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CONSTRUCTION SPECIFICATIONS

FOR

CROSSROADS PARK, STORMWATER DETENTION BASIN

FCD CONTRACT NO. 91-23

CONSTRUCTION SPECIAL PROVISIONS

Prepared By:

STANLEY CONSULTANTS OF ARIZONA, INC.
3117 North 16th Street
Phoenix, Arizona 85016

Prepared for:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
and

Recommended By: Edward A. Raleigh Date: 7/24/91
Edward A. Raleigh, P.E., Chief
Engineering Division

Approved By: D.E. Sagramoso Date: 7/25/91
D.E. Sagramoso, P.E.
Chief Engineer and General Manager

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

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ATTENTION

ALL PROSPECTIVE BIDDERS

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

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

Please take note and submit your bids accordingly.

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
FCD CONTRACT 91-23

CROSSROADS PARK, STORMWATER DETENTION BASIN

TABLE OF CONTENTS

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
INVITATION TO BID

BID OPENING DATE: September 5, 1991

LOCATION:

The project is located at Greenfield and Ray Roads and also bordered by the Southern Pacific Railroad and the Eastern Canal in the Town of Gilbert, Arizona.

PROPOSED WORK:

This project involves earthwork for the excavation of the basin, construction of a pump station, grouted rip-rap inlets, AC entrance road and parking lot, landscaping, irrigation system, electrical works, lake bed lining and concrete lake edge.

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 West Durango Street, Phoenix, Arizona 85009. No bids will be received after the time specified for bid opening. All bids must be submitted on proposal forms furnished by the Flood Control District and included in the Proposal Pamphlet. The Board of Directors reserves the right to reject any and all bids and to waive any informality in any bid received.

ELIGIBILITY OF CONTRACTOR:

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

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

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

CONTRACT TIME:

All work on this Contract is to be completed within two hundred twelve (212) calendar days after date of Notice to Proceed.

MBE/WBE PARTICIPATION:

For this project, a goal of twelve (12) 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 August 19, 1991 at 9:00 a.m. in the Flood Control District conference room, 3335 West Durango Street, Phoenix, Arizona 85009. It is in the best interest of prospective bidders to attend the Pre-bid Conference.

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

PROJECT PLANS, SPECIAL PROVISIONS AND CONTRACT DOCUMENTS:

Plans and Construction Specifications may be obtained from Flood Control District of Maricopa County, 3335 West Durango Street, Phoenix, Arizona 85009 upon payment of $33.00 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 $40.50 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

QUANTITY	UNIT	DESCRIPTION
674,456	CY	Earthwork/Excavation
23,656	SY	Asphalt Concrete (2 1/2" AC/8" ABC)
3,707	SY	Asphalt Concrete (2 1/2" AC/18" ABC)
1	LS	Landscaping
1	LS	Irrigation
1	LS	Pump Station
1	LS	Electrical Supply & Distribution
16,286	SY	Compacted Clay Lake Lining

PROPOSAL

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

Gentlemen:

The following Proposal is made for constructing FCD 91-23; Crossroads Park, Stormwater Detention Basin in the County of Maricopa, State of Arizona.

The following Proposal is made on behalf of

_____

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

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

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

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

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

The Undersigned further proposes to execute the Contract Agreement and furnish satisfactory Bonds and Sureties within ten (10) days of receipt of Notice of Proposal acceptance, **TIME BEING OF THE ESSENCE.** The Undersigned further proposes to begin work as specified in the Contract attached hereto, and to complete the work within 212 **calendar days** from the effective date specified in the Notice to Proceed, and maintain at all times a Payment and Performance Bond, approved by the Board of Directors, each in an amount equal to one hundred percent of the contract amount. This Bond shall serve not only to guarantee the completion of the work on the part of the Undersigned, but also to guarantee the excellence of both workmanship and material and the payment of all obligations incurred, said Bonds and Sureties to be in full force and effect until the work is finally accepted and the provisions of the Plans, Specifications, and Special Provisions fulfilled.

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

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

Addendum No. _____ Dated _____

Addendum No. _____ Dated _____

Addendum No. _____ Dated _____

Addendum No. _____ Dated _____

Addendum No. _____ Dated _____

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

BIDDING SCHEDULE

PROJECT: Crossroads Park, Stormwater Detention Basin

CONTRACT: FCD 91-23

ITEM NO.	DESCRIPTION	APPROXIMATE QUANTITY	UNIT	UNIT COST (IN WRITING) AND /100 DOLLARS	UNIT COST (NUMBERS)	EXTENDED AMOUNT
109	Mobilization	1	LS			
200.1	Remove Concrete Irrigation Ditch	592	LF			
215.1	Earthwork/Excavation	674,456	CY			
215.2	Compacted Clay Lake Lining	16,286	SY			
220.1	Grouted Rip Rap (21")	4,071	SY			
220.2	Plain Rip Rap (18")	112	SY			
220.3	Plain Rip Rap (6" Low Flow Spillway)	2,476	SY			
300.1	Parking Lot & Roadway Striping	1	LS			
300.2	Stop Sign	1	EA			
300.3	Firelane Signs	13	EA			
311.1	Concrete Lake Slope Protection (4")	1,816	SY			
321.1	Asphalt Concrete (2 1/2" AC/8" ABC)	23,656	SY			
321.2	Asphalt Concrete (2 1/2" AC/18" ABC)	3,707	SY			
340.1	Concrete Curb & Gutter (MAG SD 220 "A")	1,774	LF			
340.2	Concrete Curb (MAG SD 222 "A")	6,084	LF			
340.3	Concrete Curb (MAG SD 222 "B")	950	LF			
340.4	Concrete Sidewalk (4")	1,693	SY			
420.1	Chain Link Fence (5')	1,760	LF			
430.1	Landscaping	1	LS			
440.1	Irrigation	1	LS			

PROJECT: Crossroads Park, Stormwater Detention Basin

CONTRACT: FCD 91-23

ITEM NO.	DESCRIPTION	APPROXIMATE QUANTITY	UNIT	UNIT COST (IN WRITING) AND /100 DOLLARS	UNIT COST (NUMBERS)	EXTENDED AMOUNT
505.1	Concrete Lake Edge	225	CY			
505.2	Concrete Channel Lining	292	SY	INCLUDE RUCD CHANNEL		
505.3	Catch Basin (MAG SD 531, B)	2	EA			
505.4	Catch Basin (MAG SD 537/Single Grate)	1	EA			
505.5	Catch Basin (MAG SD 537/Double Grate)	1	EA			
505.6	Catch Basin (MAG SD 538/Double Grate)	1	EA			
505.7	Concrete Encasement (42" RGRCP)	178	CY			
505.8	Headwall (18" MAG SD 501-1 "U")	1	EA			
505.9	Headwall (18" MAG SD 501-1 "Straight Type")	1	EA			
505.10	Headwall (24" MAG SD 501-1 "Straight Type")	4	EA			
505.11	Headwall (42" MAG SD-504-1)	1	EA			
505.12	Concrete Impact ~~Basin~~ (Inlet #3)	1	EA			
505.13	Gate Structure (Lake Filling)	1	EA			
610.1	12" C-900, Class 150 Pipe	5	LF			
610.2	8" C-900, Class 150 Pipe	2,180	LF			
610.3	6" C-900, Class 150 Pipe	875	LF			
610.4	2" C-900, Class 150 Pipe	90	LF			
610.5	8" Gate Valve, Box and Cover	7	EA			
610.6	Fire Hydrant	1	EA			
610.7	2" Water Meter	1	EA			

BIDDING SCHEDULE

PROJECT: Crossroads Park, Stormwater Detention Basin

CONTRACT: FCD 91-23

ITEM NO.	DESCRIPTION	APPROXIMATE QUANTITY	UNIT	UNIT COST (IN WRITING) AND /100 DOLLARS	UNIT COST (NUMBERS)	EXTENDED AMOUNT
618.1	15" R.G.R.C.P.	456	LF			
618.2	18" R.G.R.C.P.	138	LF	WILL GO ;		
618.3	24" R.G.R.C.P.	1,341	LF			
618.4	42" R.G.R.C.P.	292	LF			
625.1	5' Manhole	2	EA			
800.1	Stillwell	1	EA			
800.2	Double Vehicle Barrier Gate	1	EA			
11210.1	Pump Station	1	LS			
11350.1	Aeration System	1	LS			
16050.1	Electric Supply & Distribution	1	LS			
16500.1	Lighting	1	EA			

TOTAL BASE BID AMOUNT: _____

PROJECT: Crossroads Park, Stormwater Detention Basin

CONTRACT FCD 91-23

Alternate bid items additive to base bid: using L.S. Unit Pricing.

A: American Electric light and poles for the access roadway and the parking lot lighting as specified in Special Provisions Section 16500.

_____ _____
Cost in Writing Numbers

B: Bleachers, 3 riser, 4' x 27', 8 Total as specified in Special Provisions Section 11480.

_____ _____
Cost in Writing Numbers

C: Dugout Benches, 6', 24 Total as specified in special Provisions Section 11480.

_____ _____
Cost in Writing Numbers

D: Baseball Scoreboards, 4' x 10', 4 Total as specified in Special Provisions Section 11480.

_____ _____
Cost in Writing Numbers

E: Soccer Scoreboards, 4' x 10', 3 Total as specified in Special Provisions Section 11480.

_____ _____
Cost in Writing Numbers

F: Concrete Stage, 50' diameter, 1 Total as specified in Special Provisions Section 11480.

_____ _____
Cost in Writing Numbers

G: Numex Shara Seed, 95,200 SF, as specified in Special Provisions Section 430.

_____ _____
Cost in Writing Numbers

H: Picnic Tables, 32 Total, as specified in Special Provisions Section 11480.

_____ _____
Cost in Writing Numbers

I: Soccer Goals, 6 Each, as specified in Special Provisions Section 11480.

_____ _____
Cost in Writing Numbers

TOTAL ALTERNATE A THROUGH I BID ITEMS: _____

TOTAL BASE BID PLUS ALTERNATES A THROUGH I: _____

IF BY AN INDIVIDUAL:

_____ _____

(NAME - TITLE) (ADDRESS)

DATE_____

(PHONE)

IF BY A FIRM OR PARTNERSHIP:

_____ _____

(FIRM NAME) (FIRM ADDRESS)

BY:_____ DATE _____

(NAME - TITLE) (PHONE)

** Name and Address of Each Member:

_____ _____

_____ _____

_____ _____

_____ _____

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

IF BY A CORPORATION:

_____ _____

(CORPORATE NAME) (CORPORATION ADDRESS)

BY:_____ DATE:_____

(PHONE)

TITLE:_____

* Incorporated under the Laws of _____

Names and Addresses of Officers:

_____ _____

(PRESIDENT) (ADDRESS)

_____ _____

(SECRETARY) (ADDRESS)

_____ _____

(TREASURER) (ADDRESS)

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

SUBCONTRACTOR LISTING

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

_____

_____

_____

_____

_____

(Signature) _____

SURETY BOND

KNOW ALL MEN BY THESE PRESENTS:

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

WHEREAS, the said Principal is herewith submitting its proposal for FCD 91-23; Crossroads Park, Stormwater Detention Basin.

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

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

_____
Principal

_____
Title

Witness:

_____

_____
Surety

_____
Title

Witness:

_____

AFFIDAVIT BY CONTRACTOR
CERTIFYING THAT THERE WAS NO COLLUSION
IN BIDDING FOR CONTRACT

STATE OF ARIZONA)
) ss
COUNTY OF MARICOPA)

_____ being first duly sworn, deposes and says:

That he is_____ of _____
(Title) (Name of Business)

bidding on FCD Contract No. 91-23 for the construction of Crossroads Park, Stormwater Detention Basin, in the County of Maricopa, State of Arizona.

That, in connection with the above-mentioned project, neither he, nor anyone associated with the aforesaid business, has, directly or indirectly, participated in any collusion, entered into any contract, combination, conspiracy or other act in restraint of trade or commerce in violation of the provisions of A.R.S. Sec. 34-251, Article 4, as amended.

_____
(Signature of Affiant)

Subscribed and sworn to before me this _____day of _____, 1991.

My Commission Expires:

_____

_____
(Notary Public)

VERIFICATION OF LICENSE

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

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

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

_____
_____
_____
_____

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

DATE: _____ SIGNATURE OF LICENSEE: _____

COMPANY:_____

MINORITY AND WOMEN-OWNED BUSINESS ENTERPRISE PROGRAM

A. The following conditions will apply in the calculation of the percentage attainment:

1. All MBE/WBE firms used in attainment of the goal must be certified with the Maricopa County Minority Business Office which is located in the Maricopa County Highway Department building, 3325 West Durango Street, Phoenix. In addition, only those firms certified at least seven calendar days prior to the bid opening will be considered in the attainment of the goal.

2. Prime contractor subcontracts to MBE or WBE:
   The MBE/WBE amount to be applied to the goal will be based on that portion (dollar value) of the contract that the MBE/WBE performs. For example, if a prime contractor subcontracts work amounting to $100,000 of a contract for which the total project cost is $1,000,000. the MBE/WBE participation will be credited as 10 percent.

3. Prime Minority Contractor:
   An MBE/WBE prime contractor will be credited with the MBE/WBE participation for that portion of the contract which they themselves perform plus that portions subcontracted to other MBE/WBE firms. For example, if an MBE/WBE prime contractor proposes to perform 50 percent of a project quoted at $1,000,000 and subcontracts 25 percent to an MBE firm and 25 percent to a non-MBE/WBE firm, MBE/WBE participation will be credited as 75 Percent, or $750,000.

4. Minority-Non-Minority Joint Venture:
   A joint venture consisting of MBE/WBE participation and non-MBE/WBE business enterprises, functioning as a prime contractor, will be credited with minority participation on the basis of the percentage of profit accruing to the MBE/WBE firm. For example, if a MBE/WBE and non-MBE/WBE joint venture proposes to perform 50 percent of a $1,000,000 project and 50 percent of the joint venture profits ($500,000) are to accrue to the MBE/WBE partner in the joint venture, MBE/WBE participation will be credited at 25 percent or $250,000.

5. Lower Tier Non-MBE/WBE Participation:
   MBE/WBE subcontractors proposing to further subcontract to non-MBE/WBE contractors shall not have that portion of subcontracting activity considered when determining the percentage of MBE/WBE participation.

6. MBE/WBE Suppliers:

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

B. Required forms:

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

C. Requests for Pay:

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

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

MBE/WBE PARTICIPATION ASSURANCES
AFFIDAVIT

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

_____,
(the entity submitting the bid)

(CHECK ONE)

____ Will meet the established goal for participation by Minority/Women-Owned Business Enterprises.

____ Will provide the necessary documentation to Minority Business Office to establish that a good faith effort was made.

____ Will not participate in the MBE/WBE Program.

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

_____
Name of Firm

_____
Signature

_____
Title

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

Name of Prime Contractor

FCD 91-23
Project Number

Contact Person

Total Amount of Contract

Street No.

City State Zip

Minority/Women-owned Firm	Principal	Address	Type of Work	Subcontract Amount

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

Signature

Title

Date

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

MARICOPA COUNTY
MINORITY/WOMEN-OWNED BUSINESS ENTERPRISES PROGRAM

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

Date: _____

Contractor: _____
Contact Person: _____
Address: _____

Telephone: _____

Project: Crossroads Park, Stormwater Detention Basin
Contract Number: 91-23
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, %: 12
Total Cumulative MBE/WBE
Participation on This Contract, %: _____

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

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

CONTRACT AGREEMENT

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

_____

hereinafter called the CONTRACTOR.

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

ARTICLE I - SCOPE OF WORK: The CONTRACTOR shall construct, and complete in a workmanlike and substantial manner and to the satisfaction of the Chief Engineer and General Manager, a project for the Flood Control District of Maricopa County, designated as FCD Contract 91-23; Crossroads Park, Stormwater Detention Basin, and furnish at his own cost and expense all necessary machinery, equipment, tools, apparatus, materials, and labor to complete the work in the most substantial and workmanlike manner according to the Plans and Construction Specifications on file with the Flood Control District of Maricopa County, 3335 West Durango Street, Phoenix, Arizona, and such modifications of the same and other directions that may be made by the Flood Control District of Maricopa County as provided herein.

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

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

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

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

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

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

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

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

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

_____
PARTY OF THE FIRST PART

BY:_____
Printed Name

BY:_____
Signature

_____
Title

DATE:_____

_____
Tax Identification Number

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
PARTY OF THE SECOND PART

BY:_____
CHAIRMAN, BOARD OF DIRECTORS

DATE:_____

RECOMMENDED BY:

_____
CHIEF ENGINEER AND GENERAL MANAGER
FLOOD CONTROL DISTRICT OF
MARICOPA COUNTY

DATE:_____

ATTEST:

_____
CLERK OF THE BOARD

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

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

DATE:_____

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

KNOW ALL MEN BY THESE PRESENTS:

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

WHEREAS, the Principal has entered into a certain written contract with Flood Control District of Maricopa County, dated the ____day of _____, 1991, for FCD Contract 91-23; Crossroads Park, Stormwater Detention Basin, which contract is hereby referred to and made a part hereof as fully and to the same extent as if copied at length herein.

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

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

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

Witness our hands this _____ day of _____, 1991.

_____
PRINCIPAL SEAL

BY: _____

_____
AGENCY OF RECORD

_____ _____
AGENCY ADDRESS SURETY SEAL

BY: _____

BOND NUMBER. _____ _____
POWER OF ATTORNEY SEAL

BY: _____

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

KNOW ALL MEN BY THESE PRESENTS:

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

WHEREAS, the Principal has entered into a certain written contract with Flood Control District of Maricopa County, dated the ____day of _____, 1991, for FCD Contract 91-23; Crossroads Park, Stormwater Detention Basin, which contract is hereby referred to and made a part hereof as fully and to the same extent as if copied at length herein.

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

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

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

Witness our hands this _____ day of _____, 1991.

_____
AGENCY OF RECORD

_____
AGENCY ADDRESS

BOND NUMBER _____

_____
POWER OF ATTORNEY SEAL

BY:_____

_____
PRINCIPAL SEAL

BY: _____

_____
SURETY SEAL

BY: _____

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

CERTIFICATE OF INSURANCE

CONTRACT FCD 91-23 PROJECT TITLE Crossroads Park, Stormwater Detention Basin

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

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

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

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

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

DATE ISSUED _____

_____
AUTHORIZED REPRESENTATIVE

Form C & O 88.0003.A.B. REV. 12-88

It is further agreed that:

The Contractor hereby agrees to indemnify and save harmless the **Flood Control District of Marizopa County, Maricopa County, and the Town of Gilbert** 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, Maricopa County, and the Town of Gilbert** shall in all instances be indemnified against all liability, losses and damages of any nature for or on account of any injuries to or death of persons or damages to or destruction of property arising out of or in any way connected with the performance or nonperformance of this Agreement, except such injury or damage as shall have been occasioned by the negligence of the **Flood Control District of Maricopa County, Maricopa County, and the Town of Gilbert.** The above cost of damages incurred by the **Flood Control District of Maricopa County, Maricopa County, and the Town of Gilbert** 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

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

CONTRACT FCD 91-23

SUPPLEMENTARY GENERAL CONDITIONS

SPECIFICATIONS:

Except as otherwise required in these Supplementary General Conditions and the Construction Special Provisions, construction of this project shall be in accordance with all applicable Maricopa Association of Governments (MAG) Uniform Standard Specifications and Uniform Standard Details, latest revision, together with Maricopa County Highway Department Supplements to the Uniform Standard Specifications.

PRECEDENCE OF CONTRACT DOCUMENTS

In case of a discrepancy or conflict, Project Plans will govern over the MAG Standard Specifications and Details. The Supplementary General Conditions and Construction Special Provisions will govern over the MAG Standard Specifications and Details and the Project Plans.

PAYMENT

Payment will be made for only those items listed in the proposal and will not be made in accordance with the measurement and payment provisions of the Standard Specifications where this differs from the items listed in the proposal. All material and work necessary for completion of this project are included in proposal items. Any work or material not specifically referred to in these items is considered incidental to the item and included in the unit price.

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 TIME:

The Contractor shall commence work within seven (7) calendar days after the date of the Notice to Proceed and complete all work within two hundred twelve (212) calendar days after receipt of the Notice to Proceed. In the event the Contractor elects to work overtime, second shifts, weekends, or legal holidays, to complete the work that is not required by the Project Plans and these Supplementary General Conditions or Construction Special Provisions, the Contractor will be responsible to bear the additional costs that may be incurred by the Owner including engineering, inspections, testing, surveying and construction administration all in accordance with Section 108.5. These costs will be deducted from the monies due to the Contractor for each Payment Request. The costs associated with these items shall be incidental to the unit price items in the bid schedule.

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 not be construed to void any provisions 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 in the requirements of the work by the Contractor at his expense.

PROGRESS SCHEDULE:

The Contractor shall submit a proposed work progress schedule to the Engineer for review before starting work. Weekly updates shall be submitted to the Owner's Inspector at the weekly coordination meeting.

MATERIALS SOURCES:

Select Material, Aggregate Base, Mineral Aggregate, concrete, 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 any commercial sources is in accordance with the Uniform Standard Specifications and these Supplementary General Conditions.

Subsection 101.2 - Definitions and Terms:

1. Change the definition of the phrase "Board of Supervisors" to being the Board of Directors acting under the authority of the laws of the State of Arizona and in their capacity of the Board of Directors of the FCDMC.

