#37

CONSTRUCTION SPECIFICATIONS

FOR

CONTRACT FCD 94-04
NEW RIVER CHANNELIZATION GRAND AVENUE TO GREENWAY ROAD

WOOD, PATEL & ASSOCIATES, INC.
1550 East Missouri
Suite 203
Phoenix, Arizona 85014

Registered Professional Engineer (Civil)
CERTIFICATE NO.
10512
ASHOK C.
PATEL
Date Signed 9/21/94
ARIZONA, U.S.A.

(Engineer's
Seal)

Prepared For

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

Recommended by: Edward A Raleigh Date: 9/22/94
Edward A. Raleigh, P.E., Chief
Engineering Division

Issued for Public Bidding by: D E Sagramoso Date: 9/22/94
D. E. Sagramoso, P.E.
Interim Chief Engineer and General Manager

SUPPLEMENTARY TO MARICOPA ASSOCIATION OF GOVERNMENTS UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION EDITION OF 1992 AND REVISIONS AND SUPPLEMENTS THERETO.

FLOOD CONTROL DISTRICT OF MARICOPA DISTRICT
ADDENDUM NO. 1

October 10, 1994

CONTRACT No. FCD 94-04

To Contract Documents

Title: New River Channelization Grand Avenue To Greenway Road

Owner: Flood Control District of Maricopa County

The above documents are herein modified. The provisions of said documents applicable to modifications remain unchanged unless specifically indicated otherwise herein. The Addendum No. 1 forms part of the Contract Documents and modifies them as follows:

Construction Special Provisions, Page 2

Delete Section 206 and Substitute the following new Section 206.

SECTION 206 - STRUCTURE EXCAVATION AND BACKFILL

In addition to the requirements of the MAG Standard Specifications:

206.1 - Description

Structural excavation pertains to the excavation related to the construction of the Roller Compacted Concrete Drop Structure between Stations 450+23 to 453+23. This includes excavation for granular filter bedding and the upstream and downstream riprap aprons. Excavation for the Soil Cement bank protection is excluded from structural excavation.

206.2 - Foundation Material Treatment

When the foundation material below the concrete structure is unsuitable, as determined by the Engineer, the Contractor shall overexcavate the bottom of the trench as directed and replace the overexcavation with compacted embankment fill in accordance with Section 211.2.1, but compacted to 98 percent of maximum density.

Where the original ground surface is below the base of the structure, all fill required for the structure foundation shall be placed as embankment fill. All fill about the structure above the base of the structure to lateral dimensions 1 foot outside the base of the structure and within slopes of one to one to finished surfaces of adjacent earthwork shall be placed as embankment fill.

FLOOD CONTROL DISTRICT OF MARICOPA DISTRICT
ADDENDUM NO. 1

October 10, 1994

CONTRACT No. FCD 94-04

206.5 - Payment

The quantity of structural excavation shall be those of the completed Bid Items and within the neat limits of dimensions for the structure, bedding and aprons, as shown on the plans. The quantity of overexcavation and the associated embankment for the overexcavation fill shall be as measured at site by the Engineer. The quantities for structural excavation and embankment fill will be adjusted to account for overexcavation and associated backfill, respectively.

Quantities of structural excavation shall be paid for by the cubic yard, at the contract unit price for Item 206 of the Bid Schedule. Quantities of embankment fill shall be paid for as provided in Section 211.6 herein.

Construction Special Provisions, Page 52

Replace the subtitle number 420.3 with 421.5

Construction Drawings, Sheet 8 of 18 Section C-C

For the 10 inch Subgrade Compaction, Replace 95% with 98%

Cross Sections, Pages 3 and 4 of 9

Replace Sheets 3 and 4 of 9 by the attached sheets 3r and 4r.

FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY

Registered Professional Engineer (Civil)
CERTIFICATE NO.
14397
EDWARD A.
RALEIGH
Date Signed 10/13/94
ARIZONA, U.S.A.

By: _____
D.E Sagramoso, P.E.
Interim Chief Engineer and General Manager.

By: _____
Edward A. Raleigh, P.E.
Chief, Engineering Division.

ATTENTION

ALL PROSPECTIVE BIDDERS

A.R.S. Section 34-201 now requires that construction bid proposals be accompanied by a certified check, cashiers check or surety bond for **ten percent (10%)** of the total amount of the bid.

All bonds must be executed solely by a surety company or companies holding a Certificate of Authority to transact surety business in Arizona, issued by the Director of the (State) Department of Insurance.

Bonds (bid, payment and performance) executed by an individual surety or sureties are not in compliance with the Arizona Revised Statutes. Bids received containing bid bonds not in compliance with the Arizona Revised Statutes will be considered as being non-responsive. The use of District-supplied bond forms is required.

Please submit your bids accordingly.

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

CONTRACT FCD 94-04

NEW RIVER CHANNELIZATION GRAND AVENUE TO GREENWAY ROAD

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(Area to left reserved for Engineer's Seal)

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

INVITATION FOR BID

BID OPENING DATE: October 20, 1994, 2:00 p.m.

LOCATION: This project is located within the City of Peoria along the New River alignment from Grand Avenue to Greenway Road.

PROPOSED WORK: The majority of the work will be at the confluence of New River and Skunk Creek. At this time the District is only advertising Phase I. This work consists of a roller compacted concrete stepped drop structure with a subdrainage system, and soil cement bank protection north of the drop structure.

BIDS:

SEALED BIDS for the proposed work will be received by the Flood Control District of Maricopa County, 2801 West Durango Street, Phoenix, Arizona 85009 until 2:00 p.m. (Phoenix time) on the above date and then publicly opened and read at 2801 West Durango Street, Phoenix, Arizona 85009. All bids are to be marked in accordance with Section 102.9 of the MAG Uniform Standard Specifications and addressed to the Chief Engineer and General Manager, Flood Control District of Maricopa County, 2801 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 the Flood Control District of Maricopa County to endeavor to ensure in every way possible that minority and women-owned business enterprises have every opportunity to participate in providing professional services, purchased goods, and contractual services without being discriminated against on the grounds of race, religion, sex, age, disability, or national origin.

The bidder shall be required to certify that it has the appropriate "A" Contractor's license in the State of Arizona to perform the before-mentioned type or work. Certification 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 one hundred eighty (180) calendar days after date of Notice to Proceed, subject to restrictions presented in the Supplementary General Conditions.

MBE/WBE PARTICIPATION:

For this contract, a goal of Ten (10) percent MBE/WBE is established for Minority/Women-Owned Business Enterprises. Instructions and required forms are included in the Minority and Women-Owned Business Enterprise Program Contracting Requirements section. The Maricopa County minority and Women-Owned Business Enterprise Program, effective January 1, 1992, is incorporated by reference.

PRE-BID CONFERENCE:

A Pre-Bid conference will be held on October 12, 1994 at 1:00 p.m. in the Flood Control District Adobe Conference Room, 2801 West Durango Street, Phoenix, Arizona. 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, Contracting 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. Verbal interpretations, unless specifically addressed by addendum, shall not be binding nor have any legal effect.

PROJECT PLANS, SPECIAL PROVISIONS AND CONTRACT DOCUMENTS:

Plans and Construction Specifications may be obtained from the Flood Control District of Maricopa County, 2801 West Durango Street, Phoenix, Arizona 85009 upon payment of $25.00 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 $32.50 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 10 percent (10%) 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.

****

PRINCIPLE ITEMS AND APPROXIMATE QUANTITIES

QUANTITY	UNIT	DESCRIPTION
3,803	CY	Loose Riprap
4,253	SY	Gravel Mulch
3,390	LF	Steel and Aluminum Handrails
55,700	CY	Structural Excavation
23,200	CY	Embankment Fill
20,200	CY	Channel Excavation
21,450	CY	Soil Cement Bank Protection
10,528	SY	Aggregate Base Course
13,188	CY	Roller Compacted Concrete

PROPOSAL

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

Gentlemen:

The following Proposal is made for New River Channelization Grand Avenue to Greenway Road, FCD 94-04, 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 the Proposal, have been carefully examined and also that the site 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, Supplementary General Conditions, or conditions to be overcome, be pled. On the basis of the Plans, Construction Specifications, Special Provisions, Supplementary General Conditions, 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 mentions herein are approximate only and are subject to increase or decrease and hereby proposes to perform all quantities of work, as either increase 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 **one hundred eighty (180) 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 ten (10) 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 its 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 evens, 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, attached these to the bid package, 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: New River Channelization Grand Avenue to Greenway Road CONTRACT: FCD 94-04

ITEM NO	DESCRIPTION	APPROX QTY	UNIT	UNIT COST(IN WRITING) AND/100 DOLLARS	UNIT COST NUMBERS	EXTENDED AMOUNT
107	SWPP, NPDES Permit Requirements	1	LS			
202	Mobilization	1	LS			
206	Structural Excavation	55,700	CY			
211	Embankment Fill	23,200	CY			
212	Disposal of Construction Debris	500	CY			
215	Channel Excavation	20,200	CY			
220-1	Loose Riprap	3,803	CY			
220-2	Grouted Riprap	143	CY			
221	Soil Cement Bank Protection	21,450	CY			
221-1	Cement for Soil Cement	3,780	Ton			
302	Gravel Mulch	4,253	SY			
310	Aggregate Base Course	10,528	SY			
350	Removal of Existing Improvements	1	LS			
401	Traffic Control	1	LS			
421	Fencing (smooth wire)	240	LF			
504	Roller Compacted Concrete	13,188	CY			
504-1	Cement for Roller Compacted Concrete	3,205	Ton			
504-2	Fly Ash for Roller Compacted Concrete	361	Ton			
520	Steel and Aluminum Handrails	3,390	LF			
520-1	Gate (Double)	2	EA			
606	Granular Filter Bedding	2,855	CY			
607	Perforated 6 Inch Diameter PVC Pipe	1,923	LF			
608	Galvanized 6 Inch Diameter Steel Pipe	352	LF			

Total Bid Amount:_____

IF BY AN INDIVIDUAL:

_____ _____
(Name - Title) (Address)

_____ Phone:_____
(Date)

IF BY A FIRM OR PARTNERSHIP:

_____ _____
(Firm Name) (Firm Address)

By:_____ Phone:_____
(Name - Title)

Date:_____

** 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:_____ Phone:_____

Title:_____

Date:_____

* Incorporated under the Laws of the State of Arizona 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. No change in the subcontractors and material suppliers listed will be made without prior written approval of the Owner.

_____

_____

_____

_____

_____

_____
(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 **ten percent (10%)** 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 the Arizona Revised Statutes.

WHEREAS, the said Principal is herewith submitting its proposal for FCD-94-04, New River Channelization Grand Avenue to Greenway Road.

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 the proposal and give the Bonds and Certificates of Insurance as specified in the Standard Specifications with good and sufficient Surety for the faithful performance of the contract and for the prompt payment of labor and material furnished in the prosecution of the contract, or in the event of the failure of the Principal to enter into the contract and give such Bond and Certificate of Insurance, if the Principal pays to the Flood Control District of Maricopa County the difference not to exceed the penalty of the bond between the amount specified in the proposal and such larger amount for which the Flood Control District of Maricopa County may in good faith contract with another party to perform the work covered by the proposal then this obligation is void. Otherwise it remains in full force and effect, provided, however, that this bond is executed pursuant to the provisions of Section 34-201, Arizona Revised Statutes, and all liabilities on this bond shall be determined in accordance with the provisions of the section to the extent as if it were copied at length herein.

Signed and sealed this _____ day of _____, A.D., 1994.

_____ _____

Agency of Record, State of Arizona Principal

_____ By:_____

Agency Address

Title:_____

_____

Surety

By:_____

Title:_____

Bond Number:_____ ATTACH SURETY POWER OF ATTORNEY

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/she is _____ of _____ bidding on Contract FCD 94-04 for New River Channelization Grand Avenue to Greenway Road, in the County of Maricopa, State of Arizona.

That, in connection with the above-mentioned project, neither he/she, 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. Section 34-251, Article 4, as amended.

_____
(Signature of Affiant)

Subscribed and sworn to before me this _____ day of _____, 1994.

_____
(Notary Public)

_____
My Commission Expires

CERTIFICATION OF LICENSE

Pursuant to A.R.S. Section 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. Section 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 name(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. SECTION 13-2704.

_____
Signature of Licensee

Date:_____

Company:_____

MINORITY AND WOMEN-OWNED BUSINESS ENTERPRISE PROGRAM
CONSTRUCTION CONTRACTING REQUIREMENTS

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

1. All M/WBE firms used in attainment of the goal must be certified with the Maricopa County Minority Business Office (MBO). The MBO is located at 2901 West Durango Street, Phoenix, Arizona 85009, telephone 506-4068. In addition, only those firms certified prior to the bid opening will be considered in the attainment of the goal.

2. Prime contractor subcontracts to MBE or WBE:
The M/WBE amount to be applied to the goad will be based on that portion (dollar value) of the contract that the M/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 M/WBE participation will be credited as 10 percent.

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

4. Minority-Non Minority Joint Venture:
A joint venture consisting of M/WBE participation and non-M/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 M/WBE firm. For example, if a M/WBE and non-M/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 M/WBE partner in the joint venture, M/WBE participation will be credited at 25 percent or $250,000.

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

6. M/WBE Suppliers:
Any M/WBE supplier that performs a commercially useful function, manufactures or substantially alters the material or product it supplies will have that portion of activity considered when determining the percentage of M/WBE participation.

7. M/WBE Trucking:
Credit for trucking by MBEs or WBEs will be the amount to be paid when the MBE or WBE trucker will perform the trucking with his/her trucks, tractors, and employees or when a MBE or WBE trucking broker has signed agreements with MBE and WBE truckers.

B. Required forms:
Two Affidavits are included as part of this section. The first form, the "M/WBE Assurances Affidavit", must be completed and submitted with the bid - **FAILURE TO DO SO SHALL BE CAUSE FOR REJECTION OF THE BID.**

A SAMPLE of the "Actual M/WBE Participation Affidavit", that must be completed and returned by the first and second bidders to the Minority Business Office by 4:00 p.m. on the seventh calendar day after bid opening, if M/WBE goals have been established, is provided for information purposes. A copy of the sample or the sample form itself may also be used. The affidavit will list the M/WBE participation by M/WBE firm name and the relative dollar value of the M/WBE contract. The information in this affidavit is binding on the contractor, to the extent that any amounts may be increased and not decreased, and that if any listed M/WBE's are unable to enter into a subcontract with contractor, the contractor **must** provide a written report to the Procurement Officer, through the Owner's representative in accordance with instructions provided elsewhere in this document.

C. Good Faith Efforts:
Bids which fail to meet MBE or WBE minimum goals at levels which equal or exceed established goals may be considered nonresponsive unless good faith efforts can be determined. Only MBE and WBE firms certified by Maricopa County prior to the bid submittal date, and which will perform a commercially useful function will be counted toward meeting the participation goals. Any portion of the work that a proposed MBE or WBE firm will subcontract to other than a certified firm, regardless of tier, will not be counted toward the applicable goals.

The apparent first and second low bidders who do not fulfill the established MBE and WBE goals must demonstrate, through detailed and comprehensive documentation, that "good faith" efforts have been made to solicit, assist and utilize MBE and WBE firms to meet participation goals.

The County minority Business Office (MBO) will assist prime contractors in identifying possible qualified and interested MBE and WBE subcontractors to meet designated MBE and WBE goals. **A M/WBE listing will be furnished with the bidding documents,** which contractors must utilize in identifying M/WBE firms. It will be the responsibility of the prime contractors to obtain the MBE and WBE firms necessary to meet the MBE and WBE goals.

FAILURE TO CONTACT THE MBO FOR ASSISTANCE IN COMPLYING WITH THESE GOALS MAY RESULT IN NOT HAVING IMPLEMENTED "GOOD FAITH" EFFORTS. Contact may be in writing, by telephone, or in person. If by phone or in person, name of MBO person spoken to should be obtained and written within the "CONTRACTOR CERTIFICATE OF GOOD FAITH" SUBMITTAL FORM (supplied if a contract has M/WBE goals).

(The Minority Business Office is located at 2901 West Durango Street, Phoenix, Arizona. Telephone number is 506-4068).

FAILURE TO IMPLEMENT "GOOD FAITH" EFFORTS IN ACCORDANCE WITH THE MARICOPA COUNTY MINORITY BUSINESS ENTERPRISE PROGRAM TO THE SATISFACTION OF MARICOPA COUNTY MAY RESULT IN THE REJECTION OF THE BID.

If information submitted by a prime contractor indicates that established MBE and WBE goals have not been met, the contractor must be required to provide sufficient documentation to demonstrate that he/she has complied with MBE and WBE requirements or good faith efforts. Good faith efforts will be determined by both quality and intensity of these efforts. Documentation provided to the MBO must include:

1. The date bidder requested assistance in writing, in person, or by telephone from the MBO. The bidder should request assistance from the MBO office in order for a determination to be made. **As Maricopa County M/WBE listings are updated frequently, bidders shall contact the MBO to ensure that they have the most recent edition.**

2. Names, addresses and telephone numbers; and dates of notification of Maricopa County certified MBEs and WBEs solicited by direct mail for this project; and dates and methods used for follow up of initial solicitations to determine with certainly whether MBEs or WBEs were interested in subcontracting. (SEE FOLLOWING NOTE).

3. Items of work for which bidder requested subbids, proposals or materials to be supplied by MBEs and WBEs; information furnished to interested MBEs and WBEs such as specifications and requirements of the work; plans; and any breakdown of items of work into economically feasible units to facilitate MBE and WBE participation.

4. Names of MBEs and WBEs who submitted bids for any of the work indicated above and were not accepted by the prime contractor. An explanation of why MBEs or WBEs contacted will not be awarded subcontracts. If price was the reason for rejection of the bid, the price bid of rejected MBEs or WBEs and price bid of the selected subcontractor shall be submitted. Since utilization of available MBEs and WBEs is the program objective, price differences will not automatically be considered as cause for a prime contractor's rejection of MBE and WBE bids.

5. Documentation of written notices or telephone calls to a reasonable number of M/WBEs soliciting their participation in sufficient time to allow M/WBEs to participate effectively. All M/WBEs listed on the Maricopa County Certification list which provide applicable goods and services for subject procurement/project should be contacted.

NOTE: THE ABOVE GOOD FAITH EFFORTS MUST HAVE BEEN CONDUCTED DURING THE BIDDING PERIOD AND PRIOR TO THE BID OPENING WITH SUBSTANTIAL TIME IN ORDER TO ALLOW FOR A RESPONSE FROM POTENTIAL M/WBE SUBCONTRACTORS. ORIGINAL CONTACT BY A PRIME CONTRACTOR JUST PRIOR TO OR ON THE BID OPENING WILL NOT BE CONSTRUED AS HAVING PROVIDED SUFFICIENT RESPONSE TIME FOR SUBMISSION OF SUBCONTRACT BIDS.

The following efforts can also be utilized in demonstrating "Good Faith" in soliciting M/WBE participation.

1. A description of the efforts made to assist MBEs and WBEs whose bids were rejected to be more competitive in their subcontracting bids. These efforts could include assistance in meeting bonding or insurance requirements.

2. Names and dates of advertisement of each newspaper, trade paper, and minority focus paper in which a request for MBE and WBE participation for this project was placed by the bidder.

Contractors are encouraged to seek M/WBEs in the same geographical area in which the work is to be performed or goods provided. If the bidder cannot meet the established goals using M/WBEs from the geographical area, the bidder should expand its search to a reasonable wider geographical area.

The MBO will make the final decision as to whether good faith efforts were met, based on the information submitted.

D. Appeal Process for Bid Award:
If the Owner is considering award of a contract to a bidder other than the low bidder because of failure to meet MBE and WBE participation goals or good faith efforts, the low bidder will be notified and given an opportunity to protest the decision. This protest will be made in accordance with the Maricopa County Procurement Code, Article 9, MCI-905, which is incorporated by reference.

E. Contract Compliance:
Failure of any bidder, contractor or subcontractor to comply with any of the requirements of the Maricopa County minority and Women-Owned Business Program shall be a material breach of contract. During the term of an awarded contract, the prime contractor shall:

1. Fulfill the MBE and WBE participation commitments submitted with their bid;

2. Continue to make every effort to utilize MBEs and WBEs;

3. Require that their subcontractors make every effort to utilize MBEs and WBEs;

4. Maintain records necessary for monitoring their compliance with provisions contained in the M/WBE Program.

The primary responsibility for assuring contractor's compliance with these M/WBE contract requirements after award rests with the Owner's designated representative. The Owner's designated representative should ascertain that no one other than the approved MBE or WBE contractors or subcontractors are performing the work, and that MBE and WBE subcontractor substitutes have been approved in advance. The prime contractor shall not perform any MBE or WBE contract work items without prior approval by the Owner's Procurement Officer, through the Owner's designated representative.

The Owner's Procurement Office shall advise the Minority Business Office immediately of any circumstances where a contractor appears to be in violation of the MBE and WBE contract requirements. An investigation will be held by the MBO and a recommendation for corrective action shall be forwarded to the Owner's Procurement Officer. Intentional noncompliance with the MBE and WBE requirements may result in withholding funds on the items already completed, in termination of the contract, and/or formal debarment from future contracts. The Maricopa County Minority Business Office reserves the right to inspect all records of the contractor, MBEs and WBEs concerning this project.

The MBO will conduct MBE and WBE compliance reviews on a regular basis.

F. Substitution of Subcontractors:
The prime contractor shall request approval to replace an approved MBE or WBE subcontractor that is unable or unwilling to perform successfully on a contract with another MBE or WBE. This failure does not remove the contractor's responsibility for meeting the MBE and WBE participation goals ont he contract. A written request for substitution must be made to the Owner's Procurement Officer, through the designated Owner's representative, of the Procurement Agency. The substitute MBE or WBE, obtained to perform an equal or greater dollar value of work, must be approved by the Owner's Procurement Officer, through the designated Owner's representative, prior to beginning of any work by the substitute MBE or WBE. The request for substitution must include, but is not limited to the following:

1. Reason for substitution.

2. Name, address, and telephone number of the approved MBE or WBE.

3. Name, address and telephone number of the MBE or WBE substitute.

4. Item, numbers, description of work and the proposed MBE and/or WBE dollar amount.

5. Good faith effort documentation if the substitute subcontractor is not an MBE or WBE.

G. Requests for Pay:
Each Request for Pay must be accompanied by a Maricopa County Minority/Women-Owned Business Enterprise Program "MBE/WBE PARTICIPATION REPORT" in the form as provided by the Flood Control District of Maricopa County.

The final pay request shall include a listing of total contract MBE/WBE participation. Line numbers and a description of actual work performed shall also be included. If, at the time of contract completion, the MBE and WBE commitments are not actually attained, the report is to provide an explanation of failure to comply. These reports shall be submitted within thirty (30) days of contract completion, PRIOR TO RELEASE OF ANY REMAINING CONTRACT RETENTION.

