8

CONSTRUCTION SPECIFICATIONS

FOR

CONTRACT FCD 2001C015

GUADALUPE DRAINAGE IMPROVEMENT PROJECT

PCN 035.02.31

Bradford D. Olbert

Registered Professional Engineer (Sanitary)
CERTIFICATE NO. 13955
BRADFORD D. OLBERT
Date Signed 11/27/2001
ARIZONA, U.S.A.

(Area to left reserved for Engineer's Seal)

Prepared By

Sverdrup Civil, Inc.
875 West Elliot Road, Suite 201
Tempe, AZ 85284-1130

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

Recommended by: Edward A. Raleigh Date: 11/29/01
Edward A. Raleigh, P.E.
Manager Engineering Division

Issued for Public Bidding by: [illegible] Date: 11/30/01
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 2001.

AGENDA ITEM C-69-02-003-5-00

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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 2001C015

PCN 035.02.31

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Registered Professional Engineer (Sanitary)
CERTIFICATE NO.
13955
BRADFORD D.
OLBERT
Date Signed 11/27/00
ARIZONA, U.S.A.

(Area to left reserved for Engineer's Seal)

Bradford D. Olbert

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

INVITATION FOR BID

BID OPENING DATE: **January 24, 2002**

PROJECT LOCATION: The project is located within the Town of Guadalupe with project features located along the Highline Canal and within Town streets, primarily east of Avenida del Yaqui.

PROPOSED WORK: The project includes the construction of four (4) retention basins located along the Highline Canal. These basins will be landscaped for multi-use. Storm drains will be constructed within Town streets and along the canal, and ditches will also be constructed along the canal. Sewer and water line relocations will be required.

BIDS:

SEALED BIDS for the proposed work will be received by the Flood Control District of Maricopa County, 2801 West Durango Street, Phoenix, Arizona 85009 until 2:00 P.M. (local time) on **Thursday, January 24, 2002** 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.

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.

PRE-BID CONFERENCE:

A Pre-Bid conference will be held on Wednesday, January 9, 2002 at 2:00 P.M. (local time) at the Flood Control District of Maricopa County, 2801 West Durango Street, Phoenix, Arizona. All potential contractors and subcontractors are encouraged to attend this pre-bid conference and be prepared at that time to submit in writing and discuss any comments concerning this solicitation.

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 thirty (330) calendar days from the date of Notice to Proceed.

MINORITY AND WOMEN-OWNED BUSINESS ENTERPRISE (MWBE) 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 Women-Owned Business Enterprise Program, effective January 1, 1992, is incorporated herein by reference.

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

For this contract, a goal of ten percent (10%) MWBE is established for Minority and 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 Maricopa County Minority and Women-Owned Business Enterprise program for MWBE 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 $146.00 by cash, check or postal money order payable to the FLOOD CONTROL DISTRICT OF MARICOPA COUNTY. Mail orders for project documents must include an additional $8.00 for first class U.S. postage and handling. The first class U.S. postage and handling of $8.00 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
97,000	CY	BASIN EXCAVATION
15,100	LF	RGRCP STORM DRAIN PIPE
80	EACH	CATCH BASINS, INLETS, VAULTS, HEADWALLS
1,100	LF	DIP WATER LINE
1,100	LF	VCP SANITARY SEWER LINE
12	ACRES	LANDSCAPING AND IRRIGATION
15	EACH	DRY WELLS

BID

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

Gentlemen:

The following Bid is made for Contract FCD 2001C015, Guadalupe Drainage Improvement Project in the County of Maricopa, State of Arizona.

The following Bid is made on behalf of

_____

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 thirty (330) 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. _____ Dated _____

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.

BID SCHEDULE

GUADALUPE DRAINAGE IMPROVEMENT PROJECT – BID SCHEDULE					
ITEM NO.	ITEM DESCRIPTION	UNIT	TOTAL	UNIT COST	ITEM COST
105-1	Partnering Allowance	L Sum	1	$15,000	**$15,000**
107-1	NPDES/SWPPP Permits	L Sum	1		
107-2	Public Information and Notification Allowance	L Sum	1	$25,000	**$25,000**
107-3	Project Signs Allowance	L Sum	1	$3,000	**$3,000**
201-1	Tree Removal	EA	13		
202-1	Mobilization	L Sum	1		
211-1	Earth Dike (ADOT C-03.10, Type A)	CY	46		
211-2	South Basin Over-Excavated Area, Backfill	CY	2,522		
215-1	Earthwork for Retention Basins	CY	95,522		
215-2	Earthwork for V-Ditches & Dirt Ditches	LF	6,093		
215-3	South Basin Over-Excavation	CY	1,600		
220-1	Plain Riprap D50 = 12"	CY	733		
310-1	4" ABC For O&M Access & Perimeter Roads, Access Ramps, & Pathways	SY	12,707		
310-2	2" DG for O&M Access & Perimeter Roads, Access Ramps, & Pathways	SY	12,707		
310-3	4" ABC for Storm Drain 2-5	SY	475		
310-4	3" S.D.G. for O&M Access & Perimeter Roads, Access Ramps, & Pathways North Basin (ALTERNATE)	SY	2,064		
310-5	3" S.D.G. for O&M Access & Perimeter Roads, Access Ramps, & Pathways Central Basin (ALTERNATE)	SY	1,407		
310-6	3" S.D.G. for O&M Access & Perimeter Roads, Access Ramps, & Pathways South Basin (ALTERNATE)	SY	1,522		
321-1	2" D1/2 A.C. Pavement, Storm Drain 2-5	SY	475		
321-2	2" D1/2 A.C. Pavement for O&M Access & Perimeter Roads, Access Ramps, & Pathways North Basin (ALTERNATE)	SY	2,064		
321-3	2" D1/2 A.C. Pavement for O&M Access & Perimeter Roads, Access Ramps, & Pathways Central Basin (ALTERNATE)	SY	1,407		
321-4	2" D1/2 A.C. Pavement for O&M Access & Perimeter Roads, Access Ramps, & Pathways South Basin (ALTERNATE)	SY	1,522		

GUADALUPE DRAINAGE IMPROVEMENT PROJECT – BID SCHEDULE					
ITEM NO.	ITEM DESCRIPTION	UNIT	TOTAL	UNIT COST	ITEM COST
336-1	2" A.C. over 4" ABC, Pavement Replacement Allowance	SY	3,640		
336-2	4" A.C. over 6" ABC, Pavement Replacement Allowance	SY	1,900		
340-1	Cutoff Wall 3' Deep (Typ Section R10)	LF	1,978		
340-2	Cutoff Wall 4' Deep (Det 19E)	LF	732		
340-3	Curb & Gutter (MAG Det 220, Type A) Allowance	LF	40		
340-4	Curb & Gutter (MAG Det 220, Type C) Allowance	LF	400		
340-5	Sidewalk (MAG Det 230) Allowance	SF	337		
340-6	Concrete Pathway (MAG Det 230) for O&M Access & Perimeter Roads, Access Ramps, & Pathways North Basin (ALTERNATE)	SF	18,580		
340-7	Concrete Pathway (MAG Det 230) for O&M Access & Perimeter Roads, Access Ramps, & Pathways Central Basin (ALTERNATE)	SF	12,665		
340-8	Concrete Pathway (MAG Det 230) for O&M Access & Perimeter Roads, Access Ramps, & Pathways South Basin (ALTERNATE)	SF	13,700		
345-1	Adjust Sewer Manhole Frame & Cover (MAG Std Det 422)	EA	1		
350-1	Remove Exist Catch Basins & Pipe, & Install Plug (Det 10D)	EA	2		
350-2	Remove Abandoned Telephone Cable	LF	670		
350-3	Remove Existing Headwalls	EA	11		
350-4	Remove Existing Water Lines	LF	1,099		
350-5	Remove Existing A.C. Plugs from Curb Inlets	EA	5		
350-6	Remove Existing Fencing	LF	6,313		
350-7	Remove Existing Barricade	EA	1		
350-8	Remove Asphalt Pavement for SD 2-5	SY	475		
350-9	Remove Existing Sanitary Sewer Pipe	LF	130		
350-10	Remove Existing Sanitary Sewer Manholes	EA	3		
350-11	Remove & Reinstall Exist Mail Boxes	EA	5		

GUADALUPE DRAINAGE IMPROVEMENT PROJECT – BID SCHEDULE					
ITEM NO.	ITEM DESCRIPTION	UNIT	TOTAL	UNIT COST	ITEM COST
350-12	Remove and Dispose of Septic Tank	L Sum	1		
350-13	Miscellaneous Removals	L Sum	1		
350-14	Remove & Dispose of Tires	TONS	4		
350-15	Remove & Dispose of Non-inert Materials	TONS	25		
350-16	Remove & Dispose of Inert Materials	CY	100		
350-17	Remove & Dispose of Driveways & Culverts	L Sum	1		
401-1	Traffic Control Guadalupe Road	L Sum	1		
401-2	Traffic Control Avenida Del Yaqui	L Sum	1		
401-3	Traffic Control Side Streets	L Sum	1		
401-4	Traffic Control ADOT R/W	L Sum	1		
401-5	Traffic Control City of Tempe	L Sum	1		
401-6	Off-Duty Uniformed Officer	MH	250		
415-1	Barricade	LF	25		
420-1	Chain Link Fence, 6-foot, Plain	LF	4,216		
420-2	Chain Link Fence, 3-foot, Plain	LF	903		
430-1	Landscaping North Retention Basin	L Sum	1		
430-2	Landscaping Northeast Retention Basin	L Sum	1		
430-3	Landscaping Central Retention Basin	L Sum	1		
430-4	Landscaping South Retention Basin	L Sum	1		
430-5	Decomposed Granite North Retention Basin	SY	5,500		
430-6	Decomposed Granite Northeast Retention Basin	SY	3,025		
430-7	Decomposed Granite Central Retention Basin	SY	8,400		
430-8	Decomposed Granite South Retention Basin	SY	9,710		

GUADALUPE DRAINAGE IMPROVEMENT PROJECT – BID SCHEDULE					
ITEM NO.	ITEM DESCRIPTION	UNIT	TOTAL	UNIT COST	ITEM COST
430-9	Angular Riprap North Retention Basin	CY	83		
430-10	Boulders	TONS	122		
430-11	Concrete Header	LF	4,280		
430-12	Bermuda Grass (Seed) North Retention Basin (ALTERNATE)	SY	14,470		
430-13	Bermuda Grass Sod North Retention Basin	SY	14,470		
430-14	Bermuda Grass Sod Central Retention Basin	SY	11,510		
430-15	Bermuda Grass Sod South Retention Basin	SY	7,450		
432-1	Gravel Mulch	SY	2,750		
440-1	Landscape Irrigation System North Retention Basin	L Sum	1		
440-2	Landscape Irrigation System Northeast Retention Basin	L Sum	1		
440-3	Landscape Irrigation System Central Retention Basin	L Sum	1		
440-4	Landscape Irrigation System South Retention Basin	L Sum	1		
450-1	Ball Field Electrical Conduit Installation	LF	855		
505-1	Catch Basin (MAG Det 535 Type F) w/ Apron	EA	7		
505-2	Catch Basin (MAG Det 535 Type F-Double) w/ Apron	EA	6		
505-3	Catch Basin (P-1570) - Double w/ (2) 10' Slotted Drains, Vertical Curb	EA	3		
505-4	Catch Basin (P-1570) - Double w/ 10' Slotted Drain, Roll Curb	EA	21		
505-5	Catch Basin (P-1570) - Double w/ 20' Slotted Drain, Roll Curb	EA	11		
505-6	Catch Basin (P-1570) - Double w/ 20' Slotted Drain, Valley Gutter	EA	3		
505-7	Catch Basin (MAG Det 538 Type H-Double) w/ Conc. Apron	EA	6		
505-8	Median Catch Basin (Det 11), Sta 14+28, SD 3	EA	1		
505-9	Median Catch Basin (Det 11A), Sta 19+50, SD 3	EA	1		
505-10	Median Catch Basin (Det 21), Sta 15+21, SD 4	EA	1		

GUADALUPE DRAINAGE IMPROVEMENT PROJECT – BID SCHEDULE					
ITEM NO.	ITEM DESCRIPTION	UNIT	TOTAL	UNIT COST	ITEM COST
505-11	Median Catch Basin (Det 23), Sta 30+36, SD 1	EA	1		
505-12	Median Catch Basin (Det 23A), Sta 21+80, SD 3	EA	1		
505-13	Median Catch Basin (Det 23E), Sta10+00, SD 9	EA	1		
505-14	Cross Street Storm Drain Inlet	LF	159		
505-15	Bleedoff Structure (Det 06), SD 10	EA	1		
505-16	Bleedoff Structure (Det 01), SD 8	EA	1		
505-17	Headwall for 48" Pipe (ADOT B-11.12), SD 7	EA	1		
505-18	Headwall for 30" Pipe (MAG Det 501-4), SD 9	EA	1		
505-19	Headwall for 60" Pipe (ADOT B-11.12), SD 1	EA	1		
505-20	Drop Inlet Headwall, 36" Pipe (MAG Det 501-5), SD 2-2	EA	1		
505-21	Headwall for 66" Pipe (ADOT B-11.12), SD 2	EA	1		
505-22	Headwall for 24" Pipe (MAG Det 501-4), SD 6	EA	1		
505-23	Headwall for 2-48" Pipes (ADOT B-11.14), SD 3	EA	1		
505-24	Headwall for 18" Pipe (MAG Det 501-4), SD 10	EA	1		
505-25	Headwall for 36" Pipe (MAG Det 501-4), SD 4; Pipe 001	EA	2		
505-26	Headwall for 42" Pipe (MAG Det 501-4), SD 5	EA	1		
505-27	Drop Manhole Concrete Vault (Det 09D), SD 3	EA	1		
505-28	Drop Manhole Concrete Vault (Det 09B), SD 3	EA	1		
505-29	Concrete Vault (Det 09B), SD 7	EA	1		
505-30	Concrete Spillway (Det 04)	SY	33		
505-31	Concrete Sediment Trap (Det 20), SD 2-2	SY	120		
505-32	Concrete V-Ditch (Typ Sec T)	LF	380		
515-1	Access Gate, Single	EA	2		

GUADALUPE DRAINAGE IMPROVEMENT PROJECT – BID SCHEDULE					
ITEM NO.	ITEM DESCRIPTION	UNIT	TOTAL	UNIT COST	ITEM COST
520-1	Steel Handrail, 42"	LF	672		
520-2	Tubular Steel Ornamental Fencing	LF	1,205		
520-3	Safety Post (MAG Det 140)	EA	23		
520-4	Removable Safety Post (Detail 07D)	EA	3		
602-1	Jack & Bore for 60-inch RGRCP	LF	81		
609-1	Well Closure	EA	1		
610-1	6" DIP Water Line	LF	1,048		
610-2	8" DIP Water Line	LF	34		
610-3	12" DIP Water Line	LF	30		
610-4	Water Service Adjustment Allowance	LF	700		
615-1	8" VCP Sanitary Sewer	LF	297		
615-2	12" VCP Sanitary Sewer	LF	797		
615-3	18" VCP Sanitary Sewer	LF	12		
615-4	Sewer HCS Adjustment Allowance	LF	45		
618-1	18" RGRCP Class IV	LF	1,652		
618-2	24" RGRCP Class III	LF	1,327		
618-3	30" RGRCP Class III	LF	3,266		
618-4	36" RGRCP Class III	LF	4,105		
618-5	42" RGRCP Class III	LF	1,770		
618-6	48" RGRCP Class III	LF	682		
618-7	54" RGRCP Class III	LF	1,242		
618-8	60" RGRCP Class III	LF	636		
618-9	66" RGRCP Class III	LF	446		

GUADALUPE DRAINAGE IMPROVEMENT PROJECT – BID SCHEDULE					
ITEM NO.	ITEM DESCRIPTION	UNIT	TOTAL	UNIT COST	ITEM COST
618-10	18" RGRCP Class IV at ADOT Wall	LF	20		
618-11	30" DIP, Class 52	LF	82		
618-12	Concrete Pipe Collar (ADOT Det C-13.80)	EA	1		
618-13	Concrete Plug for 36" Pipe (MAG Det 427)	EA	2		
618-14	Two 4" PVC Conduits	LF	79		
618-15	Storm Drain Clean Out	EA	1		
625-1	Manhole Base (MAG Det 520) & Shaft (MAG Det 522)	EA	17		
625-2	Manhole Base (MAG Det 521) & Shaft (MAG Det 522)	EA	3		
625-3	Manhole Base (Detail 09A) & Shaft (MAG Det 522)	EA	15		
625-4	Sewer Manhole (MAG Det 420)	EA	6		
635-1	Drywell, Single Chamber	EA	11		
635-2	Drywell, Double Chamber	EA	4		
TOTAL BID AMOUNT WRITTEN IN NUMBERS:				**$**	
TOTAL BID AMOUNT WRITTEN IN WORDS:					

IF BY AN INDIVIDUAL:

By: _____ _____
(Printed Name) (Title) (Address)

_____ _____
(Signature) (Date) (Telephone Number)

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

_____ _____
(Firm Name) (Firm Address)

_____ _____
(Signature - Title) (Date) (Telephone Number)

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

_____ _____

_____ _____

_____ _____

_____ _____

**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) (Fax Number)

By: _____ _____
(Signature) (Date) (e-mail address)

*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 women-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.

_____

_____

_____

_____

_____
(Signature)

SURETY BOND

KNOW ALL MEN BY THESE PRESENTS:

That we, _____, as Principal, (hereinafter called the Principal), and the _____, a corporation duly organized under the laws of the State of _____, as Surety, (hereinafter called the Surety), are held and firmly bound unto the Flood Control District of Maricopa County as Obligee, in the sum of **ten percent (10%)** of the total amount of the bid of Principal, submitted by him to the Flood Control District of Maricopa County, for the work described below, for the payment of which sum, well and truly to be made, the said Principal and the said Surety, bind ourselves, our heirs, executors, and administrators, successors and assigns, jointly and severally, firmly by these presents, and in conformance with the Arizona Revised Statutes.

WHEREAS, the said Principal is herewith submitting its proposal for **Contract FCD 2001C015, Guadalupe Drainage Improvement Project.**

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 _____ day of _____, AD, 200__.

Agency of Record, State of Arizona	Principal
Agency Address and Phone Number:	Signature
_____	By: _____
_____	(Printed Name)
_____	_____
_____	(Title)
_____	
	_____
	Surety Name
Bond Number: _____	_____
	(Signature)
ATTACH SURETY POWER OF ATTORNEY	By: _____
	(Printed Name)
	_____
	(Title)

NO COLLUSION AFFIDAVIT

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

STATE OF _____)
)§
County of _____)

_____ being first duly sworn, deposes and says:

That he/she is _____ of _____ bidding on Contract FCD 2001C015 for Guadalupe Drainage Improvement Project, 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 _____ day of _____, 200___.

_____
(Notary Public)

_____
My Commission Expires

CERTIFICATION OF LICENSE

Pursuant to A.R.S. Section 32-1169, I hereby state that I hold a current contractor's license, duly issued by the office of the Registrar of Contractors for the State of Arizona, said license has not been revoked, that the license number is _____ that my privilege license number (as required by A.R.S. Section 42-5005) is _____; and that, if any exemption to the above licensing requirements is claimed;

1. The basis for the claimed exemption is _____ and;

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

_____

_____

_____

IT IS UNDERSTOOD THAT THE FILING OF AN APPLICATION CONTAINING FALSE OR INCORRECT INFORMATION CONCERNING AN APPLICANT'S CONTRACTOR'S LICENSE OR PRIVILEGE LICENSE WITH THE INTENT TO VOID SUCH LICENSING REQUIREMENTS IS UNSWORN FALSIFICATION PUNISHABLE ACCORDING TO A.R.S. SECTION 13.2704.

_____
Signature of Licensee

Date: _____

Company: _____

MWBE ASSURANCES AFFIDAVIT

MARICOPA COUNTY
MINORITY AND WOMEN-OWNED BUSINESS ENTERPRISE PROGRAM

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 MWBE Program requirements and of the goal established, hereby certifies that in the preparation of this bid,

_____ (the entity submitting the bid)

(CHECK ONE)

_____Will meet the **established** goal for participation by Minority and Women-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 MWBE participation by submitting a notarized affidavit no later than 4:00 P.M. the seventh (7th) 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.

_____
Name of Firm

_____
(Signature)

By: _____
(Printed Name)

_____
(Title)

STATE OF _____)
)§
County of _____)

Subscribed and sworn to before me this ____ day of _____, 200___.

_____
Notary Public

My Commission Expires: _____

MWBE ACTUAL PARTICIPATION AFFIDAVIT

MARICOPA COUNTY
MINORITY AND WOMEN-OWNED BUSINESS ENTERPRISE PROGRAM
(NOTE: COMPLETED AFFIDAVIT MUST BE SUBMITTED
WITHIN SEVEN (7) CALENDAR DAYS
FOLLOWING THE BID OPENING.)

_____ Contract No. FCD 2001C015 Total Amount of Contract _____
Name of Contractor

_____ MWBE Goal: 10%
Contact Person

_____
Street No.

_____
City State Zip

Minority and Women-Owned Firm	Principal	Address	Type of Work	Dollar Amount & Contract Percentage

TOTALS (Dollars/Percentage) _____

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

_____
Signature Date

_____
Title

STATE OF _____)
)§
County of _____)

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

My Commission Expires: _____

MWBE PARTICIPATION REPORT

MARICOPA COUNTY
MINORITY AND WOMEN-OWNED BUSINESS ENTERPRISE PROGRAM
(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): _____

MWBE Subcontractor/Subconsultant Name: _____
Contact Person: _____
Address: _____
Telephone Number: _____
Type of Firm: _____

Type of Work performed for this contract by this MWBE firm: _____

Total MWBE Subcontract Amount for this Subcontractor: _____

The **amount above** is the MWBE percentage goal calculated from your **TOTAL CONTRACT AMOUNT,** It is **THE SAME TOTAL** amount shown for the subcontractor on the MWBE Actual Affidavit previously submitted by your firm.

Amount Paid to this MWBE Subcontractor *on this invoice* payment: _____

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

Total MWBE Contract Goal =_____**%**

Total MWBE Participation on this contract to date = _____**%**

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

CONTRACT AGREEMENT

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

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

ARTICLE I – SCOPE OF WORK: The Contractor shall construct, and complete in a workmanlike and substantial manner and to the satisfaction of the Chief Engineer and General Manager, a project for the Flood Control District of Maricopa County, designated as **Contract FCD 2001C015, Guadalupe Drainage Improvement Project** 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, Indemnification, Insurance Requirements, 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 thirty (330) calendar days following notice to proceed.

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 "MWBE 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 – MWBE PROGRAM: The Owner will endeavor to ensure in every way possible that minority and women-owned business enterprises shall have every opportunity to participate in providing professional services, purchased goods, and contractual services to the Owner without being discriminated against on the grounds of race, religion, sex, age, disability, or national origin. The Maricopa County Minority and Women-Owned 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.

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

KNOW ALL MEN BY THESE PRESENTS:

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

WHEREAS, the Principal has entered into a certain written contract with the Flood Control District of Maricopa County, dated **the_____ day of _____** the **Contract FCD 2001C015, Guadalupe Drainage Improvement Project** ,which contract is hereby referred to and made a part hereof as fully and to the same extent as if copied at length herein.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH, that if the 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 _____ day of _____, 200__.**

_____	_____
Agency of Record, State of Arizona	Principal
	_____
	Signature
Agency Address and Phone Number:	By: _____
_____	Printed Name
_____	Title: _____
_____	_____
_____	Surety Seal
Bond Number: _____	_____
	Signature
	By: _____
ATTACH SURETY POWER OF ATTORNEY	Printed Name

INDEMNIFICATION

To the fullest extent permitted by law, the Contractor shall defend, indemnify, and hold harmless the Flood Control District of Maricopa County (District) and Maricopa County, 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, Maricopa County, Salt River Project, Arizona Department of Transportation, City of Tempe, Town of Guadalupe, Absolute Storage LLC, Southwest Truck Sales LLC, Jordan Properties LLC, and 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 and Maricopa County, 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 and Maricopa County, 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 employs 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, Maricopa County, Salt River Project, Arizona Department of Transportation, City of Tempe, Town of Guadalupe, Absolute Storage LLC, Southwest Truck Sales LLC, and Jordan Properties LLC.

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, Inc. 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, Maricopa County, Salt River Project, Arizona Department of Transportation, City of Tempe, Town of Guadalupe, Absolute Storage LLC, Southwest Truck Sales LLC, Jordan Properties LLC, and their agents, representatives, officers, directors, officials and employees for any claims arising out of Contractor's work or service.

REQUIRED COVERAGE

Commercial General Liability.

Contractor shall maintain Commercial General Liability insurance with a limit of not less than $2,000,000 for each occurrence with a $4,000,000 Products/Completed Operations Aggregate and a $4,000,000 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 replacements 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 that 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 $2,000,000 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 $1,000,000, 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 Certificates of Insurance (Attachment 1), or formal endorsements as required by the contract, issued by Contractor's insurer(s), as evidence that policies providing the required coverages, 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 2000C015 **PROJECT TITLE: Guadalupe Drainage Improvement Project**

NAME AND ADDRESS OF INSURANCE AGENCY:	*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	
	GENERAL LIABILITY: ☒ COMMERCIAL GENERAL LIABILITY ☐: Claims Made ☐: Occur ☒: PREMISES OPERATIONS ☒: BLANKET CONTRACTURAL ☒: BROAD FORM PROPERTY DAMAGE ☒: PERSONAL INJURY ☒: PRODUCTS AND COMPLETED OPERATIONS HAZARD ☒: XCU HAZARDS ☒: INDEPENDENT CONTRACTORS ☒: OWNER'S AND CONTRACTOR'S PROTECTIVE LIABILITY				**GENERAL AGGREGATE** PRODUCTS/COMPLETED OPERATIONS AGGREGATE EACH OCCURRENCE	$4,000,000 $4,000,000 $2,000,000
	AUTOMOBILE LIABILITY: ☒: ANY AUTO ☒: ALL OWNED AND NON-OWNED AUTOS				Combined Single Limit Bodily Injury Property Damage Per person/Per accident	$1,000,000 $1,000,000 $1,000,000 $1,000,000
	☐: **EXCESS LIABILITY** ☐: Umbrella Form ☐: Other than Umbrella Form				Each occurrence Aggregate	$ $
	☒: **WORKERS' COMPENSATION AND EMPLOYERS' LIABILITY**				STATUTORY LIMITS AND EMPLOYER'S LIABILITY: EACH ACCIDENT DISEASE: EACH EMPLOYEE DISEASE: POLICY LIMIT	 $1,000,000 $1,000,000 $1,000,000
	☒: **BUILDERS' RISK ALL-RISK FORM**				REPLACEMENT COSTS	
	☒: **OTHER:**	Except for Workers' Compensation and Professional Liability Insurance, the Flood Control District of Maricopa County, Maricopa County, Salt River Project, Arizona Department of Transportation, City of Tempe, Town of Guadalupe, Absolute Storage LLC, Southwest Truck Sales LLC, Jordan Properties LLC, and their agents, representatives, officers, Directors, Officials, and employees are named as Additional Insured's.				

Except for Workers' Compensation and Professional Liability Insurance, the Flood Control District of Maricopa County (District), Maricopa County, Salt River Project, Arizona Department of Transportation, City of Tempe, Town of Guadalupe, Absolute Storage LLC, Southwest Truck Sales LLC, Jordan Properties LLC, and their agents, representatives, officers, Directors, Officials, and employees are named 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 District. To the extent provided in Contract FCD 2001C015, insured shall hold harmless the District 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 the District, its agents, employees, or indemnities. It is agreed that any insurance available to the named insured shall be primary of other sources that may be available. It is further agreed that no policy shall expire, be cancelled, or materially changed to affect the coverage available to the District without thirty (30) days written notice to the District. THIS CERTIFICATE IS NOT VALID UNLESS COUNTERSIGNED BY AN AUTHORIZED REPRESENTATIVE OF THE INSURANCE COMPANY.

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY 2801 WEST DURANGO STREET PHOENIX, ARIZONA 85009	DATE ISSUED: _____ _____ AUTHORIZED REPRESENTATIVE

CERTIFICATE OF PERFORMANCE
OF CONSTRUCTION CONTRACT 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 _____ (Firm) or its subcontractors and suppliers in connection with performance on **Contract FCD 2001C015 for Guadalupe Drainage Improvement Project** 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.

_____ **(Firm)** 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 FCD 2001C015 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__.

_____
Signature

_____
Title

SUBSCRIBED AND SWORN TO before me this _____ day of _____, 200__.

_____
Notary Public

My Commission Expires:_____

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

SUPPLEMENTARY GENERAL CONDITIONS

CONTRACT FCD 2001C015

GUADALUPE DRAINAGE IMPROVEMENT PROJECT

PCN 035.02.31

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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 2001, the City of Tempe Supplement thereto dated July 2001, and the latest revision of the Arizona Department of Transportation (ADOT) Standard Specifications for Road and Bridge Construction.

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, g) City of Tempe Supplements dated July 2001, h) MAG Uniform Standard Specifications and Uniform Standard Details i) ADOT Standard Specifications for Road and Bridge Construction.

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 the Maricopa County Minority and Women-Owned Small 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 Appendix "C". 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 Contractor may encounter shallow bedrock or very dense soil conditions near the south side of the North Retention Basin.

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.

Allowances as shown on the Bid Schedule shall cover the cost to the Contractor, and if applicable, delivered to the site, unloaded and handled on the site, labor, and installation costs. The Contractor's taxes, bonds, insurance, overhead, profit, and other expenses contemplated for the original Allowance amount shall be included in the Base Bid, and not in the Allowance. Whenever the costs are more than or less than the Allowance, the Contract Sum shall be adjusted accordingly by Change Order, the amount of which will recognize proportionate changes, if any, in handling costs on the site, labor, installation costs, taxes, bonds, insurance, overhead, profit, and other expenses. Contractor's monthly Application for Payment shall include supporting documentation of Allowance funds.

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 Small 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 103.3 – Award of Contract: Add the following:
The Contract shall be awarded on the Total Base Bid plus all Alternates. However, the Owner reserves the right to award ~~or not~~ to award any one or all of the Alternates.

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 103.6.2 – Indemnification of the Contracting Agency against Liability:
Add the following:
Additionally, Contractor shall execute the Indemnification found in the Contract Documents.

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.

The facilities to be constructed with this project include four retention basins, ditches, storm drains and associated inlet and outlet structures, miscellaneous paving, and fencing, and landscaping and irrigation.

In the South Retention Basin the Contractor will be working in soils that have toxaphene contamination. Refer to SGC's 107.5.4 and SP's 215 for direction.

Utility relocations such as potable water line and sanitary sewer line relocations as shown on the plans and the relocation and/or realignment of both water services and sewer House Service Connections (HCS) are anticipated during construction. All utilities within the project limits are to be protected in place.

At the Northeast Retention Basin site the Contractor may encounter an abandoned septic tank, which may need to be pumped, crushed and removed per Special Provisions Section 350. There may also be an abandoned well that will need to be capped per Special Provisions Section 609.

The Contractor will be required to deal with traffic control issues throughout the project and in particular on Avenida Del Yaqui and Guadalupe Road, as well as all the residential streets impacted by storm drain installations.

The Contractor shall either protect-in-place (P.I.P.) or remove, properly store, and reinstall all existing street signage that may be in conflict with construction activities. The cost for such signage work shall be considered incidental to the project cost.

Construction shall not begin on the portion of the storm drain #4 west of station 15+00 on the Pascua Yaqui property west of the northwest corner of the District owned property for the South Retention Basin, as shown on plan sheet 52, until at least 60 calendar days after construction Notice to Proceed. Construction of the storm drain may be deleted from the contract, and quantity adjustments for applicable bid items will be made accordingly with no penalty to the Owner.

The Contractor will encounter inert and non-inert trash, some of which has been burned, within the top three feet plus/minus of basin excavation limits for the Central Basin. Because some advance rough grading excavation has already been done on the basin, this material extends partially down the present side slopes of the excavation. This inert and non-inert material will be removed, screened and disposed of in accordance with Special Provisions section 350.

Inspection and Testing:
The Contractor will be responsible for all quality control for the project and will provide the Engineer with copies of the results of all tests performed by the Contractor Quality Control. The Owner and Engineer will provide quality assurance for the project.

104.2.3 - Changes: Add the following:
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 working 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: Add the following:
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: Add the following:

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 a reasonable time within which to evaluate each proposal or submittal made pursuant to subsections 105.3.1 and 106.4. Engineer will be the sole judge of acceptability. No "or-equal" or substitute will be ordered, installed or utilized without Engineer's prior written acceptance that 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 105.2.1 – Plans and Shop Drawings:
Add the following:

A) Shop drawings means drawings, submitted to the Engineer by the Contractor pursuant to the contract, showing in detail (i) the proposed fabrication and assembly of structural elements and (ii) the installation (i.e., form, fit and attachment details) of materials or equipment. It includes drawings, diagrams, layouts, schematics, descriptive literature, illustrations, schedules, performance and test data, and similar materials furnished by the Contractor to explain in detail specific portions of the work required by the contract.

B) Product Data is information on manufactured items, either stock or modified, and includes descriptive literature, operating data, performance curves, certified dimensional drawings, wiring or schematic control diagrams, piping, instrumentation, parts lists, and operating, maintenance and lubrication manuals.

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 Add the following:

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. The Contractor shall submit to the Engineer during the pre-construction meeting the following documents:

1. Material data safety sheets
2. Manufacturers certificates for all materials
3. Shop drawings
4. Preliminary survey layout, staking and excavation plans
5. Preliminary work schedule
6. Preliminary traffic control plan
7. Emergency telephone numbers
8. Signing authority letter
9. Name and telephone number of the certified safety professional
10. Any other documents specified in the SGC's and SP's

The pre-construction meeting will cover topics such as critical elements of the work schedule, payment application and processing of invoices. Additionally, a scheduled start date for the work will be determined.

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 602-263-1100) 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.

There are many utilities located within the project limits, including numerous water service and sewer house service connections (HCS's) as well as other service connections for gas and cable TV that are located within and across streets where storm drain construction will occur. As many as possible have been identified and shown in the approximate or anticipated locations. The Contractor shall bid his work recognizing that such utility interference's exist. And, that other such utility crossings may exist that are not shown on the plans. The Contractor shall consider these utility interference's when bidding the project. All existing utilities shall be protected-in-place (P.I.P.). It may be necessary for some of the water service and sewer HCS's to be relocated to avoid conflict with the storm drain construction. Appropriate bid item allowances have been provided for such occurrences, and the Contractor shall bid them accordingly.

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

Town of Guadalupe (Sewer) Mr. Jim Ricker	(480) 505-5380
City of Tempe Water Services Department Mr. Richard V. Johnson	(480) 350-2634
Salt River Project Power Distribution (SRPPD) Mr. Greg Wilson	(602) 236-8643
Salt River Project Power Transmission (SRPPT) Mr. Brent Bornmann	(602) 236-8073
Salt River Project Irrigation Mr. John Evans	(602) 236-5664
Salt River Project Electric Service Entrances Ms. Cindy Scott	(602) 236-0875
US Sprint Mr. Colin Sword	(602) 254-3798

Qwest Communications	
Mr. John O'Dell	(602) 630-0496
Cox Cable	
Mr. Robert Hessman	(480) 731-3274
El Paso Natural Gas	
Mr. Bill Ward	(602) 438-4224
Mr. Dennis Segars	(602) 438-4229
Mr. John McNeely	(602) 438-4214
Southwest Gas	
Ms. Norma Jordan	(602) 484-5344

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.

Town of Guadalupe:
The Town of Guadalupe maintains the sewer lines within the project limits. The Contractor shall adjust to grade the sewer manholes, and adjust sewer house service connections (HCS) as shown in the plans and the Special Provisions.

City of Tempe:
The City of Tempe (COT) maintains the water lines, water services, and fire hydrants within the project limits. The Contractor shall obtain the appropriate Permits (City of Tempe Public Works – Engineering) and relocate all water lines as shown on the plans. Coordinate water line relocation work with the City of Tempe. Only City personnel are authorized to shut down water lines and service connections. Of special concern to the City of Tempe is the construction of the twin 42-inch storm drain pipes under the 30-inch water line on Guadalupe Road. **The 30-inch water line will remain in operation (operating pressure 50 to 65 psi) during construction activities.** The Contractor must support this water line in place while constructing the storm drain beneath the line. The pipe support shall be designed and support plans sealed by a registered engineer. Prior to full excavation of the pipe, the pipe shall be inspected for evidence of existing pipe joints. If a pipe joint is present in the area of the trench, the joint area shall be fully supported prior to excavating below the water line and supporting the rest of the 30-inch pipe. The 30-inch water line is a pretensioned concrete steel cylinder pipe and has been in the ground approximately 25 years. The Contractor shall take special precautions to protect the 30-inch pipe during construction. The Contractor must hand excavate within two feet of the pipe to avoid damaging the 30-inch pipe with mechanical excavation equipment. Maintain the minimum width of vertical trench possible (approximately 13 feet) under the 30-inch water line. Proper shoring/bracing will be required. After placing the 42-inch storm drain lines under the water line, backfill the trench with a 1-sack slurry (lean) mix to the springline of the 30-inch water line. When the slurry mix has had time to set, a second slurry mix backfill shall be placed from the springline to the bottom of the AC section that will be consistent with the COT pavement replacement detail T-450. The design intent is to have a cold joint in the slurry mix backfill at the springline of the 30-inch water line. The placement of slurry mix backfill should all occur in the same working day to minimize exposure of the water line to damage. It is also recommended that the drop manhole concrete vault located on the south side of Guadalupe Road (Sta. 27+55) be completed before the two 42-inch pipes are placed under the water line.

The relocation of the 12-inch water line located on Avenida del Yaqui just south of the Highline Canal crossing will require special coordination efforts with the City of Tempe. The City must maintain water

pressure in the water line to the north of the Highline Canal for fire protection purposes. The Contractor will be required to bypass the relocation work by installing temporary water lines between existing fire hydrants north and south of the canal (refer to Special Provisions Section 610). This allows the section of 12-inch water line that needs relocation to be shut down. The shut down period to remove and relocate the 12-inch water line will take place during the very early morning hours (12 a.m. to 4 a.m.) when water demand is at its lowest. Preparation of the 12-inch water line, trench, backfill and cleanup will extend the work beyond the four hour time period for the relocation work. But it must be clear that the City of Tempe will only allow a four hour shut down of the water line. Refer to Special Provision Section 401 regarding traffic control relating to the 12-inch water line work. The Contractor shall coordinate all relocation construction activities with the City of Tempe a minimum of 14 calendar days in advance of any work impacting the City water lines.

SRPPT:
SRP maintains high voltage (230kV) overhead electric transmission lines along the east side/north side of the Highline Canal for the length of the project. SRP also maintains 12kV and 69kV distribution lines at locations within the project limits. The 12kV lines are located along the west/south side of the Highline Canal and along the streets in the Town of Guadalupe. The 69kV line is located along the south side of Guadalupe Road and the west side of Avenida Del Yaqui (Priest Drive). Power lines within the construction limits of the project shall be protected in place. The Contractor shall use caution in the adjacent area. In addition, SRP has indicated that the power pole located southwest of Avenida del Yaqui and the Highline Canal will need to be braced during construction of the storm drain outfall into the North Retention Basin. The Contractor shall coordinate with SRP, Greg Wilson, for the installation of the pole brace. The Contractor shall contact SRP at least 21 calendar days in advance of the need for the pole brace. The Contractor shall pay SRP in advance of installation for the cost of the brace. At the time of the preparation of these SGC's the estimated cost of the brace was $3,000. The Contractor shall verify this cost with SRP, and such cost shall be considered incidental to the installation of the storm drain for which such pole bracing is required.

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 SRP when working in the vicinity of these high voltage lines.

Salt River Project Water Operations:
SRP provides irrigation water to the south Phoenix area year round that is routed through the North Branch of the Highline Canal. Low flow rates can be expected during the winter months November-March. Historical flow rates for the North Branch of the Highline Canal are included in Appendix "A", however, rates may vary dependant on the need downstream. The Contractor must clearly understand that **no** interruption of irrigation service will be permitted by SRP. The Contractor will be installing a 60" storm drain pipe within a jacking sleeve under the Highline Canal near the intersection of Calle Batoua and Calle Pitaya. SRP canal maintenance operations cannot be adversely impacted by the construction of the storm drain crossing of the canal. A minimum of 25 cfs flow rate will be maintained in the canal at all times during construction. A dry-up of the canal during construction of the project will not be possible by SRP.

Two 12-inch storm drains that currently drain into the canal will be cut and plugged by the Contractor in accordance with the plans. The Contractor will also be constructing an 18" basin outlet pipe at the southeast corner of the Central Retention Basin that will be connected to an existing SRP manhole and irrigation pipe structure.

The Contractor will contact SRP at least 14 calendar days in advance of any of these construction activities that affect the canal and/or these existing pipes. The Contractor shall participate in a pre-construction meeting with SRP to be held at least 72 hours prior to the start of any such construction

activities. The Contractor will notify Canal Watermaster John Evans at 602-236-5664 or Mike Patrick at 602-236-5556, Superintendent of South Side Operation and Maintenance, prior to any activities that may impact the canal and to schedule the meeting date and time.

US Sprint :
US Sprint maintains an underground fiber optic cable along the west side of Avenida Del Yaqui. Investigation of this line location indicates that it is likely not to be in conflict with the storm drain line construction from Avenida Del Yaqui to the North Retention Basin. The Contractor shall contact US Sprint 24 hours prior to trenching across this line. An inspector will be provided by the utility on site as required during these construction activities to monitor the work. However, if it is determined by the Contractor and the inspector that the line is in conflict, US Sprint will relocate the line within 48 hours of notification from the Contractor of the need to relocate the line. The cost of the relocation will be paid for by others.

QWest :
QWest maintains an underground fiber optic cable in a concrete encased duct bank along the south side of Guadalupe Road. The Contractor will protect this duct bank in place during construction of the storm drain line and sewer line relocation. The Contractor shall contact Qwest (Mr. John O'Dell) 24 hours prior to trenching adjacent and under this line. Qwest is planning for a future conduit for a fiber optic line along the east side of Avenida del Yaqui. Final design and installation of the line is anticipated before the start of this project. The Contractor shall contact Qwest (Mr. John O'Dell) for an update on the location of the line prior to trenching near Avenida del Yaqui.

Cox Communication :
Cox Communication maintains overhead cable TV lines along the Highline Canal and along the west side of Avenida Del Yaqui. Cox has numerous shallow buried cable crossing under and along most of the streets in Guadalupe, along the south side of Guadalupe Road and a new fiber optic line buried along the east side of Avenida Del Yaqui. The Contractor will protect these facilities in place during construction.

El Paso Natural Gas (ELPNG):
ELPNG maintains a 4-inch high-pressure gas line that parallels the north side of Calle Cerritos just south of the North Retention Basin. The Contractor will be excavating a shallow ditch and placing a concrete spillway over the gas line. The Contractor will protect this line in place. The 4-inch line extends east under the canal and along the north side of the Northeast Retention Basin within an existing easement. The Contractor shall not use the easement for any construction activities at the Northeast Retention Basin without first obtaining written permission from ELPNG. ELPNG may require the Contractor to place additional fill or other means of protection over the gas line before any use of the easement. On Guadalupe Road, ELPNG maintains a 6-inch gas line. Storm drain construction along Guadalupe Road will go under this gas line. The Contractor will protect and if necessary support the 6-inch gas line in place. The Contractor shall exercise extreme caution when working near these facilities. The Contractor shall contact ELPNG and Maricopa County's Sheriffs Office a minimum of 48 hours in advance of any work to be done in the vicinity of these facilities. An inspector will be provided by the utility on site as required during these construction activities to monitor the work.

Southwest Gas Company (SWG):
SWG maintains a 2-inch gas line along the north side of Guadalupe Road, a 2-inch gas line on Avenida Del Yaqui, and numerous other service lines under the streets within the Town and within project limits that will be relocated prior to construction to avoid conflicts with storm drain and related catch basin features. The Contractor shall exercise extreme caution when working near these facilities. The Contractor shall contact SWG a minimum of 14 calendar days in advance of any work to be done in the vicinity of their gas lines. An inspector will be provided by the utility on site as required during these construction activities to monitor the work.

As is evidenced by the information provided above and on the plans there are numerous overhead and underground utilities within the project limits. The Contractor shall protect-in-place all of these utilities, and support in place such utilities as required. The Contractor shall account for in his bid the impact of underground utilities on the storm drain trenching and installation activities.

Subsection 105.6.3 – Construction Water:
Construction water may be available from City of Tempe and possibly from the Highline Canal. The Contractor shall contact the City and SRP for permission for use of such water resources. The cost for such uses of these water resources is considered incidental to the project.

Subsection 105.7 – Cooperation Between Contractors: Add the following:
The Town of Guadalupe may have construction activities underway, involving the construction of curb, gutter and sidewalk in the vicinity of Calle Iglesia from Avenida del Yaqui to Calle Tomi, Calle San Angelo from Avenida del Yaqui to Calle Vauo Nawi, at the intersection of Calle Gloria and Calle Batoua, and just west of the intersection of Calle Batoua and Calle Pitaya. The Contractor shall be aware of these possible Town of Guadalupe construction activities and shall work cooperatively with the Town's Contractors to minimize impacts to both projects.

At the time of preparation of these SGC's it was anticipated that the Diamondbacks Charities may be installing a Little League Baseball Diamond and related features in the North Retention Basin. It is the desire of the project partners to have the ball diamond installation completed at the end of the project construction. Therefore, if the installation is to occur, the Contractor shall coordinate as required with the Diamondbacks Contractor for such ball diamond installation activities. The Contractor shall contact the Diamondbacks Contractor within 30 days of the project Notice to Proceed in order to plan, schedule and coordinate the installation of the ball diamond with the Contractor's construction and landscaping activities and schedule. Ball diamond installation activities may occur before, during and/or after the installation of the basin landscaping.

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 drawings shall be prepared by updating original mylar drawings as provided by the Owner. Any changes required are to be made in red ink having waterproof, opaque, and reproducible characteristics. Deleted items shall be crossed out or lined out, no erasures will be allowed. Paper as-built progress drawings shall be maintained in a current condition at all times until completion of the work and shall be available for review by the Engineer at all times. The final as-built mylar drawings shall be sealed by an Engineer registered in the State of Arizona and shall be provided by the Contractor to the Engineer prior to project close out and prior to the final contract payment. And, as-builts will also be provided in electronic format using files on disk or CD as provided by the Owner.

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 the 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 therefore. 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 shall obtain approval of the Engineer when using private property 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 District has excess land available for such use, if desired by the Contractor, located immediately west of the South and the North Retention Basins.

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 west side of the Highline Canal is available using SRP rights-of-way, from the east side of Avenida del Yaqui to the Town of Guadalupe south town limits. The Contractor also has access to the SRP rights-of-way from I-10 to Avenida del Yaqui for North Retention Basin construction. No access along the east side of the canal is permitted. The Contractor must access the Northeast Retention Basin via the alley at the northeast corner of the basin off of Beck Avenue in Tempe.

Access to the South Retention Basin site is available from either Calle Vauo Nawi off of Guadalupe Road, or a Temporary Construction Easement (TCE) for access, which has been made available along the Mineral Street alignment off of Avenida Del Yaqui (Priest Drive). Calle Vauo Nawi south of Guadalupe Road is a very narrow residential street and the Contractor must take precautions when using the street for access. The Mineral Street alignment is a private street used for access to four business parcels along the north side of Mineral Street east of Avenida Del Yaqui. The Contractor must be cautious of business traffic along this street alignment. This is especially important at the eastern end of the TCE, which goes through an existing RV Storage Lot business. A gate has been provided through the existing masonry wall along the east side of the RV Storage Lot property for access to the basin site. The Contractor will determine the adequacy of the gate width to accommodate construction traffic. The Mineral Street TCE can be used only during normal construction working hours and only for construction traffic. Residential traffic will not be allowed use of this TCE. The gate at the east end of the TCE will be closed and locked during none working hours. The Contractor shall coordinate with the business owner, Dean Thomas at 480-768-1618, as to the locking and unlocking of the gate. Any existing pavement along the TCE or along Calle Vauo Nawi that is damaged during construction and caused by construction traffic shall be repaired by the Contractor at no cost to the project and to the satisfaction of the owner of the pavement.

Subsection 107.2 - Permits: Replace with the following:
Contractor shall obtain all permits and licenses, including those required by the Town of Guadalupe, City of Tempe, and SRP and shall pay all charges, fees, taxes, and provide all notices necessary and incidental to the due and lawful prosecution of the work.

In particular the Contractor will obtain all necessary NPDES and SWPPP permits as required and in accordance with subsection 107.2.1. Dry Well registrations are also required from the Arizona Department of Environmental Quality.

The Contractor shall contact Larry Shobe of the City of Tempe at 480-350-8860 for all City permits required for the project including haul permits, and permits for use of the alley off of Beck Avenue as access to the Northeast Retention Basin.

The Contractor shall contact the City of Tempe Development Services Center (DSC) at 480-350-8341 for all City permits for the water and electrical services required for the basin irrigation systems. The Contractor shall refer to the project DSC Tracking Number #DS010961 when requesting the permits. The various permit fees are: $110 permit fee, $2,100 water development fee, $33.50 electrical fee, and $742 water meter and tapping fee. The tapping fee of $626.00 would be waived if the Contractor is directed by the City to install the tap.

In accordance with the SRP License for construction activities within the Highline Canal right-of-way, the Contractor shall provide SRP and the Engineer at least ten (10) days prior to the beginning of any construction within SRP right-of-way notice of the date that construction will begin and a schedule listing all construction activities and dates when such construction activities will be performed.

While working within SRP right-of-way, the Contractor shall enter and exit the right-of-way at a point of reasonable access closest to the construction activity, shall drive vehicles at a maximum speed of 5 mph, shall not interfere with SRP staff and vehicles traveling along the canal, and shall secure all work areas to prevent damage or injury to other persons and equipment.

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:

   Storm Water Notice of Intent (4203)
   USEPA
   401 M Street, SW
   Washington, D.C. 20460

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

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

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

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

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

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

F. Upon project completion, acceptance and demobilization, Contractor shall submit its completed, duly executed NOT form to the EPA, with a copy to the Arizona Department of Environmental Quality 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 – Safety, Health & Sanitary Provisions: 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:
The South Retention Basin is located adjacent to a site (Sanders Aviation Site) that was listed on the National Priorities List pursuant to Section 105 of the Comprehensive Environmental Compensation and Liability Act, 42 U.S.C. 9605, because of the presence of regulated substances. Regulated substances means those substances (including petroleum), included within the definitions of hazardous substance, hazardous chemical, hazardous material, regulated or toxic substance, or hazardous, solid or special waste under federal, state, and local laws presently in effect or that may be enacted, promulgated or adopted in the future or may be amended from time to time. For this work, the Contractor will be excavating in an area in which analytical results from prior subsurface investigations (i.e., soil borings) by the District have indicated the presence of a 1 foot thick layer of toxaphene contaminated soil. Toxaphene was present near the southern property boundary at concentrations in excess of the Residential Soil Remediation Levels (RSRL) and decreases in concentration to less than laboratory detection levels at approximately 50 feet to the north of the south property line. The toxaphene is present in a one-foot thick lens of soil at depths of 8 to 12 feet below ground surface with an aerial extent of approximately 50 feet to the north of the south property line. As part of the excavation of the South Retention Basin, the Contractor will excavate to an elevation above this lens of contaminated soil. A separate environmental Contractor under contract with the District will then remove this lens of soil. Work at the South Retention Basin will begin early in the project to allow for the environmental Contractor to remove the soil. Refer to Special Provisions Section 215 for further direction.

Contractor further understands and acknowledges that the work could, though unlikely, expose its employees and subcontractors to Regulated Substances. Included in Appendix "B" is a copy of the testing and test results report for the toxaphene contamination at the South Retention Basin.

It is anticipated that the Contractor will encounter shallow layers of burned and unburned trash and debris, such as lumber, tree branches, shingles, tile, pipe, block, etc., in the upper two to three feet of soil at the Central Retention Basin location. Because of the rough grading activities that have already occurred on the site, some of this material has sloughed off down the existing side slopes of the rough grading area. And, it is possible that such trash and debris may be encountered at other locations on the project. If such material is encountered the Contractor will screen the objectionable inert material and

non-inert material from the soil at the direction of the Engineer and dispose of the inert and non-inert material at approved landfills. Refer to Section 350 for appropriate bid items.

Tires will be encountered during construction activities. These will be disposed of by the Contractor in accordance with Special Provisions Section 350.

Subsection 107.6.3 - Public Information and Notification: Add the following:
Informing the public on a regular basis of construction activities and associated disruptions and inconveniences will be extremely important on this project. 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 public information service shall have staff available specifically for this project who are fluent in Spanish. 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 Interstate 10 east to Beck Avenue/Parkside Drive/Hardy Drive, and from Baseline Road south to the Mineral Road alignment.

2. Printing and distribution of public notices and/or newsletters as required or as directed by the Engineer. 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, water and sewer service disruption, 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. Town of Guadalupe's phone number

A minimum of 30 calendar days prior to any construction activities along the west side of the Highline Canal, including but not limited to any clearing and grubbing activities and/or removal and replacement of fences, the Contractor shall specifically notify in writing and going door to door, all residents who reside along the west side of the Highline Canal. The Contractor will also notify the Town of Guadalupe, and the Town will participate in the door to door visits.

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: Add the following:
Contractor shall provide and install three (3) 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 107.8 – Use of Explosives: Delete in its entirety and replace with the following:
The use of explosives will NOT be permitted for any construction activities on the project.

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, SRP's Highline Canal and related irrigation control structures, adjacent residential and commercial structures, fences and walls, and existing vegetation located outside of the right-of-way 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. Ceremonial Hill (La Lomita), located north of Calle Cerritos and west of Avenida Del Yaqui, at the south side of the North Retention Basin, is **off limits** to construction equipment and personnel. Construction limit lines have been identified on the North Retention Basin site

plan and **NO** construction activities, equipment or personnel of any kind, will be allowed past this line and on the hill.

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.

Subsection 107.10 - Contractor's Responsibility for Work: Add the following:

A. The Contractor shall protect-in-place at all times the SRP Highline Canal and all related facilities. The Contractor shall be responsible for and shall repair at his expense any damage to the canal caused by the Contractor, to the satisfaction of SRP.

B. Contractor shall be aware that a potential exists for seepage from the Highline Canal to be encountered during excavation operations to construct the storm drains. Seepage from the Highline Canal may create conditions of over saturated soils or free water in excavations within, or adjacent to, the canal prism area.

C. Storm water runoff in the area generally flows from the west to the east, ponding against the west side of the Highline Canal. The Contractor shall take all necessary precautions to protect his work and the Highline Canal from damage that may be caused by such runoff and ponding.

D. 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.

E. The Contractor shall take all necessary action to ensure that all construction materials are stored in such a manner that storm runoff from the storage area does not reach the Highline Canal.

F. The Contractor shall not restrict SRP operation and maintenance access along the Highline Canal during construction, including the installation of the storm drain pipe and irrigation sleeve under the canal to the Northeast Retention Basin.

G. The Contractor shall coordinate with the City of Tempe Public Works Department, Jim Bond at 480-350-8897 for inspection of the Northeast Retention Basin construction, including all landscaping and fence installations.

H. The Contractor shall obtain inspection by SRP for the 4-inch conduit sleeves to be installed along the south side of the Highline Canal culvert crossing of Avenida Del Yaqui. The Contractor shall contact Floyd Hardin at 602-236-8944 or 602-809-5753 at least 7 days in advance of the need for the inspection.

