# CONSTRUCTION SPECIFICATIONS

# FOR

# CONTRACT FCD 1999C062
# RIO SALADO – PHOENIX REACH
# LOW FLOW CHANNEL PROJECT – PHASE 1
# PCN 124 01-30

C 69.00.099.5

This project was designed by the Los Angeles District of the U. S. Army Corps of Engineers. The initials or signatures and registration designations of the individuals appear on these project documents within the scope of their employment as required by E.R. 1110-1-8152.

**FLOOD CONTROL DISTRICT OF MARICOPA COUNTY**

Recommended by: Edward A. Raleigh Date: 2/29/00
Edward A. Raleigh, P.E.
Manager Engineering Division

Issued for Public Bidding by: [signature] Date: 3.10.00
Michael S. Ellegood, P.E.
Chief Engineer and General Manager

SUPPLEMENTARY TO MARICOPA ASSOCIATION OF GOVERNMENTS (MAG) UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION EDITION OF 1998 AND REVISIONS AND SUPPLEMENTS THROUGH 2000.

## ATTENTION

## ALL PROSPECTIVE BIDDERS

A.R.S. § 34-201 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 Flood Control District of Maricopa County (District) supplied bond forms is required.

Please submit your bids accordingly.

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

CONTRACT FCD 1999C062
PCN 124-01-30

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# FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

## INVITATION FOR BID

**BID OPENING DATE:** **WEDNESDAY, APRIL 12, 2000**

**PROJECT LOCATION:** The Project is located within the City of Phoenix and within the Salt River channel between the 19th Avenue and the 7th Street crossings of the River.

**PROPOSED WORK:** The Project consists of the excavation of a low flow earthen channel and the construction of numerous roller compacted concrete (RCC) structures including guide dikes, grade control structures and low flow channel bank protection.

**ELIGIBILITY OF CONTRACTOR:**

The bidder shall be required to certify that it has the appropriate "A" Contractor's license in the State of Arizona to perform the above referenced type of 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 referenced type of work.

**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 **2:00p.m. (local time) on Wednesday, April 12, 2000**, 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 of Maricopa County and included in the Construction Specifications. The Board of Directors reserves the right to reject any and all bids and to waive minor informalities in any bid received if advantageous to the Flood Control District of Maricopa County.

**MANDATORY SITE VISIT AND PRE-BID CONFERENCE:**

A **MANDATORY site visit will be conducted beginning at 8:00 a.m. (local time) on Wednesday, March 22, 2000.** Participants will meet at the northeast corner of the Central Avenue bridge and the Salt River on property owned by the City. There is a driveway and vacant land next to the pine tree grove on the east side of the street. **At 10:30 a.m. the MANDATORY Pre-Bid Conference will follow the site visit, at the** Flood Control District of Maricopa County, 2801 West Durango Street, Phoenix, Arizona. Participants should be prepared at that time to submit in writing and discuss any comments concerning this solicitation. **All potential contractors MUST ATTEND the site visit and the pre-bid in order to be eligible to submit a bid for this project.**

**QUESTIONS:**

**Questions or items for clarification may be addressed to the Contracts Branch Manager, in writing, at least five (5) working days prior to bid opening date**. Questions received after this deadline may not

be accepted. Responses to all questions submitted will be sent to all planholders by addenda. Verbal interpretations, unless specifically addressed by an addendum, shall not be binding nor have any legal effect.

## CONTRACT TIME:

All work on this contract is to be completed within three hundred (300) calendar days from the date of Notice to Proceed.

## MINORITY/WOMAN-OWNED BUSINESS ENTERPRISE (M/WBE) PARTICIPATION:

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 Maricopa County Minority and Woman-Owned Business Enterprise Program, effective January 1, 1992, is incorporated herein by reference.

**Two Affidavits are included herein.** The first form, the "M/WBE Assurances Affidavit," must be completed and submitted with the bid – **Failure to do so may be cause for rejection of the bid.** If M/WBE goals have been established, the first and second low bidders must complete and return the second form, "Actual M/WBE Participation Affidavit," to the Flood Control District of Maricopa County by 4:00 p.m. on the seventh ($7^{th}$) calendar day following the bid opening.

**For this contract, a goal of five percent (5%) is established for Minority/Women-Owned Business Enterprises.** Bidders unable to meet the established goal must submit "Good Faith" documentation. Failure to implement good faith efforts in accordance with the City of Phoenix, Maricopa County Consolidated Certification Program for M/WBE to the satisfaction of the District may result in rejection of the bid. Complete instructions and additional forms are available from the Flood Control District of Maricopa County, Contracts Branch, telephone number 602-506-4433, 602-506-8378, or 602-506-4876.

## 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 $40.00 by cash, check or postal money order payable to the FLOOD CONTROL DISTRICT OF MARICOPA COUNTY. This payment will not be refunded. Mail orders for project documents must include an additional $8.00 for first class U.S. postage and handling. The total $48.00 will not be refunded. Regardless of circumstances, we cannot guarantee mail delivery.

Each bid must be accompanied by a Bid Bond executed on the District-supplied bond form, 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.

## PRINCIPLE ITEMS AND APPROXIMATE QUANTITIES

| QUANTITY | UNIT | DESCRIPTION |
|---|---|---|
| 770.000 | CY | Low Flow Channel Excavation |
| 71.000 | CY | Roller Compacted Concrete |
| 1 | EA | Production Well |
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**BID**

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

Gentlemen:

The following Bid is made for the Rio Salado – Phoenix Reach Low Flow Channel Project, Phase 1, FCD 1999C062, in the County of Maricopa, State of Arizona.

The following Bid is made on behalf of

R. E. Monks Construction Company, LLC

and no others. Evidence of authority to submit the bid is herewith furnished. The bid 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 Flood Control District of Maricopa County Board of Directors is personally or financially interested, directly or indirectly, in the bid, 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 bid, have been carefully examined and also that the work site 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 mentioned herein are approximate only and are subject to increase or decrease and hereby proposes to perform all quantities of work, as either increased or decreased, in accordance with the provisions of the Specifications, at the unit price bid in the Bidding Schedule.

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

The Undersigned further proposes to execute the Contract Agreement and furnish satisfactory Bonds and Sureties within ten (10) days of receipt of Notice of Bid 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 three hundred (300) 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 (100%) 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 bid bond in the amount and character named in the Invitation to Bid, and amounting to not less than ten percent (10%) of the total bid, is enclosed. The bid bond is submitted as a guaranty of good faith that the Bidder will enter into a written contract to do the work, as provided, if successful in securing the award thereof. It is therefore agreed that if the Undersigned withdraws its bid at any time except as herein provided, or if the bid is accepted and the Undersigned fails to execute the contract and furnish satisfactory Bonds and Sureties as herein provided, the Flood Control District of Maricopa County shall be entitled and is hereby given the right to retain the said Bid Bond as liquidated damages.

The Undersigned acknowledges receipt of the following addenda, has attached these to the bid package, and has included their provisions in the bid:

Addendum No. ONE (1) Dated 4-1-500

Addendum No. _____ Dated _____

Addendum No. _____ Dated _____

Addendum No. _____ Dated _____

Addendum No. _____ Dated _____

Addendum No. _____ Dated _____

The Undersigned has enclosed the required bid security to the Bid.

# FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

**Rio Salado – Phoenix Reach**
**Low Flow Channel Project – Phase 1**
**FCD 1999C062**
**PCN 124-01-30**
**ADDENDUM NO. 1**

**Contract FCD 1999C062**

**To Contract Documents**

**Title:** Rio Salado – Phoenix Reach
Low Flow Channel Project Phase 1

**Owner:** Flood Control District of Maricopa County

This Addendum No. 1 modifies or clarifies Contract FCD 1999C062. All other provisions of the contract remain unchanged unless specifically modified herein. The Addendum No. 1 forms a part of the Contract Documents and modifies them as follows:

I. **Revisions to Invitation for Bid** – Not applicable to this Addendum.

II. **Revisions to Bidding Schedule**

1. **Page 6**
**ITEM 201-2 – STOCKPILE AREA CLEARING AND GRUBBING**; Add this bid item to the Bid Schedule. The basis of bid will be 10 acres.

**ITEM 221-2 – RCC GRADE CONTROL STRUCTURE**; Change the bid quantity from 33,650 CY to 34,614 CY.

Replace page 6 of the Bid Schedule with page 6A included with and made a part of this Addendum No. 1.

III. **Revisions to Supplementary General Conditions**

2. **SGC Page 13 of 23**
Subsection 107.2 – Permits; Delete the third sentence, and revise the second sentence to read – "The ADWR Groundwater Dewatering Permits are being obtained by the City and the District, and will be made available to the Contractor at the Pre-Construction Conference."

3. **SGC Page 16 of 23**
Subsection 107.5.4 – Contractor Health & Safety Provisions; In the third paragraph under Degraded Groundwater, revise the first sentence to read – "...any guide dike structure, the low flow channel north bank protection or the grade control structure,..."

4. **SGC Page 21 of 23**
Subsection 107.10 Contractor's Responsibility for Work, Part F; Make the following revisions and additions:
1. Change the reference to A.R.S. 45-495 to A.R.S. 45-595.

2. Revise the last sentence to read – "...or other dewatering points, the Contractor shall provide a completed copy of a Notice of Intent (NOI) to withdraw groundwater by means of wells, pumps or other dewatering methods as required by ADWR, or a written description..."
3. Add the following sentence – "All groundwater that is withdrawn will be discharged back into the Salt River."
4. Add the following sentence – "The Contractor will be required to obtain NOI's as required by ADWR prior to activating each dewatering point. It can typically take up to fifteen days to obtain an NOI through the ADWR. All NOI's must be signed by the City as the owner and by the District as the applicant."

Subsection 107.10 – Contractor's Responsibility for Work, Part J; Add the following – "Because of the shallow bridge pier spread footings, the Contractor shall sequence his work for construction of the GCS and the upstream RCC apron so as to minimize the exposure time of the structure excavation to potential river flows. The Contractor shall take all precautions necessary to protect-in-place the bridge structure during construction of the GCS and apron."

Subsection 107.10 – Contractor's Responsibility for Work; Add the following as a Part L "The City of Phoenix, as a part of its Sky Harbor Airport construction activities may construct a low flow channel in the Salt River from the vicinity of the airport downstream to about 7th Street. The timing of construction of the channel was undetermined, but will occur before completion of the Phase 1 Low Flow Channel project. This channel may direct more frequent nuisance flows toward the project area requiring management by the Contractor."

## IV. Revisions to Special Provisions

**5. SP Page 1 of 39**

Subsection 201.1 – Description: Add the following – "The work also includes clearing and grubbing for areas to be used for the stockpiling of silty clay soils as presented in Section 215. This clearing and grubbing will be done only as required to support the stockpiling activities. The basis of payment for this clearing and grubbing activity will be per acre."

Subsection 201.7 – Payment; Add the following – "Payment for clearing and grubbing of silty clay stockpile areas will be made on the basis of the price bid per acre, including all labor, equipment and materials required for clearing and grubbing of the stockpile areas. **ITEM 201-2 – STOCKPILE AREA CLEARING AND GRUBBING**"

**6. SP Page 5 of 39**

Subsection 215.1 – Description; Add the following --

"If fine grain silty clay soils (70% to 80% passing the 1" sieve, and free of rubble and debris) are encountered during excavation of the low flow channel (LFC), and if such soils can be separately excavated and stockpiled, then at the direction of the Engineer, such soils shall be excavated and stockpiled as follows:

1. Soil stockpiles placed in the river must be placed such that the long axis of the stockpile is parallel to river flows. Stockpile side slopes cannot be steeper than 2:1. Stockpiles downstream of Station 14+00 must be limited to 3 feet in height. Stockpiles in the river must be placed so that they do not block side drain flows into the river.

2. Soil stockpiles placed outside of the river must have side slopes no steeper than 4:1.

3. Whenever possible the soils will be placed at the nearest stockpile location to the source of the soils, as listed below:
-- Sta. 10+00 to 14+00; up to 50 feet on either side of the LFC centerline.
-- Sta. 14+00 to 38+00; either side of the LFC from top of channel to toe of riverbank.
-- Sta. 87+50 to 97+50; south of the LFC from approximately 250 feet south of the LFC centerline to approximately 400 feet south of the LFC centerline.
-- Sta. 118+00 to 125+50; south of the LFC from approximately 200 feet south of the LFC centerline to the toe of riverbank.
-- An approximately 2 acre site on the riverbank at the northeast quadrant of Central Avenue and the river, east of the pine tree grove.
– An approximately 0.5 acre site on the riverbank at the southeast quadrant of Central Avenue and the river, south of the underpass.
-- Sta. 106+50 to 122+50; along the south side of the river from approximately 300 feet south of the LFC centerline to the south project boundary.

4. The excavation and stockpiling of these soils shall be considered incidental to and included in the bid quantity for ITEM 215-1 – Earthwork For Drainage Channels."

Subsection 215.7 – Measurement; Add the following – "The pay quantity for ITEM 215-1 Earthwork For Drainage Channels will be reduced by an equivalent quantity of materials removed under ITEMS 350-1 through 350-6, using one ton of removed material to one cubic yard of excavation."

7. **SP Page 13 of 39**
Subsection 221.4.9.1 – General (Lift Joints); Clarify the first sentence as follows – "The placement of a bonding layer for RCC lifts within the top three (3) feet of the GCS applies to the north/south element of the GCS located along the transverse axis station 101+06.97 and the associated north 334 foot long and the south 200 foot long wings. Refer to plan sheet W-2."

8. **SP Page 30 of 39**
Subsection 350.1 – Description; Add the following - "The existing chain link fence located along the top of north river bank slope between the Central Avenue bridge and the ADOT storm drain outlet structure shall be protected-in-place. This fence appears on plan sheet W-1."

9. **SP Page 38 of 39**
Subsection 609.1 – Description; Revise Part 6 to read - "...from the City of Phoenix, whichever is later."

V. **Revisions to Appendix "A" Contingency Response plan**

10. **Page 4**
Subsection 5.1.1 – Work Zone Definition; Add the following sentence to follow the first sentence – "Exclusion zones will be established only as required should unacceptable or hazardous materials be encountered, and as determined necessary by the Engineer in consultation with environmental staff and the Contractor."

11. **Page 5**
Subsection 5.2 – Personal Protective Equipment (PPE); The use of PPE typically will occur only after unacceptable contaminant exposures have been identified through monitoring and testing, and if the Contractor continues to work in the area(s) where such exposure has been identified.

12. **Page 6**
Subsection 5.3 – Modification To Work Schedules; The requirement outlined in this subsection, at the direction of the Engineer, may not be required depending on the results of the test pit groundwater testing as outlined in Subsection 107.5.4, Degraded Groundwater.

**VI. Revisions to Appendix "B"**

13. **Page 3**
Under Certified Industrial Hygienist; Stop Work Orders will be issued only by the Engineer.

**VII. Revisions to Construction Plans**

14. **Sheet W-6**
Revise Typical Section "N" to include a 10' by 10' (1:1 slope) RCC toedown, as already provided for along the upstream end of the apron and shown in Section Along Channel CL "M" on sheet W-6. The added toedown will be provided along both the north and south side of the four-foot thick apron. A revised sheet W-6 reflecting this change will be provided to the Contractor at the Pre-Construction Conference. The bid quantity for the GCS is revised as indicated in Part II of this Addendum.

Note that the due date of all bids under this Invitation For Bids remains unchanged and is scheduled for **April 12, 2000 at 2:00 pm.** Bidders are reminded that each addenda must be acknowledged on page 5 of 26 of the bid and a copy of addenda attached to the bid package.

**FLOOD CONTROL DISTRICT**
**OF MARICOPA COUNTY**

By: _____
Michael S. Ellegood, P.E.
Chief Engineer and General Manager

Registered Professional Engineer (Civil)
CERTIFICATE NO
20521
DONALD J.
RERICK
Date Signed 4-5-00
ARIZONA, U.S.A.

By: _____
Donald J. Rerick, P.E.
Project Manager

## BID SCHEDULE

### Contract FCD 1999C062 Rio Salado - Phoenix Reach Low Flow Channel Project Phase 1

| ITEM NO. | DESCRIPTION | UNIT | APPROX QTY | UNIT AMOUNT | EXTENDED AMOUNT |
|---|---|---|---|---|---|
| 105-1 | Partnering Allowance | LS | 1 | $20,000.00 | $20,000.00 |
| 107-1 | NPDES/SWPPP Permits | LS | 1 | 5,000.00 | 5,000.00 |
| 107-2 | Public Information and Notification Allowance | LS | 1 | $40,000.00 | $40,000.00 |
| 107-3 | Project Signs Allowance | LS | 1 | $6,000.00 | $6,000.00 |
| 107-4 | Groundwater Dewatering | LS | 1 | 240,000 | 240,000 |
| 107-5 | Surface Water Management | LS | 1 | 50,000.00 | 50,000.00 |
| 107-6 | Test Pit Excavation | LS | 1 | 7,500.00 | 7,500.00 |
| 201-1 | Clearing and Grubbing | LS | 1 | 100,000.00 | 100,000.00 |
| 201-2 | Stockpile Area Clearing and Grubbing | AC | 10 | 2,000.00 | 20,000.00 |
| 202-1 | Mobilization | LS | 1 | 100,000 | 100,000 |
| 211-1 | Backfill of Over-Excavated Areas | CY | 5,000 | 3.00 | 15,000.00 |
| 211-2 | Backfill of Over-Excavated Areas Allowance | LS | 1 | $10,000.00 | $10,000.00 |
| 215-1 | Earthwork for Drainage Channels | CY | 695,000 | .90 | ~~625,000~~ 625,500 |
| 215-2 | Earthwork for United Metro | CY | 75,000 | 1.10 | 82,500 |
| 220-1 | Plain Riprap | CY | 745 | 25.00 | 18,625.00 |
| 220-2 | Grouted Riprap | CY | 345 | 50.00 | 17,250.00 |
| 221-1 | RCC for GDS and Bank Protection | CY | 38,600 | 30.00 | 1,158,000.00 |
| 221-2 | RCC Grade Control Structure | CY | 34,614 | 30.00 | 1,038,420.00 |
| 221-3 | Cement for RCC | TONS | 8,908 | 93.00 | 828,444.00 |
| 221-4 | Fly Ash for RCC | TONS | 3,409 | 33.00 | 112,497.00 |
| 222-1 | Gabion Mattresses | CY | 920 | 95.00 | 87,400.00 |
| 350-1 | Inert Wastes Removal | TONS | 50,000 | 2.50 | 125,000.00 |
| 350-2 | Tire Removal | TONS | 1,500 | 150.00 | 225,000.00 |
| 350-3 | Municipal Solid Waste Removal | TONS | 13,000 | 30.00 | 390,000.00 |
| 350-4 | Inert Wastes Removal Allowance | LS | 1 | $250,000.00 | $250,000.00 |
| 350-5 | Tire Removal Allowance | LS | 1 | $75,000.00 | $75,000.00 |

| ITEM NO. | DESCRIPTION | UNIT | APPROX QTY | UNIT AMOUNT | EXTENDED AMOUNT |
|---|---|---|---|---|---|
| 350-6 | Municipal Solid Waste Removal Allowance | LS | 1 | $150,000.00 | $150,000.00 |
| 350-7 | Temporary Liner | SY | 1,000 | 1.50 | 1,500.00 |
| 350-8 | Permanent Liner | SY | 1,600 | 2.50 | 4,000.00 |
| 350-9 | Temporary Liner Allowance | LS | 1 | $3,000.00 | $3,000.00 |
| 350-10 | Permanent Liner Allowance | LS | 1 | $4,000.00 | $4,000.00 |
| 350-11 | Conveyor Bridge Removal | LS | 1 | 35,000.00 | 35,000.00 |
| 350-12 | Riprap Removal | CY | 3,960 | 2.00 | 7,920.00 |
| 350-13 | Grouted Riprap and Gabion Removal | CY | 470 | 5.00 | 2,350.00 |
| 350-14 | Miscellaneous Removals | LS | 1 | 10,000.00 | 10,000.00 |
| 401-1 | Traffic Control | LS | 1 | 10,000.00 | 10,000.00 |
| 401-2 | Off-Duty Uniformed Officer | HR | 300 | 35.00 | 10,500.00 |
| 609-1 | Production Well Installation | EA | 1 | 165,000.00 | 165,000.00 |
| 609-2 | Production Well Development and | LS | 1 | 25,000.00 | 25,000.00 |
| 609-3 | Test Hole Drilling and Logging | EA | 2 | 18,000.00 | 36,000.00 |
| | | | | | |
| TOTAL BID AMOUNT WRITTEN IN NUMBERS | | | | | $ 6,111,406.00 |
| TOTAL BID AMOUNT WRITTEN IN WORDS | Six million, One Hundred and eleven Thousand, Four Hundred and Six Dollars | | | | |

**IF BY AN INDIVIDUAL:**

By: _____

(Printed Name) (Title) (Address)

(Signature) (Date) (Telephone Number)

**IF BY A FIRM, PARTNERSHIP OR L.L.C. (LIMITED LIABILITY COMPANY):**

R. E. Monks Construction Co., LLC — P.O. Box 17959, Fountain Hills, AZ 85269
(Firm Name) (Firm Address)

4/12/00 — (480) 837-3684
(Signature - Title) Chief Est. (Date) (Telephone Number)

**Name and Address of each Member, or each Manager of L.L.C. per Operating Agreement

| | |
|---|---|
| Robert E. Monks | P.O. Box 17959, Fountain Hills, AZ 85269 |
| Daniel R. Monks | 8355 Vollmer Rd. Colorado Springs, CO 80908 |
| Richard D. Monks | P.O. Box 17959, Fountain Hills, AZ 85269 |
| LLC Office | 8355 Vollmer Rd. Colorado Springs, CO 80908 |

**The name and post office address of each Member of the Firm or Partnership must be shown, or of each Manager of an L.L.C., also address of the registered office of the L.L.C.

**IF BY A CORPORATION:**

(Corporate Name) (Corporation Address)

(Printed Name) (Title) (Telephone Number)

By: _____
(Signature) (Date)

*Incorporated under the Laws of the State of _____ and 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 the name, 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 (including any minority and woman-owned business participation) that are to be used in the event the undersigned should enter into contract with the Owner. Although this list will not be considered as final commitment on the part of the successful proposer, any Subcontractor changes from those listed must have Owner's written approval prior to commencement of Subcontractor work on site.

ARIZONA CONSTRUCTION SERVICES

ALZA BROTHERS INC.

(Signature) Ronald W. Kelton, Chief Estimator

## SURETY BOND

KNOW ALL MEN BY THESE PRESENTS:

That we, R. E. MONKS CONSTRUCTION*, as Principal, (hereinafter called the Principal), and the UNITED STATES FIDELITY AND**, a corporation duly organized under the laws of the State of Maryland, 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 **Contract FCD 1999C062 Rio Salado – Phoenix Reach Low Flow Channel Project, Phase 1**, Phoenix, Arizona

NOW, THEREFORE, if the Flood Control District of Maricopa County shall accept the proposal of the Principal and the Principal shall enter into a contract with the Flood Control District of Maricopa County in accordance with the terms of 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 provision 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 12th day of April, AD, 2000.

HRH of Denver
Agency of Record, State of Arizona

Agency Address and Phone Number:
P.O. Box 9364
Denver, Colorado 80209-0364
(303) 722-7776

R. E. MONKS CONSTRUCTION COMPANY, LLC.
Principal
BY: _____
Signature

By: Ronald W. Kelton
(Printed Name)
Chief Estimator
(Title)

WITNESSED BY: Bonnie Leddy

UNITED STATES FIDELITY AND GUARANTY COMPANY
Surety Name
BY: Susan J. Rawson
(Signature)

By: Susan J. Rawson
(Printed Name)
Attorney-in-Fact
(Title)

Bond Number: Not Applicable

ATTACH SURETY POWER OF ATTORNEY

* COMPANY, LLC., 16646 East Laser Drive, Fountain Hills, Arizona 85268

** GUARANTY COMPANY, St. Paul, Minnesota

The St Paul

# POWER OF ATTORNEY

Seaboard Surety Company
St. Paul Fire and Marine Insurance Company
St. Paul Guardian Insurance Company
St. Paul Mercury Insurance Company

United States Fidelity and Guaranty Company
Fidelity and Guaranty Insurance Company
Fidelity and Guaranty Insurance Underwriters, Inc.

Power of Attorney No. 20567

Certificate No.

**KNOW ALL MEN BY THESE PRESENTS**: That Seaboard Surety Company is a corporation duly organized under the laws of the State of New York, and that St. Paul Fire and Marine Insurance Company, St. Paul Guardian Insurance Company and St. Paul Mercury Insurance Company are corporations duly organized under the laws of the State of Minnesota, and that United States Fidelity and Guaranty Company is a corporation duly organized under the laws of the State of Maryland, and that Fidelity and Guaranty Insurance Company is a corporation duly organized under the laws of the State of Iowa, and that Fidelity and Guaranty Insurance Underwriters, Inc. is a corporation duly organized under the laws of the State of Wisconsin *(herein collectively called the "Companies")*, and that the Companies do hereby make, constitute and appoint

Courtney T. Peterson, Leon B. Dartois, James S. Rosulek, J. R. Richards, Douglas J. Rothey, Susan J. Rawson and Cynthia M. Burnett

of the City of Denver, State Colorado, their true and lawful Attorney(s)-in-Fact, each in their separate capacity if more than one is named above, to sign its name as surety to, and to execute, seal and acknowledge any and all bonds, undertakings, contracts and other written instruments in the nature thereof on behalf of the Companies in their business of guaranteeing the fidelity of persons, guaranteeing the performance of contracts and executing or guaranteeing bonds and undertakings required or permitted in any actions or proceedings allowed by law.

**IN WITNESS WHEREOF**, the Companies have caused this instrument to be signed this 1st day of December, 1999.

Seaboard Surety Company
St. Paul Fire and Marine Insurance Company
St. Paul Guardian Insurance Company
St. Paul Mercury Insurance Company

United States Fidelity and Guaranty Company
Fidelity and Guaranty Insurance Company
Fidelity and Guaranty Insurance Underwriters, Inc.

MICHAEL B. KEEGAN, Vice President

MICHAEL R. MCKIBBEN, Assistant Secretary

State of Maryland
City of Baltimore

On this 1st day of December, 1999, before me, the undersigned officer, personally appeared Michael B. Keegan and Michael R. McKibben, who acknowledged themselves to be the Vice President and Assistant Secretary, respectively, of Seaboard Surety Company, St. Paul Fire and Marine Insurance Company, St. Paul Guardian Insurance Company, St. Paul Mercury Insurance Company, United States Fidelity and Guaranty Company, Fidelity and Guaranty Insurance Company, and Fidelity and Guaranty Insurance Underwriters, Inc. and that they, as such, being authorized so to do, executed the foregoing instrument for the purposes therein contained by signing the names of the corporations by themselves as duly authorized officers.

**In Witness Whereof,** I hereunto set my hand and official seal.

My Commission expires the 13th day of July, 2002.

REBECCA EASLEY-ONOKALA, Notary Public

This Power of Attorney is granted under and by the authority of the following resolutions adopted by the Boards of Directors of Seaboard Surety Company, St. Paul Fire and Marine Insurance Company, St. Paul Guardian Insurance Company, St. Paul Mercury Insurance Company, United States Fidelity and Guaranty Company, Fidelity and Guaranty Insurance Company, and Fidelity and Guaranty Insurance Underwriters, Inc. on September 2, 1998, which resolutions are now in full force and effect, reading as follows:

**RESOLVED,** that in connection with the fidelity and surety insurance business of the Company, all bonds, undertakings, contracts and other instruments relating to said business may be signed, executed, and acknowledged by persons or entities appointed as Attorney(s)-in-Fact pursuant to a Power of Attorney issued in accordance with these resolutions. Said Power(s) of Attorney for and on behalf of the Company may and shall be executed in the name and on behalf of the Company, either by the Chairman, or the President, or any Vice President, or an Assistant Vice President, jointly with the Secretary or an Assistant Secretary, under their respective designations. The signature of such officers may be engraved, printed or lithographed. The signature of each of the foregoing officers and the seal of the Company may be affixed by facsimile to any Power of Attorney or to any certificate relating thereto appointing Attorney(s)-in-Fact for purposes only of executing and attesting bonds and undertakings and other writings obligatory in the nature thereof, and subject to any limitations set forth therein, any such Power of Attorney or certificate bearing such facsimile signature or facsimile seal shall be valid and binding upon the Company, and any such power so executed and certified by such facsimile signature and facsimile seal shall be valid and binding upon the Company with respect to any bond or undertaking to which it is validly attached; and

**RESOLVED FURTHER,** that Attorney(s)-in-Fact shall have the power and authority, and, in any case, subject to the terms and limitations of the Power of Attorney issued them, to execute and deliver on behalf of the Company and to attach the seal of the Company to any and all bonds and undertakings, and other writings obligatory in the nature thereof, and any such instrument executed by such Attorney(s)-in-Fact shall be as binding upon the Company as if signed by an Executive Officer and sealed and attested to by the Secretary of the Company.

I, Michael R. McKibben, Assistant Secretary of Seaboard Surety Company, St. Paul Fire and Marine Insurance Company, St. Paul Guardian Insurance Company, St. Paul Mercury Insurance Company, United States Fidelity and Guaranty Company, Fidelity and Guaranty Insurance Company, and Fidelity and Guaranty Insurance Underwriters, Inc. do hereby certify that the above and foregoing is a true and correct copy of the Power of Attorney executed by said Companies, which is in full force and effect and has not been revoked.

**IN TESTIMONY WHEREOF,** I hereunto set my hand this 12th day of April, 2000.

Michael R. McKibben

Michael R. McKibben, Assistant Secretary

***To verify the authenticity of this Power of Attorney, call 1-800-421-3880 and ask for the Power of Attorney clerk. Please refer to the Power of Attorney number, the above-named individuals and the details of the bond to which the power is attached.***

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

STATE OF Arizona )
)§
County of Maricopa )

Ronald W. Kelton being first duly sworn, deposes and says:

That he/she is Chief Estimator of R.E. Monks Construction Co, LLC bidding on Contract FCD **Contract FCD 1999C062 Rio Salado – Phoenix Reach Low Flow Channel Project, Phase 1** in the County of Maricopa, State of Arizona.

That, in connection with the above-referenced 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 12th day of April, 2000.

Bonnie Leddy
(Notary Public)

OFFICIAL SEAL
BONNIE LEDDY
Notary Public - State of Arizona
MARICOPA COUNTY
My comm. expires Jan. 30, 2004

Jan. 30, 2004
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 072943-A that my privilege license number (as required by A.R.S. Section 42-5005) is 07-560797H; 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 Richard D. Monks, Member

Date: April 12, 2000

Company: R.E. Monks Construction Company, LLC

## FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
## MINORITY/WOMAN-OWNED BUSINESS ENTERPRISE PROGRAM
## M/WBE ASSURANCES AFFIDAVIT

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

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

R.E. Monks Construction Co., LLC (the entity submitting the bid)

**(CHECK ONE)**

_x_ Will meet the **established** goal for participation by Minority/Woman-Owned Business Enterprises.

_____ Will provide the necessary documentation to the Flood Control District of Maricopa County to establish that a good faith effort was made.

A sample Actual Participation affidavit is included in these Bid documents. The first and second low bidders are required to specify their M/WBE participation by submitting a notarized affidavit no later than 4:00 P.M. the seventh ($7^{th}$) calendar day following the bid opening, or by providing documentation of their good faith efforts. If participation is "None," the documentation shall provide bidder's good faith efforts to obtain the participation. The Flood Control District of Maricopa County will review this documentation to determine whether in fact a comprehensive "good faith" effort has been implemented. Affidavit forms and Good Faith documentation forms are available from the Flood Control District of Maricopa County, 2801 West Durango Street, Phoenix, Arizona 85009, Telephone area code 602-506-1501.

R.E. Monks Construction Company, LLC
Name of Firm

(Signature)

By: Ronald W. Kelton
(Printed Name)

Chief Estimator
(Title)

STATE OF Arizona )
)§
County of Maricopa )

Subscribed and sworn to before me this 12th day of April, 2000.

Bonnie Leddy
Notary Public

OFFICIAL SEAL
BONNIE LEDDY
Notary Public - State of Arizona
MARICOPA COUNTY
My comm. expires Jan. 30, 2004

My Commission Expires: Jan 30, 2004

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

# ACTUAL M/WBE PARTICIPATION AFFIDAVIT

(NOTE: COMPLETED AFFIDAVIT MUST BE SUBMITTED
WITHIN SEVEN (7) CALENDAR DAYS
FOLLOWING THE BID OPENING)

**R. E. Monks Construction Co. LLC.** Contract/Project No. **FCD 1999C062** Total Amount of Contract: **$6,111,406.00**
Name of Contractor

Ronald W. Kelton Contract M/WBE Goal: **5%**
Contact Person

16646 E. Laser Drive
Street No.

Fountain Hills, AZ 85269
City State Zip

| Minority/Woman-Owned Firm | Principal | Address | Type of Work | Dollar Amount & Contract Percentage |
|---|---|---|---|---|
| **Arizona Construction Services** | Terri Smith | 740 E Flynn Ln #C<br>Phoenix, AZ 85014 | Public Information And Notification | $ 33,000.00 / 0.5% |
| **Auza Brothers Inc.** | Pete Auza | 4123 El Dorado Rd<br>Yuma, AZ 85364 | Rip Rap/Gabions<br>Tire Removal | $280,000.00 / 4.6% |
| | | | **TOTALS:** | **$313,000.00 / 5.1%** |

**The undersigned has entered into a formal agreement with the M/WBE subconsultants/subcontractors/suppliers listed above in the execution of this contract with the Flood Control District of Maricopa County.**

Signature 4/17/00
Date

Chief Estimator/Officer
Title

STATE OF ARIZONA )
) ss:
County of MARICOPA )

Subscribed and sworn to before me this 17th day of April 2000 by Bonnie Leddy
Notary Public

My commission expires: 1/30/2004

OFFICIAL SEAL
BONNIE LEDDY
Notary Public - State of Arizona
MARICOPA COUNTY
My comm. expires Jan. 30, 2004

MINORITY/WOMAN-OWNED BUSINESS ENTERPRISES PROGRAM

## M/WBE PARTICIPATION REPORT

*(To be attached with each request for pay)*

Date:_____

Prime Contractor: _____

Contractor Contact Person: _____

Contractor Address: _____

Contractor Telephone Number: _____

Contractor Fax Number: _____

Contract Description: _____

Contract Number: _____

Invoice For Pay Period of (indicate dates): _____

M/WBE Subcontractor/Subconsultant Name: _____

Contact Person: _____

Address: _____

Telephone Number: _____

Type of Firm: _____

Type of Work performed for this contract
by this M/WBE firm: _____

Total M/WBE Subcontract Amount
for this Subcontractor: _____

Amount Paid to this M/WBE
Subcontractor on this invoice payment: _____

Total paid to this Subcontractor since the
contract start date: _____

Total M/WBE Contract Goal this project = _____%

Total M/WBE Participation
on this contract to date =__%

Send to: Flood Control District of Maricopa County
Contracts Branch
2801 West Durango Street
Phoenix, Arizona 85009

## CONTRACT AGREEMENT

THIS AGREEMENT, made and entered into **this** 3RD **day of** May, 2000 by and between the FLOOD CONTROL DISTRICT OF MARICOPA COUNTY, hereinafter called the Owner, acting by the through its' BOARD OF DIRECTORS, and **R. E. Monks Construction Co., LLC**, hereinafter called the Contractor.

WITNESSETH: That the said Contractor, for and in the consideration of the sum of **six million one hundred eleven thousand four hundred six dollars and zero cents ($6,111,406.00)** 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 Manger, a project for the Flood Control District of Maricopa County, designated as **Contract FCD 1999C062 Rio Salado – Phoenix Reach Low Flow Channel Project, Phase 1,** 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, i.e., 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 **three hundred (300) calendar days following notice to proceed**. Following completion and acceptance of all work performed, the Contractor will complete and return the form titled "Certificate of Performance and Payment of All Claims", contained within this contract document.

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. With each request for payment, the Contractor shall complete and provide the form "M/WBE Participation Report" which is included with this contract document.

ARTICLE V – TERMINATION: The Owner hereby gives notice that pursuant to A.R.S. Section 38-511(A) this contract may be canceled without penalty or further obligation within three (3) 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 employee or 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 regulations. 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 – M/WBE PROGRAM: The Owner will endeavor to ensure in every way possible that minority and woman-owned business enterprises shall have every opportunity to participate in providing professional services, purchased goods, and contractual services to the Owner without being discriminated against on the grounds of race, religion, sex, age, disability, or national origin. The City of Phoenix and Maricopa County Minority, Woman-Owned and Disadvantaged Business Enterprise Program 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.

**R. E. Monks Construction Co., LLC**
Party of the First Part

By: Ronald W. Kelton
Printed Name

Signature

Title: Chief Estimator

Date: April 21, 2000

84-1425505
Tax Identification Number

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
PARTY OF THE SECOND PART

RECOMMENDED BY:

5/2/00
Chief Engineer and General Manager Date
Flood Control District of Maricopa County

By: 5/3/2000
Chairman, Board of Directors Date

ATTEST:

5/3/2000
Clerk of the Board 121599 Date

**LEGAL REVIEW**

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

4/29/00
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, R. E. MONKS CONSTRUCTION* (hereinafter called the Principal), as Principal, and UNITED STATES FIDELITY AND** , a corporation organized and existing under the laws of the State of Maryland, with its principal office in the City of St. Paul (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 **six million one hundred eleven thousand four hundred six dollars and zero cents ($6,111,406.00)**, 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.

* COMPANY, LLC., 16646 East Laser Drive, Fountain Hills, Arizona 85268

WHEREAS, the Principal has entered into a certain written contract with the Flood Control District of Maricopa County, dated the 21st day of April 2000, for **Contract No. FCD 1999C062, Rio Salado – Phoenix Reach Low Flow Channel Project, Phase 1,** which contract is hereby referred to and made a part hereof as fully and to the same extent as if copied at length herein.

** GUARANTY COMPANY

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH, that if the Principal promptly pays 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, 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 they were copied at length in this agreement.

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

Witness our hands this 21st day of April, 2000.

