switch, complete with all accessories, shall be listed by UL under Standard UL-1008.

The manufacturer shall issue a certification of compliance with the Plans and Contract Documents which is signed and sealed by a Registered Professional Engineer.

On completion of the installation, start-up shall be performed by a factory-trained service representative in the presence of the operating personnel and the Engineer.

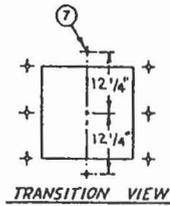
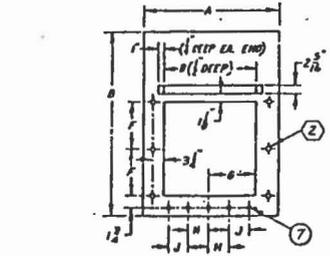
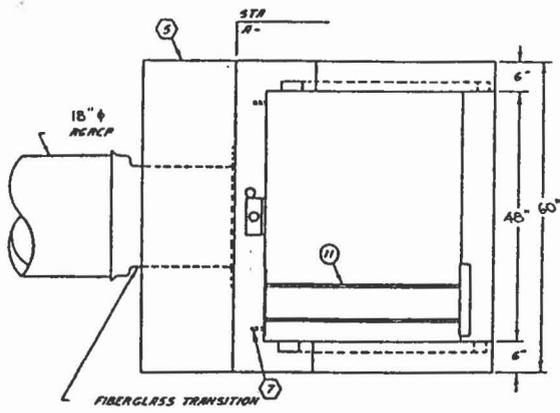
Prior to acceptance of the installation, the equipment shall be subjected to:

Load tests with all available motor load, but not to exceed generator's nameplate rating.

Any defects which become evident during this test shall be corrected by the Contractor at his own expense.

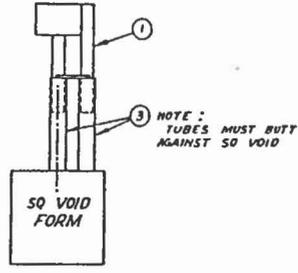
The transfer switches shall be as manufactured by Automatic Switch Company, R.G. Russell Company, or equal.

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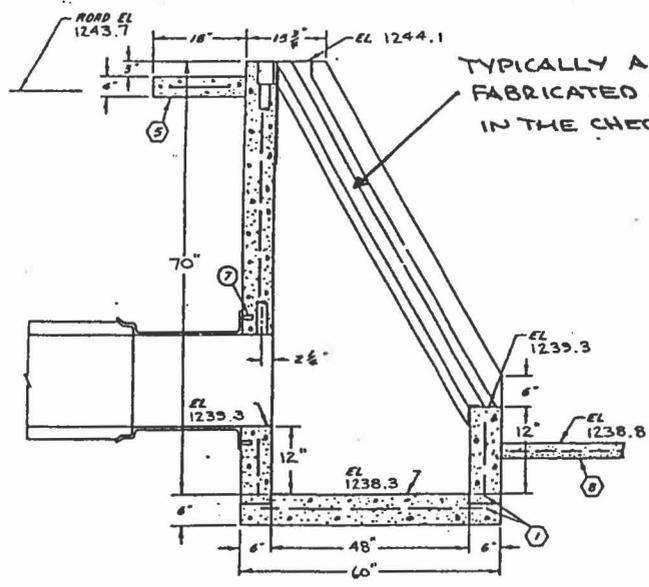


GATE SIZE	A	B	D
12"	21"	30-1/2"	12-1/8"
18"	27"	36-1/2"	18-1/8"
24"	33"	42-1/2"	24-3/8"
30"	39"	48-3/4"	30-1/2"
36"	45"	54-7/8"	36-1/8"
42"	51"	60-1/2"	42-7/16"

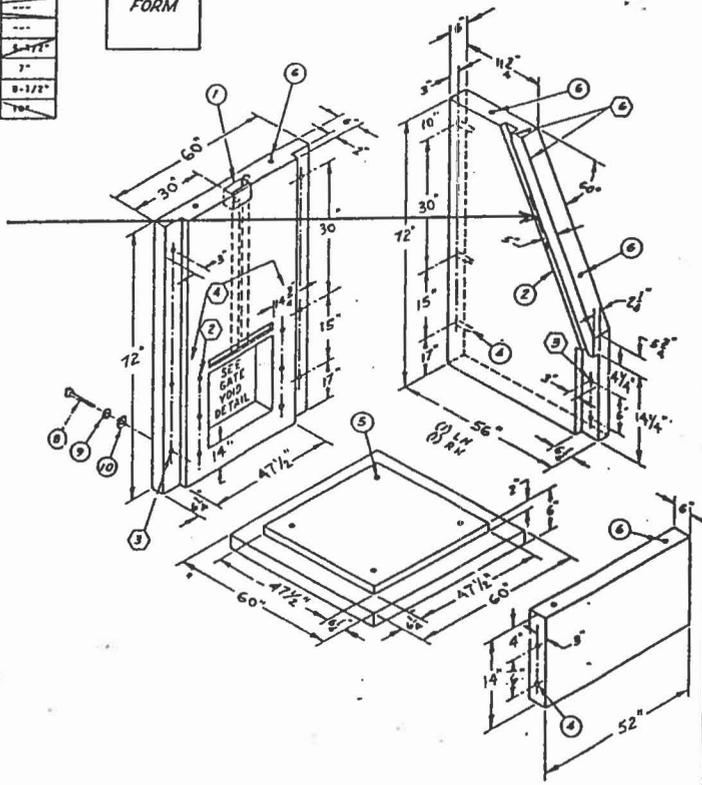
	F	G	H	J
12"	8"	8"	8"	---
18"	8"	9"	8"	---
24"	12"	12"	8-1/2"	3-1/2"
30"	10"	11"	8"	3"
36"	19"	18"	8-1/2"	8-1/2"
42"	23"	21"	10"	10"