2. Change the definition of the phrase "Budget Project" to being a project financed by funds set aside in the annual budget or otherwise approved by the FCDMC Board of Directors.

3. Add to the definition of the phrase "Contract Documents", the phrase "Supplementary General Conditions".

4. Change the definition of the term "Engineer" to being the person appointed by the FCDMC Board of Directors to the office of Chief Engineer and General Manager of the FCDMC acting directly or through his authorized representative, the Chief of the FCDMC Construction and Operations Division.

5. Change the definition for the phrase "Notice of Award" to a letter from the FCDMC advising the Contractor that he is the successful bidder and the FCDMC has accepted his proposal.

6. Change the definition of the term "Owner" to the Flood Control District of Maricopa County, acting through it's legally constituted officials, officers, or employees.

Subsection 102.5 - Preparation of Proposal: It shall be the responsibility of prospective bidders to determine, prior to submission of a bid, if any addenda have been issued by the Flood Control District. This may be accomplished by calling 602-262-1501. Any addendum issued, if not already bound into the Special Provisions, must be included as 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 which do not include appropriate addenda and show appropriate changes to the Bidding Schedule shall be invalid.

The bidder's Arizona State Contractor's License number and classifications shall be shown on the proposal. The Contractor may be required to provide certification of prior satisfactory completion for similar construction and shall include a copy of his license and the renewal certificate with the bid proposal.

Subsection 102.6 - Subcontractors' List: A list of subcontractors proposed to be employed on the project shall be submitted with the bid.

Subsection 103.3 - Award of Contract: Add to MAG Specifications: The Contract shall be awarded on the Total Base Bid plus all Alternatives. However, the Owner reserves the right to award or not to award any one or all of the Alternatives.

Subsection 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 Certificate. 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.

Subsection 103.6.1(D) - Contractor's Insurance: Add additional insureds as indicated on the included Certificate of Insurance.

Subsection 105.6 - Cooperation with Utilities: An attempt has been made to determine the location of all underground utilities and drainage pipes, culverts, and structures; however, it shall be the Contractor's responsibility to cooperate with the pertinent utility companies so that any obstructing utility installation(s) may be adjusted. Should the Contracor'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.

The Contractor shall contact Arizona Blue Stake (telephone number 263-1100) a minimum of two (2) working days before beginning any underground work. In addition, Blue Stake notification(s) shall be maintained on a current basis.

The following phone numbers should put the Contractor in contact with the proper personnel:

Flood Control District.....262-1501
US West Communications.....831-4647
Salt River Project.....236-2765
Location Staking (A.P.S.,Mtn. Bell,S.R.P.).....263-1100
Maricopa County Highway Department.....233-8600

Subsection 105.8 - Construction Stakes, Lines, and Grades: Add the following to MAG:

1. The Engineer will set the project survey control line which the construction contractor will use to set line and grade for all construction. The control line shall consist of (1) alignment staking at an interval appropriate to the project requirements and (2) elevation controls, both of which shall be at frequent enough intervals to maintain a line of sight between staking. All other surveying required for the project shall be the contractor's responsibility. The Engineer will not set any construction stakes.

2. Before any construction work is started, the Engineer shall perform all base surveys and cross sections of existing conditions that may be required as a basis for quantity determination.

Subsection 107.2 - Permits: The Contractor shall be responsible for being aware of and obtaining all permits and licenses, pay all charges, fees, taxes, and give all notices necessary and incidental to the due and lawful prosecution 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, Phoenix, Arizona, telephone number 258-6381.

Subsection 107.5.2 - Compliance with the Arizona Communication Standard: The Owner will provide the Contractor with Material Safety Data Sheets (MSDS) for any products known to exist on the site that are deemed health hazards. The Contractor will provide a copy of Owner-provided MSDS to all subcontractors.

The Contractor will provide the Owner and all subcontractors with MSDS for any products that have or are deemed health hazards that will be brought onto the site or created on the site by either the Contractor or by any subcontractors.

The Contractor will provide the Owner with a statement certifying that all personnel (Contractor and subcontractor) employed by the Contractor or by a subcontractor on the job site have received the required Hazard Communication Standard training.

Subsection 108.9 - Failure to Complete on Time: The actual cost per calendar day incurred by the District for Consultant Administrative and Inspection Services on this project will be added to the daily charges as indicated by TABLE 108, LIQUIDATED DAMAGES, and will be deducted from monies due or to become due to the Contractor for each and every calendar day that work shall remain uncompleted 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 District from deducting from monies due or to become due to the Contractor for any other costs incurred by the District directly attributable to the delay in completing this contract.

Subsection 109.1 - Measurement of Quantities: Measurement for payment shall be made for the actual work completed as determined by the Engineer. Payment will be made at the bid unit price, which price shall include the cost of all labor, materials, tools, equipment, transportation, permits, and incidentals required for performing the work as specified. Monthly Progress Payments of the agreed to value of the work accomplished shall be made by the District.

Measurements of placed materials and/or constructed items will be made after completion of the project to determine compliance with the specifications. Any deficiencies in thickness or width shall be corrected by the contractor before acceptance by the FCDMC.

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.

Subsection 109.2 - Scope of Payment:

In addition to the contained provisions, the work under this section shall consist of preparatory work and operations, including but not limited to, the movement of personnel, equipment, supplies and incidentals to the project site; the establishment of all offices, buildings and other facilities necessary for work on the project, and for all other work operations that must be performed and costs incurred prior to beginning work on the various items on the project site.

Mobilization will be measured for payment as a lump sum, a single complete unit or work.

Payment for mobilization, measured as provided above, will be made at the contract lump sum price, when so called for in the Bid Schedule, which shall be full compensation for supplying and furnishing all materials, facilities and services and performing all the work required. If payment for mobilization is not a separate bid item, then such costs shall be considered incidental.

Subsection 109.7 - Payment for Bond Issue and Budget Projects: Add the following to MAG.

1. Both progress and final pay estimates will be initially processed by the FCDMC's Construction and Operations Division on Tuesdays only, Tuesdays being the only day the Contractor may submit a pay estimate.

TABLE OF CONTENTS

SECTION 206 - STRUCTURE EXCAVATION AND BACKFILL

The work under this section consists of the removal, placing and compacting material around the pump station, inlet structure, canal, and other miscellaneous structures to the lines designated on the plans or specified or directed by the Engineer. Structural backfill shall be compacted to minimum density specified in Table 601-2 for Type III and granular material shall conform to Section 601.4.6 of the Uniform Standard Specifications.

SECTION 220 - RIPRAP CONSTRUCTION

220.1 DESCRIPTION

Riprap construction shall consist of material testing, riprap bedding layer, and riprap as shown on plans or specified in special provisions.

220.2 SUBMITTALS

Submit material test reports on abrasion, soundness, and specific gravity characteristic of bedding and riprap. Test reports conducted on materials from same ledge in same quarry within previous 10 years are acceptable.

Submit gradation test report on riprap bedding material.

Submit visual inspection report on sizes of riprap conducted by independent testing agency prior to loading at quarry.

220.3 BEDDING FILTER LAYER MATERIAL

Bedding filter layer material for 6" riprap:

Use crushed stone or sand and gravel, well-graded between 2" and No. 100 sieves with not more than 5% passing No. 100 sieve and median size at No. 4 sieve.

Bedding filter layer material for 18" and 21" riprap:

Use crushed stone or sand and gravel, well-graded 4" and No. 16 sieves with not more than 5% passing No. 16 sieve and median size at 2.5".

Percent of loss shall not exceed:

a. AASHTO T96: 45%
b. AASHTO T104: 20% (5-cycle of sodium sulfate solution.)

Specific gravity shall be 2.50 minimum (ASTM C127).

220.4 PLAIN RIPRAP MATERIAL

Use sound and durable broken limestone, dolomite, or quartzite for plain and grouted riprap. Stone shall be free from seams and coatings.

6" riprap shall be well-graded within following limits:

a. Maximum size: 15 lb. (6")
b. Not more than 5% shall weigh less than 0.5 lb. (2")
c. At least 50% shall be larger than 2 lb. (3")

18" riprap shall be well-graded within following limits:

a. Maximum size: 350 lb. (18")
b. Not more than 5% shall weigh less than 5 lb. (5")
c. At least 50% shall be larger than 40 lb. (9")

Percent of loss shall not exceed:

a. AASHTO T96: 50%.
b. AASHTO T103: 10% after 25 cycles.
c. AASHTO T104: 15% (sodium sulfate).

Specific gravity shall be 2.50 minimum (ASTM C127).

220.5 GROUTED RIPRAP MATERIAL

Stone for grouted riprap shall be well-graded within following limits:

a. Maximum size: 500 lb. (21")
b. Not more than 5% shall weigh less than 75 lb. (12")
c. At least 50% shall be larger than 200 lb. (15")

Percent of loss shall not exceed:

a. AASHTO T96: 50%.
b. AASHTO T103: 10% after 25 cycles.
c. AASHTO T104: 15% (sodium sulfate).

Specific gravity shall be 2.50 minimum (ASTM C127).

Grouted riprap shall be in accordance with requirements of Sections 220.5 and 703.3 of the Uniform Standard Specifications.

220.6 GROUTED RIPRAP WEEP DRAINS

Galvanized weep drains shall be in accordance with requirements of Section 771 of the Uniform Standard Specifications.

220.7 FOUNDATION PREPARATION

Trim and dress areas to receive plain or grouted riprap to shape and dimensions shown on Drawings; maximum tolerance shall be ±3" from theoretical grade. Areas below minus tolerance shall be filled with bedding material.

220.8 BEDDING FILTER LAYER PLACEMENT

Place after excavation and grading has been completed, filter fabric installed, and area has been observed by ENGINEER. Start placing bedding material at bottom of slopes. Use placement methods which prevent segregation and sloughing of materials. Any damage to foundation shall be repaired prior to proceeding with additional bedding placement. Final section shall be reasonably uniform using hand placement where necessary.

220.9 PLAIN RIPRAP PLACEMENT

Place on top of layer of bedding material. Start placing riprap at bottom of slope. Use methods to prevent segregation and sloughing of materials down slope, and produce reasonably well-graded mass of stone. Place to full course thickness at one operation and in such a manner as to avoid displacing bedding material.

Larger stones shall be well distributed, and entire mass of stone shall conform approximately to gradation specified. Riprap shall be so placed and distributed that there will be no large accumulations of either larger or smaller sizes of stone.

Some roughness in surface is desirable to decrease velocity of water, but mass shall be fairly compact with all sizes of material placed in their proper proportions. Hand placing or rearranging of individual stones by mechanical equipment may be required to extent necessary to secure results specified.

220.10 GROUTED RIPRAP PLACEMENT

Place riprap stone in same manner as specified for plain riprap, except place PVC weep drains in stone work at locations shown on plans. Exercise care not to damage weep drain pipes during stone placement.

Prior to grout placement, riprap stones shall be thoroughly moistened and excess fines shall be sluiced to underside of riprap stone layer before grouting.

Grout may be delivered to place of final deposit by any means that will insure uniformity and prevent segregation of grout. Penetration shall be minimum of 16" below upper surface plane of riprap. If penetration of grout is not obtained by gravity flow into interstices, grout shall be spaded or rodded to completely fill voids in stone layer.

Upper surface of grout layer shall not be closer than 4" to 6" from upper surface plane of riprap stone.

220.11 MEASUREMENT

The quantities of riprap construction shall be those of the completed bid item, in place, within limits of dimensions shown on plans.

The Engineer will compute the quantities of riprap by a method which, in his opinion, is best suited to obtain an accurate determination.

220.12 PAYMENT:

Payment for plain and grouted riprap will be made for the number of square yards including material and labor costs for foundation preparation, furnishing and placing filter fabric, riprap, bedding material, grout and weep drains; payment made on basis of surface area of material required. Measurement will be based on design area for various thicknesses shown.

SECTION 226 - PLASTIC FILTER FABRIC

226.1 DESCRIPTION

Plastic filter fabric construction shall consist of site preparation, plastic filter fabric and material testing as shown on plans or specified in special provisions.

226.2 SUBMITTALS

Submit mill certificate or affidavit attesting fabric furnished meets chemical, physical, and manufacturing requirements specified.

Submit one sample (8" x 11") of each type of fabric being furnished.

Submit manufacturer's recommended procedures for handling, storage, installation, and seam joining.

226.3 DELIVERY, HANDLING, AND STORAGE

During shipment, handling, and storage, plastic filter fabric shall be protected from direct sunlight, ultraviolet rays, temperatures greater than 140°F, mud, dirt, dust, and debris.

To maximum extent possible, fabric shall be maintained wrapped in heavy-duty protective covering.

226.4 MATERIALS

Plastic filter fabric: Pervious sheet of woven long-chain synthetic polymer filaments (yarn) of polypropylene monofilament yarns. Manufacturer and type shall be Carthage Mills "Poly-Filter X" or equal.

Material shall exhibit the following physical properties:

a. Tensile strength: Stronger principal direction 350 lb, weaker principal direction 220 lb, elongation at failure not less than 10%; ASTM D1682, Grab Test Method, 1" square jaws, constant rate of travel 12" per minute.
b. Puncture strength: 140 lb, ASTM D751 modified.
c. Abrasion resistance: Stronger principal direction 100 lb, weaker principal direction 70 lb, elongation at failure not less than 10%; ASTM D1175.
d. Equivalent opening size (EOS): No coarser than U.S. Standard Sieve No. 70, no finer than U.S. Standard Sieve No. 100.
e. Percent open area: 5 - 6%.
f. Weight: 7 oz/sq yd.

Material shall contain stabilizers and inhibitors to make filament resistant to ultraviolet and heat deterioration. Fabric shall be manufactured so yarn

will retain their relative position with respect to each other. Edges shall be finished to prevent outer yarn from pulling away from fabric.

226.5 SEAMS

Sew seams of fabric with thread of material meeting chemical requirements specified for plastic yarn, or bond by cementing or by heat.

Sheets of filter fabric shall be attached at factory or another approved location to form sections not less than 15' wide.

Test seams in accordance with ASTM D1683, using 1" square jaws and 12" per minute constant rate traverse. Strengths shall be not less than 90% of required tensile strength specified, or of unaged fabric in any principal direction.

226.6 SECURING PINS

Securing pins shall be steel, 3/16" diameter, pointed at one end and fabricated with head to retain steel washer having outside diameter of not less than 1.5" and not less than 12" in length.

226.7 SITE PREPARATION

Prior to installation of fabric, application surface shall be cleared of debris, sharp objects, tree roots, and stumps.

Prepare surface to receive fabric to relatively smooth condition free of obstructions, depressions, debris, and soft or low density pockets of material.

226.8 INSTALLATION

Place plastic filter fabric in manner and at locations shown on Drawings. At the time of installation, fabric shall be rejected if it has defects, rips, holes, flaws, deterioration, or damage incurred during manufacture, transportation, or storage.

Place fabric with long dimension parallel to top of embankment and lay smooth and free of tension, stress, folds, wrinkles, or creases. Strips shall be placed to provide minimum width of 18" of overlap or 4" for sewn joints. If sewn, fabric shall be stitched at rate of 4 stitches per inch, with nylon thread of at least 100 lb breaking strength.

Insert securing pins with washers through both strips of overlapped fabric at not greater than 3' intervals along a line through midpoint of overlap. Additional pins, regardless of location, shall be installed as necessary to prevent any slippage of filter fabric.

Place fabric so upper strip of fabric will overlap next lower strip.

Protect fabric at all times during construction from contamination by surface runoff, and any fabric so contaminated shall be removed and replaced with uncontaminated fabric.

Place bedding filter layer material on fabric by spreading dumped material off of previously placed material with bulldozer blade or end-loader in such manner as to prevent tearing or shoving of cloth. Dumping of material

directly on fabric will only be permitted to establish an initial working platform. No vehicles or construction equipment shall be allowed on fabric prior to placement of bedding filter layer.

Unless otherwise specified, bedding filter layer shall be placed to full required thickness and compacted to satisfaction of ENGINEER before any loaded trucks are allowed on bedding filter layer.

Any damage to fabric during its installation or during placement of bedding layer shall be replaced by CONTRACTOR at no cost to OWNER.

Torn fabric may be patched in-place by placing piece of same fabric over tear. Dimensions of shall be at least 2' larger than largest dimension of tear, and it shall be pinned to prevent granular material from causing lap separation.

Work shall be scheduled so that covering of fabric with layer of specified material is accomplished within 7 days after placement of fabric. Failure to comply shall require replacement of fabric.

226.9 MEASUREMENT AND PAYMENT

Full compensation for plastic filter fabric shall be considered as included in various prices paid for plain or grouted riprap, Section 220, and no separate payment for such work will be made.

SECTION 230 - DISPOSAL OF EXCESS EXCAVATED MATERIAL

The contractor shall dispose a sufficient amount of excavated material at the Town of Gilbert, Rodeo Park site to level the site. The material shall be spoiled at this site as stated below and as illustrated on attachment 230-C. This material shall be placed as unengineered fill over the site to an average depth of 3.5 feet. The portion of the site to be filled is located south of the access road off of Val Vista Road, and is approximately 23 acres in size. The site shall be level when the fill placement is complete. Fill depths at the north end of the site will average 2 feet and at the south end fill depths shall average 5 feet. Fill shall be placed in lifts not to exceed 12 inches. Slopes at the edges of the fill shall not exceed 3:1. Removal of any amenities on the site shall be the responsibility of the Town of Gilbert. The Town of Gilbert shall place fill stakes on the site.

An optional site for disposal of the remaining excavated material is illustrated in Detail 230-A and 230-B. Material disposed of at this site is to be set back a minimum of 50' from the property line and is to be stockpiled no higher than 10' with sideslopes no steeper than 4:1. The location(s) of the stockpiles on this site shall be approved by the Flood Control District Engineer.

The contractor shall be aware of and obtain all permits necessary to commence and continue hauling operations.

SECTION 230.1 - MEASUREMENT AND PAYMENT

Quantities of excess excavated material will be paid for at the contract unit price per cubic yard. Such price shall include excavating, filling, backfilling, compaction, and grading to final finish grades, hauling, removal and disposal of excess excavated material to the identified disposal sites or sites identified by the contractor.

SECTION 235 - SOILS REPORT

By this reference, the geotechnical investigation and recommendations report completed by Thomas-Hartig Inc. in April 1991 is a part of these special provisions. The Contractor shall be familiar with the report and complete the excavation, finish grading and pavement construction in accordance with the soils report recommendations.

SECTION 430: LANDSCAPING AND PLANTING

SUBSECTION 430.3.1 - PREPARATION OF IN-PLACE TURF SOIL

It shall be the responsibility of the contractor and/or applicator to assure himself that the site is properly prepared, the irrigation system is operating and programmed and don't affect the results of his operation.

The existing soil shall be ripped and disced to a depth of 18" minimum. Broadcast 30 pounds simplot best fertilizer (6-20-20 xB) or 10 pounds of Ammonium Sulfate (21-0-0), 11.25 pound of Treblesuperphosphate (0-45-0), 1.5 pound of Zinc Sulfate (36%), with 100 pounds of Gypsum, 10 pounds Soil Sulfur, 2 CU.YRDS. of Dakota Reed Sedge Peat per 1000 SQ.FT. and thoroughly mix into the top 12" of soil.

Heavily water and air dry prior to compaction of 80%-85% with a water filled roller. Contractor to furnish compaction test.

Drag and rake to remove all rocks & debris 3/4" or larger and settle the soil.

The applicator or contractor shall take responsibility for repairing all tire ruts created by his equipment, unless he has notified the owner of the poor conditions, too wet, insufficient compaction, etc.

Areas of repair shall be blended and floated to match surrounding areas and reseeded or replanted.

Contractor to receive the site at plus/minus .10 of an inch. The grade shall be brought to grades specified by the Engineer's grading and drainage plan. If the grade have not been left at plus/minus .10, the contractor shall inform the owner of the discrepancy before proceeding.

SUBSECTION 430.3.2 - SEEDING

Delete paragraphs 1, 2 and 3 and substitute:
The preparation of subsoil and lawn areas shall be done just prior to the actual seeding which shall be done at a time favorable to the growth of the grass and only at a time approved by the Engineer.

Seed shall be sown evenly at a rate of seven pounds per each 1,000 square feet for common Bermuda (Cynodon Dactylon) using a mechanical seeder for hydroseeding. In areas where hand seeding is necessary, extreme care shall be taken to insure even distribution of seed. Hand seeded areas shall then be covered with a coat of mulch at a rate of 1 cubic yard per 1,000 square feet, rolled once lightly and entire area watered with a fine spray. Care shall be taken to avoid washing. No seeding shall be done after rain unless the surface of the ground is thoroughly loosened, nor when velocity of the wind exceeds a gentle breeze.

The preplanting fertilizer will be applied into the hydro-seed mix application and shall consist of a starter mix of nitrates, phosphate and potassium to be applied at 7 to 10 pounds per 10,000 square feet. Mulch shall be Wayerhaseuer Co. Silva-Fiber or Applegate Mulch. Mulch Tackifier shall be RMB by Reinco Corp. or equal. Mulch rate at 1,500 to 2,000 pounds per acre and Tackifier at 50 pounds per acre. Seed rate at 7 pounds per 1,000 square feet for common Bermuda.

Lawn type shall be as indicated on drawings.

All seeds shall be fresh and clean "new crop" seed with a minimum percentage of purity and germination between 88% to 95%, weed seed is not to exceed 0.35%. All seeds shall be delivered in original packages which bear a guaranteed analysis.