HRH of Denver
Agency of Record, State of Arizona

Agency Address and Phone Number:
P. O. Box 9364
Denver, Colorado 80209-0364
(303) 722-7776

**Bond Number:** 400KA0423

R. E. MONKS CONSTRUCTION COMPANY, LLC.
Principal
Signature
WITNESS: Bonnie Leddy
By: Ronald W. Kelton BY: Bonnie Leddy
Printed Name
Title: Chief Estimator

UNITED STATES FIDELITY AND GUARANTY COMPANY
Surety Seal
Signature
By: Susan J. Rawson, Attorney-in-Fact
Printed Name

**ATTACH SURETY POWER OF ATTORNEY**
COUNTERSIGNED BY ARIZONA RESIDENT AGENT,
BY: Steven E. Minard
Steven E. Minard
Minard-Ames Insurance Group
4130 East Van Buren Street, Suite 350
Phoenix, Arizona 850008

**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 R. E. MONKS CONSTRUCTION* (hereinafter called the Principal), as Principal, and UNITED STATES FIDELITY AND** a corporation organized and existing under the laws of the State of Maryland, with its principal office in the City of St. Paul (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 **six million one hundred eleven thousand four hundred six dollars and zero cents ($6,111,406.00)**, 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.

* COMPANY, LLC., 16646 East Laser Drive, Fountain Hills, Arizona 85268

WHEREAS, the Principal has entered into a certain written contract with the Flood Control District of Maricopa County, dated the 21st day of April, 2000 **for Contract FCD 1999C062, Rio Salado – Phoenix Reach Low Flow Channel Project, Phase 1**, which contract is hereby referred to and made a part hereof as fully and to the same extent as if copied at length herein.

** GUARANTY COMPANY

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH, that if the Principal faithfully performs and fulfills all of the undertakings, covenants, terms, conditions and agreements of the contract during the original term of the contract and any extension of the contract, with or without notice to the Surety, and during the life of any guaranty required under the contract, and also performs and fulfills all of the undertakings, covenants, terms, conditions and agreements of all duly authorized modifications of the contract that may hereafter be made, notice of which modifications to the Surety being hereby waived; the above 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, 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 they were copied at length in this agreement.

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

Witness our hands **this** 21st **day of** April, 200 0.

HRH of Denver
Agency of Record, State of Arizona

Agency Address and Phone Number:
P. O. Box 9364
Denver, Colorado 80209-0364
(303) 722-7776

**Bond Number:** 400KA0423

R. E. MONKS CONSTRUCTION COMPANY, LLC.
Principal
WITNESS: Bonnie Leddy
Signature
By: Ronald W. Kelton BY: Bonnie Leddy
Printed Name
Title: Chief Estimator

UNITED STATES FIDELITY AND GUARANTY COMPANY
Surety Seal
Susan J. Rawson
Signature
By: Susan J. Rawson, Attorney-in-Fact
Printed Name

**ATTACH SURETY POWER OF ATTORNEY**
COUNTERSIGNED BY ARIZONA RESIDENT AGENT, Minard-Ames Insurance Group
BY: Steven E. Minard
Steven E. Minard
4130 East Van Buren Street, Suite 350
Phoenix, Arizona 85008

**The St Paul**

# POWER OF ATTORNEY

**Seaboard Surety Company**
**St. Paul Fire and Marine Insurance Company**
**St. Paul Guardian Insurance Company**
**St. Paul Mercury Insurance Company**

**United States Fidelity and Guaranty Company**
**Fidelity and Guaranty Insurance Company**
**Fidelity and Guaranty Insurance Underwriters, Inc.**

**Power of Attorney No.** 20567 **Certificate No.**

**KNOW ALL MEN BY THESE PRESENTS**: That Seaboard Surety Company is a corporation duly organized under the laws of the State of New York, and that St. Paul Fire and Marine Insurance Company, St. Paul Guardian Insurance Company and St. Paul Mercury Insurance Company are corporations duly organized under the laws of the State of Minnesota, and that United States Fidelity and Guaranty Company is a corporation duly organized under the laws of the State of Maryland, and that Fidelity and Guaranty Insurance Company is a corporation duly organized under the laws of the State of Iowa, and that Fidelity and Guaranty Insurance Underwriters, Inc. is a corporation duly organized under the laws of the State of Wisconsin *(herein collectively called the "Companies")*, and that the Companies do hereby make, constitute and appoint

Courtney T. Peterson, Leon B. Dartois, James S. Rosulek, J. R. Richards, Douglas J. Rothey, Susan J. Rawson and Cynthia M. Burnett

of the City of Denver, State Colorado, their true and lawful Attorney(s)-in-Fact, each in their separate capacity if more than one is named above, to sign its name as surety to, and to execute, seal and acknowledge any and all bonds, undertakings, contracts and other written instruments in the nature thereof on behalf of the Companies in their business of guaranteeing the fidelity of persons, guaranteeing the performance of contracts and executing or guaranteeing bonds and undertakings required or permitted in any actions or proceedings allowed by law.

**IN WITNESS WHEREOF**, the Companies have caused this instrument to be signed this 1st day of December, 1999.

**Seaboard Surety Company**
**St. Paul Fire and Marine Insurance Company**
**St. Paul Guardian Insurance Company**
**St. Paul Mercury Insurance Company**

**United States Fidelity and Guaranty Company**
**Fidelity and Guaranty Insurance Company**
**Fidelity and Guaranty Insurance Underwriters, Inc.**



MICHAEL B. KEEGAN, Vice President

MICHAEL R. MCKIBBEN, Assistant Secretary

State of Maryland
City of Baltimore

On this 1st day of December, 1999, before me, the undersigned officer, personally appeared Michael B. Keegan and Michael R. McKibben, who acknowledged themselves to be the Vice President and Assistant Secretary, respectively, of Seaboard Surety Company, St. Paul Fire and Marine Insurance Company, St. Paul Guardian Insurance Company, St. Paul Mercury Insurance Company, United States Fidelity and Guaranty Company, Fidelity and Guaranty Insurance Company, and Fidelity and Guaranty Insurance Underwriters, Inc. and that they, as such, being authorized so to do, executed the foregoing instrument for the purposes therein contained by signing the names of the corporations by themselves as duly authorized officers.

**In Witness Whereof,** I hereunto set my hand and official seal.

My Commission expires the 13th day of July, 2002.

REBECCA EASLEY-ONOKALA, Notary Public

86203 Ed. 5-99 Printed in U.S.A.

This Power of Attorney is granted under and by the authority of the following resolutions adopted by the Boards of Directors of Seaboard Surety Company, St. Paul Fire and Marine Insurance Company, St. Paul Guardian Insurance Company, St. Paul Mercury Insurance Company, United States Fidelity and Guaranty Company, Fidelity and Guaranty Insurance Company, and Fidelity and Guaranty Insurance Underwriters, Inc. on September 2, 1998, which resolutions are now in full force and effect, reading as follows:

**RESOLVED,** that in connection with the fidelity and surety insurance business of the Company, all bonds, undertakings, contracts and other instruments relating to said business may be signed, executed, and acknowledged by persons or entities appointed as Attorney(s)-in-Fact pursuant to a Power of Attorney issued in accordance with these resolutions. Said Power(s) of Attorney for and on behalf of the Company may and shall be executed in the name and on behalf of the Company, either by the Chairman, or the President, or any Vice President, or an Assistant Vice President, jointly with the Secretary or an Assistant Secretary, under their respective designations. The signature of such officers may be engraved, printed or lithographed. The signature of each of the foregoing officers and the seal of the Company may be affixed by facsimile to any Power of Attorney or to any certificate relating thereto appointing Attorney(s)-in-Fact for purposes only of executing and attesting bonds and undertakings and other writings obligatory in the nature thereof, and subject to any limitations set forth therein, any such Power of Attorney or certificate bearing such facsimile signature or facsimile seal shall be valid and binding upon the Company, and any such power so executed and certified by such facsimile signature and facsimile seal shall be valid and binding upon the Company with respect to any bond or undertaking to which it is validly attached; and

**RESOLVED FURTHER,** that Attorney(s)-in-Fact shall have the power and authority, and, in any case, subject to the terms and limitations of the Power of Attorney issued them, to execute and deliver on behalf of the Company and to attach the seal of the Company to any and all bonds and undertakings, and other writings obligatory in the nature thereof, and any such instrument executed by such Attorney(s)-in-Fact shall be as binding upon the Company as if signed by an Executive Officer and sealed and attested to by the Secretary of the Company.

I, Michael R. McKibben, Assistant Secretary of Seaboard Surety Company, St. Paul Fire and Marine Insurance Company, St. Paul Guardian Insurance Company, St. Paul Mercury Insurance Company, United States Fidelity and Guaranty Company, Fidelity and Guaranty Insurance Company, and Fidelity and Guaranty Insurance Underwriters, Inc. do hereby certify that the above and foregoing is a true and correct copy of the Power of Attorney executed by said Companies, which is in full force and effect and has not been revoked.

**IN TESTIMONY WHEREOF,** I hereunto set my hand this 21st day of April, 2000.

Michael R. McKibben

Michael R. McKibben, Assistant Secretary

***To verify the authenticity of this Power of Attorney, call 1-800-421-3880 and ask for the Power of Attorney clerk. Please refer to the Power of Attorney number, the above-named individuals and the details of the bond to which the power is attached.***

## INDEMNIFICATION

To the fullest extent permitted by law, the Contractor shall defend, indemnify, and hold harmless the Flood Control District of Maricopa County (District), Maricopa County (County), the City of Phoenix, Arizona, (Phoenix), the Arizona Department of Transportation (ADOT), and United Metro Materials, Inc., their agents, representatives, officers, directors, officials, and employees from and against all claims, damages, losses and expenses, including but not limited to attorney fees, court costs, expert witness fees, and the cost of appellate proceedings, relating to, arising out of, or alleged to have resulted from the acts, errors, omissions or mistakes relating to the performance of this contract. Contractor's duty to defend, indemnify and hold harmless the District, County, Phoenix, ADOT, and United Metro Materials, Inc., their agents, representatives, officers, directors, officials, and employees shall arise in connection with any claim, damage, loss or expense that is attributable to bodily injury, sickness, disease, death, or injury to, impairment, or destruction of property, including loss of use resulting therefrom, caused by any acts, errors, omissions or mistakes in the performance of this contract including any person for whose acts, errors, omissions or mistakes, the Contractor may be legally liable.

The amount and type of insurance coverage requirements set forth herein will in no way be construed as limiting the scope of the indemnity in this paragraph.

Abrogation of Arizona Revised Statutes Section 34-226:

In the event that A.R.S. § 34-226 shall be repealed or held unconstitutional or otherwise invalid by a court of competent jurisdiction, then to the fullest extent permitted by law, the Contractor shall defend, indemnify and hold harmless the District, County, Phoenix, ADOT, and United Metro Materials, Inc. their agents, representatives, officers, directors, officials and employees from and against all claims, damages, losses and expenses (including but not limited to attorney fees, court costs, and the cost of appellate proceedings), relating to, arising out of, or resulting from Contractor's work or services. Contractor's duty to defend, indemnify and hold harmless the District, County, Phoenix, ADOT, and United Metro Materials, Inc., their agents, representatives, officers, directors, officials and employees shall arise in connection with any claim, damage, loss or expense that is attributable to bodily injury, sickness, disease, death, injury to, impairment or destruction of property including loss of use resulting therefrom, caused in whole or in part by any act or omission of the Contractor, anyone Contractor directly or indirectly employes or anyone for whose acts Contractor may be liable, regardless of whether it is caused in part by a party indemnified hereunder, including the District and the County, Phoenix, ADOT, and United Metro Materials, Inc.

The amount and type of insurance coverage requirements set forth below will in no way be construed as limiting the scope of the indemnity in this paragraph.

The scope of this indemnification does not extend to the sole negligence of the District and Maricopa County.

## INSURANCE REQUIREMENTS

Contractor, at Contractor's own expense, shall purchase and maintain the herein stipulated minimum insurance with companies duly licensed, possessing a current A.M. Best Company Rating of at least B++ or a Financial Performance Rating (FPR) of at least 6, or approved unlicensed companies in the State of Arizona with policies and forms satisfactory to the District.

All insurance required herein shall be maintained in full force and effect until all work or service required to be performed under the terms of the contract is satisfactorily completed and formally accepted. Failure to do so may, at the sole discretion of the District, constitute a material breach of this contract.

The Contractor's insurance shall be primary insurance as respects the District, and any insurance or self-insurance maintained by the District shall not contribute to it.

Any failure to comply with the claim reporting provisions of the insurance policies or any breach of an insurance policy warranty shall not affect coverage afforded under the insurance policies to protect the District.

The insurance policies may provide coverage which contains deductibles or self-insured retentions. Such deductible and/or self-insured retentions shall not be applicable with respect to the coverage provided to the District under such policies. The Contractor shall be solely responsible for the deductible and/or self-insured retention and the District, at its option, may require the Contractor to secure payment of such deductibles or self-insured retentions by a surety bond or an irrevocable and unconditional letter of credit.

The District reserves the right to request and to receive, within ten (10) working days, certified copies of any or all of the herein required insurance policies and/or endorsements. The District shall not be obligated, however, to review such policies and/or endorsements or to advise Contractor of any deficiencies in such policies and endorsements, and such receipt shall not relieve Contractor from, or be deemed a waiver of the District's right to insist on strict fulfillment of Contractor's obligations under this contract.

The insurance policies required by this contract, except Workers' Compensation, shall name the District and Maricopa County, their agents, representatives, officers, directors, officials, and employees as Additional Insureds.

The policies required hereunder, except Workers' Compensation, shall contain a waiver of transfer of rights of recovery (subrogation) against the District and Maricopa County, their agents, representatives, officers, directors, officials and employees.

**Required Coverage**

**Commercial General Liability.**

Contractor shall maintain Commercial General Liability insurance with a limit of not less than $5,000,000 for each occurrence with a $5,000,000 Products/Completed Operations Aggregate and a $5,000,000 General Aggregate Limit. The policy shall include coverage for bodily injury, broad form property damage, personal injury, products and completed operations and blanket contractual coverage including, but not limited to, the liability assumed under the indemnification provisions of this contract which coverage will be at least as broad as Insurance Service Office, Inc. Policy Form CG 00 01 10 93 or any replacement thereof. The coverage shall include X,C,U.

The policy shall contain a severability of interest provision, and shall not contain a sunset provision or commutation clause, or any provision which would serve to limit third party action over claims.

The Commercial General Liability additional insured endorsement shall be at least as broad as the Insurance Service Office, Inc.'s Additional Insured, CG 20 10 11 85, and shall include coverage for Contractor's operations and products and completed operations.

If the Contractor subcontracts any part of the work, services or operations awarded to the Contractor, he shall purchase and maintain, at all times during prosecution of the work, services or operations under this contract, an Owner's and Contractor's Protective Liability insurance policy for bodily injury and property damage, including death, which may arise in the prosecution of the Contractor's work, service or operations under this contract. Coverage shall be on an occurrence basis with a limit not less than $5,000,000 per occurrence, and the policy shall be issued by the same insurance company that issues the Contractor's Commercial General Liability insurance.

**Automobile Liability:**
Contractor shall maintain Automobile Liability insurance with an individual single limit for bodily injury and property damage of no less than $2,000,000, each occurrence, with respect to Contractor's vehicles (whether owned, hired, non-owned), assigned to or used in the performance of this contract. Coverage will be at least as broad as coverage code 1, "any auto" (Insurance Services Office, Inc. Policy Form CA 00 01 12 93, or any replacements thereof). Such insurance shall include coverage for loading and off-loading and off-loading hazards. If hazardous substances, materials, or wastes are to be transported, MCS 90 endorsement shall be included and $5,000,000 per accident limits for bodily injury and property damage shall apply.

**Workers' Compensation:**
The Contractor shall carry Workers' Compensation insurance to cover obligations imposed by federal and state statutes having jurisdiction of Contractor's employees engaged in the performance of the work or services, as well as Employer's Liability insurance of not less than $1,000,000 for each accident, $1,000,000 disease for each employee, and $1,000,000 disease policy limit.

In case any work is subcontracted, the Contractor will require the Subcontractor to provide Workers' Compensation and Employers' Liability insurance to at least the same extent as required of the Contractor.

**Builders' Risk (Property) Insurance:**
The Contractor shall purchase and maintain, on a replacement cost basis, Builders' Risk insurance in the amount of the initial contract amount, as well as subsequent modifications thereto for the entire work at the site. Such Builders' Risk insurance shall be maintained until final payment has been made or until no person or entity other than the District has an insurable interest in the property required to be covered, whichever is earlier. This insurance shall include interest of the District, the Contractor, and all subcontractors and sub-subcontractors in the work during the life of the contract and course of construction, and shall continue until the work is completed and accepted by the District. For new construction projects, the Contractor agrees to assume full responsibility for loss or damage to the work being performed and to the structures under construction. For renovation construction projects, the Contractor agrees to assume responsibility for loss or damage to the work being performed at least up to the full contract amount, unless otherwise required by the contract documents or amendments thereto.

Builders' Risk insurance shall be on an all-risk policy form and shall also cover false work and temporary buildings and shall insure against risk of direct physical loss or damage from external causes including debris removal, demolition occasioned by enforcement of any applicable legal requirements, and shall cover reasonable compensation for architect's service and expenses required as a result of such insured loss and other "soft costs" as required by the contract.

Builders' Risk insurance must provide coverage from the time any covered property comes under Contractor's control and/or responsibility, and continue without interruption during construction, renovation, or installation, including any time during which the covered property is being transported to the construction installation site, and while on the construction or installation site awaiting installation.

The policy will provide coverage while the covered premises or any part thereof are occupied. Builders' Risk insurance shall be primary and not contributory.

Required coverage may be modified by an amendment to the contract documents.

If the contract required testing of equipment or other similar operations, at the option of the District, the Contractor will be responsible for providing property insurance for these exposures under a Boiler Machinery insurance policy.

**Certificates of Insurance:**
Prior to commencing work or services under this contract, Contractor shall furnish the District with the attached Certificate of Insurance, or formal endorsements as required by the contract, issued by Contractor's insurer(s), as evidence that policies providing the required coverage's, conditions, and limits required by this contract are in full force and effect. Such certificates shall identify this contract number and title.

In the event any insurance policy(ies) required by this contract is(are) written on a "claims made" basis, coverage shall extend for two (2) years past completion and acceptance of the Contractor's work or services and as evidenced by annual Certificates of Insurance.

If a policy does expire during the life of the contract, a renewal certificate must be sent to the District fifteen (15) days prior to the expiration date.

**Cancellation and Expiration Notice:**
Insurance required herein shall not expire, be cancelled, or materially changed without thirty (30) days prior written notice to the District.

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

**CERTIFICATE OF INSURANCE**

CONTRACT FCD 1999C062 PROJECT TITLE: **Rio Salado – Phoenix Reach Low Flow Channel Project, Phase 1**

| 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 | |

This certificate of insurance certifies that policies of insurance listed below have been issued to the insured named above and are in full force at this time.

| *CO. LTR. | TYPE OF INSURANCE | POLICY NUMBER | EFFECTIVE DATE (MM/DD/YY) | EXPIRATION DATE (MM/DD/YY) | LIMITS | |
|---|---|---|---|---|---|---|
| | **COMMERCIAL GENERAL:** | | | | | |
| | ☒: LIABILITY FORM | | | | GENERAL LIABILITY, | $5,000,000 |
| | ☒: PREMISES OPERATIONS | | | | EACH OCCURRENCE | $5,000,000 |
| | ☒: CONTRACTURAL | | | | PRODUCTS/COMPLETED OPERATIONS AGGREGATE | $5,000,000 |
| | ☒: BODILY INJURY | | | | GENERAL AGGREGATE | |
| | ☒: BROAD FORM PROPERTY DAMAGE | | | | | |
| | ☒: PERSONAL INJURY | | | | | |
| | ☒: PRODUCTS AND COMPLETED OPERATIONS HAZARD | | | | | |
| | ☒: EXPLOSION AND COLLAPSE | | | | | |
| | ☒: UNDERGROUND HAZARD | | | | | |
| | ☒: INDEPENDENT CONTRACTORS | | | | | |
| | **COMPREHENSIVE AUTO:** | | | | | |
| | ☒: LIABILITY AND NON-OWNED | | | | Each Occurrence | $2,000,000 |
| | ☐: EXCESS LIABILITY | | | | NECESSARY IF UNDERLYING NOT ABOVE MINIMUM | |
| | ☒: WORKERS' COMPENSATION AND EMPLOYERS' LIABILITY | | | | Employer's Liability: each accident<br>Disease: each employee<br>Disease: policy limit | $1,000,000<br>$1,000,000<br>$1,000,000 |
| | ☒: BUILDERS' RISK ALL-RISK FORM | | | | REPLACEMENT COSTS | |
| | ☒: OTHER: | Except for Professional Liability Insurance and Workers' Compensation Insurance, the Flood Control District of Maricopa County, Maricopa County, the City of Phoenix, AZ, the Arizona Department of Transportation (ADOT), and United Metro Materials, Inc., their agents, representatives, officers, Directors, Officials, and employees, are named as Additional Insured's. | | | | |

Except for Professional Liability Insurance and Workers' Compensation Insurance, the Flood Control District of Maricopa County and Maricopa County are added as Additional Insured's 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 of Maricopa County. To the extent provided in this contract, insured shall hold harmless the Flood Control District of Maricopa County and 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 of Maricopa County, 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**<br>**2801 WEST DURANGO STREET**<br>**PHOENIX, ARIZONA 85009** | **DATE ISSUED:** _____<br>_____<br>**AUTHORIZED REPRESENTATIVE** |

## CERTIFICATE OF PERFORMANCE AND PAYMENT OF ALL CLAIMS

_____hereby certifies to the Flood Control District of Maricopa
(Name of Signer)
County (District) that all lawful claims for labor, rental of equipment, material used, and any other claims by _____or its subcontractors and suppliers in connection with performance on Contract _____ have been duly discharged as required by Arizona Revised Statutes, Section 34-221 and Maricopa Association of Governments Uniform Standard Specifications for Public Works Construction (MAG), Section 109.7.

_____understands that with receipt of payment for previously invoiced amounts plus any retained funds and/or release of escrow funds, that this is a settlement of all claims of every nature and kind against the District arising out of the performance of the District's Contract _____ relating to the material, equipment, and work covered in and required by this contract.

The undersigned hereby certifies that to his/her knowledge no contractual disputes exist in regard to this contract, and that he/she has no knowledge of any pending or potential claim in regard to this contract.

Upon submission of this Certificate of Performance and an invoice for any applicable retained funds, the District will process final payment and release applicable escrow funds in accordance with the Contract and MAG requirements.

State of Arizona )
)§
County of Maricopa )

Signed this _____day of _____, 200____.

_____
(Printed Name of Signer)

_____
(Signature)

_____
Title

**SUBSCRIBED AND SWORN TO** before me this _____day of _____, 200____.

_____
Notary Public

My Commission Expires_____

# FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

## RIO SALADO – PHOENIX REACH
## LOW FLOW CHANNEL PROJECT – PHASE 1

## CONTRACT NO. FCD 1999C062
## PCN 124-01-30

## SUPPLEMENTARY GENERAL CONDITIONS

# FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

## RIO SALADO – PHOENIX REACH
## LOW FLOW CHANNEL PROJECT – PHASE 1

## CONTRACT NO. FCD 1999C062
## PCN 124-01-30

## SUPPLEMENTARY GENERAL CONDITIONS

### SPECIFICATIONS

Except as otherwise amended in these Supplementary General Conditions and the Construction Special Provisions, this project shall be constructed in accordance with all applicable Maricopa Association of Governments (MAG) Uniform Standard Specifications and Uniform Standard Details, dated 1998 including all revisions through 2000, and City of Phoenix (COP) Supplement to MAG Specifications and Details (1998 Edition).

### PRECEDENCE OF CONTRACT DOCUMENTS

This Contract and its designated documents, whether taken separately or together, are to be interpreted according to full intent, meaning, and spirit, and shall be deemed to mutually explain each other and to be descriptive of any materials to be furnished and the work to be performed under this Contract. In cases of any difference or discrepancy between the Contract documents, the order of precedence shall be a) Addendum to the Invitation for Bids, b) the Contract form, c) Supplementary General Conditions, d) Construction Special Provisions, e) Project Plans, f) COP Supplements 1998 Edition, and g) MAG Uniform Standard Specifications and Uniform Standard Details.

### 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 Planning and Project Management 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 its legally constituted officials, officers, or employees.

7. Whenever the word "District" is used in these Specifications, it shall mean the Flood Control District of Maricopa County.

8. 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.

9. 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 the Plans, Special Provisions, and Site Work:** Add the following:
The soil boring logs are included in the construction plans. The Geotechnical reports including ground water conditions, are available for review at the Owner's office, and Contractors are encouraged to do so. Existing moisture conditions shall be no basis for claim for additional money or time extensions. The Contractor shall manipulate the existing soil as required to achieve stable soil conditions and the required densities, as well as safe and stable side slopes during construction activities.

The ground water information provided on the plans is for information only. The range of groundwater data used to develop the profile shown in the plans varied from approximately 10 feet to approximately 40 feet below ground surface. Groundwater levels at the Salt River can fluctuate widely in response to flow events in the river and climatic conditions. The groundwater profile provided in the plans may not be representative of the actual conditions that will be encountered during construction. The Contractor should anticipate that groundwater will infiltrate into project excavations. There may also be areas of perched groundwater in the project area. The Contractor shall investigate groundwater conditions prior to excavation activities to determine what dewatering activities will be required for construction. Pertinent information is available from the City of Phoenix Office of Environmental Programs, the Arizona Department of Water Resources, and the Arizona Department of Environmental Quality.

Surface water limits delineated on the plans is representative of such conditions at the time the base mapping was prepared for the project in 1998. Such water limits are not necessarily representative of the actual conditions that will be encountered during construction. The Contractor is encouraged to make field visits as required to determine the extent of surface water conditions.

**Subsection 102.5 - Preparation of Proposal:** Add the following:
Proposals, including the Bidding Schedule, must be legibly written in ink or typed, with all prices given in numerals. In case of a conflict between the unit bid price and the extension, the unit bid price will govern.

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. Following Notice of Award, 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 the Maricopa County Minority and Women-Owned Business Enterprises Assurances Affidavit is not completed and submitted.
(G) If any addenda are not acknowledged and attached.
(H) If the Owner's bond forms are not utilized.
(I) If the entire specifications document is not returned.
(J) If the statement from the bidder's insurance carrier, as required by Subsection 103.6, is not included.

**Subsection 103.6 - Contractor's Insurance:** Add the following:
A statement from the 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, and that it will execute the form of Certificate of Insurance included in the documents. 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, 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 104.1 - Work to be Done:** Add the following 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.

All construction activities will occur within the bottom of the Salt River. Flows can occur at any time in the river, and nuisance flows are ever present in the river bottom. And, groundwater conditions indicate that some excavation for the guide dike and grade control structure toedowns, as well as some low flow channel excavation may occur below groundwater levels.

The Contractor will remove all equipment from the river whenever flows could occur that would inundate the equipment or equipment storage areas.

The major facilities to be constructed include the excavation of an earthen low flow channel (LFC), construction of 18 roller compacted concrete (RCC) guide dike structures (GDS) and one RCC grade control structure (GCS), construction of approximately 2,400 linear feet of LFC RCC bank protection along the north side of the channel west of Central Avenue, and construction of various conveyance side drain channels.

An existing sand and gravel company conveyor bridge will be removed as shown in the plans.

The Contractor will be required to remove and dispose of inert materials, such as construction rubble and debris, tires, and municipal solid waste. It is also possible that hazardous materials may be encountered during excavation activities. Removal and disposal of regulated materials will be done by others. Refer to Special Provisions Section 350.

The Contractor will also be required to manage both surface water and ground water within the project limits. Groundwater dewatering must be done according to the terms of the permits for the project that have been obtained by the City from ADWR, and will be provided to the Contractor. A form to be used by the Contractor for reporting the amount of groundwater withdrawn is provided in Appendix "C".

In accordance with the Environmental Impact Statement the Contractor **shall avoid all areas of standing or running water wherever possible**, however it may be necessary to operate equipment, including vehicles in areas of water.

No utility relocations are anticipated during construction however, all utilities near the site are to be protected in place.

**104.2.3 - Changes**:
The Owner may at any time, by written order, and without notice to the sureties, if any, make changes within the general scope of this contract in any one or more of the following:

A) Drawings, designs, or specifications;
B) Method or manner of performance of the work;
C) Owner-furnished facilities, equipment, materials, services, or site;
D) Directing acceleration in the performance of the work.

Any other written or oral order from the Owner that causes a change shall be treated as a change order under this section provided that the Contractor gives the Owner written notification within two work days after receipt of such direction stating:

A) The date, nature, and circumstances of the conduct regarded as a change;
B) The particular elements of the contract performance for which the Contractor is seeking an equitable adjustment under this section, including any price or schedule adjustments;
C) The Contractor's estimate of the time by which the Owner must respond to the Contractor's notice to minimize cost, delay, or disruption of performance.

The Contractor shall diligently continue performance of this contract to the maximum extent possible in accordance with its provisions. Except as provided in this section, no order, statement, or conduct of the Owner shall be treated as a change or entitle the Contractor to an equitable adjustment. If any change under this section causes an increase or decrease in the Contractor's cost of, or the time required for, the performance of any part of the work under this contract, the Owner shall make an equitable adjustment and modify the contract in writing. The equitable adjustment shall not include increased costs or time extensions for delay resulting from the Contractor's failure to provide notice or to diligently continue performance. No proposal for the Contractor for an equitable adjustment shall be allowed if asserted after final payment under this contract.

**Subsection 104.2.4 - Cost Estimates or Price Proposals:**
The Contractor and any lower-tier subcontractors shall submit itemized cost estimates or price proposals for any owner-directed change order or Contractor-initiated claim.

Cost estimates or pricing proposals shall be itemized to include direct labor by man-hours, individual craft, hourly wage rate and verifiable labor burden. Other direct costs shall include rental and operator rates for rented or owned equipment, material trucking expenses and other costs clearly identified and directly allocable to contract performance. Material costs shall be itemized by item description, quantity for each item, unit price per item, including applicable sales tax markup, and extended total price per item. The Contractor shall provide copies of material supplier quote sheets, invoices or purchase orders, as appropriate.

Lump sum cost estimates or price proposals shall be rejected and returned to the Contractor for itemization as described above. Failure of the Contractor to submit properly itemized cost estimates or

price proposals shall not constitute an excusable delay and will result in a change order being unilaterally priced at the Owner's fair estimated price.

**Subsection 104.2.6 - Value Engineering:**

A) ***General***. The Contractor is encouraged to voluntarily develop, prepare, and submit value engineering change proposals (VECPs). The Contractor shall share in any instant contract savings realized from accepted VECPs, in accordance with paragraph (f) below. The Owner reserves the right to make alterations to the contract, in accordance with procedures elsewhere within this contract. Such alterations will not be eligible for inclusion in any VECP.

B) ***Definitions***.

**Contractor's development and implementation costs** means those costs the Contractor incurs on a VECP in developing, testing, preparing, and submitting the VECP as well as those costs incurred by the Contractor to make the changes required by the Owner's acceptance of the VECP.

**Owner costs** means those owner costs that result directly from developing and implementing the VECP, such as any net increases in the cost of testing, operations, maintenance, and logistical support. The term does not include the normal administrative costs of processing the VECP.

**Instant contract savings** means the estimated reduction in Contract cost of performance resulting from acceptance of the VECP, minus the allowable Contractor's development and implementation costs, minus subcontractors' development and implementation costs (see paragraph (g) below).

**Value engineering change proposal (VECP)** means a proposal that (1) requires a change to the contract; (2) results in reducing the contract price or estimated cost without impairing essential functions or characteristics; and (3) does not involve a change in deliverable end item quantities, schedule, or a change to the contract type.

C) ***VECP Preparation***. As a minimum, the Contractor shall include in each VECP the information described in subparagraphs (1) through (7) below. If the proposed change affects contractually required schedule and cost reporting, it shall be revised to incorporate proposed VECP modifications. The VECP shall include the following:

(1) A description of the difference between the existing contract requirement and that proposed, the comparative advantages and disadvantages of each, a justification when an item's function or characteristics are being altered, and the effects of the change on the end item's performance. All design changes must be submitted on 24"x 36" standard drawing sheets along with supporting calculations. Each drawing sheet and at least the content sheet of the calculations shall be sealed by an Engineer registered in the State of Arizona.

(2) A list and analysis of the contract requirements that must be changed if the VECP is accepted, including any suggested specification revision.

(3) A separate, detailed cost estimate for the affected portions of the existing contract requirements and the VECP. The cost reduction associated with the VECP shall take into account the Contractor's allowable development and implementation costs, including any amount attributable to subcontracts under paragraph (G) below.

(4) A description and estimate of costs the Owner may incur implementing the VECP, such as test and evaluation and operating and support costs. This is an estimate based only on the Contractor's understanding of additional efforts to be expended by the Owner, should the VECP be accepted. The final cost will be determined by the Owner.

(5) A prediction of any effects the proposed change would have on collateral costs to the agency, i.e., costs of operation or maintenance.

(6) A statement of the time by which a contract modification accepting the VECP must be issued in order to achieve the maximum cost reduction, noting any effect on the contract completion time or delivery schedule.

(7) Identification of any previous submissions of the VECP, including the dates submitted, the agencies and contract numbers involved and previous Owner actions, if known.

D) ***Submission***. The Contractor shall submit VECPs to the Owner's Engineer.

E) ***Owner Action***.

(1) The Owner shall notify the Contractor of the status of the VECP within 15 calendar days after receipt from the Contractor. If additional time is required, the Owner shall notify the Contractor within the 15-day period and provide the reason for the delay and the expected date of the decision. The Owner will process VECPs expeditiously; however, it shall not be liable for any delay in acting upon a VECP.

(2) If the VECP is not accepted, the Owner shall notify the Contractor in writing, explaining the reasons for rejection.

(3) The Contractor may withdraw any VECP, in whole or in part, at any time before it is accepted by the Owner.

(4) Any VECP may be accepted, in whole or in part, by the Owner's award of a change order to this contract, citing this subsection. The Owner may accept the VECP, even though an agreement on price reduction has not been reached, by issuing the Contractor a notice to proceed with the change. Until a notice to proceed is issued or a change order incorporates a VECP to this contract, the Contractor shall perform in accordance with the existing contract. The Owner's decision to accept or reject all or any part of any VECP shall be final and not subject to disputes or otherwise subject to litigation.

F) ***Cost Sharing***.

(1) **Rates**. The Owner's share of savings is determined by subtracting the Owner's costs from instant contract savings and multiplying the result by 50 percent. The Contractor's share shall be the remaining 50 percent.

(2) **Payment**. Payment of any share due the Contractor for use of a VECP on this contract shall be authorized by a change order to this contract to accept the VECP, reduce the contract price or estimated cost by the amount of instant contract savings, and provide the Contractor's share of savings by adding the amount calculated to the contract price.

G) ***Subcontracts***. The Contractor may include an appropriate value engineering clause in any subcontract. In computing any adjustment in this contract's price under paragraph (f) above, the Contractor's allowable development and implementation costs shall include any subcontractor's allowable development and implementation costs clearly resulting from a VECP accepted by the Owner under this contract, but shall exclude any value engineering incentive payments; provided that these payments shall not reduce the Owner's share of the savings resulting from the VECP.

**Subsection 105.1 - Authority of Engineer:** Add the following:

105.1.1 - Engineer's Evaluation: Engineer will be allowed ten (10) working days 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.

**Subsection 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 105.5 - Cooperation of Contractor:** Add the following:
**105.5.1 - Partnering**
The Owner intends to encourage the foundation of a partnering relationship with the Contractor and its subcontractors. This partnering relationship will be structured to draw on the strength of each organization to identify and achieve reciprocal goals. The objectives are effective and efficient contract performance, intended to achieve completion within budget, on schedule, and in accordance with plans and specifications.

This partnering relationship will be bilateral in makeup. Any cost associated with effectuating partnering will be covered by the Bid Item. The initial partnering workshop shall be scheduled after award of the contract, and prior to the Notice to Proceed, and shall be facilitated by a third party competent in the fundamentals of partnering, and mutually acceptable to Contractor and Owner. The Contractor shall be responsible for scheduling, coordinating, and hiring the third party facilitator, and planning all of the partnering meetings in consultation with the Engineer. The Owner will be responsible to notify and coordinate attendance at the partnering meetings by other agencies. To achieve the desired partnering relationships, the Contractor will need to encourage attendance by its major subcontractors on the project. Follow-up workshops will be held periodically throughout the duration of the contract as agreed to by the Contractor and Owner.

An integral aspect of partnering is the resolution of disputes in a timely, professional, and non-adversarial manner. Alternative dispute resolution (ADR) methodologies will be encouraged in place of the more formal dispute resolution procedures. ADR will assist in promoting and maintaining an amicable working relationship to preserve the partnering relationship. ADR in this context is intended to be a voluntary, non-binding procedure available for use by the parties to this contract to resolve any dispute that may arise during performance.

Payment for the Partnering Allowance will be made on the basis of invoices of actual costs, and will be for a total amount not to exceed the amount shown in the bid schedule for the item.
**ITEM 105-1 – PARTNERING ALLOWANCE**

**105.5.2 – Pre-Construction Meeting**
After award of the contract, a pre-construction meeting shall be scheduled at a location and time (prior to mobilization and start of construction) to be agreed upon between the Owner and the Contractor. The Contractor shall make all necessary arrangements to have key personnel of his company and of his principal subcontractors present at the meeting. Each representative shall have authority to make

commitments and act for his firm. The purpose of the pre-construction meeting is to discuss any specific concerns or potential problems that the Contractor is aware of, to provide general information appropriate to the contract, to identify responsible individuals for various functions within each organization, and to develop tentative dates for the start of construction. There are submittals identified within the contract documents which are required to be prepared for the pre-construction meeting.

The Contractor shall be responsible to take minutes of the pre-construction meeting and distribute copies to all meeting participants. The meeting minutes shall be distributed within 48 hours of the meeting. At the subsequent construction progress meeting, the minutes will be attested or revised, as appropriate. The cost for attendance at the pre-construction meeting, and preparation and distribution of meeting minutes shall be incidental to the project and no extra payment will be made.

**105.5.3 –Construction Progress Meetings**
Construction progress meetings shall be scheduled weekly, or as considered necessary by the Owner. The Contractor shall make all arrangements to have key personnel of his company and of his principal subcontractors present at all progress meetings; representatives shall have authority to make commitments and act for their firms. The Contractor shall assume full responsibility to act for and commit any subcontractor employed by the Contractor, whether or not such subcontractor is represented at the meeting.