I. The Contractor can utilize the west bank of the Highline Canal owned by the Salt River Project (SRP) for access during construction of the flood control facilities. The east bank of the Highline Canal is not available for use as access by the Contractor for construction of the Northeast Retention Basin located on the east side of the canal in Tempe. Access to the Northeast Retention Basin is from Beck Avenue using the alley located to the northeast of the retention basin site.

J. Access for SRP staff to the well site located near the southeast corner of the South Retention Basin shall be maintained during construction. The Contractor shall prevent soil and construction materials from falling into the canal during construction operations. Access along the west side of the canal and the alley off of Beck Avenue shall be done only after the Contractor has first contacted SRP and the City of Tempe and obtained all necessary approvals and permits.

K. Construction activities associated with the North Retention Basin will occur within Arizona Department of Transportation (ADOT) right-of-way for the northbound off-ramp from I-10 to Baseline Road. The Contractor shall contact John Hauskins at 602-712-6550 at least 7 days prior to any work activity within ADOT right-of-way. A permit from ADOT will be obtained by the District for work within ADOT right-of-way. The Contractor shall use extreme caution when working within this right-of-way. Refer to Special Provisions Section 401 for further requirements for working in ADOT right-of-way.

L. The Contractor shall notify the Town of Guadalupe at least 7 days in advance of any work activities to be done within the town limits.

M. The Contractor shall notify SRP, the Town, and the residents residing along the canal at least 30 days in advance of any work activities to be done within SRP's Highline Canal right-of-way. The Contractor shall also notify the Association Dispatch Center at 602-236-5296 as to when the Contractor will be on SRP right-of-way.

N. Where no fences exist, or where existing fences are to be removed, the Contractor shall provide temporary fencing at private properties at the four basins and along the canal. The temporary fencing shall be installed before any construction activities occur and shall be maintained until construction is completed and permanent fencing has been installed.

O. Construction of storm drain one (SD1) and associated catch basins along Calle Magdalena will require construction activities within the Frank School bus bay student drop off and pick up area along the north side of the street. The Contractor shall coordinate with the school before any construction activities occur in this area. Construction shall be accomplished in such a way that school bus drop off and pick up activities are not adversely impacted. Contact Mary Lou Torres (Principal of Frank School) at 480-897-6202 at least fourteen days in advance of any construction activities near the bus bay area.

P. The Contractor will contact SRP at least 14 calendar days in advance of any of any construction activities that affect the canal and/or existing SRP facilities. The Contractor shall participate in a pre-construction meeting with SRP to be held at least 72 hours prior to the start of any such construction activities. The Contractor will notify Canal Watermaster John Evans at 602-236-5664 or Mike Patrick at 602-236-5556, Superintendent of South Side Operation and Maintenance, prior to any activities that may impact the canal or SRP irrigation structures and to schedule the meeting date and time.

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 Notice to Proceed and complete all work within **three hundred thirty (330)** calendar days beginning with the 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.

Contractor shall be solely responsible for the planning, scheduling and execution of the work to assure timely completion of the project.

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 MAG 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.

The "complete-in-place" rate shall include but not necessarily be limited to all labor, material and equipment costs for preparation, installation, construction, modification, alteration or adjustment of the items, which shall include all costs for salaries and wages, all payroll additives to cover employee benefits, allowances for vacation and sick leave, company portion of employee insurance, social and retirement benefits, all payroll taxes, contribution and benefits imposed by any applicable law or regulation and any other direct or indirect payroll-related costs. The rate shall also include but not necessarily be limited to all costs for indirect charges or overhead, mileage, travel time, subsistence, materials, freight charges for material to Contractor's facility or project site, equipment rental, consumables, tools, insurance to the levels specified in Section 103.6 CONTRACTOR'S INSURANCE, all applicable taxes, as well as Contractor's fee and profit. This rate shall further include all site clean-up costs and hauling of construction debris to disposal sites designated by the Engineer.

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

incidental to the item and are included in the unit price. **Payment shall not be made for unused materials.**

It is the responsibility of the bidders to contact all municipalities in the area to determine if they will charge Contractor sales taxes or any fees for work on this project. Any such taxes or fees shall be paid by Contractor.

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 completed and sealed As-Built plans and 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 the As-Built plans, Certificate of Performance, 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 monthly pay estimates will be processed by Owner's Construction Branch during the last week 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

SPECIAL PROVISIONS

CONTRACT FCD 2001C015

GUADALUPE DRAINAGE IMPROVEMENT PROJECT

PCN 035.02.31

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

SPECIAL PROVISIONS

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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 plants and objectionable material within the retention basin /storm drain/ditch right-of-way and as necessary for the construction of this project within temporary construction easements or limits of construction, unless otherwise directed by the engineer. Prior to starting this work the Contractor must verify the location of existing utilities, which may be damaged during this work.

The Highline Canal right-of-way will be cleared for the construction of the V-Ditch and pipe along the west side of the canal right-of-way. Clearing and grubbing will occur up to the SRP west right-of-way line. Care shall be taken to not clear and grub beyond the SRP west right-of-way line.

The basin right-of-way limits will be cleared and grubbed.

No measurement or payment shall be made for clearing and grubbing and general grading within the project limits and within temporary construction easements. Measurement and payment will be made for the removal of trees with trunk sizes over 12-inches in diameter, and the disposal of all resulting materials.

Subsection 201.7 – Payment

Payment will be made on the basis of the price bid per each for the removal of trees with trunks larger than 12-inches in diameter.

ITEM 201-1 – TREE REMOVAL

SECTION 202 - MOBILIZATION

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 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 luminaries 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 machine, 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. Long distance charges made on one telephone line will be paid for by the District.

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 toilet paper, paper towels, soap and 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 (8') conference tables, twelve folding chairs, two four drawer legal size file cabinets, one white board approximately 36" by 52" or larger with markers and erasers, and one draftsman's stool. All furnishing shall be in good working order.

i. First Aid Kit

j. Potable water supply or service

k. Parking spaces 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 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 206 - STRUCTURE EXCAVATION AND BACKFILL
Structure excavation and backfill shall conform to Section 206 of the MAG Uniform Standard Specifications except as modified herein.

Subsection 206.1 - Description
Add the following:
Work specified in this item includes the removal, placing, and compaction of material around concrete structures such as manholes, inlet and outlet structures, concrete spillways, headwalls, wingwalls, concrete ditches, and cutoff walls as shown on the plans.

Subsection 206.2 - Foundation Material Treatment
Add the following:
It has been determined from the geotechnical investigation that the existing soils are expansive and the swell potential of the upper clayey soils is a concern. Accordingly, at least one foot of non-expansive material will be placed directly beneath concrete structures.

Foundation bearing surfaces shall be overexcavated 1 foot and backfilled with non-expansive soil that is free of debris and water softened materials prior to placing concrete and reinforcing steel. All structure excavations shall be inspected and approved by the Engineer prior to placing the reinforcing steel and all trench excavations shall be inspected prior to placing bedding material. Any loose or disturbed zones should be removed and replaced with compacted fill or Class C concrete as directed by the Engineer.

The Geotechnical Reports are available from the District and may be used by the Contractor in developing plans for temporary construction slopes.

Subsection 206.4 - Structure Backfill
Add the following:
Compaction of structure backfill soils against embedded footings or walls shall be accomplished to a minimum 95 percent of the maximum ASTM D698 density. Native soils directly beneath concrete structures shall be replaced with at least 12 inches of silty sand (SM) classification or SC classification with plasticity index less than 15.

Compaction operations shall be accomplished by mechanical methods. Water settling or jetting shall not be permitted. Compaction against or within 3 feet of the structure walls or lining shall be accomplished using manual compaction equipment only.

Backfill against concrete vaults shall be compacted to density criteria from Section 211 of these Special Provisions. Backfills shall consist of granular soils, free of vegetation, debris, organic contaminants, and fragments larger than 3 inches in size, no more than 60 percent passing the 200 sieve. For the fine fraction

(passing the 40 sieve), the liquid limit and plasticity index should not exceed 30 percent and10 percent, respectively. It should exhibit less than 1.5 percent swell potential when compacted to 95 percent of maximum dry density (ASTM D-698) at a moisture content of 2 percent below optimum, confined under a 100 psf surcharge, and inundated. High plasticity on-site soils with PI > 25 may not be used in structure fills or backfills.

Imported soil used for structure backfill should be granular soils conforming to the following requirements:

Maximum Particle size:	3 inch*
Maximum percent expansion:	1.5**

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

**Performed on sample remolded to 95 percent of the maximum ASTM D698 density and 2 percent below optimum moisture under a 100 psf surcharge pressure and inundated.

Subsection 206.5 - Payment
No payment will be made for structure excavation or backfill as such; the cost thereof shall be included in the bid price for the construction or installation of the items for which said excavation or backfill is incidental or appurtenant.

SECTION 211 – FILL CONSTRUCTION

Fill construction shall conform to Section 211 of the MAG Uniform Standard Specifications except where modified herein.

Subsection 211.1 – Description
Add the following:
The work in this section consists of the placing and compacting of fill material at the North, Northeast, Central, and South Retention Basins as shown on the plans. The work shall also consist of placing and compacting fill material along the concrete lined ditch located parallel to Calle Vauo Nawi from Station 57+66 to 62+00, and the placement of earthen dikes along the south side of Guadalupe Road.

The work includes the placement of earthform mounds and berms as part of the landscaping for the North, Central and South Retention Basins as shown on the landscape plans. Work also includes placement of fill over the riprap at the basin outlet pipe structures. The cost for placement of the earthform mounds and berms, and fill over the riprap will be considered incidental to the basin excavation associated with the mounds and berms and riprap.

The work also includes the placement and compaction of backfill in the over-excavated area required for the removal of the toxaphene contaminated soils as described on the plans and in Section 215.

Subsection 211.2 - Placing
Add the following:
Soils removed during excavation with a plasticity index greater than 15 shall not be used in any structure backfills. Highly plastic soils, PI >25, removed from the excavation shall not be used in any required fills. Existing ground upon which fill material is to be placed shall be prepared as specified in Section 211.3 of the MAG Standard Specifications.

Subsection 211.3 - Compacting
Add the following:
Compaction of exposed site soil, backfill, fill, and base course materials shall be accomplished to the following density criteria:

Material	Minimum Percent Compaction (ASTM D698)
Subgrade Soil:	
Below structure elements	95
Below Pavement	95
Below Retention Basin Perimeter Road	95
Backfill:	
Structure elements	95
Basin perimeter roads	95
Earth Dikes along Guadalupe Road	95
Earthform Mounds and Berms (See Landscape Plans)	85
Fill at grade around basin perimeter	95
Concrete ditches and spillways	95
South Basin Over-excavated Area	95
Aggregate base course:	
Below O&M Roads	95
Below Retention Basin Perimeter Road	95
Below Access Ramps	95
Below pavement	100

Compaction of on site soils in scarified zones or in new fills more than 3 feet below final grade should be accomplished at a moisture content between optimum and optimum plus 3 percent. Compaction of exposed soil and fill material within 3 feet of asphalt pavement should be accomplished at a moisture content 2 percent below optimum or lower.

On site undisturbed soils or compacted soils subsequently disturbed or removed by construction operations should be replaced by materials compacted as specified above.

Subsection 211.6 – Payment
Delete section and add the following:
Generally no payment will be made for fill construction as such; the cost thereof shall be included in the bid price for the construction or installation of the items for which said fill is incidental or appurtenant. However, payment for the placement and compaction of fill will be made for the following bid items.

Payment will be made for the placement and compaction of fill material for the berms along the south side of Guadalupe Road and for the replacement of fill material for the over-excavated area created by the removal of the toxaphene contaminated soils at the South Basin. Payment shall be on the basis of the price bid per cubic yard to the neat lines shown in the plans complete in place, including the removal of vegetation and preparation of subgrade.
ITEM 211-1 – EARTH DIKE (ADOT C-03.10, TYPE A)
ITEM 211-2 – SOUTH BASIN OVER-EXCAVATED AREA, BACKFILL

SECTION 215 - EARTHWORK FOR OPEN CHANNELS

Earthwork for open channels and retention basins shall conform to Section 215 of the MAG Uniform Standard Specifications except as modified herein.

Subsection 215.1 - Description

Add the following:

The work in this section consists of excavation, fill, grading, and disposal of excavated and removed material for the construction of the following, the South Retention Basin, the Central Retention Basin, the Northeast Retention Basin, the North Retention Basin, Spillways, V-Ditches and Dirt Ditches such as along the canal and off of Calle Cerritos, O&M Access Roads, Dumped Riprap Aprons, Retention Basin Perimeter Roads and Access Ramps.

The work also includes the over-excavation of the South Retention Basin for the removal of toxaphene contaminated soils as shown in the plans.

Subsection 215.3 - Grading

Add the following:

The basins, O&M access roads, perimeter roads and access ramps, dirt ditches and V-ditches will be excavated to the neat lines shown in the plans. The riprap aprons and rock lined ditches need to be excavated down to the depth shown on the plans in order to place the filter fabric and riprap.

The southerly area of the South Retention Basin will be over-excavated as shown in the plans. The purpose of this over-excavation is to remove a thin layer of low-level toxaphene contaminated soils, estimated to be less than 12" thick, located approximately 9 feet to 12 feet below existing grade. The Contractor will over-excavate to the limits shown in the plans, being approximately to 7 feet below existing grade. The top of south excavation slope will be no closer than 10 feet from the property line, with a slope of approximately 1.5:1. Once the project Contractor has completed this excavation work, a specialty environmental Contractor under separate contract with the Owner will remove the contaminated soil layer by excavating to a depth of approximately 12 feet. This Contractor will stockpile the excavated material on the available District owned property immediately west of and adjacent to the South Retention Basin. This Contractor will test the soil and determine if it can be disposed of in a general manner by the project Contractor, or if special disposal is required. The specialty environmental Contractor will be responsible for any special disposal of the excavated soil as may be required. The project Contractor will then replace the over-excavated area with clean soil from the project compacted to a minimum of 95% per ASTM D698. The fill will be graded to the final neat lines required for the South Retention Basin as shown in the plans. Fill and compaction of the over-excavated area will be in accordance with Section 211. Because of the need for two Contractors working in the South Retention Basin area, and the additional time required for the specialty environmental Contractor to perform his excavation, testing, and possible disposal tasks, the project Contractor shall schedule the South Retention Basin work early in the project schedule allowing sufficient time and performing the necessary coordination to allow the specialty environmental Contractor to accomplish his work without adversely impacting the project schedule.

The side slopes of the concrete lined ditch shall be over-excavated to a depth of 12-inches below finished subgrade (bottom of the concrete lining) shown on the plans. The over-excavated reaches of the concrete lined ditches shall then be backfilled and compacted with two layers (6-inches) of granular soil per Section 206 and 211.

Subsection 215.4 – Fill and Backfill
Add the following:
Fill shall be placed around the perimeter of the basins as shown in the plans and per Section 211. The cost for such fill placement will be considered incidental to the basin excavation. The surface of locations requiring fill shall be scarified 6-inches deep, vegetative material and fragments larger than 3 inches in size removed, and the soil compacted to 95 percent.

Subsection 215.7 - Measurement
Add the following:
Measurement for excavation will be made according to the quantity of material excavated from natural ground to the finished grade and neat lines shown on the plans. Measurement for excavation for concrete ditches will be made according to the quantity of material excavated from natural ground to the finished subgrade shown in the plans. Subgrade excavation required for O&M access roads, perimeter roads and access ramps, and for riprap placement will be considered incidental to the roads and ramps as per Section 310, and riprap per Section 220. The Engineer will verify the quantities of excavation by a method, which in his opinion is best suited to obtain an accurate determination.

Measurement for payment for excavation of the basins 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 at a minimum spacing sufficient to accurately represent the volume of material removed, and with a sufficient number of points to describe the existing ground surface.
C. Cross sections shall be taken at a minimum of 50-foot stations for basins, and at 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.
E. The Contractor shall plot the cross sections where taken as described above showing both the original and final grades, and shall provide volumetric calculations.
F. The Contractor shall submit the cross sections in both electronic format, in either .dgn or .dxf format, and in hard copy form sealed by a Registered Surveyor.

Subsection 215.8 - Payment
Payment for excavation of the four retention basins shall be made on the basis of the price bid per cubic yard, which price shall include all labor, equipment, and materials necessary for the item and shall include disposal of excess material.
ITEM 215-1 – EARTHWORK FOR RETENTION BASINS

Payment for excavation of V-ditches and other dirt ditches shall be made on the basis of the price bid per linear foot, which price shall include all labor, equipment, and materials necessary for the item and shall include disposal of excess material.
ITEM 215-2 – EARTHWORK FOR V-DITCHES & DIRT DITCHES

Payment for the over-excavation of material located at the south end of the South Retention Basin for removal of low level contaminated soil shall be made on the basis of the price bid per cubic yard, which price shall include all labor, equipment, and materials necessary for the item and shall include the disposal of excess material.
ITEM 215-3 – SOUTH BASIN OVER-EXCAVATION

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:

The construction of plain (dumped) riprap at pipe outlet structures in the basins, and at various catch basins and inlets shall consist of furnishing and placing stone to the thickness shown on the plans. Sacked concrete riprap and waste concrete riprap shall not be allowed. Payment for dumped riprap D_{50} of 4-inches at the various catch basins and inlets shall be considered as incidental to the construction of the catch basins and inlets.

Subsection 220.2 - Materials:

Add the following:

The geotextile fabric shall be non-woven fabric consisting only of long chain polymeric filaments such as polypropylene or polyester formed into stable network such that the filaments retain their position to each other. The fabric shall be inert to commonly encountered chemicals, resistant to rot and mildew, and shall have no tears or defects which adversely affect or alter its physical properties. The requirements for the high survivability fabric shall meet the following minimum average roll values:

Property	Requirements	Test Method
Grab Tensile Strength, lbs., at break or 100% elongation, whichever occurs first	200	ASTM D4632-86
Grab Elongation at Break, %	45 min., 115 max.	ASTM D4632-86
Puncture Strength, psi	80	ASTM D3787
Burst Strength, lbs	320	ASTM D3786
Trapezoidal Tear, lbs.	50	ASTM D4533-85
Permissivity, sec^{-1}	0.1	ASTM D4491-85
Apparent Opening Size, US Standard Sieve Size	30 – 100	ASTM D4751-87
Ultraviolet Stability, %	70	ASTM D4355-84

Subsection 220.3 – Preparation of Ground Surfaces

Add the following:

Existing subgrade shall be excavated to allow for the installation of the geotextile filter fabric and riprap.

Subsection 220.4 – Plain Riprap

Plain riprap shall be placed at the outlet ends of pipe culverts into the basins where shown on the plans. The stone shall conform to Section 703 of the MAG Standard Specifications with a D50 of 12 inches. The riprap shall be rounded and dumped and spread to the lines and grades shown in the plans. A geotextile fabric underlay shall be provided for all areas using plain riprap. The gradation shall be as follows:

Stone Size Range (in)	Percent of Stone Smaller
16	100
14	85
12	50
8	15
4	0

Plain riprap shall be placed at the catch basins along Guadalupe Road and at the upstream end of storm

drain number 4 (SD-4), where shown on the plans. The stone shall conform to Section 703 of the MAG Standard Specifications with a D50 of 4 inches. The riprap shall be rounded and dumped and spread to the lines and grades shown in the plans. A geotextile fabric underlay shall be provided for all areas using plain riprap. The gradation shall be as follows:

Stone Size Range (in)	Percent of Stone Smaller
8	100
6	85
4	50
3	15
2	0

Subsection 220.5 - Measurement
Plain riprap shall be measured per cubic yard in place to the neat lines shown on the plans.

Subsection 220.6 - Payment
Payment for plain riprap construction 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 (including geotextile fabric), tools and equipment and over-excavation required to install the riprap.
ITEM 220-1 - PLAIN RIPRAP D_{50} = 12"

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

Subsection 225.1 - Description
Add the following:
Material to be excavated between the existing ground surface and the finished grade shall be pre-wet immediately prior to its removal. The Contractor shall rip or scarify the upper 1.5 feet of soil in the excavation area concurrently with the application of water. Dust shall be kept to a minimum. The moisture shall be kept at a content sufficient to insure that dust will be kept at a minimum for the excavation, hauling, and disposal or placement of soil. In particular dust control will be especially important for the over-excavation work at the south end of the South Retention Basin.

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 of the items to which watering is incidental or appurtenant.

SECTION 301- SUBGRADE PREPARATION
Subgrade preparation shall conform the Section 301 of the MAG Uniform Standard Specifications except where modified herein.

Subsection 301.1 - Description
Add the following:
This section shall include preparation of the surface below the untreated base for pavement replacement on the following roadways: Guadalupe Road, Avenida Del Yaqui, Calle Vauo Nawi, Calle Mexico, Calle Iglesia, Calle San Angelo, Calle Magdalena, Calle Batoua, and Calle Gloria, and for parking lots. In addition, this section shall include preparation of the surface below the untreated base for the operation and maintenance (O&M) access roads, retention basin perimeter roads, access ramps, and pathways.

Subgrade preparation will include the over-excavation of the O&M access road, perimeter road/access ramp, and pathway prism to the depths shown in the plans for the placement of 2-inches of decomposed granite over 4-inches of ABC. Add alternate bid items for the O&M access roads, perimeter roads, access ramps and pathways would change the 2-inches of decomposed granite over 4-inches of ABC to other material combinations. In either case, the cost for the subgrade over-excavation will be considered incidental to the cost of construction of the access and perimeter roads, ramps, and pathways.

Subsection 301.5 – Payment
No payment will be made for subgrade preparation as such; the cost thereof shall be included in the bid price for the construction of pavement replacement or O&M access roads, perimeter roads, access ramps, and pathways to which subgrade preparation is incidental.

SECTION 310 - UNTREATED BASE
Untreated base shall conform to Section 310 of the MAG Uniform Standard Specifications except as modified herein.

Subsection 310.1 - Description
Add the following:
The work under this section consists of furnishing labor, materials, and equipment to install aggregate base course under the pavement replacement shown on the plans at the following locations: Guadalupe Road, Avenida Del Yaqui, Calle Vauo Nawi, Calle Mexico, Calle Iglesia, Calle San Angelo, Calle Magdalena, Calle Batoua, Calle Gloria, parking lots, and for the structural section for the O&M access roads, the retention basin perimeter roads, access ramps, and pathways. The replacement pavement sections will be: 4" AC over 6" ABC for Avenida Del Yaqui and Guadalupe Road, and 2" AC over 4" ABC for all other streets and parking lots.

The base bid for the structural section for the O&M access and perimeter roads, access ramps, and pathways will be 2-inches of decomposed granite over 4-inches of ABC.

The work may also include add-alternate bid items for an 8-foot wide surfacing of the O&M access and perimeter roads and access ramps, and a 5-foot wide surfacing of the pathways as follows: 3-inches of stabilized decomposed granite over 4-inches of ABC as shown in the plans. Add-alternate bid items will be bid for the North, for the Central and for the South Retention Basin roads, ramps and pathways. Other add-alternate bid items for an asphalt concrete and a portland cement concrete surfacing will also be bid in their respective Sections 321 and 340.

The award of an add alternate bid item for the surfacing of the access and perimeter roads, ramps, and pathways as provided in Sections 310, 321, and 340 would result in a corresponding reduction in the amount of base bid decomposed granite installed.

Subsection 310.2 Material
The aggregate base course for the identified locations shall conform to:

Percent Passing Sieve							
3 inch	1 1/2 inch	1 1/8 inch	No. 4	No. 8	No. 30	No. 200	PI, Max
--	--	100	38-65	25-60	10-40	3-12	5

Notes:

1) The percentage, by weight, passing each sieve will be determined in accordance with the requirements of Arizona Test Method 201.

2) The PI (Plasticity Index) will be determined in accordance with the requirements of AASHTO T90.

3) For Class 1 through Class 4 aggregate, the amount of fractured particles shall be at least 30 percent, when tested in accordance with the requirements of Arizona Test Method 212.

4) Resistance to abrasion for Class 1 through Class 4 aggregate will be determined in accordance with the requirements of AASHTO T 96 and shall meet the following requirements:

   Maximum loss of 9 percent at 100 revolutions
   Maximum loss of 40 percent at 500 revolutions

The 2-inch decomposed granite for the base bid will be of the following gradation and color: 1/2" minus of Yavapai Coral.

The 3-inch stabilized decomposed granite for the add-alternate bid will be of the following gradation and color: 1/4" minus of Yavapai Coral.

The stabilizing agent shall consist of a nontoxic, nonflammable, organic binder odorless concentrated powder. The stabilizer shall be either liquid or dry depending on the manufacturer. The stabilizing agent shall not re-emulsify after cured and provide a firm pavement like surface with an effective life of at least five years or more. Required in-place compressive strength shall be 1,200 psi. Acceptable products include STABILIZER by the Stabilizer Solutions, Inc., or other approved equal. Stabilizer product shall be mixed and blended with the specified aggregate material and installed in strict accordance with the Manufacturer's specifications and requirements. Minimum rate of Stabilizing agent for mixture blending, shall be 14 pounds per ton of specified ¼" minus aggregate material.

Subsection 310.4 - Payment

No payment will be made for aggregate base course associated with pavement replacement for the installation of storm drains, the cost thereof being incidental to the cost of the installation of the storm drain. The exception to this is the two large pavement reconstruction locations on Calle Vauo Nawi associated with Storm Drain #2-5. This pavement section is 2-inches of AC over 4-inches of ABC.

Payment for the base bid for 4-inches of ABC for the O&M access and perimeter roads, access ramps, and pathways shall be made on the basis of the price bid per square yard complete and in place and including over-excavation for the placement of the material and all other equipment, materials, labor and incidentals.

ITEM 310-1 – 4" ABC FOR O&M ACCESS & PERIMETER ROADS, ACCESS RAMPS & PATHWAYS

Payment for the base bid for 2-inches of decomposed granite for the O&M access and perimeter roads, access ramps, and pathways shall be made on the basis of the price bid per square yard complete and in place and including over-excavation for the placement of the material and all other equipment, materials, labor and incidentals.

ITEM 310-2 – 2" DECOMPOSED GRANITE FOR O&M ACCESS & PERIMETER ROADS, ACCESS RAMPS, & PATHWAYS

Payment for 4-inches of ABC for the pavement reconstruction locations on Calle Vauo Nawi associated with Storm Drain #2-5 shall be made on the basis of the price bid per square yard complete and in place and including all equipment, materials, labor and incidentals necessary for the placement.

ITEM 310-3 – 4" ABC FOR STORM DRAIN 2-5

Payment for the North Retention Basin add-alternate of 3-inches of stabilized decomposed granite for the O&M access and perimeter roads, access ramps, and pathways shall be made on the basis of the price bid per square yard complete and in place and including over-excavation for the placement of the material and all other equipment, materials, labor and incidentals.

ITEM 310-4 – 3" S.D.G. FOR O&M ACCESS & PERIMETER ROADS, ACCESS RAMPS, & PATHWAYS NORTH BASIN (ALTERNATE)

Payment for the Central Retention Basin add-alternate of 3-inches of stabilized decomposed granite width for the O&M access and perimeter roads, access ramps, and pathways shall be made on the basis of the price bid per square yard complete and in place and including over-excavation for the placement of the material and all other equipment, materials, labor and incidentals.

ITEM 310-5 – 3" S.D.G. FOR O&M ACCESS & PERIMETER ROADS, ACCESS RAMPS, & PATHWAYS CENTRAL BASIN (ALTERNATE)

Payment for the South Retention Basin add-alternate of 3-inches of stabilized decomposed granite for the O&M access and perimeter roads, access ramps, and pathways shall be made on the basis of the price bid per square yard complete and in place and including over-excavation for the placement of the material and all other equipment, materials, labor and incidentals.

ITEM 310-6 – 3" S.D.G. FOR O&M ACCESS & PERIMETER ROADS, ACCESS RAMPS, & PATHWAYS SOUTH BASIN (ALTERNATE)

SECTION 321 – ASPHALT CONCRETE PAVEMENT

Asphalt concrete pavement shall conform to Section 321 of the MAG Uniform Standard Specifications except as modified herein.

Subsection 321.1 - Description

Add the following:

This section applies to the placement of asphalt concrete for Guadalupe Road, Avenida del Yaqui, Calle Vauo Nawi, Calle Mexico, Calle Iglesia, Calle San Angelo, Calle Magdalena, Calle Batoua, Calle Gloria, and parking lots.

The work may also include add-alternate bid items for surfacing of the O&M access and perimeter roads, access ramps, and pathways as follows: 2-inches of asphalt concrete over 4-inches of ABC as shown in the plans. Add-alternate bid items will be bid for the North, for the Central and for the South Retention Basin roads, ramps, and pathways.

Subsection 321.2 – Materials and Manufacture

Add the following:

All asphalt concrete material shall be D1/2 mix and conform to Section 710 of the MAG Uniform Standard Specifications. Pavement replacement is 2-inches thick for all streets and parking lots, except for Guadalupe Road and Avenida del Yaqui where the pavement thickness will be 4-inches.

Subsection 321.8 – Measurement
The asphalt concrete pavement shall be measured per square yard in place to the neat lines shown on the plans.

Subsection 321.9 – Payment
No payment will be made for asphalt concrete associated with pavement replacement for the installation of storm drains, the cost thereof being incidental to the cost of the installation of the storm drain. The exception to this is the two large pavement reconstruction locations on Calle Vauo Nawi associated with Storm Drain #2-5. This pavement section is 2-inches of AC over 4-inches of ABC.

Payment for 2-inches of D1/2 A.C. pavement for the pavement reconstruction locations on Calle Vauo Nawi associated with Storm Drain #2-5 shall be made on the basis of the price bid per square yard complete and in place and including all equipment, materials, labor and incidentals necessary for the placement.
ITEM 321-1 – 2" D1/2 A.C. PAVEMENT FOR STORM DRAIN 2-5

Payment for the North Retention Basin add-alternate of 2-inches of D1/2 A.C. pavement for the O&M access and perimeter roads, access ramps, and pathways shall be made on the basis of the price bid per square yard complete and in place and including over-excavation for the placement of the material and all other equipment, materials, labor and incidentals.
ITEM 321-2 – 2" D1/2 A.C. PAVEMENT FOR O&M ACCESS & PERIMETER ROADS, ACCESS RAMPS, & PATHWAYS NORTH BASIN (ALTERNATE)

Payment for the Central Retention Basin add-alternate of 2-inches of D1/2 A.C. pavement for the O&M access and perimeter roads, access ramps, and pathways shall be made on the basis of the price bid per square yard complete and in place and including over-excavation for the placement of the material and all other equipment, materials, labor and incidentals.
ITEM 321-3 – 2" D1/2 A.C. PAVEMENT FOR O&M ACCESS & PERIMETER ROADS, ACCESS RAMPS, & PATHWAYS CENTRAL BASIN (ALTERNATE)

Payment for the South Retention Basin add-alternate of 2-inches of D1/2 A.C. pavement for the O&M access and perimeter roads, access ramps, and pathways shall be made on the basis of the price bid per square yard complete and in place and including over-excavation for the placement of the material and all other equipment, materials, labor and incidentals.
ITEM 321-4 – 2" D1/2 A.C. PAVEMENT FOR O&M ACCESS & PERIMETER ROADS, ACCESS RAMPS, & PATHWAYS SOUTH BASIN (ALTERNATE)

SECTION 336 – PAVEMENT MATCHING AND SURFACING REPLACEMENT
Pavement matching and surfacing replacement shall conform to Section 336 of the MAG Uniform Standard Specifications except as modified herein.

Subsection 336.1 - Description
Add the following:
The work under this section shall consist of pavement replacement beyond those limits allowed by MAG for the installation of storm drain pipe and related appurtenances. The cost for pavement replacement for the installation of storm drains is considered incidental to the installation of the storm drain pipe.

In the event that additional pavement removal and replacement is necessary for the installation of storm drain pipe and related appurtenances, an allowance is provided. The unit cost for this allowance will be a bid item. Use of the allowance will be only at the direction of the Engineer, and such use must be

obtained in writing before additional pavement removal is undertaken that could result in the use of the allowance.

Subsection 336.4 – Measurement:
Measurement will be by the square yard complete in place for the A.C. pavement and ABC as described in Section 310 and Section 321.

Subsection 336.5 – Payment:
Payment for pavement replacement shall be made on the basis of the price bid per square yard complete in place including all over-excavation and subgrade preparation, materials, equipment, labor and incidentals required for the pavement replacement.
ITEM 336-1 – 2" A.C. OVER 4" ABC, PAVEMENT REPLACEMENT ALLOWANCE
ITEM 336-2 – 4" A.C. OVER 6" ABC, PAVEMENT REPLACEMENT ALLOWANCE

SECTION 340 – CONCRETE HEADERS, PATHWAYS AND MISCELLANEOUS ITEMS
Concrete headers, pathways and miscellaneous concrete structures shall conform to Section 340 of the MAG Uniform Standard Specifications except as modified herein.

Subsection 340.1 - Description
Add the following:
The work under this section shall consist of furnishing all labor, materials and equipment for the construction of the following:

Concrete Cutoff Wall per Section R10
Concrete Cutoff Wall per Detail 19E
Concrete Curb and Gutter (Type "A" and "C", MAG Std Det 220) and transitions to match existing Curb and Gutter.
Concrete Sidewalk (MAG Std Det 230)

The work may also include add-alternate bid items for surfacing of the O&M access and perimeter roads, access ramps, and pathways as follows: 4-inches of concrete per MAG Det 230 over 4-inches of ABC as shown in the plans. Add-alternate bid items will be bid for the North, for the Central and for the South Retention Basin roads, ramps, and pathways.

Concrete shall conform to the requirements of Section 725 of the MAG Standard Specifications, and mix designs shall additionally meet the requirements of Chapter 5, Section 5.3 of ACI STANDARD 318-89. The Contractor shall submit mix designs and certifications of conformance with the above requirements for the written approval of the Engineer.

Class "A" Concrete, f'c = 3000 psi, shall be used for pathways.
Class "B" Concrete, f'c = 2500 psi, shall be used for cutoff walls, curb, gutter and sidewalk.

The use of Class F fly ash will be permitted in all concrete mixes, subject to approval of mix design by Engineer.

Transit Concrete mixers used on the project must carry current certification from ADOT or Arizona Rock Products Association.

The reinforcing steel shall conform to Section 727, Grade 60, of the MAG Standard Specifications.
The concrete pathways shall be reinforced with 6x6 WWM as shown in the plans.

An allowance is provided for the removal and replacement of existing curb, gutter and sidewalk that may be required for the relocation of water services and sewer house service connections (HCS's). Refer to Sections 610 and 615. The unit cost for these allowances will be bid items. Use of the allowance will be only at the direction of the Engineer, and the Engineer must approve use of the allowance in writing in advance.

340.3.1 - Joints
Add the following:
Construction joints shall be located at the end of a day's pour or when concrete placement stops for more than 45 minutes. Reinforcing steel shall be continuous through lining construction joints for a minimum of 2 feet beyond the end of pour unless noted otherwise on the plans. The end of the pour shall be a roughened surface.

Subsection 340.6 - Payment
No payment will be made for the replacement of concrete curb and gutter, and sidewalk associated with catch basins installed where there is existing curb, gutter and sidewalk (refer to catch basin details). The cost for such replacement shall be included in the bid price for the construction of catch basin items to which such replacement is incidental. Refer to Section 505.

No payment will be made for the installation of new concrete curb and gutter associated with catch basins installed where there is no existing curb and gutter (refer to catch basin details). The cost for the new concrete curb and gutter shall be included in the bid price for the construction of the catch basins to which such construction is incidental. Refer to Section 505.

Payment for the concrete cutoff walls shall be made on the basis of the price bid per linear foot, and shall include full compensation for all labor, material, equipment, and appurtenances necessary for the construction of the cutoff walls complete in place including all concrete, reinforcing steel, and structure excavation and backfill.
ITEM 340-1 – CUTOFF WALL 3' DEEP (TYP SECTION R10)
ITEM 340-2 – CUTOFF WALL 4' DEEP (DET 19E)

Payment for the installation of new concrete curb and gutter and sidewalk associated with the relocation of HSC's, water services, and work at Avenida del Yaqui just south of the Highline Canal crossing will be made utilizing an allowance on the basis of the price bid per linear foot for curb and gutter, and on the basis of the price bid per square foot for sidewalk, and will include all materials, equipment and labor required for the installation of the curb and gutter and sidewalk complete in place. The removal and disposal of the existing curb, gutter and sidewalk associated with above work is also included in the unit cost.
ITEM 340-3 – CURB & GUTTER (MAG DET 220, TYPE A) ALLOWANCE
ITEM 340-4 – CURB & GUTTER (MAG DET 220, TYPE C) ALLOWANCE
ITEM 340-5 – SIDEWALK (MAG DET 230) ALLOWANCE

Payment for the North Retention Basin add-alternate of 4-inches of concrete pathway for the O&M access and perimeter roads, access ramps, and pathways shall be made on the basis of the price bid per square foot complete and in place and including over-excavation for the placement of the material and all other equipment, materials, labor and incidentals.
ITEM 340-6 – CONCRETE PATHWAY (MAG DET 230) FOR O&M ACCESS & PERIMETER ROADS, ACCESS RAMPS, & PATHWAYS NORTH BASIN (ALTERNATE)

Payment for the Central Retention Basin add-alternate of 4-inches of concrete pathway width for the O&M access and perimeter roads, access ramps, and pathways shall be made on the basis of the price bid

per square foot complete and in place and including over-excavation for the placement of the material and all other equipment, materials, labor and incidentals.

ITEM 340-7 – CONCRETE PATHWAY (MAG DET 230) FOR O&M ACCESS & PERIMETER ROADS, ACCESS RAMPS, & PATHWAYS CENTRAL BASIN (ALTERNATE)

Payment for the South Retention Basin add-alternate of 4-inches of concrete pathway for the O&M access and perimeter roads, access ramps, and pathways shall be made on the basis of the price bid per square foot complete and in place and including over-excavation for the placement of the material and all other equipment, materials, labor and incidentals.

ITEM 340-8 – CONCRETE PATHWAY (MAG DET 230) FOR O&M ACCESS & PERIMETER ROADS, ACCESS RAMPS, & PATHWAYS SOUTH BASIN (ALTERNATE)

SECTION 345 — ADJUSTING FRAMES, COVERS, VALVE BOXES, AND WATER METER BOXES

Adjusting manhole frames and covers shall conform to Section 345 of the MAG Uniform Standard Specifications except as modified herein.

Subsection 345.1 – Description

Add the following:

Manhole frames and covers will be adjusted as required for the installation of storm drain improvements as shown in the plans.

Subsection 345.5 – Payment

Payment for adjustment of manhole frames and covers will be made per each.

ITEM 345-1 – ADJUST SEWER MANHOLE FRAME & COVER (MAG Std Det 422)

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 required for this project includes, but is not limited to, the following:

- The removal and disposal of two existing catch basins and associated 12-inch diameter concrete pipes along the Highline Canal associated with the V-Ditch. A portion of the existing pipe will remain in place at the canal lining and plugged in accordance with Detail 10D.

- The removal of an existing telephone cable (abandoned) on Guadalupe Road associated with installation of storm drain SD-3.

- The removal of existing concrete headwall for the installation of storm drain number 3, and removal of existing driveway concrete headwalls, pipe culverts, pavement, and grading to remove the existing driveways and reform the existing ditch located along the south side of the Central Retention Basin.

- The removal of portions of existing waterlines as a part of the relocation effort for waterlines where conflicts with the storm drain system exist. Water line removal locations include but may not be limited to:

  Calle Batoua – 25+68 Lt. (SD 1);

Calle Gloria – 16+06 Lt., 17+09 Lt. (SD 1-1);
Calle Vauo Nawi – 0+28, 0+50 Rt., 2+32 (SD 2-2), 10+00 Rt. (SD 2-5);
Calle San Angelo – 13+20 Lt., 16+74 Lt., 19+91 Lt., 20+69 Lt., 24+87 Lt. 20+10 (SD 2-1);
Calle Mexico – 14+60 Rt. (SD 2-4);
Avenida del Yaqui – 12+05 (SD 7)

- The removal of existing Asphalt Concrete plugs from five catch basin inlets located between the Highline Canal culvert crossing of Avenida Del Yaqui and Calle Cerritos.

- The removal of existing chain link fence, mesh fence, T-Post and plain wire fence, wrought iron fence and miscellaneous fence located along the Highline Canal, and at the North, Northeast, Central and South Retention Basins. Removal of rent-a-fence located at the northwest corner of the Central Retention Basin will be removed by others. The Contractor will provide the Engineer with at least 14 days notice of the need to have the rent-a-fence removed.

- The removal of an existing traffic barricade located at the east end of Calle Mesquite - Sta. 68+75 Lt. (SD 6).

- The removal of existing concrete curb and gutter, valley gutter, and sidewalk for the construction of catch basins is a NPI for the construction of the various catch basins (see description for pay items 505-3 thru 6). The removal of existing concrete curb and gutter, and sidewalk associated with the replacement of water services, and sewer house service connections, is a NPI included in the allowance cost of constructing the new curb and gutter, and sidewalk.

- The removal of the large areas of existing asphalt pavement for the construction of storm drain SD #2-5.

- The relocation of existing mailboxes on Guadalupe Road, located 55 feet east of the manhole at Sta. 27+55 (SD 3).

- The removal of 8-inch, 12-inch and 18-inch sanitary sewer and manholes along Guadalupe Road. Between stations 17+40± and 27+00±, portions of the existing sanitary sewer will be abandoned in place. Where ends of the existing sewer pipe are exposed, plug the ends using low slump class B concrete. See Detail A on sheet 118. The cost of the concrete plugs is included in the cost of removing the sanitary sewer pipe to relocate the sanitary sewer line and reconnecting the house connection sewer lines.

- The removal of the miscellaneous debris.

The Contractor shall protect-in-place (P.I.P.) or remove, properly store, and reinstall all existing street signage that may be in conflict with construction activities. The cost for such signage work shall be considered incidental to the project cost.

The work includes the removal and disposal of existing structures, telephone cable, wood products, concrete rubble, vegetative material, scrap metal, and any other obstacles to construction. Holes, cavities and trenches resulting from the removal of structures shall be backfilled in accordance with Sections 206 and 211.

The work includes the removal of a "tire fence" located along the canal between approximately Stations 30+60 and 32+00, south of Guadalupe Road. The tires will be disposed of at an approved landfill that accepts tires.

According to SRP, SRP being the previous owner of the property, there may be an abandoned septic tank located on the property where the Northeast Retention Basin is to be constructed. Its location is unknown, but is likely in the northwestern portion of the property. If the Contractor encounters the tank he will be required to pump it, crush and remove as necessary for the excavation of the basin.

It is anticipated that the Contractor will encounter shallow layers of burned and unburned trash and debris, such as lumber, tree branches, shingles, tile, pipe, block, etc., in the upper two to three feet of soil at the Central Retention Basin location. Because of the rough grading activities that have already occurred on the site, some of this material has sloughed off down the existing side slopes of the rough grading area. And, it is possible that such trash and debris may be encountered at other locations on the project. If such material is encountered the Contractor will screen the objectionable inert material and non-inert material from the soil at the direction of the Engineer and dispose of the inert and non-inert material at approved landfills. Should such trash and debris as may be encountered extend into the basin finished grade side slope or invert, it shall be removed to a minimum depth of two feet beyond the finished grade of the basin side slope or invert. As an example, a tree limb buried deep into and beyond the finished grade of the basin need be removed the minimum of two feet beyond the finished grade limits. Any void created by such removal shall be backfilled and compacted to 95% per ASTM D698.

The disposal of all waste material shall be the responsibility of the Contractor. The Engineer shall approve the disposal site(s).

The project construction limits shall be cleared of all trash and construction debris. Such material as collected shall be disposed of at an approved landfill site and shall be subject to landfill fees so assessed, which will be included in the unit price bid for the removal bid item. A Landfill Use Permit will be required for all landfill disposals.

Weigh tickets from all landfill disposal must be furnished to the Engineer.

Subsection 350.4 – Payment

Payment for the removal and disposal of existing catch basins, headwalls, water lines, fences, pavement, barricades, mail boxes, abandoned utilities, sewer and manholes, and miscellaneous debris, etc. shall be made on the basis of each, linear feet, square yards, and the lump sum price bid, and shall include all labor, materials and equipment necessary to remove and dispose or reinstall the items. See the bid schedule for the bidding units for each bid item.

ITEM 350-1 – REMOVE EXISTING CATCH BASINS & PIPE,
INSTALL PLUG (DET 10D)
ITEM 350-2 – REMOVE ABANDONED TELEPHONE CABLE
ITEM 350-3 – REMOVE EXISTING HEADWALLS
ITEM 350-4 – REMOVE EXISTING WATER LINES
ITEM 350-5 – REMOVE EXISTING A/C PLUGS FROM CURB INLETS
ITEM 350-6 – REMOVE EXISTING FENCING
ITEM 350-7 – REMOVE EXISTING BARRICADE
ITEM 350-8 – REMOVE ASPHALT PAVEMENT FOR SD 2-5
ITEM 350-9 – REMOVE EXISTING SANITARY SEWER PIPE
ITEM 350-10 – REMOVE EXISTING SANITARY SEWER MANHOLES
ITEM 350-11 – REMOVE & REINSTALL EXIST MAIL BOXES

ITEM 350-12 – REMOVE AND DISPOSE OF SEPTIC TANK
ITEM 350-13 – MISCELLANEOUS REMOVALS

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

ITEM 350-14 – REMOVE & DISPOSE OF TIRES
ITEM 350-15 – REMOVE & DISPOSE OF NON-INERT MATERIALS

Payment for the removal, screening and disposal of inert materials will be made on the basis of the price bid per cubic yard and shall include all labor, materials and equipment necessary to remove, screen and dispose of the materials.

ITEM 350-16 – REMOVE & DISPOSE OF INERT MATERIALS

Payment for the removal and disposal of pipe culverts, pavement, and grading to remove the existing driveways located along the south side of the Central Retention Basin will 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 materials. Grading to reform the existing ditch will be included in the cost of these removals.

ITEM 350-17 – REMOVE & DISPOSE OF DRIVEWAYS & CULVERTS

SECTION 401 – TRAFFIC CONTROL

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

Subsection 401.1 – Description

Add the following:

Work Within the Town of Guadalupe:

Traffic shall be maintained at all times along Guadalupe Road and Avenida Del Yaqui, as these roadways are the principal routes into and out of the Town of Guadalupe.

Traffic along Guadalupe Road may be reduced to two lanes, one in each direction, for the purposes of constructing the two-barrel pipe crossing, drop structure, and the 42/54-inch storm drain. Driveway access along the south side of the street must be maintained at all times during construction. An appropriate traffic control plan will be prepared by the Contractor and submitted to the Engineer for review and to the Town of Guadalupe and the City of Tempe for approval.

Traffic along Avenida Del Yaqui may be reduced to one lane for purposes of constructing the 48-inch storm drain outfall and for the installation of the double 4-inch ductbank across the street on the south side of the Highline Canal. In order to maintain at least one lane of traffic it may be necessary to remove and reinstall existing curb, gutter and sidewalk and parking lot pavement on the east side of the street. Similar removals may be required on the west side of the street. Access to the dry cleaners and the car wash businesses on the east side of the street will be maintained at all times during construction. A flagman or off-duty police officer may required to direct and control traffic through the restricted one lane area of construction. An appropriate traffic control plan including removal and replacement of existing features will be prepared by the Contractor and submitted to the Engineer for review and to the Town of Guadalupe and the City of Tempe for approval.

Construction of the 48-inch storm drain in Avenida Del Yaqui will require the relocation of an existing 12-inch water line. The Contractor will be required to bypass the relocation work by installing two temporary water lines between existing fire hydrants north and south of the canal. This allows the section of 12-inch water line that needs relocation to be shut down while maintaining water supply and pressure

to isolated water line loops. City of Tempe personnel will be present during the relocation effort. For purposes of this relocation, traffic along Avenida Del Yaqui may be reduced to one lane. Calle Cerritos at Avenida del Yaqui will be blocked by the temporary water line as well as access to SRP right-of-way (west of Avenida del Yaqui), a few vacant lots and one driveway. Access to businesses in the area must be maintained at all times during the construction. Work at this location will affect traffic in both the Town of Guadalupe and the City of Tempe, thus an appropriate traffic control plan including removal and replacement of existing features will be prepared by the Contractor and submitted to the Engineer for review and to the Town of Guadalupe and the City of Tempe for approval.

Traffic on residential side streets such as Calle Vauo Nawi, Calle Mexico, Calle Iglesia, Calle San Angelo, Calle Magdalena, Calle Batoua, and Calle Gloria may be closed to traffic only during working hours, and only within the limits of construction, to construct the storm drain lines, laterals, catch basins, and cross-street inlets. The Contractor will attempt to make a reasonable effort to maintain driveway access to homes, businesses and schools within the construction area. No more than 200 feet of open trench will be allowed at any time for installation of the storm drain pipe. Streets must be reopened for traffic with trenches covered with steel plates during non-working hours to allow for traffic and access to residences and businesses. Street closures will be limited to one block during working hours or as directed by the Engineer. An appropriate traffic control plan will be prepared by the Contractor and submitted to the Engineer for review and to the Town of Guadalupe for approval. The Contractor will provide adequate notice at least 72 hours in advance of any street closures to all residences, businesses and schools, as well as postal, emergency and trash pickup services that may be affected by such closures. Refer to Subsection 107.6.3.

Storm drain installation will not be permitted on two parallel and adjacent streets at the same time.

Construction activities along Calle Magdelana, Calle Batoua, and Calle Gloria will be along the Frank School. The Contractor will coordinate as required to ensure there are no disruptions to school activities, especially including school bus pickup and drop-off of students. The Contractor will notify the school at least fourteen days in advance of any activities along these streets.

Access to the South Retention Basin site is available from either Calle Vauo Nawi off of Guadalupe Road, or a Temporary Construction Easement (TCE) for access, which has been made available along the Mineral Street alignment off of Avenida Del Yaqui (Priest Drive). Calle Vauo Nawi south of Guadalupe Road is a very narrow residential street and the Contractor must take precautions when using the street for access. The Mineral Street alignment is a private street used for access to four business parcels along the north side of Mineral Street east of Avenida Del Yaqui. The Contractor must be cautious of business traffic along this street alignment. This is especially important at the eastern end of the TCE, which goes through an existing RV Storage Lot business. A gate has been provided through the existing masonry wall along the east side of the RV Storage Lot property for access to the basin site. The Contractor will determine the adequacy of the gate width to accommodate construction traffic. The Mineral Street TCE can be used only during normal construction working hours and only for construction traffic. Residential traffic will not be allowed use of this TCE. The gate at the east end of the TCE will be closed and locked during non-working hours. The Contractor shall coordinate with the business owner, Dean Thomas at 480-768-1618, as to the locking and unlocking of the gate. Any existing pavement along the TCE or along Calle Vauo Nawi that is damaged during construction and caused by construction traffic shall be repaired by the Contractor at no cost to the project and to the satisfaction of the owner of the pavement.

Work Within ADOT Right-of-Way:

The Contractor will NOT be permitted to use the northbound I -10 off ramp at Baseline Road for access to construction activities within the ADOT right-of-way. ALL access shall be from Flood Control District (FCD) property immediately adjacent to the ADOT right-of-way. The Contractor will use SRP

Highline Canal north branch right-of-way west of Avenida Del Yaqui for access to the ADOT right-of-way directly from the northwest corner of FCD right-of-way. The District has obtained the necessary permits for such construction activity of connecting the 18-inch storm drain pipe to the ADOT catch basin.

The Contractor will remove and salvage existing ADOT right-of-way fence that exists beginning at the north end of the concrete sound barrier wall to provide temporary access to the ADOT right-of-way. The Contractor shall install a temporary fence/gate at the location where the existing ADOT fence has been removed, and such fence/gate shall be maintained throughout the construction activities in such a manner as to prevent entry to the ADOT right-of-way by unauthorized persons. Upon completion of construction the Contractor shall reinstall the permanent ADOT right-of-way fence to the satisfaction of ADOT. The cost of the removal and reinstallation of the permanent fence and the cost of the temporary fence will be included in the traffic control cost.

The Contractor shall place "Temporary Concrete Barrier" (ADOT Std 4-C-2.01) plus any necessary crash worthy end treatment along the east side of the ramp behind back of curb to separate traffic from the construction work area. The barriers shall be placed a distance of 240 feet south and 60 feet north of the work area. Placement of the barriers shall be in accordance with Section 701 of ADOT's Standard Specifications. The placement and layout of the barriers and advance warning signage shall be approved in advance by ADOT. The cost for the Temporary Concrete Barrier, including placement and removal, crash worthy end treatment, and signage is included in the lump sum cost for Traffic Control (ADOT R/W).

The Contractor shall restore all landscaping, irrigation and decomposed granite ground cover at the completion of construction to a condition as good as or better than found at the start of construction and as approved by ADOT. The cost for this restoration work will be considered incidental to the construction activities in the ADOT right-of-way.

Work Within City of Tempe:
The Contractor will access the Northeast Retention Basin from the alley off of Beck Avenue in Tempe. Construction access to the basin from the SRP canal bank will not be permitted. The Contractor shall obtain City of Tempe permits as required by contacting Larry Shobe at 480-350-8860.

Subsection 401.7 – Payment
Payment for traffic control shall be made on the basis of the lump sum price bid for all traffic control activities including preparation and approval of traffic control plans, installation of all signage, stripping, barriers, steel plates, removal and reinstallation of existing features, flagman, local coordination effort, and all other labor, materials, and equipment required to maintain traffic as described in this Section 401.
ITEM 401-1 – TRAFFIC CONTROL GUADALUPE ROAD
ITEM 401-2 – TRAFFIC CONTROL AVENIDA DEL YAQUI
ITEM 401-3 – TRAFFIC CONTROL SIDE STREETS
ITEM 401-4 – TRAFFIC CONTROL ADOT R/W
ITEM 401-5 – TRAFFIC CONTROL CITY OF TEMPE

Payment for an off-duty uniformed officers will be made on an as-used basis as determined by the Engineer. The Contractor shall submit documentation as required by the Engineer to support payment for this item. Payment for off-duty uniformed officers shall be made on the basis of the price bid per hour.
ITEM 401-6 – OFF-DUTY UNIFORMED OFFICER

SECTION 415 – BARRICADE

Barricade shall conform to Section 415 of the MAG Uniform Standard Specifications except as modified herein.

Subsection 415.1 – Description

A barricade shall be installed as shown on the plans at the east end of Calle Mesquite. The barricade shall conform to MAG Standard Detail 130, Type "B".

Subsection 415.5 – Payment

Payment for barricade shall be made on the basis of the price bid per linear foot and shall include all materials, equipment, and labor necessary for the installation complete in place.

ITEM 415-1 - BARRICADE

SECTION 420 - CHAIN LINK FENCE

Chain Link Fence shall conform to Section 420 of the MAG Uniform Standard Specifications except as modified herein.

Subsection 420.1 – Description

Add the following:

Chain link fence and 4-foot wide chain link gates, or 4-foot wide ungated openings, all without barbed wire shall be installed at the locations shown on the plans, including: along the west side SRP right-of-way line of the Highline Canal, the west and east sides of the South Retention Basin, the west and north sides of the North Retention Basin, the access road from Calle Cerritos to the North Retention Basin, and the east side of the Central Retention Basin. Fence and gates shall be 6 foot in height at all locations, except along the north side of the North Retention Basin where the fence height will be 3 feet. The fence and gates shall conform to MAG Detail 160.

The new fence will be installed along SRP and/or FCDMC right-of-way lines as shown on the plans. Refer to the plans for layout coordinate information.