CONTRACTOR CERTIFICATE OF GOOD FAITH*

The intent of this certification is to document the good faith efforts implemented by the apparent low bidder in soliciting and utilizing M/WBE firms to meet the established M/WBE goals for County contracts. This certificate will assist Maricopa County in determining whether the apparent low bidder has implemented "good faith" efforts in accordance with the Maricopa County Minority Business Program. The burden of proof rests with the apparent low bidder.

(NOTE: Prior to filling out this certificate it is important that contractors review the "good faith" efforts requirements in the M/WBE section of the project specification booklet).

Failure to implement "good faith" efforts to the satisfaction of Maricopa County will result in rejection of the proposal.

I, _____, do hereby acknowledge that I am the _____ of who has been identified as the selected contractor on Flood Control District Project/Contract FCD 94-04.

Provide a brief summary of why the established M/WBE goal for this project has not been met. (Attach additional sheets if necessary).

_____

_____

_____

_____

I hereby certify that I have made comprehensive "good faith" efforts to solicit and utilize County certified M/WBEs to meet the established M/WBE goal of this project as demonstrated by my responses to the following questions:

A. IDENTIFYING SUBCONTRACTOR WORK ITEMS

Contractors are encouraged to select portions of work to be subcontracted in a manner which will increase the likelihood of meeting the established M/WBE goal for the project. In selecting work to be performed, contractors will consider, where appropriate, breaking down the project into economically feasible units to facilitate M/WBE participation. Contractors are reminded that only M/WBE certified by the County can be used as participants towards meeting the project goals. A County M/WBE Certification listing will be provided to all contractors interested in submitting bids for projects. This listing is the only authorized source from which to select M/WBEs for project participation. Current copies of this listing may be obtained by calling the Minority Business Office at (602) 506-4068.

1. Which portions of the contract proposal, in terms of the nature of the work were selected to be subcontracted to M/WBE firms?

_____

_____

_____

_____

B. NOTIFYING M/WBE FIRMS OR CONTRACTING OPPORTUNITIES

1. Solicitations by mail/fax must be made to all M/WBE firms identified on the M/WBE Certification Listing that perform the type of work which is proposed for subcontracting. Following this initial solicitation, at least one follow-up telephone call must be made to any of the M/WBE firms who have not responded to the mailing.

2. In the spaces provided below, indicate which firms received written notification of work items to be subcontracted. In the appropriate space, also indicate when the M/WBE firms received subsequent telephone solicitations. Please attach additional sheets so that all firms contacted are listed and attach photo copies of all written/fax solicitations to M/WBEs to this documentation.

M/WBE Firm Contacted **Name** **Tel. No.** **Date**

_____

_____

_____

_____

3. Were the services of the County Minority Business Office used to assist the contractor in the recruitment of M/WBEs or to assist in solving other problems? Yes_____ No_____

Contact was made by_____ Telephone_____

Written correspondence_____ Date contacted_____

Staff person contacted_____

C. PROVIDING M/WBES WITH ASSISTANCE

1. Explain any efforts undertaken to provide M/WBEs with information regarding project plans, specifications and requirements of the project:

_____

_____

_____

_____

2. Describe any efforts initiated to provide special assistance to M/WBE firms interested in participating in this project:

_____

_____

_____

_____

3. Describe any efforts undertaken to assist M/WBE firms in obtaining bonding, lines of credit, or insurance required by the County for this project:

4. Was solicitation for M/WBEs advertised in local papers, ethnic periodicals, or trade journals? If YES, please list the name of the periodical and dates advertised.

D. SOLICITING QUOTES FROM M/WBE FIRMS

Contractors must solicit quotes in good faith with interested M/WBE firms. Quotes and bids from interested M/WBEs must not be rejected by bidders without sound justification based upon a thorough investigation of the capabilities of the M/WBE firms.

1. Indicate in the space provided below, which M/WBE firms submitted quotes on the project proposal. Also provide a brief explanation of why any of these M/WBE quotes were rejected. If price was a determining factor, provide documentation showing the non-minority quotes. Please attach additional sheets if necessary.

Name of M/WBE Firm **Explanation for rejecting quote**

* To be included in contract documents or those procurements which have M/WBE contract goals.

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
MINORITY/WOMEN-OWNED BUSINESS ENTERPRISE PROGRAM
MBE/WBE ASSURANCES AFFIDAVIT

NOTE: FAILURE TO COMPLETE AND SUBMIT THIS AFFIDAVIT WITH THE BID PROPOSAL SHALL BE CAUSE FOR REJECTION OF THE BID.

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.

The first and second low bidders will specify their MBE/WBE participation on the Actual Participation AFFidavit or provide documentation of their good faith efforts not later than 4:00 p.m., the seventh calendar day following the bid opening. If participation is "None", the documentation of bidder's good faith efforts to obtain the participation. This documentation will be reviewed by the MBO to determine whether in fact a comprehensive "good faith" effort has been implemented. The required affidavit shall be obtained by the apparent first and second low bidders from the Minority Business Office, 2901 West Durango Street, Phoenix, Arizona 85009, Telephone 506-4068, following the bid opening and verbal notification from the Procurement Officer of the Procurement Agency; a SAMPLE affidavit form for reference purposes follows.

_____
Name of Firm

_____
Signature

_____
Title

STATE OF ARIZONA)
)ss
County of Maricopa)

Subscribed and sworn to before me this ___ day of _____, 199___.

_____
Notary Public

My Commission Expires:_____

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
MINORITY/WOMEN OWNED BUSINESS ENTERPRISE PROGRAM
ACTUAL MBE/WBE PARTICIPATION AFFIDAVIT
(NOTE: COMPLETED AFFIDAVIT MUST BE SUBMITTED WITHIN SEVEN CALENDAR DAYS FOLLOWING THE BID OPENING).

Name of Contractor

Project/Contract Number FCD 94-04
Contract M/WBE Goal: 10 %

Total Amount of Contract _____

Contact Person

Street No.

City State Zip

Minority/Women Owned Firm	Principal	Address	Type of Work	Proposed Contract Percentage

TOTALS (Dollars/Percentage) _____

The undersigned has entered into a formal agreement with the MBE/WBE subconsultants/subcontractors /suppliers listed above, in the execution of this contract with Maricopa County.

Signature

Title

Date

STATE OF ARIZONA }
}ss
County of Maricopa }

Subscribed and sworn to before me this _____ day of _____ by _____
Notary Public

My commission Expires: _____

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: New River Channelization

Contract Number: FCD 94-04

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, %: 10%

Total Cumulative MBE/WBE: _____

Participation on This Contract, 10%: _____

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

Copy to: Minority Business Office
2901 West Durango Street
Phoenix, Arizona 85009

CONTRACT AGREEMENT

THIS AGREEMENT, made and entered into this ____ day of _____, 1994 by and between the FLOOD CONTROL DISTRICT OF MARICOPA COUNTY, hereinafter called the OWNER, acting by and through its BOARD OF DIRECTORS, and _____ _____, hereinafter called the CONTRACTOR.

WITNESSETH: 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 Contract FCD 94-18, and furnish at its 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, 2801 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 its 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 its 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. Section 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. Section 34-221.

ARTICLE V - TERMINATION: The OWNER hereby gives notice that pursuant to A.R.S. Section 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: The 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, disability, or national origin. The Maricopa County Minority Business Program implemented January 1, 1992, is incorporated by reference.

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 disability 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:_____
Signature

Title:_____

Date:_____

_____
Tax Identification Number

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY PARTY OF THE SECOND PART

By:_____
Chairman, Board of Directors

ATTEST:

_____
Clerk of the Board

RECOMMENDED BY:

_____
Interim Chief Engineer and General Manager
Flood Control District of Maricopa County

Date:_____

LEGAL REVIEW

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

By:_____
District, General Counsel

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 _____ ($_____), 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 the Flood Control District of Maricopa County, dated the _____ day of _____, 1994 for Contract FCD 94-04 which contract is hereby referred to and made a part hereof as fully and to the same extent as if copies 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 the Principal or the Principal's Subcontractors in the prosecution of the work provided for in the contract, this obligation is void. Otherwise it remains in full force and effect.

PROVIDED, HOWEVER, that this bond is executed pursuant to the provisions of the 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, conditions and limitations of Title 34, Chapter 2, Article 2, Arizona Revised Statutes, to the same extent as if it was copied at length in this Agreement.

The prevailing party in a suit on this bond shall recover as part of the judgement reasonable attorney's fees that may be fixed by the court or a judge thereof.

Witness our hands this _____ day of _____, 1994.

_____
Principal Seal

By:_____

Title:_____

_____
Agency of Record, State of Arizona

_____
Agency Address

BOND NUMBER:_____

_____
Surety Seal

By:_____

Title:_____

ATTACH SURETY POWER OF ATTORNEY

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 _____ ($_____), 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 the Flood Control District of Maricopa County, dated the _____ day of _____, 1994, for Contract FCD 94-04, 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 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 Revise 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 _____, 1994.

_____
Principal Seal

By:_____

Title:_____

_____
Agency of Record, State of Arizona

_____
Agency Address

_____
Surety Seal

BOND NUMBER:_____ By:_____

ATTACH SURETY POWER OF ATTORNEY

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

CERTIFICATE OF INSURANCE

CONTRACT FCD **94-04** PROJECT TITLE **New River Improvements**

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	**$5,000 Combined Single Limit**
	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
	[ ] ENGINEERS PROFESSIONAL LIABILITY			EACH CLAIM AND ANNUAL AGGREGATE	
	[X] OTHER **In addition to the Flood Control District, add MaricopaCounty and City of Peoria as additional insured.**				

Except for Professional Liability Insurance and Workers' Compensation Insurance, the Flood Control District of Maricopa County is added as an additional insured on those types of policies described herein which are required to be furnished by this contract entered into between the insured and the Flood Control District. To the extent provided in this contract, insured shall hold harmless the Flood Control District of Maricopa County from liability arising out of any services provided or duty performed by insured as required by statute, law, purchase order or otherwise required, with the exception of liability for loss or damage resulting from the sole negligence of Flood Control District, its agents, employees or indemnities. 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 affect 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
2801 West Durango Street
Phoenix, Arizona 85009

DATE ISSUED_____

_____
AUTHORIZED REPRESENTATIVE

Drafting\Forms\FormBB SRN

It is further agreed that:

The Contractor hereby agrees to indemnify and save harmless the FLOOD CONTROL DISTRICT OF MARICOPA COUNTY, Maricopa County, and the City of Peoria, or any of their departments, agencies, officers or employees, from and against all loss, expense, damage or claim of any nature whatsoever which is caused by any activity, condition or event arising out of the performance or nonperformance of any of the provisions of this Agreement, with the exception of liability for loss resulting from the sole negligence of the Flood Control District, its agents, employees, or indemnities.

The Flood Control District of Maricopa County, Maricopa County, and the City of Peoria 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 sole negligence of the Flood Control District of Maricopa County, Maricopa County, and the City of Peoria.

The above cost of damages incurred by the Flood Control District of Maricopa County, Maricopa County, and the City of Peoria or any of their departments, agencies, officers or employees, or others aforesaid shall include in the event of an action, court costs, expenses for litigation and reasonable attorney's fees.

_____
Firm

_____
Date

_____
Principal

_____
Title

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

CONTRACT FCD 94-04

SUPPLEMENTARY GENERAL CONDITIONS

SPECIFICATIONS:

Except as otherwise amended by 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.

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, and Change Orders will govern over the Supplementary General Conditions, Construction Special Provisions, MAG Standard Specifications and Details, and Project Plans.

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 Flood Control District of Maricopa County.

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 Flood Control District of Maricopa County 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 Flood Control District of Maricopa County Board of Directors to the office of Chief Engineer and General Manager of the Flood Control District of Maricopa County acting directly or through its authorized representative, the Chief of the Flood Control District of Maricopa County Construction and Operations Division.

5. Change the definition for the phrase "Notice of Award" to a letter from the Flood Control District of Maricopa County advising Contractor that it is the successful bidder and the Flood Control District of Maricopa County has accepted its 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.

7. Add the definition for Maricopa County Minority Business Office (MBO); the office responsible for administering the Maricopa County Minority and Women Owned Business Enterprise Program.

8. Add the definition for the Maricopa County Minority and Women Owned Business Enterprise Program as being the Program adopted by the Board of Supervisors effective January 1, 1992.

Subsection 102.4 - Examination of Plans, Special Provisions, and Site of Work:

Add the following after third paragraph:

Cross-sections are included with the Plans **FOR INFORMATION ONLY**, and are not to be considered as a part of the contract documents.

Subsection 102.5 - Preparation of Proposal:

Add the following:

Proposals, including the Bidding Schedule, must be legibly written in ink or typed.

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 602-506-1501. Any addendum issued, if not already bound into the Special Provisions, **must be attached and included as part of the Specifications** and any quantities on the Bidding Schedule requiring change shall be adjusted to the new figure by pen and ink. **Bids which do not have appropriate addenda attached and show appropriate changes to the Bidding Schedule, and receipt of addenda acknowledged in the Proposal shall be invalid.**

The bidder's Arizona State Contractor's License number and the classification under which it proposes to perform the work shall be shown on the proposal. An **A General Engineering** License is required for this contract. The two lowest bidders may be required to provide certification of prior satisfactory completion for similar construction and to furnish a copy of their license and the renewal certificate.

Subsection 102.6 - Subcontractors' List:

Add the following:

A list of subcontractors to be employed on the project shall be submitted with the bid, on the form provided in the Proposal. No change of the subcontractors named therein will be made unless first approved in writing by Owner.

Subsection 102.7 - Irregular Proposals:

Add the following:

(F) If bidder fails to complete and submit the Maricopa County Minority and Women-Owned Business Enterprises Assurances Affidavit, the bid will be considered nonresponsive and rejected.

(G) If bidder fails to acknowledge AND attach any addendum issued, if addendum is not already bound into the Specifications, the bid will be considered nonresponsive and rejected.

(H) If bidder fails to utilize Owner's bond forms, the bid will be considered nonresponsive and rejected.

(I) If bidder fails to return the entire specifications document, the bid will be considered nonresponsive and rejected.

Subsection 103.6 - Contractor's Insurance:

Add the following:

A statement from bidder's insurance carrier shall be included in the proposal certifying that it will furnish the specified kind and amounts of insurance to the bidder if it is awarded the contract. As required by law, the statement will be from an insurance carrier or carriers authorized to do business in the State of Arizona, or countersigned by an agent of the carrier authorized to do business in the State of Arizona. Concurrently with the execution of the contract, 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 the following:

Include additional insureds as indicated on the included Certificate of Insurance.

Subsection 103.6.2 - Indemnification of the Contracting Agency Against Liability:

Add the following:

Additionally, Contractor shall execute the Indemnification on Page 30 of 30 of the Contract Documents.

Subsection 104.1 - Work to be Done:

Add the following sentence to 104.1.1:

All water for construction purposes, drinking water, lighting, temporary electric power, heat and telephone service shall be arranged and provided for as per requirements of the work by Contractor at his expense.

105.1 - Authority of Engineer:

Add the following:

105.1.1 - Engineer's Evaluation: Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to subsections 105.3.1 and 106.4. Engineer will be the sole judge of acceptability. No "or-equal" or substitute will be ordered, installed or utilized without Engineer's prior written acceptance which will be evidenced by either a Change Order or an approved Shop Drawing. Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any "or-equal" or substitute. Engineer will record time required by Engineer and Engineer's Consultants in evaluating substitutes proposed or submitted by Contractor pursuant to subparagraphs 105.3.1 and 106.4(B) and in making changes in the Contract Documents (or in the provisions of any other direct contract with Owner for work on the project) occasioned thereby. Whether or not Engineer accepts a substitute item so proposed or submitted by Contractor, Contractor shall reimburse Owner for the charges of Engineer and Engineer's Consultants for evaluating each such proposed substitute item.

105.3 - Conformity with Plans and Specifications:

Add the following :

105.3.1 - Substitute Construction Methods or Procedures: If a specific means, method, technique, sequence or procedure of construction is shown or indicated and expressly required by the Contract Documents, Contractor may furnish or utilize a substitute means, method, technique, sequence or procedure of construction acceptable to Engineer. Contractor shall submit sufficient information to allow Engineer, in Engineer's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The procedure for review by Engineer will be similar to that provided in subparagraph 106.4(B).

Subsection 105.6 - Cooperation with Utilities:

Add the following:

An attempt has been made to determine the location of all underground utilities and drainage pipes, culverts, and structures; however, it shall be Contractor's responsibility to cooperate with the pertinent utility companies so that any obstructing utility installation(s) may be adjusted. Should Contractors operations result in damage to any utility the location of which has been brought to its attention, he shall assume full responsibility for such damage. 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 Contractor in contact with the proper personnel:

Flood Control District.....506-1501
City of Peoria.....412-7212
Salt River Project.....236-2956

Subsection 105.8 - Construction Stakes, Lines, and Grades:

Add the following:

A. Engineer will furnish the project survey control line together with a Bench Mark which the construction contractor will use to set line and grade for all construction. All other surveying required for the project shall be the contractor's responsibility. Engineer will not set any construction stakes.

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

Subsection 106.1 - Source of Materials and Quality:

Add the following:

Select Material, Aggregate Base, Mineral Aggregate, concrete, steel products and pipe shall be obtained from commercial sources. Contractor shall pay all royalties, or any other charges or expenses, incurred in connection with the securing and hauling of the material. Contractor will be required to furnish Engineer with a list of its 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 106.4 - Trade Names and Substitutions:

Replace with the following:

Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function and quantity required. Unless the specification or description contains or is followed by words reading that no like, equivalent or "or-equal" item or no substitution is permitted, other items of material or equipment of other Suppliers may be accepted by Engineer under the following circumstances:

A) "Or-Equal": If in Engineer's sole discretion an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by Engineer as an "or-equal" item, in which case review and approval of the proposed item may, in Engineer's sole discretion, be accomplished without compliance with some or all of the requirements for acceptance of proposed substitute items.

B) Substitute Items: If in Engineer's sole discretion an item does not qualify as an "or-equal" item under subparagraph 106.4 (A), it will be considered a proposed substitute item. Contractor shall submit sufficient information as provided below to allow Engineer to determine that the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefor. The procedure for review by Engineer will include the following and may be supplemented in the Special Provisions and as Engineer may decide is appropriate under the circumstances. Requests for review of proposed substitute items of material or equipment will not be accepted by Engineer from anyone other than Contractor. If Contractor wishes to

furnish or use a substitute item of material or equipment, Contractor shall first make written application to Engineer for acceptance thereof, certifying that the proposed substitute will perform adequately the functions and achieve the results called for by the general design, be similar in substance to that specified and be suited to the same use as that specified. The application will state the extent, if any, to which the evaluation and acceptance of the proposed substitute will prejudice contractor's achievement of completion on time, whether or not acceptance of the substitute for use in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for work on the project) to adapt the design to the proposed substitute and whether or not incorporation or use of the substitute in connection with the Work is subject to payment of any license fee or royalty. All variations of the proposed substitute from that specified will be identified in the application and available maintenance, repair and replacement service will be indicated. The application will also contain an itemized estimate of all costs or credits that will result directly or indirectly from acceptance of such substitute, including costs of redesign and claims of other contractors affected by the resulting change, all of which will be considered by Engineer in evaluating the proposed substitute. Engineer may require Contractor to furnish additional data about the proposed substitute.

C) Contractor's Expense: All data to be provided by Contractor in support of any proposed "or-equal" or substitute item will be at Contractor's expense.

Subsection 107.1 - Laws to be Observed:

Add the following Paragraph (G):

(G) 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). Contractor shall also comply with all applicable provisions of the Americans with Disabilities Act (Public Law 101-336, 42 U.S.C. 12101-12213) and all applicable federal regulations under the Act, including CFR Parts 35 and 36.

Subsection 107.2 - Permits:

Replace with the following:

Contractor shall obtain all permits and licenses, pay all charges, fees, taxes, and provide all notices necessary and incidental to the due and lawful prosecution of the work.

Subsection 107.2 - Permits:

Add the following:

107.2.1 - NPDES Permit Requirements

A. This project is subject to the National Pollutant Discharge Elimination System (NPDES) Storm water requirements for construction sites under the Environmental Protection Agency (EPA) General Permit for Arizona. Under provisions of that permit, the contractor shall be designated as permittee, and shall take all necessary measures to assure compliance with the NPDES General Permit for Arizona as well as all other applicable Federal, State and local laws, ordinances, statutes, rules and regulations pertaining to storm water discharge. As the permittee, the contractor is responsible for preparing, in a manner acceptable to the EPA, all documents required by this regulation, including but not necessarily limited to:

1. Storm water Pollution Prevention Plan (SWPPP) for the project, including certification of compliance form. Contractor shall be required to develop, implement, update and revise the SWPPP, as necessary, in order to assure compliance with the EPA permit requirements. The SWPPP shall be retained on the project site at all times during construction.

2. Notice of Intent (NOI) to assure compliance with the NPDES General Permit for Arizona, including certification of signatures.

3. Notice of Termination (NOT) of coverage under NPDES General Permit for Arizona.

B. Preliminary copies of the NOI and the SWPPP shall be submitted to Owner during the preconstruction meeting and shall be subject to review by Owner prior to implementation.

C. Contractor shall submit the completed and duly signed NOI forms no later than forty-eight (48) hours prior to the initial start of construction on the project to the following agencies:

EPA Storm water Notice of Intent
P.O. Box 1215
Newington, VA 22122

A copy of the completed NOI form shall be submitted to the following:

Storm water Coordinator
Arizona Department of Environmental Quality
P.O. Box 600
Phoenix, AZ 85001-0600

Failure by the contractor (or subcontractors of any tier) to submit NOI's within the mandated time frame shall result in delay of the construction start date, and no claim for extension of time will be granted for such delay. A copy of the completed NOI shall be posted at the construction site.

D. Inspections of all storm water pollution control devices on the project shall be performed by Contractor on a monthly basis and following each rainfall of 0.50 inches or more in a 24-hour period at the project site as required under provisions of the NPDES General Permit for Arizona. Contractor shall prepare reports on such inspections and retain the reports for a period of three years following the completion of the project. Inspection reports shall be submitted monthly to Owner along with progress payment requests. Additionally, contractor shall maintain all storm water pollution control devices on the project in proper working order, which shall include cleaning and/or repair during the duration of the project.

E. Contractor warrants that its employees and subcontractors of any tier and their employees shall at all times comply with all applicable laws, ordinances, statutes, rules and regulations set forth by all federal, state and local governments and the Environmental Protection Agency in connection with NPDES Permitting requirements and laws and regulations pertaining to air, groundwater and surface water quality.

Fines and penalties imposed by the EPA against Owner or the contractor, for contractor's failure to comply with any of the requirements of NPDES General Permit of Arizona, shall be borne by the contractor.