During the construction progress meeting the Owner's representative will act as chairman and will advise the Contractor of any administrative matters connected with the contract. The Contractor shall submit for review his two-week rolling schedule. The Contractor's representative at these meetings shall be prepared to discuss and resolve construction problems and concerns, material delivery and vendor data submittals status, construction progress as measured against the Contractor's accepted construction schedule and the Contractor's short range construction activities as provided on his two-week rolling schedule. The Contractor shall not be relieved of his responsibility to fulfill all of the terms of the contract as a result of any inferences drawn or suggestions made available at these meetings.

The Contractor shall be responsible to take minutes of the construction progress meetings and distribute copies to all meeting participants. The meeting minutes shall be distributed within 48 hours of the meeting. At the subsequent construction progress meeting, the minutes will be attested or revised, as appropriate. The cost for attendance at meetings, and preparation and distribution of meeting minutes shall be incidental to the project and no extra payment will be made.

**Subsection 105.6 - Cooperation with Utilities:** Add the following:
An attempt has been made to determine the location of all underground utilities, drainage pipes, and structures; however, it shall be the Contractor's responsibility to cooperate with the pertinent utility companies so that any obstructing utility installation(s) may be adjusted. The location of the underground and overhead utilities as shown on the plans is based on the best available information. The Contractor shall not assume that this represents an exact location of the line. No guarantee is made to the accuracy of the location shown on the plans. The Contractor shall determine for himself the exact location of all utilities. Should Contractor's 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. There also exists the strong likelihood that other abandoned older and undocumented underground utility and irrigation lines exist within the project area. Contractor shall contact Arizona Blue Stake (telephone number 623-263-1100) a minimum of two (2) working days before beginning any underground work. In addition, Blue Stake notification(s) shall be maintained on a current basis.

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

Arizona Public Service Company (APS)
Ms. Lois Winkler (623) 371-6837

| | |
|---|---|
| City of Phoenix (COP) Water Services Department | |
| Mr. Jerry Arakaki, Senior Engineer | (602) 261-8229 |
| Salt River Project Power Distribution (SRPPD) | |
| Mr. James Frescholtz | (602) 236-8040 |
| Salt River Project Power Transmission (SRPPT) | |
| Mr. Bill Phillips, Senior Engineer | (602) 236-8092 |
| Salt River Project Irrigation | |
| Mr. Bob Maurer | (602) 236-2962 |
| US West (USW) | |
| Mr. John Aker | (602) 630-0496 |
| Southwest Gas | |
| Ms. Jody McDougal | (602) 485-5453 |

**It shall be the responsibility of the Contractor to verify the location of all utilities prior to any construction activities in a particular area where such facilities may exist. All existing overhead and underground utilities shall be Protected-in-Place (P.I.P.) unless noted otherwise on the plans, these Supplementary General Conditions, and the Special Provisions.**

**APS and SRPPT:**
Both APS and SRP maintain high voltage (230kV and 500kV) overhead electric transmission lines in the vicinity of the project. The lines are within the construction limits of the project and shall be protected in place. The Contractor shall use caution in the adjacent area.

**At all times during construction, the Contractor shall comply with all laws, ordinances, rules, regulations, and safety requirements, including but not limited to the National Electric Safety Code, and the Occupational Safety and Health Standards for General Industry and specific requirements of both SRP and APS when working in the vicinity of these high voltage lines.**

**Salt River Project Water Operations:**
All construction activities will occur within the bottom of the Salt River. Flows can occur at any time in the river, and nuisance flows are ever present in the river bottom.

The Contractor **must** contact Salt River Project (SRP) Water Operations, Joe Rauch at 602-236-5461 or Dallas Reigle 602-236-2271 for information regarding SRP releases into the Salt River.

The Contractor should also request that SRP include the Contractor on a call list for anticipated releases into the river. Both the Flood Control District and the City of Phoenix are on the call list and could be used as an information resource for flow releases into the river by SRP. However, it remains the Contractor's responsibility to determine when flows will occur in the river and what impacts those flows will have on his equipment and his work.

**Existing wells and probes:**
Several groundwater monitor wells and methane gas probes exist within the project area, some of which are shown in the plans. The Contractor shall determine for himself the exact location of each of these wells and probes, and any other wells that may have been installed in the project area. The Contractor shall take the necessary precautions to protect in place these wells and probes. Any damage caused by the Contractor to these wells and/or probes shall be repaired by the Contractor to the satisfaction of the owner at no cost to the project.

**Subsection 105.6.3 – Construction Water:**
Construction water is available from City of Phoenix hydrants as follows:

1. There are seven hydrants located within one-quarter to one-half mile of the river between 19th Avenue and Central Avenue that could be used for such purposes.

2. The Contractor will obtain a permit from the City at the second floor of the City Hall Building. The Contractor should allow two weeks for the City installation of the meter.

3. A fee of $500 will be charged for each hydrant and meter, some of this fee being refundable.

4. The charge for the water is approximately $1.37/100 cubic feet.

5. The Contractor will contact the City for specific information regarding the use of City water and for all costs associated with its use.

The Contractor may elect to use surface water in the river for construction purposes such as dust control. Its use will not be permitted for roller compacted concrete (RCC) production.

The Contractor **cannot** use groundwater from dewatering activities, from the production well (see Section 609), or from within excavations for construction purposes including dust control and RCC production. The Contractor will refer to Special Provisions Section 225.

**Subsection 105.7 – Cooperation Between Contractors: Add the following:**
The City of Phoenix (COP) may have construction activities underway, including the public access "Gateway" site along the south side of the Salt River on the east side of Central Avenue. The COP may also have under construction at the time of this project their Habitat Demonstration Project located along the north side of the low flow channel and east of Central Avenue. The Contractor shall be aware of these possible COP construction activities and shall work cooperatively with the COP Contractors to minimize impacts to all projects. The Contractor shall KEEP OUT of the Habitat Demonstration Project area.

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

A) The Engineer will furnish a Benchmark which the Contractor will use to set line and grade for all construction. All other surveying required for the project shall be the Contractor's responsibility. The Engineer will not set any construction stakes.

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

C) The Contractor shall submit original construction surveyor's notes duly signed by a Registered Land Surveyor to the Engineer at the end of the project. Copies of the survey notes shall be submitted to the Engineer during construction as and when requested.

D) As-built plans sealed by an Engineer registered in the State of Arizona shall be provided by the Contractor to the Engineer prior to project close out. And, as-builts will also be provided in electronic format using files on disk or CD as provided by the Engineer.

**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 the 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. The Engineer may decide what 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.

D) If the final placement of a product will remain the property of the municipality or utility and/or owned by the municipality or utility, that entity is responsible for issuing written approval for any equivalent or "or-equal" products. The Contractor or Supplier will submit to that entity the request and documentation for written approval of a product substitution. The Contractor will provide the entity's written approval to the Engineer at the Pre-Construction Meeting.

**Subsection 106.5 - Contractors Marshaling Yards:** Add the following:

The Contractor may establish a Contractor's Work Area (CWA) in the bottom of the Salt River for the purpose of parking and servicing equipment, as well as establishing a roller compacted concrete (RCC) production plant. The Contractor understands that his use of the river bottom for a CWA is solely at his own risk. No compensation will be made to the Contractor for any damage to or loss of equipment caused by the Contractor's establishment of a CWA in the river bottom.

1. The CWA must cover the least amount of acreage possible to accomplish the tasks required for the production plant and servicing of equipment.

2. The Contractor will monitor on a daily basis all activities in the CWA that may result in the leakage of oils, fluids, fuels, etc. which may contaminate soils in the river bottom, and promptly report any suspected leaks to the Engineer.

3. The Contractor will remove or clean up to background concentrations, and in accordance with applicable regulations test and properly dispose of all such contaminated soils resulting from the Contractors activities within the CWA and the river bottom on at least a biweekly basis, or more frequently at the direction of the Engineer. The Contractor shall provide all necessary documentation to the Engineer, including at a minimum the location, quantity, test results, and documentation of disposal of any such contaminated soils within one month after removal. At the discretion of the Engineer, the Contractor may be required to provide a cleanup plan for approval prior to addressing such contaminated soils.

4. The Contractor must create low diversion berms to direct surface flows away from the CWA so as to minimize the transport of contaminated soils downstream.

The Contractor may stockpile aggregate materials for the production of RCC in the river bottom. However the following criteria will be applied to the stockpiles:

1. The stockpiles can be no more than 100 feet wide at the base.

2. The long axis of the stockpiles must be oriented parallel to the direction of flow in the river.

3. Any remnant materials remaining from the stockpiles after completion of the project must be completely removed from the river bottom.

The Contractor shall obtain approval of the Engineer when using property outside the project limits of the river to park and service equipment and store materials for use. The Contractor will obtain prior written approval of the property owner for such use and submit a copy of the approval to the Engineer prior to use of the property.

The Contractor must provide the Owners field office construction trailer area outside of the river bottom. City of Phoenix right-of-way is available along the west side of Central Avenue on the south side of the river for such field office use and as a possible site for Contractor construction trailers and general parking. This site is out of the river bottom, is accessed from the east side of Central, and goes under the bridge via an existing high clearance box culvert.

The Contractor shall grade all construction yards, easements and limits of construction which are disturbed by construction or construction related activities to the lines and grades shown on the plans; or as a minimum, where no line or grade is shown, to a condition similar to or better than the pre-existing condition.

**Subsection 106.5.1 – Contractor Access:**
Contractor access to the river bottom is available at the following locations using City of Phoenix rights-of-way:

1. On the south side of the river, from the west side of the 7th Avenue. There is an existing curb cut along the west side of the street south of the bridge, and a gradual slope down to the river bottom. The Contractor may find it necessary to construct a ramp to the river bottom in lieu of using the existing bank conditions.

2. On the south side of the river, from the east side of the Central Avenue. There is an existing curb cut along the east side of the street south of the bridge. The Contractor will find it necessary to construct a ramp at this location to the river bottom. There is also an existing high clearance box culvert crossing under Central Avenue at this location that provides access from the east side to the west side of the bridge and the river bottom.

3. The Contractor may elect to obtain permission on his own for the use of other access locations to the river bottom. This would include the use of other existing ramps into the river bottom. However, the Contractor will obtain prior written approval of the property owner for such access use and submit a copy of the approval to the Engineer prior to use of the property and/or ramps.

The Contractor will refer to Special Provisions Section 401 for specific traffic control requirements and traffic control plans and the use of these access locations.

Additional project access may be available from the United Metro property located along the project alignment. Contact Bill Peck at 602-220-5166. All gates from United Metro property must be kept closed at all times, and double pad locking may be required.

The Contractor may use other existing ramps for project access with the following stipulations. The Contractor must obtain written approval of the property owner(s) whose property will be used for access to the ramps. Any damage to the ramps caused by the Contractor's use of the ramps shall be repaired by the Contractor at no cost to the project.

**Subsection 107.2 - Permits:** Replace with the following:
Contractor shall obtain all permits and licenses, including those required by the City of Phoenix and Maricopa County and shall pay all charges, fees, taxes, and provide all notices necessary and incidental to the due and lawful prosecution of the work. An exception is the ADWR Groundwater Dewatering Permit, which has already been obtained for the project. See Appendix "C". The Arizona Department of Environmental Quality has determined that an Aquifer Protection Permit is not required for this project.

In particular the Contractor will obtain all necessary NPDES and SWPPP permits as required and in accordance with subsection 107.2.1.

**Subsection 107.2.1 - NPDES Permit Requirements:** Add the following:
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 pre-construction 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

Gary W. Boesch, PE
Stormwater Management Engineer
200 West Washington Street, 5th Floor
Phoenix, AZ 85003
(602) 495-5326

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 at the address listed in Section (C) 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 Changed Conditions. Payment of fifty percent (50%) for this bid item shall be made at the beginning of the project, and the remaining payment made upon final completion and acceptance of the project, as per MAG 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.

Payment for NPDES/SWPPP permit requirements shall be made on the basis of lump sum for all work described in Subsection 107.2 .1 for:
**ITEM 107-1 - NPDES/SWPPP PERMITS**

**Subsection 107.4 - Archeological Reports:** Add the following:
Any cultural and/or paleontological resource (historic or prehistoric site or object) discovered by the Contractor, or any person working on his behalf, shall be immediately reported to the Engineer. The Contractor shall suspend all operations in the immediate area of such discovery until written authorization to proceed is issued by the Engineer. An evaluation of the discovery will be made by authorized personnel and the Engineer to determine appropriate actions to prevent the loss of significant cultural or scientific resources. The Contractor shall prevent his employees from trespassing on, removing, or otherwise disturbing such resources.

**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 107.5.3 - 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 either by 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 107.5.4 – Contractor Health & Safety Provisions:** Add the following:
An example General Health and Safety (H&S) Plan for the project is included in Appendix "B". The Contractor must adopt a Health and Safety (H&S) Plan for this project, subject to the review and comment of the Engineer. A H&S Plan will be implemented by the Contractor as part of the project.

**Degraded Groundwater:**
The reach of the Salt River in which the project is located is in the vicinity of a number of study areas of the State of Arizona Water Quality Assurance Revolving Fund (WQARF). The WQARF program is designed to study and clean-up areas of degraded groundwater. ~~In addition, the 19th Avenue Landfill near the downstream end of the project is a Federal Superfund Site~~. Environmental assessments of the project location are available for review at the District. These assessments suggest that degraded groundwater will be present beneath some portions of the project during construction, but present indications are that the levels of contaminants are not high enough to be a hazard to worker health and safety according to a risk assessment prepared for this project. At least one employee who is certified in the OSHA 40-hour hazardous material training shall be present on site at all times during excavation activities. Proof of certification shall be provided to the Engineer at the Pre-Construction meeting. The District will monitor groundwater quality on a periodic basis and provide the Contractor with the results.

A Groundwater Contingency Response Plan for working in degraded groundwater and a Site Groundwater Monitoring Plan to be used to assess water quality are included in Appendix "A". The Contingency Response Plan would be implemented, only if necessary, at the direction of the Engineer. If implementation of the plan becomes necessary, payment for such activities required by the plan will be on a time and materials basis by change order as required. The Site Groundwater Monitoring Plan will be utilized by Flood Control District and City of Phoenix staff for purposes of monitoring the quality of groundwater encountered during the project.

At least seven calendar days prior to planned excavation of any guide dike structure or the grade control structure, the Contractor shall excavate a single test pit for each of these structures to at least three feet below the groundwater level encountered. If no groundwater is encountered before reaching the lowest elevation of the structure, no further excavation of the test pit at that location is required. The purpose of these pits is to allow the Engineer to obtain groundwater samples prior to the beginning of work on these structures, to determine if degraded groundwater exists, requiring implementation of the Contingency Response Plan. The Contractor shall notify the Engineer at least seven calendar days in advance of the test pit excavation activities. The Contractor shall assist in providing access into the bottom of the pit for the Engineer to take groundwater samples.

Payment for these nineteen test pits shall be made on the basis of the lump sum price bid, including all labor, equipment and materials required to excavate the test pits and provide sampling access.
**ITEM 107-6 – TEST PIT EXCAVATION**

**Landfills:**
There are a number of old landfill sites located along the river corridor where the project is located. These landfills may be either construction debris landfills or municipal solid waste landfills, and often may contain a variety of inert materials, regulated wastes including hazardous wastes and asbestos-containing materials, and municipal solid wastes (MSW). Remnants of these landfills may be encountered during construction of the guide dike structures (GDS), the grade control structure (GCS), excavation of the low flow channel (LFC), and construction of the low flow channel bank protection.

The Contractor shall keep adequately trained staff on site during construction activities where such landfill materials may be encountered. At least one employee who is certified in the OSHA 40-hour hazardous material training shall be present on site at all times during excavation activities. Proof of certification shall be provided to the Engineer at the Pre-Construction meeting. Such staff **must** be able

to distinguish between inert wastes and soil stains, rubbish and other municipal solid waste. If during construction, the Contractor encounters soil stains, chemical or petroleum odors, rubbish, municipal solid waste or what he believes may be other potentially regulated substances, he will immediately notify the Engineer, and if necessary stop work only in this area. The Engineer will notify the City of Phoenix (COP) environmental staff who will visit the work area, determine whether any immediate precautions should be taken, and make a characterization of the materials to determine the presence of any regulated substances. The site visit and characterization activities by the COP will generally be initiated before the end of the next working day following the day of the discovery of the materials for which such visits and characterization is required. It may take up to two weeks on average to complete the characterization process. In the interim, the Contractor will construct berms to divert nuisance flows away from any exposed suspect material.

The Contractor may be required to prepare a graded area near the landfill material area for use by the COP on-call environmental contractor for storage of hazardous or asbestos-containing materials. See Special Provisions Section 350.

Once the materials and associated soils have been characterized by the COP, and if necessary segregated by a COP on-call environmental contractor, the Contractor, at the direction of the Engineer, can remove and dispose of all non-hazardous materials. This includes construction debris such as concrete, asphalt, wood, landscaping debris, etc., as well as the disposal of municipal solid waste. Municipal solid waste must be removed from the project site and disposed of within one week of its excavation. If flows in the river are imminent, such municipal solid waste must be removed immediately before flows occur. The disposal of these types of materials will be in accordance with Special Provisions Section 350. Disposal of soils associated with the landfill materials and found not to be hazardous will considered incidental to the Special Provisions Section 215 bid items.

Any landfill material characterized and found to be of a hazardous nature will be disposed of by the COP and its on-call environmental contractor.

Methane gas is often associated with municipal solid waste disposal sites, and has been detected at some locations within or adjacent to the project area. Such locations include but are not limited to:

a. 19th Avenue Landfill and the adjacent riverbed between 15th and 19th Avenues.
b. Central Avenue North Landfill on the north bank of the river between Central Avenue and approximately 5th Avenue.
c. The McDonald/Wilhelm site on the north bank of the river between 7th Avenue and approximately 11th Avenue.

The Contractor shall take appropriate precautions as described in the example General Health and Safety Plan (HSP), and in the Contingency Response Plan and shall adhere to the excavation safety requirements of 29CFR1926.650-652. When waste materials are exposed, part of the characterization activities by the COP environmental contractor may include area monitoring for methane and other airborne contaminants. Those monitoring results will be shared with the Contractor. The Contractor shall also perform appropriate monitoring of activities as required, including monitoring for methane gas.

**Tires:**
The likelihood is that tires will be encountered during construction excavation activities. These will be disposed of by the Contractor in accordance with Special Provisions Section 350.

**Compliance with ARS 49-701:**
Inert Waste Disposal: ARS 49-701 distinguishes between "inert material", solid waste, and hazardous waste. General construction debris and rubble, typically found scattered within the project area, may consist of both inert material (concrete, brick, asphalt, etc.) and solid waste (lumber, metal, plant material). Some commercial landfills accept only inert material, while others are permitted to also accept solid waste. The Contractor shall ensure that all non-hazardous wastes are disposed of at appropriately permitted disposal sites.

The Contractor must provide information necessary to comply with ARS 49-701 to the Engineer. At a minimum, upon encountering any solid waste, including inert materials and construction debris, the Contractor must notify the Engineer of the location of this material. Within 14 days of removal and disposal of any solid waste, the Contractor must, unless otherwise directed by the Engineer, provide the following information, using the form provided in Appendix "D".

1) A written description of the removal project, including the types of material, approximate quantity, approximate dimensions of the excavation, a description of waste handling, storage, and transportation practices, and a description of the disposal method and location.
2) Supporting documentation such as load receipts, manifests, etc.

**Subsection 107.5.4.1 – Contractor's Status During any Hazard Remediation:**
The Contractor understands that project work activities could expose its employees and subcontractors to degraded groundwater and/or to regulated landfill substances. Therefore it shall be the responsibility of the Contractor to conduct a reasonable inquiry of the Flood Control District and the City of Phoenix to ascertain whether the work will affect or disturb any regulated substances, or may result in any potential employee exposure that is known to be present within the limits of project work activities.

If there is the presence of degraded groundwater, as determined by the analytical results following exceedance of all trigger levels, or there is the characterization and remediation, by the COP and/or its on-call environmental contractor, of any discovered regulated and/or hazardous material, and the Contractor is able to work elsewhere on the project site, the Engineer may direct the Contractor to relocate to another activity or location on the project without impacting the project schedule. No compensation will be provided for this relocation. The cost of such relocation will be considered incidental to the related tasks.

If the presence of degraded groundwater, or the discovery of regulated and/or hazardous materials interferes with the project's critical path, then the critical path and overall project schedule will be reviewed and revised as mutually acceptable by the Engineer and the Contractor to minimize the impact to the **total project schedule.** An extension in contract time for this delay to Contractor may be granted by Owner in accordance with Subsection 108.7, w/ no monetary compensation provided except as follows.
Upon returning to the site, if the Contractor encounters damages or disturbances made by others in his absence, the Engineer may consider reimbursement only for such repairs. The reimbursement will be made on an actual cost, time and materials basis.

If the presence of degraded groundwater, or the discovery of regulated and/or hazardous materials impacts the project schedule in such a manner that the Contractor is prevented from continuing work on any portion of the project, and Owner issues a suspension of work order, then Contractor shall be entitled to compensation in the form of a **one-time payment** of Demobilization and Remobilization costs, which shall be no more than 6 percent of the original bid item for mobilization.

Contractor's implementation of the Health and Safety Plans under Subsection 107.5.4 will be compensated in accordance with Subsection 109.5 ACTUAL COST OF WORK.

**Subsection 107.6.3 - Public Information and Notification:** Add the following:
The Contractor shall employ a specialty public information service as a subcontractor to provide the community relations program for the project as described herein. The name and address of the public information subcontractor shall be submitted with the bid as specified in subsection 102.6 of the Supplementary General Conditions. Contractor shall work closely with his subcontractor in developing and carrying out the community relations program. Contractor shall submit a history of the subcontractor's qualifications and experience in public information services at the pre-construction conference for acceptance by the Engineer. The community relations program shall be designed to run the full length of calendar days in the contract for this project. The program will include but not be limited to:

1. Distributing a pre-construction information letter to all residents, business, etc. within an area described as follows: from one-quarter mile west of 19th Avenue to one-quarter mile east of 7th Street, and from one-quarter mile north of the Salt River to one-quarter mile south of the Salt River. Included will be all neighborhood associations registered with the City, property owners, City Council members in Districts 7 and 8, and the presidents of the Central City and South Mountain Village Planning Committees.

2. Printing and distribution of public notices and/or newsletters. All printed materials must be in both English and Spanish.

The Contractor will use these or other means to inform the local citizens of necessary operations which create high noise levels, street closures, limited access, detour locations, haul route and material delivery routes, hours of construction and disruption of bus, trash, school bus and other delivery/pick-up routes.

The Contractor will be required to furnish a private line telephone to be used solely for receiving incoming calls from local citizens with questions or complaints concerning construction operations or procedures. The Contractor shall publish this phone number and maintain a 24-hour answering service. The answering service must be fluent in both English and Spanish and shall be operated by Contractor personnel during all hours that work is being performed on the job site. The Contractor shall maintain a log of incoming calls, responses, and action taken which shall be submitted to the Engineer weekly and/or upon request.

Prior to the start of work, the Contractor shall notify, by letter, all affected businesses and residents of construction plans and schedules within the geographic area identified above. In addition, all schools and emergency services which serve the geographic area will also be notified even though they may be located outside the geographic area described above. The letter shall contain, as a minimum, the following information:

1. Name of Contractor
2. 24-hour telephone complaint number
3. Brief description of the project
4. Name of Contractor project Superintendent
5. Name of Engineer
6. Name of area supervisor
7. Construction schedule including anticipated work hours
8. Traffic regulations including lane restrictions
9. City of Phoenix Street Transportation 24-hour phone number

The Contractor shall submit a Public Information and Notification Plan to the Engineer at the pre-construction meeting. No payments shall be made for this item until the Engineer approves the plan.

The plan and work which is eligible for reimbursement shall include: meetings with impacted businesses, schools, emergency services, residents, etc.; scheduling; preparation and distribution of newsletter at least monthly; and maintaining a 24-hour telephone hot line for complaints.

The Contractor shall submit a final report/evaluation of the Public Information and Notification process performed for this project. This report shall be submitted before the Contractor receives final payment.

Payment will be based on invoices, and will be for a total amount not to exceed the amount shown in the bid schedule for the item, PUBLIC INFORMATION AND NOTIFICATION ALLOWANCE, for work performed in notifying and coordinating with the local population impacted by this project. To cover the

cost for administration and supervision, the General Contractor may add an amount equal to not more than 5 percent of the accumulated total invoiced billing for actual public information services provided by a Subcontractor. This cost for administration and supervision will be considered included in the PUBLIC INFORMATION AND NOTIFICATION ALLOWANCE.

**ITEM 107-2 - PUBLIC INFORMATION AND NOTIFICATION ALLOWANCE**

**Subsection 107.6.4 - Project Signs:**
Contractor shall provide and install six project information signs, at locations to be determined by the Engineer, at the start of construction to inform the public of the forthcoming project, construction dates, and suggested alternate travel routes. Project signs shall include the names of all agencies participating in the project. The signs shall be in English and Spanish and include the 24-hour hot line complaint telephone number. Signs shall be constructed in accordance with the Project Sign Information drawing to be provided to the Contractor at the pre-construction meeting. The signs shall be installed at the location(s) approved by the Engineer. The Contractor shall maintain the signs as necessary, and update the information as requested by the Engineer. Payment shall be made according to the allowance in the Bidding Schedule in installments of 50% upon installation, and the remaining 50% upon final payment for the work.

**ITEM 107-3 - PROJECT SIGNS ALLOWANCE**

**Subsection 107.9 - Protection and Restoration of Property:** Add the following:
The Contractor shall protect-in-place all existing structures and other features as identified on the plans, including but not limited to transmission towers, existing sand and gravel operation haul roads, and existing vegetation outside of the excavation limits.

The Contractor shall limit all construction activities to the right-of-way limits shown on the plans including dedicated street right-of-way, and shall not disturb any areas other than as required for construction as shown on the plans.

The Contractor will grade all Temporary Construction and Permanent Easement areas, and project areas which are disturbed during construction to the lines and grades shown on the plans, or as a minimum, where no lines and grades are shown, to a condition similar to or better than the pre-existing condition.

Existing river bottom Sand & Gravel Operations (SGO) haul roads in the bottom of the river will be maintained as follows:

1. The haul road crossing the river upstream of 7th Avenue shall be maintained for as long as possible for use by the SGO.

2. The haul road located along the north side of the river bottom between 7th Avenue and 19th Avenue shall be maintained for as long as possible for use by the SGO. Once this haul road is no longer usable because of low flow channel construction, the Contractor shall grade a replacement haul road.

3. The Contractor will allow SGO activities along these haul roads during construction.

The Contractor will minimize damage to and the removal of existing vegetation within the project area that exists beyond required excavation limits. Haul roads and other construction access routes will be created in such a way to minimize such damage and removal whenever possible, and will be approved by the Engineer before vegetation is removed.

**Subsection 107.10 - Contractor's Responsibility for Work:** Add the following:
A. All construction activities will occur within the bottom of the Salt River. As recent as 1993 flows in excess of 100,000 cfs occurred in the river. Flows can occur at any time in the river, and nuisance flows are ever present in the river bottom. The Contractor shall protect his construction work and

equipment from flows in the river. The Owner assumes no responsibility for notifying the Contractor of any anticipated flows, nor for any damages incurred by the Contractor to his equipment or to any of the Contractor's work as a result of any flows of water.

B. The Contractor shall provide the Engineer at the pre-construction conference with his plan for managing flows.

C. Ground water will be encountered in the area of construction, and it may be pumped from the excavation limits back into the river downstream of the work area under dewatering permits obtained by the City from the Arizona Department of Water Resources, and to be provided to the Contractor.

D. The ground water infiltration rate to be managed by the Contractor when performing excavation activities can be calculated using the following parameter: the soil hydraulic conductivity (K) is estimated at 200 to 600 feet/day.

E. Groundwater pumped from excavations will be piped to the south side of the river bottom where it can be allowed to flow downstream. However, because of concerns about impacting downstream sand and gravel mining activities, this piped groundwater cannot be permitted to surface flow past the 19th Avenue bridge without the Contractor first contacting the sand and gravel mining operators, and providing evidence of this contact to the Engineer. Project access, concerns about public contact, or proximity to regulated features such as landfills may cause the Engineer to direct that the ground water be directed away from certain areas before allowing discharge.

F. Installation and abandonment of any wells installed for dewatering purposes will be done by a well drilling Contractor that holds a current well drillers' license pursuant to A.R.S. 45-495. Any dewatering wells installed by the Contractor will be equipped with a sampling port to facilitate the collection of groundwater samples by the Engineer. All dewatering wells will be installed and registered according to the Arizona Department of Water Resources rules and regulations. Contractor shall provide a copy of all well permits, Notice of Abandonment, and drillers logs to the Engineer, and shall provide access to the wells for ground water quality monitoring if requested. Prior to activating any wells, trench pumps, or other dewatering points, the Contractor shall provide a completed copy of ADWR Form 55-90, New Well Construction Supplement, or a written description of the location and type of dewatering device to the Engineer and shall not activate dewatering at that location until authorized by the Engineer.

G. It will be necessary for the Contractor to monitor the total amount of ground water pumped on a daily basis. The Contractor must provide the necessary gages and/or meters to quantify the amount of water pumped in gallons per day at each well, trench pump or other dewatering point. A daily log will be kept by the Contractor, and the data will be provided to the Engineer on a monthly basis using the form provided in Appendix "C".

H. The Contractor shall take all necessary action to protect the public from the construction work area. The Contractor will also notify the Engineer of any unauthorized personnel in the project area, including the presence of the general public.

J. The Contractor is responsible for protecting in place the ~~Central Avenue~~ 24th ST Bridge. Because the construction of the Grade Control Structure (GCS) at Central Avenue requires excavating into the river banks in close proximity to the bridge abutments, and because of the potential for significant flows in the river, the Contractor is cautioned about constructing the ends of the GCS into the river banks should this activity occur between December and March.

K. In accordance with the Environmental Impact Statement the Contractor **shall avoid all areas of standing or running water wherever possible**, however it may be necessary to operate equipment, including vehicles in areas of water.

including dewatering of landfill matl,

Payment for ground water dewatering as described in Subsection 107.10, Parts C, D, E, F and G shall be made on the basis of lump sum for all labor, materials, equipment, and appurtenances necessary to perform the dewatering, including but not limited to pumping equipment, wells, gages and/or meters, and sumps.

**ITEM 107-4 - GROUND WATER DEWATERING**

Payment for surface water management as described in Subsection 107.10, Part A shall be made on the basis of lump sum for all labor, materials, equipment, and appurtenances necessary to manage surface water.

**ITEM 107-5 - SURFACE WATER MANAGEMENT**

**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 **three hundred (300)** 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 schedule to Engineer for review before starting work using the Primavera or other similar software program that is acceptable to the Engineer. Weekly updates shall be submitted to Owner's Inspector at the weekly coordination meeting.

**Subsection 108.4.1 - Contractor's Billing Schedule:** The Contractor shall furnish the Engineer an Estimated Billing Schedule which shall include the estimated amount of each billing for the total project at the pre-construction conference, and thereafter at monthly intervals as agreed to between the Contractor and Engineer.

**Subsection 108.5 - Limitation of Operations:** Add the following:

The normal workweek shall be 40 hours, Monday through Friday, and the work hours will be determined at the pre-construction meeting. This does not imply that this contract can be completed on time utilizing normal working hours. The Contractor shall furnish sufficient forces and shall work such hours including night shifts and overtime operations as necessary to ensure the completion of the work within the time required. To work other than normal working hours, for other than emergency situations, the Contractor shall give the Engineer at least 24 hours advance written notification and receive written approval before working. The notification shall include: the working hours, the type of work to be performed, and the name of and a phone number for the person in charge. Should the Contractor elect to perform any work after regular working hours, on weekends, or legal holidays, any charges incurred by the Owner for inspection of the work, surveys or tests of materials will be deducted from monies due or to become due to the Contractor.

**Subsection 108.9 - Failure to Complete on Time:** Add the following:

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

(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) Add the following:
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 processed by Owner's Construction Branch on the week prior to the last day of the month.

**Subsection 110 – Notification of Changed Conditions and Dispute Resolution:**
Delete in its entirety and replace with the following:
The Contractor and Owner will follow the established rules of the Maricopa County Procurement Code.

# FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

## RIO SALADO – PHOENIX REACH
## LOW FLOW CHANNEL PROJECT – PHASE 1

## CONTRACT NO. FCD 1999C062
## PCN 124-01-30

## SPECIAL PROVISIONS

# FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

## RIO SALADO – PHOENIX REACH
## LOW FLOW CHANNEL PROJECT – PHASE 1

## CONTRACT NO. FCD 1999C062
## PCN 124-01-30

## SPECIAL PROVISIONS

### SECTION 201 - CLEARING AND GRUBBING

Clearing and grubbing shall conform to Section 201 of the MAG Uniform Standard Specifications except as modified herein.

**Subsection 201.1 – Description**

Add the following:

The work consists of the removal and disposal of all vegetation, including shrubs, trees of all sizes, and other objectionable plant material within the construction limits of the low flow channel, guide dike structures, grade control structure, and conveyance side drain channels as necessary for the construction of these project features, unless otherwise directed by the Engineer. Removal of vegetation outside the limits of any excavation shall be done only with the approval of the Engineer. Prior to starting this work, the Contractor must verify the location of existing utilities which may be damaged during this work.

The Contractor will minimize damage to and the removal of existing vegetation within the project area that exists beyond required excavation limits. Haul roads and other construction access routes will be created in such a way to minimize such damage and removal whenever possible, and must be approved by the Engineer before vegetation is removed.

**Subsection 201.7 – Payment**

Payment for clearing and grubbing will be made on the basis of the lump sum price bid, including all labor, equipment and materials required for clearing and grubbing of the construction limits.

**ITEM 201-1 – CLEARING AND GRUBBING**

### SECTION 202 – MOBILIZATION

Add the following Section.

**Subsection 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, supplies and incidentals to the project site; the establishment of all offices, buildings and other facilities necessary for work on the project, permits and licenses, and for all other work and operations that must be performed, and costs incurred prior to beginning work on various items on the project site.

**Field Office:**

This work shall consist of providing and maintaining a furnished Field Office for the exclusive use of and occupancy by the Engineer and the Engineer's staff.

The office shall be a building or mobile trailer erected at a location convenient to the project. The Contractor's and the Engineer's offices shall not be in the same building or mobile trailer although the offices shall be located next to each other or within reasonable walking distance.

The Contractor must provide the Engineer's field office construction trailer area outside of the river bottom. City of Phoenix right-of-way is available along the west side of Central Avenue on the south side of the river for such field office use and as a possible site for Contractor construction trailers and general parking. This site is out of the river bottom and is accessed from the east side of Central Avenue and going under the bridge via an existing high clearance box culvert.

The Contractor may furnish equivalent facilities in an existing building provided such facilities and building are located to provide convenient service.

The field office shall be an approved and weatherproof building or mobile trailer providing a minimum of 600 square feet of clear floor space, not including the toilet area. The structure shall have a minimum ceiling height of seven (7) feet and shall be provided with weatherproof doors equipped with adequate locking devices. Windows shall also be provided with adequate locking devices. The Contractor shall also provide the following:

a. Lighting - Electric light, non-glare type luminaires to provide a minimum illumination level at desk height level.

b. Heating & Cooling - Adequate electrically powered equipment to maintain an ambient air temperature of 72 degrees F plus or minus 8 degrees.

c. Telephone, answering, plain paper FAX machine, and copying machine - Two (2) telephones with two (2) outside lines for the exclusive use of the Engineer. The Contractor will pay for the cost of the line and local calling charges. The District will pay for long distance charges made on these lines.

d. Toilet - A commode and wash sink in a separately enclosed room within the building or mobile trailer, properly ventilated and complying with applicable sanitary codes. Contractor shall provide water and sewer service.

e. Maintenance - The Contractor shall maintain all facilities and furnished equipment in good working condition, and the office shall be cleaned weekly.

f. Fire Extinguisher - Two non-toxic, dry chemical, fire extinguishers meeting Underwriters Laboratories, Inc. approval for Class A, Class B, and Class C fires with a minimum rating of 2A: 20B: 10C.

g. Electricity - Contractor shall provide electric power and pay for all electric services.

h. Furnishings - Three office desks with drawers, five office chairs (padded, swivel type), one drafting table (adjustable height) 3 feet by 6 feet with Mayline straight edge attached, two eight foot conference table, twelve folding chairs, two four drawer legal size file cabinets, and one draftsman's stool. All furnishings shall be in good working order.

i. First Aid Kit

j. Potable water supply or service

k. Parking space for ten vehicles with dust proof surface.

The office shall be fully equipped and made available for the Engineer's use and occupancy prior to the start of any Contract work and not later than 10 days after the date of Notice to Proceed. The Engineer will notify the Contractor, in writing, of the acceptability of the Field Office provided. The Contractor shall maintain the field office in operating condition until seven (7) days after acceptance of the Contract work.

All facilities shall be maintained in good operating condition and appearance by the Contractor for the designated period, after which all portable buildings or trailers, fencing, surfacing, and utilities shall be removed from the site, the areas cleaned and seeded, if required, with a native seed mix approved by the Engineer, and left in a neat and acceptable condition.

**Subsection 202.1 - Payment**
Payment shall be made on the basis of the lump sum price bid and shall be full compensation for supplying and furnishing all materials, facilities, and services and performing all work involved as specified herein. The lump sum price bid shall not exceed three (3%) percent of the total project bid amount exclusive of mobilization and permits and licenses. No additional payment will be made for occupancy and services during periods of contract extension of time due to engineering changes or shutdowns.
**ITEM 202-1 - MOBILIZATION**

**SECTION 211 - FILL CONSTRUCTION**
Fill construction shall conform to Section 211 of the MAG Uniform Standard Specifications except as modified herein.

**Subsection 211.1 – Description**
Add the following:
Fill construction shall consist of the placing and compacting of fill material for the backfilling of the guide dike structures (GDS), grade control structures (GCS), and LFC bank protection. The work will also include backfilling of over-excavated areas where municipal solid waste (MSW) materials or construction rubble and debris have been removed in accordance with Section 350. Backfill placed in the low flow channel (LFC) will be compacted to 90% of the maximum ASTM D698 density, and backfill placed below GDS or GCS will be compacted to 95% percent of the maximum ASTM D698 density, where MSW materials or construction rubble and debris have been removed. Backfill of RCC structures will be compacted to 85% percent of the maximum ASTM D698.

The work also includes placement of fill along the low flow channel RCC north bank protection from approximately station 75+50 to 87+50, and placement of fill at conveyance side drain channels as shown in the plans. This fill placement will be compacted to 85% percent of the maximum ASTM D698.