Subsection 420.5 - Payment

Payment for the chain link fence without barbed wire shall be made on the basis of the price bid per linear foot, complete in place. Gates shall be considered incidental to the price of the fence.

ITEM 420-1 - CHAIN LINK FENCE, 6-FOOT, PLAIN
ITEM 420-2 - CHAIN LINK FENCE, 3-FOOT, PLAIN

SECTION 430 – LANDSCAPING AND PLANTING

Landscaping and planting shall conform to Section 430 of the MAG Uniform Standard Specifications except as modified herein.

Subsection 430.1 - Description:

Add the following:

This section shall govern the preparation and planting of landscape areas for the North, Northeast, Central and South Retention Basins as required in the Plans and Specifications. Materials shall be in accordance with MAG Section 795 or as modified herein.

Existing utilities and improvements not designated for removal shall be protected in place. Any damages will be repaired by the Contractor at no additional cost to the Owner.

Unless otherwise provided, concrete header, turf, tree and shrub plantings, irrigation systems, and other improvements shall be constructed after rough grading has been completed to within one tenth of a foot (.10') of finish grade and prior to finish grading.

The work under this section shall consist of furnishing all labor, materials and equipment to install Bermuda sod with over seeding as required, decomposed granite, concrete header, and installation of trees and shrubs.

Subsection 430.2 - General:
Add the following:
The prospective Contractors are encouraged to visit the job site prior to bidding on this project, and to satisfy their concerns as to the magnitude of the work involved.

Furnish all labor, materials, equipment and incidental needs to install the landscape to the lines and details shown in the plans.

All materials and products shall conform to the requirements of MAG Specifications Section 795 or as modified herein.

Applicable publications listed below form a part of this specification to the extent referenced:

Arizona Nursery Association Growers Committee Recommended Tree Specification (latest edition)

Perform work in accordance with all applicable laws, codes and regulations required by authorities having jurisdiction over such work and provide for all inspections and permits required by Federal, State and local authorities in furnishing, transporting and installing materials as shown or for completing the work identified herein.

Water and related electrical costs are the Contractor's responsibility, until Final Acceptance or end of Plant Establishment, Guarantee, and Maintenance Period which ever is longer and the water meters are transferred to the Town of Guadalupe.

All planting areas shall be left free of construction debris and/or toxic material and sub-graded to a level to permit landscape and irrigation construction. Trenches, foundation backfill or other filled excavations shall be compacted prior to the site being turned over to the landscape Contractor. No soil preparation or planting shall begin before the site has been cleared and cleaned of debris. Commencement of work indicates acceptance of job site conditions.

The Contractor shall cooperate and coordinate with other Contractors and trades working in and adjacent to landscape areas. In particular, this applies to the North Retention Basin where other Contractors may be constructing the Little League Baseball diamond during construction of this project.

Determine location of underground utilities and perform work in a manner, which will avoid possible damages. The Contractor at no additional cost to the Owner will repair any damages. Hand excavate, as required when working in close proximity to any underground utilities. Maintain stakes by others until removal is mutually agreed upon by parties concerned. The Contractor must meet all requirements of the MAG Uniform Standard Specifications and Blue Stake.

Ship materials with Certificate Of Inspection required by governing authorities.

If specified material is not obtainable, submit proof of non-availability, together with proposal for use of equivalent material, similar in appearance, ultimate height, shape, habit of growth and general soil requirements. The Contractor may make substitution of a larger size of the same species with approval by the Engineer. However, any additional cost for these substitutions will be borne by the Contractor.

Before delivery, Certificates Of Compliance shall be submitted, certifying that materials meet the requirements specified. Certified copies of the reports for the following materials shall be submitted:

1. Transporting of Cacti and Landscape Plant Materials (from the Arizona Department of Agriculture).
2. Soil Amendments and Conditioners

Certification shall indicate; suppliers name, address, telephone number, date of purchase, name and technical description of item purchased, and quantity of each item purchased.

The Engineer reserves the right to take and analyze samples of materials for conformity to specifications at any time. Contractor shall furnish samples upon request. Rejected materials shall be immediately removed from the site at the Contractor's expense. The Contractor shall pay the cost for all testing in addition to all removal and replacement of materials not meeting specifications.

All herbicide / pesticide applicators shall be properly licensed for application of non-restricted use chemicals with an A-20 license or an A-21 license with Pesticide Endorsement from the State Registrar of Contractors and Structural Pest Control Commission. All Landscape Contractors are required to furnish a copy of their application from the Registrar of Contractors, which shall list the names of those employees, approved as applicators by the Registrar of Contractors. Application of non-restricted use pesticides shall not take place until the Engineer receives a copy of the application.

All non-paved areas, as directed by the Engineer, shall be treated with a chemical control, such as Round up or Equal, to control and kill weeds. After weed kill has been established to the satisfaction of the Engineer, these areas shall be cleared and grubbed. For any undesirable vegetation that cannot be eradicated by approved chemical methods, the Contractor is required to mechanically remove such vegetation.

Finish grade for landscape areas shall not vary more than 1 inch from specified grade and cross section and shall be a smooth, uniform surface, free of abrupt grade changes or depressions. Finished soil grade, adjacent paving, curbs or headers shall be adjusted for surface materials.

Unless otherwise specified sodded lawn areas shall be 2 inches below adjacent concrete header, walks or curbs. Granite areas shall be 1 inch below adjacent pavements.

During Landscape Work, keep pavements clean and work areas in orderly conditions. Sweep, scrub or hose affected areas as directed by the owner's representative to maintain a clean and neat work area.

Protect Landscape Work and Materials from damage due to landscape installation, operations by other Contractors and trades and trespassers. Maintain protection during installation and maintenance periods. Treat repair or replace Contractor-damaged work as directed by the owner's representative. Remove all debris, trash and excess materials generated by the landscape installation.

Do not treat any area with a pre-emergence control that is to receive Bermuda grass.

430.3.1 - Preparation of In-Place Soil:
Add the following:

Upon completion of basin excavations, all areas designated to receive turf installations shall be completely and fully tilled to a minimum depth of 8 inches. All tilled areas shall have the top 8 inches of tilled soil material fully pulverized to eliminate all undesirable rock, Caliche and/or soil aggregates/clusters/clods greater than 1" in diameter, or any other undesirable materials, which are not loose, friable or of agricultural soil quality necessary for plant growth. All basin areas designated to receive turf installations shall be excavated and finish graded in accordance with the drawings and to conform to Section 215.

Upon completion of tilling and removal of undesirable materials, the Contractor shall arrange to have the completeness and thoroughness of the tilling operations inspected and approved by the Engineer prior to continuing with soil preparation operations. Upon approval and acceptance by the Engineer, the Contractor shall complete the addition and placement of required soil amendments as follows:

Four (4") inches of organic mulch ("Omni Mix" or approved equal) over all basin surfaces designated to receive turf installations.
Two ounces of Iron Chelate per 1,000 SF
10 LBS of Sulfur per 1,000 SF
2 LBS of Phosphate per 1,000 SF

Till soil and amendments to homogenous fine mixture, free of lumps, clods, stones roots and other extraneous matter to a depth of not less than eight (8) inches.

Fine grade lawn areas to a smooth, even surface with a loose uniformly fine texture. Roll, rake and drag lawn areas, and remove ridges. Apply fertilizer(s) as specified, at the rate recommended by the manufacturer (approximately 6-lbs/1000 sf) for initial turf installation operations.

Moisten prepared lawn areas if soil is dry prior to installation.

430.3.4 – Turf grass

Seed Mix
Bermuda grass shall be planted within the North Retention Basin area designated for turf as described on the project plans. This will be bid as an alternate bid item.

Sod
Sod will be installed in the turf designated areas of the three basins within the Town, the North, Central and South Retention Basins, in accordance with the bid items provided.

Sod supplied and installed with overseeded winter rye shall be planted in all areas designated for turf as described on the project plans between September and April.

Sod supplied and installed without overseeded winter rye shall be planted in all areas designated for turf as described on the project plans between May and August.

430.3.5 – Turf Grass Soil Preparation
Prior to placing any seed or sod, the Contractor is to verify that rough and final grading is complete and has been accepted by Engineer.

Thoroughly mix soil amendments within top 8-inches of on-site tilled soils at rates, volumes or depths as specified in Subsection 430.3.1 or as detailed. Apply soil amendments on surface of tilled site soils and incorporate thoroughly into the top eight (8) inches before planting, using approved equipment.

Fine grade the turf area to a smooth, even surface with loose, uniformly fine texture. Lightly roll, rake, and remove ridges and fill depressions to meet finish grades. The Contractor shall achieve 85% compaction for the topsoil. Remove trash, debris, stones larger than 1-inch in any dimension, and other objects, which may interfere with planting or the maintenance operation of the turf area and any materials or soil conditions that do not meet the requirements of Section 795.2 Topsoil.

Lightly moisten prepared turf area before planting if soil is very dry, or to achieve desired compaction. Allow surface to dry off and loosen top 1-inch before planting the Bermuda grass sod. Do not create muddy soil conditions.

Restore prepared areas to specified condition if eroded or otherwise disturbed after fine grading and prior to turf grass installation

Site preparation shall not disturb or destroy existing irrigation pipe, plants or other improvements. The Contractor shall be responsible to replace or repair any damage that occurs to the satisfaction of the Engineer.

430.3.6 - Application of Seed Mix
The Bermuda grass seed shall be installed per MAG Subsections 430.11.4 and 430.11.5. Do not use wet seed or seed that is moldy or otherwise damaged in transit or storage.

The Bermuda grass shall be applied using a spreader or seeding machine at a rate of four (4) lbs/1,000 sf. Do not seed when wind velocity exceeds five miles per hour. Distribute seed evenly over the entire area by sowing equal quantities in two directions at right angles to each other. The seeding rate is specified in pure live seed (pls). Any change to the specie of Bermuda grass or the rate of application will be approved by the Engineer.

The Bermuda grass seed shall be planted only after night time temperatures reach or exceed 65 degrees. Use hulled seed for greater than 65 degree planting.

430.3.7 - Acceptance:
At the end of a 120-day guarantee and maintenance period, the Engineer will make an inspection to determine acceptability of the Bermuda grass. Bermuda grass area will be acceptable provided requirements, including maintenance, have been complied with, and a vigorous, healthy, well rooted lawn is established, free of weeds, bare soil areas greater than 2-inches in diameter, and any surface irregularities.

Subsection 430.4 Decomposed Granite Area:
Delete the entire section and replace with the following:

The areas to receive decomposed granite rock ground cover shall be graded according to the drawings, prior to the placement of any decomposed granite. The ground shall be reasonably smooth and rocks larger than 1-inch in diameter, within the top 1-inch of soil, removed and disposed of off-site.

The Contractor shall stake out all areas to receive decomposed granite. These areas shall be treated with a spray applied pre-emergent control, such as Surflan or equal, both prior to and after placement of the cover material and at the end of the 120 day maintenance establishment period. All applications shall be

completed by a State of Arizona licensed applicator. All pre-emergent spray materials shall include a temporary coloring agent to provide visual verification of coverage. All applications shall be monitored and completed in the presence of the Owner's representative.

Decomposed Granite shall be evenly distributed on the designated areas to a depth as indicated on the plans and details. If a depth is not indicated the minimum depth shall be two inches.

After placing and grading the granite, the Contractor shall water settle the granite with a light spray to remove fine materials from the surface. Immediately after watering, the Contractor shall roll the granite with an appropriate device to an extent satisfactory to the owner's representative.

Refer to the plans for the color and gradation of the decomposed granite.

430.4.1 Angular Rip Rap

The areas to receive angular riprap granite shall be graded according to the drawings, prior to the placement of any riprap materials. The ground shall be reasonably smooth and rocks larger than 1-inch in diameter, within the top 1-inch of soil, removed and disposed of off-site.

The Contractor shall stake out all areas to receive riprap. These areas shall be treated with a pre-emergent control, such as Surflan, prior to and after placement of the rock ground cover material.

Angular Riprap shall be evenly distributed on the designated areas to a depth as indicated on the plans and details. If a depth is not indicated the minimum depth shall be eight (8) inches.

After placing and grading the rip rap materials the Contractor shall water wash and settle the riprap with a light spray to remove fine materials and dust from the surface.

Refer to the plans for the color and to Section 703-2 for the gradation of the D_{50} = 4-inch riprap material.

430.4.2 Boulders.

Boulders shall all be surface select in accordance with section 795. All boulders shall have natural, weathered, smooth, and generally rounded surface patinas free of fractures and surface scarring. The Contractor shall take all necessary precautions to protect all boulders and prevent any damage during delivery transport and installation.

The areas on which the Boulders are to be placed shall be graded according to the drawings, prior to the placement of any Boulder materials. The ground shall be reasonably smooth and graded to within 2" of required finish grade.

Prior to starting any boulder installations or placement, the Contractor shall stake out all boulder locations and outline the relative size and shape of each boulder as indicated on the drawings with white marking paint or chalk. The locations and layout shall be reviewed by the engineer and approved. The Engineer reserves the right to modify the staked/marked location of any boulders. Boulder placement must be coordinated with the location and placement of trees and other installations. Therefore, boulder installation shall be sequenced to occur after all hardscape and tree installations are complete and just prior to finish grading operations.

The boulders shall be carefully placed and positioned in approved locations and installed in accordance with the details. Boulders shall be placed to expose and maximize visibility of the most attractive natural surfaces. Where boulders are shown to be installed in groupings or clusters, the boulders shall be

positioned and placed to appear as a natural rock outcropping or as though they have weathered and fractured from an original larger parent boulder.

After placing each boulder all voids and cavities adjacent to or beneath the boulder shall be backfilled and compacted to prevent any future settlement or movement. Prior to final acceptance, the Contractor shall water wash each boulder to remove all dust or soil from the visible surfaces of all boulders. Any surface scars or damage to the natural surface patina of each boulder shall be treated with an artificial desert varnish product as approved by and to the satisfaction of the Engineer.

430.5.6 - Shrub and Tree Pits:
Delete the entire section and replace with the following:

Plant trees after final grades are established and prior to planting lawns, unless otherwise acceptable. If planting of trees occurs after turf grass installations are complete, protect lawn areas and promptly repair damage to lawns resulting from tree planting operations.

Layout individual trees and shrubs for the Engineer and Town of Guadalupe to approve. Make minor adjustments as might be requested.

Deliver trees just prior to planting. If planting is delayed more than 6 hours after delivery, set trees in shade, protect from weather and mechanical damage. Keep roots moist. Water as often as necessary.

Prior to delivery of any species to the project site, the Contractor shall make the necessary arrangements with the Engineer for an inspection of the plant material. The Contractor will pay for travel to non-local Nurseries, out of the metropolitan Phoenix area, when requested by the Contractor. Any plants found to be unsuitable in growth or condition, or plants, which are not true to the specification, shall be removed and replaced with acceptable plants.

The Contractor shall notify the Engineer at least 72 hours in advance for inspection of the plant material at the offsite location. Prior to notification of the Engineer, the Contractor shall physically verify that the plant materials meet the size specified.

Prior to planting, a percolation test shall be performed on all tree-planting pits to determine adequate drainage. Fill pit half-full with water. Allow 24 hours to drain. If pit has not substantially drained, a caisson shall be installed. Each caisson shall have a four-foot (4') by 8-inch (8") diameter hole filled with 1-1/2 inch diameter crushed stone. Fill to bottom of pit. Adjust depth of caissons if ground water, caliche, or rock is encountered.

Do not prune prior to delivery unless otherwise approved by owner's representative. Do not bend or bind trees or shrubs in such a manner as to damage bark, break branches or destroy natural shape. Provide adequate protection for root systems. Protect root balls from drying wind and sun.

Prepared backfill mix shall be delivered in unopened 5 pound bags as specified MAG Section 795.3 and individually mixed into the backfill as described below for each planting pit.

Plant Size	Amount of Fertilizer
1 gallon	1 pound (one fifth of a bag)
5 gallon	2.5 pounds (one half bag)
15 gallon	5 pounds (one bag)
24" box	10 pounds (two bags)
36" box	15 pounds (three bags)

Submit certification of contents, quantity and source to the Engineer for approval.

Deliver packaged materials in containers showing weight, analysis and name of manufacturer. Protect materials from deterioration during delivery and while stored on site.

Setting and Backfilling for Plants: Set plant material on layer of compacted backfill mixture, plumb and in center of pit or trench with top of ball at an elevation necessary to accomplish finished grade. Remove pallets or containers before backfilling. Do not handle container plants by foliage, branches or trunks. After removing plant from container, scarify side of root ball to eliminate root bound condition. Do not plant stock if root ball is cracked or broken. When set, place additional backfill mix around plant, brace and place fertilizer tablets, if specified on the drawings. Work each layer to settle backfill and eliminate voids and air pockets. When excavation is approximately 2/3 full, water thoroughly before placing remainder of backfill. Repeat watering until no more is absorbed. Water again after placing final layer of backfill. Fertilizer tablets when specified shall be added approximately 6" below grade at the following rate:

For one-gallon container	1 tablet
For five-gallon container	2 tablets
For fifteen-gallon container	4 tablets
For twenty-four inch box	6 tablets
For thirty-six inch box or larger	3 tablets per

Provide plant saucers as detailed, or directed by the Engineer.

Stake all trees per the drawings. Set stakes vertically and spaced to avoid penetrating balls or root masses. Place tree ties for maximum support with top tie above scaffold branches and second ties midway to the ground level. Avoid "rigid" restraint of tree and allow for some trunk movement. Stakes to be set in undisturbed soil beyond plant pit.

Surface drainage of planting areas: Provide proper surface drainage of planted areas. Any discrepancy in the Plans or Specifications, obstructions on the site, or prior work done by another party which Contractor feels precludes establishing proper drainage, shall be brought to the attention of the Engineer in writing for correction and relief.

Subsection 430.6 Header Installation:
Delete the entire section and replace with the following:
Concrete headers shall be installed at the location and grade as shown on the plans. The Engineer shall approve all layout, grading and form work prior to pouring of concrete. Work also includes openings through the header to allow construction of the swale drain pipes under access ramps (see section 618). If one or more of the alternate bid items 340-6, 340-7, 340-8 are awarded, the amount of concrete header awarded as bid item 430-11 will be reduced accordingly with no penalty to the Owner.

Subsection 430.8 - Plant Guarantee and Maintenance:
Add the following paragraphs:
Unless otherwise authorized, the Contractor shall maintain all landscape areas on a continuous basis as they are completed during the course of work and until final Plant Establishment Guarantee and Maintenance Acceptance. The Contractor shall provide adequate personnel to accomplish maintenance. Maintenance shall include keeping the landscape areas free of debris on a weekly basis, chemical control of weeds and fertilization as needed, cultivating the planting areas, and mowing of turf where lawns are part of the project. Make replacements within seven days of notification from the Engineer. Remove

dead, damaged or vandalized plants within seven days of notification. Replacement of dead, damaged or vandalized plants shall be of the same kind and size as originally specified and shall be installed as described in the contract documents.

Plants shall be kept in a healthy, growing condition by watering, pruning, spraying, weeding and any other necessary operation of maintenance. Plant saucers and beds shall be kept free of weeds, grass and other undesirable vegetation. Plants shall be inspected at least once per week and appropriate maintenance performed. Pruning and restaking is to include removal of any growth conflicting with vehicular or pedestrian movement.

Turf from seed shall be considered established when no bare ground exists within a reasonable area (approximately 2 inches in diameter) as determined by the Engineer. Disturbed areas or any areas greater than 2 inches in diameter, which fail to show a good stand of grass, shall be reworked and replanted until an acceptable stand is established.

Turf areas shall be kept in a healthy, growing condition by watering, fertilizing, spraying, weeding and any other necessary operation of maintenance. Turf areas shall be kept free of weeds, undesirable grasses or any other undesirable vegetation. Turf areas shall be inspected at least once per week and appropriate maintenance performed. Maintenance shall include mowing and removal of all clippings and edging adjacent to all paved surfaces. No more than 1/3 of the grass blade shall be removed at any cutting.

The Contractor shall maintain the irrigation system and make any necessary repairs regardless of cause to assure a complete and operational system as originally designed and constructed. Repairs shall be made within 48 hours of detection.

Chemical mixing and method of application for weed control shall be done in the presence of the Engineer. Chemical application for weed control shall not apply to areas that are hydroseeded when hydroseeding is part of the project.

The Contractor shall request an inspection by the Engineer whenever completion of the planting and related work has been accomplished. After this initial inspection, and subject to his approval of work, the Engineer will issue a written field notification to the Contractor setting the effective date for beginning of the Plant Establishment Guarantee and Maintenance Period. This Period shall last for 120 days or as specified, unless extended by the Engineer. If the landscape areas are improperly maintained; if appreciable plant replacement is required (for whatever reason); if corrective work is required for the operation of the irrigation system; if turf areas or hydroseeded areas need reseeding or are not established; or if other corrective work is necessary; the Plant Establishment Guarantee and Maintenance Period shall be extended and the Contractor shall continue to maintain the entire site until accepted at no increased cost to the Owner.

At the end of the 120-Day Plant Establishment Guarantee and Maintenance Period a final inspection will be performed. If, after inspection, the Engineer is of the opinion that all planting areas are weeds free, plant materials and turf are in satisfactory growing condition, and he will give the Contractor written Notice of Acceptance of the landscape installation. Any plants, which need to be replaced, regardless of the cause, shall be replaced prior to final acceptance.

There shall be no separate measurement and payment for the Plant Establishment and Maintenance Period. This cost shall be included in landscape related bid items. Ten percent of the landscaping and Bermuda grass bid item amounts will be withheld until the completion and acceptance of the Plant Establishment and Maintenance Period, at which time payment of these remaining monies will be paid to the Contractor.

Subsection 430.10 - Measurement and Payment

Payment shall be considered full compensation for all labor, materials, equipment, and all other items necessary and incidental to the installation of landscaping, complete in place including but not limited to trees, shrubs, and soil preparation according to the plans, and the 120-day Establishment and Maintenance period. Payment for landscaping shall be made on the basis of the lump sum price bid.

ITEM 430-1 – LANDSCAPING NORTH RETENTION BASIN
ITEM 430-2 – LANDSCAPING NORTHEAST RETENTION BASIN
ITEM 430-3 – LANDSCAPING CENTRAL RETENTION BASIN
ITEM 430-4 – LANDSCAPING SOUTH RETENTION BASIN

Payment for decomposed granite shall be made on the basis of the price bid per square yard price bid shall include all labor, material, related pre-emergent chemical applications and equipment necessary to place decomposed granite in accordance with the plans.

ITEM 430-5 - DECOMPOSED GRANITE NORTH RETENTION BASIN
ITEM 430-6 - DECOMPOSED GRANITE NORTHEAST RETENTION BASIN
ITEM 430-7 - DECOMPOSED GRANITE CENTRAL RETENTION BASIN
ITEM 430-8 - DECOMPOSED GRANITE SOUTH RETENTION BASIN

Payment for angular riprap shall be made on the basis of the price bid per cubic yard price bid shall include all labor, material, related filter fabric (see Section 220), pre-emergent chemical applications and equipment necessary to place angular riprap in accordance with the plans.

ITEM 430-9 – ANGULAR RIPRAP NORTH RETENTION BASIN

Payment for the landscape boulders shall be made on the basis of the price bid per ton. Price bid shall include all labor, material, and equipment necessary to place the boulders in accordance with the plans.

ITEM 430-10 - BOULDERS

Payment for the concrete header shall be made on the basis of the price bid linear foot. Price bid shall include all labor, material, and equipment necessary to place the concrete header in accordance with the plans.

ITEM 430-11 - CONCRETE HEADER

Payment shall be considered full compensation for all labor, materials, equipment, soil preparation, and all other items necessary and incidental to the application of the bermuda grass seed in the turf areas of the North Retention Basin as shown in the plans, and the 120-day establishment and maintenance period. Payment for the Bermuda grass seed shall be made on the basis of the price bid per square yard.

ITEM 430-12 - BERMUDA GRASS (SEED) NORTH RETENTION BASIN (ALTERNATE)

Payment shall be considered full compensation for all labor, materials, equipment, soil preparation, and all other items necessary and incidental to the application of the bermuda grass sod, including rye overseeding as required, in the turf areas of the North, the Central and the South Retention Basins as shown in the plans, and the 120-day establishment and maintenance period. Payment for the Bermuda grass sod shall be made on the basis of the price bid per square yard.

ITEM 430-13 - BERMUDA GRASS SOD NORTH RETENTION BASIN
ITEM 430-14 - BERMUDA GRASS SOD CENTRAL RETENTION BASIN
ITEM 430-15 - BERMUDA GRASS SOD SOUTH RETENTION BASIN

SECTION 432 - GRAVEL MULCH

Add this section to the MAG Uniform Standard Specifications.

Subsection 432.1 - Description

The work consists of providing all labor, materials and equipment to install gravel mulch on the interior side slopes within the limits of the Northeast Retention Basin as shown on the plans. Gravel mulch shall conform to the requirements of Section 701.2.2 of the MAG Uniform Standard Specifications.

Subsection 432.2 - Materials

Gravel mulch shall be graded material and shall be free of debris, fines and soil particles. Gravel mulch will consist of a combination of crushed and rounded material with a minimum of 50 percent by weight crushed material. Crushed rock shall have at least 50 percent of the rock having three fractured faces. A sample must be approved by the engineer prior to delivery to the site.

The percentage wear of the material to be used as gravel mulch will be determined by the test procedure of ASTM Standard C-131, Grading B. The percentage of wear of the material shall not exceed 40 after 500 revolutions.

The aggregates shall be well graded when tested in accordance with ASTM C-136 and ASTM C-117. the percentage composition by weight shall be within the following limits:

SIZE OF OPENING	PERCENTAGE PASSING SIEVE
1-inch	100
3/4-inch	0 - 25

Gravel mulch shall be gray in color. Color shall be approved by the Engineer prior to delivery to the site.

Subsection 432.3 - Subgrade Preparation

The subgrade surfaces shall be the neat lines and grades shown on the drawings.

The sites designated to receive gravel mulch shall be adequately loosened. Disking or cultipacking or both may be necessary, as determined by the Engineer.

The finished surface for both equipment and hand-tilled areas shall be left in a roughened condition as approved by the Engineer. This is the normal surface resulting from the tillage operations.

Rocks larger than 3 inches in diameter, trash, weeds, and other debris that will interfere with gravel placement shall be removed and disposed of as determined by the Engineer.

Subgrade preparation shall be discontinued when soil moisture conditions are not suitable for the preparations of a satisfactory subgrade as determined by the Engineer.

Gravel mulch shall not be placed until the subgrade surfaces have been inspected and approved by the Engineer.

Subsection 432.4 - Placement

The gravel mulch shall be placed by equipment on the prepared surfaces. The mulch shall be constructed to the full course thickness in one operation and in such a manner as to avoid serious displacement of the underlying materials and native seed mix. The gravel mulch shall be delivered and placed in a manner that will ensure that the in-place mulch layer shall be reasonably homogeneous and the fractions uniformly distributed. Hand placing of gravel cover shall be required to the extent necessary to prevent

damage to the permanent works. The thickness of the gravel mulch shall be not less than 2 inches and shall be applied at an average of 150 pounds /square yard.

The gravel mulch will be hand raked and smoothed prior to water spray settling. The application of a uniform spray of water will be made at a rate not exceeding the infiltration rate to minimize run off. The use of pressure pumps and spray bars on all sprinkling equipment used for the application of water will be required. The use of gravity flow spray bars and splash plates will not be permitted.

Subsection 432.5 - Payment
Payment for gravel mulch shall be made on the basis of the price bid per square yard, and will be considered full compensation for all labor, materials, equipment, and all other items necessary and incidental to the placement of the gravel mulch. No separate payment will be made for water to settle the gravel mulch.
ITEM 432-1 - GRAVEL MULCH

SECTION 440 - SPRINKLER IRRIGATION SYSTEM INSTALLATION
Sprinkler irrigation system installation shall conform to Section 440 of the MAG Uniform Standard Specifications and as modified herein.

Subsection 440.1 - Description
The work shall consist of the installation of an irrigation system for all landscape plantings, and the turf grass areas.

The Contractor shall install all irrigation systems, lines, sprinkler heads, electrical and water service connections and other irrigation equipment as shown on the plans. The irrigation system lines and spray heads will be adjusted as required to accommodate the newly graded area contours. All new materials and hardware for irrigation lines, valves, heads, etc. shall satisfy the requirements of Section 440 and Section 757.

Four irrigation controllers will be installed to support the irrigation systems of the four retention basins. This work includes the installation of three (3) – 3" water service line and meter and one (1) - 1" water service line and meter and connecting to the existing water mains as shown on the plans. The Contractor shall coordinate and arrange for the complete installation of all pipes, tapping sleeves, backflow preventors, meter vaults, valves, valve boxes, fittings, electrical service and any incidental items required to complete the installation of the irrigation system. All water main service taps and meters will be provided and installed by the Contractor in strict accordance with and based upon approval of the City of Tempe Water Services Department. The Contractor will be responsible to pay all related fees and costs associated with the complete installation of the required water services. The Contractor shall coordinate with the City of Tempe to have all City of Tempe required installations completed in accordance with the City of Tempe requirements, Standards and Details and to provide all other installation necessary to complete the full and operational water service installations. The Contractor shall coordinate with the City of Tempe Water Services Department for all required water service installations and connections. Contact City of Tempe Development Services at: (480) 350-8341 a minimum of 30 calendar days in advance of the desired date for the installation of the taps and meters.

Electrical power for the irrigation controllers shall be obtained from Salt River Project (SRP) at each of the four basin sites. Service connections from existing SRP facilities located within or adjacent to the basin sites shall be completed in strict accordance with the SRP standards and requirements. Contractor is responsible for all power service connections including the trenching, conduits, meters and meter pedestals, junction boxes and or pull boxes, sweeps and all incidental concrete pads, pull tapes, and ground rods required by SRP and per local codes. Contractor shall coordinate with SRP to schedule

SRP's work that includes installation of the meter and conductor wire from the transformer to the meter. The Contractor shall contact SRP, Cindy Scott at 602-236-0684 or Becky Thomas at 602-236-0696, at least 30 calendar days in advance of the need for the electrical service installation. The Contractor shall pay SRP in advance of installation for the cost of the service. At the time of the preparation of these Special Provisions the estimated cost of the service for all four basins was $2,848. The Contractor shall verify this cost with SRP, and such cost shall be considered incidental to the installation of the irrigation station systems for the four basins.

Due to the scale of the drawings, it is not possible to indicate all offsets fittings and sleeves, which may be required. The Contractor shall carefully investigate the structural and finished conditions affecting all of his work and plan his work accordingly, furnishing such offsets, fittings and sleeves as may be required to meet such conditions. All work called for on the drawings by notes or details shall be furnished and installed whether or not specifically mentioned in the specifications.

440.2 References:
Conform to the requirements of reference information listed below except where more stringent requirements are shown or specified in the Contract Documents.

A. American Society of Testing Materials (ASTM) - Specifications and Test Methods specifically referenced in this Section.
B. Underwriters Laboratories (UL) - UL Wires and Cables.

440.3 Quality Assurances:
Work involving plumbing for installation of copper piping, backflow preventer(s), and related work shall be executed by licensed and bonded plumber(s). Secure a permit at least 48 hours prior to start of installation. The Contractor shall be responsible to contact and obtain all required permits from the local jurisdiction (Town of Guadalupe or City of Tempe).

Tolerances: Specified depths of mains and laterals and pitch of pipes are minimums. Settlement of trenches is cause for removal of finish grade treatment, refilling, recompaction, and repair of finish grade treatment.

Coordinate work with other trades.

For period of one year from Final Acceptance, the Contractor shall guarantee/warranty irrigation materials, equipment, and workmanship against defects. The Contractor shall replace any pavement damage resulting from the installation of the irrigation system and repair damage to grading, soil preparation, seeding, sodding, or planting at no additional cost to the owner. Make repairs within 3 days following notification by the Engineer.

440.4 Submittals:

440.4.1 Shop drawings and product information: Prepare and make submittals in accordance with conditions of the Contract, and as follows: A minimum of ten days prior to beginning work on the irrigation system the Contractor shall submit six (6) copies of manufacturers literature including name and numbers covering materials listed below and any other items requested by the Engineer. Do not order materials until the Engineer approves products.

Items to be submitted:

Pipe	Automatic Controls
Fittings and Solvents	Wire and Connectors
Gate Valves	Air Relief Valves
Valve Boxes	Pressure Regulating Valves
Sprinklers	Quick Coupling Valves
Automatic Valves	Emitters

All items shall be those specified and approved by the Engineer. Substitutions will not be allowed without approval.

440.4.2 Record Drawings: The Contractor shall maintain an accurate set of as-built plans on site. At the end of each day work accomplished shall be updated on the as-built plans. The Contractor shall dimension from two permanent points of reference, building corners, sidewalk, or road intersections, etc., the location of the following:

A. Connection to existing water lines
B. Connection to existing electrical power
C. Gate valves
D. Routing of Sprinkler pressure lines (dimension at a minimum of 100 feet along routing)
E. Sprinkler control valves
F. Routing of control wiring
G. Quick-coupling valves
H. Other related equipment as directed by the Engineer

The above mentioned equipment and stock shall be turned over to the Owner at the conclusion of the project. Before final inspection evidence that the Owner has received this material must be shown to the Engineer.

The Contractor shall also indicate any non-pressure pipe routing changes on the as-built drawings.

Before the final inspection, the Contractor shall deliver to the Engineer one copy of the as-built plans to review. Delivery of this set of plans does not relieve the Contractor of the responsibility of furnishing required information that may be requested by the Engineer. The Contractor shall make corrections noted and submit final as-built plans to the Engineer for approval and acceptance. The Engineer will not certify payment requests or make final payment if as-built plans are not current or complete.

440.4.3 Controller Charts: The Engineer shall review As-Built drawings before controller charts are prepared. The chart shall show the area controlled by the automatic controller and shall be the maximum size, which will fit inside the controller door, and still be legible. Identify the area of coverage of each remote control valve, using a distinctively different color, drawing over the entire area of coverage. Following review of the charts by the Engineer, they shall be hermetically sealed between two layers of 20-mm thick plastic sheets. These charts shall be completed and approved prior to final inspection of the irrigation system.

440.4.4 Operation and Maintenance Manuals: Submit 4 operation and maintenance manuals to the Engineer for review prior to final acceptance. The manuals should include the complete technical description of materials and products used, guarantee statement, complete operating and maintenance instructions on all major equipment. Contractor to provide a demonstration to maintenance personnel, with owner's representative present, of how to adjust and maintain all sprinkler head types, controller

functions, and recommended controller programs, as established by the Contractor. Contractor also to review recommended watering rates for new plant materials.

440.4.5 Equipment to be furnished: All materials to be new and bear the appropriate National Association seal of approval for example, NSF, UL, etc. Similar units shall be procured from the same manufacturer and internal parts shall be common and interchangeable. Parts listing and source replacement will be furnished to the Engineer.

Equipment to be furnished:

A. Two sets of special tools required for removing, disassembling and adjusting each type of sprinkler and valve supplied to the project.
B. Two five-foot valve keys for operation of gate valves. Four quick-coupler keys and matching hose swivels for each type of quick-coupling valve installed.
C. Three valve box keys or wrenches.

Extra Stock to be furnished:

A. 10 sprinkler heads of each type.
B. 10 nozzles for each type used.
C. 10 emitters of each type used.

440.5 Permits:
All City of Tempe and Town of Guadalupe permits for installation or construction of the work included under this section, which are required by legally constituted authorities having jurisdiction, shall be obtained and paid for by the Contractor, each at the proper time. The Contractor shall also arrange for and pay all costs in connection with any inspections and examinations required by these authorities.

440.6 Execution:
Examine areas and conditions under which work of this section is to be performed. Do not proceed with work until unsatisfactory conditions have been corrected.

440.6.1 Staking: Mark with powdered lime, routing of pressure supplies line and stake locations of each of the various components indicated in the Irrigation Plan Legend including but not limited to sprinkler heads and emitters. Unless otherwise specified, the automatic sprinkler system layout shall be considered schematic. Sprinkler head spacing shall not exceed the maximum shown on the drawings or recommendations by the Manufacturer. Preliminary adjustments to conform to actual site conditions shall be accomplished during staking. Should changes be required the Contractor shall obtain approval of the Engineer prior to actual work being performed. Utility connections, both water and electrical, shall be as shown on the plans or as designated by the utility concerned.

440.6.2 Trench Excavation: Trenches and other excavations shall be sized to accommodate the irrigation system components, conduit, and other required facilities. Additional space shall be provided to assure proper installation and access for inspection. Unless otherwise specified, the minimum depth of cover over pipelines and conduits shall be as follows:

A. Electrical conduit - 18 inches
B. Waterlines continuously pressurized - 18 inches
C. Lateral sprinkler lines - 12 inches
D. Plastic lines under pavement - 24 inches

The bottom of the trenches shall be true to grade and free of protruding stones, roots or other matter, which would prevent proper bedding of pipe or other facilities. Where ledge rock, hardpan, or boulders are encountered, the trench bottom shall undercut and filled with sand or fine grained material approved by the Engineer.

Clearances:

A. Piping 3 inches and larger, minimum trench width of 12 inches.
B. Piping smaller than 3 inches, minimum trench width of 7 inches.
C. Provide not less than 6 inches of clearance between each line, and not less than 12 inches of clearance between lines of other trades, to permit service or replacement without disturbing the other line.

Grading and Stockpiling of trenched materials shall comply with Section 601.2.8.

440.6.3 Sleeving: Piping located under asphalt, concrete, or other pavements shall be sleeved, size and schedule as noted on the plan. If not noted, sleeves shall be Schedule 40, sized to easily accommodate piping. Use separate sleeve for wiring.

Boring will be permitted only where pipe must pass under obstructions, which can not be removed, or when approved by the Engineer. When any cutting or removal of asphalt and or concrete work is necessary, it shall be saw cut in accordance with Section 601. Permission to cut asphalt or concrete shall be obtained from the Engineer. When piping on the drawings is shown in paved areas, but running parallel and adjacent to planted areas, the intent of the drawings is to install the piping in the planted area.

440.6.4 Piping: Provide pipes, schedule and size as shown on the drawings and per Section 757.

PVC Pipe: Snake pipe in trench as much as possible to allow for expansion and contraction. Provide a firm, uniform bearing for the entire length of each pipeline to prevent uneven settlement. Pipe shall be installed in accordance with ASAE Standard: ASAE 376. Pipe shall be clean prior to installation and shall be maintained in that condition during installation. When pipe lying is not in progress, the open ends of the pipe shall be closed by approved means.

Sand bedding or fine-grained material shall be provided where ledge rock, hard pan, or boulders are encountered. Compact bedding material to provide a minimum depth of bed between pipe and rock of 4 inches.

Solvent welded joints shall be made in accordance with ASTM D-2855, and the type of solvent and primer recommended by the pipe manufacturer shall be used. Primer and solvent shall be of same manufacturer and applied to the pipe ends in such a manner that no material is deposited on the interior surface or forced into the interior of the pipe during insertion. Excess solvent on the exterior of the joint shall be wiped clean immediately after assembly. The pipeline will not be exposed to water for at least 12 hours after the last solvent welded joint has been made.

Schedule 80 pipe shall be used for threaded joints. Field threading shall be accomplished in the same manner as specified for steel pipe, except that a plug will be installed in the bore of the pipe prior to threading to prevent distortion. Solvent will not be used on threaded pipe. Threaded joints shall be hand tightened with final tightening as necessary to prevent leaks with a strap wrench.

The pipe shall be protected from damage during assembly. All vises shall have padded jaws and only strap wrenches will be used. Any plastic pipe, which has been nicked, scarred, or otherwise damaged,

shall be removed and replaced. Care shall be exercised so that stress on a previously made joint is avoided.

When PVC to metal pipe connectors are required, these connections shall be accomplished first. A plastic adapter with external pipe threads should be used, screwing it into the metal internal pipe threads. Use a non-hardening pipe dope, such as Permatex #2, or equal, on all plastic to metal threaded joints. The joint shall be hand-tightened. Utilize a light wrench, as necessary, to prevent leaks.

When wrapped pipe is specified, joints and connectors shall not be wrapped until completion of the pressure test.

440.6.5 Wiring: All service wiring shall be installed in rigid conduit from the service point to the controller at the minimum depth specified. A separate disconnect switch or combination meter socket, as required, shall be installed between the source of power and the controller. The minimum service wire shall be No. 12 AWG copper 600 volt type, TWH or larger, as required by the contract documents or controller manufacturer. Wire splices shall be located only in specified pull boxes and shall be made with a packaged kit approved for underground use. Pull boxes shall be plastic with locking covers set to proper elevation on a 6 inch layer of crushed rock or washed gravel.

Low Voltage Control Wiring issuing from the controller shall be direct burial, type UF, No.12 AWG copper, unless otherwise required and installed in main or lateral waterline trenches wherever practical. Install common ground wire and one control wire for each remote control valve. Multiple valves on a single control wire are not permitted. Install two (2) control wires along the entire length of the mainline. The wiring shall be bundled and secured to the lower quadrant of the irrigation pipeline at 10-foot intervals with plastic electrical tape. Sufficient slack shall be left in the wiring to provide for expansion and contraction. When control wiring cannot be installed in the pipe trench it shall be installed a minimum of 18 inches below finish grade. Attach wire markers to the ends of the control wires and label valve stations at controller locations.

All pilot or "hot" wires are to be of a different color and all common wires are to be of another color. If multiple controllers are being utilized, and wire paths of different controllers cross both common and control wires, from each controller, shall be of different colors.

Splices in control wire shall be made in accordance with the requirements for Service Wire. Sufficient slack shall be left at each splice and point of connection in pull boxes so that in case of repair the valve bonnet or splice may be brought to the surface without disconnecting the wire. No splices shall be permitted under pavements.

All wiring shall be tested for continuity, open circuits, and unintentional grounds prior to connecting the equipment. All controllers shall be grounded independent of any other controller as recommended by the controller manufacturer and all valves shall be connected to the ground wire of their controller. A separate hot wire to its controller shall connect each valve.

Two spare #12 AGW wire shall be installed from the controller pedestal of terminal along entirety of pressure lines to last electric control valve on each and every leg of mainline. Color of the spare wire will be green in all controllers. Loop spare wire inside all valve boxes.

440.6.6 Valves, Valve Boxes, and Special Equipment: Backflow Preventor Assembly: The Backflow Prevention assembly shall be installed per the details shown on the drawings and associated governing code requirements. Provide pipe supports and the accessories to properly secure the assembly. The

irrigation system shall not be operated until the assembly has been tested and certified to meet the requirements of the Town of Guadalupe and City of Tempe Water Services Department.

After the backflow assemblies have been properly installed by the Contractor and approved by Tempe Water Services and or Development Services Department - Building Safety Branch, the Contractor shall pay for testing and be responsible for having the assembly(ies) tested by a certified backflow prevention assembly tester, approved by the City of Tempe. The tester shall prepare test report(s), showing the condition of the assemblies and confirming that the assemblies are properly functioning. It is the Contractors responsibility to submit the forms to the Engineer and to Water Quality Division, Backflow Prevention Unit. Final acceptance will not be given until the Engineer approves the reports.

Valves, Pressure Regulators, and Related Accessories shall be installed as shown on the plans, or as specified. They shall be installed in a normal upright position unless otherwise recommended by the manufacturer, and shall be readily accessible for operation, maintenance and replacement. The equipment shall be set at a sufficient depth to provide clearance between the valve box cover and the valve handle, cap, or key for operation of the system.

Gate Valves and Isolation Valves shall be installed below ground and shall be housed in a concrete or plastic pipe, with bolt down locking cover that will permit access for servicing. The pipe shall be centered on the valve stem. Isolation valves shall not be located within range of the sprinklers they control without approval of the Engineer.

Quick Couplers and Hose Bibcocks shall be installed as shown on the plans, or as specified. Their location shall be a minimum of 3 feet from curbs, pavements and walks, unless approved otherwise by the Engineer. Quick-couplers shall be installed on a swing joint riser assembly and set at a sufficient depth below ground to provide clearance for the valve box cover in the closed position. Hose bibcocks shall be set 12 inches above finish grade and installed on a galvanized riser or as detailed.

Valve Boxes: Install one valve box for each type of valve installed as shown on the plans, or specified unless directed otherwise by the Engineer. Install gravel sump after compaction of all trenches. Place final portion of gravel inside valve box after valve box is backfilled and compacted.

Set valve boxes to the finish grade specified, or as follows:

A. In non-irrigated areas set box 1/2 inch above finish grade.
B. In irrigated turf areas set box 1/2 inch above finish grade.

The valve boxes shall be branded with the controller letter and station number of the contained valve. The letter and number size shall be no smaller than 1 inch and no greater in size than 1-1/2 inches. Depth of branding shall not be more than 1/8 inch into the valve box lid. All labeling shall be neat and legible.

440.6.7 Sprinkler Heads: Install sprinkler heads where indicated on the drawings, staked and approved. Set to finish grade as detailed; spacing of the heads shall not exceed maximum recommended by the manufacturer without approval of the Engineer. They shall be installed with at least 4 inches clearance from vertical elements projecting above grade such as walls, planter boxes, curbs, and fences. All sprinkler heads shall be perpendicular to finish grade unless otherwise designated on the plans or details.

440.6.8 Emitters: Install emitters where indicated on the drawings, staked and approved. Emitter heads shall be installed as detailed.

440.6.9 Riser Assemblies: Sprinkler heads, and Quick Couplers shall have double swing joint assemblies, as shown on the plans. The assembly shall consist of: horizontal nipple threaded into a single outlet ell or tee installed schedule 80 fittings, minimum 12" long threaded nipple. The Contractor may submit a pre-manufactured swing joint assembly, such as that manufactured by Lasco Inc., or approved equal.

440.6.10 Controller System: The Controller and accessories shall be installed at the locations designated and per the details shown on the contract documents. Submit shop drawing showing wall elevation with equipment, and sleeving for approval by the Engineer.

All distribution wire shall be as specified in section 440.6.5. Provide slack and tape controller wire in neat bundles. The foundation for the controller, unless wall mounted, shall be Class B concrete of the size shown on the plan or as recommended by the manufacturer. Stub out all conduits for control wiring 2 feet beyond concrete slab or walls and provide bushings for all conduits. All RGS conduit in contact with earth shall be taped with scotchwrap, or equal, #50 minimum thickness 40 mils.

440.6.11 Bedding, Backfilling and Compaction: Pipe shall be bedded in at least 4 inches of finely graded native soil or sand to provide a firm, uniform bearing. After laying, the pipe shall be surrounded with additional finely grained native soil or sand to at least 4 inches over the top of the pipe.

Bedding sand shall be required when site conditions dictate and clean backfill meeting the specifications is not available. It shall also be required under asphalt and concrete pavements such as roadways, parking surfaces and plazas.

Thrust blocking shall be formed against a solid trench wall that has been hand excavated. The size and type of the thrust blocking shall be as per the drawings. Control wire shall not be concealed within the thrust blocking.

Trench backfill, sufficient to anchor the pipes, may be deposited before pipeline pressure testing, except that joints shall remain exposed until satisfactory completion of testing.

Trenches and excavations shall be backfilled with clean material from excavations. Remove organic material as well as rocks larger than 1 inch in diameter. Place acceptable backfill material in lifts, the height of which shall not exceed that which can be effectively compacted, depending on the type of equipment and methods used. Trenches and excavations shall be backfilled so that the specified thickness of topsoil is restored to the upper part of the trench. Compaction shall be in accordance with Section 301. Water settling of the trenches will not be permitted unless approved by the Engineer.

440.6.12 Cleaning: Maintain continuous cleaning operations throughout the duration of the work. Dispose of, off-site at no additional cost to the Owner, all trash or debris generated by installation of the irrigation system.

440.7 Flushing and Testing:
After completion and prior to the installation of any terminal fittings, the entire pipeline system shall be thoroughly flushed to remove all foreign material. After flushing, the following tests shall be conducted in the sequence listed below. The Contractor shall furnish all equipment, materials, and labor necessary to perform the tests and all tests shall be conducted in the presence of the Engineer.

Pipeline Pressure Test: A water test shall be performed on all pressure mains. Pressure mains shall be tested with all control valves installed and in the closed position. The constant test pressure and duration

of the test shall be for 6 hours at 125 psi. Any leaks, which occur during the test period, will be repaired immediately following the test. The pressure mains will then be retested until accepted by the Engineer.

Sprinkler Coverage Test: The coverage test shall be performed after sprinkler heads have been installed and shall demonstrate that each section or zone in the irrigation system is balanced to provide uniform and adequate coverage of the areas serviced. The Contractor shall correct any deficiencies in the system.

Operational Tests: The Contractor shall adjust or replace any type of irrigation heads or equipment to ensure proper distribution of water throughout the course of the Plant Establishment Guarantee and Maintenance Period.

440.8 Preliminary, Substantial and Final Walk-Through Inspections:
Arrange for a preliminary walk-through with the Engineer, when the entire system is operational. Operate each zone in its entirety, additionally, open all valve boxes and expose items covered, if directed. Generate a list of items to be corrected and make adjustments, "fine tuning" the entire system by regulating valves, adjusting patterns and break-up devices, and setting pressure regulators at proper and similar pressure to provide optimum and efficient coverage. Flush and adjust all sprinkler heads for optimum performance and to prevent overspray onto walks, roadways, and buildings as much as possible. Adjustments may include, at no additional cost to the owner or Town of Guadalupe, changes in nozzle sizes, and degree of arcs or pattern coverages.

Arrange for a Substantial Completion walk-through when all items generated from the preliminary walk-through have been corrected. Items deemed not acceptable by the Engineer shall be reworked to complete satisfaction. The maintenance period will not begin unless authorized by the Engineer. All accessories, charts, record drawings and equipment, as required, will be provided before scheduling the Final walk-through.

Following the Plant Establishment Guarantee and Maintenance Period (refer to Subsection 430.8) a Final walk-through inspection will be scheduled to review the system and make adjustments to the watering schedules.

Subsection 440.11 - Measurement and Payment
Payment for the landscape irrigation system for all four basins for all landscape planting and turf areas, including the irrigation controllers shall be made on the basis of the lump sum price bid. Price bid shall include all labor, materials, tools, and equipment to complete the irrigation system for all plantings and for the complete installation of the irrigation controllers including items related to the installation and operation of the irrigation water service and electrical connections, piping, backflow preventor enclosures, and all other items necessary for the operation of the irrigation system, complete in place according to the project plans.
ITEM 440-1 - LANDSCAPE IRRIGATION SYSTEM NORTH RETENTION BASIN
ITEM 440-2 - LANDSCAPE IRRIGATION SYSTEM NORTHEAST RETENTION BASIN
ITEM 440-3 - LANDSCAPE IRRIGATION SYSTEM CENTRAL RETENTION BASIN
ITEM 440-4 - LANDSCAPE IRRIGATION SYSTEM SOUTH RETENTION BASIN

SECTION 450 – ELECTRICAL CONDUITS INSTALLATIONS
Add the following section:

Subsection 450.1 – Description
Electrical conduit for ball field area lighting consists of providing all trenching and installing, conduit, pull or junction type boxes and pull tapes for future wiring installations and connections as shown on plans.

Subsection 450.2 – Measurement
Electrical conduits shall be measured on a lineal foot basis including all associated wiring, conduits, and boxes, installed complete and in place, as detailed and called for and as shown on the drawings.

Subsection 450.3 – Payment
Payment for Electrical Conduits shall be made on the basis of the price bid per linear foot for constructing and installing all associated conduits, and boxes, including full compensation for furnishing all labor, materials, tools, equipment and any incidentals needed to complete the conduit installations as called for on the drawings.
ITEM 450-1 – BALL FIELD ELECTRICAL CONDUIT INSTALLATION

SECTION 505 - CONCRETE STRUCTURES
Concrete structures shall conform to Section 505 of the MAG Uniform Standard Specifications except as modified herein.

Subsection 505.1 – Description
Add the following:
The work under this section shall consist of furnishing all labor, materials and equipment for the construction of all cast-in-place and other concrete, including:

Inlet and Outlet Headwalls, Wingwalls and Aprons
Concrete Spillway,
Concrete Sediment Trap,
Catch Basins and Aprons,
Concrete Vaults,
Bleedoff Structures,
V-Ditch Lining

Concrete shall conform to the requirements of Section 725 of the MAG Standard Specifications, and mix designs shall additionally meet the requirements of Chapter 5, Section 5.3 of ACI STANDARD 318-89. The Contractor shall submit mix designs and certifications of conformance with the above requirements for the written approval of the Engineer.

Class "A" Concrete, f'c = 3000 psi, shall be used for all concrete structures, including the inlet and outlet headwalls, wingwalls and aprons, spillways, sediment trap, catch basins, aprons, concrete vaults, bleedoff structures, and V-Ditch lining.

The use of Class F fly ash will be permitted in all concrete mixes, subject to approval of mix design by Engineer.

Transit Concrete mixers used on the project must carry current certification from ADOT or Arizona Rock Products Association.

The reinforcing steel shall conform to Section 727, Grade 60, of the MAG Standard Specifications.

Riprap to be installed at outlet headwalls and median inlets shall conform to Section 220 and be installed as shown on the plans.

Access barriers at headwalls, grates, and concrete aprons shall be installed according to the plans and conform to the specifications. No payment will be made for access barriers, grates or aprons as such; the

cost thereof shall be included in the bid price for the construction of the items to which they are incidental or appurtenant.

The sluice gate required for the Central Retention Basin Outlet Structure, Detail 06, shall have manual handwheel operator with centerline of handwheel approximately 36 inches above operating floor. Lift shall be provided in accordance with AWWA C-501. All lifts shall be provided with clear butyrate plastic stem cover with Mylar open-close indicator.

Sluice gate frame, glides, slide, pedestal, gear housing, thimble, and yoke shall be constructed of cast iron, ASTM A126 Class B. Resilient seals for flush bottom gates shall be of neoprene. Wedges shall be of bronze, ASTM B584, CA872. Stems, stem couplings, anchor bolts, assembly bolts and nuts shall be bronze ASTM B98.

Sluice gate operators with counter clockwise opening as viewed from the top shall be provided as shown on drawings or as specified. A handwheel shall be provided with the direction of opening and the word OPEN shall be cast into the handwheel. Size handwheel for gate in accordance with AWWA C500. Size actuator to produce required torque with a maximum pull of 80 LB and to withstand without damage a pull of 200 LB. Gear actuators to be totally enclosed, permanently lubricated and with sealed bearings.

The 24" manhole frame and ring and concrete adjusting rings installed on the Concrete Vaults identified on Details 09B and 09D shall be per MAG Standards 424 and 522. The manhole rims shall be adjusted to match the existing, finish or new pavement grade as required.

505.6.1 – Joints
Add the following:
Construction joints shall be located at the end of a day's pour or when concrete placement stops for more than 45 minutes. Reinforcing steel shall be continuous through construction joints for a minimum of 2 feet beyond the end of pour unless noted otherwise on the plans. The end of the pour shall be a roughened surface.

Subsection 505.8 – Curing
Add the following:
All concrete to receive any coloration shall be water cured, utilizing the wet burlap method, unless otherwise permitted by the Engineer, and shall be kept continuously wet for 10 days.

No vehicular loads will be permitted on concrete structures before the period of twenty-one (21) days from the date of the last pour of concrete unless approval is obtained in writing from the Engineer. In no case shall traffic be allowed on the structures until the specified concrete strength has been attained. The Contractor shall take special precautions to keep the area properly barricaded, lighted, and marked to prevent automotive traffic from crossing these structures prior to the Engineer's approval. Contractor shall take all necessary precautions to protect concrete work from vandals at all times. Contractor shall maintain a work force presence within visual access of all poured and curing concrete until such time as the concrete has set up and hardened beyond the point of marking or scratching the surface.