F. Upon project completion, acceptance and demobilization, contractor shall submit its completed, duly executed NOT form to the EPA, with a copy to the Arizona Department of Environmental Quality (and the appropriate municipality), at the address listed in Section (B) above, thereby terminating all NPDES permit coverage for the project. Contractor shall then surrender to Owner copies of the SWPPP, inspection information and all other documents prepared and maintained by the contractor in compliance of the NPDES General Permit. Contractor shall retain the originals of such documents for a period of three (3) years following the completion of the project.

G. The Lump Sum price for the SWPPP shall include all material, labor, and all other costs relating to the preparation, installation and maintenance of the SWPPP during project construction, including assuring proper operation of the pollution control devices installed, and all maintenance, cleaning, and disposal costs associated with clean-up and

repair following storm events, runoff or releases on the project. The Lump Sum price for the SWPPP shall be inclusive of all costs, and no additional claims shall be made by Contractor under any other specification provision of these documents, including Change Conditions. Payment for this bid item shall be upon final completion and acceptance of the project, as per Section 109.1.

H. Copies of all required forms and guidance for preparing the SWPPP are available in the "Drainage Design Manual for Maricopa County, Volume III Erosion Control". The manual is available at the Flood Control District, 2801 West Durango Street, Phoenix, Arizona 85009.

Subsection 107.5:

Add the following:

The entire construction site shall be considered a "Hard Hat Area" and all personnel in the area will be required to wear a hard hat.

Subsection 107.5.2 - Compliance with the Arizona Communication Standard:

Add the following:

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

Contractor will provide 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 Contractor or by any subcontractors.

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

Subsection 107.10 - Contractor's Responsibility for Work:

Add the following:

All permanent construction shall be carried on in areas free from water. Water in varying quantities may be flowing in the river during the entire period of construction as a result of either rainfall or releases from agricultural irrigation ditches. Runoff from the watersheds is rapid and, during periods of rain intermittent freshets may be expected.

Surface water and/or water-table elevations at the site during certain periods of the year may create a need for dewatering during construction of the New River Channelization. It is the Contractor's responsibility to remove and/or control ground water and surface water so that all construction, inclusive of all earth filling and backfilling, shall not be performed in water or under water unless otherwise expressly permitted by the plans, the MAG Standard Specifications, or these Supplementary General Conditions. At all locations where construction work is at a lower elevation than the elevation of the stream or ground water at the time of doing the work, suitable cofferdams or dikes, if necessary, shall be constructed, the construction area shall be dewatered prior to commencement of work, and all subgrades, whether for earth fill, stone, or concrete, shall be kept drained and free of water throughout the working period.

Additionally, the construction area shall be protected from the surface water runoff up to 2,000 cfs flood peak. This volume equates to a 1.5 foot depth near the Grand Avenue Bridge. The depth (high water mark) of actual flood event shall be verified by both the District and Contractor's representative immediately after the storm.

No direct payment will be made for dewatering ground water or channelizing and diverting surface water. Costs for this work shall be considered incidental to and included in the bid items for Channel Excavation and the various bid items for bank protection.

Prior to commencement of construction, the Contractor shall submit to the Engineer an acceptable plan for handling ground and surface waters within the channelization limits during construction and for the method of determining flood event highwater marks at the Grand Avenue Bridge.

A. The Contractor shall be responsible for controlling and handling stormwater and other flows throughout the construction site, both surface drainage and channel flows, except channel flows which exceed 2,000 cfs as measured by gauges as described above. When measured channel flows exceed 2,000 cfs and result in damage to the work site, the owner will pay actual cost of damage repair. Actual cost is defined as materials, labor, and equipment utilized to restore damaged work area(s). Payment for damage repair work will be in accordance with Section 109.5 of MAG Specifications, titled Actual Cost Work. No other compensation will be considered or allowed, including home office or job site overhead.

The Contractor shall be responsible for contacting Salt River Project for information regarding flow releases.

Subsection 108.1 - Notice to Proceed:

Delete Paragraph (A) and replace with the following:

(A) Contractor shall commence work within seven (7) calendar days after the date of the Notice to Proceed and complete all work within one hundred eighty (180) calendar days beginning the day following the effective date specified in the Notice to Proceed.

Subsection 108.2 - Subletting of Contract:

Add the following:

For this project, Contractor shall perform, with its own organization, work amounting to 50 percent or more of the total contract cost.

Subsection 108.4 - Contractor's Construction Schedule:

Delete in its entirety and replace with the following:

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

Subsection 108.5 - Limitation of Operations:

Add the following:

Should Contractor elect to perform any work after regular working hours, on weekends, or legal holidays, "with or without written approval of Engineer", any charges incurred by Owner for inspection of the work, surveys or tests of materials will be deducted from monies due or to become due to Contractor.

Subsection 108.9 - Failure to Complete on Time:

Add the following:

The actual cost per calendar day incurred by Owner 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 Contractor for each and every calendar day that work shall remain incomplete after the time specified for the completion of the work in the proposal, or as adjusted by Engineer. Nothing contained in this provision shall prohibit Owner from deducting from monies due or to become due to Contractor for any other costs incurred by Owner directly attributable to the delay in completing this contract.

Subsection 109.2 - Scope of Payment:

Add the following:

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.

Subsection 109.7 - Payment for Bond Issue and Budget Projects:

Add the following.

(A) To third paragraph, add: Payment or release of retained funds shall be made to the contractor within thirty (30) days following final payment to the contractor (reference (B) following), and contractor furnishing to Engineer satisfactory receipts for all labor and material billed and waivers of liens from any and all persons and subcontractors holding claims against the work. Additionally, Contractor shall furnish a completed Certificate of Performance to Engineer evidencing it has satisfactorily discharged all its duties in connection with the work to be performed under this Contract. The form of Certificate of Performance shall be provided to Contractor by the Engineer.

(B) Delete second and third paragraphs and replace with: The final payment will be made to Contractor by Owner within thirty (30) days following receipt of Engineer's final estimate and receipt by Owner of Consent of Contractor's Surety to said final payment.

If payment will be longer than thirty (30) days as aforesaid, Owner will provide Contractor specific written findings for reasons justifying the delay in payment.

(C) Contractor's pay estimates will be initially processed by Owners' Construction and Operations Division on a Tuesday, Tuesdays being the only day Contractor may submit a pay estimate.

CONSTRUCTION
SPECIAL PROVISIONS
FOR
NEW RIVER CHANNELIZATION
GRAND AVENUE TO GREENWAY ROAD

FCD CONTRACT NO. 94-04

September, 1994

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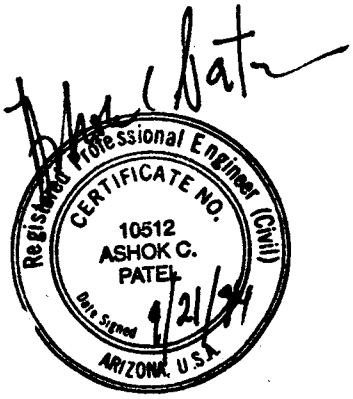

CONSTRUCTION
SPECIAL PROVISIONS
FOR
NEW RIVER CHANNELIZATION
GRAND AVENUE TO GREENWAY ROAD

FCD CONTRACT NO. 94-04

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SECTION 202 - MOBILIZATION

202.1 - Description

The work under this section shall consist of preparatory work and operations, including but not limited to, the movement of personnel, equipment, plant, 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 and operations that must be performed and costs incurred prior to beginning work on the various items on the project. Clearing and Grubbing will be done in accordance with MAG Standard Specifications and, since it is considered incidental work, will not be a separate pay item.

The District has identified, and set aside for the Contractor's use, one construction work area as depicted on the plans.

202.2 - Method of Measurement

Mobilization will be measured for the payment by the lump sum as a single complete unit of work.

202.3 - Basis of Payment

Payment for mobilization will be made by the lump sum under Item 202 of the Bid Schedule.

The amount bid shall include the furnishing and maintaining of services and facilities noted under Subsection 202.1 - Description, to the extent and at the time the Contractor deems them necessary for his operations, consistent with the requirements of the work and the Contract.

The amount bid shall be payable to the Contractor when he has completed ten percent (10%) of the Contract work. For the purposes of this item, 10% of the work shall be considered complete when the total of payment earned, as reflected by estimates of the work done, as set forth in Subsection 109.7 - Payment for Bond Issue and Budget Projects, not including the amount bid for this work, shall exceed 10% of the total amount of the Contractor's bid for this Contract.

Unless provided for elsewhere, the cost of required insurance, bonds, and permits and/or any initiation of the Contract work may be included in this work.

The adjustment provisions in Section 104 shall not apply to Mobilization.

When other Contract items are adjusted as provided in Section 104, and if the costs applicable to such items of work include mobilization costs, such mobilization costs will

be considered as recovered by the Contractor in the lump sum paid for mobilization and will be excluded from consideration in determining compensation under Section 104.

SECTION 206 - STRUCTURE EXCAVATION AND BACKFILL

In addition to the requirements of the MAG Standard Specifications:

206.1 - Foundation Material Treatment

When the foundation material below the concrete structure is unsuitable, as determined by the Engineer, the Contractor shall overexcavate the bottom of the trench as directed and replace the overexcavation with compacted backfill, compacted to 98 percent of maximum density unless otherwise stated on the plans.

Where the original ground surface is below the base of the structure, all fill required for the structure foundation shall be placed as compacted backfill. All fill about the structure above the base of the structure to lateral dimensions 1 foot outside the base of the structure and within slopes of one to one to finished surfaces of adjacent earthwork shall be placed as compacted backfill.

206.2 - Measurement

The quantity of excavation shall be those of the completed Bid Items and within the limits of dimensions shown on the plans.

206.3 - Payment

Quantities of excavation shall be paid for by the cubic yard, at the contract unit price for Item 206 of the Bid Schedule.

SECTION 211 - FILL CONSTRUCTION

In addition to the requirements of the MAG Standard Specifications:

211.1 - Description

The work under this section shall consist of placing and compacting material in fill areas designated as "Embankment Fill", "Channel Fill", "Disposal Site Fill" and "Overbank Fill".

211.1.1 - Embankment Fill

This item of work shall consist of the construction of earthen embankments shown on the plans as "Embankment Fill"; including furnishing the fill materials, watering, grading, shaping, and compaction. Embankment fill shall be constructed to a smooth and uniform surface and in close conformity to the lines, grades, dimensions, and cross-sections shown on the Plans or established by the Engineer. Embankment Fill shall be compacted to ninety-five percent (95%) of maximum density.

211.1.2 - Channel Fill

Channel fill will be necessary in channel areas where the existing ground is below the new channel flow line. Channel fill will not be subject to normal compaction testing requirements unless it is otherwise noted on plan; the normal action of placement and vehicle travel being considered sufficient to ensure adequate compaction.

211.1.3 - Overbank Fill

Overbank fill areas shown are designated for the disposal of excess material sufficient to bring overbank areas up to either the Top of Bank (TOB) or the elevation specified below TOB as designated on the design plans. These are minimum fill elevations necessary to control drainage, to be constructed as shown in detail on the design plans. Fill limits shown on the design plans are approximate only, overbank fill should extend sufficiently far toward or beyond the right-of-way (but within Temporary Construction Easements - TCE) in order to meet existing ground, while maintaining a minimum cross slope toward the channel bank or side drainage collection swale of 2 percent (2%). All construction must remain within the District right-of-way or within designated construction easements. The Contractor shall make reference to right-of-way and easement plans prepared by the District in addition to the design plans. Overbank fill shall be compacted to a density of ninety percent (90%).

211.1.4 - Disposal Site Fill

The District has the use of one fill disposal site adjacent to the New River Channelization project for the disposal of excess fill material. The location of this site is illustrated on Sheet 17 of the design plans. This site shall be used by the Contractor, as described, for the wasting of excess fill material.

The District is the owner of a parcel of land along the east bank of Skunk Creek from the confluence with New River to the Agua Fria Expressway Bridge. This parcel is shown on the design plans and referenced as Fill Disposal Site "B". This site shall be used for disposal of construction debris as defined in Subsection

212.2.1. Construction debris shall be covered with a minimum of three (3) feet of clean fill material below the finished grades shown on the Design Plans.

211.2 - Placing

Placement of fill and benching shall be in accordance with the MAG Standard Specifications. Construction debris, inclusive of asphalt, may be placed within the Zone B "Overbank Fill" area as defined in Subsection 211.2.1 and as shown on the Design Plans (Sheet 5). No asphalt concrete (pavement, hot mix, or cold mix) shall be placed beyond the toe of the soil cement within the channel. Construction debris, as defined in Subsection 212.3.1, can be disposed of at the Disposal Site illustrated on sheet 17 of the Design Plans. Surplus graded material, obtained from onsite screening processes will be permissible, provided that in overbank fill areas, the top one (1) foot uses ungraded native materials.

An alternative method of handling asphalt material may or may not be selected by the Owner. In the event that the Arizona Department of Environmental Quality does not allow the asphalt material to be used within the fill areas, the optional material handling bid will be selected by the Engineer. In such event, asphalt materials will require special handling and separating. For specifics, refer to Section 212.

'Overbank Fill' and 'Disposal Site Fill' shall be compacted to a density of not less than 90 percent of the maximum density. 'Embankment Fill' shall be compacted to a density of not less than 95 percent of the maximum density."

211.2.1 - Embankment Fill Placement

"Embankment Fill" construction shall not be started until clearing and grubbing for the embankment fill area is completed in accordance with the requirements of MAG Standard Specifications Section 201.

"Embankment Fill" shall be constructed to a total width at least two (2) feet wider than that indicated on the plans, of which one (1) foot of additional width shall occur on each side of the embankment. Once constructed, the face on which soil cement is to be placed shall be trimmed back to the finished lines, grades, and dimensions shown on the plans in order to insure proper compaction and stability of the embankment. On the backslope side, only surfaces exposed following placement of "Overbank Fill" shall be trimmed. Material trimmed from the embankment slopes shall be used as fill and/or backfill at other locations on the project. Trimming of embankment faces upon which overbank fill is to be placed will not be required. No additional payment shall be made for material placed beyond the finished lines and grades of the levees or for trimming, removing, and hauling said material, rather, these costs are considered incidental to the construction of the levee.

Fill may be constructed in a zoned configuration as indicated on fill detail, Sheet 5 of the Design Plans. Zone A Embankment Fill shall be placed from materials conforming to Type I listed below. Zone B Overbank Fill shall be placed from materials conforming to either Type I or Type II listed below.

Embankment Fill
Percent Passing, Dry Weight

Sieve	Type I	Type II
8"	100	100*
3"	100	--
No. 4	20 - 80	35 - 100
No. 200	2 - 15	0 - 20
	5<P.I.<15	0<P.I.<20

* Individual particles between 8 and 24 inches in size, including concrete, may be utilized in Zone B when placed in accordance with the requirements of this section.

Zone A and Zone B materials shall be placed in uniform horizontal layers not to exceed 12 inches in thickness, before compaction, and shall be compacted in accordance with the requirements of these specifications before the next layer is placed.

When the embankment material resulting from the required excavations consists predominately of construction debris (broken concrete, asphalt pavement, etc.) of such size that the material cannot be placed in 12 inch layers without crushing, pulverizing or further breaking down the pieces, such material may be placed in Zone B in layers not exceeding in thickness the approximate average size of the larger fragments being excavated. The larger fragments shall be evenly distributed between them to form a dense and compact mass. Each layer shall be leveled and smoothed with suitable leveling equipment.

Concrete and asphalt fragments with any dimension greater than 24 inches shall be removed and disposed of in accordance with Section 211 of these Provisions, or reduced to a maximum of 24 inches before placing in Zone B.

211.3 - Compacting

Wheel rolling with construction hauling equipment will not be an acceptable method of compaction. Equipment specifically designed for earthwork compaction will be acceptable. If a steel wheel roller is used, the resulting smooth surface shall be sufficiently roughened after compaction to insure bond to the succeeding layer. Vibratory compaction methods or equipment shall not be used when and/or where their use contributes to sloughing or caving of soils which the soil-cement is to be placed against.

211.3.1 - Embankment Fill Compaction

'Embankment Fill' material shall be placed in uniform horizontal layers not exceeding twelve (12) inches in depth before compaction except as noted in Subsection 211.2.1.

Compaction shall be accomplished by rolling, tamping, or other suitable means utilizing equipment specifically designed for earthwork compaction. Wheel rolling with construction hauling equipment will not be considered an acceptable method of compaction. Vibratory compaction methods or equipment shall not be used when and/or where their use contributes to sloughing or caving of soils which the soil-cement is to be placed against. Each layer of earth material shall be compacted to the specified density before the next layer is placed. Effective spreading equipment shall be used on each layer to obtain uniform thickness prior to compacting. As the compaction of each layer progresses, continuous leveling and manipulation of the material will be required to assure uniform density. Water shall be added or removed, if necessary, in order to obtain the required density. It shall be the Contractor's responsibility to properly place and compact all materials in the embankment fill section, and to correct any deficiencies resulting from improper or insufficient compaction of such materials throughout the Contract period.

The top ten (10) inches of ground on which embankment fill is to be constructed shall be compacted to a density of not less than ninety-five percent (95%) of the maximum density. All material placed in fill areas upon which embankment fill is to be constructed shall be compacted to a density of not less than ninety-five percent (95%) of the maximum density.

Each layer of earth material for embankment fill construction shall be compacted to a density of not less than ninety-five percent (95%) of the maximum density.

211.4 - Tests

Replace Subsection 211.4 of the MAG Standard Specifications with the following:

Optimum moisture and maximum density shall be determined in accordance with ASTM D-698 or AASHTO T-99. Field density tests shall be performed in accordance with ASTM D-1556, "Sand Cone Method" or AASHTO T-238, "Nuclear Method". Moisture contents shall be measured and reported to the nearest 0.1%.

During the progression of the work, the Engineer will review the Contractor's operations with regard to the following items:

1. Lift thickness shall not exceed the maximum allowed as herein stated. Thinner lifts than the maximum allowed may be necessary to obtain required result on some materials.

2. The compaction effort shall be uniformly applied.

3. Significant rutting, under the action of the compactor, on the final passes on a layer shall not occur.

4. Proper compaction on a layer shall be obtained as required by the specifications.

Whenever a deficiency is noted in the Contractor's operations, the Engineer will prohibit placement of an overlaying lift until the Contractor takes effective corrective action. When the Engineer determines that density tests are necessary, the Contractor shall provide any assistance requested to facilitate such tests. Such assistance shall include, but will not be limited to, excavation and backfill of test pits and holes. This work shall be considered to be incidental to construction.

Damage to any compacted lift at any time during the course of construction, such as rutting under the loads imposed by earth moving equipment, shall be fully repaired by the Contractor, at his own expense, prior to placement of any overlaying material.

211.5 - Measurement

Approximate quantities of "Embankment Fill" are indicated on the Bid Schedule item 211. "Channel Fill" and "Overbank Fill" are non-pay items and their measurement is not indicated. Fill Disposal Site "B" shall be filled to the lines and grades as denoted on the design plans.

The quantities of "Embankment Fill" between the lines and limits shown on the plans will be measured by the cubic yard, computed in the final compacted position. Any additional quantity of material required to compensate for foundation settlement, compaction, erosion, or other cause shall not be included in the measurement of this item. The quantities of embankment fill shall exclude the total volume of bank protection. No deductions will be made for the volumes occupied by pipes or culverts.

The 1.5:1 slopes of the earth cuts and embankment fill slopes for the river channel may slough if surcharges of equipment or embankment fill are placed on the ground surface above and adjacent to the slope prior to soil-cement placement against the slope and all such slopes may be slough or fail from excess moisture, rain, insufficient moisture, seismic events, or other similar causes.

Such sloughed slopes shall be reconstructed to the 1.5:1 earth slope line shown on the plans before placing the soil-cement against then, or the sloughed material shall be removed and replaced with additional soil-cement. The costs of reconstructing the 1.5:1

slopes, or placement of additional soil-cement (inclusive of cement) between sloughed slope faces and the 1.5:1 earth slope lines, as shown on the plans, shall be considered as included in the Contract price paid for embankment fill constructed to the lines and grade shown on the plans, and no separate payment will be made therefore.

211.6 - Payment

No measurement of direct payment will be made for construction of "Channel Fill", "Overbank Fill" or "Disposal Site Fill", grading of site drainage collection swales, or placement of excess fill at fill disposal sites or spoil sites, the cost being considered as incidental to and included in the cost of channel excavation.

Payment for "Embarkment Fill" will be made for the number of cubic yards in place, as measured above, on the basis of unit prices stipulated in the Bid Schedule for Item 211, and shall include preparation of ground surfaces.

SECTION 212 - LANDFILL EXCAVATION & DISPOSAL

Add the following Section 212 - Landfill Excavation & Disposal to the MAG Standard Specifications.

212.1 - Description

The work shall consist of removing and disposing of all existing man-made landfills from within the embankment fill and soil-cement bank protection areas defined herein. Landfill is defined as all man-made waste including "Hazardous Materials". Unless otherwise directed by the Engineer, the Contractor shall remove all existing landfills that lie within the "Embankment Fill" limits. If additional Temporary Construction Easements are required beyond those designated, the District shall be notified immediately. The TCE acquisition time shall not be considered as grounds for a delay of project. The extent of excavation beneath the bottom of the soil-cement bank will be determined as necessary by the Field Engineer.

Sorting of materials to be disposed, as defined within this section, will be required to ensure a minimum concentration of such materials in any given unit volume. See Section 212.3 for concentration requirements.

212.2 Hazardous Waste Materials

There is no physical evidence that Landfill of hazardous materials exists within the limits of this project. The following section on hazardous waste excavation and disposal defines a hazardous waste, specifies the method of disposal, and provides for method of payment in the event such landfill materials are encountered.

Hazardous waste is defined as all man-made waste including, tires, auto batteries, transformers and other items containing chemicals determined to be very harmful to the environment.

212.2.1 Disposal

Landfill materials, if any, shall be taken from the site and disposed of at a designated landfill or as approved by the Engineer. Disposal methods and location will depend on the type of material encountered. Hazardous waste, tires and batteries will require special handling.

212.2.2 Hazardous Chemicals and Materials

In the event the Contractor encounters such material, work in the area shall stop immediately and the Contractor shall notify the Engineer. The area suspected of containing hazardous waste shall be barricaded by the Contractor until the type of waste has been identified and disposal has been completed. If the presence of hazardous material has been verified, construction activities will be suspended as necessary and as directed by the Engineer. Appropriate action will be taken to properly dispose of the hazardous material as outlined in Section 213.

212.2.3 Tires

Tires must be hauled to an approved tire disposal site such as the Northwest Regional landfill. General information can be obtained by calling 506-7060.

212.2.4 Batteries

The County-operated New River Landfill is an approved battery recycling facility.