**Subsection 211.2 - Placing**
Add the following:
Water settling or jetting for compaction purposes will not be permitted.

**Subsection 211.3 - Compacting**
Add the following:
Compaction shall meet the following density criteria:

| Material | Minimum Percent Compaction (ASTM D698) |
|---|---|
| Backfill: | |
| Below Roller Compacted Concrete (RCC) structures | 95 |
| Below gabion baskets and mattresses | 95 |
| Within limits of the low flow channel | 90 |
| Within the backfill limits of RCC structures | 85 |

Backfill placed against the gabions shall meet the requirements of Section 222. These requirements include a maximum particle size of 3-inches. For all other materials the maximum particle size is limited to ¾ of the lift thickness except for miscellaneous fill for which the maximum particle size is 24-inches.

Compaction of on site soils in new fills shall have a moisture content between optimum and optimum plus 2 percent.

**Subsection 211.5 – Measurement**
Measurement in cubic yards shall be made for the placement and compaction of fill material for the backfilling of over-excavated areas where municipal solid waste (MSW) materials or construction rubble and debris have been removed in accordance with Section 350. No measurement will be made for the placement of fill material for the purpose of backfilling the RCC structures, such backfill placement being incidental to the construction of the RCC structures, or for placement of fill along the low flow channel RCC north bank protection of along the conveyance side drain channels.

**Subsection 211.6 - Payment**
No separate payment will be made for placement of fill material for the purpose of backfilling RCC structures, or the placement of fill along the low flow channel RCC north bank protection or the conveyance side drain channels, the cost of such backfill placement being incidental to the construction of the RCC structures or channels.

Payment for the placement of fill material for the purpose of backfilling over-excavated areas where municipal solid waste materials or construction rubble and debris have been removed shall be made on the basis of the price bid per cubic yard, and shall include all labor, material, and equipment necessary for placing and compacting the fill material.

**ITEM 211-1 - BACKFILL OF OVER-EXCAVATED AREAS**

Payment for the placement of fill material for the purpose of backfilling over-excavated areas where municipal solid waste materials or construction rubble and debris have been removed in excess of the bid quantities provided in bid item 211-1 shall be made on the basis of the price bid per cubic yard for bid item 211-1, using the allowance provided, and shall include all labor, materials and equipment necessary for placing and compacting the fill material.

**ITEM 211-2 - BACKFILL OF OVER-EXCAVATED AREAS ALLOWANCE**

## SECTION 215 - EARTHWORK FOR DRAINAGE CHANNELS

Earthwork shall conform to Section 215 of the MAG Uniform Standard Specifications except as modified herein.

**Subsection 215.1 - Description**

Add the following:

The work consists of excavation of the low flow channel and conveyance side drain channels as shown on the plans. The Contractor is encouraged to review the geotechnical report for the project, which is available from the Owner, as well as review the borings logs included in the plans. It is likely that construction rubble and debris, tires, and possibly municipal solid waste will be encountered during excavation of these project features. The excavation, removal and disposal of these materials will be accomplished in accordance with Section 350.

The Contractor shall deliver to United Metro Materials, Inc. located at the southwest corner of Central Avenue and the river, 75,000 cubic yards of excavated sand and gravel material that is reasonably clean of trash, debris and foreign material. Obvious construction rubble and debris, tires, and vegetation will not be allowed in this material. The Contractor shall deliver this material to United Metro within 120 calendar days of the notice to proceed for construction. The Contractor shall contact Bill Peck at 602-220-5000.

The work shall also include the removal and disposal of any buried utilities and utility services encountered during excavation, which have been abandoned.

**Subsection 215.7 - Measurement**

Add the following:

Measurement for payment for excavation for the low flow channel and conveyance side drain channels will be made according to the quantity of material excavated from natural ground to finished grade as shown in the plans and computed using the average end area method as follows:

A. Contractor shall obtain cross sections after clearing and grubbing and prior to any excavation.
B. Cross sections shall be taken perpendicular to the construction control line, and with a sufficient number of points to describe the existing ground surface.
C. Cross sections shall be taken at a minimum of 100-foot stations, and angle points and the beginning and ending of curves.
D. After excavation the Contractor shall obtain new cross sections at the same locations as the existing ground cross sections were taken.

The low flow channel and conveyance side drain channels shall be excavated to the lines, grades and cross sections shown on the plans. The excavation tolerance shall be plus or minus three inches (3").

**Subsection 215.8 – Payment**

Payment for excavation for the low flow channel and conveyance side drain channels shall be made on the basis of the price bid per cubic yard to the neat lines shown in the plans. Price bid shall include all labor, material, and equipment necessary for excavation, grading, compacting and disposal of excess materials in accordance with the plans.

**ITEM 215-1 - EARTHWORK FOR DRAINAGE CHANNELS**

Payment for excavation and delivery of 75,000 cubic yards of sand and gravel material to United Metro Materials, Inc. shall be made on the basis of the price bid per cubic yard. Price bid shall include all labor, material, and equipment necessary for excavation and deliver of the material.

**ITEM 215-2 – EARTHWORK FOR UNITED METRO**

## SECTION 220 - RIPRAP CONSTRUCTION

Riprap construction shall conform to Section 220 of the MAG Uniform Standard Specifications except as modified herein.

### Subsection 220.1 - Description

Add the following:

Riprap construction for this project shall consist of furnishing and installing plain riprap with filter fabric at the conveyance side drain channel inlets and outlets as shown on the plans. Sacked concrete riprap shall not be permitted.

The work also includes the replacement of existing plain and grouted riprap near the Central Avenue bridge north abutment protection required for the construction of the RCC grade control structure (GCS). The Contractor must also remove existing gabion mattresses located between the abutment protection grouted riprap and the upstream side of the existing ADOT storm drain outlet structure, as shown on the plans. The Contractor shall replace the removed grouted riprap and gabion mattresses with grouted riprap as shown on the plans. And, the Contractor shall replace the plain riprap at the toe of bank, and overlaying the grouted riprap as shown on the plans.

### Subsection 220.3 - Preparation of Ground Surfaces

Plain riprap shall be installed using a filter fabric as shown on the plans meeting the following requirements:

Geotextile filter fabric shall be used under the riprap and shall be a non-woven fabric consisting only of long chain polymeric filaments such as polypropylene or polyester formed into a stable network such that the filaments retain their relative position to each other. The fabric shall be inert to commonly encountered chemicals, which adversely affect or alter its physical properties. The physical requirements for the geotextile fabric shall meet the following minimum average roll values:

| PROPERTY | REQUIREMENT | TEST METHOD |
|---|---|---|
| Grab tensile strength, lbs. | 200 | ASTM D4632-86 |
| Grab elongation at break, % | 45 min., 115 max. | ASTM D4632-86 |
| Puncture strength, psi | 80 | ASTM D3787 |
| Burst strength, lbs. | 475 | ASTM D3786 |
| Trapezoidal tear strength, lbs. | 50 | ASTM D4533-85 |
| Permittivity, cm/sec – 1 | .48 max | ASTM D4491-85 |
| Apparent opening size, U.S. Standard sieve size | 150-200 | ASTM D4751-87 |
| UV stability, % | 70 | ASTM D4355-84 |

Minimum average roll values represent the average test results for a lot in the weaker direction when sampled according to ASTM D4354 and tested according to the test method specified above.

The identification, packaging, handling and storage of the geotextile fabric shall be in accordance with ASTM D4873. Fabric rolls shall be furnished with suitable wrapping for protection against moisture and extended ultraviolet exposure prior to placement. Each roll shall be labeled or tagged to provide product identification, sufficient to determine the product type, manufacturer, quantity, lot number, roll number, date of manufacture, shipping date, and the project number and name to which it is assigned. Rolls will be stored on the site or at another identified storage location in a manner that protects them from the elements. If stored outdoors, they shall be elevated and protected with a waterproof, light colored, opaque cover. At no time, shall the fabric be exposed to sunlight for a period exceeding 14 days.

**Subsection 220.4 – Plain Riprap**
Plain riprap shall be placed at the conveyance side drain channels and near the north bridge abutment where shown on the plans. The stone shall conform to Section 703 of these Special Provisions and as shown on the plans. The riprap shall be dumped and spread to the lines and grades shown in the plans.

**Subsection 220.5 - Grouted Riprap**
Grouted riprap shall conform to the gradation requirements set forth in the plans.

Place grouted riprap to line and grade as shown on the plans. The thickness of the grout material shall be at least 18 inches. Riprap shall be washed prior to placement so riprap stones are free of soil and fines. The concrete grout shall be placed by injection methods by pumping under low pressure, positive displacement methods, through a 2-inch maximum diameter hose to ensure complete penetration of the grout into the stone layer. The grout thickness shall be full depth as shown on the plans. A 2,500 psi grout shall be used.

The operator shall be able to stop the flow and will place grout in the voids and not on the surface rock. Clean and wash any spillage before the grout sets. A "pencil" vibrator will be used to ensure all voids are filled between and under rock and that full depth penetration of the grout to subgrade is achieved. The intent is to fill all voids through the rock layer. In all cases, grout must penetrate to subgrade. The pencil vibrator may be used to smooth the appearance of the surface. If at any time the Engineer does not believe that full penetration has been achieved with the complete filling of voids, or that the method of placement and vibration is not achieving the desired objective, the Contractor will stop work as directed by the Engineer and will not restart work until directed by the Engineer. The construction of the grouted riprap section is critical and all necessary placement and quality control measures will be undertaken by the Contractor to ensure a satisfactory installation of the grouted riprap.

The grout mix shall be stiffened and other measures taken to retain the grout in steep locations.

**Subsection 220.7 - Measurement**
Plain and grouted riprap shall be measured per cubic yard in place to the neat lines shown on the plans.

**Subsection 220.8 - Payment**
Payment for plain riprap construction for the conveyance side drain channels and for replacement near the north bridge abutment shall be made on the basis of the price bid per cubic yard to the neat lines shown on the plans, and shall include all labor, materials, tools and equipment, and including excavation and backfill, subgrade preparation and placement of filter fabric as required to install the riprap.
**ITEM 220-1 - PLAIN RIPRAP**

Payment for grouted riprap construction near the Central Avenue bridge north abutment and the upstream side of the ADOT storm drain outlet structure required for the construction of the GCS at Central Avenue shall be made on the basis of the price bid per cubic yard to the neat lines shown on the plans, and shall include all labor, materials, tools and equipment, and including excavation and backfill, grout, and subgrade preparation as required to install the riprap.
**ITEM 220-2 – GROUTED RIPRAP**

**SECTION 221 – ROLLER COMPACTED CONCRETE CONSTRUCTION**
Add this section to the MAG Uniform Standard Specifications

**Subsection 221.1 - Description:**
The work shall consist of furnishing all labor, equipment and materials and constructing Roller

Compacted Concrete (RCC) guide dike structures (GDS), a grade control structure (GCS) with low flow channel lining at the Central Avenue bridge, and low flow channel (LFC) bank protection as shown on the plans, and including all excavation and backfilling of the RCC structures.

The Contractor shall submit a Quality Control Program showing his intended method of constructing the RCC at least two weeks prior to the start of RCC production. The plan shall be sufficient in detail to clearly describe the planned execution of the work. Such a Quality Control Program 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 Program for RCC, which shall meet the same quality control requirements as Section 105 of the MAG Standard Specifications and these Special Provisions.

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

The Contractor is responsible for protecting in place the Central Avenue Bridge. Because the construction of the Grade Control Structure (GCS) at Central Avenue requires excavating into the river banks in close proximity to the bridge abutments, and because of the potential for significant flows in the river, the Contractor is cautioned to not construct the ends of the GCS into the river banks between December and March.

**Subsection 221.2 - Materials:**

221.2.1 - Portland Cement

Portland Cement 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 $SO_4$. Water shall be sampled and tested in accordance with the requirements of AASHTO T-26.

221.2.3 - Aggregates

It is anticipated that in order to meet the specified gradation of aggregates for use in RCC, the Contractor will have to crush, screen, wash, and/or blend material obtained from the required excavations. As an alternative, aggregates may be supplied from a Contractor supplied source. Aggregates for RCC shall contain no deleterious material. Before mixing as RCC the aggregates 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 RCC lining shall not result in lenses, pockets, streaks, or layers of material differing substantially in texture or gradation from surrounding material. The contractor may elect to supply the aggregates as one composite material, in conformance with the following gradation or may supply the aggregate as two or more materials to be blended, to meet the following gradation, during the batching or mixing operation.

The composite aggregate gradation supplied to the mixer for production of RCC shall conform to the following gradation requirements when tested in accordance with ASTM C-136 and C-117:

| Sieve # | Percent Passing, By Dry Weight |
|---|---|
| 1-1/2" | 100 |
| 1" | 80-95 |
| 3/4" | 65-80 |
| No. 4 | 35-50 |
| No. 30 | 15-30 |
| No. 50 | 5-20 |
| No. 100 | 0-10 |
| No. 200 | 0-5 |

Aggregates for RCC shall be non-plastic when tested in accordance with AASHTO T-90.

Blending of aggregates by combining aggregates from separate 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 conform to the requirements of ASTM C 618, with the loss on ignition limited to 6 percent. Fly ash shall be delivered to the project site separately from cement.

**Subsection 221.3 - Equipment:**
The RCC bank protection may be constructed with any combination of machines and/or equipment, except as noted herein, that will produce completed RCC meeting the requirements for pulverization aggregate quality, cement, fly ash, water introduction, mixing, saw cutting, excavating, transporting, placing, compacting, finishing, and curing as provided in these Specifications.

**Subsection 221.4 - Construction Requirements:**

221.4.1 - Required Contractor Submittals

Approval by the Engineer shall not relieve the Contractor of the responsibility for achieving the desired result of constructing sound RCC, 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 dimensions of RCC to be placed prior to starting compaction operations.

2. The number and type of transporting, spreading, and 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 RCC are placed.

5. The method to be used to cure permanently exposed RCC surfaces.

6. The proposed source(s) of materials to be used in RCC aggregate production.

7. The proposed size and number of aggregate stockpiles.

221.4.2 - Preparation

Before RCC processing begins, the area on which RCC 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 95% 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". Moisture contents shall be measured and reported to the nearest 0.1%.

Immediately prior to placement of the RCC 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 RCC below the channel bed profile elevations shown on the plans shall be considered incidental to the construction of the RCC and included in the cost of Bid Item 221-1 – RCC GDS AND BANK PROTECTION and Bid Item 221-2 – RCC GRADE CONTROL STRUCTURE.

221.4.3 - Mixing

RCC 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 RCC 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, weighing, metering, and measuring devices that will add the aggregates, cementitious materials and water into the mixer in the specified quantities.

When the quantity of water is controlled by metering, the Contractor shall make provisions 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.

A variable speed belt or a remotely operated gate, calibrated to accurately deliver any specified quantity of material shall control the aggregate feed rate. The feed rate shall be readily adjustable from the control panel to compensate for changes in the moisture content of the aggregates or to change 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 aggregates entering the mixer. Provisions for readily and frequently changing mixture proportions will be supplied.

When a continuous mixing plant with a fixed 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 aggregate feed monitoring system shall provide and record the rate of and total quantity of aggregates fed into the mixture.

The accuracy of the plant dispensing systems shall be within the following limits:

| | |
|---|---|
| Cement and Pozzolan | 0 to +2 percent |
| Water | ± 1 percent |
| Aggregates | ± 2 percent |
| Admixtures | 0 to +6 percent |

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

Mixing plant(s) shall be capable of producing RCC of a uniform quality and uniformity as would be produced in a conventional batch plant and shall be capable of producing a uniform continuous product (at both maximum and minimum production rates) that is mixed so that complete intermingling of all ingredients occurs without balling, segregation, and wet or dry portions.

Mixing shall not proceed when the aggregates or the area on which the RCC is to be placed is frozen. RCC shall not be mixed or placed when the air temperature is below 45 degrees, unless the air temperature is at least 40 degrees and rising.

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 aggregates currently entering the mixer.

The Contractor shall give copies of the hourly printed records of discharged quantities and aggregate moisture information to the Engineer at the end of each day of RCC production.

Measuring devices shall be calibrated prior to production of RCC and as deemed necessary by the Engineer. All measuring device calibration shall be approved by the Engineer and performed at the Contractor's expense.

Each measuring device shall be calibrated throughout its range to within an accuracy of 0.2 percent of scale capacity and shall be inspected and calibrated as often as the Engineer deems necessary to assure their accuracy. A certified lab shall perform all calibrations.

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 RCC shall be in the range of optimum to optimum

plus 2.0 percent when the mean air temperature during construction hours does not exceed 90 degrees F. The relationship between the RCC 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 degrees F, or there is a breeze or wind which promotes the rapid drying of the RCC mixtures, 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 RCC 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 plant's 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 sampling of the combined 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 RCC produced. These samples shall be used for the Contractors Quality Control and the Engineers Quality Assurance. The Contractor shall furnish all necessary platforms, tools, equipment and trained personnel for obtaining samples.

221.4.6 - Handling

The RCC mixture shall be transported from the mixing area to the placement location 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 not exceed thirty (30) minutes. This time may be reduced by the Engineer when the air temperature exceeds 90 degrees F or when there is a breeze or wind, which promotes rapid drying of the RCC mixtures. Compaction shall start as soon as possible after spreading.

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

221.4.7 - Placing

The mixture shall be placed on the moistened subgrade, embankment, or previously completed RCC with spreading equipment that will produce layers of nine (9) feet in width with a thickness as is necessary for compaction to the required dimensions of the completed RCC layers. The nine (9) feet dimension is to allow for full compaction of the design width of eight (8) feet with one (1) foot of excess that will not be trimmed. The compacted layers of RCC shall not exceed eight (8) inches in thickness nor be less than four (4) inches in thickness.

In areas where the design width exceeds nine feet the RCC will be deposited as close as possible to the final position. Vehicles transporting RCC on the previously placed surfaces shall be operated to prevent sudden stops, sharp turns, or other operations that damage the surface of the previously compacted lift. RCC shall not free fall more than 4 feet during dumping or be piled higher than 4 feet during spreading and shall not be spread more than 15 feet from the point of deposit. Segregated RCC aggregates shall be removed or where approved remixed into the fresh RCC.

Each successive layer shall be placed as soon as practicable after the compaction of the preceding layer has been verified by the Contractor's Quality Control.

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

All RCC surfaces that will be in contact with succeeding layers of RCC 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 aggregate or the area on which the soil-cement is to be placed is frozen. RCC shall not be mixed or placed when the air temperature is below 45 degrees F , unless the air temperature is at least 40 degrees F and rising.

221.4.8 - Compaction

The running average of five consecutive in-place density tests shall not be less than 98% of the maximum density obtained by ASTM D-558, with no individual test less than 95%. The Contractor shall remove and replace all RCC not meeting these requirements at no cost to the Owner. Optimum moisture and maximum density shall be determined in accordance with ASTM D-558. Field density tests shall be continually monitored by the Contractor's Quality Control and shall be performed in accordance with ASTM C-1040 "Density of Unhardened and Hardened Concrete in Place By Nuclear Methods", Method A. 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 soils which the RCC 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.

221.4.9 Lift Joints

221.4.9.1 General

Lift joints shall be treated with special care as indicated hereafter.

All lifts placed within the top three (3) feet of the GCS shall be treated with the bonding layer as indicated in paragraph 221.4.9.5. Where RCC is placed against pre-existing RCC or where RCC is to be placed against RCC at the end of the GDS and LFC bank protection for GDS No. 8, 10, 12, 13 through 16, the surfaces to which new RCC will be placed will be trimmed and then prepared in accordance with the requirements of Paragraph 221.4.9.5.

221.4.9.2 Normal Conditions

All RCC shall be placed with sufficient continuity so that it hardens and acts as one monolithic structure without discontinuous joints or potential planes of separation. All lift joints shall be kept clean, uncontaminated, free from ponded water, and continuously moist until placement of the succeeding RCC. Regular lift-joint treatment and maintenance applies to subsequent lifts placed within 2 hours of the previous lift and shall: require no special treatment other than as described above.

In those cases in which the contractor is unable to place the subsequent lift within 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, measured across the direction of RCC 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 RCC mixture for the next lift. During periods of hot weather as defined in Paragraph: 221.4.9.4 Placing During Hot Weather, the time period for regular lift joint treatment shall be reduced to 1-hour.

221.4.9.3 Subsequent Lift Placed Beyond 8 hours

Lift joints that are more than 8 hours old shall receive a Bedding Mortar Layer as described in paragraph 221.4.9.5 Bedding Mortar. During periods of hot weather as defined in Paragraph 221.4.9.4 Placing During Hot Weather, the time period shall be reduced to 4 hours.

221.4.9.4 Placing During Hot Weather

During periods of hot weather when the maximum daily air temperature is likely to exceed 90 degrees F; or when the combination of ambient conditions will produce evaporation rates of 0.2 lbs/sq ft/hr or more, when calculated in accordance with Figure 2.1.5 of ACI 305R; the following precautions shall be taken. The maximum period between placing succeeding lifts or lanes shall be 30 minutes. The underlying material shall be sprinkled with water immediately before placing the RCC. The RCC shall be placed at the coolest temperature practicable, and in no case shall the temperature of the RCC when placed exceed 90 degrees F. The aggregates and/or mixing water shall be cooled as necessary. The finished surfaces of the newly laid RCC shall be kept damp by applying a waterfog or mist, not streams of water, with approved spraying equipment until the RCC is covered by the curing medium. When heat or wind is determined excessive by the Engineer, the Contractor shall immediately take such additional measures as necessary to protect the RCC surface. Such measures shall consist of wind screens, more effective fog sprays, and similar measures commencing immediately after placement. If these measures are not effective, placement shall be immediately stopped until satisfactory conditions exist.

221.4.9.5 Bedding Mortar

Bedding mortar is to be used for achieving bond between RCC lifts or RCC structural elements as indicated above. No surfaces to receive a bedding mortar shall be covered with RCC until the prepared surface has been approved and that acceptance has been recorded on an approved checkout form. In no case will the bedding mortar be allowed to dry from the sun and wind.

The bedding mortar mix design will conform to the following general requirements. Aggregate for bedding mortar shall conform to the requirements of ASTM C 33, for washed concrete sand.

| Parameter: | Requirement: |
|---|---|
| Slump | 8-10 inches |
| Minimum Compressive Strength | 4000 psi (28 days) |

Bedding mortar shall be spread over the lift joint and other horizontal contact surfaces before placement of the next RCC lift. The bedding mortar shall be spread so that the maximum thickness of bedding does not exceed 1/2 inch, and the average thickness determined by dividing the volume used by the area covered is approximately 1/4 inch. Bedding mortar placements shall be controlled to prevent bleeding of the mortar through the RCC. The bedding mortar shall be covered with the designated RCC mix within 15 minutes after placement of the bedding mortar. Consolidation of the bedding mortar will not be required. Serrated rakes creating small windrows of mortar or other approved devices shall be used for mortar application.

221.4.10 - Finishing

After compaction, the top surface of the RCC shall be shaped to the required lines, grades, and cross-sections and rolled to a reasonably smooth surface.

221.4.11 - 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 RCC.

Permanently exposed surfaces of the RCC shall be kept moist during the seven (7) day cure period. Whenever atmospheric temperatures are expected to drop below 30 degrees F, RCC 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.

221.4.12 - Maintenance

The Contractor shall be required, within the limits of the Contract, to maintain the RCC 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.

221.4.13 – Bridge Pier Expansion Joints

The Contractor shall install an expansion joint between the RCC apron for the GCS and the Central Avenue bridge piers as shown on the plans. The cost of such expansion joints, including the polystyrene and the sealant (ASTM D3406) shall be considered incidental to the cost of the RCC apron.

**Subsection 221.5 - Inspection and Testing:**
The Contractor's Quality Control will perform all the tests required to insure the RCC production and placing is according to the present contract specifications.

The Engineer, with the assistance and cooperation of the Contractor, will make inspections and tests, as he deems necessary to verify the conformance of the work to the Special Provisions.

The inspections and tests performed by the Contractor's Quality Control will include, but will not be limited to: (1) the taking of test samples of the RCC 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 Special Provisions will be approved by the Engineer.

All testing of RCC or its individual components, unless otherwise provided specifically in the Special Provisions, 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 every other lift of compacted RCC If the lift being tested does not meet the specified density requirements, it must be reworked 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 RCC 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.

The Contractor will provide the Engineer with copies of the results of all tests performed by contractor's Quality Control.

**Subsection 221.6 - Mix Design:**
The design requirements for all the RCC placements shall be such that the RCC has a minimum compressive strength of 750 psi at seven days for the RCC GDS and the RCC LFC bank protection, and 2,000 psi at seven days for the RCC GCS. The Engineer will determine the mix proportions of the aggregate, cement, admixtures, and water, and the Contractor shall furnish RCC conforming to the requirements specific herein.

221.6.1 Laboratory Trials

At least 60 days in advance of the time when placing of concrete is expected to begin, samples of representative materials proposed for this project and meeting all the requirements of this specification shall be delivered to the Engineer's Lab by the Contractor at his expense. Samples of aggregates shall be taken under the supervision of the Engineer in accordance with ASTM D-75, accompanied by test reports indicating conformance with grading and quality requirements hereinafter specified. Samples of materials other than aggregates shall be representative of those proposed for the project and shall be submitted accompanied by manufacturer's test reports indicating compliance with applicable specified requirements. Quantities of finished materials required shall be as follows:

| MATERIAL | QUANTITY |
|---|---|
| 1-1/2 in. nominal maximum size coarse aggregate | 1500 pounds* |
| 3/4 in. nominal maximum size coarse aggregate | 1500 pounds* |
| Fine aggregate | 2000 pounds* |
| Cement | 750 pounds |
| Fly Ash | 400 pounds |

*The above represents nominal weights. If the contractor elects to supply the aggregates as a composite, the aggregates for mix design studies shall be supplied unsegregated in the amount of 4,000 pounds.

Mixture-proportioning studies will be made by the Engineer at his expense.

221.6.2 Proportions

RCC mixtures, and specific proportions for use in construction will be supplied by the Engineer. Preliminary mixture proportioning studies are available for review in the office of the Flood Control District of Maricopa County, 2801 West Durango Street, Phoenix, AZ 85009.

221.6.3 Proportioning Responsibility

The proportions of all materials entering the RCC will be furnished by the Engineer. The proportions will be changed as necessary by the Engineer. Adjustments will be made to the batch weights, including cement, pozzolan, and water, to maintain the necessary consistency to prevent segregation within the RCC and allow full compaction as determined. Frequent changes to the batch weights shall be considered usual and can be expected to occur frequently during the course of each day's placement depending on such variables as humidity, wind velocity, temperature, and cloud cover. Such changes will be as directed. The Contractor will be responsible for adjusting the added water to compensate for changes in aggregate moisture content.

The Engineer will determine at the placement site on a continuing basis the proper consistency necessary for adequate hauling, spreading, and compacting and will direct all necessary changes to achieve the proper RCC consistency. Changes will be directed based on visual examination of the RCC during the spreading and compaction process and on the Vebe time when it varies outside the range considered ideal for compaction, as determined by the Engineer using the modified Vebe apparatus, in accordance with ASTM C-1170.

**Subsection 221.7 - Stockpiling of Aggregate:**
Whether obtained from the required excavation or off-site commercial sources, aggregates shall not be transported directly to the mixing plant. 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. Stockpiles shall be limited to a maximum height of twenty-four (24) feet. If aggregates are supplied in separate size groups, fine aggregate and each size of coarse aggregate shall be stored in separate size groups adjacent to the batch plant and in such a manner as to prevent the intermingling of size groups or the inclusion of foreign materials in the aggregate.

Aggregates shall not be placed in bins at the batch plant until it is in a stable state of moisture content. Aggregates shall be delivered to the mixers with the least amount of free moisture and the least variation

in free moisture practicable under the job conditions. Under no conditions shall the coarse aggregate be delivered to the mixer "dripping wet."

Sampling of stockpiles will be done by the Engineer with the assistance of the Contractor.

**Subsection 221.8 - Sampling and Use of Stockpiles:**
During construction of stockpiles to be utilized in the production of RCC, 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 material. The Contractor's attention is directed to the 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.

**Subsection 221.9 - Field Quality Control:**
The Contractor shall establish and maintain an effective Quality Control Program for RCC, which will be his means of ensuring compliance with Contract requirements and of maintaining records of his control. The Quality Control Program shall include, but not be limited to the following: aggregate manufacture and gradations, moisture, batching requirements and mix proportions at the mixing plant, ensuring adequate materials are on hand, and all other tests inspections required by the Special Provisions.

All quality control tests shall be performed in strict accordance with the applicable standards as specified hereinafter. The Quality Control Program for RCC shall be established by the Contractor and be proposed to the Engineer for review and approval at least six weeks prior to RCC production. The Contractor shall supply all equipment and provide qualified personnel for testing and fulfillment of his Quality Control Program. No RCC 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 Special Provisions, 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 twice during each shift that RCC is produced 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 RCC shall be stopped at that time. The Contractor will be responsible for all costs incurred as a result of stopping any RCC placing or production operations due to materials not conforming to specification requirements.

(B) Aggregate Moisture Determination:

1. Testing:

At least twice during each day of placement for each aggregate size used, moisture content determinations shall be made in accordance with ASTM C-566 (ASTM C-70 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 RCC.

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 RCC with the aggregates, the placement foreman shall be contacted to see if a corresponding adjustment in water added at the RCC mixer is necessary to obtain maximum compaction at the placement site.

(C) RCC 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 RCC 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 RCC 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 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 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 mixing 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-C 55 prior to the start of RCC 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 RCC 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 RCC 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 every two hours at the placement site (immediately after compaction), the moisture content shall be determined on RCC mixtures using a nuclear gauge in accordance with ASTM C-1040. In any case, at least three tests shall be made in different areas of each layer of RCC placed, during each shift in which placement occurs. 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 RCC mixture at the mixing plant and/or placement area for determination of cement content using a chemical chloride titration or similar procedure daily. 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, test results copies being transmitted to Engineer daily.

6. Density:

a. Testing and Checking:

Once every lift during placement, the density and moisture content of RCC after compaction shall be determined with a nuclear density gauge in accordance with ASTM C 1040, Method A, 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. 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 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 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 under rolling 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 in subsection 221.12 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 ensure 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 RCC Placement:

The Contractor shall inspect foundations and construction joints in sufficient time prior to each RCC placement in order to certify that the area is ready to receive RCC. 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 RCC 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.

(K) Curing, Protection and Joint Surfaces:

1. Moist Curing:

The Contractor shall keep continuously moist the exposed RCC surfaces for a seven consecutive day period after placing the RCC, as stated in Subsection 221.4.11. 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 ensure 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 RCC 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.

(M) Backfill:

Special care shall be taken when placing backfill against RCC.

(N) Reports:

Mixing plant control reports and all results (both passing and failing) of tests conducted at the site shall be delivered to the Engineer daily. 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.

**Subsection 221.10 - Acceptance Sampling and Testing**

Rejection of RCC will occur due to improper temperatures, and/or density for the RCC mixture delivered to the site, placed and compacted.

(A) Sampling and Testing of RCC:

1. General:

Fresh RCC shall be sampled and tested for compliance with this 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 RCC 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 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 gauge shall be calibrated against oven-dry samples of each mix design used.

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 by the Engineer with a nuclear density gauge in accordance with ASTM C-1040. Each lift of RCC shall be tested by the nuclear gauge in at least six separate locations for density. The Engineer may check densities at any time to ensure compliance with the Specification and to require more compaction or removal.

5. RCC 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.

(B) Acceptance of RCC:

Acceptance for placed RCC which meets the above requirements or is allowed to remain in place shall be determined by the results of the in-place density tests. RCC represented by density tests, which does not meet the minimum density specified, may be allowed to remain in place at the discretion of the Engineer. No payment will be made for such RCC.

**Subsection 221.11 - Control Strips:**
At least 10 days but not more than 60 days prior to construction of the roller compacted concrete pavement, a control strip shall be constructed near the job site at the location designated on the contract plans. The Contractor shall notify the Engineer at least 5 days in advance of the date of control strip construction.

The control strip shall consist of not less than two adjacent paving lanes each approximately 50 feet long and shall be constructed to the thickness and number of lifts designated on the construction plans. The lane width of each paving lane shall be the same as that proposed for use in the project. The control strip shall contain at least one fresh longitudinal construction joint, one cold transverse joint, one longitudinal cold construction joint which has stood overnight before completion, and at least one horizontal joint showing methods for joint preparation and cleanup, including application of the bonding layer. Two separate days shall be used for construction of the control strip. The control strip will provide the Contractor the opportunity to develop and demonstrate, to the satisfaction of the Engineer, the proposed techniques of mixing, hauling, placing, compacting, finishing and curing, and the preparation of the construction joints. Additionally, the Contractor shall demonstrate the laydown method and rate, rolling pattern, joint preparation, and rolling method for both fresh and cold construction joints, start-up and finishing procedures, testing methods, and plant operations.

Each control strip, if constructed to acceptable density and surface tolerances, shall remain in place and become an integral part of the completed work. Unacceptable control strips (i.e., those that fail to meet the specified requirements for density or surface tolerances) 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 lift 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 RCC density requirements.

Variable amplitudes of the roller shall be used as approved in different areas to identify the optimum amplitude. Rolling pattern of the vibratory rollers may be varied as approved to determine the best pattern. Variations in mixture proportions other than water shall be made if directed. The control strip shall be placed in portions as directed by the Engineer. The Contractor shall vary the water content, as necessary, to arrive at the appropriate content.

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.

The mixing plant shall be operated and calibrated prior to placing the control strip. The Contractor shall use the same equipment, materials, and construction techniques on the control strip as will be used in all subsequent work. Base course preparation, RCC production, placing, compacting, curing, construction of joints, and all testing shall be in accordance with applicable provisions of this section. The Contractor shall construct a control strip acceptable to the Engineer in all aspects, including surface texture. Failure to construct an acceptable control strip will necessitate construction of additional control strips at no additional cost to the Owner. Control strips unacceptable to the Engineer shall be removed at the Contractor's expense. The Contractor shall provide twelve (12)6 inch diameter cores to the Engineer from points selected in the control strip by the Engineer 5 days after completion of the control strip.

**Subsection 221.12 - Measurement:**
This work shall be measured in cubic yards of complete-in-place RCC between the limits shown by the specified lines, grades, and cross-sections shown on the Plans. The Contractor shall compute the volume of RCC placed by the average end area method from the neat line RCC cross-sections indicated on the drawings. Cement and fly ash shall be measured and paid for in tons.

**Subsection 221.13 - Payment:**
Payment for the placement of RCC for the guide dike structures (GDS) and for the low flow channel (LFC) bank protection shall be made on the basis of the price bid per cubic yard for RCC. Such payment shall constitute full reimbursement for performing all work and for furnishing all equipment, labor, and materials necessary to complete the RCC construction for the GDS and the LFC bank protection, all excavation and backfill to grade shown on the plans, watering, mixing, placing, compacting, curing, inspection, and testing assistance and all other incidental operations, except for cement and fly ash. Any waste of RCC by the Contractor during handling, mixing, placing, etc., operations shall not be paid for.
**ITEM 221-1 – RCC GDS AND BANK PROTECTION**

Payment for the placement of RCC for the grade control structure (GCS) and low flow channel lining at the Central Avenue bridge shall be made on the basis of the price bid per cubic yard for RCC. Such payment shall constitute full reimbursement for performing all work and for furnishing all equipment, labor, and materials necessary to complete the RCC construction for the GDS and the LFC bank protection, all excavation and backfill to grade shown on the plans, watering, mixing, placing, compacting, curing, bridge pier expansion joints, inspection, and testing assistance, and all other incidental operations, except for cement and fly ash. Any waste of RCC by the Contractor during handling, mixing, placing, etc., operations shall not be paid for.
**ITEM 221-2 – RCC GRADE CONTROL STRUCTURE**

Payment for cement furnished for the production of RCC shall be made on the basis of the price bid per ton. The cement quantity to be paid will be measured using the percentages, weights and dry-density called for in the corresponding mix design. Payment for cement is based on 100% compaction of the RCC, the required cement content, and the neat line RCC limits as measured above. Any waste of cement by the Contractor during the handling, mixing, placing, etc., operations shall not be paid for. Unbalancing of the bid below market cost shall be the basis for rejection of the bid.
**ITEM 221-3 – CEMENT FOR RCC**

Payment for fly ash furnished for the production of RCC shall be made on the basis of the price bid per ton. The fly ash quantity to be paid will be measured using the percentages, weights and dry-density called for in the corresponding mix design. Payment for fly ash is based on 100% compaction of the RCC, the required fly ash content, and the neat line RCC limits as measured above. Any waste of fly ash by the Contractor during the handling, mixing, placing, etc., operations shall not be paid for. Unbalancing of the bid below market cost shall be the basis for rejection of the bid.

**ITEM 221-4 – FLY ASH FOR RCC**

## SECTION 222 - GABION CONSTRUCTION

Add the following Section.

**Subsection 222.1 – Description**

The work under this section shall consist of furnishing all materials, equipment, labor and incidentals required to construct twisted wire gabion mattresses at the locations and to the line and grade as shown on the plans.

**Subsection 222.2 – Materials**

The material used for gabion fill shall be clean, hard, well graded rock. The rock size for the 9-inch thick gabion mattresses shall range from three to six inches with D50 = 4.5 inches. Placement of stone filling shall not exceed a 12-inch vertical drop above the gabion mattress. Placement of the rock shall be done in such a manner as to minimize damage to the coating on the basket wire.

Rock shall be sound and durable, free from clay or shale seams, cracks or other structural defects. The Bulk specific Gravity (SSD) shall be determined in accordance with the requirements of AASHTO T-85 and shall be a minimum of 2.4. Rock may be rounded stones. Rock shall have a least dimension not less than one-third of its greatest dimension and a gradation in reasonable conformity with that shown herein. Control of the gradation will be by visual inspection.

The source and acceptability of the stone will be approved by the Engineer. If testing is required, suitable samples of stone shall be taken in the presence of the Engineer at least 25 days in advance of the time when its use 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 that quarry.