Subsection 505.9 - Finishing Concrete
Add the following:
The use of wood trowels will not be permitted in any finishing operations for concrete slabs.

The concrete spillway shall be finished using a heavy raked finish oriented perpendicular to the spillway centerline.

Concrete aprons shall be finished to a heavy broomed texture. V-Ditch concrete lining and concrete cutoff walls shall be finished to a light broom finish. Prepare sample for approval.

A form liner shall be used on all exposed vertical concrete surfaces of the concrete headwalls, wingwalls, and the two bleedoff structures.

The form liner shall be VA D.O.T. Fractured Rib design, No. 367, uni-cast and/or multi-cast sheets as manufactured by Greenstreak, or approved equal. Form liners shall be prepared, placed and stripped per the manufacture's requirements, recommendations, and specifications. The form liner shall be installed as required in the plans. A 5'x5' test panel of the form liners shall be made and approved by the Engineer, and shall remain on the project site until project completion. The cost of the form liner is incidental to the concrete structure.

All exposed concrete surfaces of the concrete headwalls and wingwalls, and the two bleedoff structures shall be painted using a "Weathered Sandstone" color paint conforming to #320-4, as manufactured by Pittsburgh Paints, or approved equal.

The color shall conform to the color requirements with respect to hue, value, and chroma. A 5'x5' test panel shall be made for the paint color, and the color shall be approved by the Engineer prior to use. The cost of the paint is incidental to the concrete structure.

Subsection 505.10 - Payment

Payment for all catch basins and inlets, inlet and outlet headwalls, wingwalls and aprons, bleedoff structures shall be made on the basis of the price bid per each complete in place and including all materials, form liner and paint where required, galvanizing where required, concrete, reinforcing steel, access barriers, cast grey iron grates, steel grates, 18-inch diameter slotted drain pipe where shown, concrete aprons, D_{50} = 4-inch riprap, steel plate covers, head gate and crank stand assemblies, orifice plates, structure excavation and backfill, pavement removal and replacement, and all other labor, equipment, materials and appurtenances required complete in place. For the cross street inlets the price bid per linear foot will include the removal and replacement of existing curb and gutter, roll curb, curb transitions, and sidewalk where applicable. In addition, for the Catch Basin (P-1570 Double w/ Slotted Drain Pipe), the price bid per each will include the removal and replacement of existing curb and gutter, roll curb, valley gutter, curb transitions, and sidewalk where applicable. For the Median Catch Basins, the price bid per each will include the corrugated metal arch pipe.

ITEM 505-1 — CATCH BASIN (MAG DET 535 TYPE F) W/ APRON
ITEM 505-2 — CATCH BASIN (MAG DET 535 TYPE F - DOUBLE) W/ APRON
ITEM 505-3 — CATCH BASIN (P – 1570) - DOUBLE W/ (2) 10' SLOTTED DRAINS, VERTICAL CURB
ITEM 505-4 — CATCH BASIN (P – 1570) - DOUBLE W/ 10' SLOTTED DRAIN, ROLL CURB
ITEM 505-5 — CATCH BASIN (P – 1570) - DOUBLE W/ 20' SLOTTED DRAIN, ROLL CURB
ITEM 505-6 — CATCH BASIN (P – 1570) - DOUBLE W/ 20' SLOTTED DRAIN, VALLEY GUTTER
ITEM 505-7 — CATCH BASIN (MAG DET 538 TYPE H-DOUBLE) W/ CONC. APRON
ITEM 505-8 — MEDIAN CATCH BASIN (DET 11), STA 14+28, SD 3
ITEM 505-9 — MEDIAN CATCH BASIN (DET 11A), STA 19+50, SD 3
ITEM 505-10 — MEDIAN CATCH BASIN (DET 21), STA 15+21, SD 4
ITEM 505-11 — MEDIAN CATCH BASIN (DET 23), STA 30+36, SD 1
ITEM 505-12 — MEDIAN CATCH BASIN (DET 23A), STA 21+80, SD 3;
ITEM 505-13 — MEDIAN CATCH BASIN (DET 23E), STA 10+00, SD 9
ITEM 505-14 — CROSS STREET STORM DRAIN INLET
ITEM 505-15 — BLEEDOFF STRUCTURE (DET 06), SD 10

ITEM 505-16 — BLEEDOFF STRUCTURE (DET 01), SD 8
ITEM 505-17 — HEADWALL FOR 48" PIPE (ADOT B-11.12), SD 7
ITEM 505-18 — HEADWALL FOR 30" PIPE (MAG DET 501-4), SD 9
ITEM 505-19 — HEADWALL FOR 60" PIPE (ADOT B-11.12), SD 1
ITEM 505-20 — DROP INLET HEADWALL, 36" PIPE (MAG DET 501-5), SD 2-2
ITEM 505-21 — HEADWALL FOR 66" PIPE (ADOT B-11.12), SD 2
ITEM 505-22 — HEADWALL FOR 24" PIPE (MAG DET 501-4), SD 6
ITEM 505-23 — HEADWALL FOR 2-48" PIPES (ADOT B-11.14), SD 3
ITEM 505-24 — HEADWALL FOR 18" PIPE (MAG DET 501-4), SD 10
ITEM 505-25 — HEADWALL FOR 36" PIPE (MAG DET 501-4), SD 4; PIPE 001
ITEM 505-26 — HEADWALL FOR 42" PIPE (MAG DET 501-4), SD 5
ITEM 505-27 — DROP MANHOLE CONCRETE VAULT (DET 09D), SD 3
ITEM 505-28 — DROP MANHOLE CONCRETE VAULT (DET 09B), SD 3
ITEM 505-29 — CONCRETE VAULT (DET 09B), SD 7

Payment for the concrete spillway and sediment trap shall be measured to neat lines and made on the basis of the price bid per square yard, and shall include full compensation for all labor, material, paint, equipment, and appurtenances necessary for construction of the lining including all concrete and reinforcing steel, structure excavation and backfill as required complete in place.
ITEM 505-30 — CONCRETE SPILLWAY (DET 04)
ITEM 505-31 — CONCRETE SEDIMENT TRAP (DET 20), SD 2-2

Payment for the concrete V-Ditch lining shall be measured to neat lines and made on the basis of the price bid per linear foot, and shall include full compensation for all labor, material, equipment, and appurtenances necessary for construction of the lining including all concrete, reinforcing steel, structure excavation and backfill, and cutoff wall as required complete in place.
ITEM 505-32 — CONCRETE V-DITCH (TYP SEC T)

SECTION 515 – STEEL STRUCTURES

Steel structures shall conform to Section 515 of the MAG Uniform Standard Specifications except as modified herein.

Subsection 515.1 – Description

The work includes the installation of an access gate per Detail 07 located at the northwest corner of the Central Retention Basin, and at the northwest corner of the South Retention Basin.

All pipe access gates, and the cast iron vaned grates shall be galvanized in accordance with MAG Section 771.

The work also includes the installation of access barriers and grates for the inlet and outlet headwalls, and bleedoff structures, in accordance with the plans and specifications. All access barriers shall be installed flush with the headwall. The steel used in the access barriers and grates shall be in accordance with A.S.T.M. A-36. All welding shall be in accordance with A.W.S. specifications. Steel grates shall be given one shop coat of No. 1 paint and two field coats of No. 10 paint as per MAG Section 790. Access barriers shall be given one shop coat of No. 1 paint as per MAG Section 790 and two field coats of "Weathered Sandstone" color paint conforming to #320-4, as manufactured by Pittsburgh Paints, or approved equal. The cast grey iron used in the vaned grates shall be in accordance with A.S.T.M. A-48 class 35B. No payment will be made for access barriers or grates as such; the cost thereof shall be included in the bid price for the construction of the items to which they are incidental or appurtenant.

All access barriers and grates for the inlet and outlet headwalls, catch basins and bleedoff structures shall be secured to the structure by either using tack welds of grates to embedments (angle iron) or by staking threads of anchor bolts. Where used, a minimum of two tack welds will be used for each grate.

Subsection 515.6 – Measurement
No measurement will be made for the access barriers or grates, the cost of such being considered incidental to the structures for which the access barriers or grates are required.

Subsection 515.7 – Payment
Payment for the pipe access gate shall be made on the basis of the price bid per each, and shall include all materials (including the safety post for pedestrian access), concrete foundations, galvanizing, equipment, and labor required to install them complete in place.
ITEM 515-1 –ACCESS GATE, SINGLE

SECTION 520 – STEEL AND ALUMINUM HANDRAILS
Steel handrails and fence shall conform to Section 520 of the MAG Uniform Standard Specifications except as modified herein.

Subsection 520.1 – Description
Add the following:
Steel handrail per Detail 08 shall be installed along the top of all basin concrete inlet and outlet headwalls and wingwalls in the North, Northeast, Central, South Retention Basins, and at the drop inlet near Calle Vauo Nawi at the Highline Canal as shown on the plans. The handrail shall be given one shop coat of No. 1 paint as per MAG Section 790 and two field coats of "Weathered Sandstone" color paint conforming to #320-4, as manufactured by Pittsburgh Paints, or approved equal.

Tubular steel ornamental fencing per details on sheet LH-2 shall be installed around the Northeast Retention Basin as indicated on the Drawings.

The tubular steel fencing shall be coated in accordance with MAG 790 using paint color matte black.

Safety signage in accordance with MUTCD Standards will be installed on the outside face of the east side ornamental fence in alignment with the two alleys off of Beck Avenue. The signage will consist of two reflectorized Large Arrow signs per MUTCD W1-6. The cost of the signage will be considered incidental to the installation of the ornamental fence. Center the northern most sign on the fence with the center of the approaching alley. Position the top of the sign one foot down from the top of the fence. Center the southern most sign 1 foot behind the existing 3-wire fence with the center of the approaching alley. Mount the sign on two steel posts and position the bottom of the sign four feet up from the ground.

Six-inch diameter concrete filled safety posts shall be installed at the concrete spillway per Detail 04 off of Calle Cerritos, near the Calle Batoua and Calle Pitaya intersection, and west of Avenida del Yaqui just south of the Highline Canal. Concrete filled safety posts shall conform to MAG Standard Detail 140. Steel used for safety posts shall be galvanized in accordance with MAG 771.

The work also includes the installation of removable safety posts per Detail 07D, at locations as shown on the plans.

Subsection 520.5 – Payment
Payment for the steel handrail shall be made on the basis of the price bid per linear foot including full compensation for furnishing labor, materials, tools, and equipment to construct the railing complete in place as shown on the plans, and including painting.
ITEM 520 - 1 – STEEL HANDRAIL, 42"

Payment for the Tubular Steel Ornamental Fencing shall be made on the basis of the price bid per linear foot including full compensation for furnishing labor, materials, signage, tools, and equipment to construct the fence complete in place as shown on the plans, including painting, the large arrow signs, and posts. The gate shall be considered included in the linear foot price bid.
ITEM 520 – 2 - TUBULAR STEEL ORNAMENTAL FENCING

Payment for safety posts shall be made on the basis of the price bid per each complete in place and including concrete, excavation and backfill, galvanized steel posts, reflective tape and all labor, equipment, and other materials and appurtenances required.
ITEM 520 – 3 – SAFETY POST (MAG DET 140)

Payment for removable safety posts shall be made on the basis of the price bid per each complete in place and including concrete, excavation and backfill, posts, reflective tape and all labor, equipment, and other materials and appurtenances required.
ITEM 520 – 4 – REMOVABLE SAFETY POST (DETAIL 07D)

SECTION 602 – BORING AND JACKING PIPE
Boring and jacking pipe shall conform to Section 602 of the MAG Uniform Standard Specifications except as modified herein.

Subsection 602.1 – Description
Add the following:

The work in this section consists of boring or jacking a 78-inch jacking sleeve for the installation of a 60-inch RGRCP culvert under the Highline Canal to the Northeast Retention Basin at the location, lines and grades shown in the plans on Sheet 32 and according to PS7 and PS7a on Sheet 25. Two 2-inch, schedule 40 PVC irrigation pipe sleeves will be installed as shown on section PS7a.

Subsection 602.2 – General
Add the following:
The casing pipe and joints shall be of steel and of leak proof construction. The steel casing pipe shall be tongue and groove circular pipe with a minimum yield strength of at least 35,000 psi.

Subsection 602.3 – Jacking Pipe
Add the following:
The jacking operation shall be done by an experienced specialty contractor normally engaged in performing this type of service. The jacking contractor must strictly conform to all Federal, State, and local regulations and in particular, the requirements of the Occupational Safety and Health Administration (OSHA).

The jacking operation shall be done in a continuous manner to minimize the tendency of the material to "freeze" around the pipe. Lubricants such as bentonite slurry are available to minimize the freezing tendency. The approach trench shall be properly sheeted and braced on the sides and working face. The excavation should not be carried more than a few inches ahead of the pipe.

Excessive voids shall not be permitted in the jacking process. Grout points shall be installed in pipe and all voids shall be filled by pressure grout as soon as possible after the completion of the jacking process.

Jacking frames shall be so constructed as to avoid breaking the pipe or forcing it out of alignment. The pipe shall preferably be jacked upgrade in order to provide drainage at the heading during excavation. Satisfactory means shall be provided for maintaining the lead pipe at the correct line and grade.

The pipe shall be installed according to specially prepared plans and specifications. The Contractor shall set forth the construction procedure, extra pipe reinforcement and jack shield (if required), jacking pit location and shoring, and other special features for the safe and satisfactory completion of the work. Plans prepared by the Contractor giving the construction details shall be submitted for review by the Engineer at least 10 working days before the desired start of the jacking operation. The jacking work or any part of it shall not begin prior to approval of construction details by the Engineer.

Straw filler shall be inserted into voids created by excavation during jacking operations. Locations shall be recorded and after mining is completed, grout holes are to be drilled through the pipe and the voids filled with grout.

The Contractor shall provide a survey crew to continually monitor the elevation and alignment of the canal above during the jacking procedures. Jacking must be stopped and any problems corrected if canal movement is detected.

Subsection 602.7 – Measurement and Payment
Payment for the installation of the jack and bore casing and the associated 60-inch storm drain pipe, and including the irrigation pipe sleeves, shall be made on the basis of the price bid per linear foot, and shall be full compensation for furnishing and installing the pipes, casing, fittings complete in place, as specified, including jack and bore of the casing, grouting of the annular space, excavation, backfilling, compaction, and all incidental work not specifically covered in other pay items.
ITEM 602-1 - JACK AND BORE FOR 60-INCH RGRCP

SECTION 609 – WELL ABANDONMENT
Add this section to the MAG Uniform Standard Specifications.

Subsection 609.1 – Description
According to SRP, SRP being the previous owner of the property, there may be an abandoned groundwater well located on the property where the Northeast Retention Basin is to be constructed. Its location is unknown, but is likely in the northern portion of the property. If the Contractor encounters the well while excavating and/or grading for the basin he will be required to cut and plug the well in accordance with well closure procedures required by the Arizona Department of Water Resources (ADWR). All work shall be done in accordance with Arizona Administrative Code R12-15-816, and as a minimum shall consist of the following:

1. Well abandonment shall be performed by a licensed well drilling Contractor.

2. The Contractor will not commence abandoning well until the appropriate abandonment card is received from the ADWR via the District. This card will be maintained at the well site.

3. All well casings will be removed prior to abandonment of the well.

4. The well shall be filled with cement grout or clean sand with bentonite of sufficient volume, density, and viscosity to prevent the well from being a channel allowing the vertical movement of water or fluids.

5. Within 30 days after a well is abandoned the Contractor shall file with ADWR a "Well Abandonment Completion Report" on the form prescribed and furnished by the ADWR which shall include the date the abandonment of the well was completed and such other information as the ADWR may require.

The Contractor shall coordinate the abandonment of the well with the Engineer. The Contractor shall provide 30 days advance notice to the Engineer of when the well will be abandoned. The District will contact the ADWR to initiate the well abandonment process and the issuance of the well abandonment card, which will then be sent directly to the Contractor.

Subsection 609.2 - Payment
Payment for the closure and abandonment of the 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 abandon the well, including all necessary paperwork required by the ADWR.
ITEM 609-1 – WELL CLOSURE

SECTION 610 - WATER LINE CONSTRUCTION
Water line construction shall conform to Section 610 of the MAG Uniform Standard Specifications and to the City of Tempe Supplement to the MAG Uniform Standard Details and Specifications for Public Works Construction, except as modified herein.

Subsection 610.1 - Description
Add the following:
The work required for this project includes, but is not limited to, the following:

- New 6-inch and 8-inch ductile iron pipe (thickness class 52) water line and fittings for the relocation of water mains at the following locations:

  Calle Batoua – 25+68 Lt. (SD 1);
  Calle Gloria – 16+06 Lt., 17+09 Lt. (SD 1-1);
  Calle Vauo Nawi – 0+28, 0+50 Rt. (SD 2-2), 10+00 Rt. (SD 2-5);
  Calle San Angelo – 10+10 Lt., 13+20 Lt., 16+74 Lt., 19+91 Lt., 20+69 Lt., 24+87 Lt., 20+10 (SD 2-1);
  Calle Mexico – 10+42 Rt., 14+60 Rt. (SD 2-4);

- New 6-inch ductile iron pipe water line (thickness class 52), and fittings will be installed for the relocation of an existing City of Tempe water line along Calle Vauo Nawi that is in conflict with the new concrete lined V-Ditch.

- New 12-inch ductile iron pipe water line (thickness class 52) shall be installed (see sheet 97 and Detail 27A on sheet 119) for the relocation of an existing City of Tempe water line along Avenida Del Yaqui that is in conflict with the new 48" storm drain.

- Existing water service connections shall be adjusted where they are in conflict with new storm drains. An allowance is provided for water service adjustments using copper pipe and will be used at the direction of the Engineer with prior written approval. Water service connections shall be adjusted if less than 1 foot of clearance is available from the storm drains. Water service connections shall also

maintain a minimum cover of 24-inches. The length of the water service adjustments will be minimized to avoid disturbing existing improvements beyond the existing pavement.

- The water service locations as shown on the plans are based on the best available record drawing information. The locations are approximate only and are not to be assumed to be the exact locations. The Contractor will determine water service locations as required in order to accomplish his storm drain construction activities.

The Contractor will provide a minimum of 48 hours advance notification to each affected residence or business whose water service will be impacted by construction. Service will be fully restored within 4 hours after disruption begins.

The Contractor is responsible for coordinating with the City of Tempe, obtaining a PERMIT from Public Works – Engineering (Contact Jim Bond 480-350-8897), and installing all other items included in the plans and these specifications for the above mentioned waterlines. The relocation work on all the existing 6-inch, 8-inch, and 12-inch water lines shall be accomplished with approval and coordination from the City of Tempe. Contact Richard Johnson at (480) 350-2634 at least 14 days in advance for installation of any new water line. Only City of Tempe personnel will be permitted to shut down the water lines and/or service connections.

Special coordination will be required for the 12-inch water line with the City of Tempe. The City of Tempe must maintain water supply and pressure in the water line to the north of the Highline Canal for fire protection purposes. The Contractor will be required to bypass the relocation work by installing temporary water lines between existing fire hydrants north and south of the canal. Only the use of hard piping will be permitted for the temporary water lines. This allows the section of 12-inch water line that needs relocation to be shut down. On the west side of Avenida del Yaqui, a temporary water line will be placed between two fire hydrants. The southern most fire hydrant is located approximately 350 feet south of the Highline Canal (just south of Calle Cerritos) while the northern fire hydrant is located approximately 230 feet north of the canal and 120 feet west of Avenida del Yaqui (on the south side of the Holiday Inn driveway). On the east side of Avenida del Yaqui, a temporary water line will be placed between two fire hydrants. The southern most fire hydrant is located approximately 100 feet north of the Highline Canal (just north of the Central Self Storage driveway) while the northern fire hydrant is located approximately 200 feet north of the canal and 100 feet east of Avenida del Yaqui (on the north side of the Town Place Suites driveway). Setting up the water bypass system will cause temporary closures to a few driveways and Calle Cerritos. Affected businesses, apartments, SRP, and the Guadalupe Fire Department, shall be notified of the driveway closures seven days in advance of the work. The City of Tempe will schedule for water department personnel to inspect the relocation work and close the appropriate water valves. The shut down period for the water line will take place during the very early morning hours (12:00 a.m. to 4:00 a.m.) when water demand is at its lowest. The City of Tempe will authorize no more than the four hour shut down of the water line. Overtime/night work will be allowed for this installation. Refer to Special Provisions Section 401 regarding traffic control relating to the 12-inch water line work.

The vertical relocation of the water lines will conform to MAG Standard Detail 370. See plan sheet 119 for relocation of water lines.

All testing and disinfecting of the water lines shall be in accordance with MAG Section 610 and 611. Fittings for the line shall conform to Sections 630 and 750 of the MAG Standard Specifications. The water lines and fittings will be encased with polyethylene protective wrapping in accordance with MAG Section 610. Claw type restrained joints (per MAG 303-1 and 303-2) will be used.

Subsection 610.18 - Measurement and Payment
Payment for the installation of the 6-inch, 8-inch and 12-inch, water lines including all piping, fittings, tees, elbows, restrained joints, polyethylene wrapping, thrust blocks, other materials, labor and equipment, and including all pavement, curb and gutter removal and replacement necessary for the water line installations complete in place, and including the temporary rerouting of the existing water line for the 12-inch water line relocation on Avenida del Yaqui, shall be made on the basis of the price bid per linear foot.
ITEM 610-1 – 6" DIP WATER LINE
ITEM 610-2 – 8" DIP WATER LINE
ITEM 610-3 – 12" DIP WATER LINE

Payment for water service adjustments including all materials, labor, excavation, backfill and compaction, pavement removal and replacement, connection to existing service line and water main, installation of new copper pipe, fittings and adaptors, testing and disinfection, and equipment necessary for the adjustment complete in place, shall be made on the basis of the price bid per linear foot.
ITEM 610-4 – WATER SERVICE ADJUSTMENT ALLOWANCE

SECTION 615 – SEWER LINE CONSTRUCTION
Storm drain construction shall conform to Section 615 of the MAG Uniform Standard Specifications.

Subsection 615.1 - Description
Add the following:
The work consists of the relocation of an existing 8-inch, 12-inch, and 18-inch sanitary sewer line located along the south side of Guadalupe Road that is in conflict with the new 42-inch and 54-inch storm drain. The new sewer pipe shall be vitrified clay pipe placed at the locations and grades shown on the plans.

Existing sewer house service connections (HCS's) shall be adjusted where they are in conflict with new storm drains using ductile iron pipe. An allowance is provided for HCS adjustments using one or more of the three HCS relocation details shown on Detail 10 and will be used at the direction of the Engineer with prior written approval. The length of the HCS adjustments will be minimized to avoid disturbing existing improvements beyond the existing pavement. The sewer house service connection shall be adjusted if less than 1 foot of clearance is available from the storm drains, and shall also maintain a minimum cover of 24-inches.

The HCS's as shown on the plans are based on the best available record drawing information. The locations are approximate only and are not to be assumed to be the exact locations. Attempts were made during the preparation of the plans to obtain pothole information for the HCS's. The limited pothole information that was obtained is shown on the plans and indicates that at the successful pothole locations, the depth to the HCS varied between 6 feet and 7 feet below grade at the storm drain alignment. The Contractor will determine HCS locations as required in order to accomplish his storm drain construction activities.

The Contractor will provide a minimum of 48 hours advance notification to each affected residence or business whose sewer HCS will be impacted by construction. Prior to any disruption of sewer service, the Contractor will provide clean and appropriate alternative service to the affected residence or business. Such alternative service will be approved by the Engineer in advance. Service will be fully restored within 6 hours after disruption begins.

Subsection 615.6 - Payment
Payment for the 8-inch, 12-inch, and 18-inch sanitary sewer relocation shall be made on the basis of the price bid per linear foot, and shall be full compensation for furnishing and installing the pipe and fittings,

all coatings, and including excavation, saw-cutting, pavement removal and replacement, disposal, grouting around new pipe at existing manhole, pipe collars, pipe markers, furnishing and compacting granular bedding, backfilling, compaction, sheeting and bracing, testing, and all incidental materials, labor and equipment, complete in place.

ITEM 615-1 – 8" VCP SANITARY SEWER
ITEM 615-2 – 12" VCP SANITARY SEWER
ITEM 615-3 – 18" VCP SANITARY SEWER

Payment for sewer HCS adjustments including all materials, labor, excavation, compaction and backfill, pavement removal and replacement, connection to existing service line and sewer main, installation of new ductile iron pipe, fittings and adaptors, testing, and equipment necessary for the adjustment complete in place, shall be made on the basis of the price bid per linear foot.

ITEM 615-4 – SEWER HCS ADJUSTMENT ALLOWANCE

SECTION 618 - STORM DRAIN CONSTRUCTION

Storm drain construction shall conform to Section 618 of the MAG Uniform Standard Specifications.

Subsection 618.1 – Description

Add the following:

This work shall consist of the installation of storm drain and storm drain connector pipe of rubber gasket reinforced concrete pipe (RGRCP), and/or high density polyethylene pipe (HDPE), and/or Cast-in-Place Pipe (CIPP), and ductile iron pipe (DIP) at the locations and grades shown on the plans.

The work includes the installation of two 4-inch Schedule 40 PVC conduits crossing under Avenida Del Yaqui along the south side of the Highline Canal culvert. Refer to sheet 97, Section 05B. The two conduits will be capped and magnetic locator strips will be applied to the ends of the conduits. "Chairs" will be used to support and maintain uniform separation of the two conduits. The chairs shall be spaced no greater than 6 feet center to center.

The work includes the installation of an 18-inch RGRCP storm drain pipe under an existing Arizona Department of Transportation (ADOT) sound barrier wall. Installation shall be done by a method that does not require the removal of the wall and protects the wall in place. The trench width under the wall will be kept to a minimum up to grade so as to avoid any structural or other impacts to the wall. Trench will be backfilled with cement treated slurry backfill to the base of the sound barrier wall. Refer to sheets 68 and 93, Detail 01.

The work also includes the installation of concrete pipe collars and plugs as shown in the plans.

All other work such as connecting new storm drain pipe to existing structures or other pipe shall be considered incidental to the storm drain installation for which such connections are required.

The work also includes the "cleaning out" of approximately 180± feet of existing 24-inch storm drains located at the intersection of Avenida Del Yaqui and Guadalupe Road. The storm drain begins at the northwest corner of the intersection, extends to the southwest corner and then crosses to the southeast corner to an existing headwall. Access to the storm drain is through the headwall at the southeast corner and from catch basins. The Contractor shall cleanout the sediment and trash that has collected in the storm drain, and such work shall be accomplished to the satisfaction of the Engineer prior to the connection of Storm Drain 3 (SD-3) to the existing storm drain.

If open cut construction methods are approved by SRP and used by the Contractor for the installation of the storm drain 1 (SD-1) under the Highline Canal, the canal reconstruction shall be in accordance with

SRP standard drawing for canal undercrossings, found in Appendix "E". Refer to Section 602 for the jack and bore requirements for the installation of this storm drain undercrossing of the canal.

Subsection 618.2 - Materials
Add the following:
Rubber gasket reinforced concrete pipe (RGRCP) Class IV shall be used for the 18" diameter pipe and RGRCP Class III shall be used for the 24", 30", 36", 42", 48", 54", 60", and 66" diameter pipe as shown on the Alternative Pipe Material Summary sheets. In addition, rubber gasket reinforced concrete pipe shall be used for the 48" to 60", 60" to 66" transition sections. Manhole tee sections for the 54", 60", and 66" diameter pipes shall be manufactured for this project. Material for pipe, gaskets, joints, specials and testing shall conform to MAG Uniform Standards Section 735.

High Density Polyethylene Pipe (HDPE) may be bid as an optional material in lieu of the RGRCP for the 18" through 48" diameter pipe sizes. Material for pipe, gaskets, joints, specials and testing shall conform to MAG Uniform Standards Section 738 and installation shall conform to MAG Uniform Standards Section 603.

Cast-in-place pipe (CIPP) may be bid as an optional material in lieu of the RGRCP for pipe sizes greater than 36-inches with the following conditions:

1. The Contractor must provide hydraulic calculations sealed by an Engineer registered in the State of Arizona, using the increased hydraulic design n-value for CIPP of 0.015 as approved by ADOT, to calculate the increased pipe size required by the use of CIPP and to show that such use will not compromise the design hydraulic function of the storm drain system for which CIPP is to be used. This evidence must be provided to the Engineer at the pre-construction meeting for review and approval by the Engineer.
2. Any pipe size increases required by the use of CIPP and any associated utility impacts caused by the pipe size increase will not be a project cost.
3. Installation, inspection and repair of CIPP will be in accordance with Section 620.

Ductile iron pipe (DIP) Class 52 and fittings shall utilize push-on restrained joints and shall be designed in accordance with AWWA C-150 and shall be manufactured in accordance with AWWA C-151 and Section 750 of the MAG specifications. The DIP shall be externally protected using an 8-mil thick polyethylene encasement in accordance with AWWA C-105. No pipe material substitutions will be permitted for the DIP pipe as shown on the plans.

The Contractor will notify the Engineer at the pre-construction meeting of the pipe material selections made for the various storm drain pipe bid items.

The specification for the installation of storm drains located within the SRP right-of-way along the Highline Canal (SD 5 & 6) will not use the standard MAG granular material but will use the SRP Standard Specification for Utility Trench Excavation and Backfilling (SRP 02224). Class D backfill/bedding material (native material) will be used. The suitability of the backfill/bedding material shall be approved by Mr. John Evans, (602) 236-5664, with SRP. Standard specification SRP 02224 has been included in Appendix F.

Subsection 618.3 – Construction Methods
Water jetting is not an accepted method of compaction for any storm drain construction activities.

Backfill material for storm drains shall be placed in layers not more than 8-inches in depth before compaction.

No more than 200 feet of open trench will be allowed at any time for installation of the storm drain pipe due to the tight working conditions and traffic considerations.

Subsection 618.6 - Payment
Payment for the installation of storm drain piping (RGRCP, HDPE, CIPP, DIP) shall be made on the basis of the price bid per linear foot, and shall be full compensation for furnishing and installing the pipe, bends and fittings (including the manhole tees and pipe diameter transitions) complete in place, as specified, including excavation, saw-cutting, pavement removal and replacement, disposal, pipe collars, pipe markers, furnishing and compacting granular bedding/native material, backfilling, compaction, sheeting and bracing, testing, and all incidental work not specifically covered in other pay items.
ITEM 618-1 – 18" RGRCP CLASS IV
ITEM 618-2 – 24" RGRCP CLASS III
ITEM 618-3 – 30" RGRCP CLASS III
ITEM 618-4 – 36" RGRCP CLASS III
ITEM 618-5 – 42" RGRCP CLASS III
ITEM 618-6 – 48" RGRCP CLASS III
ITEM 618-7 – 54" RGRCP CLASS III
ITEM 618-8 – 60" RGRCP CLASS III
ITEM 618-9 – 66" RGRCP CLASS III
ITEM 618-10 – 18" RGRCP CLASS IV AT ADOT WALL
ITEM 618-11 – 30" DIP, Class 52

Payment for the installation of concrete pipe collars and plugs shall be made on the basis of the price bid per each, complete in place.
ITEM 618-12 – CONCRETE PIPE COLLAR (ADOT DET C-13.80)
ITEM 618-13 – CONCRETE PLUG FOR 36" PIPE (MAG DET 427)

Payment for the installation of the two 4-inch Schedule 40 PVC conduits shall be made on the basis of the price bid per linear foot, and shall include magnetic locator strips, slurry backfill, "chairs", removal and replacement of pavement, curb, gutter and sidewalk, and all other materials, labor and equipment to install the conduits complete in place.
ITEM 618-14 – TWO 4" PVC CONDUITS

Payment for cleaning out the existing storm drain pipes at the intersection of Avenida Del Yaqui and Guadalupe Road shall be made on the basis of the lump sum price bid.
ITEM 618-15 – STORM DRAIN CLEAN OUT

SECTION 620 – CAST-IN-PLACE CONCRETE PIPE

Replace MAG Section 620 with the following:

Subsection 620.1 - General
Cast-in-place concrete pipe (CIPP) conforming to the following is an accepted alternate material for use on this project for storm drains. This specification covers cast-in-place non-reinforced concrete pipe intended for use as storm drain or irrigation lines. The abbreviated title is CIPP. CIPP is conduit made of Portland cement concrete cast monolithically in a properly prepared trench, using equipment specifically designed for this purpose. The type of equipment to be used by the contractor must be approved by the Engineer and the contractor may be required to furnish evidence of the successful use of this equipment on prior work. CIPP will be placed only:

(a) By experienced operators. The Engineer will be the sole judge as to experience level.

(b) In the presence of the Engineer.

(c) In ground capable of standing unsupported from the bottom of the trench to the top of the pipe without sloughing.

(d) In fill when it can be demonstrated to the satisfaction of the Engineer that the fill will adequately support the pipe.

(e) When designated as an allowable storm drain pipe material in the project specifications, this designation is no warranty, expressed or implied, that conditions will be suitable for the use of CIPP. Any costs incurred and/or time required to provide suitable conditions or to substitute an alternate pipe acceptable to the Engineer, in whole or in part, shall be the responsibility of the contractor.

Subsection 620.2 - Materials

620.2.1 Cement shall be ASTM C- 1 50, Type 11, low alkali as per Section 725.

620.2.2 Sand aggregate used for concrete and mortar shall conform to Section 701. Maximum size of the aggregate shall not be greater than 1/3 of the minimum wall thickness up to and including a wall thickness of 4 ½-inches. The maximum aggregate size is 1 ½-inches.

620.2.3 Water used for concrete and for curing of pipe shall be as per Section 725.

620.2.4 Concrete shall be Class 'A' in accordance with Section 725. Slump shall be the minimum required for satisfactory placement of the concrete by the equipment used by the contractor. The slump shall not exceed 3-inches.

620.2.5 Bonding mortar shall consist of two (2) or more parts of cement to three (3) parts of sand by volume.

Subsection 620.3 - Construction Methods

620.3.1 Excavation:

The trench will be neatly excavated with vertical sides and semi-circular bottom. The trench shall be shaped to form the bottom outside of the pipe on the alignment and to the grades specified in the plans. Departure from and return to the established grade for the finished trench and the invert of the installed pipe shall not exceed 1-inch per 10 linear feet with a maximum allowable departure of 1 ½-inches. Departure from and return to specified alignment for the trench and pipe shall not exceed the allowable tolerances specified for the grade. The bottom of the trench, hereinafter known as the trench form, will be shaped to provide full, form, and uniform support by undisturbed earth or compacted fill for at least the bottom 210 degrees of the pipe. Density of the fill shall be at least five percent (5%) greater than the natural in place soil, but in no case less than 85 percent (85%) when tested in accordance with AASHTO T-99, Method A and T-1 91 or ASTM D-2922 and D-3017.

When it is necessary to install the pipe in rocky areas, the rock will be removed and replaced with suitable fill material compacted to proper density. The rock will be over-excavated to leave a 6-inch minimum compacted soil cushion between the rock and the pipe. For construction accuracy, areas left void by rock removal will be completely filled with compacted material, and then trenched for the pipe as though natural ground. If the rock below the pipe subgrade is fractured or fragmented or if it consists of large cobblestones or boulders, the replacement fill material will be carefully selected to ensure that it is of such gradation that it will not be removed downward by fluctuation of the water table. In no case will expansive soils be used for fill. A similar procedure of over-excavation, backfill, compaction, and

retrenching will be used where sloughing sand or where soft or spongy soil conditions are encountered. When expansive clays are encountered, they will be thoroughly moistened by ponding, to completely expand the soil, and the moisture maintained until the concrete is placed. The contractor may substitute non-reinforced or reinforced concrete pipe for CIPP in these unsuitable areas. There will be no additional payment for this substitution.

Excavated trench shall be checked for compliance with requirements for grade and alignment prior to placement of concrete. The contractor shall submit his proposed method of grade and alignment control and checking of same for conformance with specifications to the Engineer for his approval prior to start of work. The contractor shall supply manpower, equipment and materials, as are required, to provide and confirm compliance with grade and alignment requirements. This is a non-pay item and all costs incurred shall be included in the bid item(s) for the pipe installation.

620.3.2 Placement:
At the time of concrete placement, all soil in the trench will be adequately moistened so that water is not drawn from the freshly placed concrete. However, the trench form will be completely free of water, mud, and debris. All forming devices, including the slipforms and hopper of the placement device, shall be thoroughly moistened.

Concrete shall not be placed when temperature of the concrete exceeds 90 degrees Fahrenheit (32 Celsius) or is less than 50 degrees Fahrenheit (10 Celsius). The soil adjacent to the trench shall be at a temperature above freezing.

The pipe shall be constructed in one placement, the entire cross-section being placed monolithically. Inside forms shall be sufficiently rigid to withstand consolidation of the fresh concrete. Placement shall be such as to produce a thoroughly consolidated homogeneous concrete mixture conforming to the test requirements of this specification. Effective consolidation means shall be applied to the fresh concrete over the entire circumference and from within the pipe shell. Consolidation means shall be capable of effectively placing and consolidating fresh concrete at production speeds. Methods of consolidating shall be capable of building up sufficient pressure to effectively bond the concrete to the surrounding earth and to keep loose sand, mud and water out of the pipe shell.

Under no circumstances will the contractor be allowed to continue the pipe installation if the vibrators of the cast-in-place machine are inoperable. Portable vibrators or "stingers" shall only be used to supplement internal vibrators on the machine and not as a sole source to consolidate and distribute the concrete mix.

The contractor shall make provisions for removing sloughed material, debris and any foreign objects from trench before and during placement of concrete such that buildup of material does not occur ahead of the machine. In addition, small transverse trenches shall be dug across trench bottom, at distances not to exceed 25 linear feet to receive soil built up and pushed ahead of the slipform.

(A) Construction Joints:

When pipe placement stops in excess of ninety (90) minutes, a construction joint shall be formed. The ends of the pipe that are to be butt contact shall be left in rough condition with a slope between 20 and 45 degrees. Number 4 reinforcing bars shall be embedded 12-inches in the previous pour and 12-inches into the next pour and shall be placed 12-inches on center for pipe 42-inches in diameter or less and shall be placed 18-inches on center for pipe diameters in excess of 42-inches. Immediately before resuming concrete placement the surface to be bonded shall be cleaned of all latence, coatings, foreign materials, and loose or defective concrete thoroughly

wetted and coated with a layer of bonding mortar (Section 620.2.5) approximately ¼ -inch thick. In lieu of the bonding mortar, neat cement paste may be thoroughly scrubbed onto the wet surface of the previously placed concrete. For a joint that may be used for connections to another pipe or structure, a joint shall be made by squaring off the end of the pipe. An excavation shall be made along the sides and bottom of the cast-in-place pipe, for any diameter, to permit casting of a concrete collar as described above.

(B) Pipe Dimensions and Tolerances:

(1) The internal diameter of the pipe at any point shall not be less than 95% of the nominal diameter, and the average of any four (4) measurements of the internal diameter made at 45 degree intervals shall not be less than the nominal diameter.

(2) For pipe less than 15-inches inside diameter, the minimum wall thickness shall be 2-inches.

For pipe with an inside diameter of 15-inches to 24-inches the minimum wall thickness shall be 2 ½-inches. For pipe exceeding 24-inches, inside diameter the minimum wall thickness shall be 1/12 of the inside diameter, plus ½-inch.

(3) Offsets at form laps and horizontal edges shall not exceed ½-inch for pipe having inside diameter not greater than 42-inches; ¾-inch for pipe having inside diameter greater than 42-inches but not greater than 72-inches; and 1-inch for pipe having inside diameter greater than 72-inches.

(C) Pipe Placement:

(1) It is essential that concrete placement be done in a smooth and steady manner with as few starts and stops as is possible. The contractor shall schedule materials and operate the pipe machine at speeds and in a manner that will achieve this.

(2) The contractor shall provide an anchoring system for pull of the machine in a manner that will provide the least probability of causing deviations in grade and/or alignment. Adjustments to or modifications in the anchoring system, when required in the opinion of the Engineer, shall be made at no additional cost to the project.

620.3.3 Curing and Backfilling:

The contractor shall be responsible for proper curing of the concrete and backfilling the trench to an even grade. Final backfill and compaction shall not be started until concrete has developed a compressive strength of at least 2,000 psi. The pipe shall be checked for grade, alignment and thickness prior to backfilling. Curing shall be performed in such a manner as to prevent the premature drying of the concrete. The contractor shall use the method described below.

(A) Polyethylene film complying with ASTM C-171, nominal thickness 0.0015-inches, shall be placed on the exposed top surface of the pipe immediately after the pipe is cast. The film shall be anchored in place with loose soil to assure continuous, adequate curing.

A humid atmosphere within the pipe, as evidenced by condensation on the interior surface, shall be maintained for at least seven (7) days following placement, except for a maximum period of 24 hours allowed for removing forms and making repairs. To prevent air drafts which may dry the pipe and to maintain a humid atmosphere inside the pipe, all openings, ends, manholes, connector pipes shall be kept closed or securely covered, except when actual

work is in progress on the inside of the pipe. The pipeline shall be partially filled with water during the curing period when work is not being performed on the inside of the pipe.

Water jetting is not an accepted method of compaction for any storm drain construction activities.

620.3.4 Repair:
Immediately after removal of the forms, the inside of pipeline will be inspected for required repairs and conformance with all dimensional requirements including alignment and grade. The Engineer shall be the sole judge as to the repairability of deficiencies. He shall require removal and replacement of those sections of pipeline that he judges to be non-repairable or which are not within required dimensional tolerances, including alignment and grade.

When concrete placement is done by a method requiring the use of metal inner forms, the contractor shall schedule his work force, by extended, staggered or multiple shifts, as required, to provide for removal of forms within four to six hours of placement of concrete and start of repairing, patching and finishing of pipeline to conform with specification requirements.

When concrete placement is done by methods using pneumatically inflated inner liner, the contractor shall schedule his work force, by extended, staggered or multiple shifts, as required, to provide for removal of the pneumatic inner liner within 12 hours of placement of concrete and start of repairing, patching and finishing of pipeline to conform with specification requirements.

All rock pockets and indentations shall be cleaned out, moistened and filled (full depth) with 1:2 cement grout or approved epoxy material. Except where, in the opinion of the Engineer, the width and/or length of the crack may indicate a structural deficiency, repairs shall be made as required for longitudinal cracks.

Longitudinal cracks exceeding 0.01-inches in width and 12-inches in length may be cause for rejection and removal and replacement of that portion of the pipe. Subject to the approval of the Engineer, cracks may be repaired using a pressure applied epoxy compound capable of providing structural correction to the area in addition to sealing the void. A longitudinal crack shall be defined as one that has the general direction of a 30 degree angle or less with the alignment of the pipe.

Transverse cracks 0.05 inches or more in width that can be penetrated by more than 0.25 inches and are more than 12 inches in length shall be repaired by injection of an approved elastomeric compound or another method approved by the Engineer.

Irrespective of concrete placement method, all repairs, patches and finishing shall be completed within 24 hours of concrete placement. In addition, the contractor shall examine the inside of the pipe 45 days after placement and make necessary repairs to cracks occurring during curing. Epoxy compound used for crack repair shall conform to ADOT Standard Specifications Section 1015-5.

The contractor, prior to start of concrete placement on project shall submit a written schedule of his proposed work activities and work time schedules for the Engineer's review and approval. No time schedule requiring overtime by the Engineer's staff is authorized without specific written approval of the Engineer.

Compliance with this section is a non-pay item and any costs incurred shall be included in the bid proposal item(s) for the pipe.

620.3.5 Finish:
Except for the form offsets, the interior surface of the pipe shall be equivalent to or better than a wood

float finish. Form offsets shall be trimmed so as to provide a reasonably tapered slope from surface to surface. The bottom of the pipe below the metal forms shall be finished in a workmanlike manner and shall conform to the general circular circumference of the pipe without sags, dips and humps. All extraneous concrete shall be removed from the interior surface.

Subsection 620.4 – Method of Tests
Random tests shall be made of the wall thickness at the top, bottom and sides, approximately every 100 feet on a daily basis by probes through fresh concrete or small holes drilled through the concrete. Holes shall be properly and permanently closed and sealed, flush with the inside surface of the pipe, after measurements are made, in accordance with the requirements of the fifth paragraph of MAG Subsection 620.3.4, contained herein.

Test cylinders shall be prepared and tested as per Section 725. If the cylinder tests indicate that the concrete does no meet the specified strength requirements, cores shall be taken from the same section of concrete represented by the faulty test cylinder under the supervision of the Engineer. The concrete should be at least 14 days old before the core specimens are taken. The diameter of the core specimens for the determination of compressive strength should be at least three (3) times the maximum nominal size of the coarse aggregate used and must be at least twice the maximum nominal size of coarse aggregate.

The length of the specimen, when capped, should be twice to core diameter. A core having a maximum height of less than 95 percent of its diameter before capping or a height less than its diameter after capping shall not be tested.

If cores are taken, the contractor shall patch all core holes in such a manner that the patch will be permanent, will not leak, and will have a smooth interior finish flush with the interior surface of the pipe.

Procedures and payment for coring shall be in accordance with applicable portions of Section 725. The Engineer will evaluate the test results and his decision as to required corrective action will be final.

Subsection 620.5 - Measurement
Measurement of cast-in-place concrete pipe will be the number of linear feet of pipe measured horizontally along the pipe axis from end to end of pipe. At change in diameter, the measurement shall be to center of manhole or transition.

Subsection 620.6 - Payment
Payment will be made on the basis of the price bid per linear foot to the nearest foot for each size of pipe complete in place and shall be compensation in full for furnishing and installing the cast-in-place concrete pipe as specified including removal of obstructions, excavation, backfilling, compacting, testing, repairs as required, and all incidental labor, materials and equipment. Refer to Section 618 for applicable bid items.

SECTION 625 - MANHOLE CONSTRUCTION AND DROP SEWER CONNECTIONS
Manhole construction shall conform to Section 625 of the MAG Uniform Standard Specifications.

Subsection 625.1 – Description
Add the following:
The work includes the construction of 48" diameter storm drain manhole shafts, conforming to MAG Detail 522, the 48" diameter storm drain manhole base, conforming to MAG Detail 520 or 521, and Drop Manholes per Detail 09A.

In addition, four new sanitary sewer manholes (conforming to MAG Detail 420) will be constructed to relocate the existing sewer line on Guadalupe Road to the south. New 8-inch, 12-inch and 18-inch sanitary sewer lines shall be constructed between the new manholes and connected to the existing sanitary sewers and manholes shown on the plans.

Manhole frames and covers shall be a nominal 24-inches in diameter per MAG Detail 424.

All new manhole structure rims shall be adjusted to existing or new pavement grade as required.

Subsection 625.5 – Payment
Add the following:
Payment for the 48" diameter manhole base, conforming to MAG Detail 520 or 521, or Detail 09A, and manhole shaft, conforming to MAG Detail 522, combinations shall be made on the basis of the price bid per each, and shall include full compensation for all earthwork, pavement removal and replacement, labor, materials, equipment, ladder rungs, frame and cover, and other incidental items necessary to construct the manhole structure complete in place.
ITEM 625-1 – MANHOLE BASE (MAG DET 520) AND SHAFT (MAG DET 522)
ITEM 625-2 – MANHOLE BASE (MAG DET 521) AND SHAFT (MAG DET 522)
ITEM 625-3 – MANHOLE BASE (DETAIL 09A) AND SHAFT (MAG DET 522)
ITEM 625-4 – SEWER MANHOLE (MAG DET 420)

SECTION 635 – DRYWELL
Add this section to the MAG Uniform Standard Specifications.

Subsection 635.1 – Description
This work consists of the installation of single chamber and double chamber drywells in each of the four retention basins. Work includes excavating a 4-foot diameter hole, installation of gravel and cobble backfill, interior piping, manhole riser and cone sections, frame and inlet cover, as shown in Detail 17 of the plans. Boring logs of each retention basin are available in Appendix "C".

Rim elevations for each dry well will be set as shown in the retention basin grading plans.

The Contractor shall coordinate the installation of the drywells with the Engineer. The District has obtained the necessary registration forms from ADEQ. A copy of the forms is included in the Appendix "D". A specialty contractor with proven experience constructing drywells, and approved by ADEQ, shall do the installation. The Contractor shall complete the Drywell Registration Forms for each drywell as required by the Arizona Department of Environmental Quality (ADEQ) and submit the form along with all required information and fees. The Contractor shall provide 45 days advance notice to the Engineer of when the drywells will be installed.

The Contractor shall exercise care to ensure that petroleum products and debris do not get into the drywells during construction.

Subsection 635.4 – Payment
Payment for the drywell installation shall be made on the basis of the price bid per each, and shall include full compensation for all labor, materials, equipment, all necessary paperwork, fees, and appurtenances necessary for construction in place including precast manhole sections, excavation and backfill, backfill material, interior piping, and all steel and other embedments, and manhole inlet covers, including frames.
ITEM 635-1 – DRYWELL, SINGLE CHAMBER
ITEM 635-2 – DRYWELL, DOUBLE CHAMBER

SECTION 703 - RIPRAP

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

Subsection 703.1 – Stone

Add the following:

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 and sacked concrete shall not be used for riprap.

In order to maintain slope stability where the plain riprap is constructed, stone used shall be 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.

Riprap Gradation shall be angular where indicated on the drawings unless otherwise approved by the Engineer. Rounded or river run type rock can be used for all other installations.

All visible or surface installations of angular riprap material shall have natural coloring to match the color of the specified or approved decomposed granite rock ground cover as shown on the plans. The Contractor shall provide representative samples of the riprap along with the required Decomposed Granite samples for comparison and approval prior to ordering any materials.

Subsection 703-2 - Size of Stone

Add the following:

Subsection 703-2 of the MAG Standard Specifications is replaced with the following requirements:

RIPRAP GRADATION

D_{MIN}	D_{15}	D_{50}	D_{85}	D_{MAX}
4 inch	8 inch	12 inch	14 inch	16 inch
2 inch	3 inch	4 inch	6 inch	8 inch

SECTION 795 – LANDSCAPE MATERIAL

Landscape material shall conform to Section 795 of the MAG Uniform Specifications except as modified herein.

Subsection 795.4 – Organic Soil Conditioners:

Eliminate the entire sub-section and add the following:

Organic soil conditioner shall be Omni Mix™ or approved equal as produced by Western Agricultural Products/Western Organics, 2807 N. 27th Avenue, Phoenix, AZ, Telephone: (602) 278-6703

Subsection 795.5 – Chemical Soil Conditioner:

Add the following:

No herbicides shall be used in or around the areas shown to receive turf grass installations.

Subsection 795.7 – Plants, Trees and Shrubs
Plant Materials, as specified, shall be obtained from local and nursery/grower sources.

Turf grass seed and/or sod supply shall be obtained from local growers.

Subsection 795.8.5 – Boulders:
Add the following:

Boulders shall all be surface select quality, with complete unfractured surfaces. All boulders shall have natural, weathered, smooth, and generally rounded surfaces with a natural weathered patina surface color, free of chips, fractures or other and surface scarring. The boulders shall be obtained from a single local source and location. The boulders shall be sized in accordance with the drawings. The Contractor shall take all necessary precautions to protect all boulders and prevent any damage during delivery transport and installation.