Sow common Bermuda from May 1, but not beyond September 10 dependant on weather conditions.

Hydroseeding shall be done per the best standards of the industry to achieve a uniform application and germination. The Contractor shall submit application materials and methods to the Engineer prior to installation.

It shall be the responsibility of the applicator to assure himself that the site is properly prepared, the irrigation system is operational and programmed not to affect the results of his operation. Inspection of irrigation system shall be prior to application of seed.

The Hydro-seed applicator shall take responsibility for repairing, all tire ruts created by his equipment.

Area of repair shall be blended and floated to match surrounding areas and reseeded.

For alternate on Soccer fields only, bid 'Numex Sahara' seed. Hydroseed as specified.

SUBSECTION 430.4 - DECOMPOSED GRANITE AREA

Paragraph 2: Delete "in flat areas, a 10 mm black polyethylene film shall be placed prior to spreading granite."

Add paragraph 3: A 2" layer of 3/8" minus granite is to be placed on area indicated on plans and a 2" layer of 1/4" minus granite on the baseball warning track.

SUBSECTION 430.5.5 - GROUNDCOVER AREAS

Delete entire subsection and substitute:

Sod: Sod shall be freshly cut Midiron or E-Z turf (Cynodon Dactylon Cultivars). Soil shall be finely raked and the sod applied with long seam in perpendicular direction to major view. Short seams shall be staggered. Top dressing shall be 3/4 sand and 1/3 mulch applied at a rate of one cubic yard per 2,000 square feet. Roll with 200 pounds ballast roller in two directions at right angles to each other.

SUBSECTION 430.6 - HEADER INSTALLATION

Delete entire paragraph after the first sentence.

SECTION 440 - SPRINKLER IRRIGATION SYSTEM INSTALLATION

SUBSECTION 440.2 - TRENCH EXCAVATION AND BACKFILL

Compaction of backfill shall be to 85% of maximum density in landscape area.

SUBSECTION 440.3 - PIPE INSTALLATION

Gasket type pipe and mechanical joint pipe shall include concrete thrust blocks as per M.A.G. Standard Detail 380 and when applicable 302-1 and 302-2.

Pulling of plastic pipe of sizes 1" through 2" will be permitted as a method of installation.

Pipe shall be maintained so that interiors are clean and free of material. Pipe ends shall be covered until ready for joining.

SUBSECTION 440.4 - VALVES, VALVE BOXES AND SPECIAL EQUIPMENT INSTALLATION

Quick coupler valves shall be located within bolt locking plastic valve boxes as detailed. Pitchers mound valves shall be flush with grade without valve boxes.

Quick couplers located at pitchers mounds shall be 1" size, all others shall be 3/4". Each coupler shall be of the two-piece type with brass body and having a locking red or purple thermoplastic cover marked "DO NOT DRINK" in English and Spanish.

Backflow prevention assembly shall be constructed of flanged, standard weight, schedule 40 steel pipe. Buried assembly inlets and outlets shall be cast or ductile iron conforming to Section 750 with mechanical joints and blocking as per Standard Detail 381.
The backflow prevention assembly shall be fully primed and painted.

30-PSI pre-set regulators with union and schader valve shall be provided at locations indicated on the plan. Each regulator shall be rated for flows from 2 to 20 GPM and located within Std. 12" rectangular plastic valve box and marked "P.R." on the lid in 2" high letters using a solder tipped propane torch.

Emitter valve filters shall be 1"x1" MPT reinforced plastic with 150 mesh screen and 3/4" FPT HT ball flush valve adapter. Flow shall be rated at 12 GPM with no more then 3.0 PSI loss. Locate with emitter valve in jumbo valve box.

System filter shall be a 6" in-line automated cleaning filter with 80 mesh screen rating (200 micron). The cleaning cycle shall be initiated by turning a knob at the end of the filter body. Cleaning shall be done by an internal low pressure vacuum device which shall sweep the fine screen portion of the filter. The filter shall be of the same manufacturer as at the pump facility and shall be located on the Town's water supply only.

SUBSECTION 440.5 - SPRINKLER HEAD INSTALLATION AND ADJUSTMENT

New rotor heads shall be gear driven heads with plastic bodies and adjustable radius. Each head shall include pre-manufactured swing joint.
Rotors shall have a 3/4" MPT inlet, selection of eight or more nozzles, stainless steel riser, at least a 2 3/4" pop-up and adjustable arc (for part circle heads).

Emitter heads shall be non-compensating continuous flush heads with black plastic bodies, 1/2" FPT inlet, multiple silicone diaphragm passage of flexible orifices.

1. Tree emitters shall have six outlets rated at plus/minus 1.0 GPH output at 20 PSI per port.

2. Shrub emitter shall have one outlet rated at plus/minus 1.0 GPH output at 20 PSI per port.

The contractor shall properly adjust all rotor irrigation heads to the correct nozzle, flow, arc and radius and as specified for bubbler heads in Section 440.5.

The maximum overspray from rotors adjacent to pavement shall be 3" for textured surfaces with no overspray onto smooth finish pavement. Overspray from infield heads is minimal.

Moisture probes shall measure soil for hydrogen content and signal an adjustable control module at the irrigation controller where a water or don't water condition shall be determined by the module. Moisture sensing range shall be between 500-1,000 milliliters per cubic foot.

An adjustable dial shall allow moisture settings of 1-8 with five being optimum. The module shall operate on 24 volts which has been stepped down from 115 volts A.C., 1 AMP.

Lake level probes and a lake level controller shall be installed to monitor the water level height and signal the controller of its status for determining which water source is to be used for irrigation. Probes shall be located within a still well (by others) and adjusted per detail to provide accurate water height readings. Contractor shall provide all components for a complete installation.

The automatic controller shall be as follows: Motorolla MIR 5000F with 26 stations, radio interface and antenna.

Provide all connections, conduit, wire, enclosures, etc. for a complete installation which interfaces with all flow sensors, convertors, probes managers, lake controller, remote valves, master valves, radio interface and surge protector power supply

SECTION 505 - CONCRETE STRUCTURES

The work under this section consists of constructing in place the concrete pump station and miscellaneous structures in accordance with the plans and Section 505 of the Uniform Standard Specifications.

The concrete shall conform to Section 725 (Class AA) and the reinforcing steel shall conform to Section 727 (Grade 60) of the Uniform Standard Specifications.

The use of fly ash will be permitted in all concrete mixes.

SECTION 510 - CONCRETE BLOCK MASONRY

The work under this section consist of constructing screen wall in accordance with plans and Section 510 of the Uniform Standard Specifications.

Concrete block shall conform to Section 775 (ASTM C90 for Grade N-1, 1,000 psi units) and mortar shall be Type S conforming to Section 776 of the Uniform Standard Specifications.

SUBSECTION 510.1 - PAYMENT

No separate pay item shall be contained in the proposal for concrete block masonary wall. Payment shall be included in the price bid for the pump station, installed complete in place, as specified in the proposal.

SECTION 515 - STEEL STRUCTURES

The work under this section consist of fabrication and installation of miscellaneous steel items in accordance with plans and Section 515 of the Uniform Standard Specifications.

Steel shall conform to Section 770 (ASTM A36 of the Uniform Standard Specifications). Steel shall be galvanized in conformance to Section 771 of the Uniform Standard Specifications.

SUBSECTION 515.7 PAYMENT

No separate pay item shall be contained in the proposal for steel structures. This operation shall be included in bid price for the facility for which it is a part.

SECTION 516 - VEHICLE BARRIER GATE

Security Model VBG-67 as manufactured by Security Fabricators, Inc., Kenilworth, New Jersey or approved equal.

Provide two gates 19' long each.

Anchor bolts to be 1" Diameter x 30" long with 4" leg-hot dipped galvanized.

Shoe base (for 6-5/8" O.D. Aluminum Pipe) is a permanent mold, 356 aluminum alloy casting with natural finish.

Stud Post to be 6" I.D. (6-5/8" O.D.) aluminum Schedule 40 pipe with circular locking plate welded to stud post.

Sleeve to be 7.5 O.D. with .375 wall.

First Panel to be filled with 3/8 aluminum plate.

All frame sizes to be aluminum Schedule 40 alloy 6063-T6 of A.S.T.M. Designation B-429 as dimensioned on Security Drawings.

SUBSECTION 516.1 - PAYMENT

Payment for vehicle barrier gate will be paid for on a lump sum basis as stipulated in the proposal. Price shall include all labor, materials, tools and equipment necessary for installation of vehicle barrier gate.

SECTION 702 - BASE MATERIAL

SUBSECTION 702.4 - DECOMPOSED GRANITE

Change "particles larger than 3"..." to particles larger than 3/8".

SECTION 703 - RIPRAP

The work under this Section consists of placing riprap wherever necessary according to the construction drawings. Material shall be in accordance with MAG Section 703.

SECTION 735 - REINFORCED CONCRETE PIPE

All installed pipe shall conform to ASTM C-76, Class III (Rubber Gasket), except pump station intake shall be Class IV, conforming to the requirements of Section 735 and 765 of the Uniform Standard Specifications. The basis of pipe acceptance shall be in accordance with test methods described in ASTM Standard C-76, Section 5.1.1.

SECTION 757 - SPRINKLER IRRIGATION SYSTEM

SUBSECTION 757.3.2 - GATE VALVES

Gate valves up to 3" in size shall be of brass or bronze with hand wheel. Larger valves shall be epoxy coated iron with 2" operating nut. All trim and hardware shall be bronze, brass and stainless steel.

SUBSECTION 757.3.4- ELECTRICAL REMOTE VALVES

Remote control valves shall be of fiber reinforced plastic. Each shall have downline & manual external bleed capability with friction losses as follows:

1. 1" valves shall be rated for operation to 0.25 GPM.

2. 1 1/2" valves shall pass 50 GPM with a maximum loss of 1.5 PSI.

3. 2" valves shall pass 100 GPM with a maximum loss of 2.3 PSI.

All valves shall be scrubber type for dirty water applications and be of one model type and manufacturer.

Locate remote valves within plastic rectangular valve box having locking bolt down lid marked with a matching two digit circuit number 2" high using a solder tipped propane tipped torch.

SUBSECTION 757.4

Backflow preventor assemblies shall be reduced pressure type. The 4" unit shall not loose more than 5.1 PSI at 400 GPM or 6.0 PSI at 500 GPM. The 2" unit shall not loose more than 7.0 PSI at 60 GPM.

SECTION 795 - LANDSCAPE MATERIAL

SUBSECTION 795.7.2 - FLATTED PLANTS

Delete entire section.

SUBSECTION 795.8.1 - HEADER AND STAKES

Delete entire section and substitute:
Header: concrete 8"x8" see detail and drawings for construction and placement.

SUBSECTION 795.8.4 - DECOMPOSED GRANITE

Delete section and substitute:
Decomposed Granite: Decomposed Granite to be 3/8" minus and 1/4" minus in size and Desert Gold in color. A sample shall be submitted to the Engineer for approval prior to installation.

SECTION 2770 - LAKE CONSTRUCTION SPECIFICATIONS

2770.1 - GENERAL REQUIREMENTS

The intent of the drawings and specifications is to indicate and specify a complete lake system ready for use in accordance with the plans, specifications and the manufacturer's recommendations and meeting with the approval of the owner without further cost for labor and material to the Engineer.

Verification of Dimensions: All dimensions are approximate. Before proceeding with any work, the contractor shall carefully check and verify all dimensions and shall report any variations to the Engineer.

Typical details shall apply where no special details are shown.

Any omissions or conflicts between various elements of the working drawings and/or specifications shall be brought to the attention of the Engineer before proceeding with any work so involved.

A soils report has been prepared for this project by Thomas-Hartig, Inc.

By reference this report is made a part of these Specifications, and all restraints are applicable to the work. Copies of the reports may be inspected at the office of the Engineer.

The inclusion of these reports and addendums shall not be construed to be a waiver of the Contractor's obligation to inspect the soil conditions before submitting a bid. There is no guarantee, expressed or implied, that the conditions indicated are representative of those actually existing throughout the project, or any part of it, or that unforseen developments may not occur. By submitting a bid, the contractor acknowledges satisfaction as to the quality of the soil information, including but not restricted to the conditions affecting handling and storage of materials, disposal of excess material, and level and amount of groundwater.

2770.2 - SCOPE OF WORK

Furnish materials and labor required to execute the work as indicated on the drawings, as specified and as necessary to complete the contract, including but not limited to, these major items:

1. Lake circulation and aeration system for a complete lake system, including all vaults, discharge structures, blowers, pumps, aerators, pipelines, drain lines, valves, including electrical hook-up.

2. Trench wall concrete lake edge including fine grading.
3. Clay soil seepage control lining.

4. Concrete slope protection.

5. Fine grading.

6. Lake fill up.

7. Testing of complete lake system.

8. Record drawings.

9. Guarantee of lake system.

Related work specified elsewhere:

1. Lake water supply system.

2. Rough grading.

3. Landscape construction around lake perimeter.

4. Construction of utility facilities, including electrical distribution system, storm drain system, sanitary sewers, domestic water lines, landscape irrigation system.

2770.3 - EXECUTION

A. SUBMITTALS

1. Shop Drawings - Five (5) copies of all required shop drawings shall be submitted to the Project Engineer at least two (2) weeks prior to start of the affected work. No work shall be performed without written approval of Engineer.

2. Requests for Substitutions of Specified Equipment - Five (5) copies of all requests shall be submitted within fifteen (15) days after the construction contract is executed. Acceptance of such requests shall be at the sole discretion of the Engineer.

3. Samples of Work - All required samples shall be prepared as required and accepted by the Engineer.

4. Acceptance of submittals shall not relieve the Contractor of any of his obligations under the plans and specifications.

B. FREEFORM LAKE EDGE

1. The lake edge shall be constructed as per plans.

2. Concrete shall be Class B 2500 PSI and will be vibrated.

3. The exposed face will be stained with acid concrete stain or diluted acrylic based stain to the satisfaction of the Engineer.

4. Contractor will construct a twenty, (20) foot sample for approval by the Engineer.

5. Maximum continuous single pour length shall not exceed 30'. Each 30' pour shall be allowed to cure 24 hours before a contiguous pour may start. Construction joints shall be per detail on sheet C8.

C. LAKE LINING

Selected Soil Seepage Control Lining

1. Site soils - There is an abundance of clayey silt material, both in the topsoils and alluvium soils which underlie the majority of the site, which can be used to form an effective compacted soil seepage control lining.

2. Seepage Control Lining Requirements - To expedite lining construction, the liner thickness should not exceed one (1) foot. To meet reasonable water requirement limitations based on economics and conservation, the lining permeability coefficient should be on the order of 10^{-8} cm/sec. Selected site soils can be treated as per the following procedures to meet this requirement.

3. Soils selected for stockpiling shall be approved by the Site Soils Engineer. The select soils, which shall be free of organic debris, shall be stockpiled under the direction of the Site Soils Engineer during the lake excavation and site grading.

4. The side slope of the lake shall be fine graded to a 10:1 side slope away from the concrete lake edge. The side slope and bottom should be at finished grade minus one (1.0) foot to allow for the final twelve (12) inches of approved soil liner. Deposits of sand, gravel or rocks should be removed to a depth of one (1) foot and replaced with approved site soil to the approval of the Site Soils engineer.

5. Spread enough approved soil over the entire surface of bottom and side slopes of the lake to achieve a 6" layer after the compaction procedure of item 6 below has been followed.

6. The treated soil layer shall immediately be compacted to at least 95% relative density by ASTM Method D-698-70 to a depth of six (6) inches. The method of compacting is at the discretion of the contractor. All work shall be to the satisfaction of the Site Soils Engineer.

7. The second layer of seepage control lining shall be spread over the previously compacted layer. Enough soils shall be added to achieve a minimum six (6) inch layer of compacted soil. The top layer shall remain loose until concrete underwater slope protection is installed.

8. The concrete underwater slope protection layer shall be constructed as per Section 2770.3 - D.

9. The final layer of the seepage control liner shall be treated and compacted as per item 6 above.

10. The select soil lining shall be kept moist to prevent surface cracking until the lake bottom is flooded, and thereafter shall be kept covered with water to a depth of six (6) inches until the lake can be filled.

Filling of the lake shall begin as soon as possible after compaction is completed. The filling water shall be added carefully to avoid erosion of the soil liner.

D. CONCRETE UNDERWATER SLOPE PROTECTION

The concrete underwater slope protection layer indicated on the plans and details shall conform to the following:

1. The full 12" depth of seepage control lining shall be installed at the appropriate elevations as subgrade per Section C above.

2. The concrete slope protection layer shall be a cast in place 5" slab with 6" x 6" - W2.9 x W2.9 welded wire fabric.

3. Concrete shall be Class B 3000 PSI.

4. Control joints shall be spaced no farther apart than 10'. A building paper joint shall be constructed between the freeform lake edge and the concrete underwater slope protection layer.

5. Expansion joints shall be spaced no farther apart than 100'. Joint material shall be an asphalt joint material conforming to ASTM D994.

6. Maximum continuous single pour length shall not exceed 50'. Each 50' long pour shall be allowed to cure for a minimum of 24 hours before a contiguous pour may start.

7. The concrete underwater slope protection area shall be kept moist to minimize cracking until the lake is filled.

E. RECORD PRINTS

1. Maintain one record set of black and white prints of the lake system in good condition at the site. Mark on them the exact lake arrangement including locations of all valves and other equipment. Locations shall be shown by the triangular system of measurements from easily identified permanent features.

2. On or before the date of the final inspection, deliver one set of transparency prints and two sets of blueline prints to the Town of Gilbert. The delivery of the prints shall not relieve the Contractor of the responsibility of furnishing required information that may have been omitted from the prints.

F. LAKE FILLING

1. The lake shall be filled as soon as possible after the bottom lining and slope stabilization processes are completed. The lake contractor shall be responsible for keeping the lining moist as required.

2. The lake may be filled with temporary pipe lines after approval of method and system by the Engineer.

3. The lake contractor is responsible for filling the lake without erosion of the side slopes or bottom. All equipment or materials required shall be furnished by the lake contractor.

4. All water required for filling will be furnished by the Town of Gilbert as required.

G. LAKE SYSTEM GUARANTEE

1. The entire lake system shall be unconditionally guaranteed by the Contractor as to material and workmanship, including mechanical and settling of backfilled areas below grade for a period of one year following the date of final acceptance of the work.

   a. If, within one year from the date of completion, settlement occurs and adjustments in pipes, valves, sod or paving is necessary to bring the system, sod or paving to the proper level of the permanent grades, the Contractor, as part of the work under his contract, shall make all adjustments without extra cost to the Town of Gilbert, including the complete restoration of all damaged planting, paving, or other improvements of any kind.

   b. Should any operational difficulties in connection with the lake system develop within the specified guarantee period which in the opinion of the Town of Gilbert may be due to inferior materials or workmanship, said difficulties shall be corrected immediately at no additional cost to the Town of Gilbert, including any and all other damage caused by such defects.

H. SERVICE BY THE CONTRACTOR

The Contractor shall service the system at the Town of Gilbert's request during the guarantee period and shall be paid for work performed which is not covered by the guarantee. If requested, by the Town of Gilbert, the Contractor will furnish a Schedule of Service Fees.

SECTION 9900 - PAINTING

9900.1 GENERAL

Work under this section consists of painting of piping and equipment at the pump station.

9900.2 ACCEPTABLE MANUFACTURERS

For the purpose of this specification, proprietary brands of paint and paint materials shall be construed to mean paint or paint materials conforming to the requirements of this specification and produced for distribution and consumption through regular wholesale and retail outlets. Whenever paint or paint materials are designated on the plans or special provision by a manufacturer's name or catalog reference, any proprietary brand of equal quality will be permitted, subject to the approval of the Engineer. Information required by the Engineer as proof of the comparative quality shall be furnished by the Contractor.

9900.3 MATERIALS

Coating materials listed under "Coating System" are manufactured by Tnemec Company, except as indicated otherwise. Coatings are applied at the dry film thickness (dft) in microns per coat noted.

Paints shall be ready-mixed except field catalyzed coatings. Pigments shall be fully ground maintaining soft paste consistency, capable of readily and uniformly dispersing to complete homogeneous mixture. Paints shall have good flowing and brushing properties and be capable of drying or curing free of streaks or sags.

Coating systems shall be as follows:

1. System A:

    a. Prime coat on bare steel and touch-up on primed steel: "37 Chem-Prime" alkyd phenolic primer, 50 to 76 dft.
    b. First coat: "23 Enduratone " alkyd enamel, 38 to 76 dft.
    c. Second Coat: "23 Enduratone " alkyd enamel, 38 to 76 dft.
    d. Use: Exterior steel surfaces.

2. System B:

    a. Filler coat: "54-560 Masonry Filler" epoxy, 700 dft
    b. Seal coat: "51-792 PVA Sealer" vinyl-acrylic, 25 to 50 dft.
    c. First coat: "23 Enduratone " alkyd enamel, 38 to 76 dft.
    d. Second Coat: "23 Enduratone " alkyd enamel, 38 to 76 dft.
    e. Use: Concrete masonry surfaces.

3. System C:

    a. Touch-up: "62-1211 Epoxoline Primer," 76 to 127 dft.
    b. First coat: "71 Endura-Shield" aliphatic polyurethane, 38 to 63 dft.
    c. Use: Shop finished equipment with epoxy coat.