Gabion mattress units shall be of non-raveling construction and fabricated from a double twist by twisting each pair of wires through three half turns developing the appearance of a triple twist per ASTM A 975-97. The double twisted mesh shall be manufactured from zinc-5% Al coated steel wire conforming to ASTM 856 Zinc-5% Aluminum – Mishmetal Alloy Coated Carbon Steel. The nominal diameter of the wire shall be 0.0866 inches for the gabion mattresses and 0.120 for the gabion mattress. The metallic-coated steel wire shall have a 3.0 mm thick zinc-5% Al coating with at least 275 g/m2 per DIN 1548, as manufactured by Maccaferri Gabions, Inc. or approved equal. The metallic coated wire used shall be coated prior to weaving into mesh. All gabion diaphragms and frame wires shall equal or exceed the requirements for Style 3 in ASTM A975-97. The mesh opening shall be hexagonal in shape and uniform in size measuring not more than 3 ¼ inches by 4 ½ inches for gabion mattresses and measuring not more than 2 ½ inches by 3 ¼ inches for gabion mattresses. Selvedge or perimeter basket frame wire shall be of a heavier gauge than the mesh wire with a diameter of 0.150 inches after the zinc-5% Al coating. Lacing and connecting wire shall meet the same specifications as the wire used in the gabion body except that its diameter shall be of 0.091 inches (US gauge 13) after zinc-5% Al coating. The use of alternate wire fasteners shall be permitted in lieu of tie wire providing the alternate fastener produces a four (4) wire selvedge joint with a strength of 1,400 lbs. per linear foot while remaining in a locked and closed condition. Properly formed interlocking fasteners shall be spaced from 4 to 6 inches and have a minimum ¾ square inch inside area to properly confine the required selvedge wires. The interlocking

wire fastener shall meet material specification ASTM A-764, Finish 2, Class 1, Type 3. All of the above wire diameters are subject to tolerance limit of 0.004 inches in accordance with ASTM A-641.

**Subsection 222.3 – Assembling and Placing**

The gabion bed subgrade shall be excavated to the width, line and grade as shown on the plans. The gabions shall be founded on this bed and laid to the lines and dimensions required.

Gabions shall be fabricated in such a manner that the sides, ends, lid and diaphragms can be assembled at the construction site into rectangular units of the specified sizes. Gabions are to be of single unit construction, the base, ends and sides either to be woven into a single unit or one edge or these members connected to the base section of the unit in such a manner that strength and flexibility at the point of connection is at least equal to that of the mesh.

Gabion basket dimensions shall conform to standard manufactured sizes.

Tolerances. All gabion dimensions shall be within a tolerance limit of 5% of the manufacturer's stated sizes.

The Contractor shall submit for review by the Engineer, shop drawings prepared by a Professional Engineer registered in the State of Arizona for the gabion layout at the locations shown in the plans. Said shop drawings will be based on the layout shown on the plans and shall include, but not be limited to: plan and sections, basket sizes and locations.

Where the length of the gabion exceeds its horizontal width, the gabion is to be equally divided by diaphragms, of the same mesh and gauge as the body of the gabions, into cells whose length does not exceed the horizontal width. The gabion shall be furnished with the necessary diaphragms secured in proper position on the base section in such a manner that no additional tying at this juncture will be necessary.

All perimeter edges of gabions are to be securely selvedged or bound so that the joints formed by tying the selvedges have at least the same strength as the body of the mesh.

Gabions shall be placed to conform with the project plan details. Stone shall be placed in close contact in the unit so that maximum fill is obtained. The units may be filled by machine with sufficient handwork to accomplish requirements of this specification, however the stone filling shall not exceed a 12-inch vertical drop above the gabion mattress. The exposed face or faces shall be hand-placed using stones to prevent bulging of the gabion cell and to improve appearance. Each gabion mattress cell shall be filled in three lifts.

Two connecting tie wires shall be placed between each lift in each cell. Care shall be taken to protect the vertical panels and diaphragms from being bent during filling operations.

The last lift of stone in each cell shall be level with the top of the gabion in order to properly close the lid and provide an even surface for the next course.

All gabion units shall be tied together each to its neighbor along all contacting edges in order to form a continuous connecting structure.

Empty gabions stacked on filled gabions shall be laced to the filled gabion at the front, side and back.

**Backfill for Gabions** - Gabion mattresses shall be installed to the elevation and location specified in the plans. Backfill material shall then be placed and compacted to 85 percent.

Through sections containing hard and compact material, coarse gravel, cobbles, and boulders that cannot be excavated and trimmed efficiently with excavating and trimming machinery, excavate so that there will not be less than 3 inches between any point of the excavated surface and the underside of the gabion mattress. Surfaces so excavated shall be refilled with compacted fill material.

The specified following material is for backfilling over gabion mattresses. Suitable on-site or imported granular material used for backfill as described above shall be free of vegetation, debris, organic contaminants, and fragments larger than three inches in size; and shall conform to the following requirements:

| | |
|---|---|
| Maximum Particle size: | 3 inches* |
| Percent Passing #4 sieve | 40-100 |
| Percent Passing #200 sieve | 0-25 |
| Plasticity Index | ≤5 |

* Maximum size may be reduced at the Engineer's direction to satisfy trenching requirements, etc.

Backfilling of the completed gabions will begin only after the gabions have been inspected and approved by the Engineer.

**Subsection 222.4 – Measurement**
The quantity of gabions shall be measured and paid for to the neat lines as shown on the plans.

**Subsection 222.5 – Payment**
Payment for gabion construction shall be made on the basis of the price bid per cubic yard, and shall be full compensation for all materials, equipment, labor, excavation, backfilling, preparing the ground area, rock, and all incidentals required to complete the gabion mattresses in place.
**ITEM 222-1 – GABION MATTRESSES**

## SECTION 225 – WATERING

Watering shall conform to Section 225 of the MAG Uniform Standard Specifications except as modified herein.

**Subsection 225.1 – Description**
Construction water availability and usage is as described below.

Construction water is available from City of Phoenix hydrants as follows:

1. There are seven hydrants located within one-quarter to one-half mile of the river between 19th Avenue and Central Avenue that could be used for such purposes.

2. The Contractor will obtain a permit from the City at the second floor of the City Hall Building. The Contractor should allow two weeks for the City installation of the meter.

3. A fee of $500 will be charged for each hydrant and meter, some of this fee being refundable.

4. The charge for the water is approximately $1.37/100 cubic feet.

5. The Contractor will contact the City for specific information regarding the use of City water and for all costs associated with its use.

The Contractor may elect to use surface water in the river for construction purposes such as dust control. Its use will not be permitted for roller compacted concrete (RCC) production.

The Contractor **cannot** use groundwater from dewatering activities, from the production well, or from within excavations for construction purposes including dust control and RCC production.

**Subsection 225.5 – Payment**
No payment will be made for watering as such; the cost thereof shall be included in the bid price for the construction or installation to which watering is incidental or appurtenant.

## SECTION 350 - REMOVAL OF EXISTING IMPROVEMENTS

Removal of existing improvements shall conform to Section 350 of the MAG Uniform Standard Specifications except as modified herein.

**Subsection 350.1 - Description**
Add the following:
The work includes the removal of an existing sand and gravel conveyor bridge across the river, with the bridge superstructure and foundations being removed to the limits shown in the plans.

The work includes the removal of existing plain riprap at storm drain outlets into the river in order to construct new conveyance side drain channels to convey flows to the low flow channel.

The work also includes the removal of existing buried plain riprap at the bridge piers, and the removal of plain riprap near the north abutment of the Central Avenue bridge, and the removal of grouted riprap and gabion mattresses near the north abutment of the bridge in order to construct the RCC grade control structure (GCS) and apron as shown on the plans.

The work required by this Section 350 in support of the excavation of the low flow channel (LFC) and conveyance side drain channels, and the construction of the roller compacted concrete (RCC) guide dike structures (GDS), grade control structure (GCS) with low flow channel lining, and LFC bank protection includes, but is not limited to, the following:

1. The removal and disposal offsite of inert wastes, including debris such as concrete, asphalt, landscape refuse, abandoned concrete at-grade river crossing pavement such as exists at 7th Avenue, etc.

2. The removal and disposal offsite of tires.

3. The removal and disposal offsite of municipal solid waste landfill materials.

4. The placement of temporary and permanent liners over the exposed face of any municipal solid waste landfill materials.

The project construction limits within the LFC, GDS, GCS, or LFC bank protection excavation limits shall be cleared of all trash, construction rubble and debris, tires, and municipal solid waste materials, unless otherwise described below or in Subsection 107.5.4. Any such materials encountered and requiring removal for construction of haul roads, access routes and Contractor Work Areas shall also be removed and disposed of offsite. Such material as collected shall be disposed of offsite at an approved

landfill site and shall be subject to landfill fees so assessed, which will be included in the unit price bid for this item.

Upon encountering any solid waste, including inert materials and construction debris, the Contractor shall immediately notify the Engineer of the location of this material and allow the Engineer and the City of Phoenix (COP) on-call environmental contractor full access to the site to inspect the wastes and recommend further procedures. The Contractor must provide all information necessary to comply with ARS 49-701 to the Engineer. Within 14 days of the removal and disposal of any solid waste, the Contractor must, unless otherwise directed by the Engineer, provide the following information, using the form provided in Appendix "D".

1) A brief written description of the wastes and removal procedures, including the nature and approximate quantity of the wastes removed, approximate dimensions of the excavation, a description of waste handling, storage, and transportation practices, and a description of the disposal method and location.
2) Supporting documentation such as load receipts, manifests, etc.

Materials removed by the COP on-call environmental contractor will be documented by that contractor.

Municipal solid waste (MSW) material and associated soils will be characterized by the COP (See Subsection 107.5.4 of the Supplementary General Conditions), and if necessary segregated by a COP on-call environmental contractor. Once this has been accomplished the Contractor, at the direction of the Engineer, can remove and dispose of all non-hazardous materials. This includes construction debris, concrete, asphalt, wood, landscaping debris, etc., as well as the disposal of municipal solid waste. Disposal of soils associated with the landfill materials and found not to be hazardous will be considered incidental to the Special Provisions Section 215 bid items.

The limits of removal for municipal solid waste (MSW) material for RCC GDS, GCS, and LFC bank protection excavations shall be to remove MSW material to 3 feet beyond neat line limits and backfill and compact to neat line in accordance with Section 211.

The limits of removal for non-inert municipal solid waste (MSW) material for LFC excavation shall be as follows:

Non-inert MSW along the side slope of the LFC shall be overexcavated at least 10 feet horizontally from the face of the final LFC side slope. The overexcavation will be performed to a slope of 6:1 through the waste accumulation. Portions of the overexcavated slope which do not contain waste can be sloped as necessary to meet existing or final grade.

Non-inert MSW below the LFC invert shall be completely removed.

Non-inert MSW below the invert of the LFC that also extends under the side slope shall be completely removed below the channel invert for a distance of at least 10 feet horizontally from the toe of the final LFC side slope.

The limits of removal for inert construction rubble and debris shall be as follows:

At the LFC side slope, such material shall be overexcavated and removed to a horizontal distance of at least 3 feet from the side slope neat line, and to a depth of at least 8 feet below the LFC channel invert.

For the placement of RCC structures, such material shall be removed at least 3 feet beyond neat line limits of the structure.

In all cases where construction debris or MSW has been removed, the resulting void shall be backfilled and compacted to neat line in accordance with Section 211.

The Contractor may be required to prepare a graded area for use by the COP on-call environmental contractor for storage of hazardous or asbestos-containing materials. This will be done at the direction of the Engineer.

Any landfill material characterized and found to be of a hazardous nature, including asbestos-containing material, will be disposed of by the COP and its on-call environmental contractor.

The disposal of all waste material removed under this Section 350 shall be the responsibility of the Contractor, unless otherwise removed and disposed of by the COP on-call environmental contractor. The disposal sites must be certified to accept the specific waste materials to be disposed of, and the disposal sites shall be approved by the Engineer.

All tires removed during excavation activities or recovered from the ground surface shall be handled, stored, transported, and disposed of in accordance with applicable federal, state, and local regulations. Applicable state regulations include: Arizona Revised Statues (ARS) §§44-1301 et seq: §44-1301; §44-1302; §44-1303; §44-1304.01; §44-1305; §44-1306; §44-1307.

If a Maricopa County landfill is selected for disposition of waste materials and/or debris, a Landfill Use Permit will be required. Charges will be levied for each load delivered to the landfill in accordance with the current fee schedule.

Weigh tickets from all landfill disposal must be furnished to the Engineer. The tonnage indicated on the weigh tickets will be the basis of payment.

The Contractor will screen inert construction rubble and debris, to minimize the amount of soil and rock to be paid for disposal at landfills. The resultant soil and rock may be used for backfill in accordance with Section 211, or may be disposed of offsite, unless the resultant soil requires special handling in accordance with Subsection 107.5.4 and Section 350.

The bid quantities provided in the bid schedule are based on the best available information at the time of the preparation of these Special Provisions. Additional allowances have been provided for the purpose of dealing with quantity overruns based on actual conditions encountered in the field during construction. The use of the allowance will be applied at the direction of the Engineer for quantities in excess of those provided for in the bid quantities. The use of the allowance will be applied at the same unit rate as the unit rate bid for the related quantified bid items.

**Subsection 350.1.1 – Landfill Liners**

The contractor will be responsible for odor and vector control of any non-inert waste that is exposed during excavation activities. To mitigate these concerns, the Contractor will be responsible to apply a temporary liner over any exposed face of non-inert waste at the end of each working day. However, if the temporary liner as applied by the Contractor has been removed or disturbed by the COP on-call environmental contractor, the COP contractor shall be responsible for the re-application of the temporary liner.

Temporary liner shall be applied whenever non-inert waste remains exposed overnight. Temporary liner for exposed waste shall consist of one of the following or other pre-approved equivalent methods:

- A spray-on material such as Sanifoam®, Posi-Shell®, or pre-approved equivalent, applied in accordance with manufacturers specifications.

- A one-foot layer of soils consisting of Unified Soil Classification System (ASTM D 2488) type GM or finer.

- A weighted tarp covering consisting of geosynthetic, cloth, or other pre-approved equal.

In addition to the use of any synthetic temporary liner, a stockpile of fine-grained soils will be maintained to provide temporary cover or fire suppression whenever excavation activities may encounter significant accumulations (more than 10 cubic yards) of decomposing or flammable waste (i.e. landscape debris, household trash, industrial waste). The soil shall consist of Unified Soil Classification System (ASTM D 2488) type SM or finer. The stockpile shall be located within one-quarter mile of excavation activities, and shall be an amount capable of covering the exposed burning or smoldering waste to a depth of at least three feet.

Prior to placement of RCC structures, placement of backfill at such structures, or construction of the final LFC cross section, any non-inert waste remaining in place shall be completely covered with a permanent liner.

The permanent liner will consist of a single layer of soil placed over the exposed trash. The soil shall consist of Unified Soil Classification System (ASTM D 2488) type GM or finer. Prior to placement of the liner, the exposed waste will be graded smooth so that there is no flagging trash or loose materials. The liner shall extend at least 5 feet beyond the edge of the exposed waste. The soil layer will be placed and compacted to a thickness of two feet at 90% relative density as determined by Standard Proctor.

**Subsection 350.4 – Payment**

The Contractor will provide to the Engineer at the Pre-Construction meeting a breakdown derivation of the unit costs for the bid items 350-1, 2, 3, 7 and 8.

Payment for the removal and disposal of ~~inert wastes such as construction rubble and debris~~ shall be made on the basis of the price bid per ton, and shall include all labor, materials and equipment necessary to remove and dispose of the inert wastes.

**ITEM 350-1 – ~~INERT WASTES~~ REMOVAL**

Payment for the removal and disposal of tires shall be made on the basis of the price bid per ton, and shall include all labor, materials and equipment necessary to remove and dispose of the tires.

**ITEM 350-2 – TIRE REMOVAL**

Payment for the removal and disposal of ~~municipal solid waste~~ shall be made on the basis of the price bid per ton, and shall include all labor, materials and equipment necessary to remove and dispose of municipal solid waste.

**ITEM 350-3 – ~~MUNICIPAL SOLID WASTE~~ REMOVAL**

Payment for the removal and disposal of inert wastes such as construction rubble and debris in excess of the bid quantities provided in bid item 350-1 shall be made on the basis of the price bid per ton for bid item 350-1, using the allowance provided, and shall include all labor, materials and equipment necessary to remove and dispose of the inert wastes.

**ITEM 350-4 – INERT WASTES REMOVAL ALLOWANCE**

Payment for the removal and disposal of tires in excess of the bid quantities provided in bid item 350-2 shall be made on the basis of the price bid per ton for bid item 350-2, using the allowance provided, and shall include all labor, materials and equipment necessary to remove and dispose of the tires.

**ITEM 350-5 – TIRE REMOVAL ALLOWANCE**

Payment for the removal and disposal of municipal solid waste in excess of the bid quantities provided in bid item 350-3 shall be made on the basis of the price bid per ton for bid item 350-3, using the allowance provided, and shall include all labor, materials and equipment necessary to remove and dispose of municipal solid waste.

**ITEM 350-6 – MUNICIPAL SOLID WASTE REMOVAL ALLOWANCE**

Payment for the installation of the temporary liner shall be made on the basis of the price bid per square yard complete in place and shall include all labor, materials and equipment necessary to install the temporary liner.

**ITEM 350-7 – TEMPORARY LINER**

Payment for the installation of the permanent liner shall be made on the basis of the price bid per square yard complete in place and shall include all labor, materials and equipment necessary to install the permanent liner.

**ITEM 350-8 – PERMANENT LINER**

Payment for the installation of the temporary liner in excess of the bid quantities provided in bid item 350-7 shall be made on the basis of the price bid per square yard for bid item 350-7, using the allowance provided, and shall include all labor, materials and equipment necessary to install the temporary liner.

**ITEM 350-9 – TEMPORARY LINER ALLOWANCE**

Payment for the installation of the permanent liner in excess of the bid quantities provided in bid item 350-8 shall be made on the basis of the price bid per square yard for bid item 350-8, using the allowance provided, and shall include all labor, materials and equipment necessary to install the permanent liner.

**ITEM 350-10 – PERMANENT LINER ALLOWANCE**

Payment for the removal and disposal of existing sand and gravel conveyor bridge shall be made on the basis of the lump sum price bid, and shall include all labor, materials and equipment necessary to remove and dispose of the bridge.

**ITEM 350-11 – CONVEYOR BRIDGE REMOVAL**

Payment for the removal and disposal of existing plain riprap at side drains and at the Central Avenue bridge piers and removal of plain riprap near the north abutment shall be made on the basis of the price bid per cubic yard, and shall include all labor, materials and equipment necessary to remove and dispose of the riprap.

**ITEM 350-12 – RIPRAP REMOVAL**

Payment for the removal and disposal of existing grouted riprap and gabion mattresses near the Central Avenue bridge north abutment protection shall be made on the basis of the price bid per cubic yard, and shall include all labor, materials and equipment necessary to remove and dispose of the riprap and gabions.

**ITEM 350-13 – GROUTED RIPRAP AND GABION REMOVAL**

Payment for the removal and disposal of all other existing items not included in the above listed bid items shall be made on the basis of the lump sum price bid, and shall include all labor, materials and equipment necessary to remove and dispose of the items.

**ITEM 350-14 - MISCELLANEOUS REMOVALS**

## SECTION 401 - TRAFFIC CONTROL

Traffic control shall conform to Section 401 of the MAG Uniform Standard Specifications and COP Supplements except as modified herein.

**Subsection 401.1 - Description:**

Add the following:

This work shall consist of traffic control, and use of devices and flagmen or pilot cars in accordance with Section 401 of the COP Supplements and the City of Phoenix Traffic Barricade Manual, dated 1998.

a. Traffic Control Devices
All traffic and/or traffic control devices on this project shall be provided, maintained and/or controlled as specified in the City of Phoenix Traffic Barricade Manual, dated 1998.

b. Street Closure Permits
Permission to restrict city streets, sidewalks and alleys (street closure permits) shall be requested as specified in Section III of the City of Phoenix Traffic Barricade Manual.

c. Traffic Manual
Unless otherwise provided for in the following General Traffic Regulations, all traffic on this project shall be regulated as specified in Section IV of the City of Phoenix Traffic Barricade Manual.

d. Prior Approval
No deviation to the General Traffic Regulation will be allowed or implemented unless submitted to the Engineer for review and approval two weeks prior to the proposed work.

e. City of Phoenix Coordination
The Contractor shall contact Tony Arviso, Construction Traffic Control, City of Phoenix, at 602-262-6235 to coordinate the traffic control plan.

**Subsection 401.5 - General Traffic Regulations:**

Add the following:

a. Local Access Requirements
The Contractor shall maintain local access to all side streets, access roads, driveways, alleys, and parking lots at all times unless specified to be closed herein or as shown on the traffic control plans, and shall notify residents 72 hours in advance of any restrictions which will affect their access. The Contractor shall restore the access as soon as possible. If the primary access cannot be restored in a timely manner, the Contractor shall provide an alternative which shall be predetermined with the residents prior to imposing any restrictions, and approved by the Engineer.

b. Special Sign Requirements
The Contractor shall provide, erect and maintain advance notifications, and informational and directional access signs that may be required by the Engineer.

c. Flagging of Traffic

No flagging of traffic will be permitted during the peak traffic hours of 6:00 a.m. to 8:30 a.m. and 4:00 p.m. to 7:00 p.m. weekdays. If construction requires, intermittent flagging will be allowed from 8:30 a.m. to 4:00 p.m. to facilitate access for heavy construction equipment.

d. Traffic Control Plan

The Contractor shall submit a traffic control plan which shall implement all traffic control as required in these Special Provisions for approval, showing placement of all traffic control devices, including all conflicting signs to be covered/removed or relocated, or other features that may conflict with the placement of temporary signage. The plan shall be submitted to the Engineer at the pre-construction meeting for review. The Contractor shall obtain approval from the City of Phoenix, prior to implementation. Contact Tony Arviso at 602-262-6235.

e. At the time of the Pre-Construction conference, the Contractor shall designate an employee, other than the Project Superintendent, who is well qualified and experienced in construction traffic control and safety, to be available on the project site during all periods of construction to set up, maintain and coordinate safe barricading whenever construction restricts traffic. This individual shall be authorized to receive and fulfill instructions from the Engineer and shall supervise and direct the work. Instructions and information given by the Engineer to this individual shall be considered as having been given to the Contractor.

**Subsection 401.5.1 - Special Traffic Regulations**

Contractor access to the river bottom is available at the following locations using City of Phoenix rights-of-way:

1. On the south side of the river, from the west side of the 7th Avenue. There is an existing curb cut along the west side of the street south of the bridge, and a gradual slope down to the river bottom. The Contractor may find it necessary to construct a ramp to the river bottom in lieu of using the existing bank conditions.

2. On the south side of the river, from the east side of the Central Avenue. There is an existing curb cut along the east side of the street south of the bridge. The Contractor will find it necessary to construct a ramp at this location to the river bottom. There is also an existing high clearance box culvert crossing under Central Avenue at this location that provides access from the east side to the west side of the bridge and the river bottom.

3. The Contractor may elect to obtain permission on his own for the use of other access locations to the river bottom. This would include the use of other existing ramps into the river bottom. However, the Contractor will obtain prior written approval of the property owner for such access use and submit a copy of the approval to the Engineer prior to use of the property and/or ramps.

4. Left turns across traffic are acceptable only if there is a left turn center lane. If no center lane, then right turns only. Possible exceptions to this requirement may be provided by the City through an approved TCP.

5. Off duty uniformed officers shall be utilized for traffic control only as required by the City of Phoenix, and only as approved by the Engineer. An off duty officer will be required wherever multiple lanes of traffic must be crossed with construction equipment.

6. A TCP must be provided to the City for review and approval for each access location prior to implementation of the plan. The TCP must include appropriate signage for "truck crossing", etc.

The Contractor shall restore and regrade the areas within the Temporary Construction Easement limits to the same grade as prior to construction. All trash, large rocks, other debris, etc. shall be removed and the easement area left in a neat and clean condition acceptable to the Engineer.

**Subsection 401.7 - Payment**

Payment for the implementation of the traffic control plans, including all mobilization, flag persons, placement, storage, and removal of devices, maintenance incidental to and preparation of the approved traffic control plan, temporary pavement, signing, striping, safety fencing, coordination with the City of Phoenix and other work as required shall be made on the basis of the lump sum price bid for:

**ITEM 401-1 - TRAFFIC CONTROL**

Payment for off-duty City of Phoenix uniformed officers as mandated by the City of Phoenix will be on an as-used basis as determined by the Engineer. The Contractor shall submit documentation as required by the Engineer to support the City of Phoenix hourly rates charged and payments made for this item. Payment for off-duty uniformed officers shall be made on the basis of unit price per hour for:

**ITEM 401-2 - OFF-DUTY UNIFORMED OFFICER**

## SECTION 609 – PRODUCTION WELL INSTALLATION

**Subsection 609.1 – Description**

The work in this section consists of the drilling and installation of a production well, including well development and aquifer testing, and the drilling and lithologic logging of a test hole, in accordance with the plans and specifications provided in Appendix "E". All work shall be performed in accordance with applicable State and Federal laws, ASTM standards, and as a minimum shall consist of the following:

1. Well installation shall be performed by a well drilling Contractor licensed in the State of Arizona.

2. The Contractor will not commence well installation until all the appropriate permits/permissions/notices pertaining to the City of Phoenix NPDES permit have been obtained from the City of Phoenix, Arizona Department of Water Resources (ADWR), and the Arizona Department of Environmental Quality (ADEQ).

3. Well development, as described in Appendix "E", shall be performed immediately after well installation has been completed. Well development shall commence and terminate as directed by the Engineer.

4. Aquifer testing, as described in Appendix "E", shall be performed immediately after the Engineer has determined that well development is sufficiently complete. Aquifer testing will commence and terminate as directed by the Engineer.

5. A State of Arizona Registered Geologist experienced in the completion of water production wells in the Salt River basin shall be present during test hole drilling and logging, well drilling, installation, and development to ensure that the well is constructed to specifications and thoroughly developed prior to aquifer testing. The Registered Geologist shall perform the lithologic logging, and will also be present during aquifer testing to collect water level data and to select discharge rates for the step-drawdown and constant-rate tests.

6. The well will be installed, tested and accepted within 120 calendar days of the Notice to Proceed or the receipt of permits from the City of Phoenix, whichever is earlier.

7. The Contractor shall drill at least one test hole of a maximum diameter of 6-inches and to a depth similar to that shown on the plans for the well, as directed by the Engineer.

**Subsection 609.2 – Permits**
The following applicable permits will be obtained:

- The Contractor is responsible for adhering to the City of Phoenix general NPDES permit procedures and permits necessary to contain, manage, and dispose of drilling fluids and groundwater that may be generated during well drilling and testing activities. The Contractor shall use the existing City of Phoenix general NPDES permit for disposal of all fluids generated during drilling and hydrologic testing activities. It is anticipated that the Contractor shall utilize the general NPDES permit to discharge all fluids into the City storm water system via man-hole covers. The nearest storm water man-holes are shown on the plan view drawing included in the appendix. It is also anticipated that the Contractor shall have to coordinate with the City of Phoenix, obtain a copy of the NPDES permit and if necessary, obtain the proper City permits and/or notices to use the man-holes.

- The Contractor shall obtain a Borehole Abandonment Permit from ADWR, if the test hole is abandoned.

- The ADWR permits for Recovery Well and Service Area Well are being obtained by the City of Phoenix and will be provided to the Contractor.

- The Ground Water Withdraw Permit for Hydrologic Testing from ADWR will not be required to be obtained by the Contractor.

- The Contractor shall coordinate with the City to obtain the drilling card.

- The Notice of Intent to Drill from ADWR will not be required to be obtained by the Contractor.

- The Contractor will contact Howard Davis of the City Water Services Department, at 200 West Washington Street, 602-495-7684 regarding the permits, notices, etc.

The Contractor shall coordinate test hole drilling and logging, well drilling, installation, development, and aquifer testing with the Engineer. The Contractor shall also coordinate with the ADWR to obtain the drilling card and initiate the well installation process.

Acceptance or rejection of the well will be based on results of alignment testing and the post-construction well video survey as performed by the Contractor, and approved by the Registered Geologist and Engineer. Upon completion and acceptance of the well, the City of Phoenix will utilize the well for the purpose of providing water to their Habitat Demonstration Project located along the north side of the low flow channel and east of Central Avenue.

**Subsection 609.3 - Payment**

Payment for the production well shall be made on the basis of the price bid per each, and shall include full compensation for all labor, materials, equipment, and appurtenances necessary to successfully install the well, including all necessary paperwork required by the ADWR or other regulatory agencies.

**ITEM 609-1 – PRODUCTION WELL INSTALLATION**

Payment for production well development and aquifer testing shall be made on the basis of the lump sum price bid, and shall include full compensation for all labor, materials, equipment, and appurtenances necessary to successfully perform and complete the development and testing as approved by the Registered Geologist and the Engineer, and including all necessary paperwork required by the ADWR or other regulatory agencies.

**ITEM 609-2 – PRODUCTION WELL DEVELOPMENT AND TESTING**

Payment for test hole drilling and lithologic logging shall be made on the basis of the price bid per each, and shall include full compensation for all labor, materials, equipment, and appurtenances necessary to successfully perform and complete the drilling and logging as approved by the Registered Geologist and the Engineer, and including all necessary paperwork required by the ADWR or other regulatory agencies.

**ITEM 609-3 – TEST HOLE DRILLING AND LOGGING**

**SECTION 703 - RIPRAP**

Riprap shall conform to Section 703 of the MAG Uniform Standard Specifications except as modified herein.

**Subsection 703.1 - Stone**

In addition to the requirements of Section 703.1, stone for riprap shall have a minimum apparent specific gravity of 2.4 per ASTM C-127. Waste concrete shall not be used for riprap.

The rock used for plain riprap shall be rounded stone or angular, hard, durable, resistant to weathering and to water action, free from overburden, spoil, shale, and organic material, and shall meet the gradation requirements for the type specified.

**Subsection 703.2 - Size of Stone**

Section 703.2 of the MAG Standard Specifications is replaced with the following for riprap:

Stone size for plain riprap used for the conveyance side drain channel inlets and outlets:

| $D_{min}$ (in) | $D_{max}$ (in) | $D_{50}$ (in) |
|---|---|---|
| 6 | 15 | 10 |

Stone size for grouted riprap used for replacement of north abutment protection near the Central Avenue bridge:

| $D_{min}$ (in) | $D_{max}$ (in) | $D_{50}$ (in) |
|---|---|---|
| 6 | 18 | 10 |

# APPENDIX "A"

## GROUNDWATER CONTINGENCY RESPONSE PLAN
## AND
## SITE GROUNDWATER MONITORING PLAN

# RIO SALADO HABITAT RESTORATION PROJECT
# GROUNDWATER CONTINGENCY RESPONSE PLAN
# CITY OF PHOENIX, ARIZONA

*Submitted To:*
City of Phoenix Engineering &
Architectural Services Department
200 West Washington Street, 7th Floor
Phoenix, Arizona 85003-1611

*Submitted By:*
AGRA Earth & Environmental, Inc.
3232 West Virginia Avenue
Phoenix, Arizona 85009-1502
(602) 272-6848


February 10, 2000

**AGRA JOB NO. 0-114-002022**

AGRA
ENGINEERING GLOBAL SOLUTIONS

# RIO SALADO HABITAT RESTORATION PROJECT
# GROUNDWATER CONTINGENCY RESPONSE PLAN
# CITY OF PHOENIX, ARIZONA

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Architectural Services Department
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February 10, 2000

**AGRA JOB NO. 0-114-002022**


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Senior Engineer

AGRA
ENGINEERING GLOBAL SOLUTIONS

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## 1.0 INTRODUCTION

At the request of the City of Phoenix, AGRA Earth & Environmental, Inc. (AGRA) has prepared this Groundwater Contingency Response Plan for the Rio Salado Habitat Restoration Project. The scope of this Groundwater Contingency Response Plan is based on conversations between AGRA and City of Phoenix personnel, and the results of the Risk Management Assessment and Monitoring Program Report (RMA; AGRA, 2000). The Groundwater Contingency Response Plan is intended to 1) augment the Rio Salado Habitat Restoration Project site-specific Health and Safety Plan, and 2) outline the procedures to be implemented in the event that daylighted groundwater (*i.e.*, groundwater present at the surface, either in excavations, in ponds, or flowing), containing concentrations of constituents of concern (COC) above risk-based action levels (RBALs) established in the RMA, is encountered during construction activities.

## 2.0 BACKGROUND

The City of Phoenix, in conjunction with the United States Army Corps of Engineers (USACE) and the Maricopa County Flood Control District, is proposing to undertake an environmental restoration project for a five mile reach (Phoenix Reach) along the Salt River in the City of Phoenix, Arizona. This project is part of the overall Rio Salado Habitat Restoration project along the urban reaches of the Salt River. Currently, the Phoenix Reach is a dry river bed with minimal or no vegetation and/or habitat and the area surrounding this portion of the Salt River has been used for gravel mining, landfills and other industrial activities. The overall objective of the restoration project is to enhance riparian habitat along the Phoenix Reach in order to restore local flora and fauna and provide incidental recreational opportunities.

The plan for the Phoenix Reach is to use shallow groundwater to create a perennial low flow channel in the river bed. Initially, this groundwater may be brought to the surface during construction of the low flow channel and associated features and will then be discharged downstream of the construction area, either within or downstream of the restored reach.

The ground water underlying the project area has been found to be contaminated with varying levels of industrial chemicals. Therefore, an assessment of risk to human health from this water was completed to increase worker safety and ensure that groundwater discharged to the surface downstream of the project will not endanger public health during or following construction. Appropriate RBALs, which are protective of human receptors likely to be in the general vicinity during the restoration project, were established for COC in the RMA and Monitoring Program developed by AGRA for the City of Phoenix. The evaluation indicated that exposure to daylighted groundwater, as the primary source of COC, posed the highest potential risk, and that the on-site trench worker had the greatest risk of exposure. Consequently, exposure to daylighted groundwater containing concentrations of COC above the RBALs is not permissible.

## 3.0 RISK-BASED ACTION LEVELS

The Rio Salado RMA was conducted to identify allowable RBALs which would be protective of human health for receptor populations over the entire project area, regardless of location, throughout the duration of construction for the Rio Salado Habitat Restoration Project. The analysis focused on daylighted groundwater, sediment and air, and the potential effects of human contact with these media during construction of the project components. The evaluation has utilized exposure routes including dermal contact, inhalation and ingestion to evaluate risk potential. The RBALs do not predict a concentration which may be present at a given location at a given time. Actual concentrations may be subject to change over time, as affected groundwater moves through the project area. Overall, the result of the RMA has indicated that appropriately managing risk in groundwater will address risk posed by other media.

Table 1 provides a summary of RBALs derived utilizing the site-specific parameters and algorithms for exposure in daylighted groundwater. Of the compounds reported in groundwater from several locations adjacent to the project area, maximum concentrations of 1,1-dichloroethene, 1,2-dichloroethane, benzene, toluene, tetrachloroethene, trichloroethane, vinyl chloride, arsenic and mercury were reported at levels which exceed the most stringent action level.

## 4.0 POTENTIAL CONSTITUENTS OF CONCERN

The historic groundwater data and the results of the RMA indicated that the following contaminants present in the groundwater have the greatest potential to be COC in the Phoenix Reach:

1,1-dichloroethene
1,2-dichloroethane
benzene
toluene
tetrachloroethene
trichloroethene
mercury
arsenic
vinyl chloride

Additionally, a statistical summary of all analytical data indicated that Polynuclear Aromatic Hydrocarbons (PAHs) and methyl-tertiary butyl ether (MTBE) were not evaluated at any of the available sites in the vicinity of the Phoenix Reach. These are analytes commonly associated with many types of industrial processes and petroleum releases; therefore, all PAHs and MTBE were included as potential COC.

Each of these chemical classes contains contaminants that have similar chemical properties and structures and, therefore, similar toxicological effects on humans. Table 2 provides a summary of the routes of entry, and potential acute and chronic health effects. It should be

noted that the health effects listed in Table 2 would result from overexposure to these compounds, and that daylighted groundwater sampling for these compounds is required before it can be determined if overexposure will occur during restoration activities at the Phoenix Reach.

## 5.0 GROUNDWATER CONTINGENCY RESPONSE PLAN TO MINIMIZE WORKER RISK

The Groundwater Contingency Response Plan is intended to augment the Rio Salado Habitat Restoration Project site-specific Health and Safety Plan, and to outline the procedures to be implemented in the event that daylighted groundwater containing concentrations of COC above RBALs established in the RMA, is encountered during construction activities. The Groundwater Contingency Response Plan addresses engineering controls, modifications to personal protective equipment, modifications to work schedules, water sampling procedures, and appropriate laboratory sample analysis to minimize or mitigate exposure to daylighted groundwater containing contaminant concentrations above the RBALs. This document is intended to supplement the site-specific Health and Safety Plan in regards to this issue. The site-specific Health and Safety Plan should be consulted on all health and safety issues not specifically addressed by this Groundwater Contingency Response Plan.

AGRA has identified three potential contingency response scenarios:

Scenario 1 daylighted groundwater is encountered for which no information concerning the COC is available;

Scenario 2 daylighted groundwater which is known to contain concentrations of COC above the prescribed RBALs is encountered; and

Scenario 3 daylighted groundwater is encountered that is not believed to contain concentrations of COC above the RBALs, but site-specific conditions warrant further investigation. These conditions may include odor, visible contamination, or reported worker discomfort as a result of contact with daylighted groundwater.

Groundwater Contingency Response Scenario 1 occurs if daylighted groundwater is encountered in areas of the project for which no information is available regarding the concentrations of potential COC present. Since little data are available for COC concentrations in groundwater beneath the Rio Salado channel at this time, this contingency response scenario will occur most frequently, especially at the beginning of the project.

Groundwater Contingency Response Scenario 2 conditions are present if daylighted groundwater containing concentrations of COC known to be above the RBALS is encountered.

This scenario may occur more frequently in later phases of the project after daylighted groundwater monitoring and sampling data have been collected in the project area.

Under Groundwater Contingency Response Scenario 3 conditions, daylighted groundwater is believed to contain concentrations of COC below RBALS. However, site-specific conditions such as odor, visible contamination, or reported worker discomfort as a result of contact with daylighted groundwater indicate that additional investigation is appropriate. This scenario may occur at any time during the project.

## 5.1 SITE CONTROL MEASURES

AGRA feels that site control measures in some form should be implemented at all times during the construction activities. The implementation of site measures will vary according to the contingency response scenario encountered or anticipated.