APPENDIX "A"

HIGHLINE CANAL FLOW RATES
AS PROVIDED BY SALT RIVER PROJECT

APPENDIX "A"

HIGHLINE CANAL FLOW RATES
AS PROVIDED BY SALT RIVER PROJECT

CFS

Gate	Date	AF	cfs
7-02.8	1/1/00	12.14	6.1
7-02.8	1/2/00	3.02	1.5
7-02.8	1/3/00	1.24	0.6
7-02.8	1/4/00	4.50	2.3
7-02.8	1/5/00	5.71	2.9
7-02.8	1/6/00	11.37	5.7
7-02.8	1/7/00	12.92	6.5
7-02.8	1/8/00	14.36	7.2
7-02.8	1/9/00	17.26	8.7
7-02.8	1/10/00	1.24	0.6
7-02.8	1/11/00	8.96	4.5
7-02.8	1/12/00	4.16	2.1
7-02.8	1/13/00	2.30	1.2
7-02.8	1/14/00	11.99	6.0
7-02.8	1/15/00	8.84	4.5
7-02.8	1/16/00	9.38	4.7
7-02.8	1/17/00	7.21	3.6
7-02.8	1/18/00	14.14	7.1
7-02.8	1/19/00	6.36	3.2
7-02.8	1/20/00	3.46	1.7
7-02.8	1/21/00	9.61	4.8
7-02.8	1/22/00	5.84	2.9
7-02.8	1/23/00	4.55	2.3
7-02.8	1/24/00	1.24	0.6
7-02.8	1/25/00	1.24	0.6
7-02.8	1/26/00	7.31	3.7
7-02.8	1/27/00	16.12	8.1
7-02.8	1/28/00	12.71	6.4
7-02.8	1/29/00	13.95	7.0
7-02.8	1/30/00	10.49	5.3
7-02.8	1/31/00	11.16	5.6
7-02.8	2/1/00	9.30	4.7
7-02.8	2/2/00	11.24	5.7
7-02.8	2/3/00	6.20	3.1
7-02.8	2/4/00	8.46	4.3
7-02.8	2/5/00	18.81	9.5
7-02.8	2/6/00	24.54	12.4
7-02.8	2/7/00	13.99	7.1
7-02.8	2/8/00	11.16	5.6
7-02.8	2/9/00	9.92	5.0
7-02.8	2/10/00	8.68	4.4
7-02.8	2/11/00	8.68	4.4
7-02.8	2/12/00	14.36	7.2
7-02.8	2/13/00	14.88	7.5
7-02.8	2/14/00	14.88	7.5
7-02.8	2/15/00	17.00	8.6
7-02.8	2/16/00	12.48	6.3
7-02.8	2/17/00	8.37	4.2
7-02.8	2/18/00	24.72	12.5
7-02.8	2/19/00	21.08	10.6
7-02.8	2/20/00	11.50	5.8
7-02.8	2/21/00	8.68	4.4
7-02.8	2/22/00	8.68	4.4
7-02.8	2/23/00	11.13	5.6
7-02.8	2/24/00	8.68	4.4
7-02.8	2/25/00	8.68	4.4
7-02.8	2/26/00	10.80	5.4
7-02.8	2/27/00	10.33	5.2
7-02.8	2/28/00	10.87	5.5
7-02.8	2/29/00	7.69	3.9
7-02.8	3/1/00	7.69	3.9
7-02.8	3/2/00	8.62	4.3
7-02.8	3/3/00	22.48	11.3
7-02.8	3/4/00	21.08	10.6
7-02.8	3/5/00	22.01	11.1
7-02.8	3/6/00	8.58	4.3
7-02.8	3/7/00	6.20	3.1
7-02.8	3/8/00	16.12	8.1
7-02.8	3/9/00	15.09	7.6
7-02.8	3/10/00	6.20	3.1
7-02.8	3/11/00	6.20	3.1
7-02.8	3/12/00	7.44	3.8
7-02.8	3/13/00	8.19	4.1
7-02.8	3/14/00	6.20	3.1
7-02.8	3/15/00	6.20	3.1
7-02.8	3/16/00	7.44	3.8
7-02.8	3/17/00	10.28	5.2
7-02.8	3/18/00	18.76	9.5
7-02.8	3/19/00	15.81	8.0
7-02.8	3/20/00	13.64	6.9
7-02.8	3/21/00	17.62	8.9
7-02.8	3/22/00	13.64	6.9
7-02.8	3/23/00	19.07	9.6
7-02.8	3/24/00	25.65	12.9
7-02.8	3/25/00	19.22	9.7
7-02.8	3/26/00	13.64	6.9
7-02.8	3/27/00	16.44	8.3
7-02.8	3/28/00	13.95	7.0
7-02.8	3/29/00	17.36	8.8
7-02.8	3/30/00	15.66	7.9
7-02.8	3/31/00	33.66	17.0
7-02.8	4/1/00	29.42	14.8
7-02.8	4/2/00	23.64	11.9
7-02.8	4/3/00	7.29	3.7
7-02.8	4/4/00	10.20	5.1
7-02.8	4/5/00	7.44	3.8
7-02.8	4/6/00	7.44	3.8
7-02.8	4/7/00	7.91	4.0
7-02.8	4/8/00	14.11	7.1
7-02.8	4/9/00	25.16	12.7
7-02.8	4/10/00	27.22	13.7
7-02.8	4/11/00	18.70	9.4
7-02.8	4/12/00	24.65	12.4

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7-02.8	4/13/00	30.02	15.1
7-02.8	4/14/00	36.37	18.3
7-02.8	4/15/00	29.71	15.0
7-02.8	4/16/00	25.21	12.7
7-02.8	4/17/00	30.43	15.3
7-02.8	4/18/00	23.02	11.6
7-02.8	4/19/00	24.44	12.3
7-02.8	4/20/00	31.83	16.0
7-02.8	4/21/00	22.68	11.4
7-02.8	4/22/00	19.84	10.0
7-02.8	4/23/00	19.27	9.7
7-02.8	4/24/00	18.60	9.4
7-02.8	4/25/00	26.76	13.5
7-02.8	4/26/00	25.32	12.8
7-02.8	4/27/00	21.08	10.6
7-02.8	4/28/00	32.50	16.4
7-02.8	4/29/00	25.89	13.1
7-02.8	4/30/00	20.87	10.5
7-02.8	5/1/00	25.14	12.7
7-02.8	5/2/00	30.59	15.4
7-02.8	5/3/00	34.05	17.2
7-02.8	5/4/00	32.78	16.5
7-02.8	5/5/00	40.35	20.3
7-02.8	5/6/00	40.51	20.4
7-02.8	5/7/00	28.86	14.5
7-02.8	5/8/00	35.19	17.7
7-02.8	5/9/00	28.42	14.3
7-02.8	5/10/00	34.06	17.2
7-02.8	5/11/00	25.63	12.9
7-02.8	5/12/00	28.26	14.2
7-02.8	5/13/00	22.53	11.4
7-02.8	5/14/00	29.61	14.9
7-02.8	5/15/00	30.25	15.3
7-02.8	5/16/00	29.40	14.8
7-02.8	5/17/00	23.72	12.0
7-02.8	5/18/00	26.04	13.1
7-02.8	5/19/00	37.54	18.9
7-02.8	5/20/00	28.47	14.4
7-02.8	5/21/00	24.39	12.3
7-02.8	5/22/00	25.83	13.0
7-02.8	5/23/00	33.07	16.7
7-02.8	5/24/00	41.54	20.9
7-02.8	5/25/00	46.99	23.7
7-02.8	5/26/00	35.21	17.8
7-02.8	5/27/00	39.14	19.7
7-02.8	5/28/00	30.07	15.2
7-02.8	5/29/00	29.19	14.7
7-02.8	5/30/00	44.54	22.5
7-02.8	5/31/00	52.70	26.6
7-02.8	6/1/00	42.37	21.4
7-02.8	6/2/00	31.23	15.7
7-02.8	6/3/00	31.62	15.9

			CFS
7-02.8	6/4/00	29.45	14.8
7-02.8	6/5/00	32.86	16.6
7-02.8	6/6/00	40.61	20.5
7-02.8	6/7/00	37.33	18.8
7-02.8	6/8/00	26.61	13.4
7-02.8	6/9/00	23.84	12.0
7-02.8	6/10/00	28.96	14.6
7-02.8	6/11/00	28.93	14.6
7-02.8	6/12/00	44.59	22.5
7-02.8	6/13/00	44.07	22.2
7-02.8	6/14/00	34.41	17.3
7-02.8	6/15/00	45.18	22.8
7-02.8	6/16/00	52.62	26.5
7-02.8	6/17/00	56.47	28.5
7-02.8	6/18/00	27.36	13.8
7-02.8	6/19/00	31.49	15.9
7-02.8	6/20/00	23.97	12.1
7-02.8	6/21/00	18.21	9.2
7-02.8	6/22/00	16.95	8.5
7-02.8	6/23/00	13.64	6.9
7-02.8	6/24/00	13.64	6.9
7-02.8	6/25/00	17.67	8.9
7-02.8	6/26/00	31.23	15.7
7-02.8	6/27/00	28.34	14.3
7-02.8	6/28/00	22.53	11.4
7-02.8	6/29/00	16.12	8.1
7-02.8	6/30/00	15.47	7.8
7-02.8	7/1/00	13.33	6.7
7-02.8	7/2/00	14.53	7.3
7-02.8	7/3/00	12.40	6.3
7-02.8	7/4/00	17.10	8.6
7-02.8	7/5/00	23.90	12.0
7-02.8	7/6/00	25.47	12.8
7-02.8	7/7/00	33.38	16.8
7-02.8	7/8/00	30.20	15.2
7-02.8	7/9/00	22.63	11.4
7-02.8	7/10/00	19.53	9.8
7-02.8	7/11/00	17.36	8.8
7-02.8	7/12/00	30.12	15.2
7-02.8	7/13/00	25.63	12.9
7-02.8	7/14/00	29.14	14.7
7-02.8	7/15/00	22.53	11.4
7-02.8	7/16/00	14.05	7.1
7-02.8	7/17/00	13.64	6.9
7-02.8	7/18/00	13.64	6.9
7-02.8	7/19/00	20.60	10.4
7-02.8	7/20/00	27.59	13.9
7-02.8	7/21/00	23.56	11.9
7-02.8	7/22/00	24.03	12.1
7-02.8	7/23/00	19.84	10.0
7-02.8	7/24/00	29.86	15.1
7-02.8	7/25/00	37.20	18.8

			CFS
7-02.8	7/26/00	45.57	23.0
7-02.8	7/27/00	29.37	14.8
7-02.8	7/28/00	17.36	8.8
7-02.8	7/29/00	25.63	13.0
7-02.8	7/30/00	21.91	11.0
7-02.8	7/31/00	17.36	8.8
7-02.8	8/1/00	17.36	8.8
7-02.8	8/2/00	17.36	8.8
7-02.8	8/3/00	17.36	8.8
7-02.8	8/4/00	22.79	11.5
7-02.8	8/5/00	24.49	12.3
7-02.8	8/6/00	31.05	15.7
7-02.8	8/7/00	32.68	16.5
7-02.8	8/8/00	44.61	22.5
7-02.8	8/9/00	23.30	11.7
7-02.8	8/10/00	18.39	9.3
7-02.8	8/11/00	22.32	11.3
7-02.8	8/12/00	23.10	11.6
7-02.8	8/13/00	25.78	13.0
7-02.8	8/14/00	21.65	10.9
7-02.8	8/15/00	22.62	11.4
7-02.8	8/16/00	19.84	10.0
7-02.8	8/17/00	28.73	14.5
7-02.8	8/18/00	27.44	13.8
7-02.8	8/19/00	28.78	14.5
7-02.8	8/20/00	29.37	14.8
7-02.8	8/21/00	35.65	18.0
7-02.8	8/22/00	39.86	20.1
7-02.8	8/23/00	27.95	14.1
7-02.8	8/24/00	20.38	10.3
7-02.8	8/25/00	23.25	11.7
7-02.8	8/26/00	17.05	8.6
7-02.8	8/27/00	11.06	5.6
7-02.8	8/28/00	11.16	5.6
7-02.8	8/29/00	9.95	5.0
7-02.8	8/30/00	9.92	5.0
7-02.8	8/31/00	9.92	5.0
7-02.8	9/1/00	21.44	10.8
7-02.8	9/2/00	14.88	7.5
7-02.8	9/3/00	25.73	13.0
7-02.8	9/4/00	32.89	16.6
7-02.8	9/5/00	31.57	15.9
7-02.8	9/6/00	25.94	13.1
7-02.8	9/7/00	22.94	11.6
7-02.8	9/8/00	22.79	11.5
7-02.8	9/9/00	23.92	12.1
7-02.8	9/10/00	20.05	10.1
7-02.8	9/11/00	27.69	14.0
7-02.8	9/12/00	29.35	14.8
7-02.8	9/13/00	25.32	12.8
7-02.8	9/14/00	21.08	10.6
7-02.8	9/15/00	28.31	14.3

			CFS
7-02.8	9/16/00	24.80	12.5
7-02.8	9/17/00	36.01	18.2
7-02.8	9/18/00	38.13	19.2
7-02.8	9/19/00	38.44	19.4
7-02.8	9/20/00	27.46	13.8
7-02.8	9/21/00	28.37	14.3
7-02.8	9/22/00	16.02	8.1
7-02.8	9/23/00	18.55	9.4
7-02.8	9/24/00	16.12	8.1
7-02.8	9/25/00	16.12	8.1
7-02.8	9/26/00	14.98	7.6
7-02.8	9/27/00	17.77	9.0
7-02.8	9/28/00	13.05	6.6
7-02.8	9/29/00	19.63	9.9
7-02.8	9/30/00	25.01	12.6
7-02.8	10/1/00	23.72	12.0
7-02.8	10/2/00	39.45	19.9
7-02.8	10/3/00	36.01	18.2
7-02.8	10/4/00	27.20	13.7
7-02.8	10/5/00	13.12	6.6
7-02.8	10/6/00	15.94	8.0
7-02.8	10/7/00	12.97	6.5
7-02.8	10/8/00	8.68	4.4
7-02.8	10/9/00	9.77	4.9
7-02.8	10/10/00	8.01	4.0
7-02.8	10/11/00	4.96	2.5
7-02.8	10/12/00	4.96	2.5
7-02.8	10/13/00	8.73	4.4
7-02.8	10/14/00	9.25	4.7
7-02.8	10/15/00	14.16	7.1
7-02.8	10/16/00	17.36	8.8
7-02.8	10/17/00	22.97	11.6
7-02.8	10/18/00	19.83	10.0
7-02.8	10/19/00	12.71	6.4
7-02.8	10/20/00	8.68	4.4
7-02.8	10/21/00	14.53	7.3
7-02.8	10/22/00	10.10	5.1
7-02.8	10/23/00	6.20	3.1
7-02.8	10/24/00	6.20	3.1
7-02.8	10/25/00	6.20	3.1
7-02.8	10/26/00	6.20	3.1
7-02.8	10/27/00	16.95	8.5
7-02.8	10/28/00	11.16	5.6
7-02.8	10/29/00	15.19	7.7
7-02.8	10/30/00	15.11	7.6
7-02.8	10/31/00	8.86	4.5
7-02.8	11/1/00	1.24	0.6
7-02.8	11/2/00	1.24	0.6
7-02.8	11/3/00	1.24	0.6
7-02.8	11/4/00	1.24	0.6
7-02.8	11/5/00	1.24	0.6
7-02.8	11/6/00	0.57	0.3

CFS

7-02.8	11/8/00	4.70	2.4
7-02.8	11/11/00	2.27	1.1
7-02.8	11/12/00	8.63	4.4
7-02.8	11/13/00	11.16	5.6
7-02.8	11/14/00	9.04	4.6
7-02.8	11/15/00	7.44	3.8
7-02.8	11/16/00	3.10	1.6
7-02.8	11/17/00	3.41	1.7
7-02.8	11/18/00	4.86	2.4
7-02.8	11/19/00	4.13	2.1
7-02.8	11/20/00	8.50	4.3
7-02.8	11/21/00	4.81	2.4
7-02.8	11/22/00	14.05	7.1
7-02.8	11/23/00	12.61	6.4
7-02.8	11/24/00	0.62	0.3
7-02.8	11/25/00	2.48	1.3
7-02.8	11/26/00	1.42	0.7
7-02.8	12/9/00	37.20	18.8
7-02.8	12/10/00	37.20	18.8
7-02.8	12/11/00	32.24	16.3
7-02.8	12/12/00	32.24	16.3
7-02.8	12/13/00	32.24	16.3
7-02.8	12/14/00	35.88	18.1
7-02.8	12/15/00	37.98	19.1
7-02.8	12/16/00	31.00	15.6
7-02.8	12/17/00	27.28	13.8
7-02.8	12/18/00	31.00	15.6
7-02.8	12/19/00	37.59	19.0
7-02.8	12/20/00	40.92	20.6
7-02.8	12/21/00	40.92	20.6
7-02.8	12/22/00	37.20	18.8
7-02.8	12/23/00	41.98	21.2
7-02.8	12/24/00	13.15	6.6
7-02.8	12/26/00	9.56	4.8
7-02.8	12/27/00	11.78	5.9
7-02.8	12/28/00	19.65	9.9
7-02.8	12/29/00	15.01	7.6
7-02.8	12/30/00	14.67	7.4
7-02.8	12/31/00	16.70	8.4

10.0 mean
28.5 max
0.3 min

APPENDIX "B"

TOXAPHENE REPORT

APPENDIX "B"

TOXAPHENE REPORT

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February 3, 1999

BROWN AND CALDWELL
Environmental Engineering & Consulting

Mr. Robert Stevens
Environmental Planner
Flood Control District of Maricopa County
2801 West Durango
Phoenix, Arizona 85009

15-16935/004

Subject: Results of Additional Drilling and Analysis at the Maricopa County Proposed South Basin Site
Guadalupe, Arizona
Contract FCD 97-29

Dear Mr. Stevens:

This letter report documents the tasks performed and results of the additional subsurface soil investigation conducted at the Flood Control District of Maricopa County (FCDMC) proposed South Basin, "the Site," located approximately 0.5 miles south of Guadalupe Road and 0.5 miles east of Priest Drive (along the west side of the Highline Canal) in Guadalupe, Arizona. The Site is currently owned by the Salt River Project (SRP). The purpose of this additional investigation was to further define the lateral extent of observed subsurface toxaphene contamination. The work documented in this letter report was conducted in general accordance with the scope of work outlined in the Brown and Caldwell proposal, dated November 17, 1998. Any deviations from the approved scope of work were the result of on-site observations and were discussed with and approved by the on-site FCDMC representative.

Previous Subsurface Soil Investigation

Based on prior environmental investigations conducted at the Site and adjacent property, toxaphene concentrations in excess of Arizona Department of Environmental Quality (ADEQ) Residential Soil Remediation Levels (RSRLs) are present at approximately 9 to 12 feet below ground surface (bgs). Previous excavation activities to remove the toxaphene-contaminated soil at the former Sanders Aviation Site to the south also extended several feet on the SRP property. However, this excavation work reportedly did not remove all the toxaphene-contaminated soil north of the former Sanders pond location.

Results of recent on-site core drilling conducted by Brown and Caldwell revealed toxaphene contamination between the depths of 9 to 12 feet bgs. The toxaphene-contaminated layer was observed to have a distinct gray to grayish-brown color. Concentrations of toxaphene in this layer ranged from 1.3 to 19 milligrams per kilogram (mg/Kg) with concentrations generally decreasing with distance from the southern property boundary.

Scope of Work

Brown and Caldwell drilled a total of seven borings at six locations (B1 through B6) at the Site to further define the lateral extent of toxaphene contamination that was detected in four previous borings (C, E, EN, and WN). Boring B1 was located within a very shallow depression in the south-central portion of the Site. Borings B2 through B6 were located to the east, north, and west of the shallow depression. The location of the previously drilled borings and the borings drilled during this additional investigation are shown in Figure 1.

Based on the results of the previous investigation, the depth interval from 9 to 12 feet bgs was targeted during this additional investigation. Continuous soil samples were collected from each boring from 9 to 12 feet bgs and analyzed by an on-site mobile laboratory for toxaphene. Brown and Caldwell subcontracted THF Drilling, Inc. to perform drilling operations using a hollow-stem auger drilling rig. Samples were collected using a split-spoon sampler lined with 4-inch brass sleeves. The soil samples collected from each boring were visually inspected in the field for changes in color and composition. Samples collected between the depths of 9 to 12 feet bgs were selected from each boring for toxaphene analysis at the Transwest Geochem, Inc. (Transwest) on-site mobile. Soil samples were analyzed using U.S. Environmental Protection Agency (USEPA) Test Method 8081A modified. Following drilling and sampling of each boring, the boring was abandoned by filling the borehole with soil cuttings.

During the drilling of Boring B4, soil cuttings removed from the approximate depth of 4 to 6 feet bgs showed a yellowish discoloration. A second Boring (B4A) was drilled adjacent to Boring B4 so that a discrete split-spoon sample could be collected from the discolored soil. A split-spoon sample and a cuttings sample from Boring B4A were analyzed at the on-site mobile laboratory for toxaphene.

Analytical Results

The results of the toxaphene analysis for samples collected from B1 through B6 during this additional investigation are shown in Table 1. The concentration distribution of samples analyzed from all borings drilled at the Site is shown in Figure 2. Of the 13 soil samples collected and analyzed on site during this investigation, only 2 samples were reported at or above the laboratory method reporting limit of 1.0 mg/Kg for toxaphene. None of the sample results were above the RSRL of 4.0 mg/Kg. Samples from Boring B1 had detectable toxaphene concentrations of 2.4 and 2.5 mg/Kg at depths of 10 to 10.5 and 10.5 to 11 feet bgs, respectively. No other samples analyzed by Transwest were reported with concentrations above the laboratory method reporting limit for toxaphene.

Duplicate samples from samples collected in Borings B1 and B4A were submitted to Acculabs, Inc., an Arizona Department of Health Services (ADHS) certified laboratory, for confirmatory analysis. The Acculabs' results were similar to the on-site laboratory (Table 1).

TABLE 1.

BORING NO.	SAMPLE DEPTH	TRANSWEST (MOBILE LABORATORY) ANALYTICAL RESULTS
B1	10 to 10.5 feet bgs	2.4 mg/Kg
B1	10.5 to 11 feet bgs	2.5 mg/Kg[2]
B2	10 to 10.5 feet bgs	<1.0 mg/Kg
B2	11.5 to 12 feet bgs	<1.0 mg/Kg
B3	9 to 9.5 feet bgs	<1.0 mg/Kg
B3	10.5 to 11 feet bgs	<1.0 mg/Kg
B4	9 to 9.5 feet bgs	<1.0 mg/Kg
B4A	5 to 5.5 feet bgs	<1.0 mg/Kg[2]
B4A[1]		<1.0 mg/Kg
B5	10 to 10.5.5 feet bgs	<1.0 mg/Kg
B5	11.5 to 12 feet bgs	<1.0 mg/Kg
B6	9 to 9.5 feet bgs	<1.0 mg/Kg
B6	11.5 to 12 feet bgs	<1.0 mg/Kg

[1]Sample was collected from cuttings from approximately 4 to 6 feet bgs.
[2] Confirmation results from Acculabs is 2.6 mg/Kg for Boring B1 and <0.3 mg/Kg for Boring B4A.

Submittals of soil samples were documented on the laboratory chain-of-custody as to sample nomenclature, sampling time, and the date. Analytical results were documented in daily preliminary result summaries and on the certified laboratory reports, which are presented as Appendix A.

Conclusions and Recommendations

Based on the results of this investigation, the lateral extent of toxaphene-impacted soil at the Site has been defined. Toxaphene concentrations above the RSRL have only been detected in borings near the south-property boundary. The analytical results indicate that the lateral extent of toxaphene between 9 and 12 feet bgs is limited to the area between the southern boundary of the Site and the south-central part of the Site.

Based on the intended use of the Site as a flood control detention basin, Brown and Caldwell recommends the following:

1. During the excavation of this area, soils from 9 to 12 feet bgs along the south-central part of the Site should be segregated and placed on plastic sheeting. Brown and Caldwell recommends that excavated soil from 9 to 12 feet bgs be placed in separate piles of up to 100 cubic yards.

2. One discrete soil sample should be collected from approximately every 100 cubic yards of soil excavated and analyzed at an ADHS-certified laboratory for toxaphene. If the analytical results are below the RSRL, then the soil can be used on the Site as fill material or removed from the Site. If the soil samples contain

toxaphene concentrations above the RSRL, then the soil pile could be remediated on site or disposed at a solid waste facility.

If you have any questions or require any additional information, please feel free to contact us at 222-4444.

Very truly yours,

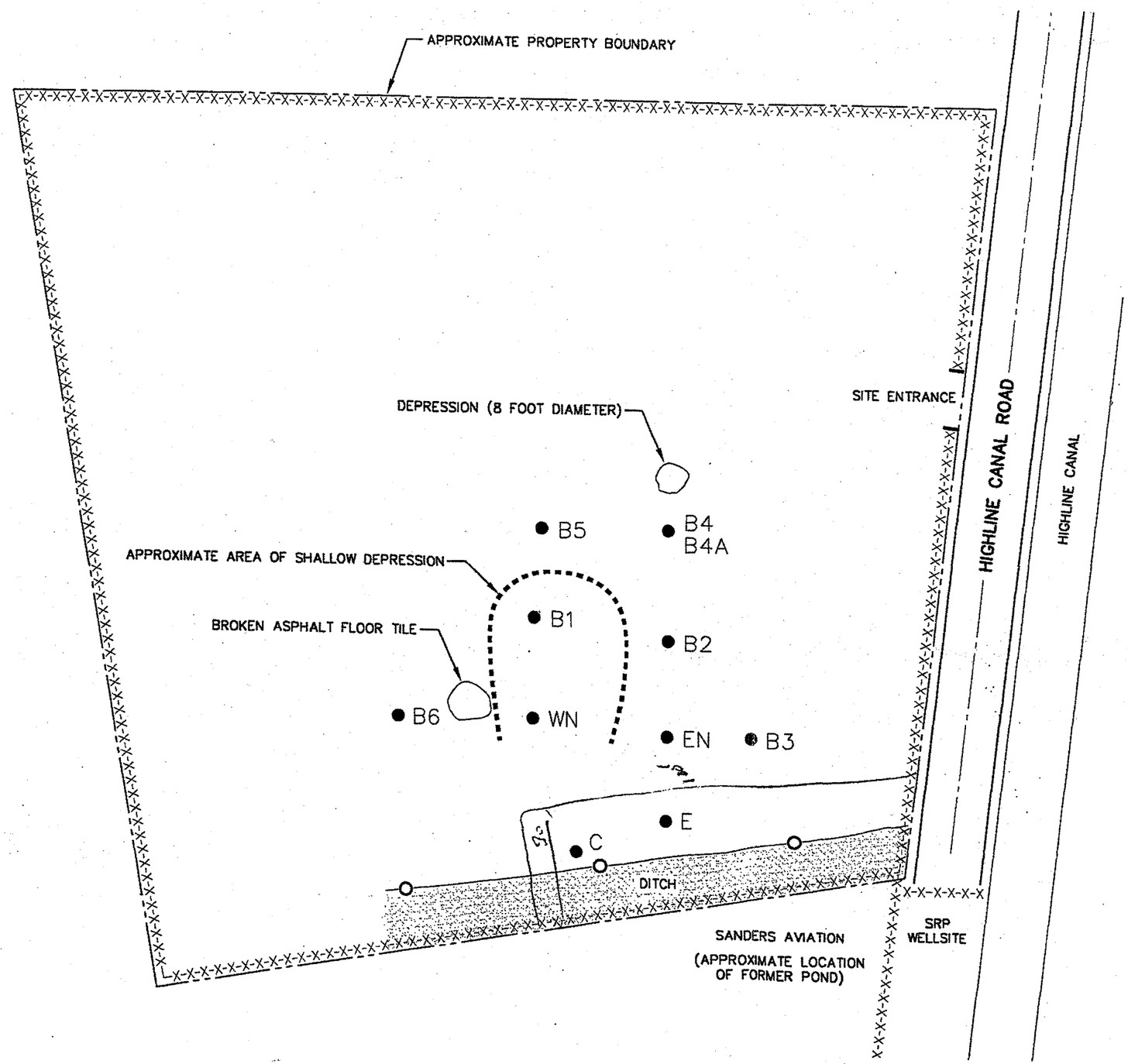
BROWN AND CALDWELL

Kevin Hebert, R.G.
Senior Project Manager

Anthony Martorana
Environmental Manager

ARM:kw
Attachments

REGISTERED GEOLOGIST
CERTIFICATE NO.
26388
KEVIN D.
HEBERT
Date Signed 2/3/99
ARIZONA U.S.A.



NOT TO SCALE

EXPLANATION

X-X-X-X-X-X-X-X	FENCELINE
● EN	SOIL BORING
○	PRELIMINARY BOREHOLE SITING

BROWN AND CALDWELL
Phoenix, Arizona

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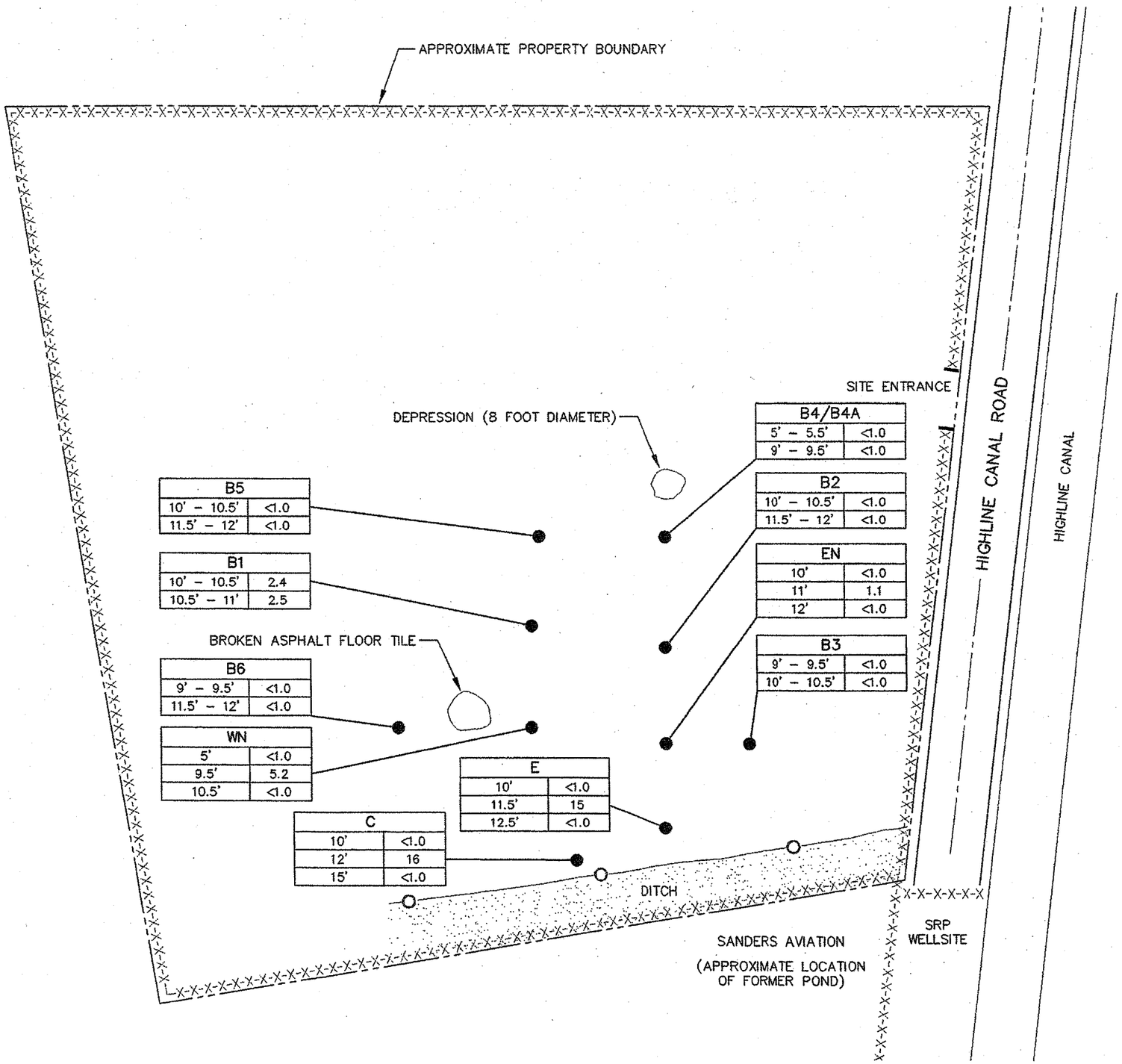
Figure 1
SOIL BORING LOCATION MAP
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY



NOT TO SCALE

EXPLANATION

X-X-X-X-X-X-X FENCELINE

● SOIL BORING

○ PRELIMINARY BOREHOLE SITING

Figure 2

TOXAPHENE CONCENTRATION IN SOILS (mg/Kg) FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

BROWN AND CALDWELL
Phoenix, Arizona

P:\Cad\ES\PRIVATE\6935\F6935007.dwg (1=1) 02-01-99 JCollier

APPENDIX A

ANALYTICAL LABORATORY REPORTS

TRANSWEST GEOCHEM

JAN - 6 1999

TGI ID: A812029

December 31, 1998

Brown and Caldwell
3636 N. Central Ave, Suite 200
Phoenix, Arizona 85012

Attention: Tony Martorana

Project Name/No: FCD-Guadalupe/16935.004
Samples Received: 12/14/98
Matrix: Soil
Mobile Lab No.: TGI05

Transwest Geochem, Inc. received and analyzed samples on the above date(s). The samples were analyzed by EPA Method 8081A-Modified, a field screening method. The results of these analyses and the quality control data are enclosed.

As part of the project, three samples were networked to Acculabs, Inc. for DDE, DDD, DDT and Toxaphene analysis by EPA Method 8081A. Acculab's final report will be forwarded as soon as it is received along with a separate invoice for the analyses.

If you have any questions or comments, please do not hesitate to contact us at (602)756-1400.

Sincerely,

Michael E. Barber
Laboratory Director

ADHS License No.: AZM133

1810 West Drake Drive • Suite 103 • Tempe, AZ 85283 • Phone (602) 756-1400 • Fax (602)756-1410

Transwest Geochem, Inc.
Analytical Results

Client Name: Brown and Caldwell
Project Name/No.: FCD-Guadalupe/16935.004
Samples Received: 12/14/98

TGI ID No.: A812029
ADHS Cert. No.: AZM133

TGI ID/ SAMPLE NUMBER	CLIENT ID	Matrix	Units	EPA Method 8081A-Modified							
				Date Extracted	Date Analyzed	Dil.	4,4'-DDE	4,4'-DDD	4,4'-DDT	Toxaphene	Sur. Rec. %
A812029 -01	G-B1-10-10.5	Soil	mg/kg	12/14/98	12/14/98	1	**0.86**	<0.05	<0.05	**2.4**	96
A812029 -02	G-B1-10.5-11	Soil	mg/kg	12/14/98	12/14/98	1	**0.98**	<0.05	<0.05	**2.5**	107
A812029 -03	G-B2-10-10.5	Soil	mg/kg	12/14/98	12/14/98	1	<0.05	<0.05	<0.05	<1.0	128
A812029 -04	G-B3-9-9.5	Soil	mg/kg	12/14/98	12/14/98	1	<0.05	<0.05	<0.05	<1.0	131
A812029 -05	G-B3-10.5-11	Soil	mg/kg	12/14/98	12/14/98	1	<0.05	<0.05	<0.05	<1.0	130
A812029 -06	G-B4-9-9.5	Soil	mg/kg	12/14/98	12/14/98	1	<0.05	<0.05	<0.05	<1.0	133
A812029 -07	G-B4a-4-6c	Soil	mg/kg	12/14/98	12/14/98	1	<0.05	<0.05	<0.05	<1.0	124
A812029 -08	G-B4a-5-5.5	Soil	mg/kg	12/14/98	12/14/98	1	**0.14**	**0.52**	<0.05	<1.0	131
A812029 -09	G-B2-11.5-12	Soil	mg/kg	12/14/98	12/14/98	1	<0.05	<0.05	<0.05	<1.0	126
A812029 -10	G-B5-10-10.5	Soil	mg/kg	12/14/98	12/14/98	1	<0.05	<0.05	<0.05	<1.0	125
A812029 -11	G-B5-11.5-12	Soil	mg/kg	12/14/98	12/14/98	1	<0.05	<0.05	<0.05	<1.0	128
A812029 -12	G-B5-9-9.5	Soil	mg/kg	12/14/98	12/14/98	1	**0.16**	<0.05	<0.05	<1.0	128
A812029 -13	G-Drum 1	Soil	mg/kg	Field Analysis not requested							
A812029 -14	G-B6-11.5-12	Soil	mg/kg	12/14/98	12/14/98	1	<0.05	<0.05	<0.05	<1.0	135

Transwest Geochem, Inc.
Analytical Quality Control Data
Reagent Blank Method 8081A-mod

Client Name:	**Brown and Caldwell**	**TGI ID No.:**	**A812029**
Project Name/No.:	**FCD-Guadalupe/16935.004**	**ADHS Cert. No.:**	**AZM133**
Samples Received:	**12/14/98**		

Units:	mg/kg
Matrix:	Soil
4,4'-DDE	<0.05
4,4'-DDD	<0.05
4,4'-DDT	<0.05
Toxaphene	<1.0
Surrogate Recovery %:	79
Date Extracted:	12/14/98
Date Analyzed:	12/14/98
Samples Linked:	A812029 -(1-12,14)

Transwest Geochem, Inc.
Analytical Quality Control Data
MS/MSD 8081A-mod

Client Name: Brown and Caldwell
Project Name/No.: FCD-Guadalupe/16935.004
Samples Received: 12/14/98

TGI ID No.: A812029
ADHS Cert. No.: AZM133

	Toxaphene
Units:	mg/kg
Matrix:	Soil
Sample Result:	2.4
Spike Amount:	5.0
Spike Result:	7.2
Percent Recovery:	96%
Duplicate Result:	7.1
Percent Recovery:	94%
RPD:	1%
Date Extracted:	12/14/98
Date Analyzed:	12/14/98
Sample Spiked:	A812029 -01
Samples Linked:	A812029 -(1-12,14)

Acculabs Inc.
Tempe
1725 W. 17th Street, Tempe AZ 85281 • 602-967-1310 • Fax 967-1019

Acculabs ID No.: 1-812-218

January 12, 1999

Transwest Geochem, Inc.
1810 W. Drake Drive, Ste. 103
Tempe, AZ 85283
Attention: Michael Barber

Project Name: FCD-Guadalupe
Project Number: A812029
Date Received: 12/15/98

This is to transmit the attached analytical report. The analytical data and information contained therein was generated using specified or selected methods contained in references, such as Test Methods for Evaluating Solid Waste, EPA SW-846, 3rd Edition.

The samples were received by Acculabs Inc. in good condition on 12/15/98.

If you should have any questions or comments regarding this report, please do not hesitate to contact me.

Sincerely,

Stewart Podolsky
Laboratory Director
ADHS License Number AZ0563

Enclosure

Acculabs Inc.

Tempe

1725 W. 17th Street, Tempe AZ 85281 • 602-967-1310 • Fax 967-1019

Acculabs I.D.: 1-812-218-01
Date Received: 12/15/98
Date Reported: 01/12/99
Date Extracted: 12/16/98

Transwest Geochem, Inc.
1810 W. Drake Drive, Ste. 103
Tempe, AZ 85283
Attention: Michael Barber

PROJECT NAME: FCD-Guadalupe
PROJECT NUMBER: A812029
SAMPLE I.D.: G-B1-10.5-11 (2)

Sample Date: 12/14/98
Sample Matrix: Soil
Units: mg/kg

RESULTS

PARAMETER	METHOD	RESULTS	DILUTION	DATE ANALYZED
4,4-DDE	8081A	0.75	20	12/31/98
4,4-DDD	8081A	< 0.050	10	12/31/98
4,4-DDT	8081A	< 0.050	10	12/31/98
Toxaphene	8081A	2.6	10	12/22/98

SURROGATE	% RECOVERY
TCMX	41
DCBP	64

Stewart Podolsky, Laboratory Director

Acculabs Inc.

Tempe

1725 W. 17th Street, Tempe AZ 85281 • 602-967-1310 • Fax 967-1019

Acculabs I.D.: 1-812-218-02

Transwest Geochem, Inc.
1810 W. Drake Drive, Ste. 103
Tempe, AZ 85283
Attention: Michael Barber

Date Received: 12/15/98
Date Reported: 01/12/99
Date Extracted: 12/16/98

PROJECT NAME: FCD-Guadalupe
PROJECT NUMBER: A812029
SAMPLE I.D.: G-B4A-5-5.5 (8)

Sample Date: 12/14/98
Sample Matrix: Soil
Units: mg/kg

RESULTS

PARAMETER	METHOD	RESULTS	DILUTION	DATE ANALYZED
4,4-DDE	8081A	1.0	40	12/31/98
4,4-DDD	8081A	0.94	10	12/31/98
4,4-DDT	8081A	< 0.050	10	12/31/98
Toxaphene	8081A	< 0.30	10	12/22/98

SURROGATE	% RECOVERY
TCMX	42
DCBP	71

Stewart Podolsky, Laboratory Director

Acculabs Inc.

Tempe 1725 W. 17th Street, Tempe AZ 85281 • 602-967-1310 • Fax 967-1019

Acculabs I.D.: 1-812-218-03

Transwest Geochem, Inc.
1810 W. Drake Drive, Ste. 103
Tempe, AZ 85283
Attention: Michael Barber

Date Received: 12/15/98
Date Reported: 01/12/99
Date Extracted: 12/16/98

PROJECT NAME: FCD-Guadalupe
PROJECT NUMBER: A812029
SAMPLE I.D.: G. Drum 1 (13)

Sample Date: 12/14/98
Sample Matrix: Soil
Units: mg/kg

RESULTS

PARAMETER	METHOD	RESULTS	DILUTION	DATE ANALYZED
4,4-DDE	8081A	0.074	2	12/31/98
4,4-DDD	8081A	< 0.010	2	12/31/98
4,4-DDT	8081A	< 0.010	2	12/31/98
Toxaphene	8081A	0.50	2	12/22/98

SURROGATE	% RECOVERY
TCMX	41
DCBP	67

Stewart Podolsky, Laboratory Director

Acculabs Inc.

QC BATCH:	P121698A

DATE EXT:	12/16/98
UNITS:	mg/Kg

METHOD 8081A-SOIL
METHOD BLANK REPORT

PARAMETER	REPORT LIMIT	RESULTS	DILUTION	DATE ANALYZED
A-BHC	0.0050	<0.0050	1	12/31/98
G-BHC (Lindane)	0.0050	<0.0050	1	12/31/98
B-BHC	0.0050	<0.0050	1	12/31/98
Heptachlor	0.0050	<0.0050	1	12/31/98
D-BHC	0.0050	<0.0050	1	12/31/98
Aldrin	0.0050	<0.0050	1	12/31/98
Heptachlor epoxide	0.0050	<0.0050	1	12/31/98
Endosulfan I	0.0050	<0.0050	1	12/31/98
4,4-DDE	0.0050	<0.0050	1	12/31/98
Dieldrin	0.0050	<0.0050	1	12/31/98
Endrin	0.0050	<0.0050	1	12/31/98
4,4-DDD	0.0050	<0.0050	1	12/31/98
Endosulfan II	0.0050	<0.0050	1	12/31/98
4,4-DDT	0.0050	<0.0050	1	12/31/98
Endrin aldehyde	0.025	<0.025	1	12/31/98
Endosulfan sulfate	0.0050	<0.0050	1	12/31/98
Methoxychlor	0.010	<0.010	1	12/31/98
Chlordane	0.020	<0.020	1	12/31/98
Toxaphene	0.030	<0.030	1	12/31/98

SURROGATE	% RECOVERY	LIMITS
TCMX	29	D-138
DCBP	73	32-151

Yu Min Shi, Organics Supervisor

Acculabs Inc.

Spiked Sample No.:	1-812-218-03	8081A-SOIL	Date Extracted: 12/16/98
QC Batch:	P121698A		Date Analyzed: 12/31/98
			Units: mg/kg

QUALITY CONTROL REPORT

		MATRIX SPIKES							LABORATORY CONTROL SAMPLE		
PARAMETER	EPA METHOD	SAMPLE RESULT	SPIKE ADDED	SPIKE RESULT	% REC	MSD RESULT	% REC	RPD	SPIKE ADDED	LCS RESULT	% REC
G-BHC (Lindane)	8081A	<0.010	0.017	0.00824	48	0.00948	56	14	0.017	0.00941	55
Heptachlor	8081A	<0.010	0.017	0.00764	45	0.00826	49	8	0.017	0.00852	50
Aldrin	8081A	<0.010	0.017	0.00788	46	0.00864	51	9	0.017	0.00905	53
Dieldrin	8081A	<0.010	0.017	0.0179	105	0.0202	119 M	12	0.017	0.0116	68
Endrin	8081A	<0.010	0.017	0.0199	117 M	0.0210	124 M	5	0.017	0.0118	69
4,4-DDT	8081A	<0.010	0.017	0.0177	104	0.0199	117 M	12	0.017	0.0120	71

Yu Min Shi, Organics Supervisor

APPENDIX "C"

SOIL BORING LOGS

APPENDIX "C"

SOIL BORING LOGS

SPEEDIE
AND ASSOCIATES

Geotechnical ▪ Environmental ▪ Materials Engineers

SPEEDIE
AND ASSOCIATES

Geotechnical
Environmental
Materials Engineers

Gregg A. Creaser, P.E.
Brett P. Creaser, P.E.
Donald L. Cornelison, P.E.
Steven A. Griess, P.E.
Prabhakar (Peter) Rupal, P.E.
Timothy J. Rheinschmidt, R.G.
James A. Speedie, P.E.

REPORT ON GEOTECHNICAL INVESTIGATION

DESIGNATION: Guadalupe Drainage Improvement Project

LOCATION: Highline Canal, Baseline Rd. to Elliot Rd.
Guadalupe, Arizona

CLIENT: Sverdrup Civil, Inc.

PROJECT NO: 990906SB

DATE: October 31, 2001

Registered Professional Engineer (Civil)
CERTIFICATE NO.
14388
GREGG ALAN
CREASER
Date Signed 10.31.01
ARIZONA, U.S.A.

3331 East Wood Street ■ Phoenix, AZ 85040
Phone 602-997-6391 ■ Fax 602-943-5508 ■ www.speedie.net

SPEEDIE ANDASSOCIATES

TABLE OF CONTENTS

1.0 INTRODUCTION 1

2.0 GENERAL SITE AND SOIL CONDITIONS 1

2.1 Site Conditions 1
2.2 General Subsurface Conditions 2

3.0 ANALYSIS AND RECOMMENDATIONS 2

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3.9 Asphalt Pavement 8
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APPENDIX A
APPENDIX B – 990906SA
APPENDIX C – Agronomy Tests

Registered Professional Engineer (Civil)
CERTIFICATE NO.
14388
GREGG ALAN
CREASER
Date Signed 10-31-01
ARIZONA, U.S.A.

1.0 INTRODUCTION

This report presents the results of a subsoil investigation carried out at the site of the proposed Guadalupe Drainage Improvement Project, which extends from the Highline Canal at Avenida del Yaqui to Elliot Road, in Guadalupe, Arizona.

Preliminary information calls for the construction of three new storm water retention basins and a system of storm drain pipeline and catch basins throughout town. Each basin will be equipped with dry well(s) for disposal. Additionally, recreational improvements are proposed for each basin. The proposed improvements range from a small practice field to baseball fields, volleyball and basketball courts, ramadas and restroom facilities.

The original design called for a conveyance system to be located adjacent to Highline Canal. That planned system has been abandoned. Speedie & Associates conducted an investigation for the original plan, issuing a draft report under project number 990606SA. The field and laboratory data from that original report, as well as a supplementary investigation conducted for the Flood Control District in the north basin, is included as Appendix B of this report. The recommendations made in this report are based on the field and laboratory data obtained from both investigations.

Supplementary to this investigation was an additional investigation to sample soils from the proposed retention basins and perform agronomy tests. This information from this investigation is included in Appendix C.

2.0 GENERAL SITE AND SOIL CONDITIONS

2.1 Site Conditions

As indicated, the project consists of four retention basins with connecting pipelines and catch basins. The basins are identified as the North, Tempe, Central and South basins. They are located at Avenida Del Yaqui and Calle Cerrito, Oxford Drive and Beck Avenue, Guadalupe Road and the Highline Canal, and Calle Vauo Nawi south of Calle Jimenez, respectively. All four basin locations are relatively flat and contain sparse vegetation ranging from low lying grasses to small trees. The Tempe Basin has a considerable amount of dumped soil on the east side of the basin.

The connecting pipeline/catch basins are generally located within the residential community. The roadways are typically paved with asphalt concrete. Along the south and west sides of the Highline Canal there is a graded dirt service road.

2.2 General Subsurface Conditions

Subsoil conditions are variable along the alignments. The subsoils in general consist of medium dense to very dense silty sands and clayey sands to very stiff to hard sandy clays. Subordinate amounts of gravel and calcareous cementation were reported, generally increasing with depth. Locally, this cementation may result in rock-like conditions. Two deeper borings conducted in the north retention basin did encounter auger refusal on cobbles/small boulders between 26 and 30 feet deep. This is most likely attributed to a colluvial fan from the nearby South Mountains. Shallow bedrock was present in the additional borings drilled in the south end of the north basin.

Standard Penetration Test values generally range from 5 to 50+ blows per foot (bpf), with the majority ranging from 15 to 50+ bpf. No groundwater was encountered during this investigation, and there was no indication of leakage from the adjacent canal at the locations drilled. Laboratory testing indicates in-situ dry densities of the upper soils on the order of 96 to 110 pcf at about 3 to 15 percent moisture at the time of investigation. Liquid limits are in the 22 to 52 percent range with plasticity indices ranging from 1 to 29 percent. The upper clayey soils exhibit volume increase due to wetting of up to 4 percent when recompacted to moistures and densities normally expected during construction. Undisturbed samples displayed additional compression due to inundation under a maximum load of 2,200 psf

3.0 ANALYSIS AND RECOMMENDATIONS

3.1 Analysis

In general, construction of this project should be relatively straightforward. Excavation of the basins and/or pipeline may be accomplished with conventional excavation equipment. The cemented soils may require use of heavier equipment on a localized basis. The more heavily cemented soils and shallow rock in the north basin may require rock removal techniques depending on depth. The fact that a boring was advanced to a particular depth does not mean it can be readily excavated. The contractor(s) must make their own evaluation based on the type of equipment they intend to use and the geometry of the excavation.

The presence of cobbles/boulders and possible shallow bedrock in the north basin may impede excavation progress and functionality of the proposed dry well. Regional ground water is not expected to be a factor in the design or construction of shallow foundations and underground utilities.

Two samples from the south basin were submitted for pesticide analysis due the past use of the site. Both samples indicated 'non-detect' values for common pesticides. Samples were also submitted for agronomy analysis. The results of that analysis are attached in Appendix B. A supplementary

investigation was conducted to collect additional soil samples from the proposed retention basins and perform agronomy/fertility tests. This information from this investigation is included in Appendix C.

There are some locations along the canal where there are structure encroachments that may affect pipeline installation. In some instances, these encroachments consist of temporary or minor structures such as trailers, shed and/or patios. It may be possible to relocate and/or remove and replace these interferences at a cost less than providing temporary support. Typically, temporary support will likely be required for any excavation that encroaches on a zone defined by a 45 degree line drawn down and away from the ground surface of a building wall. Secondly, the soils are relatively loose in the area along the canal, possibly requiring unbraced slopes as flat as 1½:1. Slopes this flat would undermine these structures. Temporary building support can include standard underpinning, helical piers, or top down excavation such as Soil Nail walls. It is recommended that the contractor be required to submit a plan for building support for these identified areas, since the underpinning detail will depend on the contractors means and methods of excavating. The contractor should also be required to provide a pre-construction survey of any structure that may be affected by proposed construction to avoid damage claims. For the canal, it may be possible to install temporary piping that will allow the required irrigation water to flow past the area being excavated or tunneled under thereby reducing the risk for embankment failure and flooded trenches.

The swell potential of the upper clayey soils is a concern. The potential is usually strong enough to cause differential movements of slabs-on-grade such as floors and sidewalks but not enough to cause damage to structures. Accordingly, attention must be paid to provide proper drainage to limit the potential for water infiltrating under slabs. A minimum slope of at least 5 percent for a distance of 10 feet is recommended for unpaved landscaped areas. Typical recommendations to reduce the swell potential include reducing the compaction requirements and requiring higher moisture contents during pad preparation and requiring at least one foot of non-expansive material to be placed directly beneath the building slabs and slabs contiguous to the structure such as sidewalks.

For exterior slabs-on-grade, frequent jointing is recommended to control cracking and reduce tripping hazards should differential movement occur. It is also recommended to pin the landing slab to the building floor/stem wall. This will reduce the potential for the exterior slab lifting and blocking the operation of outswinging doors. Pinning typically consists of 24 inch long No. 4 reinforcing steel dowels placed at 12-inch centers.

3.2 Site Preparation

The entire area to be occupied by the proposed construction should be stripped of all vegetation, debris, rubble and obviously loose surface soils.

If grading plans require placing structural fill for small surface structures (restrooms, ramadas, etc.), the existing (exposed) grade should be scarified to a depth of 8 inches, moisture conditioned to optimum (±2 percent) and compacted to at least 95 percent of maximum dry density as determined by ASTM D-698. Cut areas and pavement areas should be treated in a similar manner.

For below grade structures such as box culverts, excavations should be cut to grade, carefully removing any remaining loose soils, similar to any other foundation excavation. Inadvertent over-excavation should be filled with lean grout or concrete.

3.3 Excavation And Temporary Cut Slopes

All excavations must comply with current governmental regulations including the current OSHA Excavation and Trench Safety Standards. Side slopes for open-cut excavation in fill material should be cut back at 1.5:1 (horizontal to vertical). Excavation in the native, dense clayey soils maybe cut back at 1:1 or as steep as ¾:1 in cemented soils. Slopes need to be evaluated by the contractors qualified person(s) on a case by case basis along the trench alignment. The slopes should be protected from erosion due to run-off or long term surcharge at the slope crest. Construction equipment, building materials, excavated soil and vehicular traffic should not be allowed within 10 feet or a distance equal to the slope height, whichever is greater, from the top of slope. All cut slopes should be observed by the qualified person during excavation. Adjustments to the recommended slopes may be necessary due to wet zones, loose strata and conditions not observed in the borings. Localized shoring may also be required. Shotcrete or soil stabilizer on the slope face may be useful in preventing erosion due to run-off and/or drying of the slope. Of considerable concern would be excavations against/under the Canal where trench backfill is encountered. This could create a preferred drainage path that may pipe or "blowout", flooding the excavation.

3.4 Foundation Design

It is recommended that surface structures be founded on shallow spread footings bearing on undisturbed native soil, or on properly compacted fill, at a minimum depth of 18 inches below lowest finished exterior grade within 5 feet of the structure. If site preparation is carried out as set forth herein, a recommended allowable bearing capacity of 2,000 psf can be utilized for design. For below grade structures such as box culverts, an allowable bearing capacity of 10,000 psf may be used for foundations bearing on dense soils at a depth of at least 8 feet below existing grade. The upstream and downstream edges should have turn-down cut-off walls that extend below the design scour and/or stream bed degradation elevation.

These bearing capacities refer to the total of all loads, dead and live, and are net pressures. They may be increased one-third for wind, seismic or other loads of short duration. All footing excavations should be level and cleaned of all loose or disturbed materials.

Although borings were not advanced to 100 feet, based on the nature of the subsoils encountered in the borings and geology in the area, Soil Profile Type, S_C, (Table 16-J, 1997 UBC) may be used for design of the structures.

Continuous wall footings and isolated rectangular footings should be designed with minimum widths of 16 and 24 inches respectively, regardless of the resultant bearing pressure. Lightly loaded interior partitions (less than 800 plf) may be supported on reinforced thickened slab sections (minimum 12 inches of bearing width).

Estimated settlements under design loads are on the order of 0.5 to 1-inch, virtually all of which will occur during construction. Post-construction differential settlements will be negligible, under existing and compacted moisture contents. Additional localized settlements of the same magnitude or more could occur when the native supporting soils experience a significant increase in moisture content.

Continuous footings and stem walls should be reinforced to distribute stresses arising from small differential movements, and long walls should be provided with control joints to accommodate these movements. Reinforcement and control joints are suggested to allow slight movement and prevent minor uncontrolled floor slab cracking.

3.5 Lateral Pressures

The following lateral pressure values may be utilized for the proposed construction:

Active Pressure	
Unrestrained Walls	35 pcf
Restrained Walls	60 pcf
Passive Pressure	
Continuous Footings or Drilled Piers	300 pcf
Spread Footings or Drilled Piers	350 pcf
Coefficient of Friction *(With Passive Pressure)*	0.35
Coefficient of Friction *(Without Passive Pressure)*	0.45

All backfill must be compacted to not less than 95 percent (ASTM D-698) to mobilize these passive values at low strain. Expansive soils should not be used as retaining wall backfill, except as a surface seal to limit infiltration of storm/irrigation water. The expansive pressures could greatly increase active pressures.

3.6 Fill And Backfill

Native soils are considered suitable for use in general grading fills depending on location and classification. Expansion tests were conducted on selected upper soils. These samples indicate that the upper clayey soils possess a swell potential that could be detrimental to slabs on grade. Tests on the sandier soils indicate that they are suitable for use directly beneath concrete slabs. Accordingly, it is recommended to place at least 12 inches of native soil from the excavations with a silty sand (SM) classification (or SC with plasticity index less than 15) directly under slabs on grade in addition to the prescribed aggregate base. In lieu of selectively stockpiling soils cut from the basins for this use, an approved import may be used.

If imported common fill for use in site grading is used, it should be examined by a Soils Engineer to ensure that it is of low swell potential and free of organic or otherwise deleterious material. In general, the fill should have 100 percent passing the 3-inch sieve and no more than 60 percent passing the 200 sieve. For the fine fraction (passing the 40 sieve), the liquid limit and plasticity index should not exceed 30 percent and 10 percent, respectively. It should exhibit less than 1.5 percent swell potential when compacted to 95 percent of maximum dry density (ASTM D-698) at a moisture content of 2 percent below optimum, confined under a 100 psf surcharge, and inundated.

No mater how well compacted, post construction settlement of fine grained soil fill can occur behind retaining walls including box culvert walls. Typical values on the order of several percent of the fill height are possible if the fill is subjected to saturation. Accordingly, if there are any critical areas where this settlement cannot be tolerated, well graded granular fill or lean grout fills should be considered.

Fill should be placed on subgrade which has been properly prepared and approved by a Soils Engineer. Fill must be wetted and thoroughly mixed to achieve optimum moisture content, ±2 percent (optimum moisture content to +3 percent underslabs). Fill should be placed in horizontal lifts of 8-inch thickness (or as dictated by compaction equipment) and compacted to the percent of maximum dry density per ASTM D-698 set forth as follows:

A.	Building Areas		
	1.	Below footing level	95
	2.	Below slabs-on-grade (non-expansive soils)	95
	3.	Below slabs-on-grade (expansive soils) (not recommended within 12 inches of slabs on grade)	90 to 95(max)
B.	Pavement Subgrade or Fill		95
C.	Utility Trench Backfill		
	1.	More than 2.0' below finish S/G	90
	2.	Within 2.0' of finish S/G	95
D.	Aggregate Base Course		
	1.	Below floor slabs	95
	2.	Below asphalt paving	100
E.	Landscape Areas		
	1.	Miscellaneous fill	90
	2.	Utility trench - more than 1.0' below F/G	85
	3.	Utility trench - within 1.0' of F/G	90

3.7 Utilities Installation

Excavation operations should be relatively straightforward although the presence of very dense soils and calcareous cementation may impede progress and possibly require the use of heavier equipment. **It should be noted that the fact that a boring was advanced to a particular depth should not lead to the assumption that it is necessarily excavatable by conventional means.** Very dense and/or cemented conditions may require more aggressive/rock removal techniques. The responsible contractors should review the boring logs and make their own assessment as to methods and means of excavation.