212.2.5 Payment

Payment shall be on actual cost basis as defined in Section 109.5 Actual Cost Work of MAG Uniform Standard Specifications.

212.3 - Construction Debris

212.3.1 Description

Construction debris are materials such as broken concrete, asphalt, rebars, and other materials of organic origin such as wood and plastics.

All existing such landfill materials removed by the Contractor shall either be processed onsite and utilized as Zone B material (as defined in Section 211) as

approved by the Engineer, or placed in Fill Disposal Site "B" as designated on the plans.

Construction debris placed at Site "B" shall have a minimum of three (3) feet of cover with clean material below the finished grades shown on the design plans. The Contractor shall be responsible for obtaining all necessary permits and shall submit proof of such permits to the District or its Engineer prior to the disposal of any material.

212.3.2 Organic Material

Organic material will be permitted to be dumped at Fill Disposal Site "B". The Contractor should assure himself as to the types of waste that may be disposed of at this site.

212.3.3 Asphalt Material, Disposal

Asphalt materials may either be processed onsite and utilized as Zone B material (as defined in Section 211) as approved by the Engineer, or placed in Fill Disposal Site "B" as designated on the plans.

212.3.4 Measurement

No measurement for direct payment will be made for construction debris excavation, hauling and preparation for use as fill material in Fill Zone "B" or disposal at Disposal Site "B".

212.3.5 - Payment

There will be no seperate payment for excavation and disposal of construction debris, the cost being considered as incidental to and included in the cost of channel excavation and embankment fill construction.

General Comments:

In order to assist in bid preparation, an example of an approved Monitoring Plan from a previous project will be available at the Flood Control District for review by prospective bidders.

SECTION 213 - LANDFILL EXCAVATION MONITORING

213.1 - Description

The Contractor shall establish and maintain an effective landfill monitoring system. The landfill excavation monitoring system shall consist of plans, procedures, and organization

necessary to provide monitoring and reporting operations which comply with Contract requirements. The system shall cover monitoring of excavation operations in the landfill areas, as identified by the Engineer, and shall be keyed to the proposed construction sequence.

213.2 - Landfill Excavation Monitoring Plan

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

Before the start of construction, the Contractor shall meet with the Engineer to discuss the Contractor's Landfill Excavation Monitoring system. During the meeting, a mutual understanding of the system details shall be developed, including the requirements for reporting the Landfill excavation Monitoring operations, control activities, testing, administration of the system for both onsite work and offsite testing, and the interrelationship of Contractor's inspection and control with the Engineer's inspection. Minutes of the meeting shall be prepared and signed by both the Contractor and the Engineer. The minutes shall become a part of the Contract file.

This plan shall include, as a minimum, the following:

(1) A description of the Landfill Excavation Monitoring organization individual or subconsultant;

(2) The name, qualifications, duties, responsibilities, and authorities of each person assigned Landfill excavation Monitoring and/or testing functions;

(3) Procedures and subconsultants intended to be used in the event of emergencies or the encounter of hazardous wastes during excavations;

(4) Reporting procedures to document the type and number of control activities, results of control activities, proposed remedial action (if any), and correction actions taken;

(5) The individual, within his organization at the site of the work, who shall be responsible for overall management of Landfill Excavation Monitoring and have the authority to act in all monitoring matters for the Contractor.

Acceptance of Contractor's plan will be required prior to the start of landfill excavation.

Acceptance is conditional and will be predicated on satisfactory performance during the

construction. The District reserves the right to require the Contractor to make changes in his Landfill Excavation Monitoring plans and operations as necessary to obtain the monitoring specified.

213.3 - Landfill Excavation Monitoring Organization

213.3.1 - System Manager

The Contractor shall identify an individual, within his organization at the site of the work, who shall be responsible for overall management of Landfill excavation Monitoring and have the authority to act in all monitoring matters for the Contractor. The System Manager shall be a Certified Industrial Hygienist or Safety and Health Specialist. A Certified Industrial Hygienist shall have working experience in the chemical industry and/or chemical waste industry and will have a sound working knowledge of state and federal occupational and safety regulations and formal training in occupational safety and health. A Safety and Health Specialist will have a minimum of two years working experience in the chemical industry and/or chemical waste industry. The Safety and Health Specialist will have a sound working knowledge of State and Federal occupational safety and health regulations and formal training in occupational safety and health. This System Manager shall be approved by the Engineer.

213.3.4 - Personnel

A staff shall be maintained under the direction of the system manager to perform all Landfill Excavation Monitoring activities. The actual strength of the staff during any specific work period may vary to cover work phase needs, shifts, and rates of placement. The personnel of this staff shall be fully qualified by experienced and technical training to perform their assigned responsibilities and shall be directly hired by and work for the Prime Contractor.

213.3.5 - Monitoring

Monitoring Procedure. The Contractor shall perform monitoring specified or required to verify that control measures are adequate to provide monitoring conforming to contract requirements. A list of activities which the Contractor understands he is to perform shall be furnished as a part of the Landfill Excavation Monitoring plan to the Engineer. The list shall give the specification paragraph containing the requirements and the personnel responsible for each activity. The Contractor shall perform the following activities:

(A) Verify monitoring complies with Contract requirements.

(B) Verify monitoring is adequate to provide immediate notification of the presence of hazardous waste.

(C) Verify recording forms have been prepared.

213.3.6 - Documentation

The Contractor shall maintain correct records of Landfill Excavation Monitoring operation performed including the work of subcontractors. In addition, these records shall include factual evidence that the required activities have been performed including, but not limited to, the following:

(A) Type and number of control activities involved.

(B) Results of control activities.

(C) Proposed remedial action.

(D) Corrective actions taken.

(E) Significant problems and results encountered outside of limits.

(F) These records shall cover both conforming and defective or deficient activities. Legible copies of these records shall be furnished to the Engineer daily. The Contractor shall maintain reports and supporting data throughout the duration of the Contract.

213.4 - Payment

No separate payment shall be made for providing monitoring of existing landfills, the cost being assumed to be incidental to the cost of Section 212 - Landfill Excavation and Disposal. Should hazardous chemicals or waste be encountered during the course of these inspections, the Engineer shall be notified immediately, with a follow-up notification in writing. The cost of implementation of cleanup will be based upon Actual Cost Work as described in MAG Standard Specifications, Section 109 -Measurements and Payments of the Standard Specifications.

SECTION 215 - CHANNEL EXCAVATION

In addition to the requirements of the MAG Standard Specifications.

215.1 - Description

This item of work shall include channel excavation, overbank filling, drainage channel excavation, and grading behind embankment fills, watering, grading, shaping, and compaction.

215.2 - Excavation and Fill and Backfill

215.2.1 - Excavation

Prior to commencing any excavation work, the contractor shall notify the appropriate utility companies or Arizona Blue Stake as noted in MAG Standard Specifications, Subsection 105.6

The Contractor shall take full responsibility for costs incurred due to damage to utilities as a result of excavation or embankment operations. Utility locations shown are approximate and all utilities are not necessarily shown. No direct payment will be made for this work, the cost being included in the price for Channel Excavation.

The Contractor shall provide for continued access to private property during and after grading of the right-of-way has been accomplished. Any deviation from the Plans necessary for this purpose shall first be approved, in writing, by the Engineer. The Contractor shall secure written permission from the appropriate property owner prior to undertaking any work outside the designated right-of-way necessary for this purpose. No direct payment will be made for this work, the cost being included in the price for Channel Excavation.

215.2.2 - Fill and Backfill

At the time of compaction, the moisture content of material to be used in fill areas shall be such that the specified compaction will be obtained and the fill will be firm and unyielding. Material containing excessive moisture shall not be compacted until the material is dry enough to obtain the required compaction. Compensation for additional work involved in drying fill material to the required moisture content shall be considered as included in the Contract price for Channel Excavation and no additional compensation will be allowed. Concrete is allowable within backfill areas if it is crushed into pieces less than eight (8) inches in diameter and is covered with a minimum of three (3) feet of clean fill.

215.3 - Measurement

The quantities of Channel Excavation will be measured by the cubic yard of excavation only, as computed in the original position within the payment limits indicated on the Plans. The Engineer will compute the quantities of Channel Excavation based upon the

differences between field cross-sections of the existing ground, obtained at the start of the project, and the channel design grades. Cross-sections will be obtained at a maximum spacing of 100 feet and quantities will be computed using the "average end area" method. Channel excavation quantities are inclusive of quantities to the backslope of the soil cement as necessary for its placement, but not inclusive of any excavation below the flowline. Over-excavation shall not be paid for unless authorized, in writing, by the Engineer.

215.4 - Payment

The Contract unit price for Channel Excavation includes payment for all work encompassed by this Section, and shall be full compensation for performing all work and for furnishing all equipment, labor, and materials as necessary to complete the work of the item, except where specific costs are designated or included in another pay item of work.

All incidental costs, such as acquisition of borrow pits or material outside of the right-of-way, rock and/or concrete drilling and blasting, compaction and special test requirements, stockpiling and rehandling of materials, precautionary measures to protect private property and utilities, to form and trim graded surfaces, and any delays caused by corrective work, shall all be included in the unit price of the pay item where such costs are incurred. When there is no pay item for Construction Water in the itemized proposal, the work shall be performed in accordance with the specifications for the appropriate items but, the costs thereof shall be included in those pay items that require the application of water. Payment shall be made at the Contract unit price per cubic yard of in-place volume for Item 215 in the Bid Schedule and shall cover all costs of channel excavation, overexcavation, and backfill as indicated on the design plans. No additional compensation will be made for overhaul required to complete the work.

SECTION 220 - RIPRAP CONSTRUCTION

Replace Section 220 of the MAG Standard Specifications with the following:

220.1 - Description

The work shall consist of furnishing all plant, labor, equipment, and materials and performing all work necessary, including toe excavation, backfill, and dewatering to place a protective covering of erosion-resistant material on the slopes of embankments, riverbanks, or levees, at culvert inlets and outlets, on bottoms and side slopes of channels, at abutment wings, at structure foundations, at drop structures, at other locations shown on the plans, or as directed by the Engineer.

The work in this section shall include the placement of new grouted riprap at the ADOT outlet in Skunk Creek (Sta. 461+92), and at the 91st Avenue channel outlet (Sta. 475+69).

The work shall be done in accordance with these specifications and in conformity with the lines and grades shown on the plans or established by the Engineer. The items of work included in this specification are:

(A) **Salvaged Riprap**: Salvaged riprap consists of river run cobbles obtained through on-site screening and grading operations.

(B) **Imported Riprap**: At the Contractor's option, riprap meeting the specifications for salvaged riprap.

(C) **Grouted Riprap**; Loose riprap grouted in place.

220.2 - Materials

Rock used for riprap shall be sound and durable, free from clay or shale seams, cracks or other structural defects and shall have a specific gravity of at least 2.50.

Control of gradation will be by visual inspection. The Contractor shall provide two samples of rock of at least five (5) cubic yards each, meeting the gradation specified herein. One sample shall be provided at the quarry and one sample at the construction site. The sample at the construction site may be a part of the furnished riprap covering. These samples shall be used as a frequent reference for judging the gradation of the riprap supplied. Any difference of opinion between the Engineer and the Contractor shall be resolved by dumping and checking the gradation of two random truck loads of rock. Mechanical equipment, a sorting site, and labor needed to assist in checking gradation shall be provided by the Contractor at no additional cost to the District. No source of rock is designated. It shall be the Contractor's responsibility to negotiate for the material, obtain the right-of-way and pay all applicable royalties and damages.

The source from which the rock will be obtained shall be selected well in advance of the time when the rock will be required in the work. The acceptability of the rock will be determined by the Engineer on the basis of test results furnished by the Contractor. Suitable samples of rock shall be taken in the presence of the Engineer at least 45 days in advance of the time when the use of the rock is expected to begin. The approval of some rock fragments from a particular quarry site shall not be construed as constituting the approval of all rock fragments taken from the quarry. The Contractor shall provide the Engineer with test reports from an independent testing laboratory to establish that the sampled rock has a minimum specific gravity (Bulk SSD) of 2.50 per ASTM C127. Rock shall contain no swelling type clay.

220.3 - Preparation of Ground Surfaces

Areas on which riprap is to be constructed shall be cleared, grubbed, excavated, or backfilled in accordance with the MAG Standard Specifications and these Special Provisions. The areas shall be graded and dressed to produce a ground surface in

reasonable conformance with the lines and grades shown on the plans or established by the Engineer. All soft or spongy material shall be removed to the depth directed by the Engineer and replaced with approved material. Filled area shall be compacted as specified in Section 211 - Fill Construction for "Embankment Fill".

Placement of riprap and/or filter fabric through water will not be permitted unless otherwise approved, in writing, by the Engineer.

220.4 - Plain Riprap

Salvaged riprap shall be stone that has been obtained from on-site screening grading operations ranging from 3- to 24-inches in size.

All points on individual grading curves shall be between the boundary limits as defined by smooth curves drawn through specified grading limits plotted on a mechanical analysis diagram. The individual grading curves shall not exhibit abrupt changes in slope denoting skip grading or scalping of certain sizes. Specified grading of all material shall be met both at the source and as delivered to the project.

It is anticipated that salvaged riprap may be obtained from on-site screening and grading operations. Stone may be furnished from other sources at the option of the Contractor, subject to the conditions stated herein. Material to be used for riprap, whether salvaged onsite or obtained elsewhere, shall conform to the gradation tables below for the types of riprap specified:

TYPE I (D_{50} = 8")

RIPRAP GRADATION	
Diameter	**Percent Passing**
16"	90-100
12"	70-85
8"	30-50
5"	5-15
3"	0-5

TYPE II (D_{50} = 12")

RIPRAP GRADATION	
Diameter	**Percent Passing**
24"	90-100
18"	70-85
12"	30-50
8"	5-15
4"	0-5

TYPE III (D_{50} = 14")

RIPRAP GRADATION	
Diameter	**Percent Passing**
18"	90-100
14"	30-50
9"	0-5

220.4.1 - Filter Blanket/Filter Fabric

A base upon which loose riprap types II & III is to be placed is to be constructed of a granular filter blanket or a filter fabric. A filter blanket shall consist of a one (1) ft. thick layer of granular material which conforms to the following gradation:

D_{85} = 100mm
D_{50} = 25mm
D_{15} = 3.5mm

If a filter fabric is installed in lieu of a granular filter bedding, the filter fabric material shall conform to the following specifications:

Min. permeability:	$1.6x10^{-3}$ ft./sec.
Max. AOS:	0.6mm
Type:	Mirafti 140n, TYPAR 3401, TRIVERA Spunbound 1112 or Approved Equal
Overlap:	18-inch minimum at Fabric Edge

Filter fabric overlaps shall be pinned using steel securing pins, 3/16 inch diameter, 18 inches long, pointed at one end and fitted with a 1.5 inch diameter metal washer at the other end. Pins shall be placed along the overlap at approximately three feet on center.

220.4.2 - Placement

Rock for riprap shall be placed on the prepared slope or base in a manner which will produce a reasonably well-graded mass of rock with a minimum practicable percentage of voids. The entire mass of rock shall be placed so as to be in conformance with the lines, grades, and thicknesses shown on the plans. Riprap shall be placed to its full course thickness at one operation and in such manner

as to avoid displacing the underlying material. Placing the riprap in layers, or by dumping into chutes, or by similar methods likely to cause segregation, will not be permitted. Riprap thickness shall be as shown on plan.

The larger rocks shall be well distributed and the entire mass of rock shall conform to the gradation specified in Subsection 220.4 All material going into riprap bank protection shall be so placed and distributed that there will be no large accumulations of either the larger or smaller sizes of rock.

It is the intent of these specifications to produce a fairly compact riprap protection in which all sizes of material are placed in their proper proportions. Hand placing or rearranging of individual rocks by mechanical equipment may be required to the extent necessary to secure the results specified.

The Contractor shall maintain the riprap protection until accepted, and any material displaced by any cause shall be replaced to the lines and grades shown on the plan at no additional cost to the District.

RIPRAP LOCATION

STATION	TYPE
450+23-451+23	II (plain) 12"
452+73-453+23	III (plain) 14"
462+00 (Skunk Creek, RT)	II (grouted) 12"
475+39-475+69 (LT)	I (grouted) 8"

220.5 - Grouted Riprap

The grout shall consist of one part cement and three parts by volume of aggregate. The Portland Cement shall be Type II as specified in Section 725 of the MAG Standard Specifications, and the aggregate shall be two parts sand and one part gravel passing a 3/8-inch square mesh screen. The quality of the sand and gravel shall be a specified in Section 701 of the MAG Standard Specifications.

Rock to be used for grouted riprap shall conform to the Riprap Gradation Table, TYPE I as specified in Section 220.4.

The water content of the mix shall not exceed 8-1/2 gallons per sack of cement. In calculating total water content of the mix, the amount of moisture carried on the surfaces of aggregate particles shall be included. Slump of grout mix shall be between 9 and 10 inches for the first course, and between 7 and 8 inches for the second course. The grout shall be mixed in a concrete mixer in the manner specified for concrete, except that time of mixing shall be as long as is required to produce a satisfactory mixture, and the grout

shall be used in the work within a period of 30 minutes after mixing. Retempering of grout will not be permitted.

The consistency of the grout shall be such as to permit gravity flow into the interstices of the stones with the help of spading, rodding, and brooming in order to assure penetration of the grout for full depth of the riprap layer. Grout batches in the same course shall be uniform in mix, size, and consistency.

220.5.2 - Placement

New riprap shall be placed to the dimensions and locations as shown on the plans.

Prior to grouting, the stone shall be thoroughly washed with water to wash down the fines and remove silt form the full depth of the gabions, and to prevent absorption of water from the grout. The stone shall be kept wet just ahead of the actual placing of the grout.

The grout shall be placed in two courses on the side slopes. Each course shall be placed full width or in successive lateral strips approximately 10 feet in width, as applicable, extending from toe of slope to top of side slopes. The grout shall be brought to the place of final deposit pneumatically by approved means and discharged directed on the stone. The flow of grout shall be directed with brooms or other approved baffles to cover the entire area and to assure that all crevices are filled. Sufficient barring shall be done to loosen tight pockets of stone and otherwise aid the penetration of grout. The first course shall fully penetrate the stone blanket. The second course shall be placed as soon as the first course has sufficiently stiffened so that it will not flow when additional grout is added. On side slopes, all brooming shall be uphill. The finished surface of the grout shall fill the interstices of the stones to the top of stone surfaces and then lightly brushed. The upper surface of the completed grout layer shall be approximately 2 inches below the upper surface plane of riprap stone. After the grout has been placed, the portion of stone projecting above the grouted surface shall be cleaned by air-water blasting. Cleaning shall remove all grout, cement paste, and discolorations caused by the grout without damaging the grout to remain in place.

After completion of any strip or panel, no workmen or other load shall be permitted on the grouted surface for a period of 24 hours. The grouted surface shall be protected from injurious action of the sun; shall be protected from rain, flowing water, and mechanical injury; and shall be moist cured or membrane cured at the Contractor's option.

220.5.3 - Curing and Protection

The grout shall be kept moist for a period of seven (7) days following placement or may be covered with a suitable curing material subject to the engineers

approval. Any damage to the protective membrane provided by an approved curing material occurring within the initial 7 days of placement shall be repaired immediately to the satisfaction of the engineer.

Curing compounds shall be applied as soon as the free water disappears and shall be applied in a 2-coat continuous operation by approved power-spraying equipment at a rate not to exceed 200 square feet per gallon for the combined coats. The second coat shall be applied to overlap the first coat in a direction approximately at right angles to the direction of the first application.

Membrane curing compound shall be resin-base dissipating membrane-type conforming to CRD-C 300.

Whenever atmospheric temperatures are expected to drop below 30° F, grouted riprap shall be protected from freezing for 7 days after its construction by a covering of loose earth, straw, or other suitable material approved by the engineer.

220.6 - Measurement

The quantities of riprap construction shall be measured by the cubic yards of riprap, in place, within the limits of dimensions shown on the plans. Quantities of salvaged riprap in excess of design requirements may be disposed of within the project limits as shown on the design plans. No measurement shall be made for quantities in excess of design requirements.

Grouted riprap shall be measured by the cubic yard, in place, inclusive of excavation, placement of rocks and grouting. Approximate dimensions and quantities are shown on the design plans.

220.7 - Payment

Payment for loose riprap will be made for the number of cubic yards of riprap in place, as measured above, on the basis of unit prices stipulated in the Bid Schedule for Item 220-1 and shall include preparation of ground surfaces and trenching.

Payment for grouted riprap shall be by the cubic yard, in place, inclusive of all labor and materials on the basis of the unit prices stipulated in the Bid Schedule for Item 220-2.

No separate payment shall be made for Filter Blanket/Filter fabric. Cost are incidental to the cost for loose riprap.

SECTION 221 - SOIL-CEMENT BANK PROTECTION

SECTION 221 - SOIL-CEMENT BANK PROTECTION

221.1 - Description

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

The Contractor shall submit a plan showing his intended method of constructing the soil-cement. The plan shall be sufficient in detail to clearly describe the planned execution of the work. Such plan shall include, but not necessarily be limited to, mixing plant, transport equipment, spreading equipment, and compacting equipment, indicating number and capacities of each type of equipment.

The Contractor shall have full responsibility for administration of a Quality Control Plan for soil-cement which shall meet the same quality control requirements as Section 105 of the MAG Standard Specifications.

The plan shall also show the access planned for performing the work.

221.2 - Materials

221.2.1 - Portland Cement

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

221.2.2 - Water

Water shall be clear and free from injurious amounts of oil, acid, alkali, organic matter, or other deleterious substances. Water shall contain not more than 1,000 parts per million of chlorides as CL or of sulfates as SO4. Water shall be sampled and tested in accordance with the requirements of AASHTO T26.

221.2.3 - Aggregate

Soil aggregate for use in soil-cement may be produced by the Contractor by processing, screening, crushing and/or blending soils obtained from the required excavations, and/or may be furnished by the Contractor from Contractor - furnished borrow. Soil aggregate for soil-cement shall contain no deleterious material. Before mixing as soil-cement the soils shall be stockpiled and sampled, and shall be approved by the Engineer, in accordance with the requirements of Section 221.9 of these Special Provisions. The distribution and gradation of materials in the soil-cement lining shall not result in lenses, pockets, streaks, or

layers of material differing substantially in texture or gradation from surrounding material.

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

Sieve #	Percent Passing, By Dry Weight
3"	100%
No. 4	40% to 90%
No. 200	0% to 12%

Plasticity index shall be between 0 and 5 when tested in accordance with the requirements of AASHTO T-90.

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

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

221.2.4 - Fly Ash

Fly ash shall not be allowed as cementitious material.

221.3 - Equipment

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

221.4 - Construction Requirements

221.4.1 - Required Contractor Submittals

Such approval shall not relieve the Contractor of the responsibility for achieving the desired result of constructing sound soil-cement, free from defects, according to the specifications and plans, or as directed by the Engineer.