9900.4 SURFACE INSPECTION

Thoroughly examine surfaces scheduled to be painted prior to commencement of Work. Report in writing to Engineer any condition that may potentially affect proper application. Do not commence until such defects have been corrected.

Correct defects and deficiencies in surfaces which may adversely affect work of this Section.

9900.5 PROTECTION

Adequately protect other surfaces from paint and damage.

Furnish sufficient drop cloths, shields, and protective equipment to prevent spray or droppings from fouling surfaces not being painted and in particular, surfaces within storage and preparation area.

Place cotton waste, cloths, and material which may constitute a fire hazard in closed metal containers and remove daily from Site.

Protect electrical plates, nameplates, surface hardware, fittings, and fastenings, prior to painting operations. Do not use solvent to clean hardware that may remove permanent lacquer finish.

9900.6 PREPARATION OF SURFACES

Provide surface preparation, materials, equipment, and labor for painting specified.

Apply coating materials and finishes to surfaces of new exposed Work, except surfaces specifically excluded hereinafter.

Prime unprimed field-fabricated material in manner specified in this Section.

Touch up factory-applied and other completed finishes using methods and materials which produce repaired surface closely matching original finish.

Remove rough areas of structural steel using grinder or other applicable power tools to smooth rough areas on structural steel resulting from cutting and welding.

Determine compatibility of primers with paints to be applied over them. If priming, undercoating, or finish coating specified does not conform in every way to recommendations of manufacturers, prepare schedule of recommended coatings and submit to Engineer for review. Any resulting changes shall be made at no additional cost to Owner.

Surface preparation shall conform to recommendations of paint manufacturer and these Specifications to ensure satisfactory performance of each coating system.

Surfaces, before painting and between coats, shall be dry, smooth and free from dust, rust, loose mill scale, grease, grit, and frost. Wire brushing shall be used only to remove loose dirt.

Iron and steel surfaces:

1. Cleaning methods: Conform to applicable requirements of Steel Structures Painting Council:

   a. Solvent cleaning: SSPC-SP1.
   b. Power tool cleaning: SSPC-SP3.
   c. Commercial blast cleaning: SSPC-SP6.

2. Blast cleaning requirements: Nonsubmerged; SSPC-SP6.

3. Cleaning for other field painting: SSPC-SP3.

4. Removal of materials such as grease and oil: SSPC-SP1.

5. Surface irregularities from blasting shall be approximately 30% of total paint system dry micron thickness.

Masonry surfaces:

1. Curing time: Minimum 60 days. Surface moisture must conform to requirements listed hereinafter.

2. Patch cracks and holes with mortar or patching compound.

3. Remove chalk, dust, dirt, and efflorescence by scraping and brushing.

9900.7 APPLICATION

Apply each coat at proper consistency. Materials shall be evenly spread and applied smoothly without runs or sags, by skilled workers. Do painting under conditions suitable to production of best quality work. Follow manufacturer's directions on container label.

Each coat of paint is to be slightly darker than preceding coat unless otherwise approved by Engineer.

Do not apply finishes on surfaces that are not sufficiently dry. Allow each coat of finish to dry before following coat is applied, unless directed otherwise by manufacturer.

9900.8 WORK EXCLUDED

The following materials, items, and areas shall not be painted under this Contract, unless specifically indicated in "Painting Schedule."

1. Surfaces of glass, chrome-plating, rubber, stainless steel, brass, bronze, copper, aluminum, fiberglass, plastic, and galvanized metal.

2. Lighting fixtures, electrical cabinets, control panels, transformers, and panel boards.

3. Surfaces of concrete.

4. Switchplates, nameplates, and finish hardware.

5. Lubrication fittings, valve stems, and shafting.

6. Contact surfaces of moving parts and machined surfaces of equipment.

7. Piping underground or embedded in concrete.

8. Factory prefinished equipment except touch-up or as noted.

9900.9 PAINTING SCHEDULE

Apply specified coatings to items indicated in schedule below:

Item	System
Structural and miscellaneous steel	A
Piping and equipment	A or C
Concrete block	B

9900.10 PAYMENT

Payment for preparation of surfaces, shop prime coat and field touch-up coats on structural steel and miscellaneous metal items shall be considered as included in price for pump station. Payment for second and finish coats on structural steel or miscellaneous metal items shall be considered as included in payments for the structures, except that payment for cleaning all painting on miscellaneous metal items shall be considered as included in price for item when a separate price therefor is included in proposal.

Full compensation for preparing surfaces and for painting machinery, galvanized metal, guard rails and wood shall be considered as included in various prices paid for contract items or work and no separate payment for such work will be made.

SECTION 11208 - STILL WELL

11208.1 GENERAL

Furnish and install still well as detailed on the plans.

11208.2 PAYMENT

Payment for still well will be paid for on a lump sum basis or at contract unit price as stipulated in the proposal. Such price shall include all labor, materials, tools and equipment necessary for installation of still well.

DIVISION 11 - EQUIPMENT

SECTION 11209 - SLIDE GATES

11209.1 GENERAL

The slide gates, where shown on the plans shall be self-contained, rising stem with the guides designed to mount to the face of the concrete.

The guides shall be of extruded aluminum incorporating a dual slot design. The primary slot shall accept the plate of the disc and the secondary slot shall be sufficiently wide to accept the reinforcing ribs of the disc. The guides shall be designed for maximum rigidity, and shall be provided with keyways to lock it into the concrete. The invert of the frame shall be an angle welded to the lower ends of the guides to form a seating surface for resilient seal mounted on the disc.

The guides shall extend above the operating level and shall be sufficiently strong so that no further reinforcing shall be required. The yoke to support the operating bench-stand shall be formed by two angles or channels welded at the top of the guides to provide a one-piece rigid frame. The arrangement of the yoke shall be such that the disc and the stem can be removed without disconnecting the yoke. The design of the yoke shall limit its deflection to 1/360 of its span under full operating load.

The disc shall be of aluminum plate reinforced with aluminum extrusions welded to the plate. The disc shall not deflect more than 1/360 of the span of the gate under the design head. Reinforcing ribs shall extend into the guides so that they overlap the seating surface of the guide. A specially molded resilient seal shall be mounted on the bottom of the disc to provide flush-bottom closure. The shape of the seal shall have a minimum seating surface width of 3/4". The seal shall extend into the secondary slot of the guide. The vertical face of the seal shall be in contact with the seating surface of the guide to provide a proper seal at the corners.

Operation of the gate shall be by means of a handwheel or crank operated benchstand mounted on the yoke of the gate. The operating stem shall be Type 303 or Type 304 stainless steel designed to have an L/r of less than 200 and to withstand in compression at least twice the rated output of the benchstand. The stem shall be connected to the disc by means of a cast aluminum stem connector bolted to the stem and welded to the disc.

All necessary attaching bolts and anchor bolts shall be stainless steel and furnished by the slide gate manufacturer.

Gates shall be as manufactured by Rodney Hunt Series 760; Waterman Model AR-5, or equal.

GATE SCHEDULE

Location	Gate Height	Gate Width	Invert Elevation	Operator Elevation
Pump Station	48"	24"	1,264'-9"	1,276'-0"
Pump Station	42"	42"	1,264'-9"	1,276'-0"
Gate Structure	42"	30"	1,265'-6"	1,276'-0"
Gate Structure	54"	54"	1,265'-6"	1,276'-0"

11209.2 PAYMENT

No separate pay item shall be contained in the proposal for slide gates. Payment shall be included in bid price for structure for which they are a part.

SECTION 11210 - PUMPS

11210.1 GENERAL

Furnish, install, and test all pumps as indicated on the Plans, or as specified herein. Pumps will be installed at an elevation of approximately 1,250 feet above sea level.

Each pump shall be furnished as a complete, ready-to-install unit by a single supplier, including but not limited to pump, motor, and mountings.

Pumps that have mechanical defects or do not meet the range of head-capacity characteristics, horsepower, and efficiency requirements after testing, shall be replaced without additional cost to the Owner for furnishing, removal, reinstallation, and retesting. Mechanical defects shall include excessive vibration, improper balancing of any rotating parts, improper tolerances, binding, excessive bearing heating, defective materials, improper fitting of parts, and any other defect which will in time damage the pump or unreasonably impair the efficiency of the pump.

11210.2 SUBMITTALS

Submit sufficient literature, detailed specifications, and drawings indicating dimensions, make, style, speed, size, type, horsepower, full-load amps, head-capacity, efficiency, NPSH curves, materials of construction, design features, weights, and any other information required.

Any bronze used in the manufacture of any pump shall not contain more than 2 percent aluminum nor more than 6 percent zinc.

Before installation, Contractor shall furnish three sets of installation instructions and three sets of lubrication instructions for each type of pump. Instructions shall include details for adjustment and recommendations for the proper type of lubricant.

11210.3 MOTORS

Motors shall be in accordance with the provisions of DIVISION 16 in addition to the following provisions and characteristics specified hereafter.

Motors, as furnished and installed, shall be of sufficient horsepower rating so that the rated horsepower and full-load amps will not be exceeded at any point on the pump curve within the specified operating range of the pump. The operating range shall be that part of the pump curve within the limits specified.

11210.4 TESTS

Each pump shall be factory tested and certified performance curves and other required data shall be submitted to the Engineer for approval before the pump is delivered to the job site. Contractor shall furnish all manpower, facilities, power, and equipment required for making tests. Tests shall be conducted in accordance with the latest requirements of the Hydraulic Institute Standards.

11210.5 VERTICAL TURBINE PUMPS

Contractor shall furnish and install two, multi-stage, vertical, oil-lubricated, turbine pumps to supply the irrigation water system. Each unit shall include a bowl assembly, strainer, column and enclosed line shaft, discharge head, and a driver as specified.

Pumps shall be manufactured by Fairbanks-Morse, Worthington, Cascade, Aurora, or equal.

Each pump shall be rated for 450 gpm, and shall produce at 200 total pump head including velocity head losses at the pump discharge. Each pump shall be capable of pumping 300 gpm minimum at 245' total pump head. Each pump shall be capable of operating continuously at a total pump head of 150'. Sump floor is at 1,237' elevation and the minimum sump water level occurs at 1,244' elevation. Pump discharge centerline shall be at 1274'-6" elevation. Maximum pump speed shall not exceed 1800 RPM. Minimum efficiency at rated operating point shall be 80%. Motor horsepower shall not be exceeded over full range of pump operation.

Pump bowls shall be of close grained cast iron having a minimum tensile strength of 30,000 pounds per square inch, free from blow holes, sand holes, and all other faults; accurately machined and fitted to close dimensions.

Impeller shaft shall be of stainless steel of not less than 12% chrome content and shall be supported by bronze bearings located on both sides of each impeller.

Impellers shall be of the enclosed type and shall be of bronze construction, accurately fitted and balanced. They shall be locked securely to the impeller shaft with a tapered lock bushing. The bowls and impellers shall be designed with smooth passages to assure efficient operation. The impellers shall be adjustable by means of a top shaft adjusting nut.

The total length of the discharge column shall be as shown on drawings. The column pipe shall be not less than 6 inches inside diameter. The pipe shall be furnished in interchangeable sections not over twenty feet in length, and shall be connected with threaded, sleeve-type couplings. Joints shall be butted to insure perfect column alignment after assembly.

Lineshafting shall be of ample size to operate the pump without distortion or vibration. The shafts shall be furnished in interchangeable sections not over

twenty feet in length, and shall be coupled with extra-strong threaded steel couplings machined from solid bar steel.

An enclosing tube shall be provided to house the drive shaft. It shall be of extra-strong pipe furnished in interchangeable sections not to exceed five feet in length and with ends machined to receive bronze connector bearings. A suitable oiler and oil reservoir shall be provided at the pump head to provide proper lubrication for the bearings when pump is in operation.

A suitable base of high grade cast iron or fabricated steel shall be provided for mounting the motor and with discharge elbow having above-ground flanked discharge outlet for 6 inch standard pipe.

Pump components shall be made from the following materials:

Part Name	Material	Specification
Shaft coupling	Steel	ASTM A108 12L14
Pump Shaft	Stainless Steel	AISI A582 416
Bowl Bearings	Bronze	ASTM B505 ALLOY 932
Bowls	Cast Iron	ASTM A48 CLASS 30
Bowl Wear Ring	Bronze	ASTM B505 ALLOY 932
Impeller	Bronze	ASTM B584 ALLOY 836
Impeller Lock Collet	Steel	ASTM A108 GRADE 12L14
Suction Case	Cast Iron	ASTM A48 CLASS 30
Suction Case Bearing	Bronze	ASTM B505 ALLOY 932
Connector Bearing	Bronze	ASTM B505 ALLOY 932
Discharge Case	Cast Iron	ASTM A48 CLASS 30
Line Shaft Coupling	Steel	ASTM A108 12L14
Line Shaft	Steel	AISI 1045
Enclosed Line Shaft Connector Bearing	Bronze	ASTM B505 ALLOY 932
Shaft Enclosing Tube	Steel	ASTM A120
Column Pipe	Steel	ASTM A120
Column Flange	Steel	ASTM A283 GR.D
Top Shaft Adjusting Nut	Steel	ASTM A108 GRADE 12L14
Discharge Head	Steel	ASTM A283 GRADE D AND ASTM A120
Top Shaft	Steel	AISI 1045
Top Column	Steel	ASTM A120
Top Shaft Coupling	Steel	ASTM A108 12L14
Top Enclosing Tube	Steel	ASTM A120 SCHED 80

11210.6 VERTICAL PROPELLER PUMPS

Contractor shall furnish and install two vertical, oil-lubricated, propeller pumps for pumping floor water. Each unit shall include a bowl assembly, strainer, column and enclosed line shaft, above ground discharge head, and a drive as specified.

Pumps shall be as manufactured by Fairbanks Morse, Worthington, American Turbine, Cascade, Aurora, or equal.

Each pump shall be rated for 2,500 gpm, and shall produce 30' total pump head including velocity head losses at the pump discharge. Sump floor is at 1,237' elevation with minimum sump water level occurring at 1,244' elevation. Pump discharge centerline shall be at 1,274'-6" elevation. Maximum pump speed

shall not exceed 1,770 rpm. Manufacturer shall certify that pump shall be capable of operating continuously at a total head of 5' and a pump submergence at elevation 1,269' without damage.

Pump bowl shall be flanked, and free from sand and blow holes. The suction bell shall be of the flared inlet type with a grease packed lower bearing. A sand cap shall be provided to prevent entrance of sand into the suction bell bearing.

The unit(s) shall be provided with a strainer.

The discharge bowl shall be provided with a bearing immediately above the propeller and a connector bearing above the diffuser vanes. A discharge bowl bearing bypass shall be provided in the bearing cavity for drainage and pressure relief. The connector bearing shall be externally threaded along its entire length and serve as both a pump shaft support and enclosing tube connector.

Propeller shall be capable of passing a 1 1/2" solid. Vane leading edges shall be rounded to prevent accumulation of fibrous material. Propeller shall be statically and dynamically balanced to limit vibration and supported on both sides by bearings for stability.

Pump shall be supplied with a diffuser cone for connection to the discharge bowl and for connection to the column pipe.

Column shall be threaded, size 10", with butt joint connections. Sleeve type column couplings shall be used to connect the column pieces.

A shaft enclosing tube shall be provided to protect the lineshaft and contain the oil lubricant required for the lineshaft and discharge bowl connector bearing. The enclosing tube shall be of extra-strong pipe, furnished in interchangeable sections of uniform length not exceeding 5 feet. The ends shall be machined and threaded internally to receive bronze connector bearings. The bottom section of the shaft enclosing tube shall be directly connected to the discharge bowl connector bearing. The top enclosing tube shall have external threads and shall be fitted with a tube tensioning nut to maintain tension on the enclosing tube. The lineshaft shall be sized per ANSI-B 58.1 to provide satisfactory operation without undue vibration or distortion, and furnished in sections of uniform length not exceeding 10 feet. The lineshaft shall be coupled with threaded steel shaft coupling machined from solid bar stock.

The discharge shall be above ground. The discharge shall terminate in a flange dimensionally equal to ANSI 25 lb. cast iron flanges with drilled holes except for thickness. The pump mounting plat shall be 25" x 25" to cover an opening which will permit the withdrawal of the complete pump unit. Thickness shall be designed to adequately support the entire pump unit. The above ground discharge head shall have adequate space provided to allow for the maintenance of shaft sealing arrangement.

An enclosing tube adaptor shall be provided to retain packing around the enclosing tube. A tension nut shall be furnished to provide means for tensioning the enclosing tube. A top enclosing tube bearing shall be furnished to function as a bearing and to provide a pipe tap connection for introduction of oil to the enclosing tube connector bearings. Provision shall be made for mounting automatic solenoid, two-quart oiler.

Pump components shall be made from the following materials:

Description	Material	Specification
Diffuser Cone	Steel	A283-GRADE D
Shaft Coupling	Steel	AISI-C1215
Pump Shaft	416 Stainless Steel	A582-416
Discharge Bowl	Cast Iron	A48- CLASS 30
Propeller Lock Nut	Bronze	B147-(865)
Propeller	Bronze	B145-(836)
Propeller Lock Collet	Steel	A108-12L14
Suction Bell	Cast Iron	A48- CLASS 30
Suction Bell Bearing	Bronze	B505-(932)
Connector Bearing	Bronze	B505-(932)
Lineshaft	Steel	AISI-1045
Column Coupling	Steel	A120
Column Pipe (Threaded)	Steel	A120
Lineshaft Sleeve	Stainless Steel	AISI-304
Tapered Bottom Column Pipe	Steel	A283-GRADE D
Enclosing Tube	Steel	A120
Adjusting Nut	Steel	A108-12L14
Packing		GRAPHITE FILLED ASBESTOS
Top Shaft	Steel	AISI-1045
Top Enclosing Tube Bearing	Bronze	A145-(836)
Top Enclosing Tube	Steel	A120
Enclosing Tube Adapter	Cast Iron	A48-CLASS 30
Enclosing Tube Tension Nut	Bronze	B145-(836)
Above Ground Discharge Head	Steel	A283-GRADE D, A120[2]

[1]All material designations are ASTM unless otherwise noted, and are for description of chemistry only.

[2]Flat material shall be ASTM A283 Grade D. Cylindrical material shall be ASTM A120. Rib material shall be ASTM A36.

Pump controls shall be as specified in Division 16.

11210.7 SUBMERSIBLE PUMP

Contractor shall furnish and install, complete in place in operable condition, submersible type well pump. The pump shall be installed as indicated on the Plans, and as specified herein. The pump shall function as the jockey pump for the irrigation system.

The pump shall be as manufactured by Red Jacket, or equal.

Pump shall be rated to deliver not less than 33 GPM at 230' total head, with efficiency not less than 50 percent and speed not more than 3,600 rpm. Pump shall be capable of operation at all points on its curve between 13 gpm and 45 gpm. The pump shall operate over this range without excessive noise or vibration, without exceeding motor horsepower rating, and free of cavitation or any other mechanical defects.

Pump unit shall be designed for intermittent operation of 10 starts per hour without harmful effect.

The pump, with its appurtenances and cable, shall be capable of continuous submergence underwater without loss of watertight integrity to a depth of 60 feet.

Entire pump and motor assembly shall be constructed of corrosion resistant material. All exterior fasteners shall be stainless steel. Pump shaft shall be stainless steel.

The pump motor shall be housed in a watertight motor housing with a removable motor cap for easy access to stator wires, and with a watertight seal between stator lead and motor compartments: The motor shall be NEMA Design for continuous duty. The stator windings shall be furnished with thermal sensors for thermal protection of the motor. These shall be used in conjunction with the supplemental to external motor overload protection, and shall be wired into the control panel.

The motor shall have the following characteristics:

Horsepower - not less than 3
Speed - rpm, maximum 3,600
Volts 208/230
Phase 1
Hertz 60
Service Factor 1.10

11210.8 INSTALLATION

Pumps shall be installed and adjusted as specified and in accordance with the manufacturer's recommendations and in such manner that connecting piping will not impose any strain whatever on pump. Pumps shall be set on level, fully grouted foundations, so that connecting flanges, screwed connections, or flexible connections will meet without strain or distortion.

11210.9 PAYMENT

No separate pay item shall be contained in the proposal for pumps. Payment shall be included in the price bid for the pump station, installed complete in place, as specified in the proposal.

SECTION 11330 - WATER FILTER

11330.1 GENERAL

Contractor shall furnish two water filters designed to remove suspended solids from the water pumped to the irrigation system. The filters shall be automatic self-cleaning while maintaining flow through the units.

The filters shall be as manufactured by Filtomat, Model M306L, or equal.

11330.2 FILTER

Each filter shall be designed for a maximum flow of 660 gpm. Average water flow will be 450 gpm. The maximum pressure drop across a clean screen at maximum flow shall be 3.0 psi.

Filter housing shall be divided into three distinct zones.

1. Removable, chemically inert, single, slotted, PVC cylinder for primary coarse filtration.

2. Removable chemically inert, secondary fine filter consisting of a single perforated PVC cylinder with a 100 micron stainless steel screen.

3. A dirt collector tube with high flow velocity vacuum dirt collector nozzles, O-ring mounted in separator plate dividing filtration and drain areas of filter.

The filter shall automatically clean itself when the differential pressure across the secondary fine filter increases to the preset maximum value. Cleaning shall be accomplished by hydraulic valves which shall allow previously filtered water to briefly backflush the stainless steel screen and discharge dirty water through drain opening.

During cleaning operation, 100% of surface area of secondary filtration screen shall be vacuum cleaned.