Waist-high trench walls should stand near-vertical for the short periods of time required to install shallow utilities although some sloughing may occur in looser and/or sandier soils requiring laying back of side slopes and/or temporary shoring. Adequate precautions must be taken to protect workmen in accordance with all current governmental regulations.

Backfill of trenches may be carried out with native excavated material outside of the pipe bedding zone. Pipe bedding should be selected based on materials and trench loading conditions. This material should be moisture-conditioned, placed in 8-inch lifts and mechanically compacted. Water settling is not recommended. Compaction requirements are summarized in the "Fill And Backfill" section of this report.

3.8 Corrosion Protection

Resistivity and pH tests were conducted for corrosion potential evaluation. The pH values range from 8.1 to 9.4 (7.8 to 9.1 in the original investigation), while the resistivity values are on the order of 480 to 3,600 ohm-cm (138 to 5,368 ohm-cm in the original). These values indicate that the subsoils are severe to moderately corrosive and will require appropriate protection depending on pipe materials and life expectancy.

3.9 Asphalt Pavement

If earthwork and backfill in paved areas is carried out to finish subgrade elevation as set forth herein, the subgrade will provide adequate support for pavements.

In general, it is recommended to replace the pavement cut for trenches with an equivalent section. For new pavement areas to be used primarily for low volume passenger traffic and parking, our experience in the area indicates that a minimum of 2.0 inches of asphalt over 4.0 inches of aggregate base course will provide satisfactory service. An equivalent full depth asphalt pavement section would be 3.5 inches thick. This basically matches the pavement section encountered in the residential streets. Heavy-duty areas subject to occasional, low volume truck traffic should be 3.0 inches of asphalt over 6.0 inches of base.

This assumes that all subgrades are prepared in accordance with the recommendations contained in the "Site Preparation" and "Fill and Backfill" sections of this report, and paving operations carried out in a proper manner. If pavement subgrade preparation is not carried out immediately prior to paving, the entire area should be proof-rolled at that time with a heavy pneumatic-tired roller to identify locally unstable areas for repair.

Pavement base course material should be aggregate base per M.A.G. Section 702 Specifications. Asphalt concrete materials and mix design should conform to M.A.G. 710. It is recommended that a 12.5mm or 19.0mm mix designation be used for the pavements. While a 19.0mm mix may have a somewhat rougher texture, it offers more stability and resistance to scuffing, particularly in truck turning areas. Pavement installation should be carried out under applicable portions of M.A.G. Section 321 and municipality standards. The asphalt supplier should be informed of the pavement use and required to provide a mix that will provide stability and be aesthetically acceptable. Some of the newer M.A.G. mixes are very coarse and could cause placing and finish problems. A mix design should be submitted for review to determine if it will be acceptable for the intended use.

3.10 Percolation Tests

Percolation tests were performed in three of the proposed retention basins in 12-inch diameter borings. The bottoms of the borings were located at an approximate depth equivalent to the proposed depth of the retention basins. The depth below ground surface (bgs) is indicated in the table. Each of the borings was presoaked at least 18 hours prior to conducting the test. Table 3.10 presents stabilized percolation rates that were achieved.

TABLE 3.10 – PERCOLATION TESTS

Location/Depth	Stabilized Percolation Rate	
	minutes/inch	cu ft/hour/sq ft of drainage area
North Basin B-7/14 ft. bgs	18	0.3
Central Basin B-4/14.5 ft. bgs	10	0.5
South Basin B-6/14 ft. bgs	10	0.5
Tempe Basin P-1/9 ft. bgs	2	2.5
Tempe Basin P-2/4 ft. bgs	3	1.6

The rates were achieved with an 10-inch to 12-inch head of water. Based on the soil classifications, these rates will deteriorate over time.

4.0 GENERAL

The scope of this investigation and report does not include regional considerations such as seismic activity and ground fissures resulting from subsidence due to groundwater withdrawal, nor any considerations of hazardous releases or toxic contamination of any type.

Our analysis of data and the recommendations presented herein are based on the assumption that soil conditions do not vary significantly from those found at specific sample locations. Our work has been performed in accordance with generally accepted engineering principles and practice; this warranty is in lieu of all other warranties expressed or implied.

We recommend that a representative of the Soils Engineer observe and test the earthwork and foundation portions of this project to ensure compliance to project specifications and the field applicability of

subsurface conditions which are the basis of the recommendations presented in this report. If any significant changes are made in the scope of work or type of construction that was assumed in this report, we must review such revised conditions to confirm our findings if the conclusions and recommendations presented herein are to apply.

Respectfully submitted,
SPEEDIE & ASSOCIATES, INC.

Keith R. Gravel, E.I.T.

Registered Professional Engineer (Civil)
CERTIFICATE NO.
14388
GREGG ALAN
CREASER
Date Signed 10-31-01
ARIZONA, U.S.A.

Gregg A. Creaser, P.E.

APPENDIX A

FIELD AND LABORATORY INVESTIGATION

SOIL BORING LOCATION PLANS

SOIL LEGEND

LOG OF TEST BORINGS

TABULATION OF TEST DATA

CONSOLIDATION TEST

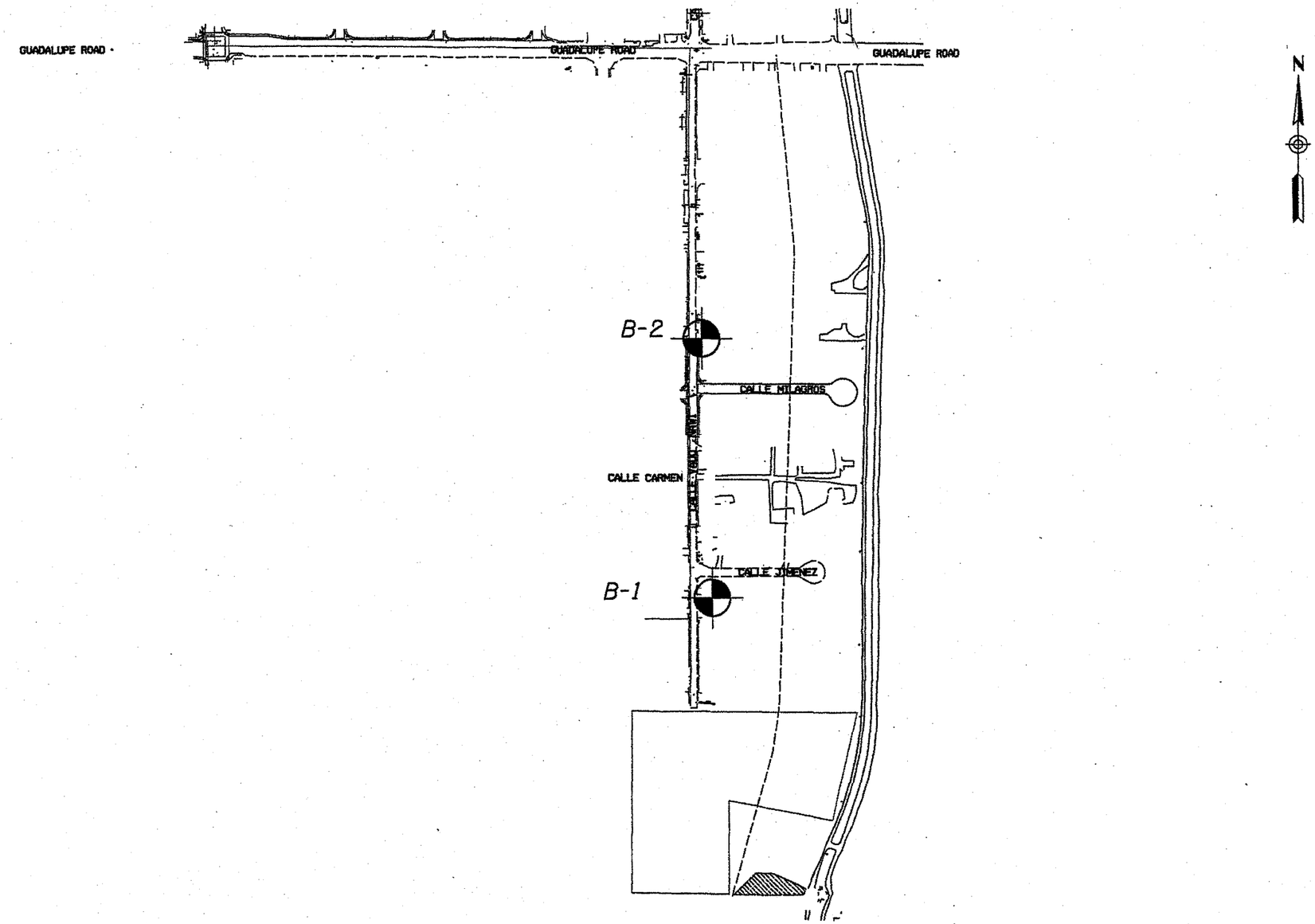
MOISTURE-DENSITY RELATIONS

SWELL TEST DATA

FIELD AND LABORATORY INVESTIGATION

From March 8 and 9, 2001 soil test borings were drilled at the approximate locations shown on the attached Soil Boring Location Plans. All exploration work was carried out under the full-time supervision of our staff geologist, who recorded subsurface conditions and obtained samples for laboratory testing. The soil borings were advanced with truck-mounted CME-75 drill rig utilizing 7-inch diameter hollow stem flight augers. Detailed information regarding the borings and samples obtained can be found on an individual Log of Test Boring prepared for each drilling location. Shallow percolation tests were conducted for storm water retention basin design parameters.

Laboratory testing consisted of moisture content, dry density, grain-size distribution and plasticity (Atterberg Limits) tests for classification and pavement design parameters. Remolded swell tests were performed on samples compacted to densities and moisture contents expected during construction. Compression tests were performed on a selected ring sample in order to estimate settlements and determine effects of inundation. All field and laboratory data is presented in this appendix.



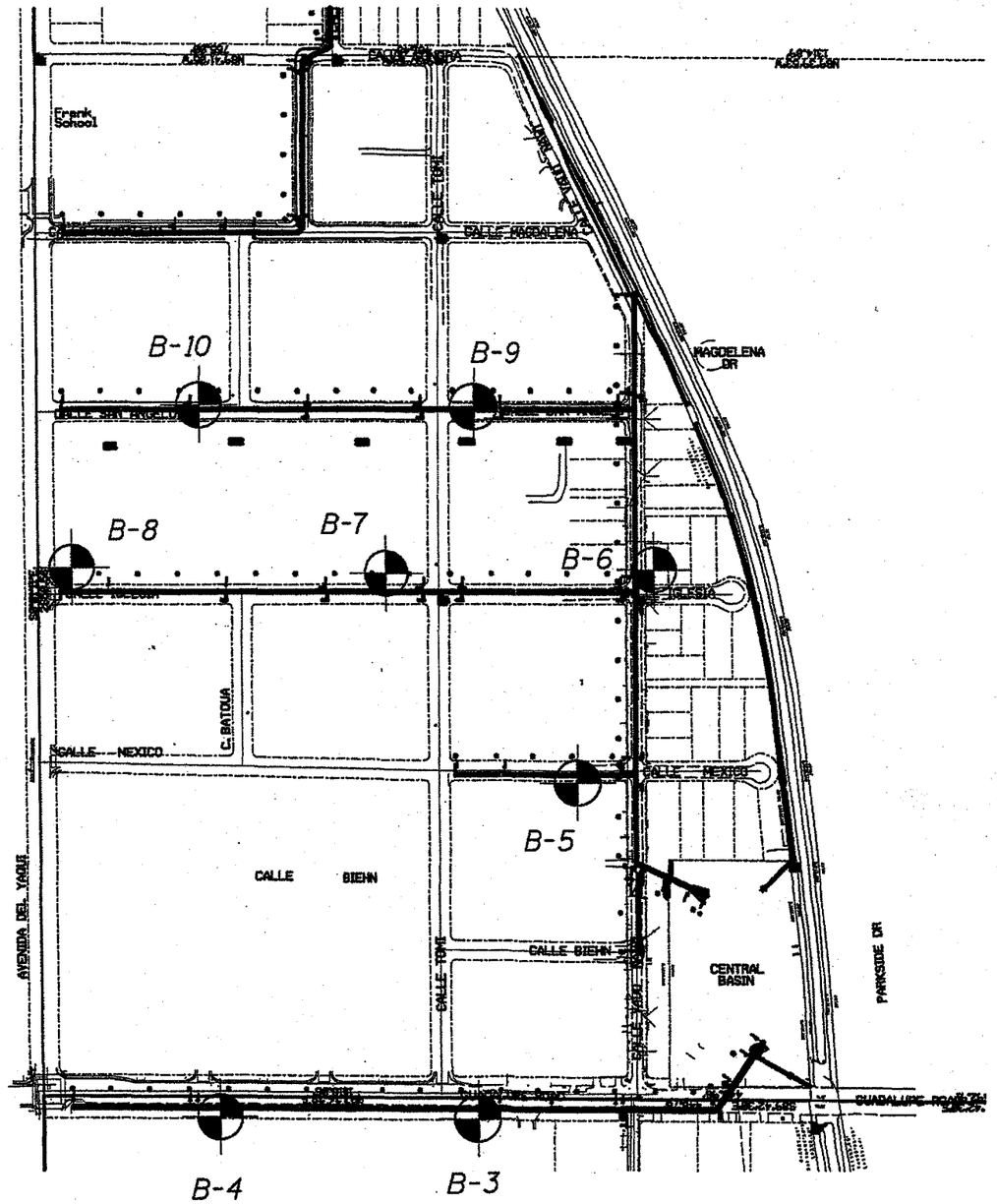
- APPROXIMATE SOIL BORING LOCATION

SOIL BORING LOCATION PLAN

GUADALUPE DRAINAGE IMPROVEMENTS
GUADALUPE & AVENDIA DEL YAQUI
GUADALUPE, ARIZONA

SPEEDIE AND ASSOCIATES
GEOTECHNICAL/ENVIRONMENTAL/MATERIALS ENGINEERS
11029 N. 24th AVE., SUITE 805 PHOENIX, ARIZONA 85029 (602) 997-6391

DES:	DR: CMW	CHK: GC	DATE: 03-28-01	PROJ. NO.: 990906SB



N

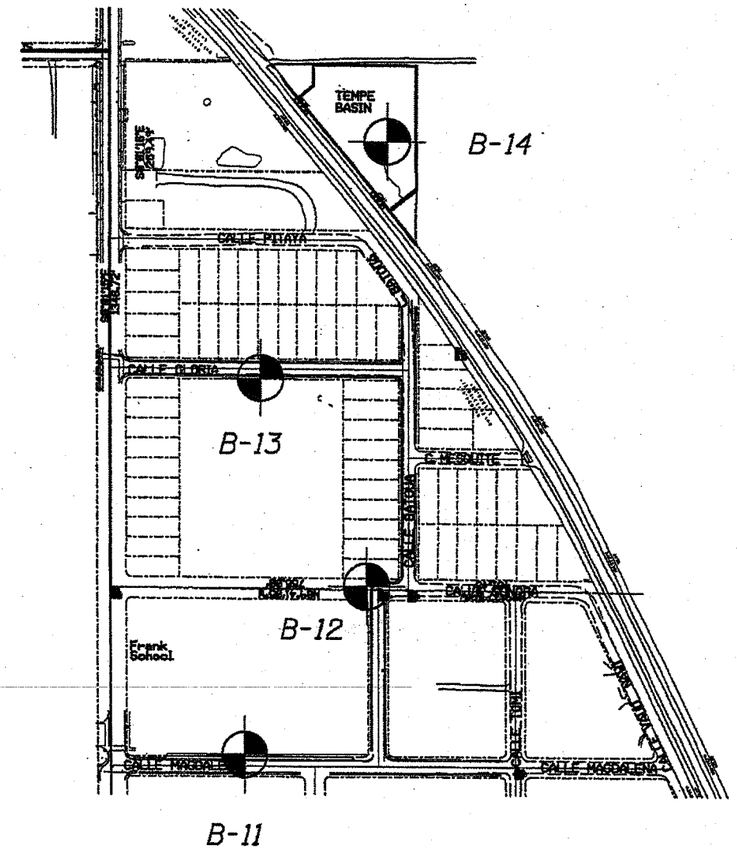
- APPROXIMATE SOIL BORING LOCATION

SOIL BORING LOCATION PLAN

GUADALUPE DRAINAGE IMPROVEMENTS
GUADALUPE & AVENDIA DEL YAQUI
GUADALUPE, ARIZONA

SPEEDIE AND ASSOCIATES
GEOTECHNICAL/ENVIRONMENTAL/MATERIALS ENGINEERS
11029 N. 24th AVE., SUITE 605 PHOENIX, ARIZONA 85029 (602) 997-6391

DES:	DR: CMW	CHK: GC	DATE: 03-28-01	PROJ. NO.: 990906SB



N

- APPROXIMATE SOIL BORING LOCATION

SOIL BORING LOCATION PLAN

GUADALUPE DRAINAGE IMPROVEMENTS
GUADALUPE & AVENDIA DEL YAQUI
GUADALUPE, ARIZONA

SPEEDIE AND ASSOCIATES
GEOTECHNICAL/ENVIRONMENTAL/MATERIALS ENGINEERS
11029 N. 24th AVE., SUITE 805 PHOENIX, ARIZONA 85029 (602) 997-6391

DES:	DR: CMW	CHK: GC	DATE: 03-28-01	PROJ. NO.: 990906SB

SOIL LEGEND

SAMPLE DESIGNATION		DESCRIPTION	
	AS	**Auger Sample**	A grab sample taken directly from auger flights.
	BS	**Large Bulk Sample**	A grab sample taken from auger spoils or from bucket of backhoe.
	S	**Spoon Sample**	Standard Penetration Test (ASTM D-1586) Driving a 2.0 inch outside diameter split spoon sampler into undisturbed soil for three successive 6-inch increments by means of a 140 lb. weight free falling through a distance of 30 inches. The cumulative number of blows for the final 12 inches of penetration is the Standard Penetration Resistance.
	RS	**Ring Sample**	Driving a 3.0 inch outside diameter spoon equipped with a series of 2.42-inch inside diameter, 1-inch long brass rings, into undisturbed soil for one 12-inch increment by the same means of the Spoon Sample. The blows required for the 12 inches of penetration are recorded.
	LS	**Liner Sample**	Standard Penetration Test driving a 2.0-inch outside diameter split spoon equipped with two 3-inch long, 3/8-inch inside diameter brass liners, separated by a 1-inch long spacer, into undisturbed soil by the same means of the Spoon Sample.
	ST	**Shelby Tube**	A 3.0-inch outside diameter thin-walled tube continuously pushed into the undisturbed soil by a rapid motion, without impact or twisting (ASTM D-1587).
	--	**Continuous Penetration Resistance**	Driving a 2.0-inch outside diameter "Bullnose Penetrometer" continuously into undisturbed soil by the same means of the spoon sample. The blows for each successive 12-inch increment are recorded.

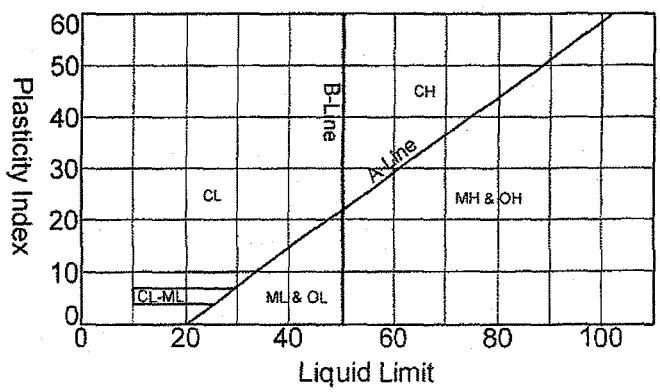
CONSISTENCY			RELATIVE DENSITY	
Clays & Silts	Blows/Foot	Strength (tons/sq ft)	Sands & Gravels	Blows/Foot
Very Soft	0 - 2	0 - 0.25	Very Loose	0 - 4
Soft	2 - 4	0.25 - 0.5	Loose	5 - 10
Firm	5 - 8	0.5 - 1.0	Medium Dense	11 - 30
Stiff	9 - 15	1 - 2	Dense	31 - 50
Very Stiff	16 - 30	2 - 4	Very Dense	> 50
Hard	> 30	> 4		

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	SAND AND SANDY SOILS	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL OR MODIFIED SYMBOLS MAY BE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS OR TO PROVIDE A BETTER GRAPHICAL PRESENTATION OF THE SOIL

MATERIAL SIZE	PARTICLE SIZE Lower Limit mm	Lower Limit Sieve Size ♦	Upper Limit mm	Upper Limit Sieve Size ♦
SANDS				
Fine	0.075	#200	0.42	#40
Medium	0.420	#40	2.00	#10
Coarse	2.000	#10	4.75	#4
GRAVELS				
Fine	4.75	#4	19	0.75" ×
Coarse	19	0.75" ×	75	3" ×
COBBLES	75	3" ×	300	12" ×
BOULDERS	300	12" ×	900	36" ×

♦U.S. Standard ×Clear Square Openings



Rig Type: CME-75
Boring Type: Hollow Stem Auger
Surface Elevation: N/A

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 – 25 – 50)
0	Very Loose Brown SILTY SAND (SM-Moist) With Roots					
2.0	Medium Dense to Dense Brown CLAYEY SAND (SC-Moist) with Weak Calcareous Cementation	S-1	2.5	NT	NT	
		RS-2	6.0	7.8	101.6	
8.5	Medium Dense to Very Dense Light Brown SILTY SAND (SM-Dry) with Moderate to Strong Calcareous Cementation					
		S-3	11.5	NT	NT	69/12"
16.5	End of Boring	S-4	16.5	NT	NT	

Boring Date: 3-8-01
Field Engineer/Technician: M. Polsky
Driller: B. Freeman
Contractor: Heber Mining

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B- 1

Guadalupe Drainage Improvements

Baseline to Elliot Roads

Guadalupe, Arizona

Project No.: 990906SB

_SPEEDIE 990906SB.GPJ GENGEO.GDT 3/27/01

Rig Type: **CME-75**
Boring Type: **Hollow Stem Auger**
Surface Elevation: **N/A**

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 – 25 – 50)
0	3" Asphalt on 2" to 3" Aggregate Base (0.5)					
	Medium Dense to Dense Brown CLAYEY SAND (SC-Dry to Moist)	S-1	2.5	NT	NT	
		BS-2	5.0	NT	NT	
5	with Weak to Moderate Calcareous Cementation	S-3	6.5	NT	NT	
	(9.0)					
10	Very Dense Brown SILTY SAND (SM-Dry) with Moderate Calcareous Cementation	S-4	11.5	NT	NT	74/12"
15	(16.5)	S-5	16.5	NT	NT	81/12"
	End of Boring					
20						
25						
30						

Boring Date: **3-8-01**
Field Engineer/Technician: **M. Polsky**
Driller: **B. Freeman**
Contractor: **Heber Mining**

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: **B- 2**

Guadalupe Drainage Improvements

Baseline to Elliot Roads

Guadalupe, Arizona

Project No.: **990906SB**

SPEEDIE 990906SB.GPJ GENGEO.GDT 3/27/01

Rig Type: **CME-75**
Boring Type: **Hollow Stem Auger**
Surface Elevation: **N/A**

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)
0	3" Asphalt on 4" Aggregate Base (0.6)				
	Medium Dense Brown CLAYEY SAND (SC-Dry)	S-1	2.5	NT	NT
5		S-2	6.5	NT	NT
	(8.0)				
	Dense Light Brown SILTY SAND (SM-Dry) with Weak to Moderate Calcareous Cementation				
10		S-3	11.5	NT	NT
	(12.5)				
	Hard Brown SANDY SILT (ML-Dry) with Weak Calcareous Cementation				
15	(16.5)	S-4	16.5	NT	NT
	End of Boring				
20					
25					
30					

Penetration Resistance Blows per Foot (0, 25, 50)

Boring Date: **3-9-01**
Field Engineer/Technician: **M. Polsky**
Driller: **H. Usery**
Contractor: **Heber Mining**

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: **B- 3**

Guadalupe Drainage Improvements

Baseline to Elliot Roads

Guadalupe, Arizona

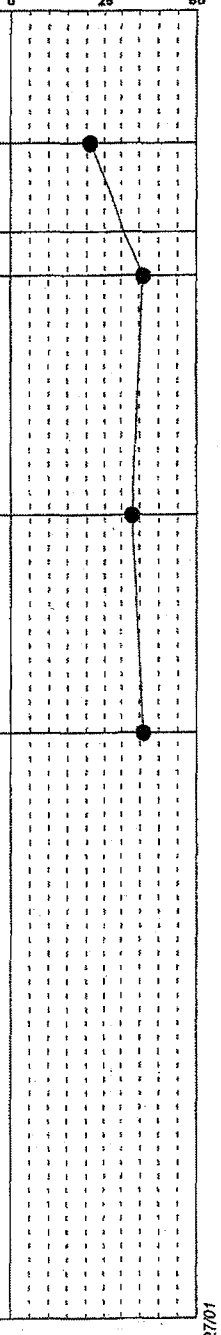
Project No.: **990906SB**

_SPEEDIE 990906SB.GPJ GENGEO.GDT 3/27/01

Rig Type: **CME-75**
Boring Type: **Hollow Stem Auger**
Surface Elevation: **N/A**

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)
0	4" Asphalt on 8" Aggregate Base				
1.0	Medium Dense to Dense Brown CLAYEY SAND (SC-Dry)	S-1	3.0	NT	NT
		BS-2	5.0	NT	NT
5		RS-3	6.0	NT	NT
8.0	Dense Light Brown SILTY SAND (SM-Dry) With Clay and Weak Calcareous Cementation				
10		S-4	11.5	NT	NT
12.5	Hard Light Brown SANDY SILT (ML-Dry) with Weak Calcareous Cementation				
15					
16.5	End of Boring	S-5	16.5	NT	NT
20					
25					
30					

Penetration Resistance Blows per Foot (0 – 25 – 50)



Boring Date: **3-9-01**
Field Engineer/Technician: **M. Polsky**
Driller: **H. Usery**
Contractor: **Heber Mining**

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: **B- 4**

Guadalupe Drainage Improvements

Baseline to Elliot Roads

Guadalupe, Arizona

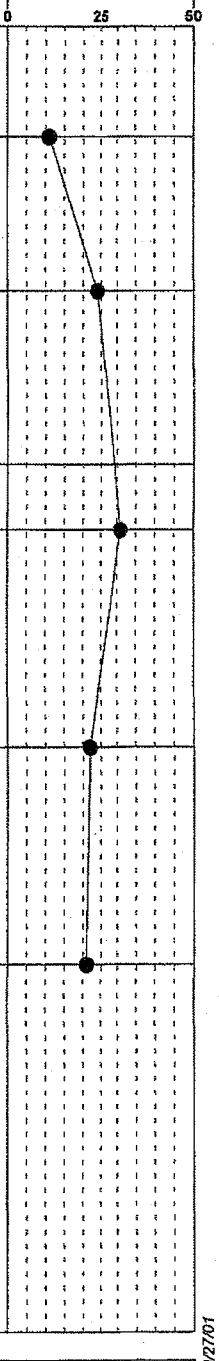
Project No.: **990906SB**

SPEEDIE 990906SB.GPJ GENGEO.GDT 3/27/01

Rig Type: CME-75
Boring Type: Hollow Stem Auger
Surface Elevation: N/A

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)
0	3.5" Asphalt				
	0.3 Medium Dense Brown CLAYEY FINE SAND (SP/SC-Dry to Moist) with Weak Calcareous Cementation	S-1	2.5	NT	NT
5		RS-2	6.0	14.6	102.3
	8.5 Dense Brown CLAYEY SAND (SC-Dry) with Weak Calcareous Cementation	BS-3	10.0	NT	NT
10		S-4	11.5	NT	NT
	13.5 Medium Dense Brown SILTY SAND (SM-Dry)	S-5	16.5	NT	NT
15					
	18.0 Very Stiff Light Brown SANDY LEAN CLAY (CL-Dry) with Weak Calcareous Cementation				
20	21.5 End of Boring	S-6	21.5	NT	NT
25					
30					

Penetration Resistance Blows per Foot (0 – 25 – 50)



Boring Date: 3-8-01
Field Engineer/Technician: M. Polsky
Driller: B. Freeman
Contractor: Heber Mining

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B- 5

Guadalupe Drainage Improvements

Baseline to Elliot Roads

Guadalupe, Arizona

Project No.: 990906SB

SPEEDIE 990906SB.GPJ GENGEO.GDT 3/27/01

Rig Type: CME-75
Boring Type: Hollow Stem Auger
Surface Elevation: N/A

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 – 25 – 50)
0	Loose Brown CLAYEY SAND (SC/SM-Dry) with Silt	S-1	2.5	NT	NT	
4.0	Very Stiff Brown SANDY SILT (ML-Dry) with Weak Calcareous Cementation	BS-2	5.0	NT	NT	
5		RS-3	6.0	10.6	97.5	
8.5	Very Stiff to Hard Light Brown SANDY LEAN CLAY (CL-Dry) with Weak to Moderate Calcareous Cementation	S-4	11.5	NT	NT	59/12"
10						
15		S-5	16.5	NT	NT	
20						
21.5	End of Boring	S-6	21.5	NT	NT	
25						
30						

Boring Date: 3-8-01
Field Engineer/Technician: M. Polsky
Driller: B. Freeman
Contractor: Heber Mining

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B- 6

Guadalupe Drainage Improvements

Baseline to Elliot Roads

Guadalupe, Arizona

Project No.: 990906SB

_SPEEDIE 990906SB.GPJ GENGEO.GDT 3/27/01

Rig Type: **CME-75**
Boring Type: **Hollow Stem Auger**
Surface Elevation: **N/A**

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 – 25 – 50)
0	3" Asphalt					
	Medium Dense Brown SILTY SAND (SC/SM-Dry to Moist) With Clay (0.2)	S-1	2.5	NT	NT	
5	Dense Brown CLAYEY SAND (SC-Dry) with Weak Calcareous Cementation (4.0)	S-2	6.5	NT	NT	
10	Hard Brown SANDY LEAN CLAY (CL-Dry) with Weak Calcareous Cementation (8.5)	BS-3	10.0	NT	NT	
		S-4	11.5	NT	NT	
15		S-5	16.5	NT	NT	
	End of Boring (16.5)					
20						
25						
30						

Boring Date: **3-8-01**
Field Engineer/Technician: **M. Polsky**
Driller: **B. Freeman**
Contractor: **Heber Mining**

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: **B- 7**

Guadalupe Drainage Improvements

Baseline to Elliot Roads

Guadalupe, Arizona

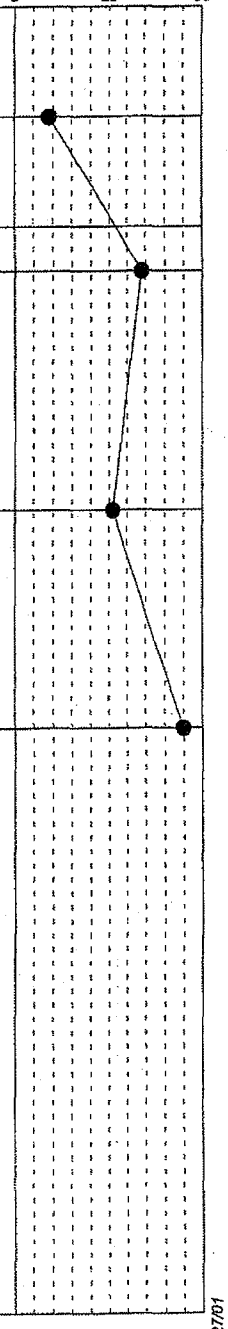
Project No.: **990906SB**

SPEEDIE 990906SB.GPJ GENGEO.GDT 3/27/01

Rig Type: **CME-75**
Boring Type: **Hollow Stem Auger**
Surface Elevation: **N/A**

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)
0	3" Asphalt				
	0.2 Loose Brown CLAYEY SAND (SC-Dry to Moist)	S-1	2.5	NT	NT
	4.0 Dense Reddish Brown CLAYEY SAND (SC-Dry) with Weak Calcareous Cementation	BS-2	5.0	NT	NT
5		RS-3	6.0	10.7	104.1
	8.5 Very Stiff Brown SANDY LEAN CLAY (CL-Dry) with Weak Calcareous Cementation				
10		S-4	11.5	NT	NT
	13.5 Dense Light Brown CLAYEY SAND (SC-Dry) with Weak to Moderate Calcareous Cementation				
15	16.5 End of Boring	S-5	16.5	NT	NT
20					
25					
30					

Penetration Resistance Blows per Foot (0 – 25 – 50)



Boring Date: **3-8-01**
Field Engineer/Technician: **M. Polsky**
Driller: **B. Freeman**
Contractor: **Heber Mining**

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: **B- 8**

Guadalupe Drainage Improvements

Baseline to Elliot Roads

Guadalupe, Arizona

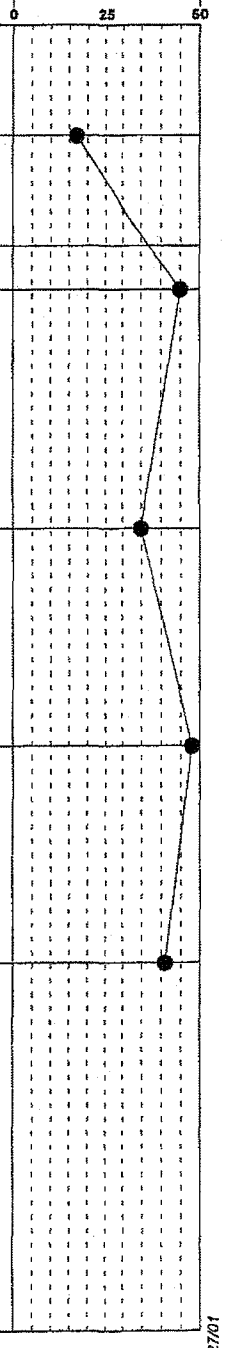
Project No.: **990906SB**

SPEEDIE 990906SB.GPJ GENGEO.GDT 3/27/01

Rig Type: **CME-75**
Boring Type: **Hollow Stem Auger**
Surface Elevation: **N/A**

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)
0	3" Asphalt				
	0.2 Medium Dense to Dense Brown CLAYEY SAND (SC-Dry to Moist) with Weak Calcareous Cementation	S-1	2.5	NT	NT
		BS-2	5.0	NT	NT
5		RS-3	6.0	6.6	98.7
	8.0 Dense Light Brown SILTY SAND (SM-Dry) with Moderate Calcareous Cementation				
10		S-4	11.5	NT	NT
15		S-5	16.5	NT	NT
20	21.5 End of Boring	S-6	21.5	NT	NT
25					
30					

Penetration Resistance Blows per Foot (0, 25, 50)



Boring Date: **3-8-01**
Field Engineer/Technician: **M. Polsky**
Driller: **B. Freeman**
Contractor: **Heber Mining**

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: **B- 9**

Guadalupe Drainage Improvements

Baseline to Elliot Roads

Guadalupe, Arizona

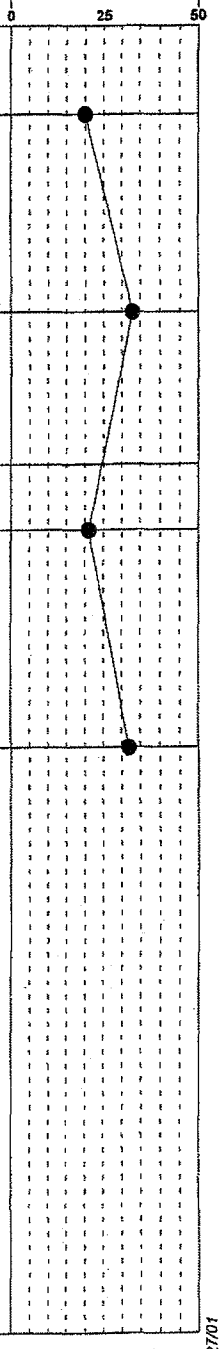
Project No.: **990906SB**

SPEEDIE 990906SB.GPJ GENGEO.GDT 3/27/01

Rig Type: CME-75
Boring Type: Hollow Stem Auger
Surface Elevation: N/A

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)
0	3" Asphalt on 3" Aggregate Base				
	0.5 Very Stiff Brown SANDY CLAY (CL-Dry)	RS-1	2.0	13.5	95.9
	4.0 Dense Brown CLAYEY SAND (SC-Dry) with Weak to Moderate Calcareous Cementation	S-2	6.5	NT	NT
5	9.0 Medium Dense Brown CLAYEY SAND (SC/SM-Dry) With Silt and Weak Calcareous Cementation	BS-3	10.0	NT	NT
10		S-4	11.5	NT	NT
	13.0 Hard Brown SANDY LEAN CLAY (CL-Dry) with Weak Calcareous Cementation				
15	16.5 End of Boring	S-5	16.5	NT	NT
20					
25					
30					

Penetration Resistance Blows per Foot (0, 25, 50)



Boring Date: 3-8-01
Field Engineer/Technician: M. Polsky
Driller: B. Freeman
Contractor: Heber Mining

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B-10

Guadalupe Drainage Improvements

Baseline to Elliot Roads

Guadalupe, Arizona

Project No.: 990906SB

_SPEEDIE 990906SB.GPJ GENGEO.GDT 3/27/01

Rig Type: **CME-75**
Boring Type: **Hollow Stem Auger**
Surface Elevation: **N/A**

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)
0	3" Asphalt				
	0.2 Loose to Medium Dense Brown SILTY SAND (SC/SM-Moist) With Clay	S-1	2.5	NT	NT
5		RS-2	6.0	NT	NT
	6.5 Dense Brown CLAYEY SAND (SC-Dry) with Weak Calcareous Cementation	BS-3	10.0	NT	NT
10		S-4	11.5	NT	NT
	13.5 Very Stiff Brown SANDY SILT (ML-Dry) with Weak Calcareous Cementation				
15	16.5 End of Boring	S-5	16.5	NT	NT
20					
25					
30					

Penetration Resistance Blows per Foot (0, 25, 50)

Boring Date: **3-8-01**
Field Engineer/Technician: **M. Polsky**
Driller: **B. Freeman**
Contractor: **Heber Mining**

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: **B-11**

Guadalupe Drainage Improvements

Baseline to Elliot Roads

Guadalupe, Arizona

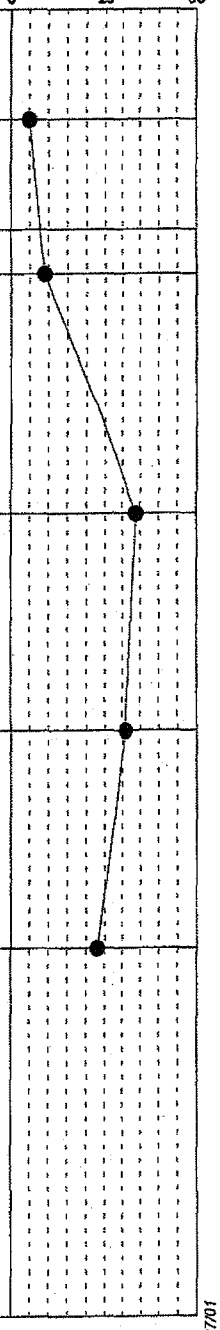
Project No.: **990906SB**

_SPEEDIE 990906SB.GPJ GENGEO.GDT 3/27/01

Rig Type: **CME-75**
Boring Type: **Hollow Stem Auger**
Surface Elevation: **N/A**

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)
0	4" Asphalt — 0.3				
	Loose Brown SILTY SAND (SC/SM-Dry to Moist) With Clay	S-1	2.5	NT	NT
5		BS-2	5.0	NT	NT
		RS-3	6.0	13.2	98.5
	8.0				
	Dense Brown CLAYEY SAND (SC-Dry) with Weak to Moderate Calcareous Cementation				
10		S-4	11.5	NT	NT
	13.5				
	Hard Brown SANDY LEAN CLAY (CL-Dry) with Weak Calcareous Cementation				
15		S-5	16.5	NT	NT
	18.0				
	Medium Dense Brown CLAYEY SAND (SC-Dry) with Trace Gravel				
20		S-6	21.5	NT	NT
	21.5 End of Boring				
25					
30					

Penetration Resistance Blows per Foot (0 – 25 – 50)



Boring Date: **3-8-01**
Field Engineer/Technician: **M. Polsky**
Driller: **B. Freeman**
Contractor: **Heber Mining**

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: **B-12**

Guadalupe Drainage Improvements

Baseline to Elliot Roads

Guadalupe, Arizona

Project No.: **990906SB**

_SPEEDIE 990906SB.GPJ GENGEO.GDT 3/27/01

Rig Type: **CME-75**
Boring Type: **Hollow Stem Auger**
Surface Elevation: **N/A**

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 – 25 – 50)
0	3.5" Asphalt on 2" Aggregate Base (0.5)					
	Loose to Dense Brown to Light Brown CLAYEY SAND (SC-Dry to Moist)	S-1	2.5	NT	NT	
		BS-2	5.0	NT	NT	
5	Moderate Calcareous Cementation	S-3	6.5	NT	NT	
10		S-4	11.5	NT	NT	
15	(16.5)	S-5	16.5	NT	NT	
	End of Boring					
20						
25						
30						

Boring Date: **3-8-01**
Field Engineer/Technician: **M. Polsky**
Driller: **B. Freeman**
Contractor: **Heber Mining**

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: **B-13**

Guadalupe Drainage Improvements

Baseline to Elliot Roads

Guadalupe, Arizona

Project No.: **990906SB**

SPEEDIE 990906SB.GPJ GENGEO.GDT 3/27/01

Rig Type: **CME-75**
Boring Type: **Hollow Stem Auger**
Surface Elevation: **N/A**

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot
0	Fill: Stiff Brown SANDY SILT (ML-Dry)					
1.0	Medium Dense Brown CLAYEY SAND (SC-Dry)	S-1	2.5	NT	NT	
		BS-2	5.0	NT	NT	
5	Weak Calcareous Cementation	S-3	6.5	NT	NT	
8.0	Dense Light Brown SILTY SAND (SC/SM-Dry) With Clay and Moderate Calcareous Cementation	S-4	11.5	NT	NT	59/12"
10						
13.0	Medium Dense to Dense Brown SILTY SAND (SM-Dry) with Weak Calcareous Cementation	S-5	16.5	NT	NT	
15						
20		S-6	21.5	NT	NT	
23.0	Hard Brown SANDY SILT (CL/ML-Dry) With Clay and Weak Calcareous Cementation					
25		S-7	26.5	NT	NT	
28.5	Dense to Very Dense Light Brown CLAYEY					
30						

Penetration Resistance scale: 0 25 50

Continued on Next Page

Boring Date: **3-9-01**
Field Engineer/Technician: **M. Polsky**
Driller: **H. Usery**
Contractor: **Heber Mining**

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: **B-14**

Guadalupe Drainage Improvements

Baseline to Elliot Roads

Guadalupe, Arizona

Project No.: **990906SB**

_SPEEDIE 990906SB.GPJ GENGEO.GDT 3/27/01

Rig Type: **CME-75**
Boring Type: **Hollow Stem Auger**
Surface Elevation: **N/A**

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 – 25 – 50)
30	SAND (SC-Dry) with Trace Gravel and Moderate Calcareous Cementation	S-8	31.5	NT	NT	55/12"
35		S-9	36.5	NT	NT	
	38.5					
40	Very Dense Brown SILTY SAND (SM-Dry) with Trace Clay and Trace Gravel	S-10	41.5	NT	NT	58/12"
	43.0					
45	Very Dense Light Brown SILTY SAND (SM-Dry) with Little Gravel and Weak Calcareous Cementation	S-11	46.0	NT	NT	50/6"
	48.5					
50	Hard Brown SANDY CLAY (CL-Dry) With Silt	S-12	51.0	NT	NT	50/6"
	53.5					
55	Very Dense Brown to Grayish Brown CLAYEY SAND (SC-Dry) with Little to Some Gravel	S-13	55.3	NT	NT	50/4"
60	South Mountain Fanglomerate Sediments from 54 Feet to 75.1 Feet					

Continued on Next Page

Boring Date: **3-9-01**
Field Engineer/Technician: **M. Polsky**
Driller: **H. Usery**
Contractor: **Heber Mining**

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: **B-14**

Guadalupe Drainage Improvements

Baseline to Elliot Roads

Guadalupe, Arizona

Project No.: **990906SB**

SPEEDIE 990906SB.GPJ GENGEO.GDT 3/27/01

Rig Type: CME-75
Boring Type: Hollow Stem Auger
Surface Elevation: N/A

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 – 25 – 50)
60	Very Dense Brown to Grayish Brown CLAYEY SAND (SC-Dry) with Little to Some Gravel	S-14	60.3	NT	NT	50/4"
65		S-15	65.1	NT	NT	50/1"
70		BS-16	70.0	NT	NT	50/1"
		S-17	70.1	NT	NT	
75	75.1 End of Boring	S-18	75.1	NT	NT	50/1"
80						
85						
90						

Boring Date: 3-9-01
Field Engineer/Technician: M. Polsky
Driller: H. Usery
Contractor: Heber Mining

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B-14

Guadalupe Drainage Improvements

Baseline to Elliot Roads

Guadalupe, Arizona

Project No.: 990906SB

_SPEEDIE 990906SB.GPJ GENGEO.GDT 3/27/01

TABULATION OF TEST DATA

SOIL BORING or TEST PIT NUMBER	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE INTERVAL (ft)	NATURAL WATER CONTENT (Percent of Dry Weight)	IN-PLACE DRY DENSITY (Pounds Per Cubic Foot)	PARTICLE SIZE DISTRIBUTION (Percent Finer)					ATTERBERG LIMITS			R VALUE at 300 PSI	CORRELATED R VALUE	pH	RESISTIVITY (Ohm-Centimeters)	% SULFATE (SO4)	% CHOLRIDE (CL)	UNIFIED SOIL CLASSIFICATION
						#200 SIEVE	#40 SIEVE	#10 SIEVE	#4 SIEVE	3" SIEVE	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX							
B- 1	RS-2	RING	5.0 - 6.0	7.8	101.6	38	58	83	96	100	39	21	18	NT	30	NT	NT	NT	NT	SC
B- 2	BS-2	BULK	0.5 - 5.0	NT	NT	36	53	78	88	100	43	21	22	NT	25	8.1	1150	NT	NT	SC
B- 4	BS-2	BULK	0.5 - 5.0	NT	NT	41	56	81	91	100	39	17	22	NT	24	NT	NT	NT	NT	SC
B- 5	RS-2	RING	5.0 - 6.0	14.6	102.3	47	70	90	97	100	40	23	17	NT	28	NT	NT	NT	NT	SC
B- 5	BS-3	BULK	5.1 - 10.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT		9.4	2640	NT	NT	
B- 6	BS-2	BULK	0.5 - 5.0	NT	NT	36	56	84	96	100	25	18	7	NT	46	8.6	900	NT	NT	SC-SM
B- 6	RS-3	RING	5.0 - 6.0	10.6	97.5	NT	NT	NT	NT	NT	NT	NT	NT	NT		NT	NT	NT	NT	
B- 7	BS-3	BULK	5.1 - 10.0	NT	NT	45	61	85	93	100	42	19	23	NT	22	8.2	480	NT	NT	SC
B- 8	BS-2	BULK	0.5 - 5.0	NT	NT	31	48	74	87	100	28	15	13	NT	40	8.4	1150	NT	NT	SC
B- 8	RS-3	RING	5.0 - 6.0	10.7	104.1	NT	NT	NT	NT	NT	NT	NT	NT	NT		NT	NT	NT	NT	
B- 9	BS-2	BULK	0.5 - 5.0	NT	NT	38	55	80	89	100	39	19	20	NT	28	NT	NT	NT	NT	SC
B- 9	RS-3	RING	5.0 - 6.0	6.6	98.7	NT	NT	NT	NT	NT	NT	NT	NT	NT		NT	NT	NT	NT	
B-10	RS-1	RING	1.0 - 2.0	13.5	95.9	NT	NT	NT	NT	NT	NT	NT	NT	NT		NT	NT	NT	NT	
B-10	BS-3	BULK	5.1 - 10.0	NT	NT	30	41	67	85	100	45	22	23	NT	26	9	948	NT	NT	SC
B-11	BS-3	BULK	5.1 - 10.0	NT	NT	37	52	81	93	100	45	21	24	NT	23	8.5	580	NT	NT	SC
B-12	BS-2	BULK	0.5 - 5.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT		8.6	3600	NT	NT	

Sieve analysis results do not include material greater than 3". Refer to the actual boring logs for the possibility of cobble and boulder sized materials.

NT=Not Tested

Sheet 1 of 2

Guadalupe Drainage Improvements
Baseline to Elliot Roads
Guadalupe, Arizona
Project No. 990906SB

SPEEDIE AND ASSOCIATES

TABOFLAB R-VALUE 990906SB.GPJ GENGEO.GDT 3/20/01

TABULATION OF TEST DATA

SOIL BORING or TEST PIT NUMBER	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE INTERVAL (ft)	NATURAL WATER CONTENT (Percent of Dry Weight)	IN-PLACE DRY DENSITY (Pounds Per Cubic Foot)	PARTICLE SIZE DISTRIBUTION (Percent Finer)					ATTERBERG LIMITS			R VALUE at 300 PSI	CORRELATED R VALUE	pH	RESISTIVITY (Ohm-Centimeters)	% SULFATE (SO4)	% CHOLRIDE (CL)	UNIFIED SOIL CLASSIFICATION
						#200 SIEVE	#40 SIEVE	#10 SIEVE	#4 SIEVE	3" SIEVE	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX							
B-12	RS-3	RING	5.0 - 6.0	13.2	98.5	25	40	69	87	100	47	28	19	NT	33	NT	NT	NT	NT	SM
B-13	BS-2	BULK	0.5 - 5.0	NT	NT	32	47	74	87	100	35	18	17	NT	33	8.8	1440	NT	NT	SC
B-14	BS-2	BULK	0.0 - 5.0	NT	NT	40	58	81	92	100	32	19	13	NT	34	NT	NT	NT	NT	SC
B-14	BS-16	BULK	65.2 - 70.0	NT	NT	37	53	74	85	100	36	20	16	NT	31	NT	NT	NT	NT	SC

Sieve analysis results do not include material greater than 3". Refer to the actual boring logs for the possibility of cobble and boulder sized materials.