Prior to the start of construction, the Contractor shall submit, in writing, for approval, the following items:

1. The approximate length of soil-cement bank protection to be placed prior to starting compaction operations.

2. The type of compaction equipment to be used.

3. The number and type of watering equipment to be used.

4. The method to be used to keep surfaces continually moist until subsequent layers of soil-cement are placed.

5. The method to be used to cure permanently exposed soil-cement surfaces.

6. The proposed source(s) of soil to be used in soil-cement.

7. The proposed size and number of soil aggregate stockpiles.

8. The mix design to be used in conformance with the requirements specified herein.

221.4.2 - Preparation

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

The subgrade shall be compacted to a minimum of ninety-eight percent (98%) of the maximum density. Optimum moisture and maximum density shall be determined in accordance with ASTM D-698 or AASHTO T-99. Field density tests shall be performed in accordance with ASTM D-1556 "Sand Cone Method" or AASHTO T-238 "Nuclear Method". Moisture contents shall be measured and reported to the nearest 0.1%.

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

Excavation and backfill of toes, and any dewatering necessary to construct soil-cement bank protection below the channel bed profile elevations shown on the plans shall be considered incidental to the construction of the soil-cement and included in the cost of Item 221, Soil-Cement Bank Protection.

221.4.3 - Mixing

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

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

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

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

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

Mixing shall be sufficient to secure a homogeneous, intimate, uniform mixture of the soil, and water within the specified tolerances. Soil and cementitious material

shall be mixed sufficiently to prevent cementitious balls from forming when water is added.

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

At the completion of moist mixing, any lumps consisting of silt, clay and/or cementitious material shall be so pulverized that, exclusive of gravel-sized and larger stones, 100% shall pass a one (1) inch sieve, and at least 80% by dry weight shall pass a No. 4 sieve.

In the production of soil-cement, the percent of cementitious material shall not vary by more than +0.3 percent of the contents specified by the Engineer.

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

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

1. The total discharged quantity per hour of each weighed or metered material.

2. The cumulative total discharged quantity of each weighed or metered material.

3. The moisture content of the combined soil aggregate currently entering the mixer.

4. The cumulative total discharged weight of soil aggregate moisture.

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

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

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

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

221.4.4 - Required Moisture

At the time of compaction, the moisture content of the soil-cement shall not be more than 2.0 percent below optimum and shall not be above optimum when the mean air temperature during construction hours does not exceed 90°F. The relationship between the soil-cement's moisture content and its optimum moisture content will be determined in accordance with ASTM D-558 or AASHTO T-134. When the mean air temperature does exceed 90°F, or there is a breeze or wind which promotes the rapid drying out of the soil-cement mixture, the moisture content of said mix shall be increased as needed at the direction of the Engineer, but shall be less than that quantity that will cause the soil-cement to become unstable during compaction and finishing operations.

221.4.5 - Sampling Facilities

Free and safe access to the plant must be provided to the engineer at all times for inspection of the plants operation.

The Contractor shall provide suitable facilities and shall take representative samples of materials as they enter the mixer, are discharged from the mixer, and are discharged from the gob hopper. The frequency of the engineers sampling of the combined said aggregate feed shall be at the discretion of the engineer, but will not be less than once a day or once for each 500 cubic yards of soil-cement produced. These samples shall be used for Contractor quality control and quality assurance testing. All necessary platforms, tools, equipment and trained personnel for obtaining samples shall be furnished by the Contractor.

221.4.6 - Handling

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

The Contractor shall take all necessary precautions to prevent damage to completed soil-cement by the equipment and to prevent the deposition of raw earth

or foreign materials between layers of soil-cement. Earth ramps crossing completed soil-cement must have at least two (2) foot compacted thickness. Where ramps are constructed over soil-cement that is not to grade, all foreign materials and the uppermost one (1) inch of the previously placed soil-cement mixture must be removed prior to continuation of the soil-cement construction.

221.4.7 - Placing

The mixture shall be placed on the moistened subgrade, embankment, or previously completed soil-cement with spreading equipment that will produce layers of 8½ feet in width with a thickness as is necessary for compaction to the required dimensions of the completed soil-cement layers. The 8½ feet dimension is to allow for full compaction of the design width of 8 feet with the ½ foot of excess to be trimmed. The compacted layers of soil-cement shall not exceed eight (8) inches in thickness nor be less than four (4) inches in thickness. The maximum depth of compacted soil cement that shall be placed per day shall be four (4) feet.

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

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

All soil-cement surfaces that will be in contact with succeeding layers of soil-cement shall be kept continuously moist by fog spraying until placement of the subsequent layer, except that the Contractor will not be required to keep such surfaces continuously moist for a period longer than seven (7) days.

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

221.4.8 - Compaction

Soil-cement shall be uniformly compacted to a minimum of ninety-five percent (95%) of maximum density as determined by field density tests. Optimum moisture and maximum density shall be determined in accordance with ASTM D-558 or AASHTO-134. Field density tests shall be performed in accordance with ASTM D-1556 "Sand Cone Method" or AASHTO T-238 "Nuclear Method". Moisture contents shall be measured and reported to the nearest 0.1%.

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

At the start of compaction, the mixture shall be in a uniform, loose condition throughout its full depth. Its moisture content shall be as specified in Subsection 221.4.4 herein. No section shall be left undisturbed for longer than thirty (30) minutes during compaction operations. Compaction of each layer shall be done in such a manner as to produce a dense surface, free of compaction planes, in not longer than one (1) hour from the time water is added to the mixture. Whenever the Contractor's operation is interrupted for more than two (2) hours, the top surface of the completed layer, if smooth, shall be scored to a depth of at least one (1) inch with a spike-tooth instrument, or by other means approved by the Engineer, prior to placement of the next lift. The spacing of scores shall not exceed eighteen (18) inches, measures across the direction of soil-cement placement. The surface, after said scoring, shall be swept using a power broom or other method approved by the Engineer to completely free the surface of all loose material prior to actual placement of the soil-cement mixture for the next lift.

221.4.9 - Finishing

After compaction, the top surface of the soil-cement shall be shaped to the required lines and grades, and cross-sections and rolled to a reasonably smooth surface. The face of soil-cement shall be trimmed, as indicated on the plans.

Surface compaction and finishing of each layer shall be done in such a manner as to produce a dense surface free of compaction planes or loose material in no more than two (2) hours from the time compaction is started or three (3) hours from the time water is added to the mixture.

221.4.10 - Curing

Temporarily exposed surfaces shall be kept moist as set forth in Subsection 221.4.7.

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

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

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

221.4.11 - Construction Joints

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

221.4.12 - Maintenance

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

221.5 - Inspection and Testing

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

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

Testing for proper compaction shall be done on at least every other lift of compacted soil-cement and at least once for every 500 cubic yards of soil-cement. Test locations shall be chosen by the Engineer. If the lift being tested does not meet the specified density requirements, it must be reworked as directed by the Engineer until it passes or be removed by the Contractor at the Contractor's expense. The Contractor shall not be

permitted to continue placing lifts of soil-cement on any lift which has failed the compaction tests until such time as that lift has been reworked, retested, and passed as to meeting density and moisture content requirements.

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

221.6 - Mix Design Methodology

The design requirements for the soil-cement bank protection shall be such that is has a minimum compressive strength of 750 psi at 7 days plus two (2) percent additional cementitious material to compensate for variations in mixing method, material and placement, but in no case less than 7%. The Contractor shall determine the mix proportions of the aggregate, cement and water, and shall furnish soil-cement conformity to the requirements specified herein. The job-mix design with the supporting test results shall be submitted to the Engineer for approval, prior to incorporating any of the material into the work.

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

221.7 - Mix Design for This Project

For bidding purposes only, the estimated mix design for this project shall include nine percent (9%) base cementitious material for the soil-cement banks.

The percent of cementitious material to be used in the mix shall be calculated to be the weight of cementitious material divided by the total weight of the dry soil-cement materials. The actual mix designs used on this project shall be determined by laboratory tests on each soil aggregate stockpile after construction of stockpiles has been completed. Per Section 221.6, no less than 7% cementatious material may be used in a mix.

The cement content may be increased at any time by the engineer if, in the engineer's opinion, increased cement content is needed to assure design strength. An increase in cement content may be justified by inconsistencies in production methods, various test results, and test results which drop below acceptable standard deviation.

221.8 - Stockpiling of Aggregate

Soil aggregate stockpiles shall be constructed on level, firm ground free of brush, trees, stumps, roots, rubbish, debris, and other objectionable or deleterious material and shall be located so as to provide a distance of not less than fifty (50) feet from the outside bottom edge of conical stockpiles built up under processing plant conveyors or any other existing stockpiles. The stockpiles shall be constructed in layers, each layer not exceeding two (2) feet in thickness. Ramps formed for stockpile construction shall be of the same material as that being stockpiled, and will be considered a part of the stockpile. Before steepening a ramp, any contaminated surface material shall be removed. The stockpile height shall be limited to a maximum of twenty-four (24) feet.

Stockpiled material shall be thoroughly mixed throughout its depth, width, and length before utilization. The material shall be homogeneous and uniform in color, gradation, and moisture throughout.

Sampling of stockpiles will be done by the Engineer. After the stockpiles have been sampled and approved, material shall not be added to them. Each stockpile shall be completed and approved at least fourteen (14) days prior to start of soil-cement production from the stockpile.

221.9 - Sampling and Use of Stockpiles

During construction of stockpiles to be utilized in the production of soil-cement, the Contractor will be solely responsible for monitoring the uniformity of the material being placed therein to assure conformance with the gradation requirements specified for said soil material. The Contractor's attention is directed to the soils reports prepared for this project and which are on file at the office of the Flood Control District of Maricopa County, 2801 West Durango Street, Phoenix, AZ 85009.

Stockpiles for use in soil-cement production shall be constructed to the following minimum size:

1. 40,000 cubic yards, or

2. The total quantity of material required to complete all soil-cement when the quantity of material required for blending into the soil aggregate is less than 40,000 cubic yards.

Upon completion of each stockpile, the Contractor shall notify the Engineer in order to allow for verification of the soil-cement mix design determined during design from random site sampling. The Contractor shall provide the manpower and equipment necessary to sample each stockpile in accordance with the following procedure:

Under the direction of the Engineer, the Contractor shall use a front-end loader to excavate a face for the full height of the stockpile, extending into the stockpile a distance required by the Engineer, at a minimum of four (4) different sampling locations around the perimeter of the stockpile. The Contractor shall excavate one (1) additional sampling location for each 10,000 cubic yards in the stockpile in excess of 40,000 cubic yards. The front-end loader shall then be used to channel the total excavated face at each location from the bottom to the top in one operation, and the material obtained shall be dumped on the ground in piles.

The Engineer or his representative will then sample each of the sample piles by channeling it with a hand shovel at four (4) locations equally spaced around the perimeter.

Approval of a stockpile shall not relieve, in any degree, the full responsibility of the Contractor to furnish, in its final position, a material conforming to all the specification requirements.

221.10 - Field Quality Control

The contractor shall establish and maintain an effective quality control program for soil-cement which will be his means of ensuring compliance with Contract requirements and of maintaining records of his control. The program shall include, but not limited to the following: aggregate manufacture and gradations, moisture, batching requirements and mix proportions at the mixing plant, insuring adequate materials are on hand, and all other tests inspections required by the Specification.

All quality control tests shall be performed in strict accordance with the applicable standards as specified hereinafter. The quality control program for soil-cement shall be established by the Contractor and be proposed to the Engineer for review and approval. The Contractor shall supply all equipment and provide qualified personnel for testing and fulfillment of his quality control program. No soil-cement placement or aggregate production will be allowed until the Contractor has received approval of an acceptable quality control program. The Contractor's program shall be similar in nature to the quality control program established in the following paragraphs. If at any time, in the opinion of the Engineer, the Contractor's proposed system is inadequate or fails to ensure compliance with the Specification, the Contractor will be required to adopt a new system which, at a minimum, conforms strictly to the requirements stated in the following paragraphs.

(A) Aggregate Gradations:

1. Testing:

At least once during each shift that soil-cement is placed and that aggregates are produced, aggregates shall be checked for the characteristics specified in Section 221.2.3. A recheck sample is required for any test out of specifications. The location from which samples are taken may be selected by the contractor providing that they give an accurate indication of gradations of materials as they enter the mixer. However, provisions must be made for accurate sampling of aggregates on the feed belts.

2. Action Required:

Whenever a test result is outside of the specification limits, the Engineer shall be immediately notified and a recheck sample taken. If the recheck sample is outside of the specification limits, the Engineer shall be immediately notified again, the process shall be considered out of control, and positive steps shall be taken by the Contractor to rectify the situation. The Engineer will advise the Contractor if production and placement of soil-cement shall be stopped at that time. The contractor will be responsible for all costs incurred as a result of stopping any soil-cementing operations due to out of specification materials.

(B) Aggregate Moisture Determination:

1. Testing:

At least once during each day of placement for each aggregate size used, moisture content determinations shall be made in accordance with ASTM C566 (ASTM C70 where appropriate for fine aggregate if it is stockpiled separately). The location from which the sample is selected may be determined by the Contractor, providing that it is typical of materials entering the soil-cement.

2. Action Required:

The Engineer may test for verification any field determinations of moisture contents made by the Contractor. This verification will use the oven drying procedure. If there is a discrepancy between the Contractor's test results and the verification tests, immediate steps shall be taken to identify the source of the problem and correct it so

that accurate field determinations are obtained. When moisture content determinations indicate a change in water entering the soil-cement with the aggregates, the placement foreman shall be contacted to see if a corresponding adjustment in water added at the soil-cement mixer is necessary to obtain maximum compaction at the placement site.

(C) Soil-Cement Plant Control:

When the mixing plant is operating, the measurement of all constituent materials including cement, each size of aggregate, water and admixtures, shall be continuously controlled. The aggregate weights and amount of added water to compensate for free moisture in the aggregates shall be adjusted as necessary. A daily report shall be prepared indicating the type and source of cement used during that day; the amount, type and source of admixtures used; aggregate size groups used; required mix proportions per cubic yard for each mix design used; the amount of water as free moisture in each size of aggregate; and the aggregate and water weights per cubic yard for each mix design of soil-cement made during plant operation.

(D) Scales for Weigh Batching:

1. Tests and Checking:

The accuracy of scales shall be checked by test weights prior to the start-up of soil-cementing operations. Such tests shall also be made whenever there are variations in properties of the soil-cement that could result from batching errors. The accuracy of each batching device when weight batching procedures are used shall be routinely checked during a weighing operation by noting and recording the required weight and the weight actually batched. Rechecks shall be made at least every four shifts of operation thereafter and whenever there are variations in the properties or control of soil-cement that could result from batching errors.

2. Action Required:

Whenever either the weighing accuracy or batching accuracy is found not to comply with specification requirements, the plant shall not be operated until necessary adjustments or repairs have been made.

(E) Volumetric Feed Calibrations:

1. Tests and Checking:

The accuracy of volumetric feeds shall be checked by collecting all material delivered during a unit of time to the mixer and also by washout tests of material exiting from the mixer. Suitable methods and equipment shall be provided for obtaining and handling samples at the mixing plant. The weight of material corresponding to a standard time interval, and the resulting proportions of materials per cubic yard, shall be determined. The accuracy of volumetric feeds shall be determined at least three times during check out of the mixing plant prior to production operations and soil-cement placement. Rechecks shall be made at least every four shifts of operation thereafter and whenever there are variations in the properties of control of soil-cement that could result from volumetric feed errors. The sample shall be of sufficient size to give accurate determinations and calibration may require weights in excess of 500 pounds per item checked.

2. Action Required:

Whenever the volumetric feed is found not to comply with Specification requirements, the plant shall not be operated until necessary adjustments or repairs have been made.

(F) Testing Soil-Cement Mixes:

1. General:

Fresh soil-cement shall be sampled and tested for compliance with the Specification and for additional information required by the Engineer. Samples and tests will primarily be made at the placing location at the time of placement, but may also be required at the mixing plant. The Contractor shall provide a method of readily obtaining representative soil-cement samples from the plant and any gob hopper locations.

2. Mixer Performance:

A complete mixer performance test of three different batches of soil-cement or runs through a volumetric plant shall be made on each stationary mixer in accordance with the Army Corps of Engineers CRD-D 55 prior to the start of soil-cement placing. Additional tests

may be made at any time to support a Contractor's request for reduction of mixing time. Whenever mixer adjustments are necessary because of failure of a mixer to comply, the mixer shall be retested after adjustment. The abbreviated test may be used for this purpose. Abbreviated tests shall be run routinely on each mixer at least once every five days.

3. Temperature:

a. Testing:

At least one test of temperature shall be made at the mixing plant and at the placement on a randomly selected batch of each mix design of soil-cement used per shift of placement. Additional tests shall be made when rapid set time or workability loss is reported by the placing foreman or Engineer's inspector, or when cold weather problems occur. The temperature of air and soil-cement shall be reported during the period of cure and cold weather protection when those restrictions are applicable.

b. Action Required:

Whenever the mix temperature falls below 50 degrees F or is above 90 degrees F, the Contractor shall notify the Engineer immediately. All other temperatures shall be included as standard data in the quality control reports.

4. Moisture Content:

a. Tests and Checking:

At least once during each four hours of production placement at the mixing plant, and once every two hours at the placement site (immediately after compaction), the moisture content shall be determined on the soil-cement mix using a nuclear gauge in the direct transmission mode. The probe shall be driven to a depth of at least 10 inches for each reading. The gauge shall be calibrated against oven-dry samples of each mix design used. If, after three days of production placement, consistent moisture control is achieved, the rate of testing may be decreased to one test per eight hours at the plant and one test per four hours at the placement. In any case, at least three tests shall be made in different areas of each layer of soil-cement placed. The placing foreman shall continuously monitor the apparent effectiveness of compaction

equipment from a visual standpoint, and shall notify the mixing plant whenever the mix becomes too dry or too wet.

b. Action Required:

Whenever moisture content tests indicate a change from what has been established as the optimum batching and placing moisture for maximum density and efficiency of compaction equipment, a corresponding adjustment shall be made in the mix water added at the mixing plant and the adjustment shall be noted. Whenever the placing foreman observes a condition of moisture which begins to consistently allow the vibratory rollers to sink excessively in the mix, cause excessive paste to develop at the surface, or leave an open appearing unconsolidated surface, an adjustment shall be made in the mix water added at the plant and the adjustment shall be noted.

5. Cement Content:

The Contractor shall obtain samples of the soil-cement mix at the mixing plant and/or placement area for determination of cement content using a chemical chloride titration or similar procedure. The test equipment shall also allow moisture content determinations to be made. The equipment shall be provided by the Contractor and all testing shall be by the Contractor.

6. Soil-Cement Compressive Strength Tests:

The Contractor shall cast, transport and cure specimens for compressive strength tests and test the specimen for compressive strength at time intervals as directed by the Engineer, but not less than one set of three cylinders per 500 cubic yards of soil-cement placed. The soil-cement samples shall be prepared and tested in accordance with the requirements of Arizona Test Method 241a.

7. Density:

a. Testing and Checking:

At least once every two hours during placement, but not less than once every 500 cubic yards of soil-cement, the density and moisture content of soil-cement after compaction shall be determined with a nuclear density gauge in accordance with AASHTO Designation T-2.30, previously calibrated against sand cone densities. The Contractor shall maintain a nuclear gauge in good working condition on the placement area at all times.

The Engineer shall have access to the gauge at all times and shall be allowed to use it for quality assurance check tests. Each lift of soil-cement shall be tested by the nuclear gauge in at least six separate locations for density. The direct transmission mode shall be used and readings shall be taken in each quadrant of a circle obtained by rotating the gauge 90 degrees each after each reading around the transmission probe. The probe shall be inserted into pre-driven holes of diameter recommended by the manufacturer to a depth of at least 10 inches for each reading. Density shall be as specified in Subsection 221.4.8 of this Special Provision. The vibratory roller operators shall continually monitor their "on board" compaction meters as an indicator or any areas which have not been fully compacted.

b. Action Required:

Whenever a roller operator finds that his compaction meter indicates insufficient compaction, he shall continue rolling until the required compaction meter readout is achieved. If this requires more than an estimated six passes, the Engineer shall be notified by the placing foreman, and the Contractor shall determine the actual density with a nuclear gauge. Whenever the nuclear gauge indicates compaction of less than specified in Subsection 221.4.8 of this Special Provision, a retest shall be made. If the retest indicates incomplete compaction, the Engineer shall be notified, additional rolling shall be immediately provided and a determination shall be made as to whether the lower density resulted from insufficient passes of the roller or a change in the mix properties. If the mix properties have changed, adjustments such as increasing or decreasing the moisture content shall be made at the mixing plant. If the problem persists, the Engineer may require the Contractor to adjust the proportions of aggregates, and/or cement. If the lower density is the result of incomplete rolling, the operator shall be notified and the Engineer may require removal of the incompletely compacted material at no cost. If the same operator repeatedly rolls less than the required number of passes, and/or if his compaction meter repeatedly indicates underrolling due to deliberate action or inattentiveness, he shall be replaced with a different operator.

(G) Compaction Equipment:

1. Tests and Checking:

Before any compactor is used in soil-cement construction, it shall be checked for current dimensions, weight and vibratory capacity. At least once per four shifts of use, a spot recheck of frequency shall be made. At least once per each shift of placement for the first five

days of operation by any new operator, his performance shall be spot checked for the correct number of passes, correct spread, coverage of the area being rolled, and good rolling practice. Thereafter, spot checks shall be made on each operator at least every four shifts.

2. Action Required:

Compaction equipment not meeting the physical dimensions and weights required shall be removed from the site. Any roller having improper frequency shall be corrected before being used for soil-cement compaction. Roller operators running at speeds in excess of Specification requirements shall be immediately notified and shall correct any noted improper practices or be replaced by another operator.

(H) Dumping and Spreading:

1. Tests and Checking:

The placing foreman or other designated representative shall continually observe and monitor dumping and spreading operations to insure that they are done in a manner that minimizes segregation and spreading after dumping. Each lift of soil-cement shall be routinely checked in its spread uncompacted condition for evenness and correct thickness that will result in a smooth, even, compacted layer having thickness as required.

2. Action Required:

Whenever thickness checks on uncompacted soil-cement indicate an excess or shortage of material, the lift shall be immediately bladed off or supplemented to establish the correct thickness before compaction. Whenever a compacted layer thickness or elevation exceeds the specified thickness by two inches, the Engineer shall be immediately notified and he will determine whatever corrective action is necessary.