Collector tube with dirt collector nozzles shall rotate in overlapping pattern, removing dirt from all screen surfaces. Dirty backflush water shall be drawn through the collector nozzles/collector tube and ejected from filter through drain valves.

Entire secondary screen cleaning process shall last 5-15 seconds while filter remains on stream.

Each unit shall be self-powered and shall not require any external utility (electric, compressed air, water, etc.) for operation. Initiation of the cleaning cycle shall be field adjustable.

Construction of the filter shall be as follows:

Inlet/outlet connections	6" flanges
Inlet/outlet configuration	Inline
Drain connection	(2) 2" NPT
Maximum inlet pressure	150 PSIG
Minimum inlet pressure	30 PSIG
Pressure drop at normal flow	2 PSI
Maximum temperature	149 degrees F
Rinse flow at 30-150 PSIG	60 GPM
Rinse duration	13 seconds
Effective screen area	3.3 sq. ft. (minimum)
Screen openings	100 micron

11330.3 PAYMENT

No separate pay item shall be contained in the proposal for water filters. Payment shall be included in the price bid for the pump station, installed complete in place, as specified in the proposal.

SECTION 11350 - AERATION SYSTEM

11350.1 GENERAL

There shall be furnished a complete sub-surface static tube aeration system comprised of thermoplastic, 304 stainless steel and concrete materials of construction. All thermoplastic components shall have carbon black incorporated in the base resin to prevent damage from exposure to direct sunlight.

The system shall consist of static tubes, static tube support legs, nuts, bolts, washers, concrete bases, adjusting and tie-down mechanisms, aeration pipe laterals and required operating blower systems. The entire system of aerators, sub-surface piping and pre-packaged blower shall be manufactured and assembled by a single manufacturer.

System shall be as manufactured by Semblex, or equal.

11350.2 STATIC TUBE AERATOR

The static tube shall be constructed of high density polyethylene and shall be 12 inches in diameter, 30 inches in height and have a minimum wall thickness of .250 inches. The wall of the static tube shall be one piece construction made from polyethylene pipe, SDR 32.5 PE 3408. Each static tube shall contain polyethylene diffuser membranes of the design that generates maximum air bubble formation and fluid mixing and providing clog-free high rate air-lift pumping. These membranes shall be permanently affixed to the static tube by non-corrosive connectors. Sub-surface aerators that have moving parts, shall not be used.

11350.3 STATIC TUBE SUPPORT

The static tube shall be supported by and held firmly in-place by four 304 stainless steel support legs, minimum 12 gauge. Each support leg shall be attached to the static tube by two stainless steel nuts, bolts, washers and stainless back-up plates.

The static tube/support leg assembly shall be embedded into a reinforced concrete base. The concrete base shall be adequately sized to firmly anchor the static tube and supply air piping on the bottom of the lake when the system is operating.

11350.4 AIR PIPING

Submerged air piping shall be provided by the equipment supplier and shall be constructed of ultraviolet stabilized polyethylene pipe, PE 3408. The piping system shall be as shown on the drawings. The manufacturer shall design the diameter of the piping and the air discharge orifices to provide a uniform flow of air (±10%) to all aerators.

The submerged air piping shall be secured in-place, by adjustable assemblies below each aerator, supplied by the static aerator manufacturer. The assembly shall be constructed of non-corrosive material. The aeration pipe anchors shall allow for precise vertical adjustment to insure equal static head at all air discharge orifices.

Air piping shall be buried except as required at each aerator and blower. Minimum depth of bury shall be 1' - 6". Exposed air piping subject to high

temperatures shall be insulated and/or shielded to protect against injury. Insulation shall be suitable for outdoor service.

11350.5 AIR DISCHARGE ORIFICES

Air discharge orifices shall be drilled in the bottom of the air manifolding and located directly under each static tube. Exact size of orifices shall be as indicated by the aerator manufacturer.

Manufacturer shall provide complete pressure drop calculations for the entire system, including all blower accessories, main air header, aeration laterals, orifice and static water head. The manufacturer shall ensure that the blower discharge pressure is adequate for the overall system operation.

11350.6 AERATION BLOWER

Provide 1 rotary, positive displacement blower, having a capacity of 180 scfm, measured at 14.7 psig and 70 degrees F standard conditions. Discharge pressure shall be determined by the manufacturer but shall not be less than 11.0 psig. Site elevation is 1270 feet above sea level, inlet temperature range is 120°F to 10°F. Blower shall be sized so that capacity is no greater than 75% of manufacturer's recommended maximum capacity.

The blower shall be constructed as follows:

Housing:	Cast iron
End Plates:	Cast iron
End Covers:	Aluminum at free end; cast iron at gear end
Rotors:	Three lobe, ductile iron
Shafts:	Ductile iron, cast integrally with rotor
Gears:	Heat treated alloy steel; helical matched
Seals:	Lip type
Lubrication:	Oil splash system; both ends

All components listed in this section, shall be mounted and piped on a common structural base by the blower equipment supplier.

Motor shall be of size as required, 1800 rpm, TEFC, 230/460 V., 3 Ph., 60 hz., normal torque, induction motor, with suitable slide bases.

Inlet Filter: Provide dry type inlet filter/silencer complete with weather hood and filter restriction indicator.

Silencer: Provide multi-chamber silencer (with acoustical packing) on discharge.

Piping: Inlet and discharge piping shall be factory supplied from inlet filter to discharge silencer and include in order, the inlet filter, flexible connector, blower, flexible connector, pressure relief valve, pressure gauge, discharge silencer, and check valve.

Check Valve: Blower shall be protected from reverse air flow by a tight shut-off reverse air flow check valve of the split-disc type.

Pressure Relief Valve: Blower shall be protected by a discharge relief valve of the stacked weight type.

V-Belt Drive: Blower shall have a V-belt drive designed with a 1.5 service factor, and a suitable OSHA safety guard.

Vibration Isolation Pads: Vibration isolation pads shall be supplied with blower skid of the sandwiched cork and rubber type.

Flexible joints: Provide slip-on flexible connectors on inlet and outlet, with wire re-enforcing and suitable for design pressure at 300 degrees F.

Gages: Blower shall have a 0-15 psig liquid filled dial type pressure gauge and 50-400 degrees dial type temperature gauge with capillary and separable socket well. Each shall be connected to the discharge piping, have a dial size 2 1/2 inches and installed on the blower panel.

High Air Temperature Switch: The switch shall be mounted in the discharge piping of blower. Switch to be set at 300 degrees F and shall shut-down blower motor in the event of excess discharge temperature.

Inlet Filter Restriction Indicator: Vacuum gauge or other suitable device shall be supplied and mounted, for sensing of inlet vacuum and blinding of filter medium.

Spare Parts: Two replacement filters and one set extra V-belts.

Shop Primer: Apply one coat Tnemec 37-77 Chemprime prior to shipment. Blowers, motors, and accessories may be shipped with manufacturer's standard enamel finish coat.

11350.7 START-UP

The equipment supplier shall provide the services of a factory trained service engineer to check-out and start up the blower and to insure satisfactory installation and leveling of the aeration system.

11350.8 PAYMENT

Contract price shall include all labor materials, tools, and equipment for performing work for installing aeration system as specified in the proposal.

SECTION 11395 - PRESSURE TANK AND CONTROLS

11395.1 GENERAL

Furnish materials, equipment, tools, and labor required for a complete and workable pressure tank system installation with piping connections, fittings, accessories, and controls specified and as shown on plans. System shall be designed for outdoor installation at project site.

11395.2 HYDROPNEUMATIC TANK

Provide a welded steel pressure tank complete with all piping connections, fittings, and welded steel support cradles as shown for installation at the pump station.

Tank dimensions shall be 5'-0" (approximate) diameter by manufacturer's standard straight side length, with standard dished heads. Capacity shall be 2,200 gallons minimum. Tank shall fit in space available as shown on drawings.

Test pressure shall be 150 psig.

All construction shall be in accordance with, and tank shall bear stamp of, ASME "Boiler and Pressure Vessel Code for Unfired Pressure Vessels."

Accessories shall include:

1. Air pressure relief valve: 1" size set to relieve at 105 psig.

2. Pressure gage with 0 - 150 psi range and nominal 4-1/2" dial.

3. Provide access manhole; minimum size of 16" x 11".

4. Provide water column gage with cleanouts and valves; Ernst Gage Co., Fig. L250, Eugene Ernst Product Co. Model EEP 3, or equal. Provide 4'-0" gage length to indicate water levels below high level probe.

Tank exterior shall be sandblasted to a commercial grade finish (SSPC SP-6) and given 1 shop coat of Tnemec "66-1211 Epoxoline Primer" or equal epoxy primer, 4.0 mils dry film thickness. Tank interior shall be sandblasted to near-white blast cleaning finish (SSPC SP-10) and given 4 shop coats of Tnemec "413 Hi-Build Tneme-Tar" or equal coal tar epoxy, 32 mils dry film thickness. Field painting shall be as specified in Section 09900.

Tank shall be provided with connections as follows:

1. Inlet: 6" flanked.

2. Water column (2 taps): 1" NPT.

3. Air inlet and outlet (1 tap): 1" NPT.

4. Drain: 2" NPT.

5. Connections as required for tank water level sensor.

6. Connections as required for pneumatic pump control system.

7. Air pressure relief: 1" NPT.

11395.3 CONTROLS

Furnish and install a complete automatic control system for operating 2 irrigation water pumps, jockey pump, and compressed air system based on pressure and water level in tank. Control panel layout and schematic wiring shall be as shown on Drawings. Basic unit, including autosensory devices, shall be purchased in package from 1 manufacturer and wall-mounted near tank.

Controls shall start jockey pump when pressure in tank drops to 80 psig. Lead irrigation pump shall start when pressure drops to 65 psig. Standby irrigation pump shall start when pressure drops to 60 psig. Lead/standby shall be stopped at high water level in pressure tank by probe-operated switch. High water level shall be at 30% of tank volume. Jockey pump shall also be stopped when either irrigation pump is running.

At high tank water level, control shall automatically balance air pressure by operating "aid-add" solenoid valve, if pressure in tank is less than 90 psig or "air-expel" solenoid valve if pressure is greater than 95 psig. If tank pressure ever reaches 95 psig the "air-expel" solenoid valve shall open.

All pumps shall shutdown with low water level at pump suction, and not be allowed to restart automatically.

Each irrigation pump and the jockey pump shall be provided with "JOG-OFF-AUTO" switches and controls when "AUTO" is selected. Pumps shall operate when required based on controls as previously discussed.

11395.4 CONTROL SPECIFICATIONS

Water level switches shall be a floatless-type conductive switch consisting of induction relay and probe assembly. Probe assembly shall be suitable for flange mounting on side of tank. Probe material shall be 316 stainless steel. Probe shall ignore condensation and humidity effects. Induction relay shall be suitable for mounting in the control panel and be of high-sensitivity, solid-state design. Induction relay shall operate on primary 120-volt, ac, 60 Hz power. Secondary coil shall be suitable for operation with irrigation water. Load contact rating shall be 10 amperes at 120 volts ac. Manufacturer shall be B/W Controls, Inc. with Series 52 solid-state relay, with 316 stainless steel probe suitable for flange mounting, or equal.

Pressure indicator shall be tank mounted, 4-1/2" dial-type, solid front with 1/2" NPT connection. Pressure tap shall be prepiped to a bulkhead fitting for field connection. Fitting shall be located for bottom entry. Pressure gage range shall be 0 - 160 psig. Manufacturer shall be Ashcroft Series 1279, or equal.

Control panel shall be NEMA 4 construction, size suitable to house controls as required to provide a complete operable system.

Power and 120-volt ac control wiring shall be 12 AWG stranded copper with MTW insulation. Wire shall be looped in such a manner that any item can be removed without interrupting power of circuit. Use spade lugs where applicable. Wire insulation color codes shall be as follows:

1. 120-volt ac supply: Black.
2. 120-volt ac control: Red.
3. Neutrals: White.
4. Grounds: Green.

Terminal strips shall be Buchannan 600-volt nylon sectional, Catalog No. 0725, with tubular clamp contact, or equal. Wireway and adequate terminals shall be provided for field wiring; 20% spare terminals shall be provided for associated external interlocks and alarms. Group terminals for outgoing cables in a logical manner in accordance with type and destination.

Both ends of wires shall be identified with permanent wire markers. Wire markers shall be embossed heat shrink tubing; color, white.

Wiring shall be installed in accordance with applicable provisions of National Electric Code.

Each internally-mounted component shall be clearly identified by nameplate adjacent to mounted unit.

Selector switches for equipment control shall be oiltight operator with standard operating lever. Number of positions and contacts as dictated by design. Suitable for mounting on panel front and for 120-volt ac operation; Allen-Bradley Type 800T, or equal.

Auxiliary relays (if required):

1. Relays shall be Allen-Bradley Series 700, or equal.

2. Contact arrangement and current carrying capabilities as dictated by design.

3. Complete with mounting hardware and wiring accessories.

Nameplates:

1. Provide permanent nameplates for devices mounted on or within panels. Plastic tape labeling of interior devices is not acceptable.

2. Type: White, laminated engraving stock with black core.

3. Size: As required; sizes of nameplates for similar devices shall be identical.

4. Attach nameplates with heat-resistant, waterproof adhesive.

Painting:

1. Manufacturer's standard interior and exterior paint shall be acceptable as a primer coat.

2. Prepare exterior surface for finish coat of paint as required.

3. Exterior surfaces shall be painted with satin finish tinted to slate gray color.

4. For final coat, gloss shall be between 10 and 15° glossmeter.

5. Paints shall be spray-applied to produce a smooth uniform coat, free of defects. Steel Structures Painting Council PA-1 shall apply.

6. Each coat shall be properly cured according to manufacturer's instructions before application of succeeding coats.

Solenoid Valves:

1. Packless-type suitable for air service used on "Air-Add" and "Air-Expel" circuit.

2. 1/2" NPT bodies, connections conforming to ANSI B2.1 Coils shall be Class A molded.

3. Performance requirements:

   a. Coil voltage: 120 volts, ac.
   b. Minimum operating pressure: 0 psig.
   c. Maximum operating pressure: 125 psig.

4. Materials of construction:

   a. Body: Brass.
   b. Discs and seals: Buna-N.
   c. Core tube, core, plug nut: Stainless steel.
   d. Shading coil: Copper.
   e. Enclosure: Conforming to NEMA 4.

5. Two-way valve, normally-closed: Valve shall direct air to service when energized, or relieve pressure as required.

Pressure Switches:

1. Pressure switches shall be diaphragm, bellows, or piton actuated as applicable. Pressure switches shall be suitable for low, medium, or high pressures.
   a. Switch type: Up to 3 SPDT snap switches as required for service.
   b. Switch rating: 15 amperes, 120 volts, 60 Hz, noninductive.
   c. Construction:
      1) Housing: Die-cast aluminum.
      2) Sensor: As applicable.
      3) Set point adjustment: Internal.
   d. Manufacturer and model number: United Electric Controls Company, Series 400, or equal.

11395.5 AIR COMPRESSOR

Provide an air compressor to maintain the proper air-to-water ratio in the pressure tank. The unit shall be reciprocating, air-cooled, automatic, loadless starting, horizontal, tank-mounted, and pressure lubricated.

Compressor capacity shall be 5 cfm free air, minimum. Pressure range shall be 120 - 150 psig, controlled by an automatic pressure switch. Crankcase shall be totally-enclosed and dustproof with an automatic breather valve. Unit shall be complete with V-belt drive, belt guard, and intake filter.

Compressor shall be engineered and designed as a complete functioning unit with prewired control panel containing motor starter, control transformer, indicating lights, and controls as required to provide a complete and operable system.

Motor shall meet the following requirements:

1. Standards: Applicable parts of NEMA MG-1, latest revision.

2. Type: Constant-speed, squirrel cage. Provide grease lubricated ball bearings.

3. Enclosure: TEFC.

4. Starting: Full voltage, across-the-line.

5. Ratings:
   a. Continuous duty.
   b. Voltage: 460 volts, 3-phase, 60 Hz, 1.15 service factor.

6. Insulation and temperature rating: Class B insulation nonoverloading based on 40°C ambient.

Provide manufacturer's standard finish painting system.

Compressor shall be as manufactured by Quincy, Ingersoll-Rand, Gardner-Denver, Worthington, or equal.

SECTION 11480 - ATHLETIC AND RECREATION EQUIPMENT

11480.1 - CONCRETE SLAB, ETC.

The mix designs to be used for the concrete should be submitted to the Engineer for approval a minimum of 7 calendar days prior to placement of concrete. All concrete pavement shall be Type II, high early strength concrete, such that a minimum compressive strength of 4,000 psi is reached within 28 days.

Concrete represented by a strength test of at least 95 percent of the required 28 day compressive strength will be acceptable. All concrete failing to meet this requirement will be rejected unless the Contractor, at his own expense, can submit evidence that will indicate to the Engineer that the strength and quality of the concrete is such that the concrete should be considered acceptable.

If such evidence consists of concrete cores, the Contractor shall obtain three cores from the concrete represented by the failing strength test and deliver them to the Engineer in time to allow complete testing of such cores within 30 days after the placement of the concrete. All cores shall be obtained and tested in accordance with the requirements of AASHTO T 24. All cores will be tested in the wet condition unless, based on the service conditions of the structure, the Engineer decides that they should be tested in other than the wet condition. The concrete represented by the cores will be considered acceptable if the numerical average of the three tests is 95% of the required 28 day compressive strength. If the average compressive strength does not meet this requirement, all concrete so represented shall be removed at the Contractor's expense unless permitted to remain in place by the Engineer. No payment will be made for concrete permitted to remain in place when the average compressive strength of the three cores fails to meet the required 28 day compressive strength.

11480.1.1 - BASIS OF PAYMENT

The accepted quantities of portland cement concrete pavement, measured as provided above, will be paid for at the contract unit price which shall include full payment for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing the pavement complete in place as shown on the plans and specified herein.

Cracked pavement slabs which require repair will be paid for at 80% of the contract unit price for the pavement repaired, as measured between the original longitudinal and transverse pavement joints; abutting the repaired pavement.
When the average length of cores indicated pavement thickness is deficient by more than 0.25 inch but not more than 1.00 inch, payment will be made as specified in Table 1.

Table 1

Core Thickness, Less Than Specified Thickness, Inches	Percent of Contract Unit Price Allowed
0.00 to 0.25	100
0.26 to 0.35	93
0.36 to 0.45	85
0.46 to 0.55	75
0.56 to 0.75	63
0.76 to 1.00	50

Pavement represented by compressive strength tests which do not meet the minimum strength specified will be paid for in accordance with Table 2. All pavement represented by compressive strength tests which do not provide at least 75% of the specified strength shall be removed and replaced unless allowed to remain in place by the Engineer. If allowed to remain in place, no payment will be made for such pavement.

Table 2

Percent of Specified Strength (To Nearest Whole %)	Percent of Contract Unit Price Allowed
Equal to or Greater than 100	100
97-99	92
94-96	85
90-93	77
85-89	68
80-84	60
75-79	50
Less than 75	Remove and Replace or leave in place at no payment

11480.1.2 - CURING AND PROTECTION

This work shall consist of all labor and material required to apply the acrylic curing sealing compound. The compound shall be applied to all exposed concrete surfaces.

The material shall be applied using a sprayer. Application shall conform to the manufacturer's instructions. Maximum application rate shall be 200 square feet per gallon and a minimum rate of 350 square feet per gallon.

The curing compound shall form a continuous unbroken surface.

Acrylic curing and sealing compound shall be CS-309 manufactured by W.R. Meadows, Inc., or approved equal.

Basis of payment shall be considered incidental to the concrete work.

11480.1.3 - CONCRETE SURFACE TEXTURE

Concrete smoothness shall be a light broom finish with the prior approval of the Owner. The Contractor shall pour one 4'x4' section of concrete court as a test section. This test section shall be finished and approved by the Engineer prior to construction.

11480.1.4 - PAVEMENT CRACKS

Cracks penetrating the full depth of the pavement shall be repaired or the cracked pavement shall be removed and replaced, as specified herein, prior to final acceptance.

Within 28 days after concrete placement and prior to acceptance of the work, the Engineer will perform a pavement crack survey. The pavement shall be cleaned prior to the crack survey.

Cracks which are visible without magnification and which require repair and pavement slabs which require replacement will be marked by the Engineer and shall be repaired or replaced by the Contractor as specified, and at no additional cost to the Department.

The Contractor shall provide the Engineer with detailed information concerning the methods and materials to be used for crack repair and the Contractor shall obtain the Engineer's approval of the proposed methods and materials prior to beginning the required repairs.

The Contractor, at his option and expense, may core cracked pavement as approved by the Engineer, to determine the extent of cracking.

11480.1.5 - CRACK REPAIR

Repair of random cracks shall be performed when any of the following types of full-depth pavement cracks occur:

Transverse cracks which at any point are more than 3 inches from transverse joints.

Longitudinal cracks which at any point are within 12 inches of longitudinal joints.

Longitudinal cracks which occur more than 54 inches from longitudinal joints.

Cracks in pavement which are constructed without load transfer dowel assemblies and longitudinal cracks in pavement which is constructed with load transfer dowel assemblies shall be repaired by sawing or routing the cracks to a width of at least 1/2 inch and to a depth of 1 inch and sealing with a grey-colored joint sealant material as approved by the Engineer. Just prior to sealing, each crack shall be thoroughly cleaned of all foreign material and the crack faces shall be clean and surface dry when the seal is applied. When any portion of a repaired crack is within five feet of a non-working sawed joint, the sawed joint shall be filled with epoxy as approved by the Engineer.