### 5.1.1 Work Zone Definition

In order to minimize exposure potential, AGRA recommends the establishment of an exclusion zone surrounding construction activities. The exclusion zone should be designed to restrict access to unauthorized personnel, but accommodate necessary equipment. Fencing and road barriers may be appropriate to restrict public vehicle and foot traffic. Caution tape and posted signs and placards indicating restricted access should be placed in appropriate locations surrounding the construction site. Additional personnel responsible for restricting site access may also be appropriate, depending upon the size of the exclusion zone or the applicable scenario.

If unusual site conditions such as strong odors or staining or worker discomfort related to contact with daylighted groundwater or sediment are reported, site personnel should be removed from the immediate area until the potential for adverse impacts to health or safety can be evaluated. Site access should be restricted to those personnel responsible for assessing the site conditions.

Whenever possible, avoid ponded water, damp sediments, or discolored areas. Avoid sitting or laying on the ground, or leaning against excavation sidewalls to the maximum extent practicable.

In the event that sediments associated with daylighted groundwater containing elevated concentrations of COC (above RBALs) becomes dry, routine dust suppression techniques (*i.e.* periodic water truck sprinkling) may be considered if airborne dust occurs.

### 5.1.2 Air Monitoring

Monitoring and analysis of the breathing zone at test borings that encounter daylighted groundwater can also provide information prior to field construction activities. Personal air samples may be collected in the breathing zone of selected workers engaged in tasks which place the workers near daylighted groundwater for extended periods of time; however, the sensitivity of these personal devices may be limited to concentrations above the RBALs.

Air monitoring for exposure during field operations should be conducted to provide further assurance that no health hazard is present at the site. Volatile organic compounds (VOC) monitoring with a photoionization detector (PID) or flame ionization detector (FID) or equivalent can be performed during excavation activities; however, these instruments may not be sensitive enough to detect airborne VOCs at concentrations at or below the RBALs. Air monitoring that is more sensitive but requires a longer duration can be performed at an excavation site prior to the initiation of field activities.

### 5.1.3 Training

Limited training is required at all sites where hazardous substances are present, even if it can be demonstrated that no exposure to concentrations above action levels will occur. In general, the limited training must include information regarding the health effects of exposure to the substance(s) to which employees potentially may be exposed, and information regarding actions to minimize exposure. The training should include communication of the content of both the site-specific Health and Safety Plan and this Groundwater Contingency Response Plan.

## 5.2 PERSONAL PROTECTIVE EQUIPMENT (PPE)

Personal protective equipment (PPE) will be required for certain field operations, based on the potential for contaminant exposures. It is anticipated that United States Environmental Protection Agency (EPA) Level D protection as recommended by the site Health and Safety Plan will be appropriate for most site activities which do not involve contact with daylighted groundwater. The results of the RMA indicated that exposure to groundwater containing concentrations of COC above the RBALs is not permissible. Under Scenario 1 conditions, the concentrations of potential COC present in the daylighted groundwater, if contacted, are not known. Under Scenario 2 conditions, the concentrations of potential COC present in contacted daylighted groundwater are known to exceed the RBALs. Unusual site conditions such as odor, present in Scenario 3 conditions, warrant additional investigation to determine the potential for negative impacts to health and safety. The following PPE is required to minimize worker exposure when daylighted groundwater is encountered in Scenario 2 conditions and until concentrations of COC below the RBALs can be established in Scenario 1 conditions. The PPE may also be required for those personnel involved with additional

investigation activities. If the concentrations of COC present are below the RBALs, Level D PPE will be appropriate. This list does not include PPE that may be required to minimize risk to workers from physical hazards.

1. Chemical-resistant clothing - Criteria used to select protective clothing must include consideration of heat stress in addition to liquid/dirt and chemical resistance. Selected clothing should be made of a breathable material in order to address heat stress issues.

2. Boots - Polyvinyl chloride (PVC) boots should afford adequate protection against incidental contact with daylighted groundwater exhibiting concentrations of COC above RBALs. These will be steel-toed boots as appropriate for the work tasks being performed.

3. Gloves - Chemical-resistant PVC gloves will be worn if daylighted groundwater is encountered.

If disposable chemical-resistant clothing is utilized, its disposal must be properly managed.

Respiratory protection may be required based upon the results of air monitoring performed in the work area. Additional personal protective equipment should be utilized based on an assessment of exposures.

## 5.3 MODIFICATION TO WORK SCHEDULES

When daylighted groundwater is initially encountered in a construction area, work should cease immediately. If the concentrations of COC in the daylighted groundwater are unknown, the personnel responsible for sampling and monitoring the daylighted groundwater should be notified immediately so that a water sample can be collected for monitoring and laboratory analysis. Work may proceed after the appropriate water sample has been collected, but before the concentrations of COC in the daylighted groundwater are known, only after the appropriate PPE identified in Section 5.2 has been donned and only if contact with the daylighted groundwater can be avoided.

Work in areas where unusual site conditions are reported will cease until the nature and cause of the conditions can be adequately investigated. Workers will be removed from the area as a precaution.

## 5.4 MONITORING AND SAMPLING

A sample of daylighted groundwater encountered during construction in any previously unsampled area should be collected and analyzed for the list of COC. The list consists of the VOCs and metals which were present at concentrations above RBALs in groundwater samples collected from locations adjacent to the site. PAHs and MTBE are included in the preliminary list of monitored potential COC for daylighted groundwater until sufficient information

regarding concentrations can be collected to establish or disregard MTBE or any PAH constituents as a COC. Additionally, daylighted groundwater should be monitored for physical parameters including turbidity, total suspended solids (TSS), total dissolved solids (TDS), pH, and specific conductance. Monitoring of these parameters will assist evaluating of changes in general conditions of the water chemistry at the Site. Sampling and analysis at previously unsampled locations will be conducted in accordance with the site water quality sampling and analysis plan or monitoring plan.

Sampling and monitoring of daylighted groundwater in areas where COC concentrations are known to exceed the RBALs will be addressed in the site monitoring plan. Sampling locations and frequency, field parameters, and laboratory analysis will be specified by the site monitoring plan.

Sampling and monitoring of daylighted groundwater in areas which fall into the Groundwater Contingency Response Scenario 3 category may or may not be included in the site monitoring plan. The investigation of the unusual site conditions may require additional monitoring and sampling of the daylighted groundwater or sediment in the area. This sampling will be conducted in accordance with the site monitoring plan for the COC and for other constituents, as appropriate, to determine the nature and cause of the unusual conditions.

## 5.5 SUMMARY OF RESPONSE

Table 3 presents a summary of the anticipated response for each of the contingency response scenarios described above. The applicability of required actions for each contingency response scenario are indicated in the appropriate column.

## 5.6 OVEREXPOSURE

Any employee at this site who develops signs or symptoms indicating possible overexposure involving contaminated daylighted groundwater or sediment will be required to seek medical attention within 24 hours, and to notify his or her supervisor. The incident will be reported as soon as possible in writing. The worker's employer shall ensure that the employee is appropriately tested for the listed COC, to determine if overexposure is the cause of the employee's reported symptoms. A physician's written opinion will be required prior to the employee's return to normal site activities.

## 5.7 EMERGENCY RESPONSE NOTIFICATION REQUIREMENTS

Although every attempt will be made to prevent exposure to COC which may be present in daylighted groundwater at the site, an emergency situation may arise. If an emergency situation does occur, site personnel should refer to the Emergency Response Contingency Plan of the site Health and Safety Plan

## TABLES

## Summary of Action Level Calculations for Daylighted Groundwater Exposure Scenario

| Constituent | Residential | Commercial/Industrial | Trespassing Recreationalist | | Construction Foreman | | Construction Worker | | |
|---|---|---|---|---|---|---|---|---|---|
| | Action Level at Grade Control Structures (mg/L) | Action Level at Grade Control Structures (mg/L) | Non-carcinogenic Action Level (mg/L) | Carcinogenic Action Level (mg/L) | Non-carcinogenic Action Level (mg/L) | Carcinogenic Action Level (mg/L) | Non-carcinogenic Action Level (mg/L) | Carcinogenic Action Level (mg/L) | Most Stringent Action Level (mg/L) |
| **volatiles** | | | | | | | | | |
| 1,1,1-Trichloroethane | 40,260 | 42,273 | 135.9040572 | | 167.1573585 | | 113.6096204 | | **113.61** |
| 1,1-dichloroethene | 2 | 3 | 1.595563628 | 0.00951771 | 2.844906604 | 0.011277588 | 2.158582788 | 0.007573975 | **0.0076** |
| 1,2-dichloroethane | 5 | 5 | 9.687637089 | 0.053193153 | 3.643359142 | 0.024761456 | 2.120712914 | 0.014565336 | **0.0146** |
| Bromodichloromethane | 254 | 266 | 2.694688939 | 0.256302128 | 1.284637191 | 2.19100518 | 0.757397469 | | **0.26** |
| Benzene | 15 | 16 | 0.142072076 | 0.037293215 | 0.10333901 | 0.05966375 | 0.064757484 | 0.04570502 | **0.037** |
| Chlorobenzene | 77 | 81 | 1.045144412 | | 0.371935566 | | 0.216236978 | | **0.22** |
| Dibromochloromethane | 1 | 2 | 3.754568849 | 0.06040686 | 1.305856168 | 0.026932746 | 0.757397469 | 0.015779114 | **0.02** |
| Ethyl benzene | 2,008 | 2,108 | 3.716102584 | | 9.975251388 | | 10.83078381 | | **3.72** |
| Tetrachloroethene | 244 | 257 | 0.931368206 | 0.007001689 | 2.643682341 | 0.036647455 | 3.029589878 | 0.652928853 | **0.007** |
| Trichloroethene | 77 | 81 | 0.337999806 | 0.062164307 | 1.750501974 | 0.184682677 | 20.07103294 | 0.220907595 | **0.062** |
| Toluene | 1,350 | 1,417 | 5.649067678 | | 5.670405653 | | 3.786987347 | | **3.79** |
| Vinyl chloride | 1 | 1 | 0.961935053 | 0.005463179 | 0.326713034 | 0.00672384 | 0.189349367 | 0.004418152 | **0.00** |
| Xylene | 12,258 | 12,871 | 150.0903235 | | 52.2846787 | | 30.29589878 | | **30.30** |
| **metals** | | | | | | | | | |
| Arsenic | NA | NA | 0.31799143 | 0.024890863 | 13.38976505 | 1.096238074 | NA | NA | **0.025** |
| Barium | NA | NA | 21.86709319 | | 157.5770925 | | NA | NA | **21.87** |
| Chromium | NA | NA | 386.4532288 | | 3033.978319 | | NA | NA | **386.45** |
| Mercury | NA | NA | 0.071087481 | | 0.472731278 | | NA | NA | **0.071** |
| Nickel | NA | NA | 4.398104251 | | 28.74580916 | | NA | NA | **4.40** |
| Lead | NA | NA | 2.803748703 | | 85.5585393 | | NA | NA | **2.80** |
| Antimony | NA | NA | 0.016260125 | | 0.090044053 | | NA | NA | **0.02** |
| Thallium | NA | NA | 0.943380464 | | 174.6798278 | | NA | NA | **0.94** |
| **semivolatiles** | | | | | | | | | |
| Acenaphthene | NA | NA | 5.651823344 | | 30.48699286 | | NA | NA | **5.65** |
| Acenaphthylene | NA | NA | 2.249180325 | | 12.10432631 | | NA | NA | **2.25** |
| Anthracene | NA | NA | 13.04845761 | | 70.0908817 | | NA | NA | **13.05** |
| Benzo(a)anthracene | NA | NA | 0.018119079 | 0.00024789 | 0.09726981 | 0.001332463 | NA | NA | **0.00** |
| Benzo(a)pyrene | NA | NA | 0.029381404 | 0.000017 | 0.157577093 | 8.99413E-05 | NA | NA | **0.00** |
| Benzo(b)fluoranthene | NA | NA | 0.005631436 | 0.000167557 | 0.030202276 | 0.000899413 | NA | NA | **0.00** |
| Benzo(g,h,i)perylene | NA | NA | 0.000477751 | | 0.00255717 | | NA | NA | **0.00** |
| Benzo(k)fluoranthene | NA | NA | 0.000151236 | 0.0000450 | 0.000809509 | 0.000241069 | NA | NA | **0.00** |
| Chrysene | NA | NA | 0.115962103 | 0.0247890 | 0.622526785 | 0.133246315 | NA | NA | **0.02** |
| Dibenz(a,h)anthracene | NA | NA | 0.005447102 | 0.0000075 | 0.029180943 | 3.99739E-05 | NA | NA | **0.00** |
| Fluoranthene | NA | NA | 3.24931333 | | 17.50856583 | | NA | NA | **3.25** |
| Fluorene | NA | NA | 2.594894848 | | 13.96336481 | | NA | NA | **2.59** |
| Indeno(1,2,3-cd)pyrene | NA | NA | 0.018570471 | 0.000105938 | 0.099522374 | 0.00056805 | NA | NA | **0.00** |
| Naphthalene | NA | NA | 1.648777945 | | 9.134903914 | | NA | NA | **1.65** |
| Phenanthrene | NA | NA | 0.886676741 | | 4.795824555 | | NA | NA | **0.89** |
| Pyrene | NA | NA | 0.380829541 | | 2.040463642 | | NA | NA | **0.38** |

NA - Not applicable because inhalation is the only exposure route for these receptors. Metals and semi-volatile constituents do not volatilize from water.

## TABLE 2
## POTENTIAL CHEMICAL HAZARDS
Potential Effects and Routes of Entry

| CHEMICAL | ROUTE OF ENTRY | POTENTIAL EFFECTS OF HIGH DOSES[1] | |
|---|---|---|---|
| | | Acute | Chronic |
| Chlorinated Hydrocarbons | Inhalation. Ingestion. Dermal Contact. | Hematological effects. Respiratory inflammation. Death. | Carcinogenic. Gastrointestinal Effects. Cardiovascular Effects. |
| Petroleum Hydrocarbons | Inhalation. Ingestion. Dermal Contact. | Central Nervous System Depression. Respiratory Arrest. Asphyxiation. | Carcinogenic. Hematological Effects. Immune System and Nervous System Effects. . |
| MTBE | Inhalation. Ingestion. Dermal Contact. | Dizziness. Headaches. Gastrointestinal Irritation. Nose and Throat Irritation. | Suspected Carcinogen. Liver, Kidney and Nervous System Damage. Suspected Developmental Toxicity. |
| PAHs | Inhalation. Ingestion. Dermal Contact. | Dermatitis. Bronchitis. | Carcinogenic. Impaired Bladder, Kidneys, and Respiratory System. Dermatitis. |
| Mercury | Inhalation. Ingestion. Dermal Contact. | Impaired Respiratory, Cardiovascular and Gastrointestinal Systems. | Effects on Kidney and Central Nervous System. |
| Arsenic | Inhalation. Ingestion. Dermal Contact. | Respiratory Irritation. Skin Pigmentation. Gastrointestinal Disturbances. Ulceration of Nasal Septum and Skin. | Carcinogenic. Liver, Kidney, Lung, Lymphatic Dysfunction. Dermatitis. |

[1] Toxicological Profile. U.S. Department of Health and Services, Public Health Service, Agency for Toxic Substances and Disease Registry (ATSDR).

## TABLE 3
## RESPONSE

| SCENARIO | SITE CONTROL MEASURES | PPE (in addition to Level D) | WORK SCHEDULE MODIFICATION | SAMPLING |
|---|---|---|---|---|
| 1 - COC concentrations are unknown | X | X | X | X |
| 2 - COC concentrations are known to be above RBALs | X | X | X | |
| 3 - COC concentrations are believed to be below RBALs, but unusual site conditions are observed | X | X | X | X |
| 4 - COC concentrations are below RBALs or daylighted groundwater is not present | X | | | |

# SITE GROUNDWATER MONITORING PLAN

## SITE GROUNDWATER MONITORING PLAN

The City of Phoenix in conjunction with the Army Corps of Engineers (USACE) along with the Flood Control District of Maricopa County is constructing a restoration project in the Salt River extending from the 24th street bridge to 19th avenue. Based on available groundwater data in the project area, degraded groundwater may exist beneath the site. Work for the Rio Salado restoration project will be conducted in these areas of potential degraded groundwater. Consequently, the District along with the City of Phoenix has developed a groundwater sampling plan to assess the water quality at locations where groundwater is encountered during the project. This information will be provided to the Contractor and will be used to evaluate whether to implement the Groundwater Contingency Plan (Appendix __) during construction activities. The sampling plan for the project will include monitoring at existing monitor wells to establish baseline data for the low flow channel as well as groundwater sampling at the excavations and at dewatering sumps or wells installed by the Contractor.

This monitoring plan is presented as a guideline for personnel who perform the sampling as well as to inform the Contractor about the types of activities that will take place during construction, and the information that will be recorded and available for public review. A more detailed, site-specific sampling plan may be developed, particularly in response to the construction of dewatering points. If the Contractor elects to do additional sampling for their own purposes, it shall be in general accordance with this plan or with another plan subject to review by the Engineer.

### A. Monitoring Well Purging

- Purging must be performed on all wells prior to sample collections. Depending on the stability of pH and conductivity readings, three or more borehole volumes of groundwater in casing and backfill (filter pack) shall be withdrawn prior to sample collection. The volume of water present in each well shall be computed using the length of the water column, monitoring well inside diameter, borehole diameter, length of filter pack and porosity estimate for the filter pack. Volume discharged may be estimated using any applicable method.

- Several general methods are used for well purging. Well purging may be achieved using bailers, bladder pumps and submersible pumps. The specific pumping method shall be chosen based on depth to groundwater, diameter of well, existing well configuration and contaminant (s) of concern. In all cases, pH, specific conductance, temperature, and purge volume values will be entered in the field manual. (See field information). Field parameters will be measured periodically during the discharge period. When the field parameters remain at plus or minus ten percent over successive readings the well is ready for sampling.

- Generally, the wells shall be sampled in order from the least contaminated to the most contaminated, if known. All sampling equipment shall be inspected for damage, and repaired if necessary, prior to arriving on-site

### B. Monitoring Well Sampling

A sampling schedule will be developed that describes sampling locations and frequency Initially, frequent sampling of existing wells will be scheduled. That data will be combined with the other monitoring well information available from monitoring at City of Phoenix and ACOE wells to make statistical inferences on the quality of groundwater beneath the site. Data will be used to

anticipate specific problem areas prior to construction activities in the channel and also to identify areas where groundwater degradation is not present. Subsequent sampling schedules will be dependent on analytical results. A description of groundwater sampling protocol for the monitoring wells and dewatering wells has been provided in Section C.

## C. Well Sampling Protocol

- Open well and obtain water levels if accessible. Water levels shall be measured from a reference measuring point. A low flow sampling port or access for a portable submersible sampling pump must be provided at the dewatering wells.
- Use a clean, decontaminated stainless steel or Teflon bailer and a spool of polypropylene rope or equivalent bailer cord (Teflon-coated stainless steel cable) to sample well, unless a dedicated pump and low flow sampling port is available.
- Tie a bowline knot through the bailer loop and attach to well casing or wrist and lower into well.
- Record all measurements in the field manual (see field information).
- Measure pH and specific conductance
- Monitor field parameters (pH, specific conductance, and temperature) periodically during purging process. When purge volume is equal to 3 casing volumes, and or when field parameters are within plus or minus five percent (+ or – 5%) over successive readings the well is ready for sampling.
- Sampling procedures must be consistent with EPA protocol ("Handbook for Sampling and Sample Preservation of Water and Wastewater", EPA-600/4-82-029, "Guidelines Establishing Test Procedures for the Analyses of Pollutants Under the Clean Water Act", 40 CFR 136, and "Test Methods for Evaluating Solid Wastes," EPA SW-846).
- Rinse sample containers, without preservatives, with sample water before final collection.
- For volatile analyses add preservative (or order pre-preserved from lab) to sample vial and fill vials at the rate of 100 milliliters per minute (24 seconds for 40 milliliter vial); form positive meniscus over vial brim and cap. After capping, invert vial, gently tap and look for air bubbles. If bubbles are present, uncap vial, add more water and repeat procedure.
- Label each sample container with project number, sample location, well owner, date, military time, samplers initials, preservative and analysis required.
- Record all information in field manual.

## D. Sampling at Open Excavations

If it is necessary to sample at an open excavation, the following procedures should be followed:

- Identify an accessible point as close as possible to the point where water is entering the excavation, if distinguishable, and sample at that location. Access point should be free of any foreign debris (i.e., municipal waste) other than native soil material in the excavation which could introduce bias to the sampling and analytical results. Chemical resistant polyvinyl chloride surgical gloves and boots should be worn if it is necessary to contact the water at the sampling location. Prior to sampling, measure and record pH, temperature, and specific conductance.
- Place the sampling device, typically a bailer as described above, a minimum of several inches below the surface of the water. Avoid touching the bottom or otherwise creating turbid conditions in the water.
- Wait a brief period of time for the water conditions around the sampling device to return to equilibrium.
- Obtain the sample in accordance with EPA sampling procedures outlined in Section C.

## E. Analytical Methods

- Water samples collected from wells and excavations should be immediately wrapped in plastic (glass bottles only) and placed in an ice chest packed with ice and cooled to 4 degrees celsius and submitted to the laboratory with a chain of custody. Samples will be preserved and analyzed for volatile, semi-volatile organic compounds RCRA metals and physical parameters using the laboratory methods as outlined in the Table of Analytical Methods.

**Table 1. Analytical Methods**

| Analysis | Method | Container | Preservation | Maximum holding time |
|---|---|---|---|---|
| Volatile organic compounds | 8260B | 3 * 40-ml VOA (glass) | HCL | 14 days |
| Semi-volatile compounds | 8270C | 2 * 1-liter (amber glass) | None | 7 days/ 40 days |
| Total Dissolved Solids | 160.1 | 1 * 1 Liter (plastic) | | 7 days |
| Turbidity | 180.1 | 1* 1 Liter (plastic) | | 48 hours |
| Total Suspended Solids | 160.2 | 1* 1 Liter (plastic) | | 7days |
| RCRA metals | 6010B/ 7470 | 1 * Liter (plastic) | HNO3 to pH<2 | 7 days/ 40 days |

Historic groundwater data has indicated that specific contaminants of concern (list from GW contingency plan) may be present in the groundwater beneath the site. A list of these contaminants is provided in Table 2.

**Table 2. Contaminants of Concern**

| | |
|---|---|
| 1,1 – dichloroethene | 1,2 – dichloroethane |
| Benzene | Toluene |
| Tetrachoroethene | Trichloroethene |
| Mercury | Arsenic |
| Vinyl chloride | |

## E. Quality Control

**Sample Documentation**

- Field Form
- Chain of Custody Form
- EPA Sample tags
- Custody Seals
- SAS Packing lists
- Sample Identification Matrix Forms

## QA/QC Samples

- **Travel blank**
  Include a travel blank from the laboratory to insure against the introduction of contamination during the transport of the samples.

- **Field duplicates**
  Field blanks will be collected to assess the accuracy of the laboratory analyses. One well will be chosen for the duplicate sample. Sample should be labeled different than that of the well samples to insure that that there is no bias introduced during the analytical process.

- **Equipment blanks**
  If a dedicated hand bailer is used to purge the wells, an equipment blank should be collected to insure against equipment contamination. The bailer will be rinsed with deionized or distilled water prior to collecting equipment control sample.

## Field Information

Field information should be recorded in a bound field book. Information to be recorded includes the following:

- Date and time of starting work and weather conditions
- Names of field personnel performing work
- Project name
- Description of site conditions and unusual circumstances
- Location of sample site, including map reference, if relevant
- Equipment ID numbers
- Details of actual work effort, particularly any deviations from the field operations plan or standard operating procedure.
- Field observations (i.e., discoloration in sample, equipment activity in the vicinity of the well).
- Field measurements (including pH, EC, temperature and depth to groundwater below top of well casing) on whether or not the discharge water will require treatment.

# APPENDIX "B"

## HEALTH AND SAFETY PLAN

SA&B
Environmental & Chemical Consultants
*Providing Practical Environmental Solutions*

PREPARED FOR:

CITY OF PHOENIX
ENGINEERING AND ARCHITECTURAL SERVICES DEPARTMENT
200 WEST WASHINGTON STREET, 7TH FLOOR
PHOENIX, ARIZONA 85003-1611

SA&B JOB NO. 99158BJ

# HEALTH AND SAFETY PLAN
RIO SALADO PROJECT AREA
BETWEEN 19TH AVENUE
AND
THE INTERSTATE 10 BRIDGE
PHOENIX, ARIZONA

PREPARED BY:

SA&B
ENVIRONMENTAL & CHEMICAL CONSULTANTS
3001 WEST INDIAN SCHOOL ROAD, SUITE 312
PHOENIX, ARIZONA

SEPTEMBER 28, 1999

SA&B
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**PHOENIX, ARIZONA**

**SEPTEMBER 28, 1999**

# HEALTH AND SAFETY PLAN
# RIO SALADO PROJECT AREA
# CITY OF PHOENIX
# PHOENIX, ARIZONA

Job No. 99158BJ

## 1.0 PROJECT BACKGROUND

### 1.1 INTRODUCTION

This Health and Safety Plan (HSP) sets forth the minimum health, safety, and emergency response requirements for activities involving, or potentially involving, employee exposure to Health and Safety hazards and accidents associated with the site operations at Rio Salado Project Area in Phoenix, Arizona

### 1.2 SITE LOCATION

The proposed Rio Salado Project Area (RSPA) is located along the Salt River in Phoenix, Arizona. A vicinity map is presented as Figure 1. The general project area extends from 19th Avenue on the west to the Interstate 10 bridge on the east, and consists of the river channel, Extending approximately 50 feet beyond the top of the river bank. Several landfills and abandoned dumps have been identified within this area. This area may pose special hazards to workers due to previous chemical and/or debris disposal practices. Please refer to Figure 2.

### 1.3 Scope of Construction Activities

The anticipated construction activities consist of excavation, backfill, consolidation of soil and debris, demolition, water diverson, concrete reinforcement, and concrete placement.

### 1.4 Site Safety Regulatory Requirements

Work activities must comply with provision of the United States Army Corps of Engineers (USACE) Safety and Health Requirements Manual EM 385-1-1 (September, 1996), applicable Federal, State of Arizona,City of Phoenix, and local safety and occupational health laws, regulations, and policies. Where the requirements of this specification, applicable laws, criteria, ordinances, policies, regulations, and referenced documents vary, the most stringent should be followed.

## 2.0 HEALTH AND SAFETY

The Contractor is responsible for developing a site specific Health and Safety Plan for this project. The Contractor must establish Organization and Management procedures and structure to implement an effective and practical Health and Safety Program

Typically this organizational and management structure includes the following positions and functions. Please note that position title and assignment of responsibilities may vary, however, the functions must be addressed.

### Key Personnel and Responsibilities

**Project Manager :**

- Overall management of the project and subcontractors
- Project liaison with outside agencies
- Overall project safety and health management
- Carries primary stop-work authority for site activities

**Project Engineer:**

- Management of project engineering
- Management of on-site safety and health program
- Carries secondary stop-work authority for site activities
- Conduct safety orientation for all on-site contractors , subcontractors, engineers, owner(s) and visitors

**Health and Safety Officer(s) (HSO):**

- Implement the site Health and Safety Plan and monitor for compliance
- Ensure all on-site personnel have been properly trained and certified as physically fit to perform field activities
- Issues a stop-work order authorized by the Project Manager and Certified Industrial Hygienist where a safety hazard or potentially dangerous situations exists
- Selects the proper level of personal protective equipment (PPE) and ensures its use by all employees

- Regularly inspects all PPE and monitors proper maintenance and storage of PPE
- Monitor workers for signs of stressors (e.g., heat stress, cold exposure, and general fatigue)
- Conduct safety briefings and site-specific safety training
- Attend daily project construction/safety meetings and provide input on Health and Safety concerns
- Notify the Project Engineer where suspicious materials are identified on-site

**Certified Industrial Hygienist:**

- Modify and/or develop new Health and Safety procedures as required.
- Maintain medical surveillance procedures as outlined in the Contractor's site specific Health and Safety Plan.
- Authorize a stop-work order if it is determined, in consultation with the Project Manager and site HSO, that a safety hazard or potentially dangerous situations exists.
- Ensures the proper level of personal protective equipment (PPE) and clothing, and monitor its use by all on-site employees.
- Conduct on-site audits of Health and Safety procedures as outlined in Contractor's site specific Health & Safety Plan ( i.e. use, maintenance, storage of PPE, etc.)

**Project Personnel/Employees:**

All personnel who perform work activities which may result in contact with the potential hazards present at this site will have the following responsibilities:

- Read and be thoroughly familiar with all aspects of the Contractor site specific Health and Safety Plan
- Complete all assigned tasks in compliance with the Health and Safety Plan
- Notify the Safety and Health Officer of any potentially unsafe conditions
- Attend all on-site safety meeting

## 3.0 Hazard Analysis

### 3.1 Job Hazard Summary

Exposure to chemical hazards are not anticipated during routine operations performed during this job. However, during the course of excavation, potential chemical hazards may be encountered when "Suspicious Materials" are uncovered. Suspicious Materials are defined under Section 3.3 – Chemical Hazards of this plan. When "Suspicious Materials" are uncovered the worker is to immediately contact the Project Manager or Engineer and vacate and cordon off the area, if necessary. The Contractor's work in this area will be stopped and moved to an area not affected by the "suspicious materials". The City of Phoenix's Emergency Response Contractor will be notified and will manage the "Suspicious Materials." During the occasions where handling is required these operations should be considered potentially hazardous. Exposure to the general public is considered negligible due to the fact that the public's access to this site and work zone is limited.

Heavy equipment operation during excavation and handling of suspicious materials pose a risk to workers. The risk of injury from the use of heavy equipment is considered to be the most significant risk to site workers. Potential of a serious injury caused by heavy equipment will be reduced by daily safety meetings, worker awareness, and the presence of a HSO on-site.

### 3.2 General Safety Hazards

Potential safety hazards may include, but are not limited to general excavation-type hazards, such as:

- Unstable surfaces and uneven terrain
- Unstable slopes
- Noise
- Improperly operated equipment
- Unguarded machinery contact points
- Confined spaces
- Lifting heavy objects
- Fire

The contractor must address these in the Contractor's site specific Health and Safety Plan.

## 3.3 Chemical Hazards

During construction operations "suspicious materials" that present the potential for inhalation, ingestion, or skin absorption may be encountered. These materials are chemicals of unknown or uncertain hazard, which may be encountered during excavation. Through identification and separation, such materials may be classified as "Hazardous or Special Waste" (as classified by the Arizona Department of Environmental Quality – ADEQ). These materials may include industrial waste, construction debris, tires, materials contaminated by the spillage of petroleum fuel, oils or greases exceeding the ADEQ cleanup levels; and materials containing asbestos. Other possible "suspicious materials" that may be encountered during excavation include: Metals or Volatile Organic Compounds (VOC), stained sand or soil, batteries, liquids stored in containers or drums, and medical wastes or hospital wastes. Polychlorinated biphenyl's (PCB), lead associated with batteries, acids (sulfuric acid) introduced from batteries, caustic medical wastes or soil, and drums could contain volatile as well as semi-volatile compounds. Data obtained during investigative studies indicates the presence of materials that may omit organic vapors. Priority pollutant metals could also be encountered during excavation, as expected in a landfill setting. Table 1 lists the potential health hazards and Permissible Exposure Limits (PELs) associated with possible contaminants that may be encountered within the Rio Salado Project Area.

TABLE 1. POTENTIAL CHEMICAL HAZARDS RIO SALADO PROJECT AREA

| CHEMICAL | PEL | PRIMARY HEALTH HAZARD |
|---|---|---|
| Benzene | 1 ppm | May cause irritation to eyes, skin, nose & respiratory system. Can cause CNS distrubances, headache, nausea, and dizziness. Can be absorbed through the unbroken skin. Considered to be a human carcinogen. |
| Ethylbenzene | 100 ppm | May cause irritation to the eyes, skin and mucous membranes,. Can cause headache, skin damage, dizziness, CNS distrubances, and extremely high exposures may cause coma. |
| Stoddard Solvent (Petroleum hydrocarbons) | 500 ppm | May cause eye, throat, and nose irritation. Can cause dizziness, skin damage, and if ingested, can cause chemical pneumonias. |
| Arsenic | 0.01 $mg/m^3$ | May cause damage to the liver, kidneys, skin, lungs, and lymphatic system. |
| Selenium | 0.2 $mg/m^3$ | May cause damage to the eyes, skin, respiratory tract, liver, kidneys, blood, and spleen. |
| Chromium | 0.5 $mg/m^3$ | May cause damage to the eyes, skin, and respiratory tract. |
| Zinc | 5.0 $mg/m^3$ (Respirable Dust) | May cause damage to the respiratory system. |
| Cadmium | 0.005 $mg/m^3$ | May cause damage to the respiratory tract, kidneys, prostate, and blood. |
| Lead | 0.05 $mg/m^3$ | May cause damage to the eyes, GI tract, CNS, kidneys, blood, and gingival tissue. |
| Nickel | 1.0 $mg/m^3$ | May cause damage to the nasal cavities, lungs, and skin. |
| Beryllium | 0.002 $mg/m^3$ | May cause damage to the eyes, skin, and respiratory tract. Beryllium may cause granulomas if contacted with exposed skin. |
| Copper | 1 $mg/m^3$ | May cause damage to the eyes, skin, respiratory tract, liver and kidneys. |
| Silver | 0.01 $mg/m^3$ | May cause damage to the nasal septum, skin and eyes. |
| Naphthalene | 10 ppm | May cause damage to the eyes, skin, blood, liver, kidneys and CNS. |
| Coal Tar Derivatives | 0.2 $mg/m^3$ | May cause damage to respiratory tract, skin, bladder, and kidneys. Symptoms will vary depending upon the specific compound. |
| Xylene | 100. ppm | May cause damage to the eyes, skin, respiratory tract, CNS, GI tract, blood, liver, and kidneys. |
| Toluene | 200 ppm | May cause damage to the eyes, skin, respiratory tract, CNS, liver, and kidneys. |
| Poly-chlorinated biphenyl (PCBs) (PCBs 1016, 1221, 1232, 1242, 1248, 1254, 1260) | 0.5 $mg/m^3$ | There are no known acute toxic effects of PCB's. In general, PCB's are absorbed through the skin, with minor contributions from the lungs and GI tract. PCB's have an extremely low vapor pressure and do not present an inhalation hazard unless some physical process causes them to become airborne. Burning of PCB's produces Dioxin which is a known cancer causing agent. Long-term exposure to PCB's may cause chloracne or liver injury. |
| Asbestos | 0.1 fibers/cc | There are no known acute toxic effects of asbestos. Chronic exposures may not show symptoms till 20 years later. May cause damage to respiratory system at extremely high concentrations. |

General site workers should avoid these "suspicious materials" or areas when these materials have been identified. The City of Phoenix Emergency Response Contractor will manage these materials or areas.

## 3.4 Physical Hazards

Physical hazards are inherently present during field operation. Physical hazards present at this site may include mechanical hazards and noise exposure associated with the operation of heavy equipment, slip-trip-fall hazards associated with operation conducted in a field environment, thermal hazards, and muscular-skeletal injury hazards resulting from work performed outdoors. The contractor must address the following physical hazards in its Health and Safety plan.

### 3.4.1 Heavy Equipment Operations

The safety hazards associated with the operation of heavy equipment can be effectively eliminated by the worker if constant awareness of these hazards is maintained. Constant visual contact with the equipment operator will facilitate such awareness. Back up alarms should be functional on all heavy equipment with obstructed rear view. Where required, the equipment should be equipped with Rollover Protection (ROP's) and seat belts. Operational daily inspections should be performed on all equipment and inspections records should be maintained at the job site.

### 3.4.2 Slip-Trip-Fall Hazards

While it is difficult to prevent slip-trip-fall hazards, risk of injury can be minimized by implementing proper site control measures, such as daily safety meeting, proper footwear, by keeping the work area free of obstructions where possible, and/or marking areas with caution devices.

### 3.4.3 Lifting Hazards

Field operations often require that heavy physical labor tasks be performed. Employees should be encouraged to perform pre-work stretching exercises and follow proper lifting techniques. All employees should be instructed in proper lifting techniques during the site specific training.

### 3.4.4 Tool and Equipment Hazards

Safety hazards present during the use of tools and/or equipment are generally associated with improper tool handling and inadequate maintenance. Management of these hazard involve rigorous maintenance of tools and equipment and effective training of employees in the proper use of tools.

### 3.4.5 Electrical Hazards

Overhead power lines, downed electrical wires, and buried cables all pose danger of shock or electrocution if workers contact or sever them during construction operations. OSHA Standard 29 CFR 1910.137 describes clothing and equipment for protection against electrical hazards that may be encountered. The Contractor shall ensure that workers are properly trained and equipped for these hazards.

### 3.4.6 Open Excavations

Open excavations may be present during the construction and remedial actions at the project site. Excavations must be maintained in compliance with appropriate OSHA regulations for trenching and excavation (29 CFR 1925.650,1926.651, and 1926.652). Constant employee safety awareness while working near excavating should lessen the associated hazards of excavations. All excavations on this project should be properly sloped and delineated in accordance with the OSHA regulations. Also, the Contractor should have trained "competent persons" to oversee these operations.

### 3.4.7 Confined Spaces

It is anticipated that confined spaces will be encountered during excavating activities. Confined space encountered are expected to be classified as "Non Permit Confined Spaces" but must be verified by pre-entry air monitoring results. The procedures outlined in Section 11- Confined Space Procedures in this plan shall be followed by all workers entering a confined space. Any worker who believes a work area could be classified as a confined space shall immediately report the condition to the Project Engineer and/or HSO. The contractor must develop specific provisions to address Confined Space Entry. They must be consistent with 29 CFR 1910.147 and 29 CFR 1926.21.

### 3.4.8 Noise Levels

Noise levels identified as exceeding 90 decibels must be addressed and when feasible reduced by means of engineering controls. These controls will include isolation, enclosure, and application of noise reduction materials. Hearing protection shall be worn at all times when noise levels are suspected of being equal to or exceeding 90 decibels (dBA). Use of portable "Walkman-type" radios are prohibited at any time on this project. When applicable, a hearing conservation programs should be implemented in accordance with OSHA standards when the daily noise exposures are at or above 85 dBA for an 8-hour day.

### 3.4.9 Weather

The weather condition is an important consideration in planning and conducting site operation in the Southwest. Extremely hot or even mildly cold weather can cause physical discomfort, loss of efficiency and personal injury. Of particular importance is heat stress.

The stress to the body due to excess heat can diminish the body's ability to function properly. Because the incidence of heat stress depends on a variety of factors, all workers should be monitored.