(I) Preparation for Soil-Cement Placement:

Foundations and construction joints shall be inspected in sufficient time prior to each soil-cement placement by the Contractor in order to certify that the area is ready to receive soil-cement. The results of inspections shall be reported in writing as a part of the quality control reports. The placing

foreman shall supervise all placing operations and shall be responsible for measuring and recording concrete temperatures, ambient temperature, weather conditions, time of placement, yardage placed and method of placement. The placing foreman shall not permit placing to begin until he has verified that an adequate number of vibratory rollers and spreading equipment of the right size, in working order, and with competent operators are available.

(J) Construction Joints:

Vertical construction joints are to be provided at the end of each day's work or when work is halted for two hours or more. The joints shall be trimmed to a straight line and vertical to the full depth of the lift. Before resuming placement of new soil-cement, loose material shall be removed from the joint.

(K) Curing, Protection and Joint Surfaces:

1. Moist Curing:

At least once each shift around the clock, seven days per week, an inspection shall be made of all areas subject to moist curing and joint protection. The surface moisture condition shall be noted and recorded. If an isolated area has been allowed to dry, that area shall be considered as improperly cured. The Contractor shall immediately wet the surface and take positive steps to insure that the problem does not reoccur.

2. Protection:

At least once each shift, around the clock, seven days per week, an inspection shall be made of all areas subject to cold weather protection or protection against damage. Deficiencies shall be noted. During removal of cold weather protection, measurement of soil-cement and ambient temperature shall be made at least every three hours.

(L) Finishing:

After compaction, the soil-cement shall be further shaped, if necessary, to the required lines, grades, and cross sections, and rolled to a reasonably smooth surface. Trimming of the soil-cement face is required.

(M) Backfill:

Backfill shall not be placed against the soil-cement until it has achieved its full design strength. Special care shall be taken when placing backfill against soil-cement.

(N) Reports:

Mixing plant control reports and all results (both passing and failing) of tests conducted at the site shall be reported daily and shall be delivered to the Engineer within two days after the end of each weekly reporting period. These requirements do not relieve the Contractor of the obligation to report certain failures immediately as required in the preceding paragraphs. Such reports of failures and the action taken shall be confirmed in writing in the routine reports. The Engineer has the right to examine all Contractor quality control records.

221.11 - Acceptance Sampling and Testing

Rejection of soil-cement will occur due to improper temperatures, and/or density for the soil-cement mixture delivered to the site, placed and compacted. The Engineer at his discretion may allow failed soil-cement mixture already in place to remain in place subject to acceptance by compressive strength or may require its removal.

Rejection of soil-cement will also occur due to insufficient compressive strength. Soil-cement compressive strength requirements consist of the specified strength which the soil-cement shall attain at 28 days.

A. Sampling and Testing of Soil-Cement:

1. General:

Fresh soil-cement shall be sampled and tested for compliance with the Specification. Samples and tests will be made at the placing location at the time of placement. The Contractor shall provide a method of readily obtaining representative soil-cement samples from the placement locations.

2. Temperature:

At least one test of temperature shall be made at the placement location on a randomly selected batch of each mix design of concrete used per shift of placement. Additional tests shall be made when rapid set time or workability loss is reported or when cold weather problems occur.

3. Moisture Content:

At least once during each four hours at the placement site (immediately after compaction), the moisture content shall be determined on the soil-cement mix using a nuclear gauge in the direct transmission mode. The probe shall be driven to a depth of at least 10 inches for each reading. The gauge shall be calibrated against oven-dry samples of each mix design used. If, after three days of production placement, consistent moisture control is achieved, the rate of testing may be decreased to one test per eight hours at the placement.

In any case, at least three tests shall be made in different areas of each layer of soil-cement placed.

4. Density:

At least once every two hours during placement, but not less than once every 500 cubic yards of soil-cement, the density and moisture content of soil-cement after compaction shall be determined with a nuclear density gauge in accordance with AASHTO Designation T-2.30, previously calibrated against sand cone densities. Each lift of soil-cement shall be tested by the nuclear gauge in at least six separate locations for density. The direct transmission mode shall be used and readings shall be taken in each quadrant of a circle obtained by rotating the gauge 90 degrees each after each reading around the transmission probe. The probe shall be inserted into pre-driven holes of diameter recommended by the manufacturer to a depth of at least 10 inches for each reading.

5. Soil-Cement Compressive Strength:

The Engineer shall cast, transport, and cure specimens for compressive strength tests and test the specimen for compressive strength at time intervals as directed by the Engineer, but not less than one set of three cylinders per 500 cubic yards of soil-cement placed. The cylinders shall be prepared and tested in accordance with the requirements of Arizona Test Method 241a.

(B) Acceptance of Soil-Cement:

Acceptance and penalties for placed soil-cement which meets the above mixture requirements or is allowed to remain in place shall be determined by the results of the 7 day compressive strength. Soil-Cement represented

by compressive strength tests which do not meet the minimum compressive strength specified may be allowed to remain in place at the discretion of the Engineer. No payment will be made for such soil-cement.

221.12 - Control Strips

A soil-cement control strip shall be constructed at the beginning of work on the soil-cement. The control strip construction shall be used to demonstrate equipment and procedures necessary to attain the required densities for the specified course.

Each control strip, if constructed to acceptable density and surface tolerances, shall remain in place and become an integral part of the completed levee protection. Unacceptable control strips (i.e., those that fail to meet the specified requirements for density or compressive strength) shall be replaced at the Contractor's expense. A control strip shall have an area of not less than 500 square yards and the compacted thickness specified for the construction of the course which it represents.

Compaction equipment shall be capable of obtaining the specified compaction requirements without detrimentally affecting the compacted material. The equipment shall be modern, efficient compacting units meeting the requirements of this section.

Rollers shall be the self-propelled drum drive vibratory type which will be capable of transmitting dynamic impact to the surface to be compacted through a steel drum by means of revolving weights, eccentric shafts, or other equivalent methods. The compactor shall have a gross weight of not less than 21,000 pounds and shall produce a dynamic force of at least 400 pounds per lineal inch of drum width at the operating frequency which is used during construction. The roller shall have a vibrating frequency of at least 1,800 CPM (cycles per minute). The roller shall have a smooth drum or drums with a drum diameter between 4 and 5.5 feet and a width of between 5.5 and 8 feet. The engine driving the eccentric mass shall have a rating of not less than 125 horsepower. Heavier compacting equipment may be required to achieve the soil-cement density requirements.

The equipment used in the construction of the control strip shall be of the same type and weight to be used on the remainder of the course represented by the control strip.

The materials used in the construction of the control strip shall conform to the specification requirements. They shall be furnished from the same source and shall be of the same type used in the remainder of the course represented by the control strip. The underlying surface upon which a control strip is to be constructed shall have the prior approval of the Engineer.

221.13 - Soil-Cement Strength Requirements

Soil-cement shall have the following minimum required compressive strength at seven (7) days of not less than 750 psi when tested in accordance with the requirements of Arizona test Method 241a.

A minimum of three (3) cylinders shall be taken for testing purposes per 500 cubic yards of material placed, but not less than three (3) cylinders per day shall be made.

Test results which indicate strength below 750 psi shall be the basis of rejection of the defective soil cement. Defective material shall be removed and replaced at the contractors expense.

221.14 - Measurement

This work shall be measured 1) in cubic yards of complete-in-place soil-cement between the limits shown by the specified lines, grades, and cross-sections shown on the Plans; and 2) in tons of cement incorporated into the soil-cement, as determined by tests.

221.15 - Payment

This work shall be paid for at the Contract unit price per cubic yard for soil-cement as set forth in the Bid Schedule under Item 221. Such payment shall constitute full reimbursement for performing all work and for furnishing all equipment, labor, and materials necessary to complete the soil-cement bank protection, bank transition, dewatering, trench excavation and backfill toe, watering, mixing, placing, compacting, curing, inspection, and testing assistance and all other incidental operations.

Cement furnished will be paid for at the Contract unit price per ton under Item 221-1 of the Bid Schedule. Any waste of cement and/or soil cement by the Contractor during the handling, mixing, placing, etc., operations shall not be paid for. Unbalancing of unit price bid or any material bid below market cost shall be the basis for rejection of the bid.

SECTION 225 - WATERING

In addition to the requirements of the MAG Standard Specifications.

225.1 - Description

Replace Section 225.1 of the MAG Standard Specifications with the following:

The work under this section shall consist of furnishing and applying all water required for the control of dust, for the safety and convenience of the traveling public, and for the reduction of the dust nuisance to adjacent property.

The Contractor shall obtain the necessary permits required under the County Air Pollution Statutes. It shall be the responsibility of the Contractor to keep the construction site moistened to prevent pollution of air, water and adjacent property.

225.3 - Construction Equipment

The use of pressure pumps and spray bars on all sprinkling equipment used for the application of water will be required. The use of gravity flow spray bars and splash plates will not be permitted.

225.5 - Payment

There is no pay item for watering.

SECTION 302 - GRAVEL MULCH

302.1 - Description

Gravel mulch shall be placed in a 2-inch layer on 3:1 slopes adjacent to maintenance roads and turnaround areas, where shown on the design plans.

302.2 - Materials

Materials for use as gravel mulch shall consist of crushed rock with at least 50 percent having 2 fractured faces and shall conform to the following gradation:

PERCENT BY WEIGHT	
SIEVE SIZE	**PASSING SIEVE**
1½"	100
3/4"	10-20
#4	0-10

302.3 - Placement

The gravel mulch may be placed and compacted in a single layer. After distributing, the base material shall first be watered and then immediately bladed to a uniform layer that will net, after rolling, the required thickness. If the materials deposited are not uniformly blended together, the blading operation shall be continued to such extent as may be necessary to eliminate segregation. The quantity of water applied shall be that amount

which will assure proper compaction resulting in a relative density of not less than 100 percent as determined under Section 301 of the Standard Specifications. Care shall be exercised in connection with watering operations to avoid wetting the subgrade or any lower base course to a detrimental extent.

Upon completion, the base surface shall be true, even, and uniform conforming to the grade and cross-section shown on the design plans.

302.4 - Measurement

Quantities of gravel mulch shown on the design plans are measured by the square yard, based upon the actual dimensions shown. No allowance is made for spalling or waste beyond those limits.

302.5 - Payment

Payment shall be by the square yard, in place, to the dimensions shown on the design plans for Item 302 of the Bid Schedule. Such payment shall be compensation in full for materials, transportation, miscellaneous earthwork, labor, equipment, placement, watering, and roller compaction.

SECTION 310 - AGGREGATE BASE COURSE

Replace Section 310 of the MAG Standard Specifications with the following:

310.1 - Description

Aggregate Base Course, also referred to as ABC, shall be placed in a 4-inch layer for the maintenance roads and turn around areas, where shown on the design plans.

310.2 - Materials

Materials for use as ABC shall be in accordance with Section 702 - Base Materials of the MAG Standard Specifications, with the exception that the following gradation shall be used:

PERCENTAGE BY WEIGHT	
Sieve Size	**Passing Sieve**
1½ Inch	100
1 Inch	90-100
No. 8	35-55
No. 200	0 - 8.0
P.I. Max	3

310.3 - Placement

The ABC may be placed and compacted in a single layer. After distributing, the base material shall first be watered and then immediately bladed to a uniform layer that will net, after rolling, the required thickness. If the materials deposited are not uniformly blended together, the blading operation shall be continued to such extent as may be necessary to eliminate segregation. The quantity of water applied shall be that amount which will assure proper compaction resulting in a relative density of not less than 100 percent as determined under Section 301 of the MAG Standard Specifications. Care shall be exercised in connection with watering operations to avoid wetting the subgrade or any lower base course to detrimental extent.

Upon completion, the base surface shall be true, even and uniform conforming to the grade and cross-section shown on the design plans.

ABC may vary not more than ½ inch above or below required grade and cross-section.

310.4 - Measurement

Quantities of ABC shown on the design plans are measured by the square yards, based upon the actual dimensions shown. No allowance is made for spalling or waste beyond those limits.

310.5 - Payment

Payment shall be by the square yard in place, to the dimensions shown on the design plans for Item 310 of the Bid Schedule. Such payment shall be compensation in full for materials, transportation, miscellaneous earthwork, labor, equipment, placement, watering, and roller compaction.

SECTION 350 - REMOVAL OF EXISTING IMPROVEMENTS

In addition to the requirements of the MAG Standard Specifications:

350.1 - Description

This work shall consist of removal of existing fence, buildings, asphalt road paving, concrete pads, irrigation structures, canal and ditch lining, culverts, manholes, headwalls, sand piles, gravel piles, rock piles, and other miscellaneous items from within the limits of the work. Holes, cavities and trenches resulting from the removal of structures shall be backfilled in accordance with Section 206 and 211.

350.2 - Construction Method

All materials, unless designated on the plans or by the Engineer as to be salvaged, reused, or relocated shall become the property of the Contractor and shall be immediately removed from the job site.

350.3 - Miscellaneous Removal and Other Work

In addition to subsection 350.3 of the MAG Standard Specifications, the work shall include but not be limited to:

(M) Remove existing concrete slabs and structures.
(N) Remove concrete curb and gutter at Thunderbird Road
(O) Remove grouted riprap at 91st Avenue channel
(P) Miscellaneous unlisted items.

350.4 - Payment

Payment for removal of all existing improvements will be made the Contract lump sum price for Item 350 of the Bid Schedule. This lump sum price shall be full compensation for the item complete, as described herein or on the plans.

SECTION 401 - TRAFFIC CONTROL

In addition to the requirements of the MAG Standard Specifications:

401.1 - Description

At the time of construction, there will be a bridged crossing completed at Thunderbird Road. Earthmoving equipment should be able to cross this roadway underneath the bridge without disturbing normal traffic flow. The Contractor shall take necessary precautions to protect existing structures and utilities in place.

Traffic control may be necessary during construction of the maintenance vehicle access at Thunderbird Road and when construction equipment crosses existing surface streets.

401.2 - Traffic Control Devices

The number and kind of barricades, signs, delineators, barriers, and all other traffic control devices and the approval of the Contractor's method of application of all traffic control measures, shall not relieve the Contractor of the responsibility of protecting the work, the workers, and the traveling public.

401.4 - Traffic Control Measures

At the time of the pre-construction conference, the Contractor shall submit for review and approval a traffic control plan. The plan shall show all measures, including types of signs, barricades, and sand berms with their placement and spacing. All advance warning signs shall be mounted on steel channels driven into the ground. Locations of all signs shall be coordinated with the Maricopa County Highway Department, Traffic Engineering Division before placement (contact Mr. K.C. Bone, Senior Inspector - 506-8676).

The Contractor shall provide and maintain all necessary signs, barricades, and centerline vertical panels for five working days beyond any construction which prevents traffic from using the roadway, or acceptance of the project by the District, whichever is greater.

401.6 - Measurement

In addition to providing temporary traffic control, work shall consist of providing, erecting, paint striping, and maintaining before final acceptance all traffic control devices.

401.7 - Payment

The traffic control both temporary and permanent will be paid for at the lump sum price for the type and size specified on the design plans and under Item 401 in the Bid Schedule.

This shall be considered full compensation for performing all work and for furnishing all labor, equipment, and materials required to erect, install, maintain, and remove traffic control devices.

SECTION 421 - SMOOTH WIRE FENCE

421.1 - Description

The work under this section shall consist of furnishing all materials and constructing wire fence at the location and in accordance with the details shown on the plans. Fences shall

be of the types and sizes shown on the plans and shall be constructed in accordance with the requirements of these specifications.

421.2 - Materials

Fencing wire shall be 12-1/2 gauge steel wire and shall be either zinc coated or aluminum coated. Zinc coated steel wire shall conform to the requirements of ASTM A 121 Class 1 coating. Aluminum coated steel wire shall conform to the requirement of ASTM A 585, Type 1, Class 1 coating.

Posts, rails, braces and caps shall conform to Section 772.2, Type A.

Portland cement concrete shall conform to the requirements of Section 725.

421.3 - Construction

The contractor shall clear the fence lines of all earth, trees, brush and other obstructions which interfere with the proper construction of fences, unless the Engineer orders certain trees to remain in place. Disposal of removed material shall be in accordance with the requirements of Section 201.

Fence shall be constructed along and up to twelve inches (12") within the project right of way as shown on the plans.

Fence posts shall be spaced at the intervals and set to depths shown on the plans.

In the determining the post spacing measurements shall be made parallel to the ground slope, and all posts shall be placed in a vertical position, except in unusual locations where the engineer may direct that the posts be set perpendicular to the ground surface.

Line posts may be driven into undisturbed earth provided driving does not injure the posts. All voids around the post shall be backfilled and the material thoroughly tamped.

End, corner, pull, latch and gate posts and braces shall be set in concrete footings and crowned at the top to shed water.

Any high points which interfere with the placing of fence wire shall be excavated to provide the clearance shown on the plans.

After post assemblies have been placed, the wire shall be pulled taut to the satisfaction of the engineer and each longitudinal wire shall be cut and securely fasten to the brace post with devices suited for the purpose. Wire shall not be carried past a post assembly, but shall be cut and fastened to the post independently of the adjacent spans. A

maximum of two splices on wire will be permitted between post assemblies, but not on the same wire. No splice shall be placed closer than 100 feet to any post assembly

After the tensioning of the wire between the post assemblies, all longitudinal wires shall be attached to each intervening line post at the height and spacing as shown on the plans. The distance from the bottom wire to the ground may vary at any one point from that shown on the plans four inches plus or minus. Where abrupt changes occur in the fence line grade, intermediate line posts may be required to maintain proper distances between the bottom wire and the ground.

Spacing of the twisted vertical wire stays shall be as shown on the plans for each type of fence. The vertical wire stays shall be woven into every horizontal wire.

At all grade depressions where stresses tend to pull the posts from the ground, the affected fence posts shall be anchored in concrete. The volume of concrete required to anchor the posts shall be not less than one cubic foot.

421.4 - Measurement

Wire fence shall be measured on the fence line along the top of the completed fence from center of end posts.

420.3 - Payment

Payment shall be made at the contract price bid per linear foot for:
ITEM 421 SMOOTH WIRE FENCE, and shall be fully compensated for furnishing and installing the wire fence as specified, including removal of obstructions and all incidental costs not specifically covered in other items.

SECTION 504 - ROLLER COMPACTED CONCRETE (RCC) 504.1 - Description

The work covered by this Section consists of designing the mix and furnishing all plant, materials and equipment, and performing all labor for the manufacturing, testing, transporting, placing, compacting, and curing of roller-compacted concrete (RCC) for the New River drop structure.

The Contractor shall submit a plan showing his intended method of constructing the RCC. The plan shall be sufficient in detail to clearly describe the planned execution of the work. Such plan shall include, but not necessarily be limited to, mixing plant, transport equipment, spreading equipment, and compacting equipment, indicating number and capacities of each type of equipment.

The Contractor shall have full responsibility for administration of a Quality Control Plan for roller-compacted concrete which shall meet the same quality control requirements as Section 105 of the MAG Standard Specifications.

The plan shall also show the access planned for performing the work.

504.2 - Materials

RCC shall be composed of portland cement, fly ash, aggregate, water and admixtures.

504.2.1 - Mix Designs

RCC mix designs shall be performed by the Contractor and verified by the Engineer. There shall be one basic RCC mix. The Engineer may direct or authorize minor variations to this mix in the field. The mix design shall be developed using aggregates stockpiled during initial aggregate production by the Contractor.

The strength of RCC shall be 3000 psi at 28 days.

A seven day break will be required as an indicator that 3000 psi at 28 days will be met. The Engineer shall be immediately notified of 7 day break results and may request mix adjustments if results indicate 28 day strength requirements may not be achieved.

504.2.2 - Test Specimens

Test specimens for RCC mix designs shall be prepared in accordance with the requirements of Arizona Test Method 241a.

504.2.3 - Cement

Cement shall conform to the requirements of MAG Standard Specifications Subsection 725.2 for low alkali type II Portland Cement.

504.2.4 - Fly Ash and Water

Fly ash shall conform to the requirements of Subsection 725.2.1 of the MAG Standard Specifications, and shall be a maximum 15% of the total weight of cement. The replacement ratio shall be 1.2 pounds of fly ash per pound of replaced Portland cement. Water shall conform to the requirements of Subsection 725.5 of the MAG Standard Specifications.

504.2.5 - Bedding Mortar

Bedding mortar shall consist of a broomable, high Portland cement/fly ash content, heavily sanded mortar, with a compressive strength of 3500 psi at 28 days, and shall have a slump of approximately eight to nine inches. The sand shall meet the following requirements when tested in accordance with Arizona Test Method 2.01.

U.S. Standard Sieve Size	Percent Passing By Weight
3/8"	100
#4	95-100
#16	45-80
#50	0-30
#100	0-10
#200	0-4

504.2.6 - Aggregates

Aggregate for the RCC shall be a sand and gravel mixture (permitting use of crushed aggregate at the Contractor's option). The materials shall be derived from the Contractor's own sources and shall be selected, excavated, and processed as necessary to provide a well-graded mixture that will compact into a dense, stable, impervious mass. If the borrow areas are so deficient in fines that the RCC is pervious or is unstable during compaction, an approved filler of fine material shall be added to the aggregate. The fine material shall not contain fat clays and shall be non-plastic.

The aggregate gradation shall conform to the following limitations:

U.S. Standard Sieve Size	Percent Passing By Weight
3"	100
#4	35-70
#8	25-60
#30	10-40
#200	0-12

It is expected that a properly designed production plant for handling aggregates will not require washing. However, some moisture or spray may be necessary for dust control.

504.2.7 - Admixtures

The Contractor shall be required to obtain written authorization from the engineer for each type of admixture furnished. Chemical admixtures shall conform to the requirements of AASHTO M194 and may be used for the purpose of water reduction or set retardation. Admixtures for air-entrainment will not be accepted.

504.3 - Construction Requirements

504.3.1 - Mixing and Proportioning

The plant for RCC may be the conventional mass concrete batch type, a continuous mix rotating tilted drum or a pug mill designed specifically for continuous operation where large aggregate is specified. The Contractor shall be responsible to perform, at his expense, all necessary shakedown and trial runs of his mixing and proportioning equipment so that when it is put into RCC production operation it consistently and accurately provides mixes of the quality required by the Specification. Material not meeting the Specification will be rejected and not allowed in the work.

RCC shall be central-plant mixed in an approved continuous flow or Batch-type mixer. The plant shall be equipped with metering and feeding device, that will supply the aggregate cement, admixtures and water into the mixer in the specified quantities. If the actual quantities in the mix deviate more than 3% by weight from the specified quantities, the Engineer may require such changes in the plant operation as will provide the required accuracy.