Transverse cracks in pavement which is constructed with load transfer dowel assemblies shall be repaired by deepening and immediately adjoining uncracked saw cuts to 1/2 inch above the dowels and pressure injecting an approved grey-colored epoxy into the random crack.

Crack repairs shall begin within seven days after completion of the pavement crack survey and shall be completed within 30 days after the start of repairs.

Payment for pavement slabs which required crack repairs, as specified herein, will be adjusted.

11480.1.6 - PAVEMENT REMOVAL AND REPLACEMENT

Cracks not detailed in Subsection 11480.1.5 shall be repaired by removal and replacement of the portland cement concrete pavement. Cracked pavement shall be removed to the limits established by the Engineer. Cracked pavement will generally require removal of the full width of the slab over a length of at least 6 feet. Excessively cracked pavement areas will require full width pavement removal as directed by the Engineer. Pavement to be removed shall be cut full depth prior to removal.

Base material which is damaged as a result of pavement removal shall be repaired or replaced by the Contractor as approved by the Engineer.

Removed pavement and base material shall be disposed of by the Contractor, as approved by the Engineer.

After removal of cracked pavement, tie bars and dowel bars shall be placed by drilling and grouting at approximately mid-depth in existing concrete pavement.

Replacement concrete shall be placed, finished and cured in accordance with the requirements specified for the original pavement.

11480.2 - CONCRETE CURBS

Concrete sidewalk shall be constructed in conformance with City of Phoenix Standard Detail P-1230, modified to the width (as) shown on the plans.

The subgrade shall be constructed in reasonably close conformity to the lines and grades established or shown on the project plans.

Prior to placing concrete curb, curb and gutter, driveway, valley gutter or sidewalk, the material on which they are to be placed shall be compacted to a depth of at least 6 inches to a density of not less than 95 percent of the maximum density.

All soft or unsuitable material shall be removed to a depth of not less than 6 inches below subgrade and replaced with material approved by the Engineer.

Single curb, curb and gutter, and sidewalk shall be constructed either by the use of conventional fixed forms or by slip-form curb and sidewalk placing machines.

Forms shall be maintained at all times in good condition as to the accuracy of shape, strength, rigidity, and smoothness of surface. The depth of face forms for concrete curbs shall be equal to the full face height of the curb.

All other forms shall be set to form the full depth of all edges not formed by adjacent concrete. Forms unsatisfactory in any respect shall not be used. The exposed edges shall be tooled to a 1/4 inch radius unless a larger radius is indicated on the plans. When concrete placed in curb has set sufficiently so that it will not slump, the front face form shall be removed. The gutter, front face and top of curb shall be troweled smooth and then given a final fine brush finish with brush strokes parallel to the lines of curb and gutter. The exposed edges shall be tooled to a 1/4 inch radius.

Expansion joint filler shall be 1/2 inch bituminous or non-bituminous performed strips.

Expansion joints shall be constructed at tangent points of curb returns, at structures and at a maximum of 60 foot intervals. Expansion joints shall match as nearly as possible the joints in the adjacent pavement vertically and extend full depth beginning 1/2 inch below the surface of the concrete being placed. During the placing and tamping of concrete, the filler shall be restrained in its proper position.

Contraction joints (weakened-plane joints) shall be constructed at a maximum of 10 foot intervals in curb and shall coincide with contraction joints in adjacent pavement or existing concrete curb and sidewalk.
Sawed joints shall be sawed to a depth of 2 inches or 1/3 the thickness of the concrete, whichever is greater.

11480.3 - BASEBALL BACKSTOPS

Little League/Softball backstops shall be 25' wide, 20' wings, 20' high, 6' cantilever top and 2 2"x6" wood kick boards along the bottom inside the backstop and wings.

Babe Ruth League backstops shall be 33' wide, 20' wings, 30' high, 8' cantilever top and 2 2"x6" kick boards along the bottom of the backstop and wings.

11480.4 - 8' and 6' CHAIN LINK FENCING

Chain link fencing shall conform to M.A.G. Specifications Sections 420, 725, 772.

11480.5 - CHAIN LINK BACKSTOPS

The work under this item shall conform to the applicable requirements of the M.A.G. Specifications, Section 420, Chain Link Fences, except as modified herewithin. The wire used in manufacturing the fabric shall be 9 gauge in all cases. The chain link fabric shall be woven into approximately 2-inch mesh and shall be galvanized after fabrication. All wire shall have a knuckled finish on the top and bottom edge. Diameter of posts shall be as specified in Section 772 of the M.A.G. Specifications, except as follows: Terminal and corner posts on 20 foot high fences shall be a minimum 4 inches in diameter. Line posts on 20 foot high fences shall be a minimum 3 inches in diameter. Total length of the posts shall be equal to the depth below ground (as indicated on the detail on the plans) plus the height of the fence required above ground.

Footings for line posts for the 6 and 5 foot high fences shall be 36 inches deep and 8 inches in diameter. Footings for 6 and 5 foot end, corner slope, gate, pull and brace posts shall be 36 inches deep and 12 inches in diameter.

The 20 foot high backstops shall be built in sections with top rails and intermediate rails at 5 and 15 foot high. Footings for all posts on 20 foot high fences shall be 48 inches deep and 18 inches in diameter.

Gates shall be swing-type with lockable device which allows locking in closed and open positions.

11480.6 - KICK BOARDS

The work under this item shall conform to the applicable requirements of MAG Specifications, Section 778, Lumber. The wood base shall be constructed as shown in the details on the plans or as specified herein.

All bolts, washers & nuts shall be galvanized. All surfaces of the wood shall receive 3 coats of preservative in strict accordance with manufacturer's recommendations (Thompson's Water Seal or equal approved by the Engineer). Contractor must notify Engineer so a representative of the Engineer can be on-site during application of preservative. If sawing or drilling is necessary after treatment, the cut surfaces shall then receive three coats of preservative. 2" x 10" redwood boards shall be installed along the complete length of the 12 foot high, 16 foot high and 24 foot high backstops. Ends of parallel boards shall be staggered with a minimum separation of the two feet (2') except where both boards must terminate (at end and corner posts).

Payment for this work will be made at the contract price per lineal foot of backstop with WOOD BASE installed, which price shall be full compensation for the item complete in place, as described and specified herein and on the plans.

11480.7 - SCOREBOARDS

Scoreboards shall be NEVCO Local Representative:

Leonard Sweeney & Associates
17617 N. 61st Ave.
Glendale, Az 85308
(602)978-8444

Baseball scoreboards are to be Model 1010. Contractor to supply board's equipment, electrical (from panel), supports and installation.

Soccer scoreboards are to be Model 1020. Contractor to supply boards, equipment, electrical (from panel), supports and installation.

11480.8 - BASEBALL DUGOUT BENCHES

Dugout benches to be 6' Dura bench by Hammer's Plastic Recycling to fill the dugout. Contractor to supply material, equipment, labor and installation.
Local representative: Mesa Sprinkler
Bob Schottke
(602)964-8888

11480.9 - BASEBALL BLEACHERS

Bleachers to be National Recreation Model 315, 3 row, 15' long, non-elevated, aluminum seats foot rail with a galvanized steel understructure. Contractor to supply all material, labor, equipment and installation.

Local representative:

Dave Bang and Associates
P.O. Box 2480
Mesa, AZ 85204
(602)892-2266

11480.10 - SOCCER GOALS

Soccer Goals to be Patterson/Williams Model 2236-01, NCAA permanent Soccer Goals with 2 net support. Contractor to supply all material, labor, equipment and installation.

Local representative:

Dave Bang and Associates
P.O Box 2480
Mesa, AZ 85204
(602)892-2266

11480.11 - DRINKING FOUNTAINS

Drinking fountains to be Stern-Williams Co. Inc. model # series APF-3500 dual push button valves. Optional bibb faucet.

Contractor to furnish fountains, hookups, water line from meter (see Engineer Water Plans) and all equipment and material needed for complete installation. Stern-Williams Co. P.O. Box 8004 Shawnee Mission Kansas 66208 Tel. (913)362-5635.

11480.12 - BASEBALL WARNING TRACK

The warning track shall consist of 2" course of 1/4" minus gold granite with 2 applications of pre-emergent and 2 Round-Up contact herbicide.

11480.13 - BASEBALL INFIELD

The infields shall be constructed with 2" of "TUFF-LITE" pomice incorporated into the first 6" of soil. Apply an application of pre-emergent and 2 applications of Round-Up contact herbicide.

Local representative:

Tuff-Lite
2432 West Peoria Ave.
Suite 1081
Phoenix, AZ 85029
(602)931-3681

11480.14 - PICNIC TABLES

3'x 10' x 6' commercial picnic tables by Hammer's Plastic Recycling. Number of benches and location to be specified by Town of Gilbert Park and Recreation, Mr. Maury Ahlman. Contractor to supply material, labor and equipment for installation.

Local representative: Mesa Sprinkler

Bob Schottke
(602) 964-8888

11480.15 - METHOD OF PAYMENT

Method of payment shall be lump sum for all landscape, irrigation sports items and add alternates set forth in the contract.

SECTION 15061 - PIPING SYSTEMS

15061.1 GENERAL

Section includes pipe, fittings, valves, and accessories located at the pump station. Systems included are flood water, irrigation water, and air.

15061.2 SUBMITTALS

Submit the following as appropriate for each piece of equipment, material, piping, and valve provided.

1. Outline and installation Drawings for equipment and fixtures furnished.

2. Equipment performance data and operating characteristics.

3. Manufacturers' catalog data, marked to indicate materials being furnished, on standard equipment, fixtures, specialties, and accessories.

4. Shop Drawings on shop-fabricated piping systems.

5. Drawings showing arrangement of piping, controls, and accessory equipment furnished.

Submit list of field welders names with corresponding identifying symbols.

15061.3 QUALITY ASSURANCE

Welding materials and procedures shall conform to ASME Code. Employ certified welders in accordance with ASME Code Section IX and/or ANSI/AWS D1.1.

15061.4 PIPE SCHEDULE

Refer to Pipe Schedule specified herein. If pipe wall thickness specified is not available, use next heavier wall thickness. Allow 10% additional wall thickness for pipe wall thinning on steel pipe bends.

Pipe Schedule

Service	Pipe
Pump Station Intake	RCP (See Section 735)
Flood Pump Discharge	Steel
Pump Station Outfall	Ductile Iron
Irrigation Water	
Above ground	Steel
Below ground	Ductile Iron
Compressed Air	Steel
Blower Air	Steel

15061.5 DUCTILE IRON

Ductile iron pipe shall conform to AWWA C151; with 60-42-10 ductile iron. Minimum thickness shall be Class 50.

Fittings shall be mechanical or push-on joints conforming with AWWA C110, except AWWA C153 may be used for sizes 16" and smaller. Rated working pressure shall be 150 psi minimum.

Joints shall be mechanical or push-on conforming to AWWA C111 with a rubber gasket.

Fittings shall have joints similar to that used for piping conforming to AWWA C111.

Include gaskets, glands, bolts, and nuts required for complete installation. Mark each length of pipe with manufacturer's name and thickness class.

Bituminous coating shall conform to AWWA C151.

Cement lining (if used) shall conform to AWWA C104, with standard thickness with bituminous seal coat.

15061.6 POLYVINYL CHLORIDE (PVC) PIPE

PVC pipe shall conform to AWWA C900. The minimum pressure class shall be 150; dimension ratio 18. Pipe outside diameter shall be identical to that of cast iron or ductile iron pipe. Joints shall be integral bell or separate coupling with elastomeric gaskets conforming to ASTM F477. Fittings shall be cast or ductile iron in accordance with AWWA C110 or C153.

15061.7 STEEL PIPE

Pipe and fittings shall conform to ASTM A53, Type E or S. Wall thickness shall be Schedule 40 for 6" and smaller and Schedule 20 for 8" and larger. Dimensions shall conform with ANSI B16.9 and ANSI B16.25. Joints shall be flanked in accordance with ANSI B16.5, 150-lb, with rubber-ring gasket where shown on Drawings. All other joints shall be butt-welded for pipe 2-1/2" and larger and screwed for pipe 2" and smaller.

15061.8 VALVES

Valves shall be type shown on Drawings and as specified herein. Insofar as possible, use valves of only one manufacturer for each type of valve. Provide special tools required for repacking and disassembling valves provided. Laying dimensions of flanked valves shall be in accordance with ANSI B16.10. Valves shall open by turning operator in a counterclockwise direction. Provide valves with manufacturer's name and pressure rating clearly marked on outside of body. Provide valves suitable to connect to adjoining piping as specified for pipe joints. Use pipe size valves.

Gate valves shall conform to AWWA C500 and shall permit repacking under pressure when wide open. Packing shall be O-ring type. Stem arrangement for exposed cast iron valves shall be rising stem with handwheel; for bronze valves shall be inside screw and rising stem; and for buried valves, nonrising stem with 2" operating nut. Disc shall be solid-wedge type, except double disc may be used for buried valves. Provide brass or bronze and bolted bonnet. Provide handwheel operator.

Swing-type check valves, 3" or larger shall have cast iron body, bronze mounted, bronze faced disc, stainless steel hinge pins, and adjustable outside lever and weight or spring arranged to assist in closing as manufactured by Dresser Industries, Inc., M & H Style 159-02 or 259-02, or equal.

Swing-type check valves, smaller than 3" shall have bronze body, screwed access cover with bronze and composition disc seats rated for 200 psi working pressure as manufactured by Crane No. 41, Nibco Scott T-413Y, or equal.

Air and vacuum valves shall be used to vent large quantities of air when filling line and allow air to re-enter line when it is being drained. Valves shall be vertical, float-operated, automatic, designed for use with vertical turbine pumps. Pressure rating shall be 150 psi. Provide with inlet gate shut-off valve; air flow throttling device. Connection shall be threaded; 2" inlet. APCO Model 144WD, or equal.

15061.9 SLEEVE COUPLINGS

Construction shall include steel middle ring, without pipe stop, 2 steel followers, 2 rubber compound wedge section gaskets suitable for maximum temperature of 240°F, and required number of track-head steel bolts to properly compress gaskets.

Harness-type lugs, tie rods, and nuts shall be furnished and installed where shown on Drawings. Harness-type connections shall be capable of withstanding working pressure of 100 psi.

Provide gap of not less than 1" nor more than 2" between ends of pipe.

15061.10 HANGERS AND SUPPORTS

Provide hangers and supports as necessary to support piping properly.

15061.11 PIPES THROUGH WALLS AND SLABS

Use cast or ductile iron wall pipes where shown on Drawings. Provide with intermediate flange. Material, thickness, and ends shall match connecting piping. Provide tapped holes where wall pipes are flush with concrete. Use wall sleeves where shown for pipes passing through floors, walls, or roof slabs.

Material shall be cast iron with intermediate flange on piping 3" and larger; galvanized steel pipe with anchor ring or lugs on piping smaller than 3". Sleeve length shall be flush with surfaces.

15061.12 PIPE JOINTS AND METHODS

Welding shall be by metallic arc process, in accordance with ANSI/ASME B31.1. Shielded arc or coated electrodes specifically designed for pipe material. Use only 1 welding operator on each joint. Thoroughly grind or wire brush each weld pass and remove welding slag and defective material before next pass is applied. Welds shall be neat; remove excessive spatter by chipping or grinding.

Threaded joints shall be thread type in accordance with ANSI B2.1 taper pipe thread. Clean-cut threads; ream pipe ends and remove burrs. Apply suitable lubricating, noncorrosive, flexible pipe joint compound to male threads only.

Make up flanges prior to completing last weld in connecting piping; alignment of piping shall be correct without forcing or drifting. Coat bolt threads with suitable lubricant, Crane "Anti-Seize" thread compound, or equal.

15061.13 VALVE INSTALLATION

Install valves with stems upright or horizontal. Install as recommended by manufacturer to prevent distortion of body. Remove bonnets from solder end valves during installation. Tighten valve glands as work is erected, and again as required after placing in service. Replace any gland packing which is deteriorated or in unsatisfactory condition. Install air release and air/vacuum valves at high points as shown on Drawings.

15061.14 CLEANING

Remove foreign material from pipe before erection. Close ends of partially erected systems. Remove temporary preservative coatings from valves and accessories. Flush or otherwise clean systems after erection.

15061.15 TESTS AND INSPECTIONS

For irrigation water piping, remove air before tests; insert taps if necessary. Plug or cap openings. Test hydrostatically at 150 psig. Duration of test shall be 1 hour. Maximum allowable pressure drop during test period shall be 5 psi or 10% of test pressure whichever is smaller.

Test air piping pneumatically, in accordance with ANSI B31.1. Test other piping hydrostatically, in accordance with ANSI B31.1.

Provide pumps, compressors, meters, gages, piping, fittings, accessories, and labor required to conduct tests. Isolate equipment that would be damaged by test pressure. Refit joints indicating leakage. Replace defective pipe, fittings, and accessories. Conduct test in presence of Engineer. Piping shall be anchored sufficiently to withstand test pressure.

15061.16 PAYMENT

Payment for work included in this specification section will be made on basis of lump sum or unit prices stipulated in the proposal, unless payment for piping systems work is included in the cost for other improvements. Such payment shall include full compensation for furnishing labor, tools, and equipment and incidentals for doing work involved.

Service from Greenfield Co. by Utility Sht E1

SECTION 16050 - BASIC ELECTRICAL MATERIALS AND METHODS

16050.1 SECTION INCLUDES

Raceway systems and accessories; power control, and instrument wiring to equipment; and excavation and backfill required for installation of underground raceways.

16050.2 SUBMITTALS

Provide list of proposed materials identifying manufacturer and type for conduit (all types) and wireway.

Provide manufacturer's catalog sheet;s, marked as necessary to indicate type, model, or catalog number for wire and cable, cable tray.

Provide such other similar information as Engineer may request.

16050.3 GENERAL REQUIREMENTS

Determine required location, arrangement, and quantities of equipment and materials from Plans.

Systems provided shall be complete and operable, and shall include required accessories, fastenings, and supports.

Determine size of conductors and conduits from Plans.

Conduits shall be in accordance with standards referenced, except use 1/2" minimum.

Mark conduits with manufacturer's name or trademark.

16050.4 RIGID STEEL CONDUIT

Use in general purpose areas except where other types are specified or optionally permitted. Use in areas indicated on Plans.

Material shall be mild steel with continuous welded seam.

External protective coating shall be metallic zinc applied by hot-dip galvanizing or electrogalvanizing; coating shall not flake or crack when conduit is bent.

Interior surface shall be protected by zinc, enamel, or other equivalent corrosion-resistant coating.

Manufacturer shall be Republic Steel "Galvite", Triangle PWC, Allied Tube and Conduit Corporation "GRC", or equal.

Couplings, unions, and fittings shall be threaded-type, galvanized steel.

Conduit bodies shall be threaded-type, cast metal or malleable iron type with zinc or cadmium coating, Crouse-Hinds "Condulets-Form 7", Appleton "Unilets", O.Z./Gedney Co., or equal. Equip covers with solid gaskets and captive screw fasteners.

Expansion fitting shall be O.Z./Gedney Co. Type EX, Crouse-Hinds Type XJ, or equal; provide bonding jumper.

Standards used shall be ANSI C80.1 and NEMA FB1.

16050.5 FLEXIBLE LIQUIDTIGHT CONDUIT

Use in short lengths between motor terminal boxes or vibration-producing devices and rigid conduit. Use in other locations shown on Plans. Maximum length shall be 5'-0". Other limitations as defined by NEC Article 351.

Material shall be mild steel, galvanized.

Construction: One continuous length of steel strip of uniform weight and thickness and shaped in interlocking convolutions; fabrication shall result in smooth interior surface.

Provide outer jacket or tough extruded polyvinyl. Jacket shall be positively locked to steel core.

Continuous integral grounding strip shall be required in sizes 1-1/4" and smaller; not required in larger sizes.

Manufacturer shall be Anaconda "Sealtite Type U.A.", Electri-Flex Co. "Liquatite L.A.", O.Z./Gedney Co., "Flexi-Guard Type UAG", or equal.

Fittings shall be cadmium-plated steel or malleable iron, compression-type with tapered hub and synthetic rubber gasket. Provide ground ferrule for making positive ground contact with steel core. Design to prevent outer jacket from pulling away from steel core. Box connectors shall have insulated insert in throat.

Provide ground wire lug for sizes 1-1/2" and larger.

Manufacturer shall be Thomas & Betts, O.Z./Gedney Co., or equal.

Standards shall be UL 360 and UL 514.

16050.6 HEAVY-WALL PLASTIC CONDUIT FOR ABOVEGROUND USE

Uses and limitations: Aboveground runs where shown on Plans; underground runs without concrete encasements where shown on Plans; other limitations as defined by NEC Article 347.

Material: Polyvinyl chloride (PVC) plastic compound, sunlight-resistant. Conduit shall be rated to withstand temperatures of power cables operating at 90°C installed within.

Manufacturer: Carlon "PV-Duit Plus" (Schedule 40), or equal.

Fittings shall be made from same material as conduit. Threadless type; connect to conduit by solvent cement process. Boxes, access fittings, covers and accessories shall meet requirements of NEC Article 370. Expansion fittings shall be Carlon "Part 945", or equal.

Standards: NEMA TC2 and TC3.