Hazards associated with heat stress include the following:

Heat Cramps: Caused by heavy sweating with inadequate electrolyte replacement. Heat cramps can cause muscle spasms and pain in the hands, feet, and abdomen.

Heat Exhaustion: Occurs from increased stress on various body organs and ranges from inadequate blood circulation to cardiovascular insufficiency or dehydration. Heat exhaustion is characterized by pale, cool, moist skin, heavy sweating, dizziness, nausea and fainting.

Heat Stroke: The most serious form of heat stress. Temperature regulation fails and the body temperature rises to critical levels. Immediate action must be taken to cool the body before serious injury or death occurs. Competent medical help must be obtained as soon as possible. Heat stroke is characterized by red, hot, unusually dry skin. Symptoms include lack of, or reduced perspiration, nausea, dizziness, confusions, and strong rapid pulse as well as coma.

A heat stress protection program should be provided in the contractors site specific Health and Safety Plan to address heat related problems. Additional guidance is presented under Section 10.1 of this plan, Heat Stress Monitoring

### 3.4.10 Fire and Explosion

Flammable or combustible gases or vapors may be present in the project work area. Typically, these hazards are associated with methane gas which may be found in old landfill areas. The concentration of gases or vapors in the excavation, or the work area may reach flammable (explosive) range before venting is completed and/or safe atmosphere is attained. The contractor's site specific Health and Safety Plan should contain procedures for monitoring for fire and explosion hazards, including emergency response actions. The following precautions must be taken:

- Eliminate all potential sources of ignition from the area (smoking, lighters, matches, non-spark proof equipment, etc.).
- Prevent the discharge of static electricity during venting of flammable vapors
- Minimize the accumulation of vapors at ground level, and in the excavation trenches.
- Containers with unknown quantities of unknown materials may present explosion hazard, in addition, substances in buried containers may contain toxic materials.
- All excavation and trench areas should be tested with gas monitoring instruments before conducting any welding or cutting operations.

### 3.4.11 Traffic Hazards

Traffic control measures should be instituted to prevent hazards associate with moving equipment and hauling trucks. The Contractor's site specific Health and Safety Plan should address this concern. Daily safety briefing should review the traffic procedure for that day.

## 3.5 Biological Hazards

Decaying refuse will support the growth of large colonies of bacteria and fungi, both anaerobic (not requiring oxygen) and aerobic. Airborne bacteria and fungi (microbes) can cause illness and long term respiratory irritation. The use of water spraying will reduce the amount of airborne dust carrying spores and bacteria, but will also augment microbial growth and colonization. To reduce the ingestion of microbial and other contaminants no food should be ingested within the project area, and prior to eating workers should wash hands and faces.

### 3.5.1 Hospital or Medical Waste

Hospitals or medical waste may be encountered at this site. Workers who observe any materials that appear to be hospital or medical waste shall notify the Project Engineer and/or HSO immediately, all employees must avoid direct contact with these materials. Depending on the type and extend of the material present the HSO, will determine the appropriate handling procedures and personal protection equipment.

### 3.5.2 Hanta Virus

Hanta virus-associated disease has occurred in the Southwest. Rodents are the primary reservoir host of recognized Hanta viruses. A person is thought to contract the virus by handling infected rodents, or their nests or dropping then touching their nose, mouth, or eyes. The virus may also be spread by inhaling airborne particle from urine, droppings, or saliva from infected rodents. This may happen while directly disturbing rodent nests, droppings or burrows. The first symptoms of the illness are much like the symptoms of

the flu and may include fever, feeling tired, muscle aches, cough, headache, and vomiting. To reduce the risk of Hanta virus infection avoid contact with rodents and rodent burrows or disturbing dens (such as pack rat nests). Wash hands and face before eating and drinking. When work activities create a potential for direct contact with rodents or rodent droppings, the HSO may require worker to utilize personal protective equipment.

## 4.0 Sanitation

An adequate supply of safe potable drinking water should be supplied by the Contractor. Drinking water should be dispensed by means that prevent contamination between the consumer and the source. A sanitary container for the paper cups and waste receptacle for the used cups should be provided. Containers for drinking water should be clearly marked as to contents and not used for other purposes.

Toilets should be provided at the job side according to USACE Safety and Health Requirements Manual EM 385-1-1 guidance. The toilet(s) should be equipped with metal, plastic or porcelain urinal trough. Provisions for routinely servicing and cleaning all toilets and disposing of the sewage should be established.

## 5.0 Training Requirements

### 5.1 General Workers

All of the contractor and subcontractor employees shall receive and be able to document training and instruction in the following areas:

1) General safety and health work practices, and
2) Specific instruction with respect to hazards unique to their job assignment;

Training of these employees shall occur:

1) When the project is first initiated
2) To all new workers to the project
3) To all workers given a new job assignments for which training has not previously been received,

4) Whenever new substances, processes, procedures, or equipment are introduced to the project and represent a new hazard, and

5) Whenever new or previously unrecognized or discovered materials are encountered

## 5.2 "Suspicious Material" Handlers

Additional training is required for any worker, including contractor, subcontractors, City of Phoenix personnel, Health and Safety Consultants and Emergency Response personnel who will be involved in the evaluating and/or handling of any "suspicious material". All affected employees will be required to be trained and be able to document the following:

- 40-hour general site worker HAZWOPER training as specified in 29 CFR 1910.120 (e) and/or
- 8-hour HAZWOPER refresher training as specified in 29 CFR 1910.120 (e), and, if applicable,
- Confined Space Entry Awareness training as specified in 29 CFR 1910.147 and 29 CFR 1926.21, and
- Respiratory Protection training as specified in 29 CFR 1910.134

In addition, all of these "suspicious material" handlers must have documentation for meeting the medical surveillance requirement of the referenced OSHA citations (1910.120(f) and 1910.134(e)). They must be physically capable of working on "hazardous sites" and wearing respiratory protection devices.

## 5.3 Record of Training

Upon completion of the project safety briefing, all personnel will sign a statement indicating that they have read and understand and that they agree to abide by the site specific Health and Safety Plan. A record of attendance should be kept for all safety briefings.
A sample health and safety statement is presented as Attachment A.

# 6.0 Air Monitoring

The principal area of concern for air monitoring on this project are confined spaces and excavations where methane or hydrogen sulfide could accumulate.

Air monitoring for oxygen deficiency, combustible vapors, and organic vapors should be conducted as directed by the contractor's HSO. Air monitoring should be determined based on visual conditions and equipment reading encountered during excavation and disturbance of soils and type of production operations taking place (i.e. confined spaces).

## 6.1 Air Monitoring Procedures

Air monitoring should be conducted for the various potential hazards. The reading should be obtained, or samples collected in the breathing zone of the personnel using the instruments listed below for the material of concern.

**Combustible Gases/Vapors:**

Methane is generally associated with decomposing garbage. Methane is biologically inert (no toxic affects). Methane may cause flammable/explosive atmospheres or displace oxygen. Therefore, the contractor should monitor for the presence of methane using a Multi-gas meter with direct reading Combustible Gas Indicator (CGI) capable of detecting methane and an Oxygen Monitor.

**Hydrogen sulfide:**

Multi-gas meter having a hydrogen sulfide sensor

**Oxygen Deficiency:**

Multi-gas meter with a Direct Reading Oxygen Monitor

**Organic Vapors:**

Direct Reading Photo Ionization Detector (PID). Note: This instrument will not detect methane.

Direct Reading Calorimetric Detector Tubes.

TWA samples using Low Flow Sampling Pumps and activated charcoal or silica gel tubes, using OSHA or NIOSH sampling and analytical methods. Analysis should be conducted by an AIHA accredited laboratory

## 6.2 Air Monitoring Decision Criteria

The following air monitoring action levels should be used to determine the upgrade/downgrade of PPE or to discontinue work in a specific area.

TABLE 2. AIR MONITORING DECISION CRITERIA

| CONTAMINANT/ HAZARD | INSTRUMENT | ACTION LEVEL | ACTION TAKEN |
|---|---|---|---|
| Oxygen Level | O2 monitor | < 19.5% Oxygen | Discontinue task. Evacuate immediate work area. Monitor in SCBA equipment. Ventilate area. Determine the cause/source and eliminate. |
| | | ≥19.5 % Oxygen ≤23.5% | Level D-Standard Work Practices. |
| | | > 23.5% | Fire hazard, evacuate immediate work area, discontinue monitoring. |
| Combustible Atmosphere | Multi-gas meter, Combustible Gas Indicator | < 10% of the Lower Explosive Limit (LEL) | Level D-Standard Work Practices. Be aware that 5 and 6% LEL can be 5000 ppm of a toxic gas. PPE may still be required. |
| | | ≥ 10% of the LEL | Discontinue task. Evacuate immediate work area. Ventilate area. Determine the cause/source and eliminate. |
| Organic Vapors | Photo Ionization Detector (PID) | < 10 meter units (mu) | Level D-Standard Work Practices. |
| | | ≥ 10 mu for 5 minutes | Discontinue task. Upgrade to Level C PPE. Conduct sampling for laboratory analysis of specific compound(s). Determine cause/source and eliminate. |
| Respirable Dust | Mini-Ram | <2.5 $mg/m^3$ | Level D-Standard Work Practices. |
| | | ≥ background plus 2.5 $mg/m^3$ | Increase water spraying of operation. If levels persist, discontinue task. Upgrade to Level C PPE. Use wet method handling techniques. |
| Carbon Monoxide | Multi-gas meter, CO Sensor | < 25 ppm | Level D-Standard Work Practices. |
| | | ≥ 25 ppm for 5 minutes | Discontinue task. Evacuate immediate work area. Ventilate and retest. Determine cause/source and eliminate. |
| Hydrogen Sulfide | Multi-gas meter, $H_2S$ Gas Sensor | < 10 ppm | Level D-Standard Work Practices. |
| | | ≥ 10ppm but <20 ppm | Discontinue task. Evacuate immediate work area. Ventilate area. Determine the cause/source and eliminate. |
| | | ≥ 20 ppm | Discontinue task. Evacuate immediate and surounding work areas. Ventilate area. Determine the cause/source and eliminate. |

## 6.3 Air Monitoring Equipment and Analysis

All air monitoring equipment should be calibrated at the beginning and end of each sampling period. Direct reading equipment should be calibrated before use with span gases provided by the manufacturer of the equipment.

Direct reading and continuous monitoring samples should be collected from the workers breathing zone (personnel samples). Area sampling may be conducted when determined by the Contractor HSO that the area sampling is appropriate based on potential hazardous conditions.

Personal breathing zone air samples collected to document employee's 8-hour TWA exposure levels should be analyzed by an American Industrial Hygienist Association (AIHA) accredited laboratory.

The Contractor HSO should determine the sampling type and frequency as the job progresses based on potential hazardous materials encountered.

## 6.4 Record Keeping

Air sampling data logs should be completed daily when sampling occurs. The logs should indicate the sampling protocol and results. Recorded results that exceed established action levels should be reported to the Project Engineer and City of Phoenix representative immediately.

Chain of custody records should be maintained for any sample that is sent to laboratory for analysis. The chain of custody should be kept with air sample data sheets and laboratory reports.

A calibration log should be maintained for each instrument. The calibration should include the date and time calibrated, type of calibration gas used, concentration of calibration gas used, span of instrument, and instrument reading.

# 7.0 Personal Protective Equipment

In order to ensure complete personal protection from physical and chemical agents, employee's may be required to wear protective equipment in various situations

## 7.1 Minimum Level of Protection

Level D should be the minimum level of protection set for general site operations.

### 7.1.1 Level D

- Level D protection is primarily a work uniform and should be selected by the HSO only under the following conditions:
  - The work to be conducted does not include potential for splashing, immersion, or accidental release of chemical substances.
  - No hazardous air contaminants have been measured or assessed.

- Level D equipment includes the following:
  - Regular work clothing
  - Hard hat
  - Work boots
    Steel toed steel shanked work boots will be used by ground crews in open refuse, concrete, or where rolling, falling, puncture hazards exist. For all other operations standard work boots are acceptable. No canvas shoes should be allowed.
  - Safety glasses, goggles, or face shield as specified by the HSO.
  - Standard leather work gloves

## 7.2 Respiratory Protection

No respiratory protection is anticipated for general site workers.

# 8.0 NOISE MONITORING

The contractor should conduct noise monitoring in areas that may exceed 85 decibels. Noise monitoring should be conducted using a sound level meter or dosimeter conforming to the American National Standards Institute (ANSI) S1.4-1983 or S1.25-1991. Whenever feasible, noise levels identified as

exceeding 90 decibels, A-weighted (dBA), should be reduced by means of engineering controls. These controls could include isolation, enclosure, and application of noise reduction materials. Hearing protection must be worn at all times by site personnel when noise levels are suspected of being equal to or exceeding 90 dBA. A hearing conservation program should be implemented in accordance with OSHA standards for noise exceeding 85 dBA.

## 9.0 Work Zones and Security Measures

### 9.1 Work Zones

The active work area of the Rio Salado Project Area will be considered a "Restricted Work Zone". This area will be restricted to only authorized personnel and will be designated a Level D PPE zone. When "suspicious materials" are encountered it will, either be managed in place or moved to a designated area by the COP Emergency Response Contractor. An essential measure toward reducing the migration of contaminants is to delineate the "suspicious material" area into three specific work zones. Movement of personnel and equipment must be through designated access control points. All workers entering the "contaminated" area must have fulfilled the training and medical examination criteria for "suspicious material" handling (please refer to Section 5.2). These work zones designations assume the existence of hazardous conditions at these work locations. These designated areas will then be identified as exclusion zones pending lab analytical results. Exclusion zones (EZ) and Contaminated Reduction Zones (CRZ) will be demarcated with barricade tape.

### 9.2 Security Measures

The Contractor must develop procedures to restrict general public access to the site and their worker access to the "suspicious material" contamination area.

## 10.0 MEDICAL SURVEILLANCE

Prior to assignment to any task requiring a level of personnel protection above Level D, personnel will submit, if requested by the project manager, evidence that they have received a medical examination within the previous twelve months which meets the requirements of 1910.120 and 1910.134

## 10.1 Heat Stress Monitoring

To aid in the prevention of heat stress, the following should be provided for personnel working at the site, if required:

- Potable Water;
  Potable water with commercial mix (such as Gatorade) can be made available, but adequate consumption of plain water, with appropriate work/break cycles is usually adequate.
- Work Schedules;
  Work/rest regimes should be developed on recommendations by the HSO and CIH is accordance to weather and site conditions.

Personnel should be instructed to look for the following initial symptoms of heat stress:

-Heat Exhaustion:

- Pale, clammy skin;
- Profuse respiration;
- Tiredness, weakness;
- Headache, dizziness (possible vomiting); and
- Possible fainting.

-Heat Cramps:

- Cramping of muscles in legs and abdomen.

-Heat Stroke:

- High body temperature; and
- Skin is characteristically hot, red, and dry (the body's sweating mechanism is blocked)

Heat stress monitoring will commence when the ambient temperature reaches 85 degrees Fahrenheit, or higher. The monitoring should consist of the following:

- Heart rate (HR) can be measured by the radial pulse during 30 seconds as early as possible in the resting period. The heart rate at the beginning of the rest period should not exceed 110 beats per minute. If the HR is in excess of the above value, the next work period should be decreased by 33% while the rest period remains the same. If the HR is in excess of 110 beats/min. at the beginning of the next rest period, the following work period will be shortened by 33%.

Control measures to prevent heat stress include:

- Adequate intake of fluids, preferably cool water
- Work/rest regimen with rest periods taken in a cool, shaded area
- Proper work clothing
- In extreme conditions, cooling vests can be worn.

The HSO should monitor worker activity and should stop employee work activity when signs of heat stress conditions warrant. The HSO may choose to use the ACGIH TLV criteria for heat stress using the Wet Bulb Globe Temperature method. Employees should report any signs and symptoms of heat stress to the HSO. During the day-to-day field work, the Project Manager, Project Engineer, and workers should be alert for the signs and symptoms of heat stresses. The HSO should monitor the ambient air temperature using a thermometer located in the Support Zone. Ambient temperatures should be checked at least three times daily; once in the morning and twice in the afternoon. The field crew members should be observed for the following signs and symptoms of heat stress: dizziness and nausea; profuse sweating; skin color change; vision problems; fainting; weakness; fatigue; cramping; and hot, red, dry skin. Any employee who exhibits these symptoms should be monitored for heat stress. Heat stress monitoring should consist of measuring heart rate and/or body temperature to prevent the onset of heat stress illness. Workers experiencing heat stress that is not relieved by rest period/work period modifications should be removed immediately from field work and be required, if conscious, to consume two to four pints of electrolyte fluid or cool water every hour while resting in a shaded area. The individual should not return to work until symptoms are no longer recognizable. If the symptoms appear critical, persist, or get worse, immediate medical attention should be sought.

## 11.0 CONFINED SPACE ENTRY PROCEDURES

Entry into a trench or excavation, poses the additional hazards associated with confined spaces. These hazards may include, but are limited to: oxygen deficiency; toxic vapors or gases; flammable gases or vapors; contact with chemicals; moving equipment within the space; slips, trips, or falls; and electric shock. The provisions of this section should apply to all site personnel, subcontractors, and site visitors.

## 11.1 Site Inspection and Air Monitoring Recommendation

1. Prior to initial entry, and after each work break, continuous ambient air monitoring for oxygen level, combustible gas level, and when appropriate, toxic gas or vapor level shall be conducted in and around the confined space.
2. The confined space or the trench or excavation must be tested prior to entry.
3. Air monitoring within the space must be conducted from the exterior of the space and must include all levels (bottom, middle, and top) of the space. Whenever possible, monitoring should also be conducted along the length of the space. The person conducting the air monitoring must be trained in the use and calibration of the testing equipment.
4. Instrumentation must be approved for uses in Class I, Division I, Groups A, B, C, and D atmospheres. It must also be calibrated immediately before and after each use.
5. If monitoring reveals levels of combustible gases or vapors at or above 10% of LEL or oxygen levels at or below 19.5% or above 24%, entry is prohibited.
6. All air monitoring results should be recorded on daily field notes.

## 11.2 Ventilation Procedures

1. Prior to and throughout confined space entry procedures the space should be ventilated. In the absence of natural ventilation, the use of mechanical air movers or blowers can be used to assure that sufficient fresh ambient air passes through the space.
2. These devices should be steam or air driven. Oxygen must never be used to ventilate the space.
3. Whenever possible, ducting shall be used to increase the efficiency of the air movement. All air moving equipment should be grounded to prevent build up of static charges.

## 11.3 Isolation Procedures

Before employees are permitted to enter a confined space, steps should be taken to prevent the accidental release of liquid, vapor, or gas into the area via piping, ducts, vents, drains, etc. All piping, duct work, etc should be effectively isolated using disconnection, blank insertion, or double blocking and bleeding of the lines.

Electrical utilities, if present, should also be locked out and tagged out prior to entry. All temporary lighting must be approved for use in Class I, Division I, Groups A, B, C, and D atmospheres, and all electrical equipment and cords should be equipped with ground fault circuit interrupters.

### 11.4 Means of Egress

There must be two means of egress present whenever an employee enters a confined space. The primary means is usually a ladder. The secondary means can be a full-body harness attached to a man-rated hoisting device, or it can be the standby person (discussed below) if they are properly protected against the hazards found in the space.

### 11.5 Emergency Rescue Procedures

All confined space entry activities should require that one person act as the standby person. The standby should be stationed outside of the space at all times when employees are in the space and shall be prepared to provide emergency assistance.

## 12.0 EMERGENCY RESPONSE CONTINGENCY PLAN

There is always a possibility that personnel may unexpectedly encounter an emergency situation when working in the field or at the office. The following procedures should be incorporated into the Contractor site specific Health and Safety Plan. In the event of an emergency, the following general procedures should be initiated. Emergency telephone numbers should be listed in site specific Health and Safety Plan.

### 12.1 Illness

1. Contact qualified first aid personnel and;
2. Notify Supervisor, Project Manager, and/or Project Engineer.

## 12.2 Serious Injury

1. Notify Supervisor, Project Manager, and/or Project Engineer;
2. Supervisor should call an ambulance if life threatening, or if non-life threatening Project Manager or Project Engineer should call a hospital or physician and transport as soon as possible;
3. Assist first aid and ambulance personnel as directed;
4. Complete appropriate accident information report and witness statements; and notify the HSO or his designee.

## 12.3 Fatal Accident

1. Notify Supervisor, Project Manager, and/or Project Engineer ;
2. Supervisor should call an ambulance if life threatening, or if non-life threatening Project Manager or Project Engineer should call a hospital or physician and transport as soon as possible;
3. Assist first aid and ambulance personnel as directed;
4. Complete appropriate accident information report and witness statements; and notify the HSO or his designee.
5. Notify the appropriate City of Phoenix representative and Arizona Division of Occupational Safety and Health as soon as possible at (602) 542-5795.
6. Collect copies of all reports and submit to Project Manger.

## 12.4 Site Emergency Procedures

In the event of an emergency that necessitates an evacuation of the site, the contractor should initiate an alarm procedures. It should include the following:

1. Equipment and/or portable air horns should be used to alert all site personnel of an evacuation emergency. The Contractor should develop specific procedures to notify all site personnel to exit the site and gather at the predetermined staging area(s). A head count should be completed by the Project Engineer at the meeting place and further directions or response discussions coordinated at that point.

2. In the event that a site wide evacuation is necessary, radio communication should be used to alert the employees to evacuate the site.

Following an Emergency Alarm signal, access to the site and immediate vicinity of the incident should be restricted. Depending upon the severity and location of the incident, physical barriers or banner guards should be used to delineate restricted areas. Site Control should be the responsibility of the Project Manager or Project Engineer who should establish the new work boundaries if necessary. Future entry into restricted areas will require permission from the Project Manager.

## 12.5 Unexpected Hazards

If there is any doubt regarding the degree of hazard of a particular circumstance and personnel are unsure as to what measures to take or what protective equipment to utilize, the following steps should be written into the site specific Health and Safety Plan.

1. Stop Work Immediately - Personnel should remove themselves from the hazard or suspected hazard area.
2. Contact HSO - Personnel should immediately inform their supervisor regarding the situation.
3. Contact the Contractor's Director of Health and Safety or equivalent. Be prepared to give all details of the situation and instructions on how the appropriate representative can contact those involved at the site.

Following these actions, personnel should be given proper direction on how to proceed. By simply removing personnel from the hazard and maintaining good communication, many accidents can be avoided. If there is any doubt about the safety of employees in a particular circumstance, this course of action should be initiated.

## 12.6 Fire and/or Explosion

If a fire or explosion occurs on-site, the following steps should be taken:

1. If the fire is small and manageable, appropriate fire extinguishers should be utilized by properly trained personnel to control the situation.
2. If the fire is beyond control or there is a potential for explosion, all personnel should immediately evacuate the site.

3. Emergency fire department personnel should be contacted immediately. If the fire involves hazardous chemicals, the City of Phoenix Emergency Response Contractor must be informed of such. (Fire Department Call 911).
4. As soon as practical, the appropriate supervisor should be contacted and briefed.
5. The HSO will direct personnel to immediately secure any items from the fire.
6. The HSO shall assist the fire department as necessary in securing the fire or determining the cause.
7. The fire will be reported to all applicable authorities.
8. Necessary arrangements with doctors, fire protection, medical facilities, and emergency transportation should be identified and their respective telephone numbers posted on the job site at conspicuous locations.
9. A telephone should be accessible to all employees in case of an emergency.

## 12.7 Chemical Release/Spill Evacuation Plan

In the event that there is an accidental spill, release, discharge, etc., of toxic or hazardous liquid, gas vapor, dust, or mist within the area, the following actions should be taken:

1. Personnel in the immediate area of the incident should quickly assess the degree of danger and contact the HSO or Project Manager.
2. If possible, without danger to the employee, the source of the release should be stopped (i.e., right or plug the drum, etc.). Contact the HSO or Project Manager.
3. If possible, without danger to the employee, immediately eliminate all flames or other possible sources of ignition.
4. If the spill is small and controllable, personnel trained in spill clean up should contain or remediate the problem using proper spill clean up and personal protective equipment. Personnel in areas surrounding the spill may have to be evacuated until clean up is complete.
5. If the spill represents an imminent hazard to all personnel (potential explosion, acid gas release, etc.), or if it is suspected to be a dangerous situation to all personnel, notify the proper authorities (fire department 911) as soon as possible regarding the emergency.
6. All personnel in the area should be instructed to evacuate in an orderly fashion. Upon exiting, personnel should move away from the area to allow all occupants to safely exit and to be clear of arriving emergency vehicles. If practical evacuation should be conducted upwind.
7. At the earliest possible convenience, the Manager must be notified regarding any major chemical release.

## 12.8 Natural Disaster Plan

1. In the event that a weather related or other natural disaster occurs, all employees should be notified immediately. The announcement should alert employees regarding the potential situation.
2. Employees should monitor local radio reports and should immediately notify nearby employees if funnel clouds or other disaster indicators have been sighted in areas near the site.
3. All building (such as a trailer) occupants should take the following precautionary measures:
   - Move inside a building in case of weather disasters (tornado, severe thunderstorms, etc.).
   - Move away from windows and glass doors.
   - Shut off gases valves, heat sources, open flames, etc.
   - Move to interior rooms or hallways.

   If a tornado strikes a building, seek immediate shelter under a sturdy structure (i.e., desk, countertop, door frame).

## 12.9 Equipment

To properly handle emergency situations, the Contractor should have the following pieces of emergency equipment available if the situation warrants.

### 12.9.1 Field Equipment

1. First Aid Kits - Well stocked first-aid kits must be maintained in all of the Contractor's field vehicles. Additional kits may be necessary at various locations on the project site.
2. Fire Extinguishers - An A, B, C-rated fire extinguisher should be maintained in each of the Contractor's field vehicle. More than one extinguisher may be desirable in situations with a high potential for fire.
3. Eye Wash/Emergency Shower - A portable eye wash and emergency shower should be maintained on-sites where workers may physically contact corrosives or other eye and skin irritants.

## 12.10 Communications

Proper communications channels should be maintained in all phases of the project to insure adequate capability to report and respond to any emergency situations/risks encountered. In addition to the telephone communications in the Contractor's trailer, the following communications equipment should be available and properly maintained:

1. Two-way walkie-talkies or mobile radios to provide communications between Contractor crews
2. One portable cellular telephone that can be in the possession of the HSO/Project Engineer or one of the Contractor crews on the job site.
3. Between the walkie-talkies/mobile radios and the cellular telephone, communication should be possible between all crews and on-site and off-site sources.

## 12.11 Emergency Notifications

The site specific Health and Safety Plan should contain a listing of all phone numbers for emergency contacts. This would include business phone numbers for police, fire and ambulance services plus information on hospital(s), Project Manager, Project Engineer, and Health and Safety Officer including business address, main and emergency phone numbers, and any applicable pager or cell phone numbers. The City of Phoenix Engineering representative should also be included. Please refer to Attachment B for a sample listing.

## 12.12 Accident Reporting

### 12.12.1 Immediately

In the event of an accident or incident or a reportable quantity of a hazardous material or hazardous substance, the following should be contacted immediately:

1. HSO
2. Project Manager
3. City of Phoenix Engineer

### 12.12.2 Contractor Notification Procedures

The Contractor's internal notification procedures should be described in this section.

## 13.0 "SUSPICIOUS MATERIAL" MANAGEMENT

As previously stated "suspicious materials" encountered during the project may be either "special" or "hazardous" as defined by ADEQ. Employees who encounter the following materials listed below should notify the Project Engineer and/or HSO. Suspicious materials should either be left in place until the Project Engineer and CIH can determine the disposition of the waste.

- casting sands and foundry slag
- electrical transformers
- containers, tubs and drums
- stained sand
- batteries
- liquids stored in containers and drums
- medical and/or hospital wastes
- asbestos-containing materials
- materials that cause abnormal readings in field environmental monitoring instruments

As previously mentioned, the City of Phoenix Emergency Response Contractor will manage any "suspicious materials" or areas.

Prepared By SHEARON VAUGHN Date 9/9/99 Checked By RAS Date 9/10/99

Job No. 99158BJ

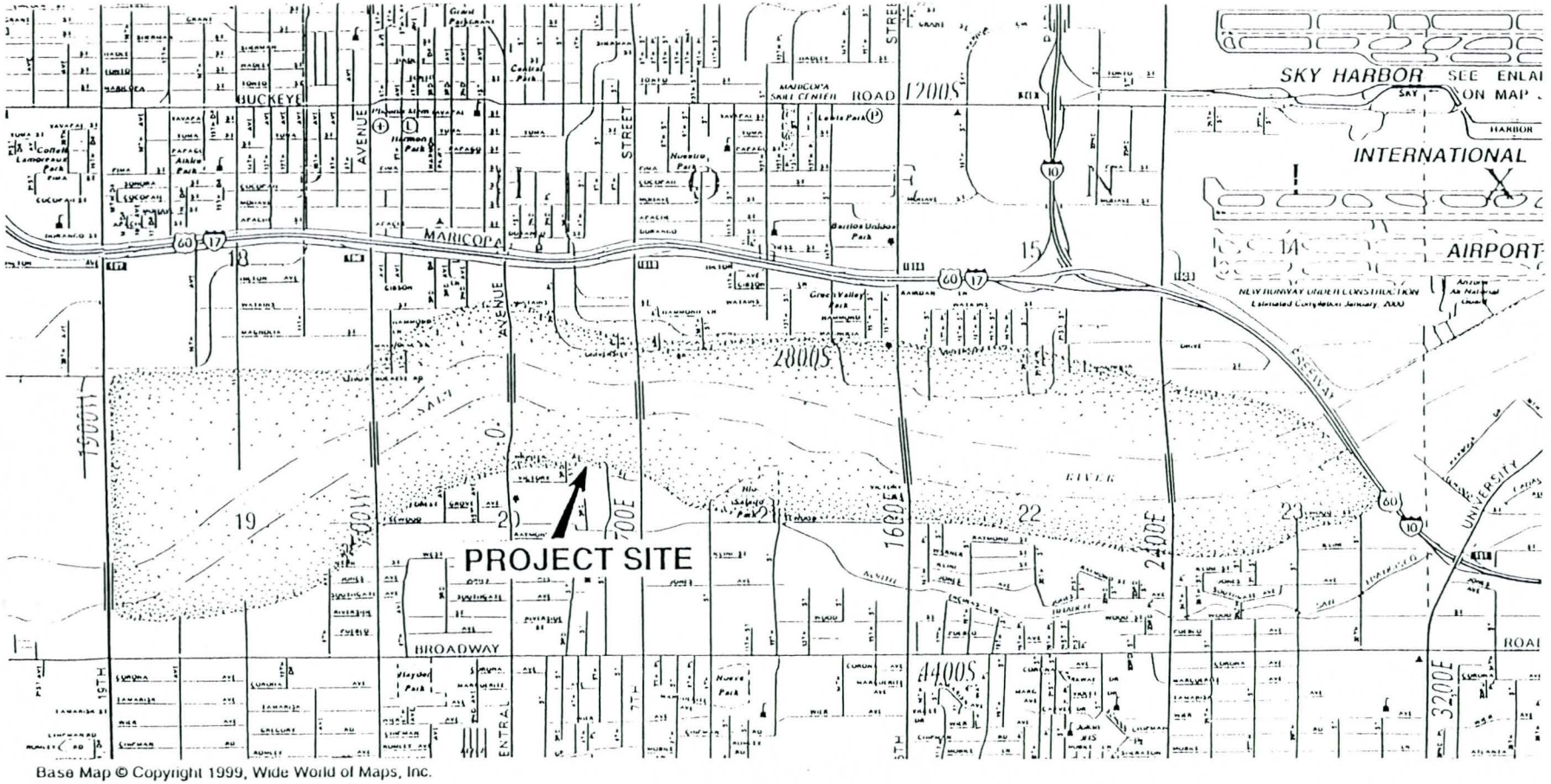
Figure 1

# Vicinity Map

## Rio Salado Project Area, Phoenix AZ

0 1

Mile

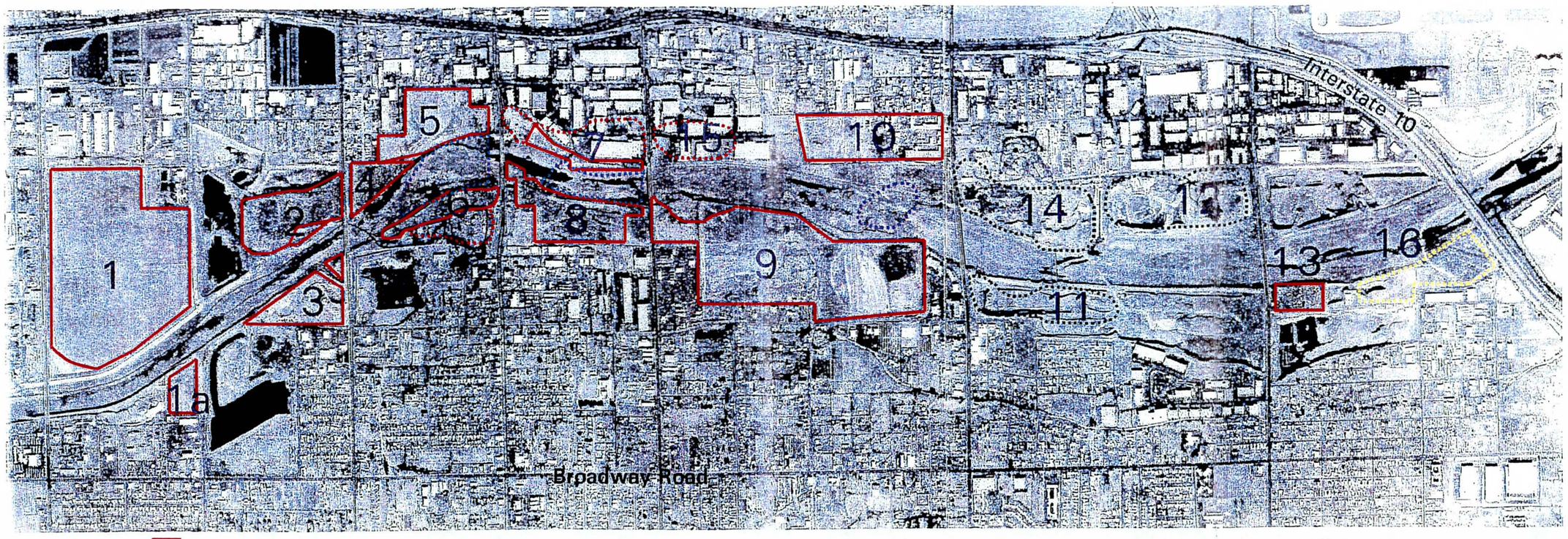





SA&B Environmental & Chemical Consultants
*Providing Practical Environmental Solutions*

3001 W. Indian School Rd., Ste. 312
Phoenix, Arizona 85017
(602) 263-0045

Job No. 99158BJ




Landfill or unknown fill area

Landfill or unknown fill area, extent or presence uncertain

Known inert material

Former fill area removed by excavation

Proposed exploratory excavation area within river channel

**NOTE:** Original figure created by SCS Engineers

Figure 2

## Rio Salado Project Area

0 .5 1.0

Mile
(approx)

Checked By _____ Date _____

Prepared By _____ Date _____


SA&B Environmental & Chemical Consultants
*Providing Practical Environmental Solutions*

3001 W. Indian School Rd., Ste. 312
Phoenix, Arizona 85017
(602) 263-0045

# ATTACHMENT "A"

# RIO SALADO PROJECT AREA

## HEALTH AND SAFETY STATEMENT

I have received a copy of the Rio Salado Project Area and Site Specific Health & Safety Plan and understand its purpose and consent to adhere to its policies, procedures, and guidelines while conducting activities on the Rio Salado Project Area site.

| EMPLOYEE NAME | EMPLOYEE SIGNATURE | COMPANY REPRESENTED | DATE |
|---|---|---|---|
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# ATTACHMENT "B"

## Emergency Telephone Numbers

The Contractor should fill in the appropriate contact, phone numbers and other pertinent information in the site specific Health and Safety Plan.

| | |
|---|---|
| Fire | Emergency 911 |
| Police | Emergency 911 |
| Ambulance | Emergency 911 |
| Phoenix Memorial Hospital | (602) 258-5111 |
| Emergency Response Contractor (Safety Kleen) | (602) 258-6155 |
| Centers For Disease Control | Day (404) 329-3311<br>Night (404) 329-2888 |
| National Response Center | 1(800) 424-8802 |
| Superfund/RCRA Hotline | 1(800) 424-9346 |

| NAME/TITLE | PHONE |
|---|---|
| Project Manager - | |
| Project Engineer - | |
| HSO - | |
| HSO - | |
| CIH- | |
| City of Phoenix Contact | |
| Additional Contractor Support | |

# APPENDIX "C"

## GROUNDWATER DEWATERING REPORT FORM

# RIO SALADO PROJECT GROUNDWATER DEWATERING REPORT FORM

I. Instructions: Complete all sections of this form for each point (well or sump) where groundwater was withdrawn during the preceding month. Forms must be submitted on or before the 15th of each month to:

**Donn Stoltzfus**
**City of Phoenix Office of Environmental Programs**
**200 West Washington Street, 14th Floor**
**Phoenix, Arizona 85003**

II. Reporting Period: _____

III. Complete the following table listing each withdrawal point.

| Withdrawal Point and Type | ADWR Registration Number | Quantity Withdrawn (Acre/Feet) | Method of Measurement |
|---|---|---|---|
| | | | |
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| | | | |

IV. Name and address of reporting party:

_____
_____
_____
_____

I (we), _____ hereby swear that all information
(print name and title)

provided on this form is true and correct to the best of my/our knowledge and belief.

Signature _____ Date _____

R:\DMS\form.DOC

# APPENDIX "D"

## WASTE REMOVAL REPORT FORM

# RIO SALADO PROJECT WASTE REMOVAL REPORT FORM

I. **Instructions**: The purpose of this report is to provide a detailed record of any waste materials that are encountered and removed from the project area. All descriptions must be thorough and reported within 14 days of the removal of any solid wastes. Attach additional pages if necessary.

II. Describe the location where the wastes were encountered.

_____

_____

_____

III. Provide a detailed description of the type of waste material. Attach notes or photographs if available.

_____

_____

_____

_____

_____

_____

_____

_____

_____

IV. Describe the procedures used to excavate, handle, store and dispose of the wastes, including the names of any subcontractors. Include the dimensions of the excavation, if any.