504.3.2 - Batch Type Plant

Materials delivered from batch type plants shall be within the following limits of accuracy:

Material	Percent
Fly Ash	Plus or minus 4%
Cement	Plus or minus 4%
Water	Plus or minus 4%
Fine Aggregate	Plus or minus 4%
Coarse Aggregate	Plus or minus 5%
Admixtures	Plus or minus 6%

The mixers shall be operated at the drum or mixing blade speed designated by the manufacturer on the name plate. If no uniformity test data are available, the mixing time for each batch after all solid materials are in the mixer, provided that all of the mixing water is introduced before 1/4 of the mixing time has elapsed, shall be one minute for mixers having a capacity of 3 cubic yards. For mixers of larger capacities, the minimum mixing time shall be increased by 15 seconds for each additional 1 cubic yard or fraction thereof of concrete mixed. These mixing periods specified are predicated on proper control of the speed of rotation of the mixer drum or blades, and on proper introduction of the materials into the mixer.

The mixing time shall be increased when such increase is necessary to secure the required uniformity and consistency of the concrete, or when the average variability index of three series of test samples of concrete taken from the first, middle, and last portions of the mixer discharge is less than any of the following uniformity requirements when tested in accordance with the provisions of CRD C55 of the U.S. Army Corps of Engineers. When authorized by the Engineer, the mixing time may be reduced to the minimum time required to meet all the following requirements:

Test	Variability Index, Min.
Water content of mortar, percent by weight	85
Coarse aggregate content of concrete, percent by weight	90
Unit weight of air-free mortar, lb/ft.^{3}	96
Cement, content of dried mortar, percent by weight	80

Excessive overmixing requiring additions of water shall not be permitted. The mixers shall be maintained in satisfactory operating condition, and mixer drums shall be kept free of hardened concrete. Mixer blades shall be replaced when worn down more than ten percent of their depth. Should any mixer at any time produce unsatisfactory results, its use shall be promptly discontinued until it is repaired. Suitable facilities shall be provided for obtaining representative samples of concrete for uniformity tests. All necessary platforms, tools, and equipment for obtaining samples shall be furnished by the Contractor.

504.3.3 - Continuous Mix Plant

Continuous mix plants shall be capable of producing concrete of the same quality and uniformity as would be produced in a conventional batch type plant. In general, the plants shall conform to the guidelines and requirements of ASTM C685, except that proportioning tolerances shall be as specified herein and adaptation to accommodate the large size aggregate shall be made as needed. Specific requirements for the plant shall be as specified in the following paragraphs.

(A) Bins and Silos:

Separate feed bins or compartments shall be provided for each size group of aggregate. Separate silos shall be provided for bulk portland cement and fly ash. The silos and compartments shall be of ample size and so constructed that the various materials will be maintained separate under all working conditions. All compartments containing cement and fly ash shall be separated from each other by a free draining air space.

(B) Cement, Fly Ash and Aggregate Feed:

Cement, fly ash and aggregates shall be uniformly, continuously, and simultaneously fed at the appropriate ratios for the mix design desired into the mixer by belt, auger, or other acceptable method. Aggregate feed may be accomplished onto a single belt from feed bins for the various size groups through openings at the bottom of the bins. Each opening shall be provided with a gate that can be locked at the necessary opening size to provide the correct feed rate. The bins shall be kept sufficiently full and shall be of sufficient size to insure a uniform flow of aggregate at an essentially constant rate. It is expected that particular attention may be needed to insure a continuous flow of the fine aggregate (and blend sand, if used) if it is very damp and contains a high content of fines. Cement and fly ash shall be fed continuously by auger feed which can be controlled by adjusting the rotation speed of the auger. The feed shall be capable of gradual adjustment while in operation.

(C) Water Dispenser:

A suitable water dispenser shall be provided which will be capable of dispensing the mix water within the specified requirements. The mechanism for delivering water to the mixers shall be free from leakage when the valves are closed. The meter may be an in-line volumetrically - activated flow meter, but it shall be adapted to read the weight of water being added in pounds per minute. The valve shall be capable of gradual adjustment during the mixing process to compensate for varying moisture contents in the aggregates.

(D) Gob Hopper:

A gob hopper shall be provided wherever the mixed RCC is temporarily accumulated while waiting to be loaded into trucks for transport.

(E) Operation and Accuracy:

After the plant has been calibrated so that the required gate openings, auger speed, and valve openings for the mix are known, start-up operations after each mixer shut down shall consist of first activating the mixer and feed belts, then opening the aggregate bin feed gates to the appropriate setting, then activating the cement and auger feed, and then opening and adjusting the water valve to the appropriate setting. All material produced from the beginning of start-up until at least 1.5 minutes after opening the water valve shall be wasted. If a uniform mix of the required proportions is not being discharged from the mixer at that time, the material shall continue to be wasted until consistent material of the specified proportions is discharged. Delivery of the materials as they are discharged from the mixer and from any gob hoppers shall be within the following limits of accuracy:

Material	Percent
Fly Ash	Plus or Minus 4%
Cement	Plus or Minus 4%
Water	Plus or Minus 4%
Fine Aggregate	Plus or Minus 4%
Coarse Aggregate	Plus or Minus 5%
Admixture	Plus or Minus 6%

(F) Mixers for Continuous Type Mix Plants:

The mixers shall not be charged in excess of the capacity recommended by the manufacturer. Mixers shall be capable of combining the materials into a uniform mixture and of discharging this mixture without segregation. The mixers shall be operated at the drum or mixing blade speed designed by the manufacturer. A method of adjusting the mix time such as by adjusting the angle of tilt of a continuous mix drum shall be provided. The mixing periods are predicated on proper control of the speed of rotation of the mixer drum, and on proper introduction of the materials into the mixer. The mixing time will be increased when such increase is necessary to secure the required uniformity and consistency of the concrete, or when the average variability index of three series of test samples of concrete taken 20 minutes apart is less than any of the following uniformity requirements when tested in accordance with the provisions of CRD C55. When authorized by the Engineer, the mixing time may be reduced to the minimum time required to meet all the following requirements:

Test	Variability Index, Min.
Water content of mortar, percent by weight	85
Coarse aggregate content of concrete, percent by weight	90
Unit weight of air-free mortar, lb/ft^3	96
Cement content of dried mortar, percent by weight	80

504.3.4 - Sampling Facilities

Free and safe access to the plant must be provided to the engineer at all times for inspection of the plants operation.

The Contractor shall provide suitable facilities and shall take representative samples of materials as they enter the mixer, are discharged from the mixer, and are discharged from the gob hopper. These samples shall be used for Contractor quality control and quality assurance testing. All necessary platforms, tools, equipment and trained personnel for obtaining samples shall be furnished by the Contractor.

504.3.5 - Conveying Equipment

Concrete shall be conveyed from mixer to placement as rapidly as practicable, by methods which control segregation, contamination and drying. Methods and equipment for handling, hauling and depositing the mix shall be subject to the approval of the Engineer. If necessary, the Contractor shall provide baffles at the ends of conveyors, within hoppers, to limit free falls to a maximum of eight feet, and at other locations that otherwise cause excessive segregation. Equipment shall not be allowed to track mud or other contamination onto previously placed RCC. The total length of time from the end of mixing until placement for spreading and compaction shall not exceed 40 minutes.

(A) Belts:

Conveyor belts shall be operated at speeds which meet production requirements and do not segregate materials. Mixed RCC will not be allowed to lie exposed on any belt for more than five minutes without being

protected from drying by the wind and sun, and by overwetting from rain. Vertical lifts of the RCC mix may be accomplished with bucketed conveyors. Steep inclines may be accomplished using conveyor belts with cleats. If conveyor belts are used as the basic means of RCC delivery from the mixing plant to the placement location, the system shall be designed by personnel fully experienced with belt delivery of mass concrete. The system shall be designed in detail by the Contractor and submitted for approval. The equipment shall be specifically designed for continuous operation with no slump large aggregate concrete. The locations, capacities, speed, reach and pivot points for all belts shall be indicated.

(B) Chutes:

Unless specifically authorized in writing after a satisfactory field demonstration, chutes will not be permitted.

(C) Transportation:

The RCC mixture shall be transported and placed by trucks, conveyors or buckets at the Contractor's option. Trucks shall be the bottom-dump type or the end-dump type. Experience has shown that end dumps have tendency to cause segregation at the edges of the deposited material. Any segregation that results from the vertical drop when the truck bed is tipped shall be removed by reworking during spreading. Trucks shall be maintained in good operating condition and shall not be allowed to spill or drip oil, grease, or other visibly apparent contamination onto the RCC. All hauling vehicles shall be operated in a manner which precludes tight turns, sudden stops, excessive speed or other procedures that damages previously compacted RCC.

504.3.6 - Compacting Equipment

(A) Self-Propelled Vibratory Rollers:

Rollers shall be of the double-drum type. They shall transmit a dynamic impact to the surface through a smooth steel drum by means of revolving weights, eccentric shafts or other equivalent methods. The compactor shall have a gross weight of not less than 21,000 pounds and shall produce a dynamic force of about 400 pounds per linear inch of drum width at the operating frequency which is used during construction. The roller shall have a vibrating frequency of at least 1,800 cpm (cycles per minute). The roller drum shall be between 4 and 5-1/2 feet in diameter and between 5-1/2 and 8 feet in width. The roller shall be operated at speeds not exceeding 1.5 miles per hour. The engine driving the eccentric mass shall have a rating

of not less than 125 horsepower. Within the range of the operational capability of the equipment, the Engineer may direct or allow variations to the frequency and speed of operation which result in maximum density at the fastest production rate. Standby replacement equipment shall be available within one hour, if needed.

(B) Power Tampers and Small Vibratory Rollers:

Small vibratory rollers similar to the Case Model W100 which are capable of operating within a few inches of a vertical face shall be used to compact the RCC in areas where the larger vibratory rollers specified above cannot maneuver. The dynamic force produced by the small rollers shall be at least 150 pounds per linear inch of drum width for each drum of a double-drum unit and at least 300 pounds per linear inch of drum width for a single-drum unit. Tampers shall develop a force per blow of at least 1,900 pounds. The amount of rolling and tamping required shall be whatever is necessary for the particular equipment to provide the same degree of compaction as would be attained with four passes of the large self-propelled vibratory roller specified above. Standby replacement equipment shall be available within one hour, if needed.

(C) Compaction Meter:

Each large self-propelled vibratory roller shall be equipped with a compaction meter having digital readout for the operator's view. The compaction meter shall not be used as a control for determining how many passes of rolling are necessary for compaction. It shall be used as an indicator to the operator to remind him if he has not provided the full four passes necessary to obtain the desired compaction. The numerical value indicated by the readout box shall increase as the degree of compaction beneath the roller increases and shall instantaneously show the relative compaction beneath the roller at all times. The compaction meter shall be calibrated on RCC placements meeting the specified density as determined by the nuclear density gauge.

504.3.7 - Placing and Spreading

The RCC shall be placed in as nearly a continuous operation as is practical. The rate of rise shall not be more than four feet at any location in a single 24-hour period.

(A) Weather:

Roller-compacted concrete shall not be placed when ambient temperatures drop to below 32 degrees F, except that if the surface of the compacted RCC and the temperature of the mix itself stays above 45 degrees F, the Engineer will permit placing of RCC during temporary periods when the ambient temperature is below 32 degrees F. If the ambient temperature drops to below freezing and the surface of any RCC less than seven days old drops to below 45 degrees F, the surface shall be covered with heavy tarps, blankets, straw, or other acceptable temporary protection until after ambient temperature rises to above 45 degrees F.

Under rainy conditions, placing of RCC shall be stopped before the quantity of surface water is sufficient to cause a flow or wash of the concrete surface or have detrimental effect on the finished concrete and acceptance parameters. If unusual adverse weather such as heavy rain, severe cold, etc. occurs or is forecast to occur during placement, an interruption in placing operations may be approved or directed. Equipment shall not be operated on lift surfaces when free surface water developed on the compacted RCC surface as the result of rain or overwatering. Otherwise, pumping, tracking, and other unacceptable damage to the RCC will result. It is the responsibility of the bidders to satisfy themselves concerning any construction schedule risk and added expense that could occur due to adverse weather.

Additionally, the construction area shall be protected from the surface water runoff up to 2000 cfs flood peak. This volume equates to a 1.5 ft. depth under the Grand Avenue Bridge. The depth (high water mark) of actual flood event shall be verified by both the District and Contractor's representative immediately after the storm.

(B) Layout of the Placement Area:

As nearly as is practical, the Contractor shall expose at one time the surfaces of only one layer, the preceding layer, and the succeeding layer. The Engineer may allow additional layer surfaces to be exposed under special circumstances. As placement of a lift progresses, the exposed edges shall be kept "live" by progressively placing out from them. When placing is done from truck haul, the paving lanes shall be kept essentially parallel with the main axis of the placement. Whenever a cold joint at any edge of any lift does occur, it shall be located at least ten feet from the location of the other cold joints that may have previously occurred in the same direction. The cold joint shall be prepared as required in Subsection 504.3.9 of this Special Provision prior to resumption of RCC placement.

Operation of tracked equipment on compacted RCC surfaces shall be minimized. Damage to compacted RCC surfaces by tracked equipment shall be repaired by removing all loose, detached material and covering the damaged area with a ½-inch nominal thickness of bedding mortar prior to spreading the next RCC lift.

(C) Deposition:

Concrete shall be deposited at the location at which it shall be spread. For truck delivery, depositing shall be accomplished with a sump-spread action while the truck is moving. If belt delivery is used, the belt shall discharge with a spreading action that does not cause segregation.

(D) Spreading and Remixing:

The interval between mixing and final compaction of RCC shall be no greater than 45 minutes. Where RCC is spread onto or into a bedding mortar as specified in Section 504.3.10 of this Special Provision, spreading shall be accomplished before the bedding mortar has begun to set, or become more than 45 minutes old starting from the time when it was batched. All RCC shall be deposited and spread in such a manner which results in no segregation when compaction occurs. The RCC shall then be worked by dozer action to knock down piles or windrows of RCC, and eliminate any segregation prior to final spreading.

The RCC shall be spread in thin unsegregated layers which will compact into layers approximately 6 inches thick until the full depth compacted lift of 12 inches is achieved. No RCC shall be placed on a previous lift which is being prepared for testing or which has been rejected. Bedding mortar shall be spread over the compacted lift surface immediately before placement of the subsequent RCC lift in accordance with Section 504.3.10 of this Special Provision. All surfaces of each compacted layer shall receive at least two passes with the dozers. The dozers shall be operating continuously during the spreading action, even if this action results in more than two passes. No RCC or other concrete shall be placed on a previous layer which has been found to be suspect or is being prepared for testing.

(E) Temperature:

The as-placed temperature of the RCC shall not be less than 50 degrees F during cold weather. During hot weather, the as-placed temperature of RCC shall not exceed 90 degrees F.

<u>504.3.8 - Compaction:</u>

Compaction equipment shall conform to Subsection 504.3.6 of this Special Provision. Within ten minutes of spreading, each lift of RCC shall be compacted with a minimum of four passes of a self-propelled vibratory roller. A round trip over the same material shall count as two passes (i.e., from point A to point B and return to point A by the same route is two passes). The largest size equipment specified in Subsection 504.3.6 of this Special Provision and capable of physical and practical operation in the area to be compacted shall be used. Hand-guided power tampers shall be used for compaction in any areas that cannot be reached with the drum of a vibratory roller. Rollers shall not be operated in the vibratory mode until they are moving. All compacting equipment shall be kept in good operation condition at all times and will not be allowed to drip or spill oil or other visible contamination onto the RCC. The edge of all compacted layers against which adjacent RCC is not placed within 40 minutes of deposition of the RCC shall be broken down or trimmed so that the exposed edge is thoroughly compacted and does not contain loose segregated aggregate.

(A) Density Control:

Maximum density shall be determined in accordance with the requirements of Section 504.3.15 of this Special Provision by the Contractor. Control of the compacted RCC shall be such that the density of the compacted RCC shall conform to the following limits:

1. Compacted RCC having an in-place density less than 95 percent of its maximum density will be rejected. Such rejected material shall be rerolled to within 98 percent of its maximum density if compaction can be achieved within 30 minutes after spreading. If this cannot be achieved, the rejected RCC shall be removed.

2. Within the above limit and based on a continuous record of tests made by the Contractor on previously placed and accepted RCC, the uniformity of the in-place density shall be such that:

   a. No more than five percent of the RCC represented by samples tested shall have in-place wet densities less than 95 percent of the maximum density.

   b. The average in-place wet density of all accepted RCC shall be not less than 98 percent of the maximum density.

   c. No more than one test in any ten consecutive tests shall be less than 98 percent of the maximum density.

3. The Contractor shall immediately make adjustments in procedures as necessary to maintain the placement density within the specified limits.

504.3.9 - Joints:

The entire roller-compacted concrete mass shall be placed with sufficient continuity and continuance so that it hardens and acts as one monolithic block without discontinuities, joints or potential planes or separation. All joint surfaces shall be kept in a clean, uncontaminated and continuously moist condition until placement of the succeeding concrete. Moisture control equipment such as hand-held hoses or a sprinkler system shall be used as necessary to prevent joining surfaces from drying and shall be supplemented as necessary by mists from hand-held hoses to reach inaccessible areas. The mist or spray shall not be applied in a channeled or pressurized manner that erodes the fresh RCC surface. It also shall not be applied at a rate which causes ponding at the surface. Vehicles will not be allowed to drip visible oil or other contaminant on the RCC surface.

504.3.10 - Bedding Mortar:

Bedding mortar, as specified in Subsection 504.2.5 of this Special Provision, shall be used between RCC lifts. The bedding mortar is to be used specifically for achieving bond between different RCC layers and eliminating and preventing segregation or voids along margins of RCC placements. Adjustments to the described mix designs may be directed by the Engineer. The thickness of the mortar after spreading shall be between 1/8" and 3/8", with an average thickness of approximately 1/4". A set-retarding admixture shall be used as required to prevent premature set. The mortar shall be placed so that it does not set prior to placement of the subsequent RCC lift.

504.3.11 - Foundation Preparation:

Prior to placing RCC, all vegetation, debris, and other deleterious material shall be removed from the site. The area shall then be graded and shaped to the lines and grades as shown on the project plans, or as directed by the Engineer. The subgrade and bedding material shall be brought to within 2 percent of optimal moisture content and compacted to a minimum of 95 percent of the maximum density as determined in accordance with the requirements of Arizona test Methods 225, 226, 227, 230, and 232, or AASHTO Designations T-238 and T-239. When the foundation material is composed predominately of rock such that these compaction control procedures will not indicate the density achieved, the Engineer will determine the amount of compaction required and the adequacy of equipment used in obtaining the required compaction. Immediately prior to placement of the roller compacted concrete, the subgrade shall be moistened if necessary. Soft or

yielding subgrade shall be corrected and made stable before construction proceeds.

504.3.12 - Curing and Protection:

The surface of any RCC layer upon which subsequent concrete will be placed shall be kept continuously damp and at a temperature above 45 degrees F until it is covered with the next layer. The final top surface of RCC at the top of the structure shall be continuously moist cured for at least 28 days. Curing compounds will not be permitted. The surfaces of RCC layers upon which subsequent layers will be placed shall also be protected from erosion by heavy rain. Water trucks shall not be permitted. Water shall be applied by a misting or sprinkling system. Any surface that is damaged by erosion that undercuts coarse aggregates shall be prepared for the subsequent lift by removing all latence, loose debris, and contaminants by sandblasting or water jetting. The cleaning procedure shall expose but not undercut the aggregate and shall be subject to approval. If a protective cover is applied, it shall be done as soon as practicable, with a maximum time limit of 24 hours between the finishing of this surface and the application of the protective cover. Any damage to the protective cover within seven days shall be repaired to the satisfaction of the Engineer.

504.3.13 - Field Quality Control:

The contractor shall establish and maintain an effective quality control program for roller compacted concrete which will be his means of ensuring compliance with Contract requirements and of maintaining records of his control. The program shall include, but not be limited to the following: aggregate manufacture and gradations, moisture, batching requirements and mix proportions at the batch plant, insuring adequate materials are on hand, and all other tests and inspections required by the Specification.

All quality control tests shall be performed in strict accordance with the applicable standards as specified hereinafter. The quality control program for concrete shall be established by the Contractor and be proposed to the Engineer for review and approval. The Contractor shall supply all equipment and provide qualified personnel for testing and fulfillment of his quality control program. No concrete placement or aggregate production will be allowed until the Contractor has received approval of an acceptable quality control program. The Contractor's program shall be similar in nature to the quality control program established in the following paragraphs. If at any time, in the opinion of the Engineer, the Contractor's proposed system is inadequate or fails to ensure compliance with the

Specification, the Contractor will be required to adopt a new system which, at a minimum, conforms strictly to the requirements stated in the following paragraphs.

(A) Aggregate Gradations:

1. Testing:

At least once during each shift that concrete is placed and that aggregates are produced, aggregates shall be checked for the characteristics specified in Section 504.2.6. A recheck sample is required for any test out of specifications. The location from which samples are taken may be selected by the contractor providing that they give an accurate indication of gradations of materials as they enter the mixer. However, provisions must be made for accurate sampling of aggregates on the feed belts.

2. Action Required:

Whenever a test result is outside of the specification limits, the Engineer shall be immediately notified and a recheck sample taken. If the recheck sample is outside of the specification limits, the Engineer shall be immediately notified again, the process shall be considered out of control, and positive steps shall be taken by the Contractor to rectify the situation. The Engineer will advise the Contractor if production and placement of concrete shall be stopped at that time. The contractor will be responsible for all costs incurred as a result of stopping any concreting operations due to out of specification materials.

(B) Aggregate Moisture Determination:

1. Testing:

At least once during each day of placement for each aggregate size used, moisture content determinations shall be made in accordance with ASTM C566 (ASTM C70 where appropriate for fine aggregate if it is stockpiled separately). The location from which the sample is selected may be determined by the Contractor, providing that it is typical of materials entering the concrete.

2. Action Required:

The Engineer may test for verification any field determinations of moisture contents made by the Contractor. This verification will use the oven drying procedure. If there is a discrepancy between the Contractor's test results and the verification tests, immediate steps shall be taken to identify the source of the problem and correct it so that accurate field determinations are obtained. When moisture content determinations indicate a change in water entering the concrete with the aggregates, the placement foreman shall be contacted to see if a corresponding adjustment in water added at the concrete mixer is necessary to obtain maximum compaction at the placement site.

(C) Concrete Plant Control:

When the concrete plant is operating, the measurement of all constituent materials including cement, fly ash, each size of aggregate, water and admixtures, shall be continuously controlled. The aggregate weights and amount of added water to compensate for free moisture in the aggregates shall be adjusted as necessary. A daily report shall be prepared indicating the type and source of cement and fly ash used during that day; the amount, type and source of admixtures used; aggregate size groups used; required mix proportions per cubic yard for each mix design used; the amount of water as free moisture in each size of aggregate; and the aggregate and water weights per cubic yard for each mix design of concrete made during plant operation.