16050.7 PULLBOXES AND JUNCTION BOXES

Use for pulling and splicing wires as required or as shown on Plans. Size in accordance with NEC requirements or as shown on Plans, whichever is larger.

Construction shall be galvanized steel or aluminum with gasketed covers and raintight hubs.

16050.8 OUTLET BOXES

Use for installation of wiring devices and lighting fixtures. Size in accordance with NEC requirements.

Construction shall be cast metal with threaded conduit hubs.

16050.9 DISTRIBUTION BOXES

Provide as needed for distribution of power circuits or as shown on Plans.

Construction shall be 14-gage sheet steel with continuously welded seams, external mounting feet and no knockouts. Gray prime outside over phosphatized surface with white enamel finish outside. Outdoor, watertight and dusttight (NEMA 12) Hoffman Engineering Co. Bulletin A-12, Type "A162008LP", or equal.

Covers shall be removable or hinged with neoprene gasket; cover clamps shall have no loose parts.

Provide each distribution box with an inside panel or rails for mounting distribution and fuse blocks.

Distribution blocks shall be waster-head, connecting screw-type to accommodate No. 4-500 MCM main lug and No. 14-2 AWG for branch lugs, Square D "LBC363106", or equal.

16050.10 WIREWAY

Provide wireways of size and arrangement shown on Plans. Wireway shall be lay-in type with screw-fastened hinged cover equipped with captive screws; minimum 16-gage steel with gray baked enamel finish. Outdoor use (NEMA 3R) enclosure classification. Square D "Square Duct", Hoffman Engineering Co. Bulletin F-40, or equal.

Provide supports, closure plates, and other fittings required.

Standard shall be UL 870.

16050.11 SINGLE-CONDUCTOR 600-VOLT WIRE

For size, type, use, and location use Circuit Schedules and Plans.

Conductors shall be annealed uncoated copper in accordance with ASTM B-3.

Stranding for No. 12 AWG and smaller, solid; for No. 10 AWG and larger, Class B in accordance with ASTM B8.

Insulations shall be of types shown on Plans, in Circuit Schedule or specified herein; insulation types defined as follows:

Type THWN wire: Single-conductor power or control wire, 600-volt, 75°C conductor temperature. Heat- and moisture-resistant polyvinyl chloride (PVC) insulation. Smooth nylon, 4 mils thick (minimum) jacket. Conform to UL 83. Mark surface of wire with manufacturer's identification, conductor size, and voltage rating. Rome Cable Corp. Spec. 2020, Triangle-PWC TP230TN, or equal.

Color coding: Identified grounded conductor shall be in accordance with NEC Article 200-6. Multiwire branch circuits shall be in accordance with requirements of NEC Article 210-5. For 480-volt power circuits Phase A, Black; Phase B, Red; Phase C, Blue; neutral, Gray. For 120/240 volt power circuits Phase A, Black; Phase B, Red; neutral, White.

16050.12 CABLE-IN-CONDUIT

Conductors shall be annealed uncoated copper in accordance with ASTM B-33, with stranding in accordance with ASTM B8, Class B.

Insulation rating shall be XHHW, 600 volts, 90°C dry, 75° wet, listed as Type RHH/RIW/USE.

Wire color coding for line wires shall be black, red; for ground wire, green.

Wire size shall be No. 6 AWG.

Duct shall be high-density polyethylene in accordance with ASTM D1248, Type III, Class C, and NEMA Tc-7. Mark duct with material, type, size and trade names every 10'.

16050.13 CIRCUIT MARKERS

Mark each end and every power and control circuit with a tag fastened securely to it and bearing circuit number shown in Circuit Schedule on Plans. Also mark cables in pullboxes and junction boxes.

16050.14 NAMEPLATES

Furnish nameplates wherever indicated as "required" in these Specifications. Nameplates shall be black plastic laminate engraving stock, 1/16" thick with white core. Bevel all edges. Lettering shall be engraved, approximately 3/16" high or as shown on Plans. Wording shall identify equipment served by device to which nameplate is attached. Attach to equipment with sheet metal screws.

16050.15 QUALITY CONTROL

Install equipment and materials in strict accordance with manufacturer's recommendations. Electrical construction shall be performed in accordance with NEC unless indicated otherwise on Plans or in Specifications.

16050.16 COORDINATION

Coordinate timing of installation and locations of equipment with work of other trades.

16050.17 CONDUIT INSTALLATION

Locate approximately as shown on Plans. Actual locations may be changed in field to avoid conflicts with other equipment.

Certain areas have been designated on Plans as access and similar areas; such areas shall be kept clear of field-routed conduit or other equipment installed as part of this contract.

Embedded conduit shall be used only where shown on Plans. Set before pouring of concrete begins. Route in as direct a line and with bends as long as possible. Structural concrete slabs: Minimum 1" from outer edge of conduit to bottom of slab. For concrete slabs-on-grade, conduit may be below slab.

Make joints in metallic conduit with couplings and unions to result in electrically continuous and moisturetight system.

Avoid pockets in conduit runs as much as possible; provide suitable fittings at low spots in exposed conduit where pocket cannot be avoided. Weep holes not permitted.

Not more than equivalent of three 90° bends between pulling points.

Cut ends of conduit square with hand or power saw and ream to remove burrs and sharp edges. Do not use wheel cutter. Threads cut on job site shall have same effective length, thread dimensions. and taper as factory-cut threads. Carefully remove burrs and paint male threads of steel conduit with 1 coat of zinc chromate.

Apply coat of zinc chromate to zinc-coated conduits where protective coating is damaged.

Hangers, supports, or fastenings: Provide at each elbow and at end of every straight run terminating in a box or cabinet. Rigid fastenings spaced maximum of 7' horizontal, 8' vertical; adjustable supports spaced maximum of 7'.

Clamps shall be galvanized malleable iron 1-hole straps, beam clamps or other device with necessary bolts and expansion shields.

Install conduits exposed except where installed underground.

Conduit ends: Cap spare conduit. Open conduit ends terminating in panels or enclosures where exposed to entrance of foreign material: Plug space around cables with commercial duct-sealing compound. Cap conduit ends during construction to prevent entrance of foreign material.

Clean and swab inside by mechanical means to remove all foreign materials and moisture before wires or cables are installed. Cleaning method shall not damage interior surface of conduit.

Conduit connections for panels and boxes: Rigid conduit and IMC, double locknuts and insulating bushing; flexible conduit, Box connector with plastic insulating insert.

Modifications to circuits from equipment may be grouped in a common raceway to junction box, from which individual circuits shall be taken. Install in strict accordance with NEC requirements. Shielded control or instrument circuits shall not be grouped in conduit with power circuits.

Direct burial conduit: Slope conduits for proper drainage. Depth shall be minimum 24" below grade.

Plastic conduit: Connect couplings and fittings with solvent cement in strict accordance with manufacturer's recommendations. Make field bends using hot box bender. Underground: Remove large stones from trench bottom which would otherwise bear directly against conduit. Exclude large stones, rubbish, and frozen material from backfill.

16050.18 INSTALLATION OF BOXES AND WIREWAYS

Locate boxes and wireways approximately where shown on Plans.

Locate pullboxes, junction boxes, terminal boxes and wireways to permit removal of covers or opening of doors for access to box interior.

Support boxes and wireways independently of conduits entering by means of bolts, screws, rod hangers and other suitable means.

16050.19 WIRE AND CABLE INSTALLATION

Install wire and cable in raceway of type or types indicated. Bending radii shall be not less than permitted by applicable NEMA Standard. Supports in vertical runs shall be as required by NEC, Article 300.

Cable pulling: Mount reels firmly on portable stand and secure against displacement. Use pulling grips which exert pulling tension on conductor, not insulation. Lubricate with powdered soapstone or commercial wire lubricant.

Connectors shall be UL-listed for conductor and service conditions encountered. Provide tools and equipment for installing compression lugs and splices specified. Compression tool shall be type which assures complete compression before jaws will release, Thomas & Betts, "Shure-Stake," or equal. Provide dies properly sized for cable and connector.

Connections of power cable to apparatus: Bolted-type to permit disconnecting without cutting conductors. For solid conductors provide form loop in conductor to wrap around binding head screw terminal or connection bolt; use retaining cup washer. For stranded copper conductors use compression-type lugs, tin-plated copper, 1 or 2-hole type, color coded, Thomas & Betts "Color-Keyed," Burndy "Hylug YA-L," or equal.

Copper-to-copper bolted connections: Silicon bronze bolts, nuts, large flat washers and lock washers; provide 2 flat washers and 1 lock washer for each bolt.

Aluminum-to-aluminum and aluminum-to=copper bolted connections: Stainless steel bolts, nuts, large flat washers, and Belleville washers; provide 2 flat washers and 1 Belleville washer for each bolt.

Make bolted connections of power cables using torque-wrenches or torque-screwdrivers. Tighten to torque values recommended by manufacturer.

Splices: Limit number of splices to absolute minimum. splice only in junction boxes or similar accessible and protected locations. Splicing in conduit bodies or similar accessible and protected locations. Splicing in conduit bodies not permitted. For lighting an convenience receptacle wiring, use twist-on type insulated spring connectors, 3M Co. "Scotchlok," Ideal Industries "Wing-Nut,"or equal.

16050.20 PAYMENT

No separate pay item shall be contained in proposal for electrical materials. Payment shall be included in price bid for electrical work, installed complete in place, as specified in proposal.

SECTION 16400 POWER DISTRIBUTION

16400.1 SECTION INCLUDES

Primary and secondary conduits, transformer pads, and transformer grounding.

Metering transformer cabinet in power panel and concrete pad below cabinet.

16400.2 SUBMITTALS

Provide dimensional layout and assembly drawings of power panels.

Provide list of proposed equipment identifying manufacturer and type for mini power zones and disconnect switches.

Provide such other similar information as Engineer may request.

16400.3 GENERAL REQUIREMENTS

Determine required quantities of equipment from Plans.

Equipment shall be complete and operable and shall include required accessories, mounting hardware and supports. Provide all trenching and conduit including trench and empty conduit for power supply to lighting and pump station transformer from Gilbert Road.

16400.4 WORK BY SALT RIVER PROJECT (UTILITY)

Provide primary and secondary cables between utility transfer and power, and connections, transformers, and transformer pad designs.

Provide meter bases, metering, potential and current transformers, and metering circuit cables, connections and conduits.

16400.5 MINI-POWER ZONES

Dry, air-cooled, 2-winding, quiet-type transformer rated at 480 volts to 240/120 volts secondary, single-phase, 3-wire, kVA capacity as shown on Plans. Transformer shall have 4 no-load voltage taps at 2-1/2%, 2 above and 2 below rated primary voltage. Transformer shall be totally-enclosed, with sand-epoxy, encapsulated windings, 115°C temperature rise, and meet NEMA ST20 standards.

Mini-power zone includes a separate panelboard section in corrosion-resistant finish metal enclosure suitable for indoor and outdoor use.

Manufacturer shall be Square D, or equal.

16400.6 POWER PANELS

Quantity and identification shall be as shown on Plans. Conform to UL 67 and NEMA PB1. Power panels shall be dead-front type with molded case breakers, surface-mounted rated at 480 volts ac, 3-phase, 4-wire; capacity of mains as shown on Plans.

Breakers shall be bolted-on, enclosed thermal-magnetic, protective, quick-make, quick-break, trip-free from handle, trip indicating type. Quantity, trip ratings, and number of poles shall be as shown on Plans. Interrupting rating shall be 30,000 rms symmetrical amperes minimum at 480 volts.

Panel and box shall be galvanized steel box, painted steel front, hinged door with catch and lock. Provide 2 keys per panel. Manufacturer's standard finish. Wiring gutters shall be not less than 4" on all sides. Enclosures shall be NEMA 3R type.

Provide separate metering section panels with cable pulling cabinet in accordance with Salt River Project specifications as shown on Plans.

Cardholder shall be on inside of door with typewritten schedule of panel branch circuits. Leave spare circuits blank. Cardholder shall have clear plastic cover.

Nameplates shall be required on each panel, with identification shown on Plans.

Panel shall be suitable for use as service entrance equipment in accordance with NEC and Salt River Project requirements. Panels shall have cable pulling section, metering instrument transformer section, and main circuit breaker section in accordance with Salt River Project requirements.

Manufacturer shall be General Electric Type NHB, Square D "I-Line," Westinghouse Type WEHB, or equal.

16400.7 MOTOR STARTER PANELS

Equipment shall be designed for operation under "usual service conditions" as defined in NEMA IC51. Equipment shall be factory-assembled, totally-enclosed, dead-front with nonreversing motor starters and surface-mounted. Square D "QMB," or equal. Each starter shall have fusible disconnect switch.

Panel shall be rated at 480Y/277 volts, 3-phase, 4-wire, with capacity of mains as shown on Plans.

Panel interrupting rating shall be 30,000 rms symmetrical amperes.

Enclosure shall be of galvanized steel with painted steel front. Enclosure shall be rated at NEMA 3R for outdoor use. Wiring gutter shall not be less than 5" on top, 6" on sides, and 10" on bottom.

Provide nameplates on each panel and starter with identification as shown on Plans.

Three-phase motor starters shall be combination magnetic with motor circuit disconnect as shown on Plans. Ratings shall be 460 volts, 3-phase, 60 Hz, NEMA size as shown on Plans. Types shall be as shown on Plans.

Motor circuit disconnecting device shall be heavy-duty disconnect switch with fuse clips to accommodate UL Class R fuses. Provide external operating handle arranged for locking in "Off" position and mechanical interlock to prevent opening door in "On" position. Provide emergency release for access to live unit.

Interrupting rating shall be 30,000 rms symmetrical amperes.

Size as required to match motor starters and motors as shown on Plans. Coil rating for NEMA size 1 through 4 shall be 120 volts.

Control transformers shall be required for each starter. Rating shall be 480-120 volts, with voltampere capacity to suit control load, including continuously energized auxiliary devices where shown on Plans. Provide dual-element fuse Bussmann Type FRN in 120-volt control circuit for each starter.

Provide minimum of 3 thermal overload relays per starter, manually reset; mount reset pushbutton on enclosure door. Type shall be bimetallic ambient compensated, Class 20; rating based on motor nameplate current.

Provide number and type of auxiliary contacts as indicated on Plans. Provide minimum of 2 per starter. Contacts shall be rated NEMA B300 minimum. If contacts required exceed maximum number, starter will accommodate, provide auxiliary relay.

Standards NEMA AB1, ICS1, ICS2, ICS6, and UL 198E and 508 shall apply in manufacture of equipment.

Enclosures shall be Type 3R for outdoor use.

Nameplates shall be required on each starter to identify equipment served.

16400.8 POWER FUSES

Provide as required for disconnect switches, combination starters and contactors, ac panels and dc panels. Bussman "Fusetron," Gould Shawmut "Tri-Onic," or equal. Noninterchangeable-type, nonrenewable, cartridge, time-delay, dual-element, current-limiting, Class RK5 as defined by UL 198E.

Ratings: Voltage shall be 250 or 600 volts as required. Continuous current shall be as shown on Plans. Interrupting current shall be 200,000 amperes rms.

16400.9 WIRING DEVICES

Type and manufacturer shall be as listed in "Wiring Device Schedule" on Plans.

Surface-mounted wiring device plates shall be galvanized steel plate. Outdoor devices shall be special plates or fittings required to render device weatherproof. Provide gang plates for multiple devices.

Mounting boxes shall be in accordance with Section 16050.

General purpose switches and receptacles shall be in accordance with NEMA WD1.

16400.10 INSTALLATION - GENERAL

Determine location and arrangement of equipment from Plans.

Locations shown on Plans are approximate unless dimensioned. Choose precise location to provide ample space for operation and maintenance. Clear final locations with Owner or Engineer.

Coordinate timing of installation and locations of equipment with other trades.

Install equipment in strict accordance with manufacturer's recommendations.

Perform construction in accordance with NEC.
Repair factory finishes where they become damaged during construction.

Install equipment level and plumb.

16400.11 WALL-MOUNTED EQUIPMENT

For concrete or masonry walls use expansion anchors and bolts; install collars around mounting bolts, or use other means to provide air space between wall and equipment enclosure.

For structural steel mounting, bolt to steel or brackets attached to steel; provide air space between steel and equipment enclosure.

16400.12 FLOOR-MOUNTED EQUIPMENT

Secure to concrete floor or foundation with expansion anchors.

16400.13 PAYMENT

No separate pay item shall be contained in proposal for power distribution. Payment shall be included in price bid for electrical work, installed complete in place, as specified in proposal.

SECTION 16450 - GROUNDING

16450.1 GENERAL REQUIREMENTS

Provide grounding of electrical equipment.

Determine required quantities of grounding materials from Plans.

Grounding system shall be complete with all required connectors, fastenings, and accessories.

16450.2 GROUND RODS

Ground rods shall be copper-clad, high-strength steel, sectional, threaded, Copperweld, or equal. Sizes shall be as shown on Plans.

16450.3 GROUND CABLE

Cable shall be soft-drawn bare copper, Class A stranding in accordance with ASTM B8. Bus size shall be as shown on Plans. Equipment taps shall be sized in accordance with NEC Article 250-95, or as shown on Plans.

16450.4 GROUND CABLE CONNECTIONS

For below-ground direct-buried connections use either thermic-welded, Erico Products, Inc. "Cadweld," or equal; or compression type, Burndy "Hyground," or equal.

For above-ground exposed connections use thermic-welded or compression types as above, or bolted-clamp type, high copper alloy, Burndy, or equal.

Connectors shall meet requirements of ANSI/IEEE 80 and 837.

16450.5 GROUNDING LUGS

Provide for equipment and steel members to be grounded. Equipment and substation steel connections shall be compression-type, high-conductivity copper alloy, nonferrous,noncorrosive; Burndy, Kearney, or equal.

16450.6 FENCE GROUNDING

Ground fence components including posts, gates, fabric, and barbed wire. Ground gates using flexible tinned-copper braid, Burndy Type B, or equal. Connectors shall be high-conductivity copper alloy, nonferrous, noncorrosive.

Cable(s) to tubular posts shall be Burndy Types GAR or GD, or equal. Cable(s) to H-beam posts shall be Burndy Types GA-H or GD-H, or equal. Flexible braid to tubular member shall be Burndy Type GG, or equal. Cable to barbed wire shall be compression-type, high-conductivity aluminum H-shape line tap, Burndy Type YHO, or equal.

16450.7 INSTALLATION - GENERAL

Determine location and arrangement of grounding materials from Plans. Coordinate timing of installation with other trades. Perform construction in accordance with NESC. Limit splices in ground cables to absolute minimum.

16450.8 GROUND RODS INSTALLATION

Install ground rods in firm soil outside of excavated areas. Drive top of rod to depth of 2' below grade unless otherwise shown on Plans. Use driving studs or other suitable means to prevent damage to threaded ends of sectional rods.

16450.9 BURIED GROUND CABLE INSTALLATION

Provide excavation required for installation of buried ground cable. Depth of excavation shall be 3'. Install in trench with sufficient slack to prevent breakage during backfilling or due to ground movement.

Leave connections and splices uncovered until inspected by Owner. Backfill around bus completely, thoroughly tamping to provide good contact between earth and ground bus.

16450.10 EXPOSED GROUND CABLE INSTALLATION

Fasten ground cable to structural steel, walls, or underside of floor slabs with suitable clamps. Bond grounding system to water supply piping on supply side of meter.

16450.11 CONNECTIONS

Remove paint, rust, or other nonconducting material from contact surfaces before making connections.

Where thermic-welded connections are used, provide molds and cartridges as recommended by manufacturer for sizes of cables and rods installed.

Where compression-type connections are used, provide tools and dies as recommended by manufacturer for sizes of cables and rods installed.

Install in strict accordance with manufacturer's recommendations.

16450.12 RACEWAY GROUNDING

Ground conduit systems using double locknuts; one inside and one outside at equipment and box connections. Use bonding jumper if conduit is installed in concentric or eccentric knockouts.

Liquidtight flexible conduit shall be parallel with copper jumper unless conduit is equipped with a continuous integral grounding strip. See Section 16050. Size and install jumper in accordance with NEC Article 351-9.

16450.13 EQUIPMENT AND STRUCTURAL STEEL GROUNDING

Ground major equipment and structural steel by cable connection to ground bus as shown on Plans.

Ground motor frames, control equipment, switches, outlets and other equipment through grounded conduit system, except where separate ground cable is shown on Plans.

Connect wiring device grounds in accordance with NEC requirements.

16450.14 EXCAVATION

Provide excavation as required for underground portions of grounding system. Excavate to depths indicated or specified. Use special care when excavating near existing foundations and utilities. Excavate by hand in such areas.

After installation of grounding system, backfill with materials from excavation. Exclude large stones, organic material and rubbish from backfill.

16450.15 GROUND TESTS

Grounding system shown on Plans is designed to result in a maximum ground resistance of 5.0 ohms.

Test completed grounding system by "Large Earth-Electrode System" method, in accordance with Biddle Instruments Bulletin 25Ta, "Earth Resistance Testing." Test equipment shall be furnished by Contractor, equal to "Megger," by Biddle Instruments. Test report shall be a typewritten report, listing equipment used, person or persons performing tests, date tested, sketch of test setup, and results of tests.

If tests show that ground system does not meet resistance requirements specified, Owner may authorize additional work. Contractor will be paid for such additional work on the basis of "Extra Work" provisions of the contract.

16450.16 PAYMENT

No separate pay item shall be contained in proposal for grounding. Payment shall be included in price bid for electrical work, installed complete in place, as specified in proposal.