_____

_____

_____

_____

_____

_____

_____

_____

_____

V. Describe the disposal method and location. Attach any related documentation such as waste manifests, weigh tickets, hauling receipts, etc. Provide a contact name and number at the disposal facility.

_____

_____

_____

_____

_____

_____

_____

_____

_____

I (we) _____ hereby swear that all information
(print name and title)

provided above is true and correct to the best of my (our) knowledge and belief.

Signature_____Date_____

# APPENDIX "E"

## PRODUCTION WELL
## PLANS AND SPECIFICATIONS

PRODUCTION WELL

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

| | |
|---|---|
| ASTM A 53 | (1997) Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless |
| ASTM A 606-98 | (1998) Steel, Sheet and Strip, High Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, with Improved Atmospheric Corrosion Resistance |
| ASTM C 139 | (1993) Specification for Electric-Fusion (Arc)-Welded Steel Pipe (sizes 4 inches and over |
| ASTM C 150 | (1997) Portland Cement |
| ASTM D 2239 | (1996a) Polyethylene (PE) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter |
| ASTM D 2487 | (1993) Classification of Soils for Engineering Purposes (Unified Soil Classification System) |
| ASTM F 480 | (1994) Thermoplastic Well Casing Pipe and Couplings Made in Standard Dimension Ratios (SDR), SCH 40 AND SCH 80 |

AMERICAN WATER WORKS ASSOCIATION (AWWA)

| | |
|---|---|
| AWWA-01 | (1995) Standard Methods for the Examination of Water and Wastewater |
| AWWA A100 | (1990) Water Wells |
| AWWA B300 | (1992) Hypochlorites |
| AWWA B301 | (1992) Liquid Chlorine |
| AWWA C200 | (1991) Steel Water Pipe - 6 In. (150 mm) and Larger |
| AWWA C206 | (1991) Field Welding of Steel Water Pipe |
| AWWA C654 | (1991) Disinfection of Wells |

CODE OF FEDERAL REGULATIONS (CFR)

40 CFR 141 National Primary Drinking Water Regulations

ARIZONA ADMINISTRATIVE CODE (AAC)

AAC Section R12-15-816 Well Abandonment

1.2 MEASUREMENT AND PAYMENT

Payment will not be allowed for wells or test holes that do not meet specifications or must be abandoned due to faulty construction practices or for the convenience of the Contractor.

1.2.1 Test Hole

Compensation for the test hole will be made at the contract unit price and will include material, equipment, and labor required to drill and perform lithologic logging of the test hole. Depth shall be measured as the total linear distance between ground surface and bottom of hole. If the test hole is developed into the permanent production well with no increase in diameter, the Contractor will be compensated as described below, and separate payment will not be made for the test hole.

1.2.2 Production Well

Compensation for the water well will be made at the contract unit price and will include material, equipment, and labor required to drill, develop, perform tests, construct and complete the permanent production well. Depth shall be measured as the total linear distance between ground surface and bottom of well screen or bottom of inner casing, whichever is lower.

1.3 GENERAL REQUIREMENTS

The production well shall be located as shown on the contract drawings. The production well shall penetrate the desirable water-bearing stratum of subunit A of the Upper Alluvial Unit (UAU) to a depth not to extend beyond the first encountered aquitard, subunit B. It is anticipated that the final production well shall be constructed such that it produces a continuous yield of approximately 1 million gallons per day.

1.4 SUBMITTALS

The following plans, test reports, permits and records shall be submitted to the Engineer as follows.

Plans

Drilling Plan
Proposed plan for drilling test holes and constructing production wells, before beginning work. The plan shall include, but shall not be limited to, the proposed method of drilling and equipment to be used, a lost circulation and drilling fluids plan, details on proposed casing, well screen, grouting material, filter pack material, temporary pump and method for placing filter pack and other annular materials where required, and methods and equipment

proposed for developing the well and for performing pump tests. Work shall not be performed until the drilling plan has been approved and deviation from the approved drilling plan will not be permitted without approval of the Engineer. Details of specific methods (Environmental Protection Plan to be employed to control potential contamination or pollution arising from production well installation activities, i.e., pollutants from chemicals and/or petroleum chemicals used to maintain and run the drilling and production well installation equipment and procedures, shall also be included.

Environmental Protection Plan
Proposed plan for providing environmental protection due to borehole and production well drilling and installation activities. The plan shall be incorporated into the Drilling Plan, as above.

Test Reports

Water Quality Test Report
Test report for water quality within 28 calendar days following the conclusion of each test.

Pump Test Report
Aquifer pump test report for production well pump testing within 28 calendar days following the conclusion of the pump test.

Plumbness and Alignment Test Report
Plumbness and Alignment test report for well plumbness and alignment to follow within 1 day after production well is successively installed.

Well Development Test Report
Well development test report to follow within 2 calendar days of successful production well development.

Permits

A copy of all permits, licenses, or other legal requirements necessary for execution of the work. Before beginning drilling work the Contractor shall coordinate with the City of Phoenix to ensure that the Notice of Intent to Drill (NOI), Hydrologic Testing Permit, General NPDES permit and the production well Recovery and Service permits have been secured by the City. A copy of all such permits as necessary to drill the test hole and drill and construct the production well shall be obtained by the Contractor from the City of Phoenix and furnished to the Engineer.

Test Hole (Borehole) Abandonment Permit
The Contractor shall obtain a Borehole Abandonment Permit from ADWR, if necessary.

Records

Boring Log
An accurate log maintained during the drilling of the production well borehole. As a minimum, the log shall include depths, elevations, and descriptions of all formations encountered; a time versus drilling depth record; identification of each stratum according to ASTM D 2487; or standard rock nomenclature, as necessary; and depths at which groundwater is encountered. The Contractor shall prepare a graphic boring log to scale

showing the required details. Five prints of the boring log drawing shall be submitted. This drawing shall be used for determining the final production well design, selection of the filter pack, well screen location and screen openings and screen slot size.

1.5 ENVIRONMENTAL PROTECTION

The Contractor shall take necessary precautions to prevent contaminated water, or water having undesirable physical or chemical characteristics, from entering the water supply stratum through the well bore or by seepage from the ground surface; and shall prevent contamination of the ground surface or of surface waters resulting from drilling of the test-hole or production well.

1.6 TEST HOLE

1.6.1 Test Hole

Before starting construction of the production well, a test hole of a maximum of 6 inches in diameter shall be drilled at the location of the well into the target water bearing stratum. The test hole shall be used to determine the expected yield from the production well, optimum depth, and to log the strata encountered. The test hole may be converted to the permanent production well. If the test hole is not used for the permanent production well, the test hole shall be filled with sand-cement grout placed by tremie or pumped through the drill pipe and/or in accordance with state of Arizona borehole abandonment procedures.

1.7 ABANDONMENT OF PRODUCTION WELL

If the Contractor fails to construct a production well to specifications or of the required capacity, or if the production well is abandoned because of loss of tools or for any other cause, the Contractor shall fill the abandoned hole with sand-cement grout and remove the casing and abandon the well in accordance with AAC R12-15-816.

PART 2 PRODUCTS

2.1 CASING

The casing shall be of sufficient size for the desired production well yield as specified in the contract drawings. All casing, screen and other production well material shall be of compatible materials to prevent galvanic reaction between components of the completed production well.

2.1.1 Steel Conductor Casing and Couplings

Steel conductor casing shall be 28-inch diameter with a minimum wall thickness of 5/16-inches and shall be composed of carbon steel, conforming to ASTM A 53 or ASTM A 139. The conductor casing shall be factory assembled in not less than 20 foot lengths. The ends of each joint shall be machine beveled perpendicular to the casing axis to ensure the straightness of each assembled section. Casing joints shall be field welded in accordance with AWWA C206. All conductor casing material shall be new and no rusted casing will be accepted.

2.1.3 Blank Steel Casing

The inner blank steel casing shall have an inside diameter of 18-inches with a minimum wall thickness of ¼-inches and shall be high strength, low alloy steel, conforming to ASTM A 606-98. A 10 foot section of blank casing (tail pipe) shall be installed beneath the lowermost section of the casing string. The bottom of the tail pipe shall be fitted with a closed shoe or plug welded to the casing.

2.2 PRODUCTION WELL SCREENS

The selection of the screen shall be submitted for approval as part of the drilling plan. The screen and all accessories required for satisfactory operation shall be essentially standard products of manufacturers regularly engaged in the production of such equipment. Field constructed screen is not acceptable. "Blanks" in the well screen may be utilized in nonproductive zones and shall be considered "casing."

2.2.1 Metal Screen

The production well screen shall have an inside diameter of 18-inches with a minimum wall thickness of ¼-inches and shall be high strength low alloy louvered steel, conforming to ASTM A 606-98. It is anticipated that screen slot size shall be a louvered, steel casing with 5/32-inch slots, the final screen slot size shall be determined according to sieve analysis of formation samples taken during the test hole drilling. The length of the screen shall be as specified in the contract drawings. The ends of each assembled section of production well screen shall be machine beveled. Production well screen end fittings or weld rings shall be made of the same material as the screen body, shall be the same thickness as the casing, shall be 6-inches in length and shall be securely fusion welded to each screen section.

2.2.2 Well Casing Guides

The portions of the blank steel casing metal screen that are below the conductor casing shall be fitted with approved centering guides as shown on the contract drawings. The guides shall be installed at no greater than 40 foot intervals. These guides shall be oriented in such a manner as to facilitate the installation and removal of tremie pipes required for filter pack placement and grouting operations in the annulus. Casing guide materials shall be of the same physical and chemical properties as the casing or screen, as applicable.

2.2.3 Gravel Make-Up Pipe

In the annulus between the inner casing and the conductor casing, the Contractor shall furnish and install a nominal 2-inch diameter, low carbon steel, gravel make-up pipe as shown on the contract drawings. The pipe shall meet the requirements of ASTM A 53 and shall be of the same physical and chemical properties as the production well casing.

2.2.4 External Sounding Tube

In the annular space between the inner casing and the borehole wall, the Contractor shall furnish and install a 2-inch diameter, low carbon steel,

sounding tube as shown on the contract drawings. The bottom 20 feet of the sounding tube shall be factory slotted with the slot size similar to that as the well screen. The pipe shall meet the requirements of ASTM A 53 and shall be of the same physical and chemical properties as the production well casing.

2.2.5 Interior Venting Tube

The Contractor shall furnish and install an interior venting tube, as attached to the blank inner casing, at approximately a 30 degree angle from the inner casing, as shown on the contract drawings. The pipe shall meet the requirements of ASTM A 53 and shall be of the same physical and chemical properties as the production well casing.

2.3 FILTER PACK

Filter pack shall be a product of a commercial sand and gravel manufacturer, shall be properly sized and graded for the surrounding soil and water encountered, and shall be composed of round, hard, waterworn siliceous gravel, free of flat or elongated pieces, organic matter, or other foreign matter. The filter pack shall be of a size which will allow the maximum flow of water into the production well and prevent the infiltration of sand and silt. The gradation of the filter pack shall be such that the uniformity coefficient is not more than 2.5. The filter pack shall be thoroughly sterilized with chlorine or hypochlorite immediately before being placed in the production well annulus. For bidding purposes, a gradation blend equivalent to a 1 by 6 (U.S. Standard Sieve Mesh no. 1 and no. 6) TACNA gravel is acceptable.

2.4 CEMENT GROUT

Cement grout shall consist of portland cement conforming to ASTM C 150, Type I or II, sand and water. Cement grout shall be proportioned not to exceed 6 gallons of water per cubic foot of cement, with a mixture of such consistency that the well can be properly grouted. No more than 3 percent by weight of bentonite powder may be added to reduce shrinkage.

PART 3 EXECUTION

3.1 PRODUCTION WELL CONSTRUCTION

The method of drilling shall be as approved by the Engineer and shall conform to all state and local standards for water well construction. The execution of the work shall be by competent workmen and shall be performed under the direct supervision of an experienced well driller. Casing pipe, well screens, and joint couplings shall be of compatible materials throughout each well. The well shall be a filter pack well, completed in Subunit A of the UAU (Upper Alluvial Unit), (see geotechnical appendix of Corps of Engineers Design Documentation Report, figure 4). The well shall be drilled straight, plumb, and circular from top to bottom, to a depth of approximately 200 feet below ground surface. The well shall be initially drilled by bucket-auger drill methods from the ground surface to

approximately 70 feet below the ground surface and the bottom of the conductor casing shall be set at this depth. The borehole below the conductor casing shall be drilled using reverse-circulation drilling methods. The borehole shall fully penetrate Subunit A of the UAU and shall terminate approximately 15 feet into Subunit B of the UAU.

3.1.1 Setting Conductor Casing

The conductor casing shall be 28-inch nominal diameter, with a minimum wall thickness of 5/16-inches and shall be composed of carbon steel. The conductor borehole shall be drilled by bucket-auger drilling methods and shall be of sufficient size to leave a concentric annular space of not less than 3-inches between the outside of the outer casing and the walls of the borehole. The annular space between the outer casing and the walls of the holes shall be filled with cement grout. Acceptable methods of grouting are detailed in AWWA A100; the approved method shall specify the forcing of grout from the bottom of the space to be grouted towards the surface. A suitable grout retainer, packer, or plug shall be provided at the bottom of the conductor casing so that grout will not leak into the bottom of the production well. Grouting shall be done continuously to ensure that the entire annular space is filled in one operation. The interior of the casing shall be maintained with water at the same elevation as the grout. After grouting is completed, drilling operations shall not be resumed for at least 72 hours to allow proper setting of the grout.

3.1.2 Construction of Inner Casing and Screen

After the grout has set, the production well borehole shall be drilled at the required diameter, to the required depth, by reverse-circulation drilling methods which will prevent caving of the borehole before or during installation of the filter pack, well screen and inner casing. The production well screen and inner casing shall be lowered into the borehole by a method which will allow for control of the rate of fall of the well screen and inner casing at all times. Production well screen and inner casing shall not be dropped or allowed to fall uncontrolled into the borehole. The inner casing shall extend up through the conductor casing to the ground surface. Approved centering devices shall be installed at a spacing of 90 degrees on the outside of the inner casing prior to production well construction at intervals not exceeding 40 feet along the length.

3.1.3 Construction of Filter Pack

After the screen and inner casing have been concentrically set in the borehole, the approved filter pack shall be constructed around the screen by filling the entire space between the screen and the borehole walls with a tremie pipe to the depth specified in the contract drawings. A gravel (filter pack) make-up pipe having an inside nominal diameter of not less than 2-inches, a nominal 2-inch diameter interior venting tube and a nominal 2-inch diameter interior sounding tube shall be installed within the production well as shown on the contract drawings.

The top of each pipe shall be fitted with a threaded cap or plug. The filter pack tremie pipe shall be arranged and connected, at the surface of the ground, to water pumping and filter pack equipment so that water and filter pack, fed at uniform rates, is discharged as the filter pack fills the borehole from the bottom up. The filter pack and water conductor shall

be raised at a rate that will keep the bottom of the pipe between 1 and 3 feet under the filter pack level at all times.

One pound of 65% calcium hypochlorite shall be added to each cubic yard of filter pack installed. During the entire filter packing operation, clean water shall be circulated through the screen and up the annular space outside of the casing. When the filter pack has been placed, a swab shall be carefully worked opposite the entire perforated interval, while circulating clean water. As the filter pack settles, more shall be added. This operation shall be continued until there is no further measurable settlement of the filter pack.

If the Contractor desires to use methods of placing filter pack other than those specified, the details of the method and equipment proposed shall be submitted to the Engineer, before filter pack placing is begun; however, dumping filter pack from the surface of the ground and agitating the well in an effort to settle the filter pack will not be allowed. The filter pack shall be installed continuously and without interruption until the filter pack has been placed to the depth specified in the contract drawings.

3.1.3 Neat Cement Annular Seal

The neat cement annular seal shall be installed as per Arizona Department of Water Resources Standards and as per the contract drawings. The seal shall be installed such that grout is prevented from reaching the filter pack.

3.1.3 Production Well Plumbness and Alignment

Upon placement of the annular seal, plumbness and alignment shall be tested. Plumbness shall be tested by surveying the cased production well with a high speed plumb-bob assembly with full gauge centralizers. Well orientation measurement shall be taken every 20 feet for the entire depth of the well. The accuracy of the measurements shall be 2.5 minutes for inclination, 1 degree for azimuth and 1 foot for true vertical depth.

Alignment will be tested by lowering a 40 foot long section of drill pipe (dummy section) into the production well. The outer diameter of the dummy shall not be more than ½-inch smaller than the diameter of that part of the casing being tested. The dummy shall consist of a rigid spindle with three rings, each ring being 17-inches wide. The rings shall be cylindrical and shall be spaced one at each end of the dummy and one in the center. The central member of the dummy shall be rigid so that it will maintain the alignment of the axis of the rings. If the dummy fails to move freely throughout the length of the casing or production well screen for the depth of the production well, or should the production well vary from the vertical in excess of two-thirds the inside diameter of that part of the production well being tested for each 100 feet of depth, the plumbness and alignment of the production well shall be corrected by the Contractor. If the faulty alignment and/or plumbness is not correctable, as determined by the Engineer, the well shall be abandoned as specified in paragraph ABANDONMENT OF WELLS and a new production well drilled at no additional cost to the owner.

3.2 PRODUCTION WELL DEVELOPMENT

After construction, the production well shall be developed in accordance with the drilling plan, by approved methods until the water pumped from the

production well is substantially free from sand and until the turbidity is less than 5 on the Jackson Turbidity Scale specified in AWWA-01. Developing equipment shall be of an approved type and of sufficient capacity to remove all cutting fluids, sand, rock cuttings, and any other foreign material. The production well shall be thoroughly cleaned from top to bottom before beginning aquifer testing (pump testing).

The production well shall first be developed by swabbing. The production well screen shall be swabbed with a close-fitting double-swab or surge block, while airlifting or pumping at a sufficient rate to remove the fines. Swabbing shall commence from the bottom of the lowermost section of production well screen, upward. Swabbing of each interval of production well screen shall consist of up and down movement of the swab through the entire interval followed by a period of airlifting/pumping to remove fines. Airlifting/pumping shall continue for each cycle until the water discharged from the production well is essentially free of sand and other fines. Upon concurrence with the Engineer, the Contractor shall move the swab to the next interval and continue development. The Contractor shall monitor and add filter pack to the annulus through the gravel make-up pipe as the filter pack settles.

After swabbing is complete, development shall continue with pump surging. The Contractor shall furnish, install, operate and remove a turbine pump for developing the production well and conducting pump testing. The pump and power source shall have a capacity to pump from 500 to 2,500 gallons per minute (gpm) with a pump suction inlet setting at approximately 150 feet. The power source shall be a variable-speed type. The Contractor shall also supply a flow meter with a 6-digit, straight reading totalizer.

The production well shall be pumped initially at lower rates until the water clears and then the pump rate increased gradually, until the maximum pump rate is reached. At frequent intervals, the pump shall be stopped and the water in the pump column shall be allowed to surge back through the pump bowls and through the production well screen. The cycle of pumping and surging shall be repeated until the discharge water is clear of fines and there is no increase in specific capacity. The production well shall be thoroughly developed so that it will not produce an aggregate amount of fine sand in excess of 5 parts per million (ppm) within 20 minutes after commencement of pumping. Development procedures, quantities, sand production and times shall be recorded in the driller's log.

## 3.3 TESTS

Following construction of the production well an aquifer (capacity) test shall be performed. If the capacity and water quality tests indicate that the required capacity and water quality can be obtained, the permanent production well, as specified, shall be completed at that depth.

### 3.3.1 Aquifer Test

The Contractor shall furnish and install an approved temporary test pump, with discharge piping of sufficient size and length to conduct the water being pumped to point of discharge, and equipment necessary for measuring the rate of flow and water level in the production well.

Following completion of production well development, the water level in the production well shall be allowed to recover for a period of 24 hours. A

step-drawdown test shall then be performed. The step-drawdown test shall consist of at least five increasing pump rates, each step continuing for approximately 2 hours. It is anticipated that these steps will range from 500 to 2,500 gpm. During the test, the Contractor shall measure and record the pumping water level and discharge rate from the pumping production well at 10-minute increments, as well as monitor water levels in the adjacent observation well (monitoring well RSMW-1). When the test is completed, the pump shall be stopped and the water allowed to recover for 24 hours.

A long term, constant-rate pumping test shall commence after the water level has recovered from the step-drawdown test. The pumping rate for this test shall be determined by the Engineer after analysis of the step-drawdown test results. The Contractor shall ensure that the pumping rate selected remains constant throughout the test. It is anticipated that the long-term pumping test will continue for approximately 72 hours. During the test, the Contractor shall measure and record the pumping water level, discharge rate, engine revolutions per minute (rpm) and calculate the drawdown and specific capacity of the production well. In addition, the Contractor shall monitor water levels in the adjacent observation well. These measurements shall be taken at the following frequencies: at every ½-minute during the first 5 minutes, after starting the pump; then every 5-minutes for an hour; then every 20-minutes for 2 hours. From this point readings taken at hourly intervals shall be sufficient. The observation well shall be read on the same schedule as the pumped production well.

When the long-term test is complete, the pump shall be stopped and the Contractor shall record recovery water level measurements for a period of approximately 24 hours. Supervision by the drilling Contractor of long-term pumping tests shall be maintained on a 24-hour basis by qualified personnel. The record of the test, in triplicate, shall be delivered to the Contracting Officer.

3.3.3 Test for Quality of Water

When the aquifer testing has been completed, the Contractor shall secure samples of the water in suitable containers, and of sufficient quantity, to have bacterial, physical, and chemical analyses made by an Arizona certified testing laboratory, except that the bacterial analysis may be made by the applicable State Board of Health, if desired. Water Quality Analysis shall address each item specified in the Water Quality Analysis Table at the end of this section. Expenses incident to these analyses shall be borne by the Contractor and the results of the analyses shall be furnished to the Contracting Officer. All sampling and analyses shall be performed using EPA and State approved methods, procedures, and holding times.

3.4 DISINFECTING

After completion of tests of production well, or at time of tests for yield and drawdown test, whichever is later, the production well shall be disinfected by adding chlorine, conforming to AWWA B301, or hypochlorite, conforming to AWWA B300, in sufficient quantity so that a concentration of at least 50 ppm of chlorine shall be obtained in all parts of the production well. Chlorine solution shall be prepared and introduced into the production well in an approved manner and shall remain in the production well for period of at least 24 hours. Disinfection of the production well shall be in accordance with any method described in Sections A1 thru A10 of AWWA A100. After the contact period, the production well shall be pumped

until the residual chlorine content is not greater than 1.0 ppm. The production well shall be disinfected and redisinfected as may be required until two consecutive samples of water are found upon test to be free from Coli Acrogenes group of organisms.

3.5 WELL PAD

A concrete well pad, as shown in the contract drawings, shall be constructed to prevent the infiltration of surface water or precipitation into the production well and to provide a foundation for the permanent pump and motor. The well pad shall be 8 feet square by 12-inches thick and shall be constructed of reinforced-concrete with a required strength of 2,500 pounds-per-square-inch.

3.6 CAPPING

Upon completion of production well disinfection and surface completion, the Contractor shall temporarily cap the production well by placing a lockable steel cap over the top of the casing. The permanent interior venting tube, exterior sounding tube and gravel make-up pipe shall be installed as shown on the contract drawings and shall be fitted with a threaded cap.

3.7 CLEAN-UP

Upon completion of the production well construction and other incidentals, all debris and surplus materials resulting from the work shall be removed from the job site.

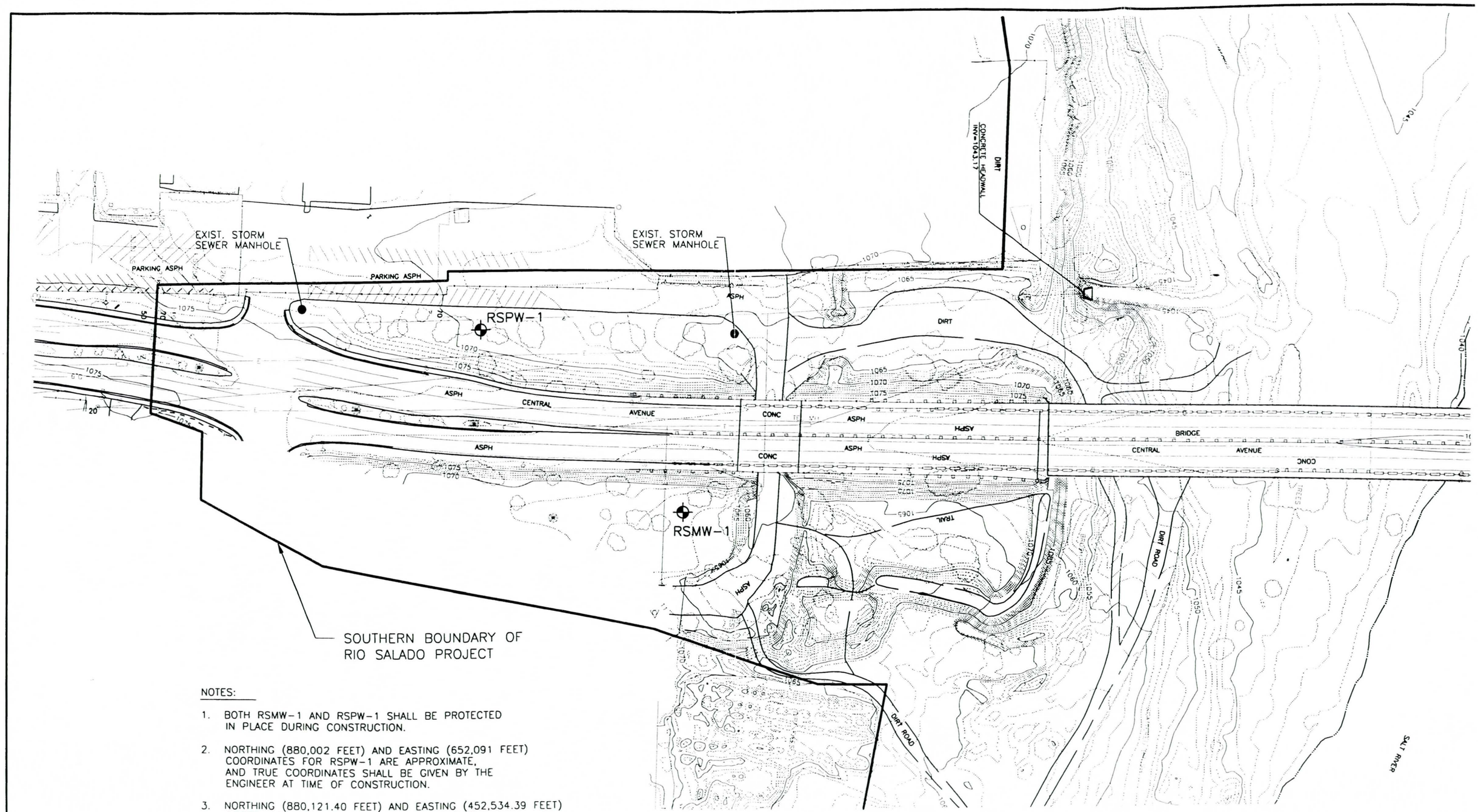
# WATER QUALITY ANALYSIS TABLE

## Physical Characteristics

Color.
Taste.
Threshold odor number.
Turbidity.
Specific Conductance in ohms per cubic centimeter and 25 degrees C.
pH value.
Temperature.

## Chemical Characteristics (Expressed as mg/L)

Arsenic.
Barium.
Cadmium .
Chromium .
Copper.
Lead .
Mercury.
Selenium.
Silver.
Zinc.
Fluoride as F.
Manganese as Mn (dissolved and total).
Iron as Fe (dissolved and total).
Suspended Solids.
Total Dissolved Solids.
Calcium as Ca.
Magnesium as Mg.
Total Hardness as CaCO(3).
Sulfides.
Total Oxidizable Nitrogen W.
Total Kjeldahl Nitrogen.
Total Organic Halogens.
TOC.
Sulfates as SO(4).
Chlorides as Cl.
Bicarbonates as HCO(3).
Ammonia as N.
Carbonates as CO(3).
Nitrites as N.
Nitrates as N.
Alkalinity (methyl-orange).
(Phenolphthalein) as CaCO(3).
Silica as SiO(2).
Sodium and Potassium as Na.
Volatile Organic Compound analysis by EPA Method 8270.
Semi-Volatile Organic Compound analysis EPA Method 8260.
Pesticides and PCBs analysis by EPA Method 8081 and 8082.




NOTES:

1. BOTH RSMW-1 AND RSPW-1 SHALL BE PROTECTED IN PLACE DURING CONSTRUCTION.
2. NORTHING (880,002 FEET) AND EASTING (652,091 FEET) COORDINATES FOR RSPW-1 ARE APPROXIMATE, AND TRUE COORDINATES SHALL BE GIVEN BY THE ENGINEER AT TIME OF CONSTRUCTION.
3. NORTHING (880,121.40 FEET) AND EASTING (452,534.39 FEET) COORDINATES FOR RSMW-1 ARE AS SURVEYED.

N

0 50 100
SCALE IN FEET
CONTOUR INTERVAL = 2 FEET

263-1100 1-800-STAKE-IT

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| APPROVED BY: | XXX | X-2000 |
| CLIENT | | |

DAMES & MOORE

U.S. ARMY CORPS OF ENGINEERS AND CITY OF PHOENI

PRODUCTION WELL RSPW-1 SITE PLAN

RIO SALADO HABITAT RESTORATION PROJECT

JOB NO. 00109-042-05

DRAWING NO. 1

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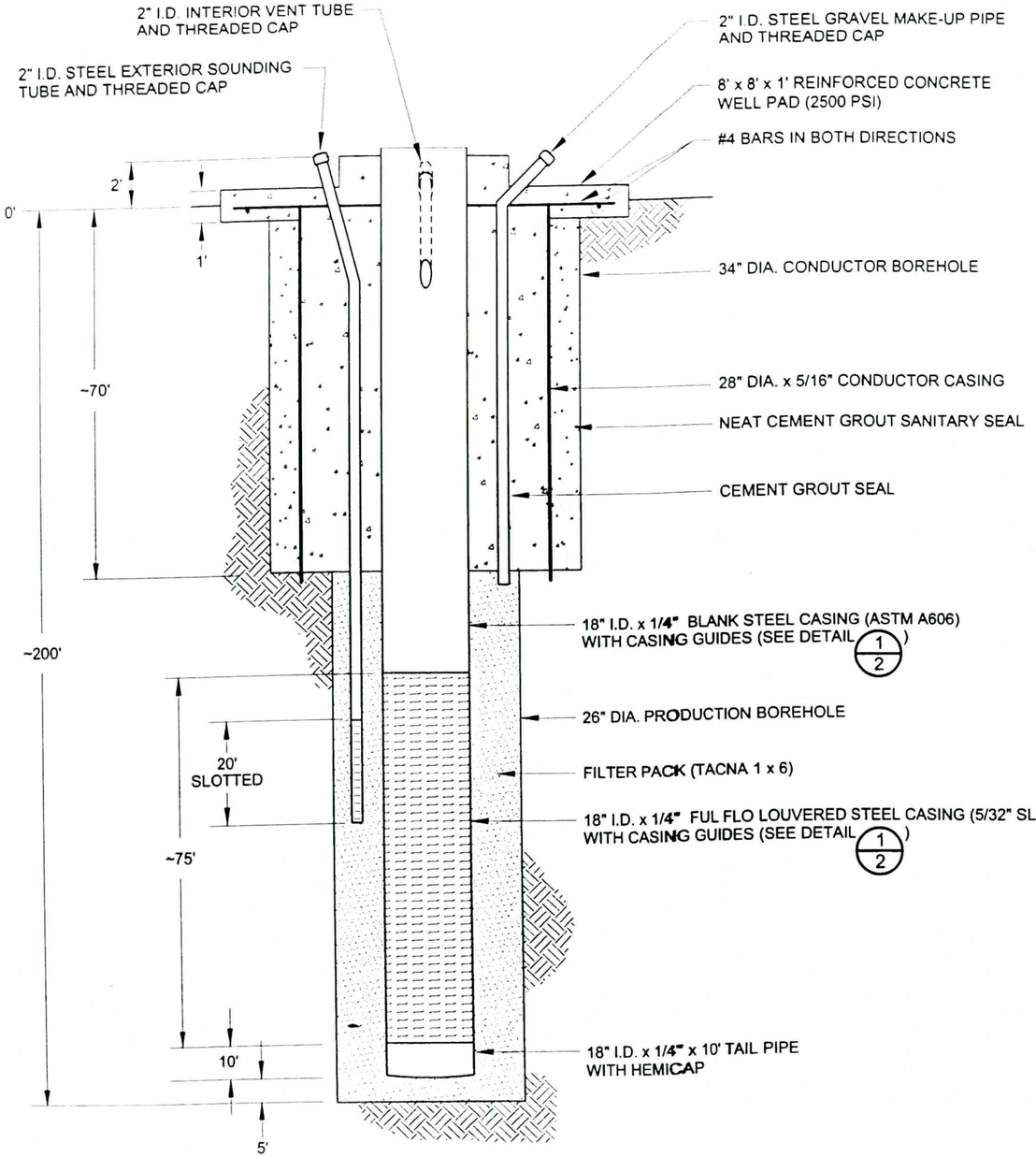


## WELL CONSTRUCTION

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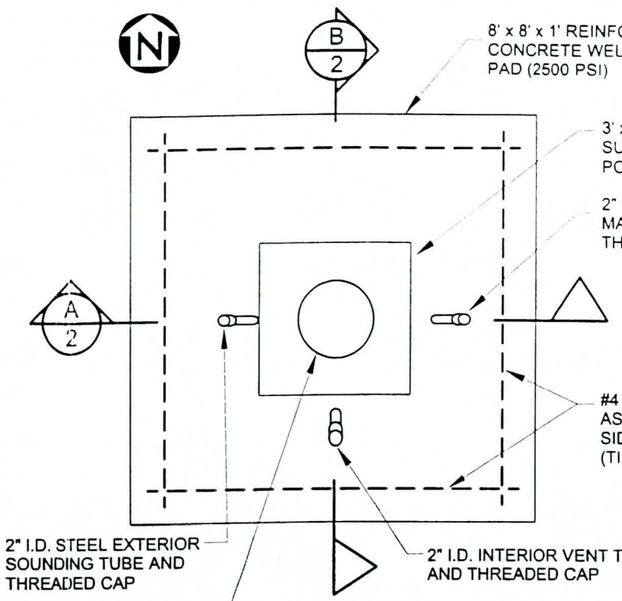


## PLAN VIEW

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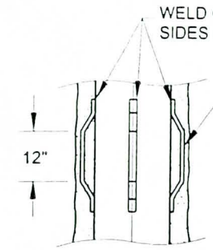


## 1/2 CASING GUIDE DETAIL

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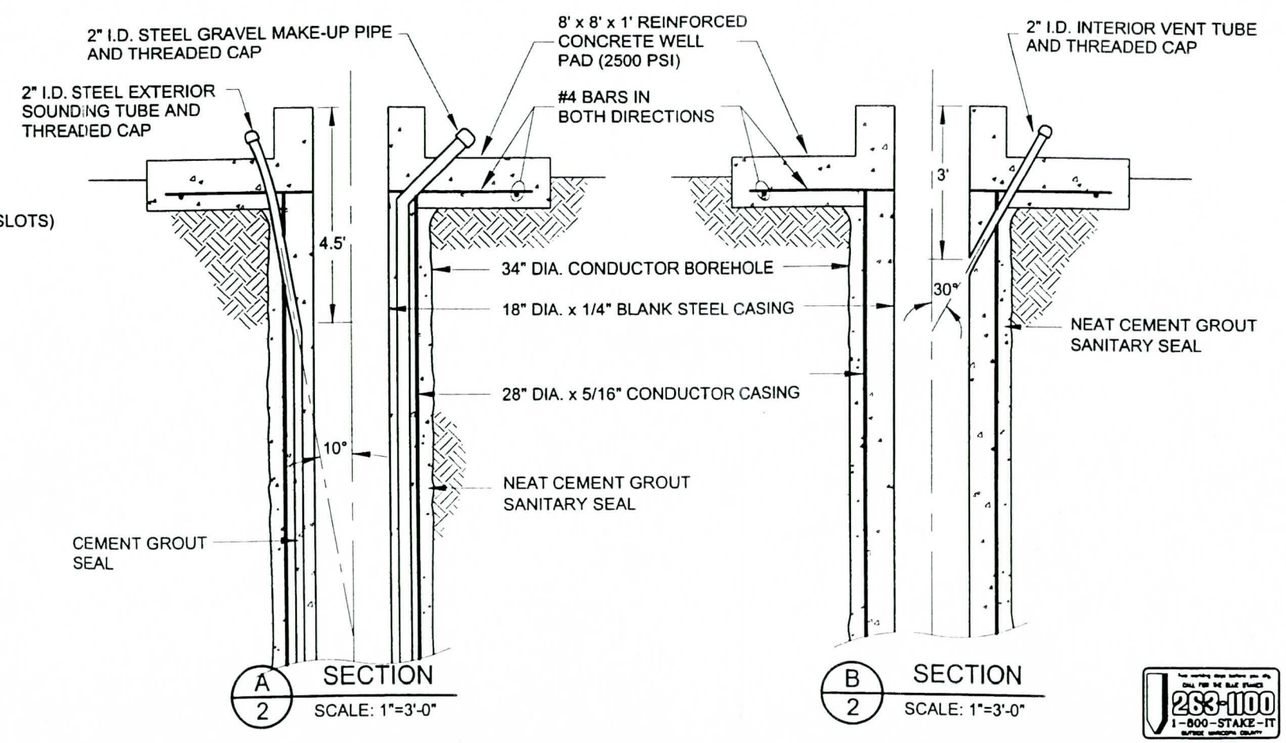


## A/2 SECTION

SCALE: 1"=3'-0"

## B/2 SECTION

SCALE: 1"=3'-0"

263-1100 1-800-STAKE-IT

| REFERENCES TITLE | REFERENCES TITLE |
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| DRAWN BY: MDH/KLP | 11-99 |
| CHECKED BY: CSW | 01-00 |
| APPROVED BY: XXX | X-00 |
| CLIENT | |

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U.S. ARMY CORPS OF ENGINEERS AND CITY OF PHOENIX

PRODUCTION WELL RSPW-1 DESIGN DETAILS

RIO SALADO HABITAT RESTORATION PROJECT

JOB NO. 00109-042-058

DRAWING NO. 2

REV. R

109\042\REV-BVA1341SAB 2-11-00