(D) Scales for Weigh Batching:

1. Tests and Checking:

The accuracy of scales shall be checked by test weights prior to the start-up of concreting operations. Such tests shall also be made whenever there are variations in properties of the RCC that could result from batching errors. The accuracy of each batching device when weight batching procedures are used shall be routinely checked during a weighing operation by noting and recording the required weight and the weight actually batched. Rechecks shall be made at least every four shifts of operation thereafter and whenever there are variations in the properties or control of RCC that could result from batching errors.

2. Action Required:

Whenever either the weighing accuracy or batching accuracy is found not to comply with specification requirements, the plant shall not be operated until necessary adjustments or repairs have been made.

(E) Volumetric Feed Calibrations:

1. Tests and Checking:

The accuracy of volumetric feeds shall be checked by collecting all material delivered during a unit of time to the mixer and also by washout tests of material exiting from the mixer. Suitable methods and equipment shall be provided for obtaining and handling samples at the concreting plant. The weight of material corresponding to a standard time interval, and the resulting proportions of materials per cubic yard, shall be determined. The accuracy of volumetric feeds shall be determined at least three times during check out of the concrete plant prior to production operations and RCC placement. Rechecks shall be made at least every four shifts of operation thereafter and whenever there are variations in the properties of control of RCC that could result from volumetric feed errors. The sample shall be of sufficient size to give accurate determinations and calibration may require weights in excess of 500 pounds per item checked.

2. Action Required:

Whenever the volumetric feed is found not to comply with Specification requirements, the plant shall not be operated until necessary adjustments or repairs have been made.

(F) Testing RCC Mixes:

1. General:

Fresh RCC shall be sampled and tested for compliance with the Specification and for additional information required by the Engineer. Samples and tests will primarily be made at the placing location at the time of placement, but may also be required at the batch plant. The Contractor shall provide a method of readily obtaining representative RCC samples from the plant and any gob hopper locations.

2. Mixer Performance:

A complete mixer performance test of three different batches of RCC or runs through a volumetric plant shall be made on each stationary mixer in accordance with the Army Corps of Engineers CRD-D 55 prior to the start of concrete placing. Additional tests may be made at any time to support a Contractor's request for reduction of mixing time. Whenever mixer adjustments are necessary because of failure of a mixer to comply, the mixer shall be retested after adjustment. The abbreviated test may be used for this purpose. Abbreviated tests shall be run routinely on each mixer at least once every five days.

3. Temperature:

a. Testing:

At least one test of temperature shall be made at the batch plant and at the placement on a randomly selected batch of each mix design of concrete used per shift of placement. Additional tests shall be made when rapid set time or workability loss is reported by the placing foreman or Engineer's inspector, or when cold weather problems occur. The temperature of air and concrete shall be reported during the period of cure and cold weather protection when those restrictions are applicable.

b. Action Required:

Whenever the mix temperature falls below 50 degrees F or is above 90 degrees F, the Contractor shall notify the Engineer immediately. All other temperatures shall be included as standard data in the quality control reports.

4. Moisture Content:

a. Tests and Checking:

At least once during each four hours of production placement at the batch plant, and once every two hours at the placement site (immediately after compaction), the moisture content shall be determined on the RCC mix using a nuclear gauge in the direct transmission mode. The probe shall be driven to a depth of at least 10 inches for each reading. The gauge shall be calibrated against oven-dry samples of each mix design used. If, after three days of

production placement, consistent moisture control is achieved, the rate of testing may be decreased to one test per eight hours at the plant and one test per four hours at the placement. In any case, at least three tests shall be made in different areas of each layer of RCC placed. The placing foreman shall continuously monitor the apparent effectiveness of compaction equipment from a visual standpoint, and shall notify the batch plant whenever the mix becomes too dry or too wet.

b. Action Required:

Whenever moisture content tests indicate a change from what has been established as the optimum batching and placing moisture for maximum density and efficiency of compaction equipment, a corresponding adjustment shall be made in the mix water added at the concrete plant and the adjustment shall be noted. Whenever the placing foreman observes a condition of moisture which begins to consistently allow the vibratory rollers to sink excessively in the mix, cause excessive paste to develop at the surface, or leave an open appearing unconsolidated surface, an adjustment shall be made in the mix water added at the plant and the adjustment shall be noted.

5. Cement and Fly Ash Content:

The Contractor shall obtain samples of the RCC mix at the batch plant and/or placement area for determination of cement and fly ash contents using a chemical chloride titration or similar procedure. The test equipment shall also allow moisture content determinations to be made. The equipment shall be provided by the Contractor and all testing shall be by the Contractor.

6. Concrete Compressive Strength Tests:

The Contractor shall cast, transport and cure specimens for compressive strength tests and test the specimen for compressive strength at time intervals as directed by the Engineer, but not less than one set of three cylinders per 500 cubic yards of RCC placed. The RCC samples shall be prepared and tested in accordance with the requirements of Arizona Test Method 241a.

7. Density:

a. Testing and Checking:

At least once every two hours during placement, but not less than once every 500 cubic yards of RCC, the density and moisture content of RCC after compaction shall be determined with a nuclear density gauge in accordance with AASHTO Designation T-2.30, previously calibrated against sand cone densities. The Contractor shall maintain a nuclear gauge in good working condition on the placement area at all times. The Engineer shall have access to the gauge at all times and shall be allowed to use it for quality assurance check tests. Each lift of RCC shall be tested by the nuclear gauge in at least six separate locations for density. The direct transmission mode shall be used and readings shall be taken in each quadrant of a circle obtained by rotating the gauge 90 degrees each after each reading around the transmission probe. The probe shall be inserted into pre-driven holes of diameter recommended by the manufacturer to a depth of at least 10 inches for each reading. Density shall be as specified in Subsection 504.3.8 of this Special Provision. The vibratory roller operators shall continually monitor their "on board" compaction meters as an indicator of any areas which have not been fully compacted.

b. Action Required:

Whenever a roller operator finds that his compaction meter indicates insufficient compaction, he shall continue rolling until the required compaction meter readout is achieved. If this requires more than an estimated six passes, the Engineer shall be notified by the placing foreman, and the Contractor shall determine the actual density with a nuclear gauge. Whenever the nuclear gauge indicates compaction of less than specified in Subsection 504.3.8 of this Special Provision, a retest shall be made. If the retest indicates incomplete compaction, the Engineer shall be notified, additional rolling shall be immediately provided and a determination shall be made as to whether the lower density resulted from insufficient passes of the roller or a change in the mix properties. If the mix properties have changed, adjustments such as increasing or decreasing the moisture content shall be made at the batch plant. If the problem persists, the Engineer may require the Contractor to adjust the proportions of aggregates, cement and/or fly ash. If the lower density is the result of incomplete rolling, the operator shall be notified and the Engineer may require removal of the incompletely compacted material at no cost. If the same operator repeatedly rolls less than the required number of passes, and/or if his compaction meter repeatedly indicates underrolling due to deliberate action or inattentiveness, he shall be replaced with a different operator.

(G) Compaction Equipment:

1. Tests and Checking:

Before any compactor is used in RCC construction, it shall be checked for current dimensions, weight and vibratory capacity. At least once per four shifts of use, a spot recheck of frequency shall be made. At least once per each shift of placement for the first five days of operation by any new operator, his performance shall be spot checked for the correct number of passes, correct spread, coverage of the area being rolled, and good rolling practice. Thereafter, spot checks shall be made on each operator at least every four shifts.

2. Action Required:

Compaction equipment not meeting the physical dimensions and weights required shall be removed from the site. Any roller having improper frequency shall be corrected before being used for RCC compaction. Roller operators running at speeds in excess of Specification requirements shall be immediately notified and shall correct any noted improper practices or be replaced by another operator.

(H) Dumping and Spreading:

1. Tests and Checking:

The placing foreman or other designated representative shall continually observe and monitor dumping and spreading operations to insure that they are done in a manner that minimizes segregation and spreading after dumping. Each lift of RCC shall be routinely checked in its spread uncompacted condition for evenness and correct thickness that will result in a smooth, even, compacted layer having thickness as required.

2. Action Required:

Whenever thickness checks on uncompacted RCC indicate an excess or shortage of material, the lift shall be immediately bladed off or supplemented to establish the correct thickness before compaction. Whenever a compacted layer thickness or elevation exceeds the specified thickness by two inches, the Engineer shall be immediately notified and he will determine whatever corrective action is necessary.

(I) Preparation for Concrete Placement:

Foundations and construction joints shall be inspected in sufficient time prior to each concrete placement by the Contractor in order to certify that the area is ready to receive concrete. The results of inspections shall be reported in writing as a part of the quality control reports. The placing foreman shall supervise all placing operations and shall be responsible for measuring and recording concrete temperatures, ambient temperature, weather conditions, time of placement, yardage placed and method of placement. The placing foreman shall not permit placing to begin until he has verified that an adequate number of vibratory rollers and spreading equipment of the right size, in working order, and with competent operators are available.

(J) Construction Joints:

Vertical construction joints are to be provided at the end of each day's work or when work is halted for two hours or more. The joints shall be trimmed to a straight line and vertical to the full depth of the lift. Before resuming placement of new RCC, loose material shall be removed from the joint. A thin layer of mortar shall be spread over the joint surface immediately before resuming placement of RCC.

(K) Curing, Protection and Joint Surfaces:

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1. Moist Curing:

At least once each shift around the clock, seven days per week, an inspection shall be made of all areas subject to moist curing and joint protection. The surface moisture condition shall be noted and recorded. If an isolated area has been allowed to dry, that area shall be considered as improperly cured. The Contractor shall immediately wet the surface and take positive steps to insure that the problem does not recur.

2. Protection:

At least once each shift, around the clock, seven days per week, an inspection shall be made of all areas subject to cold weather protection or protection against damage. Deficiencies shall be noted. During removal of cold weather protection, measurement of concrete and ambient temperature shall be made at least every three hours.

(L) Finishing:

After compaction, the RCC shall be further shaped, if necessary, to the required lines, grades, and cross sections, and rolled to a reasonably smooth surface. Trimming of the RCC face is required.

(M) Backfill:

Backfill shall not be placed against the RCC until it has achieved its full design strength. Special care shall be taken when placing backfill against RCC.

(N) Reports:

Concrete plant control reports and all results (both passing and failing) of tests conducted at the site shall be reported daily and shall be delivered to the Engineer within two days after the end of each weekly reporting period. These requirements do not relieve the Contractor of the obligation to report certain failures immediately as required in the preceding paragraphs. Such reports of failures and the action taken shall be confirmed in writing in the routine reports. The Engineer has the right to examine all Contractor quality control records.

504.3.14 - Acceptance Sampling and Testing

Rejection of RCC will occur due to improper temperatures, and/or density for the concrete mixture delivered to the site, placed and compacted. The Engineer at his discretion may allow failed concrete mixture already in place to remain in place subject to acceptance by compressive strength or may require its removal.

Rejection of RCC will also occur due to insufficient compressive strength. Concrete compressive strength requirements consist of the specified strength which the RCC shall attain at 28 days.

A. Sampling and Testing of RCC:

1. General:

Fresh RCC shall be sampled and tested for compliance with the Specification. Samples and tests will be made at the placing location

at the time of placement. The Contractor shall provide a method of readily obtaining representative RCC samples from the placement locations.

2. Temperature:

At least one test of temperature shall be made at the placement location on a randomly selected batch of each mix design of concrete used per shift of placement. Additional tests shall be made when rapid set time or workability loss is reported or when cold weather problems occur.

3. Moisture Content:

At least once during each four hours at the placement site (immediately after compaction), the moisture content shall be determined on the RCC mix using a nuclear gauge in the direct transmission mode. The probe shall be driven to a depth of at least 10 inches for each reading. The gauge shall be calibrated against oven-dry samples of each mix design used. If, after three days of production placement, consistent moisture control is achieved, the rate of testing may be decreased to one test per eight hours at the placement.

In any case, at least three tests shall be made in different areas of each layer of RCC placed.

4. Density:

At least once every two hours during placement, but not less than once every 500 cubic yards of RCC, the density and moisture content of RCC after compaction shall be determined with a nuclear density gauge in accordance with AASHTO Designation T-2.30, previously calibrated against sand cone densities. Each lift of RCC shall be tested by the nuclear gauge in at least six separate locations for density. The direct transmission mode shall be used and readings shall be taken in each quadrant of a circle obtained by rotating the gauge 90 degrees each after each reading around the transmission probe. The probe shall be inserted into pre-driven holes of diameter recommended by the manufacturer to a depth of at least 10 inches for each reading.

5. Concrete Compressive Strength:

The Engineer shall cast, transport, and cure specimens for compressive strength tests and test the specimen for compressive strength at time intervals as directed by the Engineer, but not less than one set of three cylinders per 500 cubic yards of RCC placed. The cylinders shall be prepared and tested in accordance with the requirements of Arizona Test Method 241a. A seven day break will be required as an indicator that 3000 psi at 28 days will be met. The Engineer shall be immediately notified of 7 day break results and may request mix adjustments if results indicate 28 day strength requirements may not be achieved.

(B) Acceptance of RCC:

Acceptance and penalties for placed concrete which meets the above mixture requirements or is allowed to remain in place shall be determined by the results of the 28 day compressive strength. RCC represented by compressive strength tests which do not meet the minimum compressive strength specified may be allowed to remain in place at the discretion of the Engineer. No payment will be made for such RCC.

504.3.15 - Trial Section

Unless otherwise determined by the Engineer, a trial placement of RCC shall be made prior to actual placement. The test section shall have dimensions sufficient to practice the delivery, spreading, and compaction method that will be used. The test section can be located anywhere convenient to other Contractor outside the limits of the site as approved by the Engineer. The purpose of the test fill is to familiarize Contractor and inspection personnel with RCC placement techniques prior to production on the structure. The test section shall be constructed using the same equipment and operators that will be used on the actual construction. Experimentation can be done as to lift thickness, moisture content, and number of roller passes but the test section will not be utilized as a basis for design modifications. Calibration of the nuclear density gauge should be made on the trial fill. It is permissible for the test strip(s) to be utilized as the bottom lift of adjacent bank protection, if feasible. The maximum density shall be determined as the point when additional rolling of the test strip produces no further increase in density. Density shall be determined with a nuclear density gauge in accordance with AASHTO Designation T-2.30, previously calibrated against sand cone densities.

504.4 - Measurement

This work shall be measured 1) in cubic yards of complete-in-place RCC between the limits shown by the specified lines, grades, and cross-sections shown on the Plans; and 2) in tons of cement and fly ash incorporated into the RCC, as determined by tests.

504.5 - Payment

This work shall be paid for at the Contract unit price per cubic yard for RCC as set forth in the Bid Schedule under Item 504. Such payment shall constitute full reimbursement for performing all work and for furnishing all equipment, labor, and materials necessary to complete the RCC drop structure, bank transition, dewatering, trench excavation and backfill toe, watering, mixing, placing, compacting, curing, inspection, and testing assistance and all other incidental operations.

Cement and fly ash furnished will be paid for at the Contract unit price per ton under Items 504-1 and 504-2 of the Bid Schedule respectively. Any waste of cement and/or RCC by the Contractor during the handling, mixing, placing, etc., operations shall not be paid for. Unbalancing of unit price bid or any material bid below market cost shall be the basis for rejection of the bid.

SECTION 520 - STEEL AND ALUMINUM HANDRAILS

In addition to the requirements of the MAG Standard Specifications:

520.1 - Description

Safety Railings and Fence Gate shall be made of galvanized Schedule 40 steel pipe conforming to ASTM A 53, galvanized in accordance with Section 771 of the MAG Standard Specifications.

Pipe Post for Safety Rails shall be of galvanized Schedule 40 steel pipe of nominal 2½-inch diameter (2-7/8-inch od) conforming to ASTM A 53; with a nominal weight of 4.64 lb/ft. Construction shall be continuous along the top of the concrete and RCC embankment.

Pipe rail for safety rails shall be of galvanized Schedule 40 steel pipe of nominal 1-1/2-inch diameter conforming to ASTM A53. Construction shall be continuous along the top of the concrete and RCC embankment. Rails shall be provided in 32-foot length or manufacturer's largest lengths (minimum of 24-foot lengths). Contractor shall provide end caps on all pipe ends. Endcaps to be clamped to pipe and secured with hex head bolt.

Fence Gate Frame shall be of galvanized Schedule 40 steel pipe of nominal 1-7/8-inch diameter conforming to ASTM A 53; with a nominal weight of 2.28 lbs/ft. Gate post shall be of galvanized Schedule 80 steel pipe of nominal 3-inch size conforming to ASTM A 53.

520.2 - Fabrication

Jointing for Safety Railings shall be by one of the following:

1. Flush-type rail fittings, welded and ground smooth with railing splice locks secured with 3/8-inch hexagonal-recessed-head setscrews.

2. Mitered and welded joints made by fitting post to top rail and intermediate rail to post, mitering corners groove welding joints and grinding smooth. Railing splices shall be butted and reinforced by tight-fitting exterior sleeve not less than 6 inches long.

Joints for Fence Gate shall be mitered, grooved and welds ground smooth. Tension lines shall be 7 gauge (0.177 inch diameter) coil spring steel with a minimum tensile strength of 75,000 pounds per square inch, and shall be zinc-coated or aluminum coated.

Surfaces of galvanized metals that are abraded or cut during construction and surfaces which are welded shall be covered with Grade 50B solder conforming to the requirements of ASTM B32.

520.3 - Erection

Installation shall be by grouting pipe post or gate post into preformed or drilled holes in the concrete or RCC or by placement in a concrete footing to the dimensions shown on the design plans. Concrete mixture for grouting pipe post into concrete or RCC shall be Class C per Section 725 of the Standard Specifications.

520.4 - Measurement

Measurement of safety rails will be by the number of linear feet measured horizontally along its entire length as designated on the plans.

520.5 - Payment

Payment for safety railings and fence gates will be made at linear feet of safety railing under Item 520 and at the Contract unit price bid per gate under Item 520-1 in the Bid Schedule, respectively. Such payments shall be compensation in full, inclusive of all fabrication, gate posts, end posts, intermediate posts, cross bars, hinges, braces, joints, locking chain, galvanizing, and field touch-up.

SECTION 606 - GRANULAR FILTER BEDDING

606.1 - Description

Work in this section shall consist of furnishing all labor, material and equipment for the installation of a one and one half (1.5) foot layer of granular filter bedding material as part of the Stepped Drop Structure Drainage System in accordance with the plans and specifications.

606.2 - Materials

Materials used for granular filter bedding shall be in accordance with Section 702 of the MAG Standard Specifications, with the exception that the following gradation shall be used:

PERCENTAGE BY WEIGHT	
Sieve Size	**Passing Sieve**
3 Inch	100
2 Inch	70-85
1 Inch	40-60
0.5 Inch	8-15
#200	0-5

606.3 - Placement

Subgrade preparation beneath the granular filter bedding shall conform to Section 221.4.2 herein.

In order to achieve the required 1.5 foot layer thickness, the granular filter bedding material shall be placed in successive layers of approximately equal compacted thicknesses not to exceed a maximum thickness of 6 inches for each layer.

After distributing, the material shall first be watered and then immediately bladed to a uniform layer that will net the required thickness. If the materials deposited are not uniformly blended together, the blading operation shall be continued to such extent as may be necessary to eliminate segregation. Each layer shall be watered and shall receive two passes from a minimum of 5 Ton Vibratory Steel Drum Roller. The areas adjacent to and above the PVC drain pipes shall be compacted by a Hand Operated Vibratory Steel Plate. Care shall be exercised in connection with watering operations to avoid wetting the subgrade or any lower granular material to a detrimental extent.

Upon completion, the surface shall be true, even and uniform conforming to the grade and cross-section shown on the design plans.

The granular filter bedding material may vary not more than ½ inch above or below required grade and cross-section.

606.4 - Measurement

This work shall be measured in cubic yards of in-place granular filter bedding material between the limits shown by the specified lines, grades and cross-sections on the plans. No allowance is made for spalling or waste beyond those limits.

606.5 - Payment

Payment shall be by the cubic yard in place, to the dimensions shown on the design plans for item 606 of the Bid Schedule. Such payment shall be compensation in full for materials, transportation, miscellaneous earthwork, labor, equipment, placement, watering, and roller compaction.

SECTION 607 - PERFORATED PVC PIPE

Replace Section 745 of the MAG Standard Specifications with the following:

607.1 - Description

Work in this section shall consist of furnishing all labor, materials and equipment for the installation of 6 inch diameter perforated polyvinyl chloride (PVC) heavy duty pipe within the Stepped Drop Structure Drain System in accordance with the plans and specifications. The perforated polyvinyl chloride pipe shall be enclosed in geotextile sock envelope whose material description is given below.

607.2 - Materials

The material used for perforated PVC pipe shall be Heavy Duty SDR-21 and shall conform to the requirements of ASTM D-2241. Perforations shall consist of 2 rows of 15mm holes positioned at 120° radially on the pipe and spaced to provide a minimum total cross-sectional hole area of 1933 mm^2 per meter of length. Pipe shall be placed in granular filter bedding with perforations facing up. Pipe shall be supplied with friction-fit bell ends. Where the PVC pipe connects to the un-perforated galvanized steel pipe, as shown on the plans, the Contractor shall provide shop drawings of the connection for the approval of the Engineer.

A geotextile fabric sock envelope shall be installed around the perforated pipe. The geotextile fabric shall have a minimum flow rate of 120 gallons/minute/ft^2 and an apparent opening size (AOS) of 100-120 (US Standard Sieve Size).

Where joints are required in the fabric sock, an overlap of 18 inches shall be provided at both ends. The geotextile fabric sock shall be Trevira Spunbound 1135 or approved equal.

607.3 - Measurement

Measurement of perforated PVC pipe will be by the number of linear feet measured horizontally along its length as designated on the plans.

607.4 - Payment

Payment shall be by the linear foot of perforated PVC pipe under item 607 in the Bid Schedule. Such payment shall be compensation in full, inclusive of all materials (pipe, bell ends, geotextile fabric, etc.), transportation, labor, equipment, placement and all incidental work not specifically covered in other pay items.

SECTION 608 - GALVANIZED STEEL PIPE

608.1 - Description

Work in this section shall consist of furnishing all labor, materials and equipment for the installation of 6 inch diameter un-perforated new galvanized welded or seamless pipe within the Stepped Drop Structure Drain System in accordance with the plans and specifications.

608.2 - Materials

Materials used for galvanized steel pipe shall be in accordance with Section 753 of the MAG Standard Specifications, with the exception that the Contractor shall provide shop drawings of the joint connecting the PVC pipe to the Galvanized Steel Pipe for the approval of the Engineer.

608.3 - Measurement

Measurement of galvanized steel pipe will be by the number of linear feet measured horizontally along its length as designated on the plans.

608.4 - Payment

Payment shall be by the linear foot of galvanized steel pipe under item 608 in the Bid Schedule. Such payment shall be compensation in full, inclusive of all materials, transportation, labor, equipment, placement and all incidental work not specifically covered in other pay items.