SECTION 16500 - LIGHTING

16500.1 GENERAL REQUIREMENTS

Work includes roadway, parking lot, and area lighting systems. Sports lighting systems will be by Contract 2.

Determine required locations, arrangement, and quantities of equipment from Plans. Systems shall be complete and operable including required accessories, fastenings and supports.

Locations shown on Plans are approximate unless dimensioned. Choose precise location to clear obstructions and to provide sufficient space for operation and maintenance.

Coordinate timing of installation and location of equipment with other trades.

Make permanent lighting system, or selected portions thereof, operable as soon as possible. Install equipment in strict accordance with manufacturer's recommendations. Perform construction in accordance with NEC.

Repair factory finishes where they become damaged during construction. Install equipment level and plumb.

16500.2 ALTERNATES

A. Alternates quoted on bid form will be exercised as an owner option.

B. Schedule of Alternatives

1. Provide american electric light and pole for roadway lights as shown on Detail 16500-A.

2. Provide american electric light and pole for parking lot lights as shown on Detail 16500-B.

16500.3 SUBMITTALS

Provide manufacturer's catalog sheets, marked as necessary to indicate proposed lighting fixtures, and ballasts. Include parts lists and numbers for fixture components. Include photometric test data for certain fixtures where required by Lighting Fixture Schedule. Bind this material in brochure form.

Provide such other similar information as Engineer may request.

16500.4 LUMINAIRES

Types shall be as designated in "Lighting Fixture Schedule" on Plans. Luminaires provided shall be UL-listed for application.

Provide photo cell with each Type C fixture listed in "Lighting Fixture Schedule" on Plans.

Provide luminaires complete with lamps. Lamps shall be of types and ratings as shown on "Lighting Fixture Schedule" on Plans. Manufacturer shall be General Electric, Sylvania, or Phillips.

Provide high-intensity-discharge (HID), UL-listed, reactor-type, high-power-factor lamp ballasts suitable for operation with type of lamp and supply voltage specified. Develop sufficient voltage for lamp starting. Mount integral with luminaire. Conform to UL 1029. Ballast shall be General Electric, Holophane, Universal, or equal.

Provide fuse for protection of each ballast, size as recommended by luminaire manufacturer.

Luminaire wiring: Stranded copper conductors; 600-volt class insulation, type in accordance with manufacturer's standards for ambient and environmental conditions. Other requirements in accordance with NEC Article 410F.

16500.5 WALL-MOUNTED EQUIPMENT INSTALLATION

For concrete or masonry walls use expansion anchors and bolts; install collars around mounting bolts, or use other means to provide air space between wall and equipment enclosure.

Structural steel mounting shall be bolted to steel or brackets attached to steel; provide air space between steel and equipment enclosure.

16500.6 OUTDOOR LIGHTING SYSTEM INSTALLATION

Install unit ducts (cable-in-conduit) as shown on Plans.

Provide excavation required for foundations and underground wiring. Excavate to depths indicated. Excavate by hand in areas near existing foundations and utilities. Backfill with materials from excavation, but exclude large stones, organic material and rubbish. Dispose of excess excavated material off Site.

Adjust luminaires to provide best illumination for areas intended.

16500.7 PAYMENT

No separate pay item shall be contained in proposal for lighting. Payment shall be included in price bid for electrical work, installed complete in place, as specified in proposal.

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STANLEY CONSULTANTS
OF ARIZONA, INC.
ENGINEERS • PLANNERS • SURVEYORS
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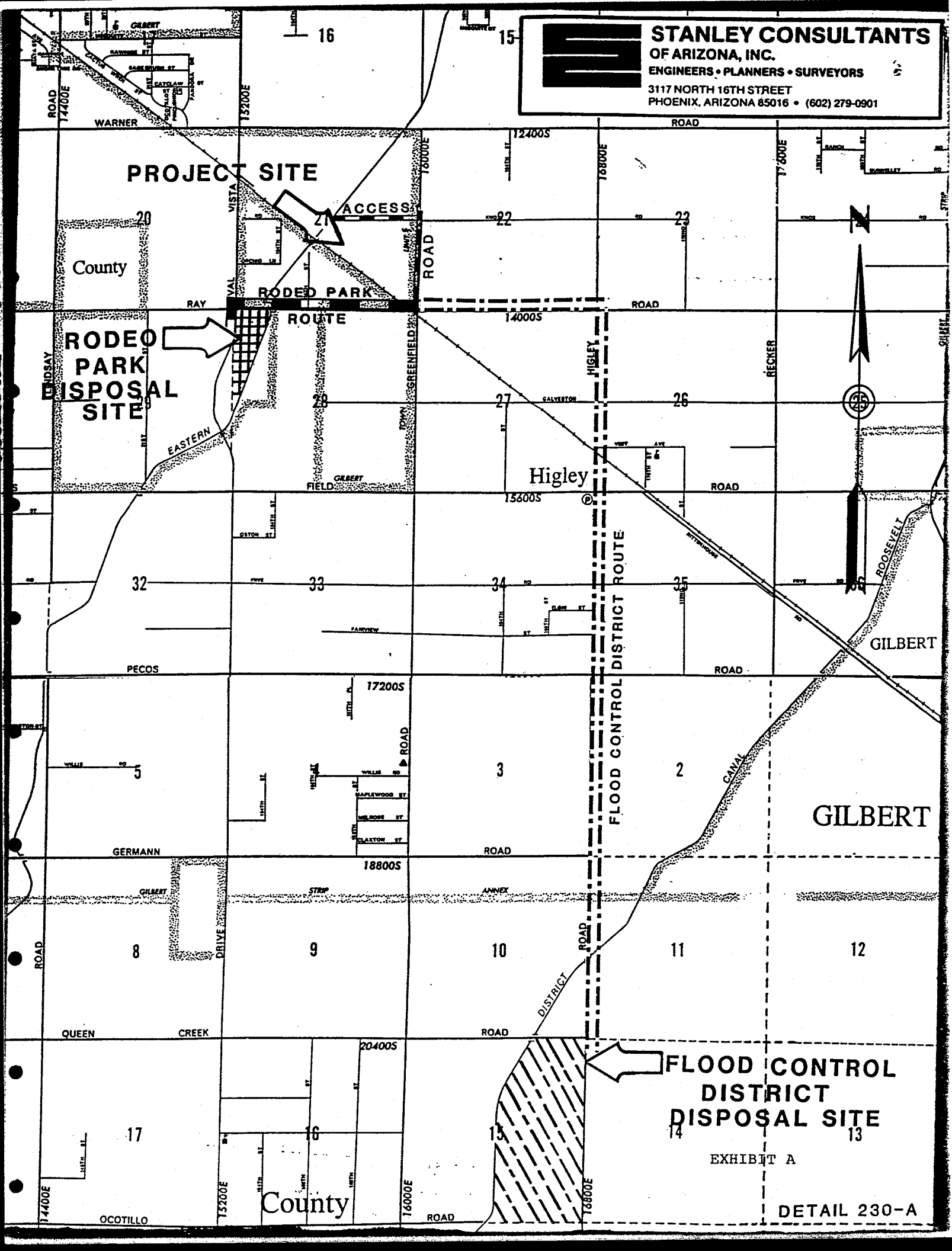
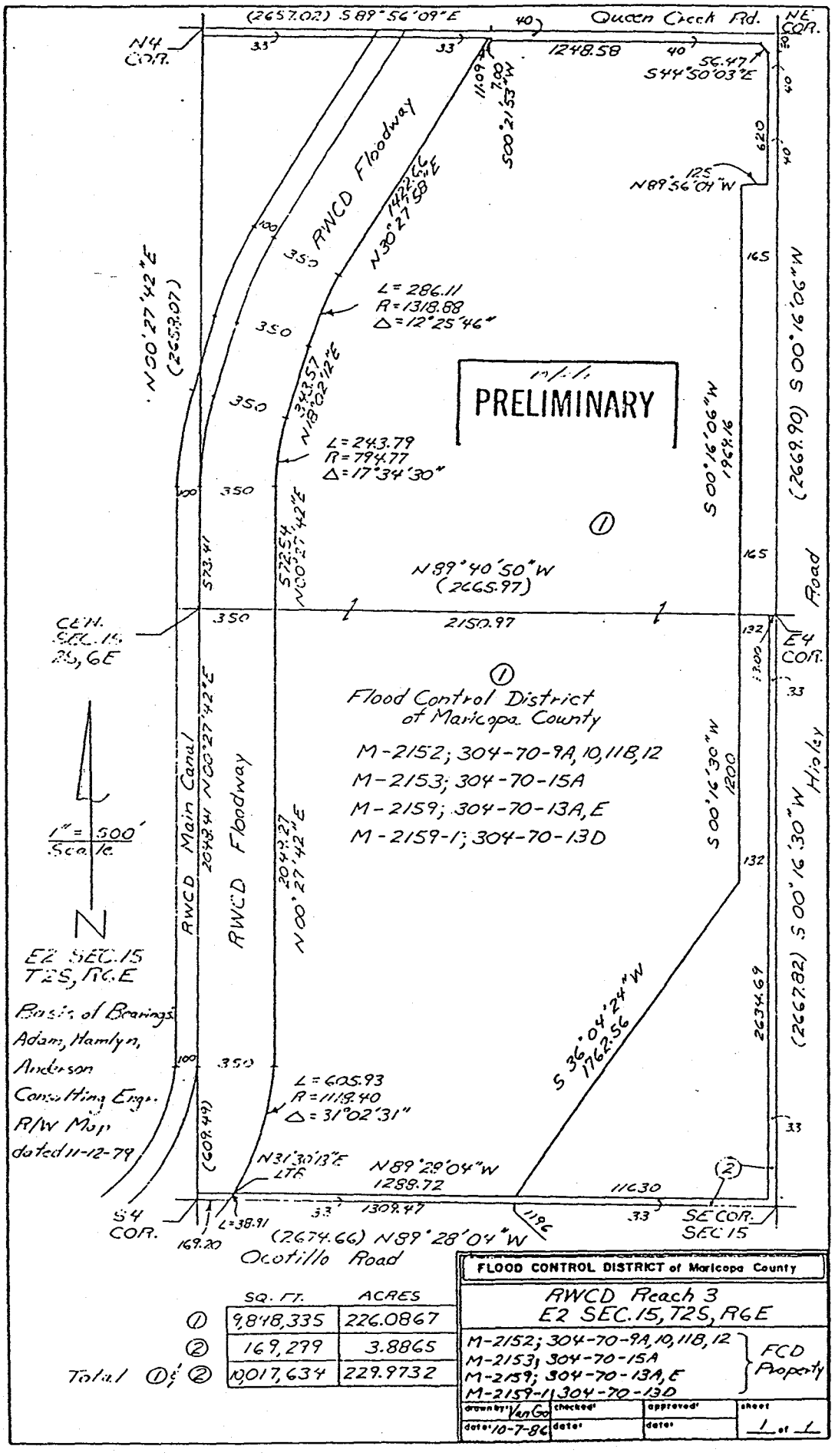
PHOENIX, ARIZONA 85016 • (602) 279-0901





	SQ. FT.	ACRES
①	9,848,335	226.0867
②	169,299	3.8865
Total ① & ②	10,017,634	229.9732

FLOOD CONTROL DISTRICT of Maricopa County

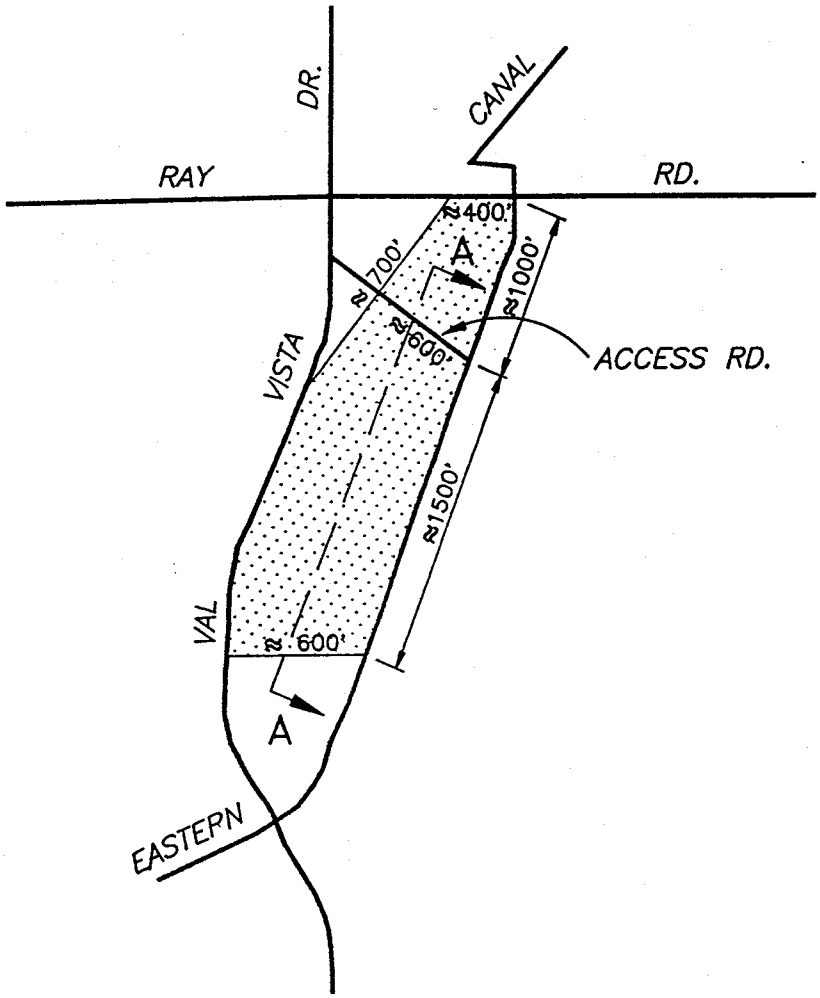
AWCD Reach 3
E2 SEC. 15, T2S, R6E

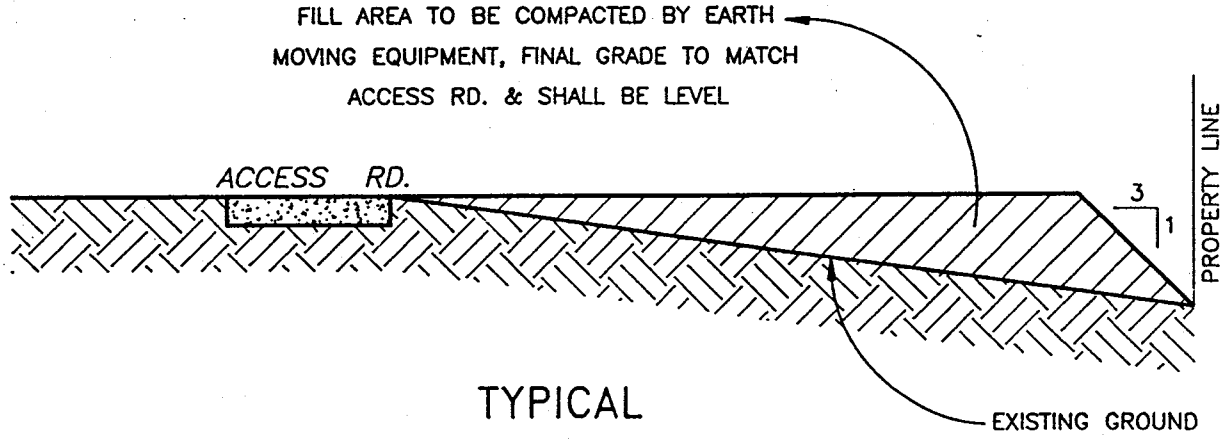
FCD Property:
M-2152; 304-70-9A, 10, 11B, 12
M-2153; 304-70-15A
M-2159; 304-70-13A, E
M-2159-1; 304-70-13D

drawn by: Van Go	checked:	approved:	sheet
date: 10-7-86	date:	date:	1 of 1

DETAIL 230-B

GILBERT BASIN
RODEO PARK

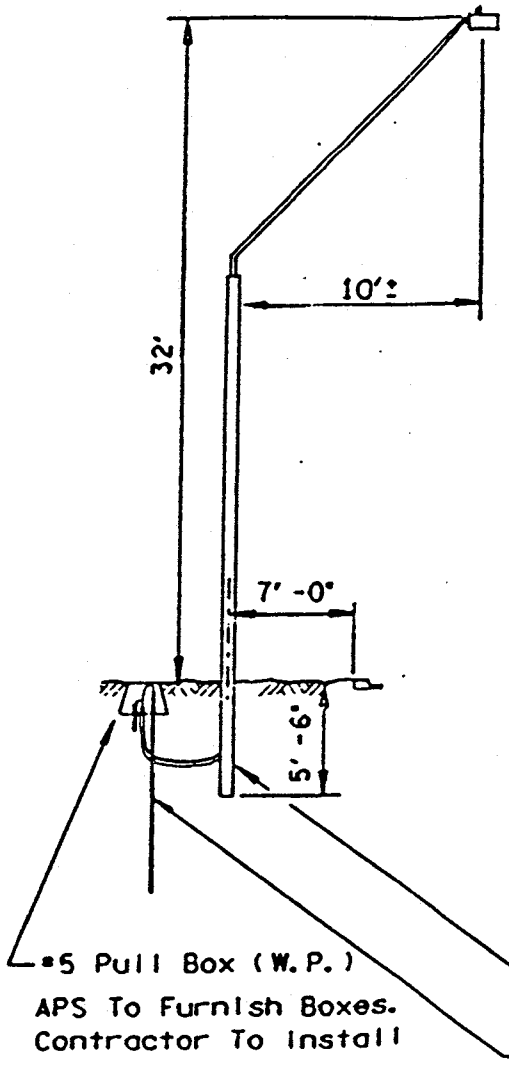




TYPICAL SECTION A – A

DETAIL 230-C

EXHIBIT C



Luminaire
- One 150W HPS, 16,000 Lumen
- 120V Cutoff

Am. Elec. •53-56262-AJH(B) 120 V
Am. Elec. # 53-56362-AJH(B) 240 V
Paint Dark Bronze
Aim Phob Cell North

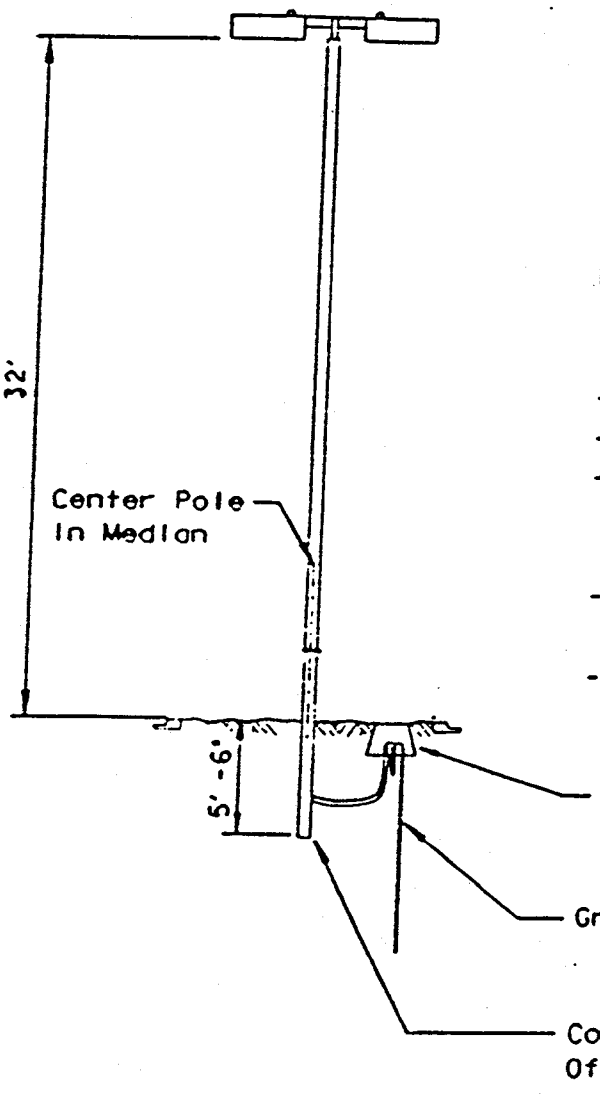
Pole
- Manufactured And Installed Per SRP Standards
- Pole Shall Be Prewired
- W/2 •12, 1 •12 Bond
- Wire Shall Be Extended To Pull Box For Connection By Power Co.
- Paint Dark Bronze To Match Fixture. (SRP Paint Specs)
- Pole Shall Be 4" ø

• If Conflicts Arise Coordinate Location W/Civil Engineer

ALTERNATE ROADWAY LIGHTING

NO SCALE

DETAIL 16500-A
EXHIBIT D



Luminaires
- Two 250 HPS, 27,500 Lumens
- 120V Cutoff
- Am. Elec. # 153-6233-AJH (A) 120 V
- Am. Elec. # 153-6333-AJH (A2) 240 V
- Paint Dark Bronze
- Aim Photo Cell North

Pole
- Manufactured And Installed Per SRP Standards
- Pole Shall Be Prewired
- W/2 #12, 1 #12 Bond
- Wire Shall Be Extended To Pull Box For Connection By Power Co.
- Paint Dark Bronze To Match Fixture. (SRP Paint Specs)
- Pole Shall Be 4" ø

ALTERNATE PARKING LOT LIGHTING

NO SCALE

DETAIL 16500-B
EXHIBIT E