NOTE:
TUBES MUST BUTT
AGAINST 50 VOID



TYPICALLY A TRASH RAKE IS
FABRICATED AND INSTALLED
IN THE CHECK GUIDES.



BILL OF MATERIAL		LENGTH	
ITEM	QTY	DESCRIPTION	FT IN FR CAT. NO
1	1	T.O. GATE STEM HOUSING	
2	2	TYPE 1 STEEL CHECK GUIDE FORMS	48 04-0400
3	2	INSIDE SHELDY, 2-1/2" O.D. x 10 GA	01-5423
4	10	ANCHOR, COIL LOOP, 1/2"x6"	04-0045
5	4	ANCHOR, CHAIR, 3/4"x1-1/2"	04-0030
6	8	ANCHOR, COIL LOOP, 3/4"x6"	04-0040
7	5	1/2" UNC THREADED INSERTS	04-1305
8	10	1/2"x6" COIL BOLT	04-0207
9	10	WASHER, FLAT	50-9640
10	10	WASHER, SQUARE	50-9670
11	1	TRASHRAKE ITEM 3 DUG.	

NOTE:
STB TO BE PRECAST AND INSTALLED BY THE CONTRACTOR. FOR ERECTION OF STB USE BONDING AGENT CAT. NO. 04-0300 ON ALL JOINTS. USE COIL BOLTS ON ALL WALL TO WALL JOINTS. SEAL INSIDE CORNERS WITH SEALING COMPOUND CAT. NO. 04-0305 OR EQUIV.

- (2) cu. yds concrete required
- (1) (200) LBS FT #4 REBAR BARS (ASTM-A615 GRADE 60) 12" O.C. BOTH WAYS IN ALL WALLS AND FLOOR
- (2) (6) HOLES TO RECEIVE 1/2" DIA TRANSITION ANCHOR BOLTS
- (3) (10) 1-1/4" HOLES THRU
- (4) PANEL WITH GATE OPENING SHALL HAVE A MINIMUM OF (2) VERTICAL #4 REBAR BARS LOCATED BETWEEN EDGE OF OPENING AND EDGE OF PANEL.
- (5) CONCRETE PAD WITH #4 REBAR BARS 12" O.C. BOTH WAYS ON 6x6-2/2" (105,5005,9) WELDED WIRE FABRIC. (10.1) CU. YDS CONCRETE, (200) LBS FT #4 REBAR BARS ON LEGS 3 TO FT WELDED WIRE FABRIC. APPLY ORDER FINISH.
- (6) 1/2" CHAMFER
- (7) (2) 1/2" UNC THRODS (INSTALL IN FIELD) USE TRASH-RACK AS TEMPLATE.
- (8) 3" MIN PLASTER WITH 6x6-6/6 (6x6-02,3005,9) WELDED WIRE FABRIC. PLASTER TO BE FLUSH WITH STB AND EXTEND TO UNDISTURBED EARTH. SHAPE RANGES TO FORM SMOOTH TRANSITION BETWEEN STB & EXISTING BANK.

REFERENCE DRAWINGS:
ASSEMBLY OF ADJUSTABLE STEEL FORMS FOR PRECASTING LAT HD STBS _____ D-54-100
INSTALLATION OF T.O. GATE STEM HOUSING TO PRECAST T.O. STB _____ D-54-100
STEEL FORMS _____ D-54-100
DETAILS & ASSEMBLY OF T.O. GATES, SPROCKET, GATE STEM & TRASH RAKE _____ A-60-63
ASSEMBLY OF STB TYPE 111 NON-RISING T.O. GATE STEM HOUSING W/COURTESY _____ D-54-100.1

RELATED DRAWINGS:
DETAILS & ASSEMBLY OF GATE STEM GUIDE WITH COUNTER SPROCKET, GATE STEM & TRASH RAKE FOR TYPE 111 NON-RISING STEEL FLAT PANELS STA _____ DUG

REVISION	BY	CHECKED	APPROVED	DESCRIPTION
SALT RIVER VALLEY WATER USERS' ASSOCIATION PHOENIX, ARIZONA				
LAT HEAD TURN OUT STB SEC T R CANAL				
DATE	DESIGNED	CHECKED	APPROVED	
BY	NOVA	NOVA	EJ	KTL
DATE	4-12-73			