NT=Not Tested

Sheet 2 of 2

Guadalupe Drainage Improvements
Baseline to Elliot Roads
Guadalupe, Arizona
Project No. 990906SB

SPEEDIE AND ASSOCIATES

TABOFLAB R-VALUE 990906SB.GPJ GENGEO.GDT 3/20/01

CONSOLIDATION TEST

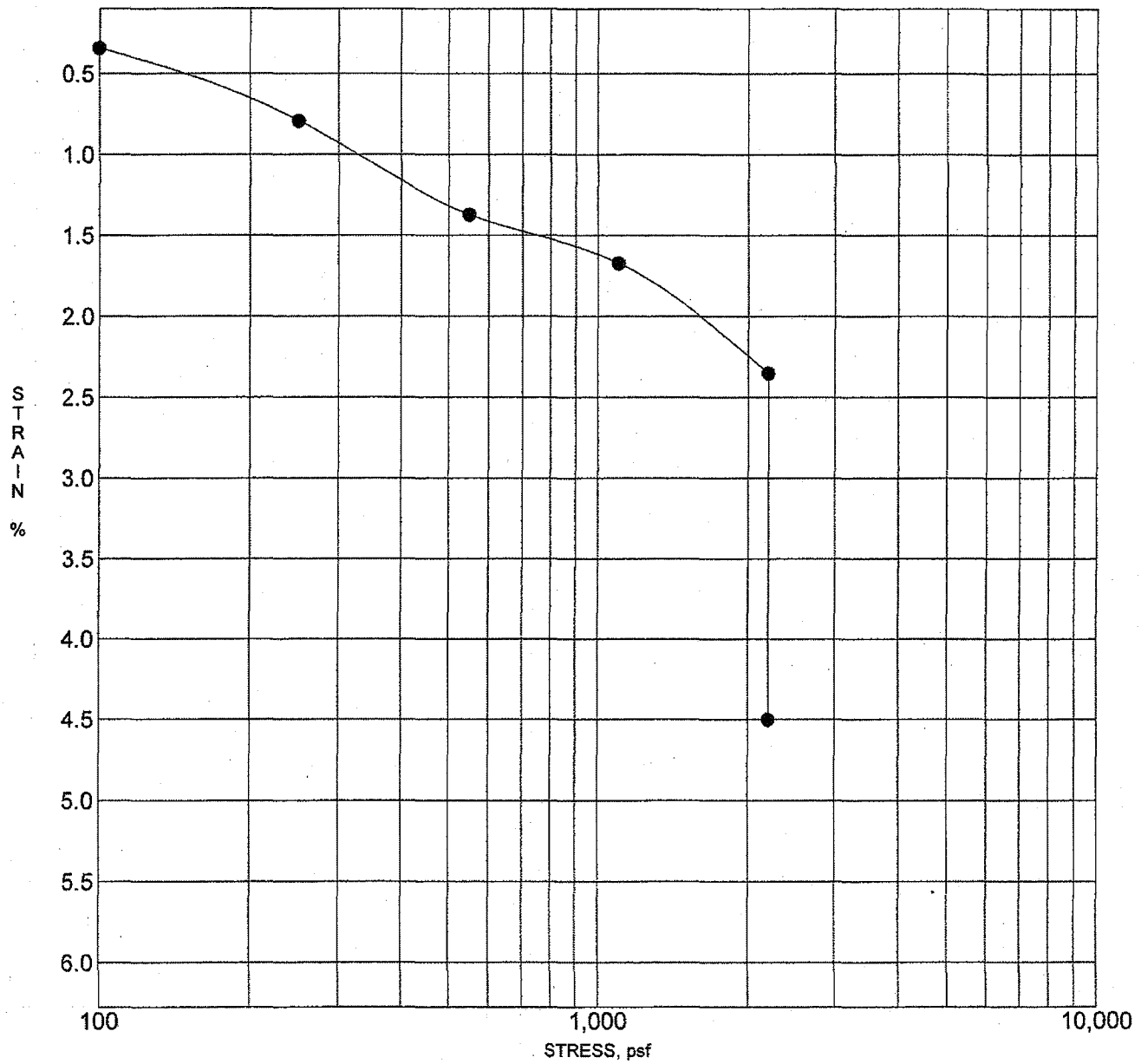
PROJECT: Guadalupe Drainage Improvements PROJECT NO.: 990906SB

LOCATION: Baseline to Elliot Roads DATE: 3/8/01

BORING NO.: B- 1 SAMPLE NO.: RS-2 SAMPLE DEPTH: 5 to 6 LABORATORY NO.: E9405

LIQUID LIMIT: 39 PLASTIC LIMIT: 21 PLASTICITY INDEX: 17

CLASSIFICATION: SC ASTM SOIL DESCRIPTION: CLAYEY SAND



Sample inundated at end of test at 2200 psf

SPEEDIE AND ASSOCIATES

GEOTECH CONSOLIDATION 990906SB.GPJ GENGEO.GDT 3/20/01

CONSOLIDATION TEST

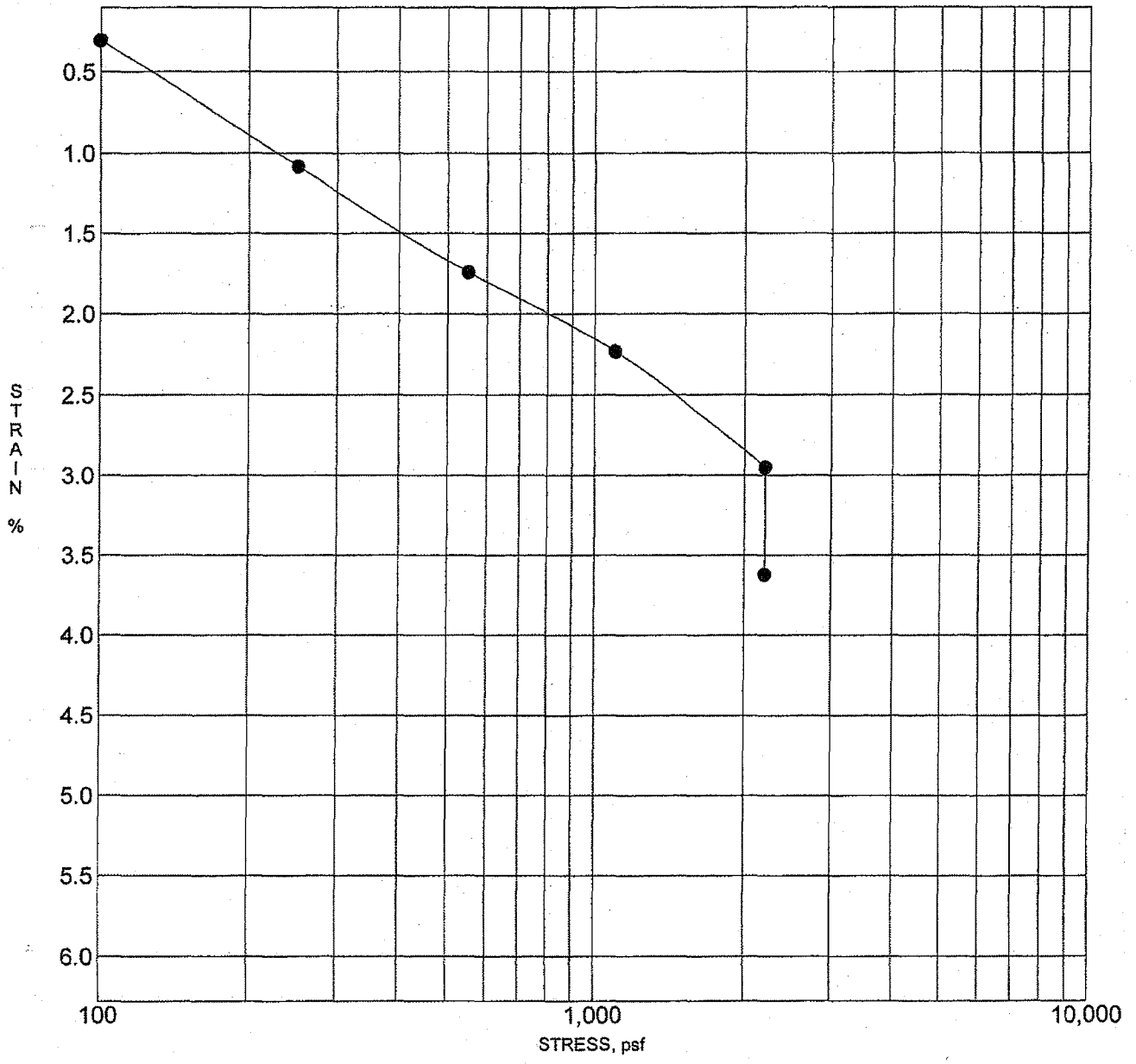
PROJECT: Guadalupe Drainage Improvements — PROJECT NO.: 990906SB

LOCATION: Baseline to Elliot Roads — DATE: 3/8/01

BORING NO.: B- 5 SAMPLE NO.: RS-2 SAMPLE DEPTH: 5 to 6 LABORATORY NO.: E9414

LIQUID LIMIT: 40 PLASTIC LIMIT: 23 PLASTICITY INDEX: 16

CLASSIFICATION: SC ASTM SOIL DESCRIPTION: CLAYEY SAND



Sample inundated at end of test at 2200 psf

SPEEDIE AND ASSOCIATES

GEOTECH CONSOLIDATION 990906SB.GPJ GENGEO.GDT 3/20/01

CONSOLIDATION TEST

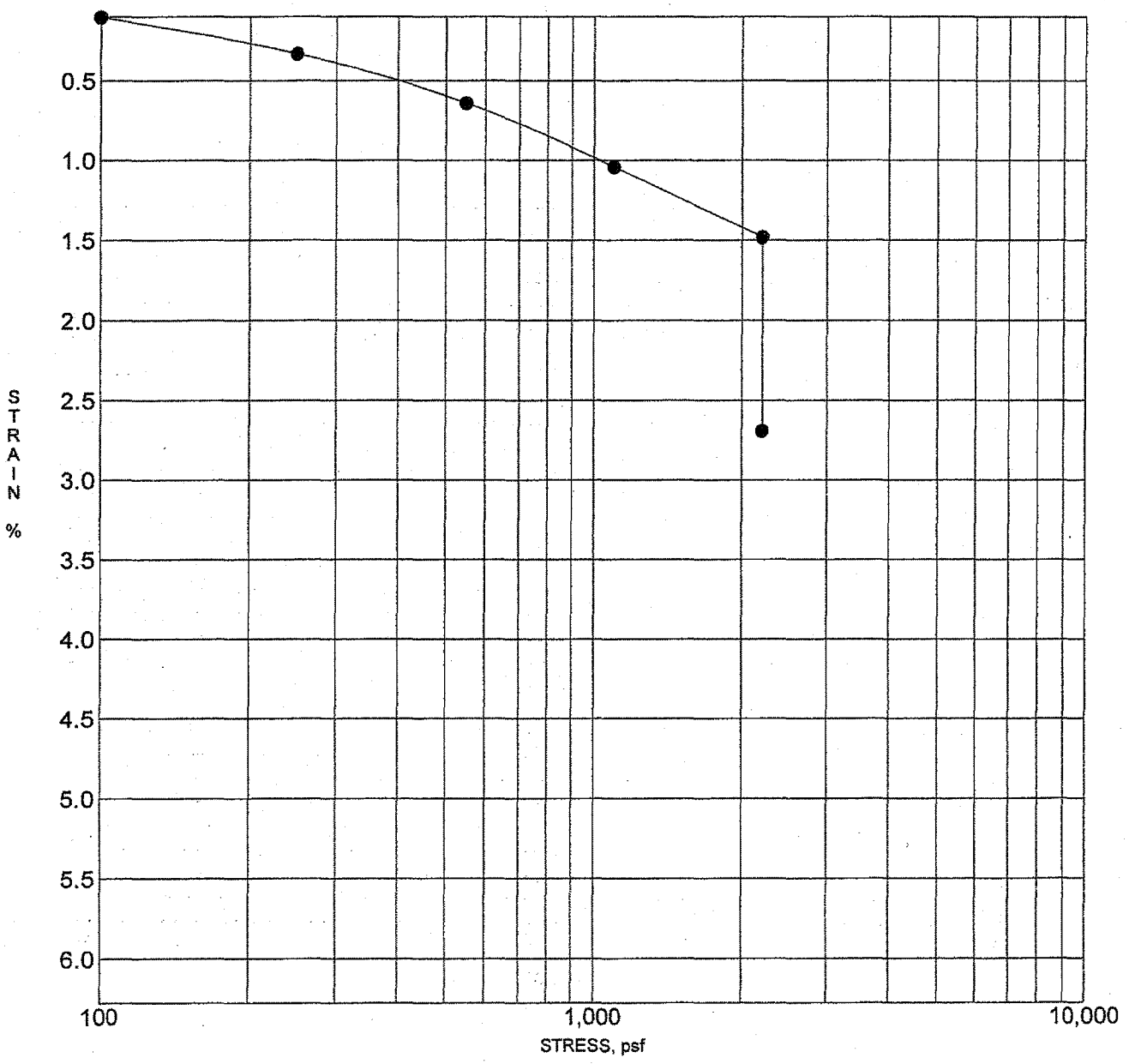
PROJECT: Guadalupe Drainage Improvements PROJECT NO.: 990906SB

LOCATION: Baseline to Elliot Roads DATE: 3/8/01

BORING NO.: B-12 SAMPLE NO.: RS-3 SAMPLE DEPTH: 5 to 6 LABORATORY NO.: E9456

LIQUID LIMIT: 47 PLASTIC LIMIT: 28 PLASTICITY INDEX: 19

CLASSIFICATION: SM ASTM SOIL DESCRIPTION: SILTY SAND



Sample inundated at end of test at 2200 psf

SPEEDIE AND ASSOCIATES

GEOTECH CONSOLIDATION 990906SB.GPJ GENGEO.GDT 3/20/01

MOISTURE-DENSITY RELATIONS

PROJECT: Guadalupe Drainage Improvements — PROJECT NO.: 990906SB

LOCATION: Baseline to Elliot Roads — DATE: 3/9/01

BORING NO.: B- 4 SAMPLE NO.: BS-2 SAMPLE DEPTH: 0.5 to 5 — LABORATORY NO.: E9492

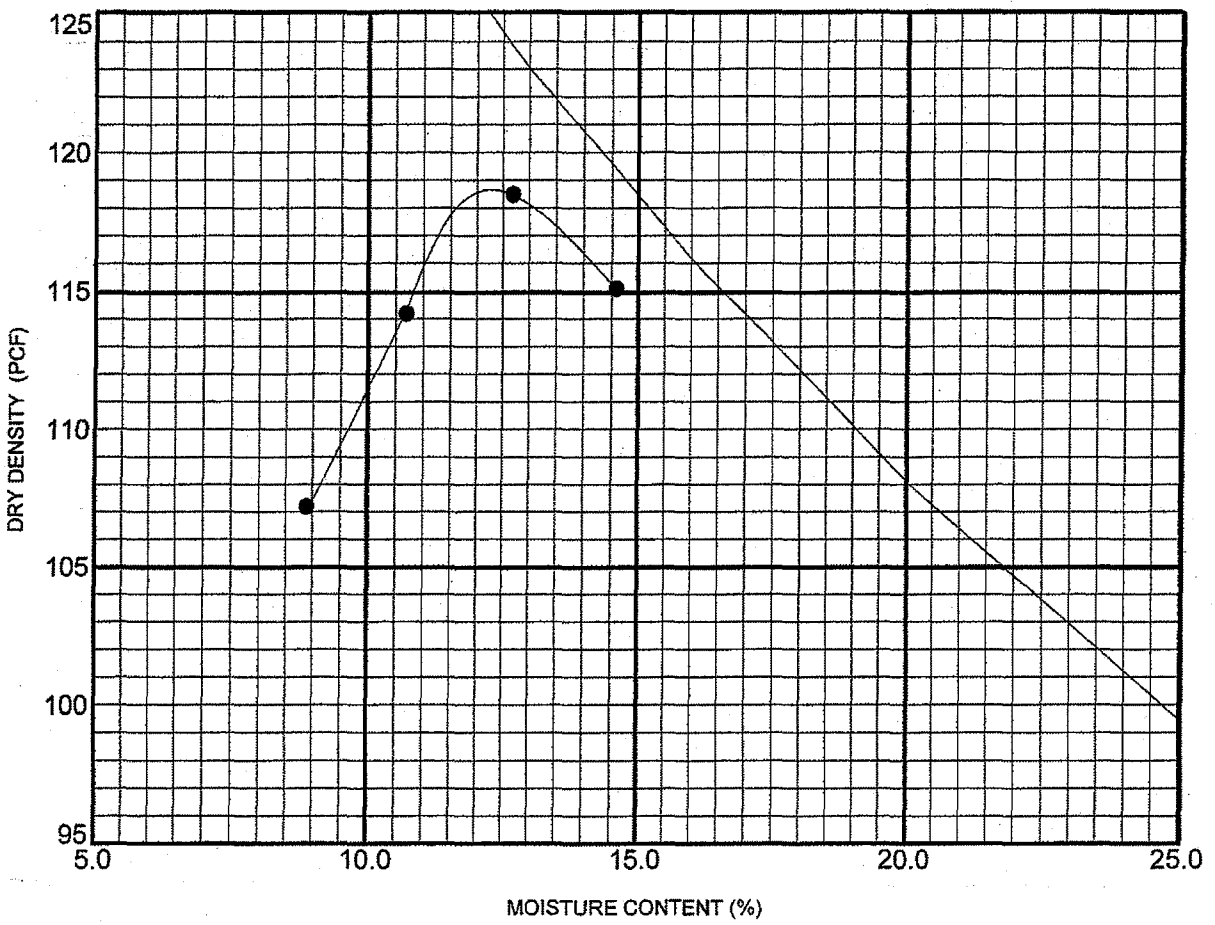
METHOD OF COMPACTION: D698A

LIQUID LIMIT: 39 PLASTIC LIMIT: 17 PLASTICITY INDEX: 23

CLASSIFICATION: SC ASTM SOIL DESCRIPTION: CLAYEY SAND

MAXIMUM DRY DENSITY: 118.5 PCF

OPTIMUM MOISTURE CONTENT: 12.2%



SPEEDIE AND ASSOCIATES

GEOTECH PROCTOR 990906SB.GPJ 3/20/01

MOISTURE-DENSITY RELATIONS

PROJECT: Guadalupe Drainage Improvements — PROJECT NO.: 990906SB

LOCATION: Baseline to Elliot Roads — DATE: 3/8/01

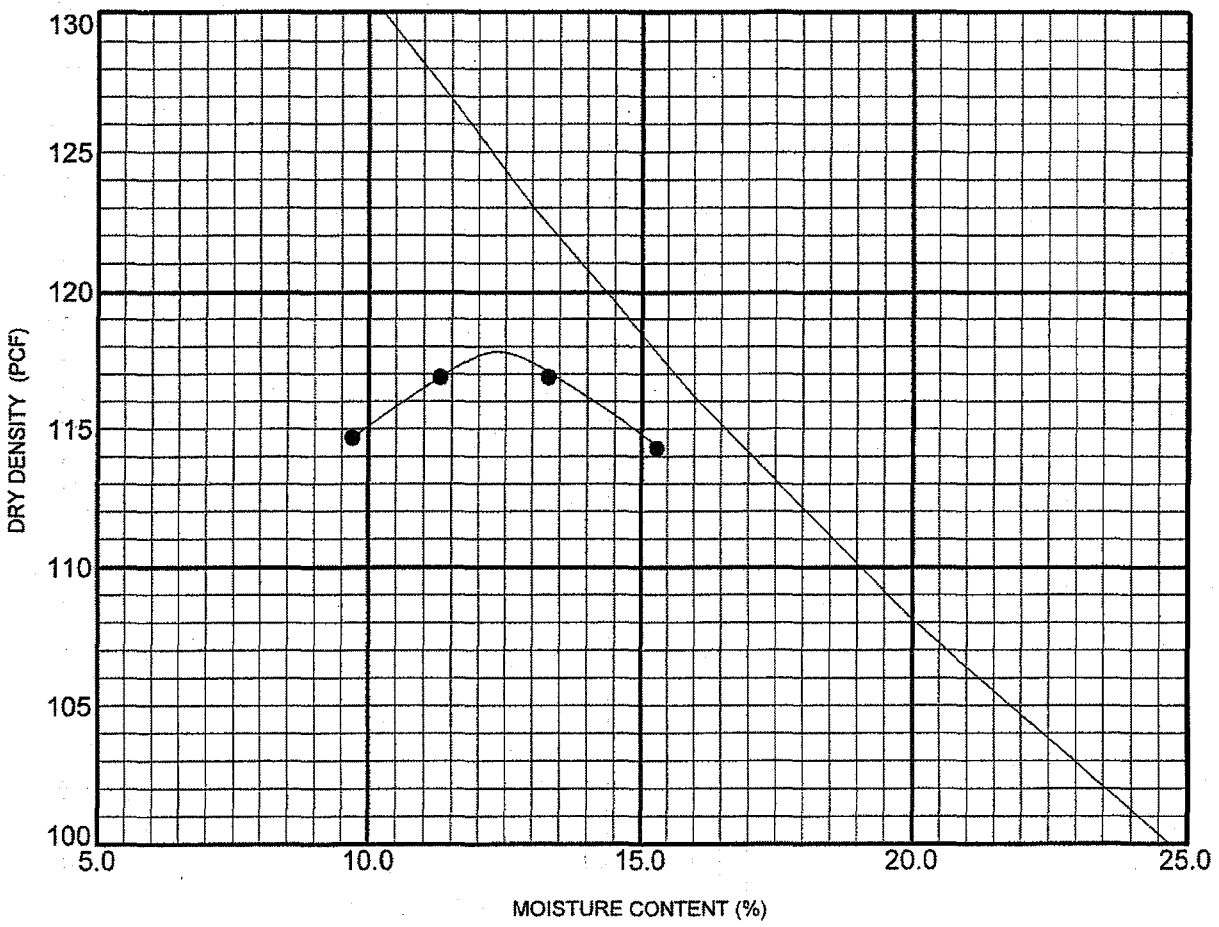
BORING NO.: B- 9 SAMPLE NO.: BS-2 SAMPLE DEPTH: 0.5 to 5 LABORATORY NO.: E9436

METHOD OF COMPACTION: D698A

LIQUID LIMIT: 39 PLASTIC LIMIT: 19 PLASTICITY INDEX: 19

CLASSIFICATION: SC ASTM SOIL DESCRIPTION: CLAYEY SAND

MAXIMUM DRY DENSITY: 117.8 PCF OPTIMUM MOISTURE CONTENT: 12.3%



SPEEDIE AND ASSOCIATES

GEOTECH PROCTOR 990906SB.GPJ 3/20/01

MOISTURE-DENSITY RELATIONS

PROJECT: Guadalupe Drainage Improvements — PROJECT NO.: 990906SB

LOCATION: Baseline to Elliot Roads — DATE: 3/9/01

BORING NO.: B-14 SAMPLE NO.: BS-2 SAMPLE DEPTH: 0 to 5 — LABORATORY NO.: E9497

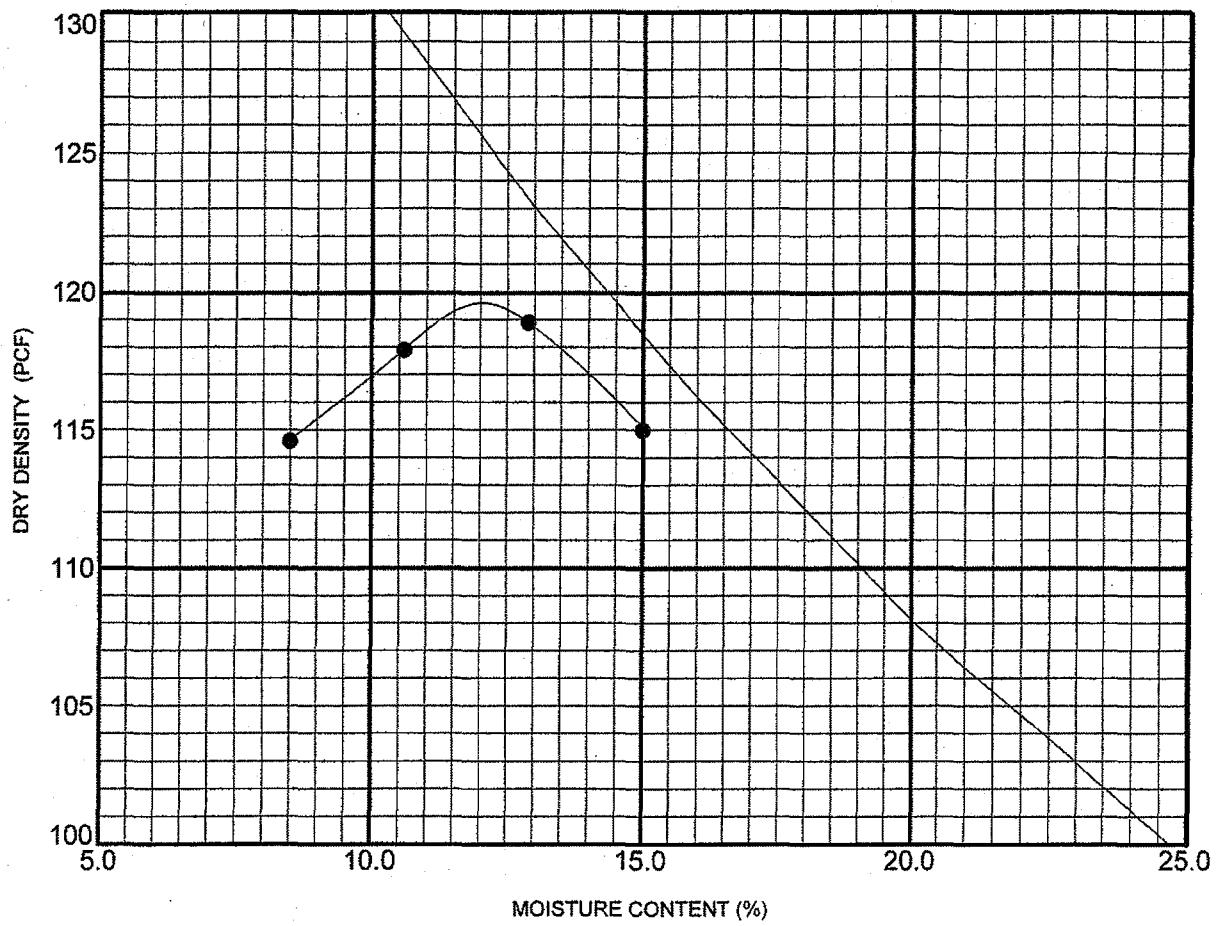
METHOD OF COMPACTION: D698A

LIQUID LIMIT: 32 PLASTIC LIMIT: 19 PLASTICITY INDEX: 13

CLASSIFICATION: SC ASTM SOIL DESCRIPTION: CLAYEY SAND

MAXIMUM DRY DENSITY: 119.6 PCF

OPTIMUM MOISTURE CONTENT: 12.2%



SPEEDIE AND ASSOCIATES

GEOTECH PROCTOR 990906SB.GPJ 3/20/01

SWELL TEST DATA

BORING or TEST PIT No.	SAMPLE DEPTH, ft	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE CONTENT (%)	REMOLDED DRY DENSITY (pcf)	INITIAL MOISTURE CONTENT (%)	PERCENT COMPACTION	FINAL MOISTURE CONTENT (%)	CONFINING LOAD (psf)	TOTAL SWELL (%)
B- 4, BS-2	5.0	118.5	12.2	112.8	10.3	95.2	17.8	100	3.0
B- 9, BS-2	5.0	117.8	12.3	112.0	10.8	95.1	18	100	3.8
B-14, BS-2	5.0	119.6	12.2	114.3	10.1	95.6	15.5	100	1.4

Guadalupe Drainage Improvements
Baseline to Elliot Roads
Guadalupe, Arizona
Project No. 990906SB

SPEEDIE AND ASSOCIATES

SWELL TEST 990906SB.GPJ GENGEO.GDT 3/20/01

APPENDIX B

PROJECT NO. 990906SA APPENDIX

FIELD AND LABORATORY INVESTIGATION

From November 16, 1999 to November 18, 1999, 27 soil test borings were drilled at the approximate locations shown on the attached Soil Boring Location Plans. All exploration work was carried out under the full-time supervision of our staff geologist, who recorded subsurface conditions and obtained samples for laboratory testing. The soil borings were advanced with truck-mounted CME drill rigs utilizing 7-inch diameter hollow stem flight augers. Detailed information regarding the borings and samples obtained can be found on an individual Log of Test Boring prepared for each drilling location. Shallow percolation tests were conducted for storm water retention basin design parameters.

Laboratory testing consisted of moisture content, dry density, grain-size distribution and plasticity (Atterberg Limits) tests for classification and pavement design parameters. Remolded swell tests were performed on samples compacted to densities and moisture contents expected during construction. Compression tests were performed on a selected ring sample in order to estimate settlements and determine effects of inundation. All field and laboratory data is presented in this appendix.

SOIL LEGEND

SAMPLE DESIGNATION	DESCRIPTION	
AS	Auger Sample–	A grab sample taken directly from auger flights.
BS	Large Bulk Sample–	A grab sample taken directly from auger flights.
S	Spoon Sample–	Standard Penetration Test (ASTM D–1586) Driving a 2.0 inch outside diameter split spoon sampler into undisturbed soil for three successive 6–inch increments by means of a 140 lb. weight free falling through a distance of 30 inches. The cumulative number of blows for the final 12 inches of penetration is the Standard Penetration Resistance (N).
RS	Ring Sample–	Driving a 3.0 inch outside diameter spoon equipped with a series of 2.42 inside diameter, 1 inch long brass rings, into undisturbed soil for one 12 inch increment by the same means of the Spoon Sample. The blows required for the 12 inches of penetration are recorded.
LS	Liner Sample–	Standard Penetration Test driving a 2.0 inch outside diameter split spoon equipped with two 3 inch long, ⅜ inch inside diameter brass liners, separated by a 1 inch long spacer, into undisturbed soil by the same means of the spoon sample.
ST	Shelby Tube–	A 2.0 inch outside diameter thin–walled tube continuously pushed into undisturbed soil by a rapid motion, without impact or twisting (ASTM D–1587).
–	Continuous Penetration Resistance–	Driving a 2.0 inch outside diameter "Bullnose Penetrometer" continuously into undisturbed soil by the same means of the spoon sample. The blows for each successive 12 inch increment are recorded.

CONSISTENCY			RELATIVE DENSITY	
Clays & Silts	Blows/Foot *	Strength †	Sands & Gravels	Blows/Foot *
Very Soft	0–2	0–0.25	Very Loose	0–4
Soft	2–4	0.25–0.5	Loose	5–10
Firm	5–8	0.5–1.0	Medium Dense	11–30
Stiff	9–15	1–2	Dense	31–50
Very Stiff	16–30	2–4	Very Dense	> 50
Hard	> 30	> 4		

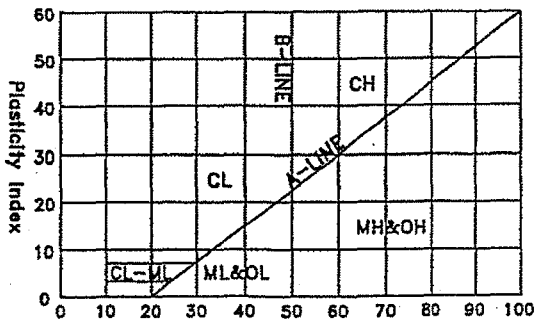
* Number of blows of a 140 lb hammer free falling 30 inches to drive a 2 inch O.D. split spoon sampler (ASTM D–1586)

† Unconfined compressive strength in tons/sq ft. Read from a pocket penetrometer.

MAJOR DIVISIONS			GRAPH SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS
Coarse Grained Soils More than 50% of material is larger than #200 sieve size	Gravel and Gravelly Soils 50% Coarse Fraction is > #4 Sieve Size	Clean Gravels		GW	Well Graded Gravels
				GP	Poorly Graded Gravels
		Gravels w/ Fines		GM	Silty Gravels
				GC	Clayey Gravels
	Sand and Sandy Soils 50% Coarse Fraction is < #4 Sieve Size	Clean Sands		SW	Well Graded Sands
				SP	Poorly Graded Sands
		Sands w/ Fines		SM	Silty Sand
				SC	Clayey Sand
Fine Grained Soils More than 50% of material is smaller than #200 sieve size	Silts and Clays Liquid Limit is less than 50%			ML	Inorganic Silts, Low P.I.
				CL	Inorganic Clays, Low P.I.
				OL	Organic Silts, High P.I.
	Silts and Clays Liquid Limit is greater than 50%			MH	Inorganic Silts, High P.I.
				CH	Inorganic Clays, High P.I.
				OH	Organic Clays, High P.I.
Highly Organic Soils				PT	Peat and Humus, Highly Organic

MATERIAL SIZE	PARTICLE SIZE			
	Lower Limit		Upper Limit	
	mm	Sieve Size †	mm	Sieve Size †
Sands				
Fine	.075	#200	0.42	#40
Medium	0.42	#40	2.00	#10
Coarse	2.00	#10	4.76	#4
Gravels				
Fine	4.76	#4	191	¾" ∘
Coarse	191	¾" ∘	762	3" ∘
Cobbles	762	3" ∘	304.8	12" ∘
Boulders	304.8	12" ∘	914.4	36" ∘

† U.S. Standard ∘ Clear Square Openings



Rig Type: CME-75
Boring Type: Hollow Stem Auger
Surface Elevation: N/A

Depth (feet)	Graphic Log	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 – 25 – 50)
0		Medium Dense to Dense Light Brown CLAYEY SAND (SC-Dry) with Weak Calcareous Cementation					
5			S-1	6.0	--	--	
10			S-2	11.0	--	--	
15			S-3	16.0	--	--	
20			S-4	21.0	--	--	
25			S-5	26.0	--	--	
28.5							
30							

Boring Date: 11-16-99
Field Engineer/Technician: M. Polsky
Driller: M. Stroud
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
No Water		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B- 1

Guadalupe Drainage Improvement Project

Highline Canal, Baseline Rd. to Elliot Rd.

Guadlaupe, Arizona

Project No.: 990906SA

Rig Type: CME-75
Boring Type: Hollow Stem Auger
Surface Elevation: N/A

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 – 25 – 50)
30	Dense Brown SILTY CLAYEY SAND (SM/SC-Dry)	S-6	31.0	--	--	
33.0						
35	Medium Dense to Very Dense Brown CLAYEY SAND (SC-Dry) with Weak Calcareous Cementation	S-7	36.0	--	--	
40		S-8	41.0	--	--	
45		S-9	46.0	--	--	
50		S-10	51.0	--	--	
55		S-11	55.0	--	--	50/6"
60						

Boring Date: 11-16-99
Field Engineer/Technician: M. Polsky
Driller: M. Stroud
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
No Water		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B- 1

Guadalupe Drainage Improvement Project

Highline Canal, Baseline Rd. to Elliot Rd.

Guadlaupe, Arizona

Project No.: 990906SA

Rig Type: CME-75
Boring Type: Hollow Stem Auger
Surface Elevation: N/A

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0–25–50)
60		S-12	61.0	--	--	70/12"
63.0						
65	Very Dense Brown SILTY CLAYEY SAND (SM/SC-Dry) with Weak Calcareous Cementation	S-13	66.0	--	--	58/12"
67.5						
70	Dense Brown CLAYEY SAND (SC-Dry) with Weak Calcareous Cementation	S-14	71.0	--	--	
75		S-15	76.0	--	--	52/12"
78.0						
80	Hard Brown SANDY CLAY (CL-Dry) with Moderate Calcareous Cementation	S-16	80.5	--	--	50/6"
85						
86.0	End of Boring	S-17	86.0	--	--	61/12"
90						

Boring Date: 11-16-99
Field Engineer/Technician: M. Polsky
Driller: M. Stroud
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
No Water		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B- 1

Guadalupe Drainage Improvement Project

Highline Canal, Baseline Rd. to Elliot Rd.

Guadlaupe, Arizona

Project No.: 990906SA

Rig Type: CME-75
Boring Type: Hollow Stem Auger
Surface Elevation: N/A

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 – 25 – 50)
0	Very Dense Brown SILTY SAND (SM-Dry) with Trace Gravel					
		BS-1	4.5	--	--	
5	Moderate Calcareous Cementation	RS-2	5.5	--	--	53/12"
		S-3	10.0	--	--	50/6"
10						
	13.0					
15	Medium Dense to Very Dense Brown to Light Brown SILTY SAND (SM-Dry) with Weak to Moderate Calcareous Cementation	S-4	16.0	--	--	60/12"
20	21.0	S-5	21.0	--	--	25
	End of Boring					
25						
30						

Boring Date: 11-16-99
Field Engineer/Technician: M. Polsky
Driller: M. Stroud
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
No Water		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B- 2

Guadalupe Drainage Improvement Project

Highline Canal, Baseline Rd. to Elliot Rd.

Guadlaupe, Arizona

Project No.: 990906SA

Rig Type: CME-75
Boring Type: Hollow Stem Auger
Surface Elevation: N/A

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)
0	Very Stiff Brown SANDY LEAN CLAY (CL-Dry)				
5		RS-1	5.5	8.1	99.6
9.5		BS-2	9.5	--	--
10	Medium Dense Light Brown CLAYEY SAND (SC-Dry) with Weak Calcareous Cementation	S-3	11.0	--	--
13.5					
15	Very Stiff Light Brown SANDY LEAN CLAY (CL-Dry)	S-4	16.0	--	--
18.0					
20	Medium Dense Light Brown CLAYEY SAND (SC-Dry) with Weak Calcareous Cementation	S-5	21.0	--	--
21.0	End of Boring				
25					
30					

Penetration Resistance Blows per Foot (0, 25, 50)

Boring Date: 11-16-99
Field Engineer/Technician: M. Polsky
Driller: M. Stroud
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
No Water		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B- 3

Guadalupe Drainage Improvement Project

Highline Canal, Baseline Rd. to Elliot Rd.

Guadlaupe, Arizona

Project No.: 990906SA

Rig Type: CME-75
Boring Type: Hollow Stem Auger
Surface Elevation: N/A

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 – 25 – 50)
0	Medium Dense to Very Dense Brown to Light Brown SILTY SAND (SM-Dry)					
5		S-1	6.0	--	--	
10	Moderate Calcareous Cementation	S-2	11.0	--	--	66/12"
12.5	Dense Brown CLAYEY SAND (SC-Dry)	BS-3	14.5	--	--	
15		S-4	16.0	--	--	
16.0	End of Boring					
20						
25						
30						

Boring Date: 11-16-99
Field Engineer/Technician: M. Polsky
Driller: M. Stroud
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
No Water		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B- 4

Guadalupe Drainage Improvement Project

Highline Canal, Baseline Rd. to Elliot Rd.

Guadlaupe, Arizona

Project No.: 990906SA

Rig Type: CME-75
Boring Type: Hollow Stem Auger
Surface Elevation: N/A

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 – 25 – 50)
0	Medium Dense Brown CLAYEY SAND (SC-Dry)					
5		RS-1	5.5	9.5	99.5	
7.5	Medium Dense Light Brown CLAYEY SAND (SC-Dry) with Moderate Calcareous Cementation					
10		S-2	11.0	--	--	
13.0	Medium Dense Brown SILTY CLAYEY SAND (SC/SM-Dry)					
15		S-3	16.0	--	--	
20		S-4	21.0	--	--	
21.0	End of Boring					
25						
30						

Boring Date: 11-16-99
Field Engineer/Technician: M. Polsky
Driller: M. Stroud
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
No Water		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B- 5

Guadalupe Drainage Improvement Project

Highline Canal, Baseline Rd. to Elliot Rd.

Guadlaupe, Arizona

Project No.: 990906SA

Rig Type: CME-75
Boring Type: Hollow Stem Auger
Surface Elevation: N/A

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 – 25 – 50)
0	Dense Light Brown CLAYEY SAND (SC-Dry)					
5		S-1	6.0	--	--	
8.0						
10	Very Dense Light Brown CLAYEY SAND (SC-Dry) with Moderate Calcareous Cementation	S-2	11.0	--	--	52/12"
15		BS-3	15.0	--	--	
16.0	End of Boring	S-4	16.0	--	--	
20						
25						
30						

Boring Date: 11-16-99
Field Engineer/Technician: M. Polsky
Driller: M. Stroud
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
No Water		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B- 6

Guadalupe Drainage Improvement Project

Highline Canal, Baseline Rd. to Elliot Rd.

Guadlaupe, Arizona

Project No.: 990906SA

Rig Type: CME-75
Boring Type: Hollow Stem Auger
Surface Elevation: N/A

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 – 25 – 50)
0	Brown SILTY SAND (SM-Dry)					
1.5						
	Dense Brown CLAYEY SILTY SAND (SC/SM-Dry)					
5		S-1	6.0	--	--	
8.0						
	Very Dense Light Brown SILTY SAND (SM-Dry) with Little Gravel	BS-2	9.5	--	--	
10						
15						
16.0	End of Boring	S-3	16.0	--	--	
20						
25						
30						

Boring Date: 11-16-99
Field Engineer/Technician: M. Polsky
Driller: M. Stroud
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
No Water		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B- 7

Guadalupe Drainage Improvement Project

Highline Canal, Baseline Rd. to Elliot Rd.

Guadlaupe, Arizona

Project No.: 990906SA

Rig Type: CME-75
Boring Type: Hollow Stem Auger
Surface Elevation: N/A

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 – 25 – 50)
0	Medium Dense to Dense Light Brown SILTY SAND (SM-Dry) with Trace Gravel					
5		S-1	6.0	--	--	
10		S-2	11.0	--	--	
13.0						
15	Dense to Very Dense Light Brown CLAYEY SILTY SAND (SC/SM-Dry)	S-3	15.5	--	--	50/6"
		BS-4	19.5	--	--	
20	Trace Gravel	S-5	21.0	--	--	
22.5						
25	Very Dense Light Brown SILTY SAND (SM-Dry) And Gravel	S-6	24.7	--	--	50/2"
	Cobbles Present					
27.0	Auger Refusal on Cobbles					
30						

Boring Date: 11-17-99
Field Engineer/Technician: M. Polsky
Driller: M. Stroud
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
No Water		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B- 8

Guadalupe Drainage Improvement Project

Highline Canal, Baseline Rd. to Elliot Rd.

Guadlaupe, Arizona

Project No.: 990906SA

Rig Type: CME-75
Boring Type: Hollow Stem Auger
Surface Elevation: N/A

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 – 25 – 50)
0	Very Dense Light Brown CLAYEY SAND (SC-Dry) with Trace Gravel					
5		S-1	6.0	--	--	82/12"
10		S-2	10.5	--	--	50/6"
15		S-3	15.0	--	--	50/6"
	Gravel and Cobbles Present					
	18.0					
	Very Dense Gray SILTY GRAVEL (GM-Dry) With Cobbles					
	19.6	S-4	19.6	--	--	50/1"
20	End of Boring					
25						
30						

Boring Date: 11-17-99
Field Engineer/Technician: M. Polsky
Driller: M. Stroud
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
No Water		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B- 9

Guadalupe Drainage Improvement Project

Highline Canal, Baseline Rd. to Elliot Rd.

Guadlaupe, Arizona

Project No.: 990906SA

Rig Type: CME-75
Boring Type: Hollow Stem Auger
Surface Elevation: N/A

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 – 25 – 50)
0	Medium Dense to Very Dense Light Brown SILTY SAND (SM-Dry) with Trace Gravel to 9.5 Feet	RS-1	2.0	3.3	109.8	
5		S-2	6.0	--	--	
10		S-3	11.0	--	--	60/12"
15		S-4	15.0	--	--	50/6"
20	21.0 End of Boring	S-5	21.0	--	--	
25						
30						

Boring Date: 11-17-99
Field Engineer/Technician: M. Polsky
Driller: M. Stroud
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
No Water		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B-10

Guadalupe Drainage Improvement Project

Highline Canal, Baseline Rd. to Elliot Rd.

Guadlaupe, Arizona

Project No.: 990906SA

Rig Type: CME-75
Boring Type: Hollow Stem Auger
Surface Elevation: N/A

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 – 25 – 50)
0	Very Dense Light Brown CLAYEY SAND (SC-Dry) with Trace to Little Gravel					
5		RS-1	5.3	4.3	97.3	50/10"
8.0						
10	Very Dense Light Brown CLAYEY SILTY SAND (SC/SM-Dry)	S-2	11.0	--	--	51/12"
15		S-3	16.0	--	--	
17.0						
20	Very Dense Light Gray SILTY SAND (SM-Dry) with Trace to Little Gravel					
21.0	End of Boring	S-4	21.0	--	--	90/12"
25						
30						

Boring Date: 11-17-99
Field Engineer/Technician: M. Polsky
Driller: M. Stroud
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
No Water		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B-11

Guadalupe Drainage Improvement Project

Highline Canal, Baseline Rd. to Elliot Rd.

Guadlaupe, Arizona

Project No.: 990906SA

Rig Type: CME-75
Boring Type: Hollow Stem Auger
Surface Elevation: N/A

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 – 25 – 50)
0	Dense Brown CLAYEY SILTY SAND (SC/SM-Dry)					
5		S-1	6.0	--	--	
7.5	Medium Dense to Very Dense Light Brown to Grayish Brown CLAYEY SAND (SC-Dry) with Trace to Little Gravel					
10		S-2	11.0	--	--	60/12"
15		S-3	16.0	--	--	
	Cobbles Present					
20		S-4	21.0	--	--	
25		S-5	26.0	--	--	
29.0	Auger Refusal on Cobbles					
30						

Boring Date: 11-17-99
Field Engineer/Technician: M. Polsky
Driller: M. Stroud
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
No Water		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B-12

Guadalupe Drainage Improvement Project

Highline Canal, Baseline Rd. to Elliot Rd.

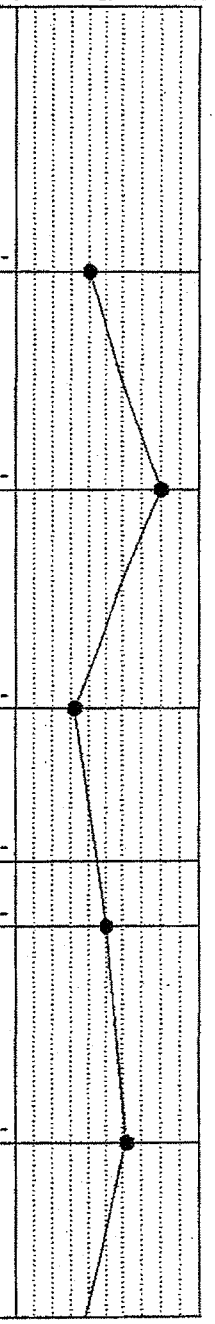
Guadlaupe, Arizona

Project No.: 990906SA

Rig Type: CME-75
Boring Type: Hollow Stem Auger
Surface Elevation: N/A

Depth (feet)	Visual Classification
0	Medium Dense to Dense Brown to Light Brown CLAYEY SAND (SC-Dry)
5	
10	Moderate Calcareous Cementation
15	Weak Calcareous Cementation
20	
25	
30	

Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot
S-1	6.0	--	--	
S-2	11.0	--	--	
S-3	16.0	--	--	
BS-4	19.5	--	--	
S-5	21.0	--	--	
S-6	26.0	--	--	



Boring Date: 11-17-99
Field Engineer/Technician: M. Polsky
Driller: M. Stroud
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
No Water		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B-13

Guadalupe Drainage Improvement Project

Highline Canal, Baseline Rd. to Elliot Rd.

Guadlaupe, Arizona

Project No.: 990906SA

Rig Type: CME-75
Boring Type: Hollow Stem Auger
Surface Elevation: N/A

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0–25–50)
30		S-7	31.0	--	--	
35		S-8	36.0	--	--	
	38.0					
40	Very Stiff Light Brown SANDY LEAN CLAY (CL-Dry) with Weak Calcareous Cementation	S-9	41.0	--	--	
	43.0					
45	Dense Light Brown CLAYEY SAND (SC-Dry) with Weak Calcareous Cementation	S-10	46.0	--	--	
50		S-11	51.0	--	--	
	53.0					
55	Very Dense Light Brown SILTY SAND (SM-Dry)	S-12	55.5	--	--	506/"
	58.0					
60	Hard Light Brown SANDY SILT (ML-Dry)					

Boring Date: 11-17-99
Field Engineer/Technician: M. Polsky
Driller: M. Stroud
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
No Water		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B-13

Guadalupe Drainage Improvement Project

Highline Canal, Baseline Rd. to Elliot Rd.

Guadlaupe, Arizona

Project No.: 990906SA

Rig Type: CME-75
Boring Type: Hollow Stem Auger
Surface Elevation: N/A

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 – 25 – 50)
60		S-13	61.0	--	--	86/12"
65		S-14	66.0	--	--	
	67.0 Very Dense Brown SILTY CLAYEY SAND (SC/SM-Dry)					
70		S-15	71.0	--	--	55/12"
75	76.0 End of Boring	S-16	76.0	--	--	56/12"
80						
85						
90						

Boring Date: 11-17-99
Field Engineer/Technician: M. Polsky
Driller: M. Stroud
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
No Water		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B-13

Guadalupe Drainage Improvement Project

Highline Canal, Baseline Rd. to Elliot Rd.

Guadlaupe, Arizona

Project No.: 990906SA

Rig Type: CME-75
Boring Type: Hollow Stem Auger
Surface Elevation: N/A

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 – 25 – 50)
0	Dense to Very Dense Light Brown CLAYEY SAND (SC-Dry) with Trace Gravel					
5		RS-1	5.5	5.1	97.3	
7.5	Very Stiff Light Brown SANDY SILT (ML-Dry)					
10		S-2	11.0	--	--	
15		S-3	16.0	--	--	55/12"
20		S-4	21.0	--	--	
21.0	End of Boring					
25						
30						

Boring Date: 11-17-99
Field Engineer/Technician: M. Polsky
Driller: M. Stroud
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
No Water		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B-14

Guadalupe Drainage Improvement Project

Highline Canal, Baseline Rd. to Elliot Rd.

Guadlaupe, Arizona

Project No.: 990906SA

Rig Type: CME-75
Boring Type: Hollow Stem Auger
Surface Elevation: N/A

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 – 25 – 50)
0	Medium Dense to Very Dense Light Brown SILTY SAND (SM-Dry) with Trace Gravel					
5		S-1	6.0	--	--	55/12"
10		S-2	11.0	--	--	
12.5	Very Dense Brown CLAYEY SAND (SC-Dry) with Moderate Calcareous Cementation					
15		S-3	16.0	--	--	77/12"
20		S-4	21.0	--	--	
21.0	End of Boring					
25						
30						

Boring Date: 11-17-99
Field Engineer/Technician: M. Polsky
Driller: M. Stroud
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
No Water		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B-15

Guadalupe Drainage Improvement Project

Highline Canal, Baseline Rd. to Elliot Rd.

Guadlaupe, Arizona

Project No.: 990906SA

Rig Type: CME-60
Boring Type: Hollow Stem Auger
Surface Elevation: N/A

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0–25–50)
0	Loose to Medium Dense Brown SILTY FINE SAND (SM-Dry)	RS-1	2.0	--	--	
5		S-2	6.0	--	--	
8.5						
10	Stiff Light Brown SANDY SILT (ML-Dry) with Strong Calcareous Cementation	S-3	11.0	--	--	
13.5						
15	Medium Dense Brown SILTY FINE SAND (SM-Dry) with Moderate Calcareous Cementation	S-4	16.0	--	--	
20		S-5	21.0	--	--	
21.0	End of Boring					
25						
30						

Boring Date: 11-18-99
Field Engineer/Technician: T. Rheinschmidt
Driller: B. Freeman
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
No Water		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B-16

Guadalupe Drainage Improvement Project

Highline Canal, Baseline Rd. to Elliot Rd.

Guadlaupe, Arizona

Project No.: 990906SA

Rig Type: CME-60
Boring Type: Hollow Stem Auger
Surface Elevation: N/A

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 – 25 – 50)
0	Loose to Dense Brown SILTY FINE SAND (SM-Dry)					
5	with Strong Calcareous Cementation	BS-1	5.0	--	--	
		S-2	6.0	--	--	51/12"
8.5						
10	Very Stiff Brown to Light Gray FINE SANDY SILT (ML-Dry) with Moderate Calcareous Cementation	S-3	11.0	--	--	
13.5						
15	Medium Dense Brown to Light Brown VERY FINE SANDY SILT/SILTY SAND (ML/SM-Dry) with Moderate Calcareous Cementation	S-4	16.0	--	--	
20						
21.0	End of Boring	S-5	21.0	--	--	
25						
30						

Boring Date: 11-18-99
Field Engineer/Technician: T. Rheinschmidt
Driller: B. Freeman
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
No Water		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B-17

Guadalupe Drainage Improvement Project

Highline Canal, Baseline Rd. to Elliot Rd.

Guadlaupe, Arizona

Project No.: 990906SA

Rig Type: CME-60
Boring Type: Hollow Stem Auger
Surface Elevation: N/A

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)
0	Medium Dense Brown CLAYEY SAND (SC-Dry) with Moderate Calcareous Cementation				
5		RS-1	5.5	11.6	99.8
8.5					
10	Medium Dense Brown SILTY FINE SAND (SM-Dry) with Moderate Calcareous Cementation	S-2	11.0	--	--
15		S-3	16.0	--	--
20		S-4	21.0	--	--
21.0	End of Boring				
25					
30					

Penetration Resistance Blows per Foot (0, 25, 50)

Boring Date: 11-18-99
Field Engineer/Technician: T. Rheinschmidt
Driller: B. Freeman
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
No Water		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B-18

Guadalupe Drainage Improvement Project

Highline Canal, Baseline Rd. to Elliot Rd.

Guadlaupe, Arizona

Project No.: 990906SA

Rig Type: CME-60
Boring Type: Hollow Stem Auger
Surface Elevation: N/A

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 – 25 – 50)
0	Hard Brown CLAYEY SAND (SC-Dry) with Moderate Calcareous Cementation					
5		RS-1	5.5	--	--	
10		BS-2	10.0	--	--	
		S-3	11.0	--	--	
13.5						
15	Hard Brown to Light Brown FINE SANDY SILT (ML-Dry) with Moderate Calcareous Cementation	S-4	16.0	--	--	59/12"
18.5						
20	Medium Dense Brown SILTY FINE SAND (SM-Dry) with Moderate Calcareous Cementation	S-5	21.0	--	--	
21.0	End of Boring					
25						
30						

Boring Date: 11-18-99
Field Engineer/Technician: T. Rheinschmidt
Driller: B. Freeman
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
No Water		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B-19

Guadalupe Drainage Improvement Project

Highline Canal, Baseline Rd. to Elliot Rd.

Guadlaupe, Arizona

Project No.: 990906SA

Rig Type: CME-60
Boring Type: Hollow Stem Auger
Surface Elevation: N/A

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)
0	Medium Dense Brown CLAYEY SAND (SC-Dry) with Weak Calcareous Cementation				
5		RS-1	5.5	12.2	102.9
8.5					
10	Medium Dense Brown SILTY SAND (SM-Dry) with Moderate Calcareous Cementation	S-2	11.0	--	--
13.5					
15	Very Stiff Brown SANDY SILT (ML-Dry) with Moderate Calcareous Cementation	S-3	16.0	--	--
20		S-4	21.0	--	--
21.0	End of Boring				
25					
30					

Penetration Resistance Blows per Foot (0, 25, 50)

Boring Date: 11-18-99
Field Engineer/Technician: T. Rheinschmidt
Driller: B. Freeman
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
No Water		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B-20

Guadalupe Drainage Improvement Project

Highline Canal, Baseline Rd. to Elliot Rd.

Guadlaupe, Arizona

Project No.: 990906SA

Rig Type: CME-75
Boring Type: Hollow Stem Auger
Surface Elevation: N/A

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 – 25 – 50)
0	Medium Dense to Dense Brown CLAYEY SAND (SC-Dry)					
5		S-1	6.0	--	--	
10	with Moderate Calcareous Cementation	BS-2	10.0	--	--	
		S-3	11.0	--	--	
15		S-4	16.0	--	--	
20		S-5	21.0	--	--	
21.0	End of Boring					
25						
30						

Boring Date: 11-18-99
Field Engineer/Technician: M. Polsky
Driller: M. Stroud
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
No Water		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B-21

Guadalupe Drainage Improvement Project

Highline Canal, Baseline Rd. to Elliot Rd.

Guadlaupe, Arizona

Project No.: 990906SA

Rig Type: CME-75
Boring Type: Hollow Stem Auger
Surface Elevation: N/A

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0–25–50)
0	Medium Dense Brown CLAYEY SAND (SC-Dry)					
5		S-1	6.0	--	--	
10		S-2	11.0	--	--	
15	Trace Gravel	S-3	16.0	--	--	
20		S-4	21.0	--	--	
21.0	End of Boring					
25						
30						

Boring Date: 11-18-99
Field Engineer/Technician: M. Polsky
Driller: M. Stroud
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
No Water		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B-22

Guadalupe Drainage Improvement Project

Highline Canal, Baseline Rd. to Elliot Rd.

Guadlaupe, Arizona

Project No.: 990906SA

Rig Type: CME-75
Boring Type: Hollow Stem Auger
Surface Elevation: N/A

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0–25–50)
0	Medium Dense Brown SILTY SAND (SM-Dry)					
		BS-1	4.5	--	--	
5		S-2	6.0	--	--	
10	9.5 to 14.5 Feet: Trace Gravel	S-3	11.0	--	--	
15		S-4	16.0	--	--	
20	21.0 End of Boring	S-5	21.0	--	--	
25						
30						

Boring Date: 11-18-99
Field Engineer/Technician: M. Polsky
Driller: M. Stroud
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
No Water		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B-23

Guadalupe Drainage Improvement Project

Highline Canal, Baseline Rd. to Elliot Rd.

Guadlaupe, Arizona

Project No.: 990906SA

Rig Type: CME-75
Boring Type: Hollow Stem Auger
Surface Elevation: N/A

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 – 25 – 50)
0	Dense to Very Dense Light Brown SILTY SAND (SM-Dry)					
5		S-1	6.0	--	--	
10	Moderate Calcareous Cementation	S-2	11.0	--	--	77/12"
15		S-3	16.0	--	--	
20		S-4	21.0	--	--	53/12"
21.0	End of Boring					
25						
30						

Boring Date: 11-18-99
Field Engineer/Technician: M. Polsky
Driller: M. Stroud
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
No Water		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B-24

Guadalupe Drainage Improvement Project

Highline Canal, Baseline Rd. to Elliot Rd.

Guadlaupe, Arizona

Project No.: 990906SA

Rig Type: CME-75
Boring Type: Hollow Stem Auger
Surface Elevation: N/A

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 – 25 – 50)
0	Medium Dense to Very Dense Brown to Light Brown CLAYEY SAND (SC-Dry)					
		BS-1	4.5	--	--	
5		S-2	6.0	--	--	
10		S-3	11.0	--	--	
15	Weak to Moderate Calcareous Cementation	S-4	16.0	--	--	76/12"
20		S-5	21.0	--	--	
21.0	End of Boring					
25						
30						

Boring Date: 11-18-99
Field Engineer/Technician: M. Polsky
Driller: M. Stroud
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
No Water		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B-25

Guadalupe Drainage Improvement Project

Highline Canal, Baseline Rd. to Elliot Rd.

Guadlaupe, Arizona

Project No.: 990906SA

Rig Type: CME-75
Boring Type: Hollow Stem Auger
Surface Elevation: N/A

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 – 25 – 50)
0	Brown SANDY SILT (ML-Dry)					
3.0						
5	Medium Dense Brown CLAYEY SAND (SC-Dry)	S-1	6.0	--	--	
10		S-2	11.0	--	--	
15		S-3	16.0	--	--	
20		S-4	21.0	--	--	
21.0	End of Boring					
25						
30						

Boring Date: 11-18-99
Field Engineer/Technician: M. Polsky
Driller: M. Stroud
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
No Water		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B-26

Guadalupe Drainage Improvement Project

Highline Canal, Baseline Rd. to Elliot Rd.

Guadlaupe, Arizona

Project No.: 990906SA

Rig Type: CME-75
Boring Type: Hollow Stem Auger
Surface Elevation: N/A

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0–50)
0	Brown SANDY SILT (ML-Dry)					
3.0						
5	Medium Dense Light Brown CLAYEY SAND (SC-Dry)	S-1	6.0	--	--	
7.5						
10	Dense Light Brown CLAYEY SILTY SAND (SC/SM-Dry) with Weak Calcareous Cementation	S-2	11.0	--	--	
15		S-3	16.0	--	--	
17.0						
20	Medium Dense Brown SILTY SAND (SM-Dry)	S-4	21.0	--	--	
21.0	End of Boring					
25						
30						

Boring Date: 11-18-99
Field Engineer/Technician: M. Polsky
Driller: M. Stroud
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
No Water		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B-27

Guadalupe Drainage Improvement Project

Highline Canal, Baseline Rd. to Elliot Rd.

Guadlaupe, Arizona

Project No.: 990906SA

Rig Type: CME-55
Boring Type: Hollow Stem Auger
Surface Elevation: N/A

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 – 25 – 50)
0	Loose Brown SILTY SAND (SM-Moist) with Trace Gravel	RS-1	2.0	NT	NT	
4.5						
5	Very Dense Brown SILTY SAND (SM-Dry) with Some Gravel	RS-2	6.0	NT	NT	52/12"
7.5						
	Very Dense Gray GNEISS Probable weathered bedrock from hill					
9.0	Auger Refusal on Bedrock					
10						
15						
20						

Boring Date: 3-22-00
Field Engineer/Technician: M. Polsky
Driller: D. Arwood
Contractor: Heber Mining

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: CB-1

Guadalupe Storm Drain - Assignment #8

NWC Avenida del Yaqui and Calle Cerritos

Guadalupe, Arizona

Project No.: 000256SA

_SPEEDIE 000256SA.GPJ GENGEO.GDT 3/23/00

Rig Type: CME-55
Boring Type: Hollow Stem Auger
Surface Elevation: N/A

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot
0	Loose Brown SILTY SAND (SM-Dry) with Trace Gravel	RS-1	2.0	NT	NT	
5	Very Dense Brown SILTY SAND (SM-Dry) with Some Gravel (5.0)	S-2	5.5	NT	NT	50/6"
10	Medium Dense Light Brown CLAYEY SAND (SC-Dry) with Trace Gravel and Weak Calcareous Cementation (7.5)	S-3	11.5	NT	NT	
15	Probable Bedrock: Gray SILTY GRAVEL (GM-Dry) (14.5)	S-4	15.1	NT	NT	50/1"
20	End of Boring (15.1)					

Penetration Resistance scale: 0, 25, 50

Boring Date: 3-22-00
Field Engineer/Technician: M. Polsky
Driller: D. Arwood
Contractor: Heber Mining

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: CB-2

Guadalupe Storm Drain - Assignment #8

NWC Avenida del Yaqui and Calle Cerritos

Guadalupe, Arizona

Project No.: 000256SA

_SPEEDIE 000256SA.GPJ GENGEO.GDT 3/23/00

Rig Type: CME-55
Boring Type: Hollow Stem Auger
Surface Elevation: N/A

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot
0	Loose Brown SILTY SAND (SM-Dry)					
1.5	Medium Dense Brown CLAYEY, SILTY SAND (SC/SM-Moist) with Trace Gravel	S-1	2.5	NT	NT	
4.0	Medium Dense Light Brown SILTY SAND (SM-Dry) with Little to Some Gravel and Weak Calcareous Cementation	RS-2	6.0	NT	NT	
9.0	Very Dense Light Brown CLAYEY SAND (SC-Dry) with Little Gravel and Moderate Calcareous Cementation	S-3	11.0	NT	NT	64/12"
11.0	End of Boring					

Penetration Resistance scale: 0, 25, 50

Boring Date: 3-22-00
Field Engineer/Technician: M. Polsky
Driller: D. Arwood
Contractor: Heber Mining

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: CB-3

Guadalupe Storm Drain - Assignment #8

NWC Avenida del Yaqui and Calle Cerritos

Guadalupe, Arizona

Project No.: 000256SA

_SPEEDIE 000256SA.GPJ GENGEO.GDT 3/23/00

Rig Type: CME-55
Boring Type: Hollow Stem Auger
Surface Elevation: N/A

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 – 25 – 50)
0	Firm Brown SANDY SILT (ML-Dry)					
		S-1	2.5	NT	NT	
4.0						
	Very Dense Light Brown SILTY SAND (SM-Dry) with Trace to Some Gravel and Moderate Calcareous Cementation	BS-2	4.5	NT	NT	
5		S-3	6.5	NT	NT	66/12"
10		S-4	10.5	NT	NT	50/6"
15.0		S-5	15.1	NT	NT	50/1"
15	Possible Bedrock: Gray GRAVEL					
15.1	End of Boring					
20						

Boring Date: 3-22-00
Field Engineer/Technician: M. Polsky
Driller: D. Arwood
Contractor: Heber Mining

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: CB-4

Guadalupe Storm Drain - Assignment #8

NWC Avenida del Yaqui and Calle Cerritos

Guadalupe, Arizona

Project No.: 000256SA

_SPEEDIE 000256SA.GPJ GENGEO.GDT 3/23/00

TABULATION OF TEST DATA

SOIL BORING or TEST PIT NUMBER	SAMPLE NUMBER	SAMPLE TYPE	DEPTH OF SAMPLE TIP	NATURAL WATER CONTENT (Percent of Dry Weight)	IN-PLACE DRY DENSITY (Pounds Per Cubic Foot)	PARTICLE SIZE DISTRIBUTION (Percent Finer)					ATTERBERG LIMITS			pH	RESISTIVITY (Ohm-Centimeters)	UNIFIED SOIL CLASSIFICATION	SPECIMEN DESCRIPTION
						#200 SIEVE	#40 SIEVE	#10 SIEVE	#4 SIEVE	3" SIEVE	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX				
B- 1	S-4	SPT	21.0	--	--	33.1	52	78	90	100	46	19	27	--	--	SC	CLAYEY SAND
B- 1	S-15	SPT	76.0	--	--	18.9	39	70	87	100	36	19	17	--	--	SC	CLAYEY SAND
B- 2	BS-1	BULK	4.5	--	--	27.7	47	78	92	100	27	23	4	7.8	537	SM	SILTY SAND
B- 3	RS-1	RS	5.5	8.1	99.6	52.1	76	94	99	100	34	22	12	--	--	CL	SANDY LEAN CLAY
B- 3	BS-2	BS	9.5	--	--	56.7	73	90	98	100	44	23	21	8.8	138	CL	SANDY LEAN CLAY
B- 4	BS-3	BS	14.5	--	--	34.8	54	78	92	100	41	23	18	--	--	SC	CLAYEY SAND
B- 5	RS-1	RS	5.5	9.5	99.5	30.6	44	70	86	100	38	23	15	--	--	SC	CLAYEY SAND
B- 6	BS-3	BS	15.0	--	--	34.1	50	75	90	100	38	22	16	--	--	SC	CLAYEY SAND
B- 7	BS-2	BS	9.5	--	--	28.3	42	64	80	100	31	23	8	8.3	826	SM	SILTY SAND with GRAVEL
B- 8	BS-4	BS	19.5	--	--	20.5	34	62	77	100	36	25	11	9.1	5368	SM	SILTY SAND with GRAVEL
B- 9	S-1	SPT	6.0	--	--	23.1	41	76	94	100	40	22	18	--	--	SC	CLAYEY SAND
B-10	RS-1	RS	2.0	3.3	109.8	40.2	64	84	94	100	22	21	1	--	--	SM	SILTY SAND
B-11	RS-1	RS	5.3	4.3	97.3	14.5	34	66	90	100	33	22	11	--	--	SC	CLAYEY SAND
B-12	S-2	SPT	11.0	--	--	40.0	58	82	93	100	43	25	18	--	--	SC	CLAYEY SAND
B-13	S-2	SPT	11.0	--	--	37.1	56	82	94	100	36	21	15	--	--	SC	CLAYEY SAND
B-13	BS-4	BS	19.5	--	--	38.2	59	86	96	100	34	20	14	8.4	4026	SC	CLAYEY SAND

Sieve analysis results do not include material greater than 3". Refer to the actual boring logs for the possibility of cobble and boulder sized materials.

Sheet 1 of 2

Guadalupe Drainage Improvement Project
Highline Canal, Baseline Rd. to Elliot Rd.
Guadlaupe, Arizona
Project No. 990906SA

SPEEDIE AND ASSOCIATES

TABULATION OF TEST DATA

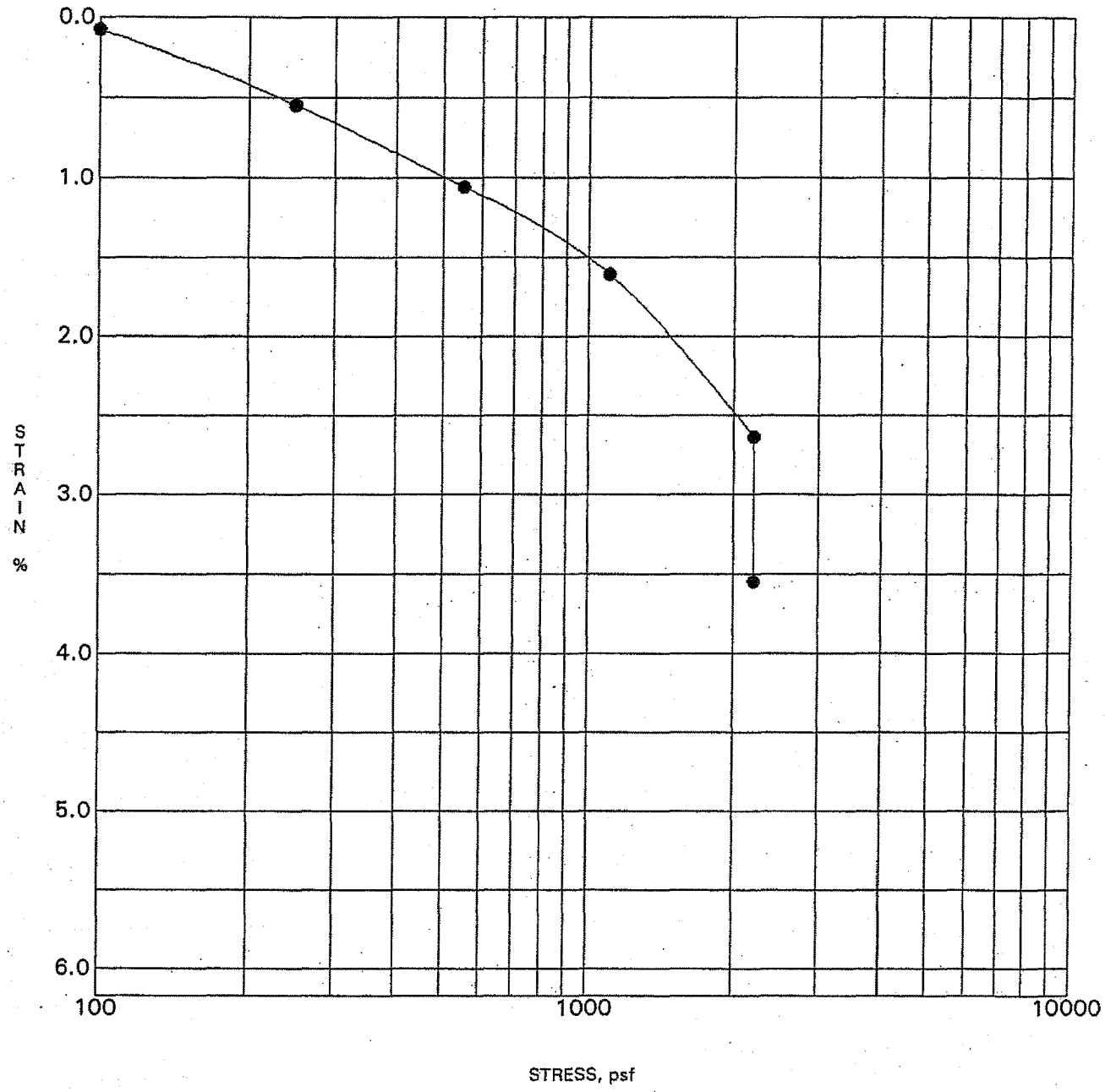
SOIL BORING or TEST PIT NUMBER	SAMPLE NUMBER	SAMPLE TYPE	DEPTH OF SAMPLE TIP	NATURAL WATER CONTENT (Percent of Dry Weight)	IN-PLACE DRY DENSITY (Pounds Per Cubic Foot)	PARTICLE SIZE DISTRIBUTION (Percent Finer)					ATTERBERG LIMITS			pH	RESISTIVITY (Ohm-Centimeters)	UNIFIED SOIL CLASSIFICATION	SPECIMEN DESCRIPTION
						#200 SIEVE	#40 SIEVE	#10 SIEVE	#4 SIEVE	3" SIEVE	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX				
B-13	S-15	SPT	71.0	--	--	23.8	42	77	94	100	27	21	6	--	--	SC-SM	SILTY, CLAYEY SAND
B-14	RS-1	RS	5.5	5.1	97.3	25.5	41	68	87	100	40	20	20	--	--	SC	CLAYEY SAND
B-15	S-3	SPT	16.0	--	--	46.3	69	90	99	100	52	23	29	--	--	SC	CLAYEY SAND
B-17	BS-1	BS	5.0	--	--	36.1	39	66	94	100	22	21	1	8.2	537	SM	SILTY SAND
B-18	RS-1	RS	5.5	11.6	99.8	35.3	55	85	95	100	44	22	22	--	--	SC	CLAYEY SAND
B-19	BS-2	BS	10.0	--	--	38.9	58	82	94	100	41	24	17	8.7	5368	SC	CLAYEY SAND
B-20	RS-1	RS	5.5	12.2	102.9	33.6	51	78	92	100	37	22	15	--	--	SC	CLAYEY SAND
B-21	BS-2	BS	10.0	--	--	41.6	61	85	96	100	38	22	16	8.6	1255	SC	CLAYEY SAND
B-22	S-2	SPT	11.0	--	--	46.6	69	90	98	100	40	23	17	--	--	SC	CLAYEY SAND
B-23	BS-1	BS	4.5	--	--	38.4	67	87	96	100	22	20	2	8.1	403	SM	SILTY SAND
B-25	BS-1	BS	4.5	--	--	43.4	69	90	97	100	27	19	8	8.3	660	SC	CLAYEY SAND

Sieve analysis results do not include material greater than 3". Refer to the actual boring logs for the possibility of cobble and boulder sized materials.

Guadalupe Drainage Improvement Project
Highline Canal, Baseline Rd. to Elliot Rd.
Guadlaupe, Arizona
Project No. 990906SA

SPEEDIE AND ASSOCIATES

CONSOLIDATION TEST



BORING B- 5

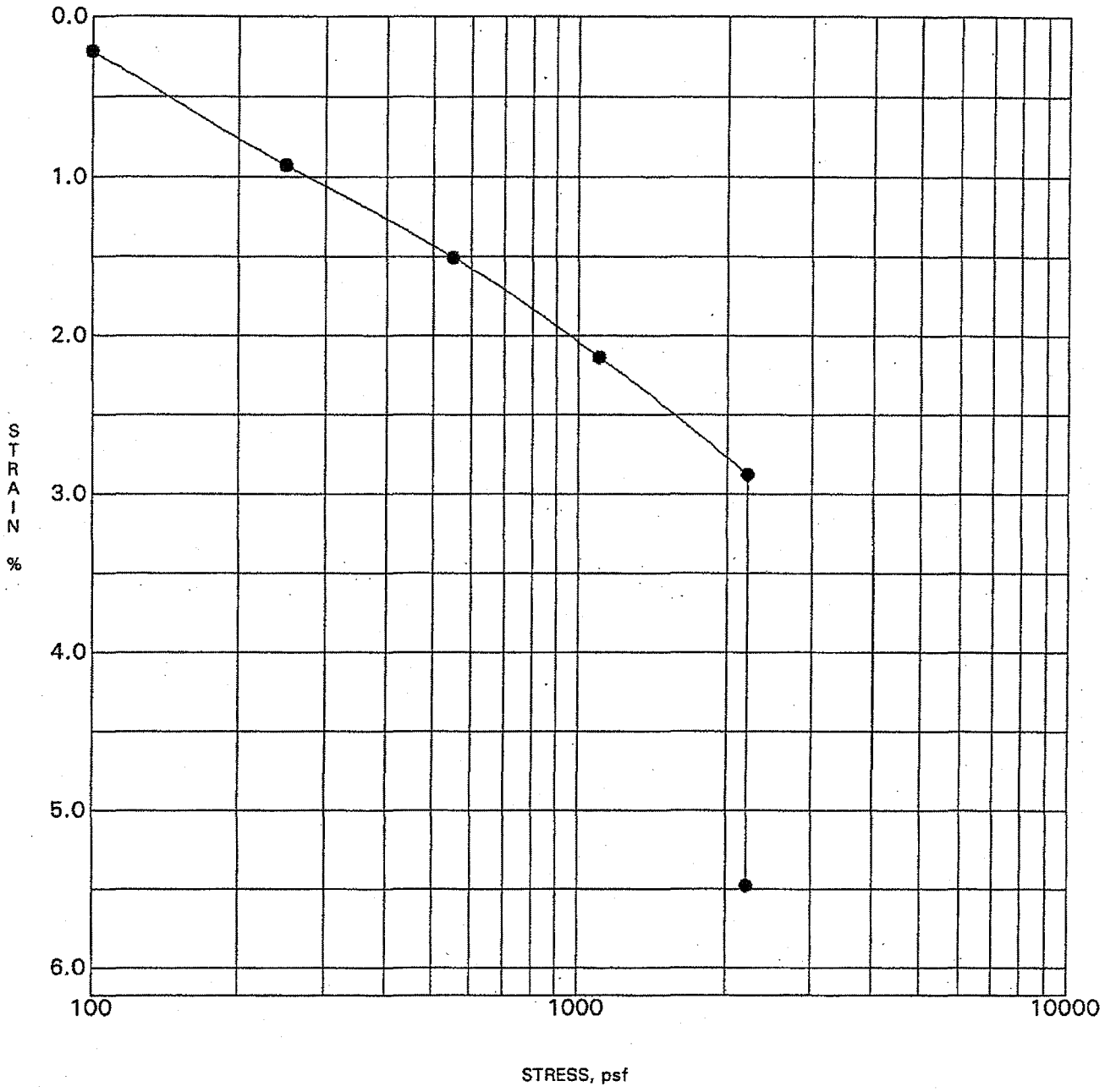
SAMPLE No. RS-1

Sample inundated at end of test at 2200 psf

PROJECT	Guadalupe Drainage Improvement Project - Highline Canal, Baseline Rd. to Elliot Rd.	JOB NO.	990906SA
		DATE	11/16/99

SPEEDIE AND ASSOCIATES

CONSOLIDATION TEST



BORING B-10

SAMPLE No. RS-1

Sample inundated at end of test at 2200 psf

PROJECT	Guadalupe Drainage Improvement Project - Highline Canal, Baseline Rd. to Elliot Rd.	JOB NO.	990906SA
		DATE	11/17/99

SPEEDIE AND ASSOCIATES

SWELL TEST DATA

BORING or TEST PIT No.	SAMPLE DEPTH, ft	REMOLDED DRY DENSITY (pcf)	INITIAL MOISTURE (%)	PERCENT COMPACTION	INITIAL DEGREE of SATURATION (%)	FINAL DEGREE of SATURATION (%)	TOTAL SWELL (%)
B- 2 BS-1	4.5	117.9	8.4	95.0	55.5	84.9	1.0

PERCENT COMPACTION BASED ON A MAXIMUM DRY DENSITY OF 123.8 pcf @ 10.2 % MOISTURE

Guadalupe Drainage Improvement Project
Highline Canal, Baseline Rd. to Elliot Rd
Guadlaupe, Arizona
Project No. 990906SA

SPEEDIE AND ASSOCIATES

SWELL TEST DATA

BORING or TEST PIT No.	SAMPLE DEPTH, ft	REMOLDED DRY DENSITY (pcf)	INITIAL MOISTURE (%)	PERCENT COMPACTION	INITIAL DEGREE of SATURATION (%)	FINAL DEGREE of SATURATION (%)	TOTAL SWELL (%)
B- 7 BS-2	9.5	116.5	8.8	95.1	55.6	85.0	1.1

PERCENT COMPACTION BASED ON A MAXIMUM DRY DENSITY OF 122.2 pcf @ 10.5 % MOISTURE

Guadalupe Drainage Improvement Project
Highline Canal, Baseline Rd. to Elliot Rd.
Guadlaupe, Arizona
Project No. 990906SA

SPEEDIE AND ASSOCIATES

SWELL TEST DATA

BORING or TEST PIT No.	SAMPLE DEPTH, ft	REMOLDED DRY DENSITY (pcf)	INITIAL MOISTURE (%)	PERCENT COMPACTION	INITIAL DEGREE of SATURATION (%)	FINAL DEGREE of SATURATION (%)	TOTAL SWELL (%)
B-25 BS-1	4.5	114.4	9.7	94.7	57.6	82.9	1.1

PERCENT COMPACTION BASED ON A MAXIMUM DRY DENSITY OF 120.4 pcf @ 11.1 % MOISTURE

Guadalupe Drainage Improvement Project
Highline Canal, Baseline Rd. to Elliot Rd.
Guadlaupe, Arizona
Project No. 990906SA

SPEEDIE AND ASSOCIATES

MOISTURE-DENSITY RELATIONS

PROJECT: Guadalupe Drainage Improvement Project — PROJECT NO.: 990906SA

LOCATION: Highline Canal, Baseline Rd. to Elliot Rd. — DATE: 11/16/99

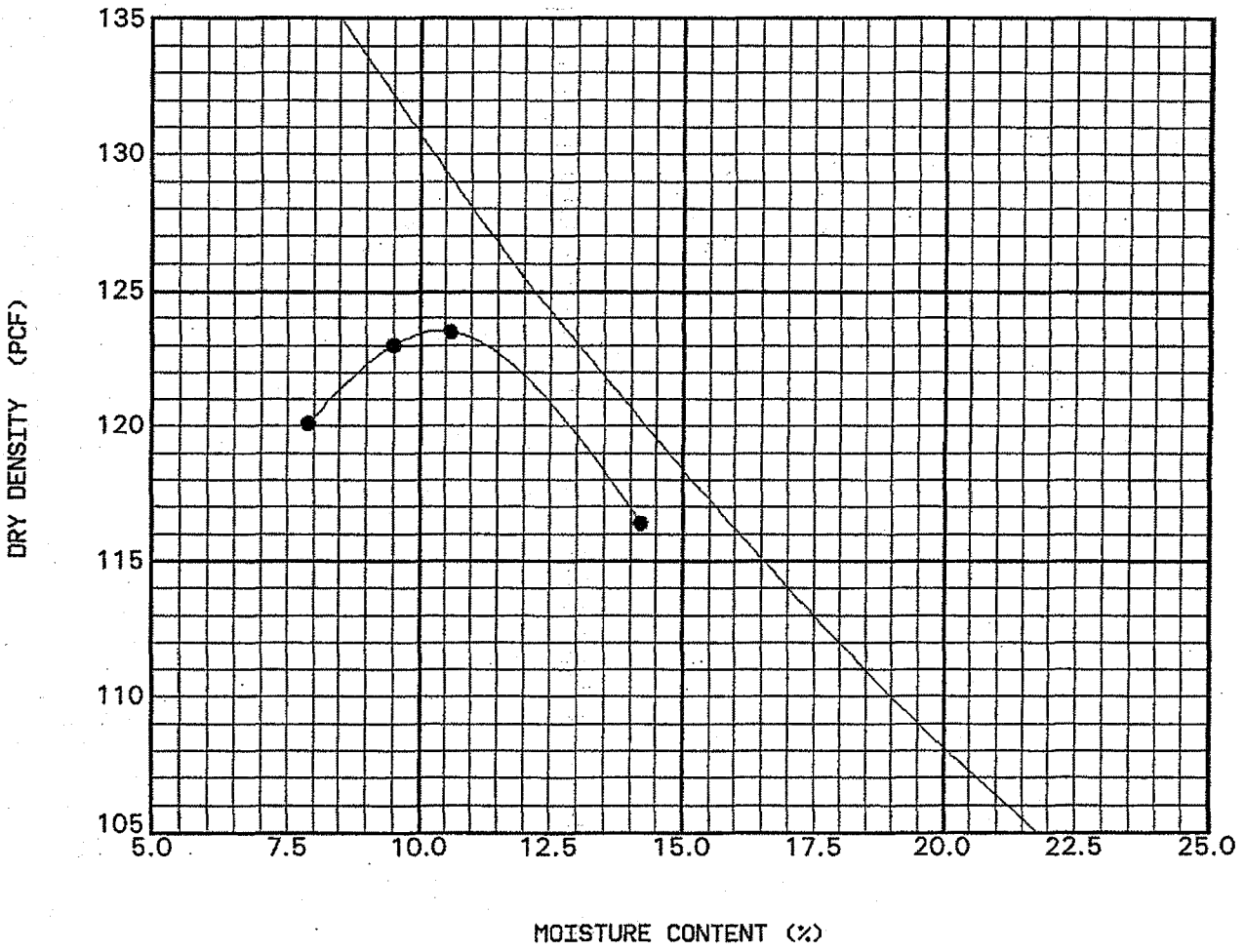
BORING NO.: B- 2 — SAMPLE NO.: BS-1' — SAMPLE DEPTH: 4.50

METHOD OF COMPACTION: ASTM D698A

LIQUID LIMIT: 27 — PLASTIC LIMIT: 23 — PLASTICITY INDEX: 4

CLASSIFICATION: SM — ASTM SOIL DESCRIPTION: SILTY SAND

MAXIMUM DRY DENSITY: 123.8 PCF — OPTIMUM MOISTURE CONTENT: 10.2 %



SPEEDIE AND ASSOCIATES

MOISTURE-DENSITY RELATIONS

PROJECT: Guadalupe Drainage Improvement Project — PROJECT NO.: 990906SA

LOCATION: Highline Canal, Baseline Rd. to Elliot Rd. — DATE: 11/16/99

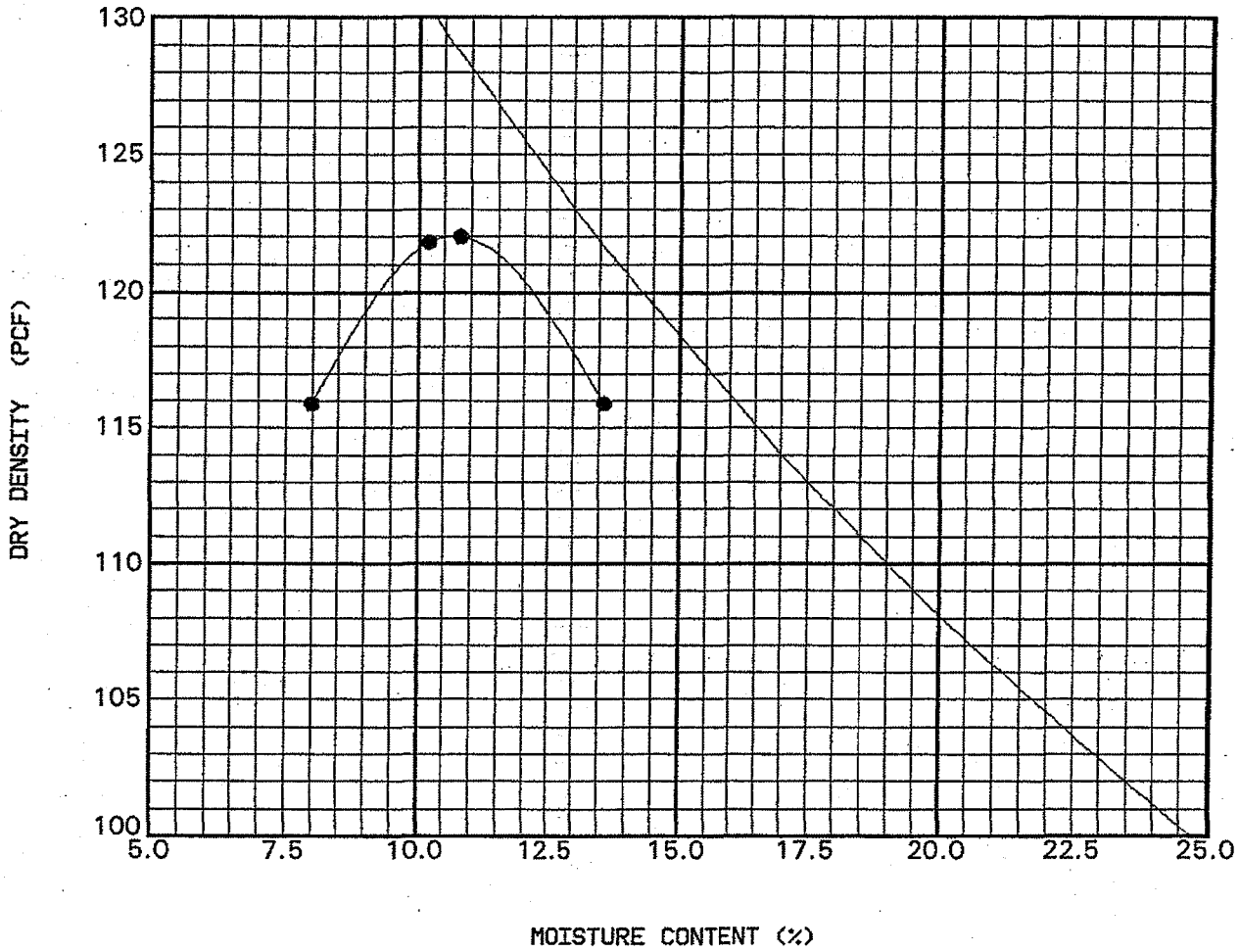
BORING NO.: B- 7 — SAMPLE NO.: BS-2' — SAMPLE DEPTH: 9.50

METHOD OF COMPACTION: ASTM D698A

LIQUID LIMIT: 31 — PLASTIC LIMIT: 23 — PLASTICITY INDEX: 7

CLASSIFICATION: SM — ASTM SOIL DESCRIPTION: SILTY SAND with GRAVEL

MAXIMUM DRY DENSITY: 122.2 PCF — OPTIMUM MOISTURE CONTENT: 10.5 %



SPEEDIE AND ASSOCIATES

MOISTURE-DENSITY RELATIONS

PROJECT: Guadalupe Drainage Improvement Project PROJECT NO.: 990906SA

LOCATION: Highline Canal, Baseline Rd. to Elliot Rd. DATE: 11/18/99

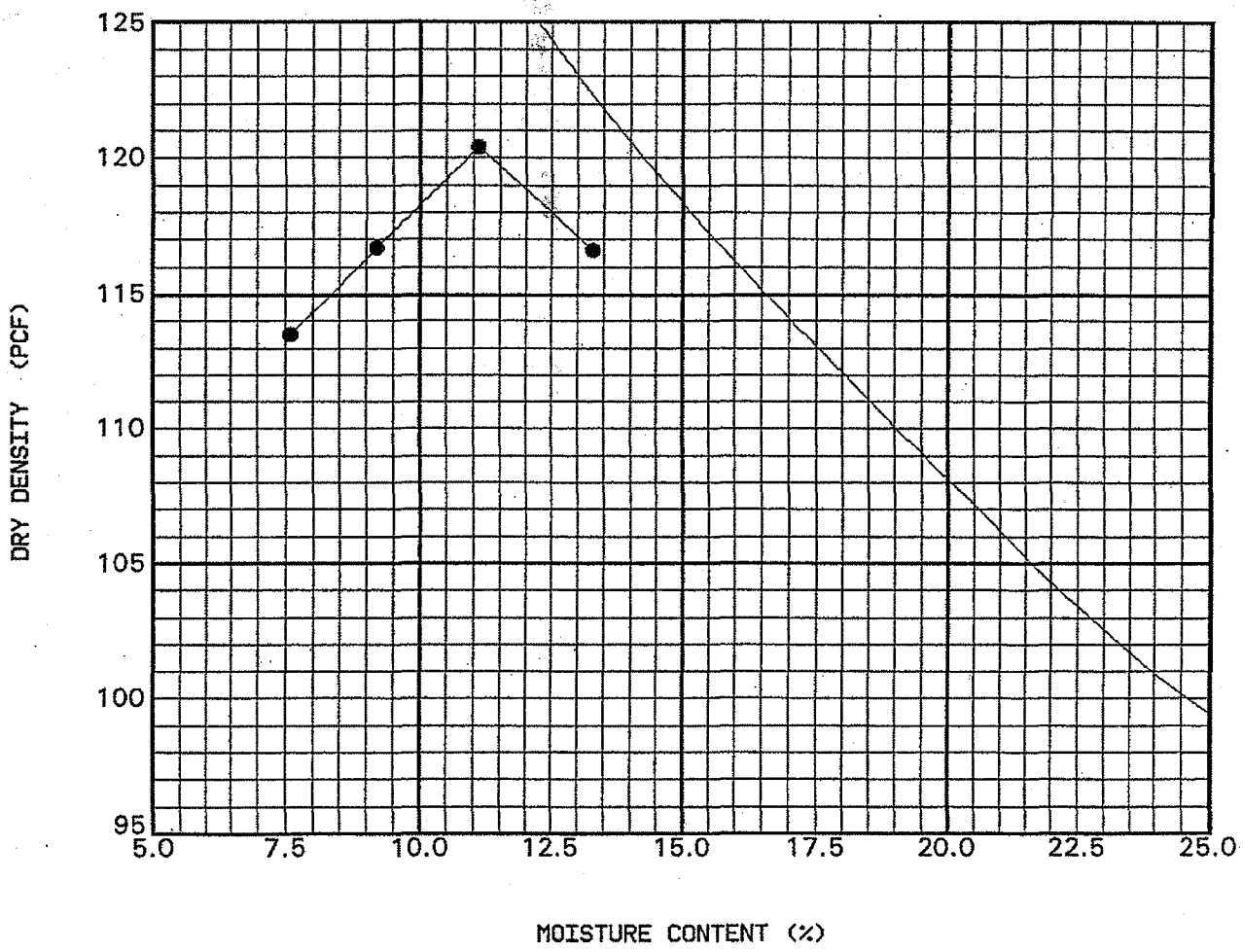
BORING NO.: B-25 SAMPLE NO.: BS-1' SAMPLE DEPTH: 4.50

METHOD OF COMPACTION: ASTM D698A

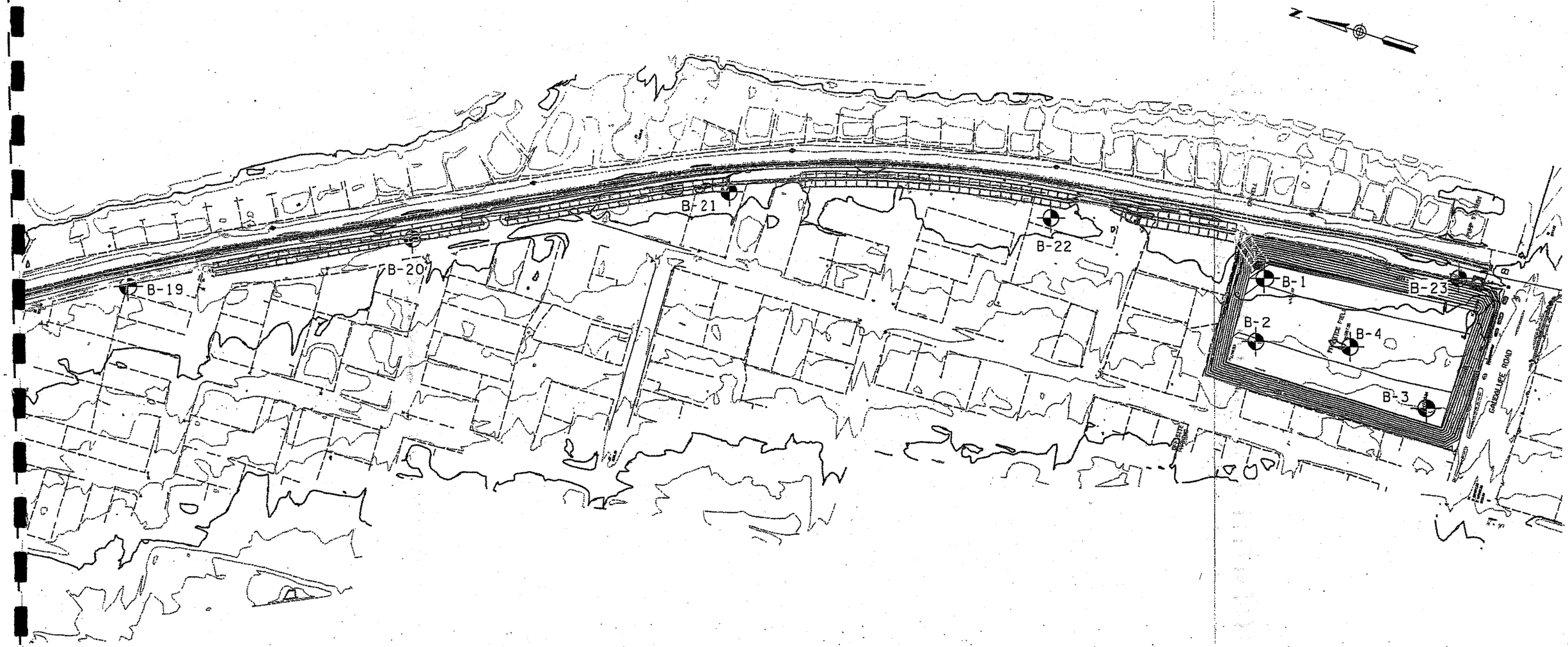
LIQUID LIMIT: 27 PLASTIC LIMIT: 19 PLASTICITY INDEX: 8

CLASSIFICATION: SC ASTM SOIL DESCRIPTION: CLAYEY SAND

MAXIMUM DRY DENSITY: 120.4 PCF OPTIMUM MOISTURE CONTENT: 11.1 %



SPEEDIE AND ASSOCIATES



CB-# - SOIL BORINGS PROVIDED FOR THE COUNTY

B-# - SOIL BORINGS PROVIDED FOR SVERDRUP

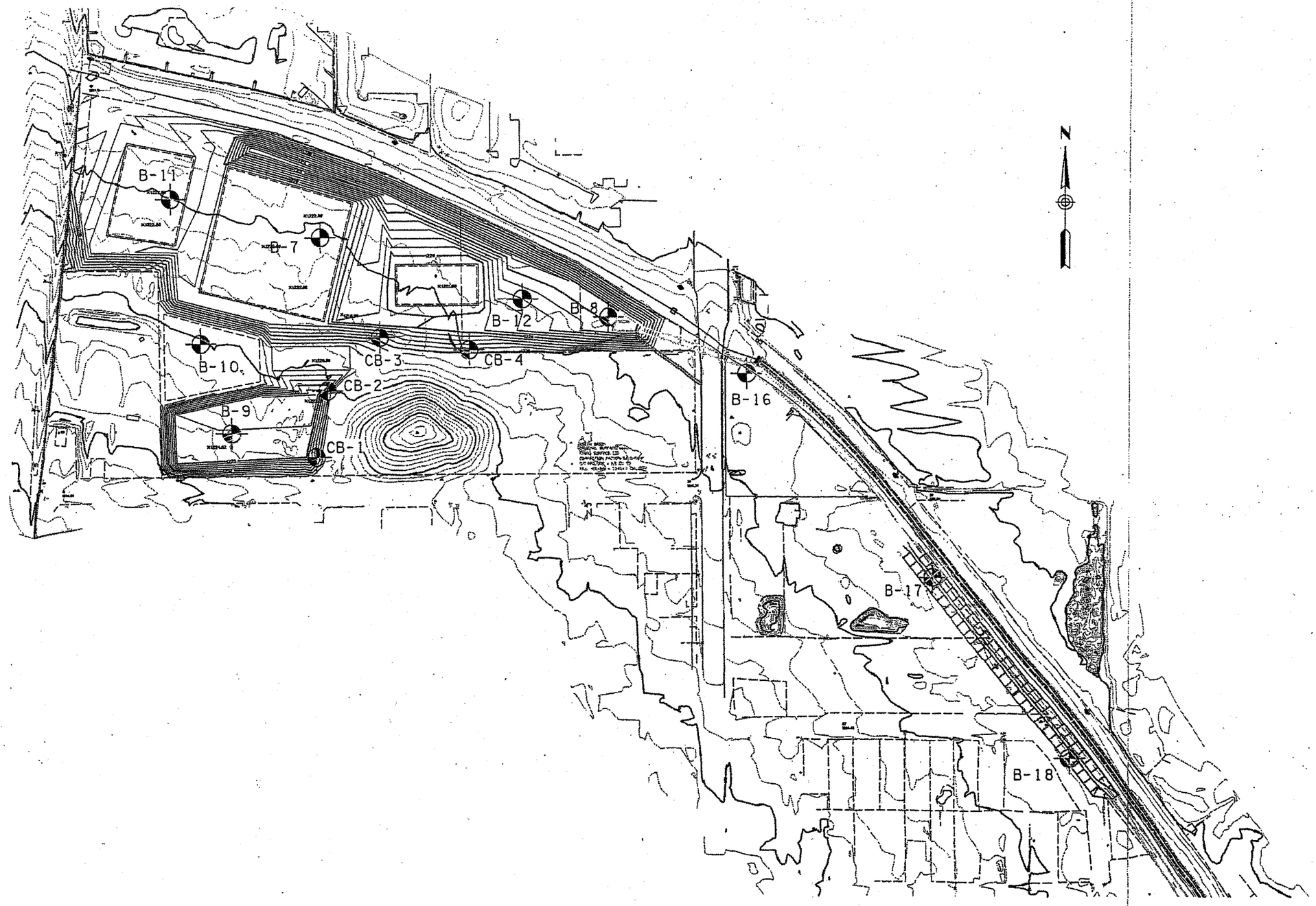
⊕ - APPROXIMATE SOIL BORING LOCATION

SOIL BORING LOCATION PLAN

GUADALUPE STORM DRAIN
NWC AVENIDA DEL YAQUI & CALLE CERRITO
GUADALUPE, ARIZONA

SPEEDIE AND ASSOCIATES
GEOTECHNICAL/ENVIRONMENTAL/MATERIALS ENGINEERS
11029 N. 24th AVE., SUITE 605 PHOENIX, ARIZONA 85029 (602) 997-6391

DES:	DR: JNM	CHK: GAC	DATE: 3-23-00	PROJ. NO.: 990906SA



CB-# - SOIL BORINGS PROVIDED FOR THE COUNTY

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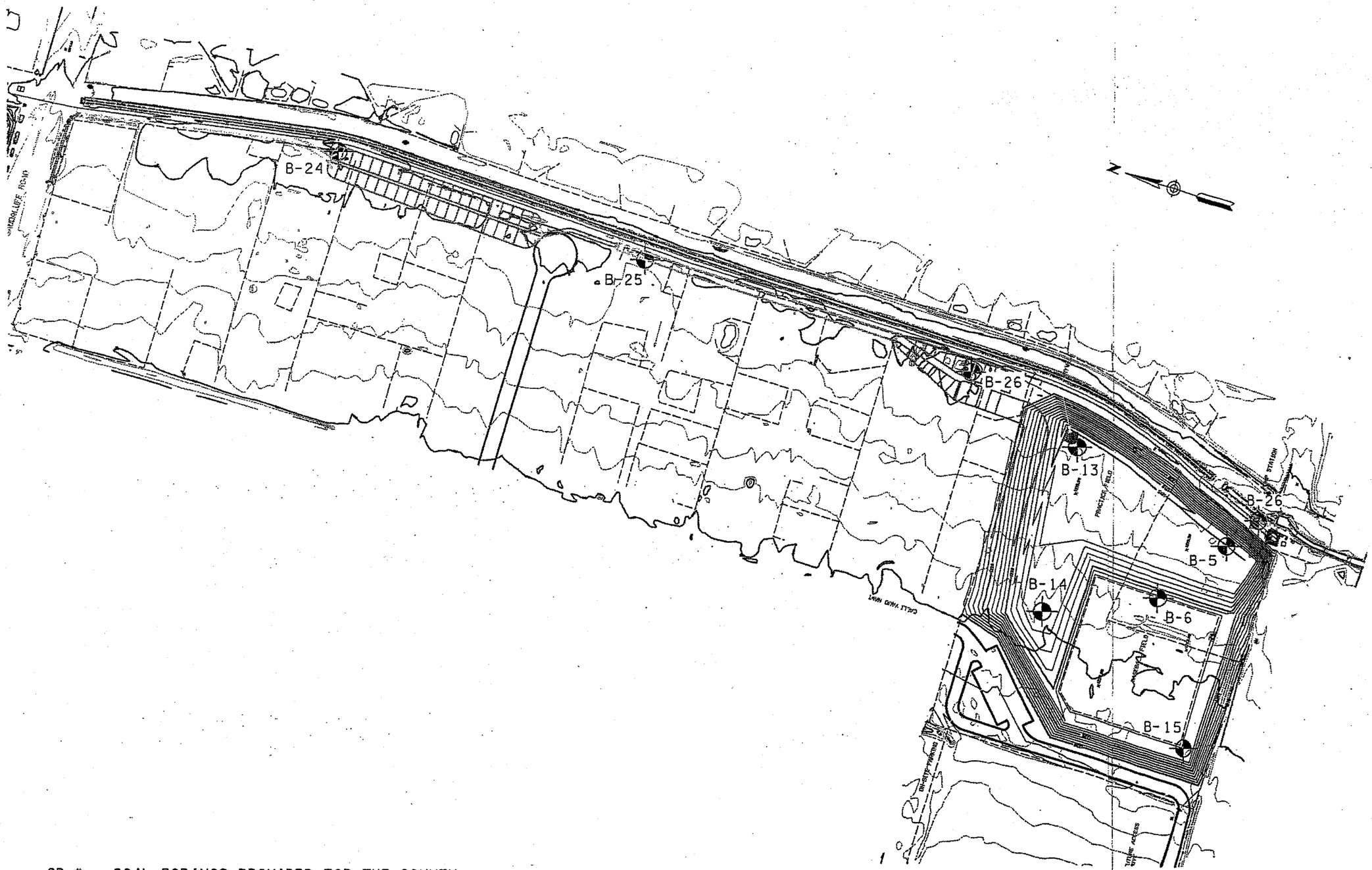
⊕ - APPROXIMATE SOIL BORING LOCATION

SOIL BORING LOCATION PLAN

GUADALUPE STORM DRAIN
NWC AVENIDA DEL YAQUI & CALLE CERRITO
GUADALUPE, ARIZONA

SPEEDIE AND ASSOCIATES
GEOTECHNICAL/ENVIRONMENTAL/MATERIALS ENGINEERS
11029 N. 24th AVE., SUITE 905 PHOENIX, ARIZONA 85029 (602) 997-6381

DES:	DR: JMM	CHK: GAC	DATE: 3-23-00	PROJ. NO.: 990906SA



CB-# - SOIL BORINGS PROVIDED FOR THE COUNTY

B-# - SOIL BORINGS PROVIDED FOR SVERDRUP

⊕ - APPROXIMATE SOIL BORING LOCATION

SOIL BORING LOCATION PLAN

GUADALUPE STORM DRAIN
NWC AVENIDA DEL YAQUI & CALLE CERRITO
GUADALUPE, ARIZONA

SPEEDIE AND ASSOCIATES
GEOTECHNICAL/ENVIRONMENTAL/MATERIALS ENGINEERS
11029 N. 24th AVE., SUITE 605 PHOENIX, ARIZONA 85029 (602) 997-6391

DES:	DR: JMM	CHK: GAC	DATE: 3-23-00	PROJ. NO.: 990906SA

Bolin Laboratories Inc.

17631 N. 25th Avenue • Phoenix, Arizona 85023
(602) 942 8220 • FAX (602) 942 1050

Speedie and Associates
11029 N. 24th Ave.
Suite 805
Phoenix, AZ 85029
Attn: Clay Spencer

Received: 11/19/99
Reported: 12/10/99
Invoice No: 059920

Project Name: Guadalupe Storm Drain (990906SA)

PARAMETER	METHOD	RESULTS	UNITS	PQL	DATE ANALYZED
Matrix: Soil					
Sample No: 9911-10582-001			Time Sampled: 14:30		
Sample ID: B-5, S-4, 21'			Date Sampled: 11/16/1999		
4,4'-DDD	EPA 8081	ND	ug/kg	10	12/07/99
4,4'-DDE	EPA 8081	ND	ug/kg	10	12/07/99
4,4'-DDT	EPA 8081	ND	ug/kg	10	12/07/99
Aldrin	EPA 8081	ND	ug/kg	10	12/07/99
alpha-BHC	EPA 8081	ND	ug/kg	10	12/07/99
Chlordane	EPA 8081	ND	ug/kg	10	12/07/99
delta-BHC	EPA 8081	ND	ug/kg	10	12/07/99
Dieldrin	EPA 8081	ND	ug/kg	10	12/07/99
Endosulfan I	EPA 8081	ND	ug/kg	10	12/07/99
Endosulfan II	EPA 8081	ND	ug/kg	10	12/07/99
Endosulfan Sulfate	EPA 8081	ND	ug/kg	10	12/07/99
Endrin	EPA 8081	ND	ug/kg	10	12/07/99
Endrin Aldehyde	EPA 8081	ND	ug/kg	10	12/07/99
Heptachlor	EPA 8081	ND	ug/kg	10	12/07/99
Heptachlor Epoxide	EPA 8081	ND	ug/kg	10	12/07/99
Lindane (gamma BHC)	EPA 8081	ND	ug/kg	10	12/07/99
Methoxychlor	EPA 8081	ND	ug/kg	10	12/07/99
Toxaphene	EPA 8081	ND	ug/kg	10	12/07/99
beta-BHC	EPA 8081	ND	ug/kg	10	12/07/99
Extraction	EPA 3550				11/24/99
Surrogate:	EPA 8081				12/07/99
***Dibutylchlorendate	EPA 8081	72	% Recovery		12/07/99
Matrix: Soil					
Sample No: 9911-10582-002			Time Sampled: 14:30		
Sample ID: B-14, S-4, 21'			Date Sampled: 11/16/1999		
4,4'-DDD	EPA 8081	ND	ug/kg	10	12/07/99
4,4'-DDE	EPA 8081	ND	ug/kg	10	12/07/99
4,4'-DDT	EPA 8081	ND	ug/kg	10	12/07/99
Aldrin	EPA 8081	ND	ug/kg	10	12/07/99

Bolin Laboratories Inc.

17631 N. 25th Avenue • Phoenix, Arizona 85023
(602) 942 8220 • FAX (602) 942 1050

Matrix: Soil
Sample No: 9911-10582-002
Sample ID: B-14, S-4, 21'

Time Sampled: 14:30
Date Sampled: 11/16/1999

PARAMETER	METHOD	RESULTS	UNITS	PQL	DATE ANALYZED
alpha-BHC	EPA 8081	ND	ug/kg	10	12/07/99
Chlordane	EPA 8081	ND	ug/kg	10	12/07/99
delta-BHC	EPA 8081	ND	ug/kg	10	12/07/99
Dieldrin	EPA 8081	ND	ug/kg	10	12/07/99
Endosulfan I	EPA 8081	ND	ug/kg	10	12/07/99
Endosulfan II	EPA 8081	ND	ug/kg	10	12/07/99
Endosulfan Sulfate	EPA 8081	ND	ug/kg	10	12/07/99
Endrin	EPA 8081	ND	ug/kg	10	12/07/99
Endrin Aldehyde	EPA 8081	ND	ug/kg	10	12/07/99
Heptachlor	EPA 8081	ND	ug/kg	10	12/07/99
Heptachlor Epoxide	EPA 8081	ND	ug/kg	10	12/07/99
Lindane (gamma BHC)	EPA 8081	ND	ug/kg	10	12/07/99
Methoxychlor	EPA 8081	ND	ug/kg	10	12/07/99
Toxaphene	EPA 8081	ND	ug/kg	10	12/07/99
beta-BHC	EPA 8081	ND	ug/kg	10	12/07/99
Extraction	EPA 3550				11/24/99
Surrogate:	EPA 8081				12/07/99
***Dibutylchlorendate	EPA 8081	74	% Recovery		12/07/99

Authorized Signatory
ADHS License No.: AZ0004

Bolin Laboratories Inc.

17631 N. 25th Avenue • Phoenix, Arizona 85023
(602) 942 8220 • FAX (602) 942 1050

EPA Method 8081 (Solid)
Quality Control Data Report

Bolin Sample ID: 9911-10582-001; 9911-10582-002; 9911-10583-002; 9911-10583-004

Date Analyzed: 12/7/99
Spike Concentration: 250 ug/Kg

Analyte	BLK (ppb)	LFB/MS Control Limits(%)	LFB Conc. (ppb)	LFB % Rec	LFBD Conc. (ppb)	LFBD % Rec	RPD	Sample Conc. (ppb)	MS Conc. (ppb)	MS % Rec	CCV % Rec
Alpha-BHC	< 1.0	70-130	253	101	263	105	4	< 1.0	270	108	105
Gamma-BHC (Lindane)	< 1.0	70-130	250	100	258	103	3	< 1.0	260	104	104
Beta- BHC	< 1.0	70-130	270	108	276	110	2	< 1.0	282	113	105
Delta-BHC	< 1.0	70-130	278	111	282	113	1	< 1.0	288	115	105
Heptachlor	< 1.0	70-130	243	97	244	98	1	< 1.0	247	99	101
Aldrin	< 1.0	70-130	253	101	262	105	4	< 1.0	265	106	104
Heptachlor Epoxide	< 1.0	70-130	261	104	266	106	2	< 1.0	270	108	104
Endosulfan I	< 1.0	70-130	265	106	271	108	2	< 1.0	276	110	104
4,4'-DDE	< 1.0	70-130	264	106	272	109	3	< 1.0	263	105	103
Dieldrin	< 1.0	70-130	262	105	269	107	3	< 1.0	272	109	104
Endrin	< 1.0	70-130	273	109	280	112	3	< 1.0	290	116	98
4,4'-DDD	< 1.0	70-130	270	108	276	110	2	< 1.0	278	111	104
Endosulfan II	< 1.0	70-130	268	107	276	110	3	< 1.0	277	111	108
4,4'-DDT	< 1.0	70-130	255	102	258	103	1	< 1.0	235	94	99
Endrin Aldehyde	< 1.0	70-130	238	95	242	97	1	< 1.0	212	85	107
Methoxychlor	< 1.0	70-130	279	112	279	111	0	< 1.0	294	118	102
Endosulfan Sulfate	< 1.0	70-130	263	105	270	108	3	< 1.0	270	108	105

Note:
BLK = Blank
LFB = Laboratory Fortified Blank
LFBD = Laboratory Fortified Blank Duplicate
RPD = Relative Percent Deviation
MS = Matrix Spike
CCV = Continuing Calibration Verification

Laboratory Consultants, Ltd.

January 11, 2000

Speedie & Associates
Mr. John Kelley
11029 North 24th Avenue
Phoenix, Arizona 85029

RE: Soil sample, Laboratory #991662
Project: 990906SA

Dear Mr. Kelley:

Transmitted with this letter is a Herbicide Bioassay report by Agri-Services for the above referenced samples. Laboratory numbers correspond to the following sample markings.

Laboratory Number	Sample Marking
991652-01	A1918
991652-01	A1920
991652-01	A1922
991652-01	A1925
991652-01	A1951

Respectfully submitted,

Harry Owens
Laboratory Director

Speedie991652.doc

RECEIVED
JAN 13 2000

947 South 48th Street, Suite 127 Tempe, Arizona 85281 Phone (480) 858-1841 Fax (480) 858-0752

MEMBER ACIL

APPENDIX C

FIELD AND LABORATORY INVESTIGATION

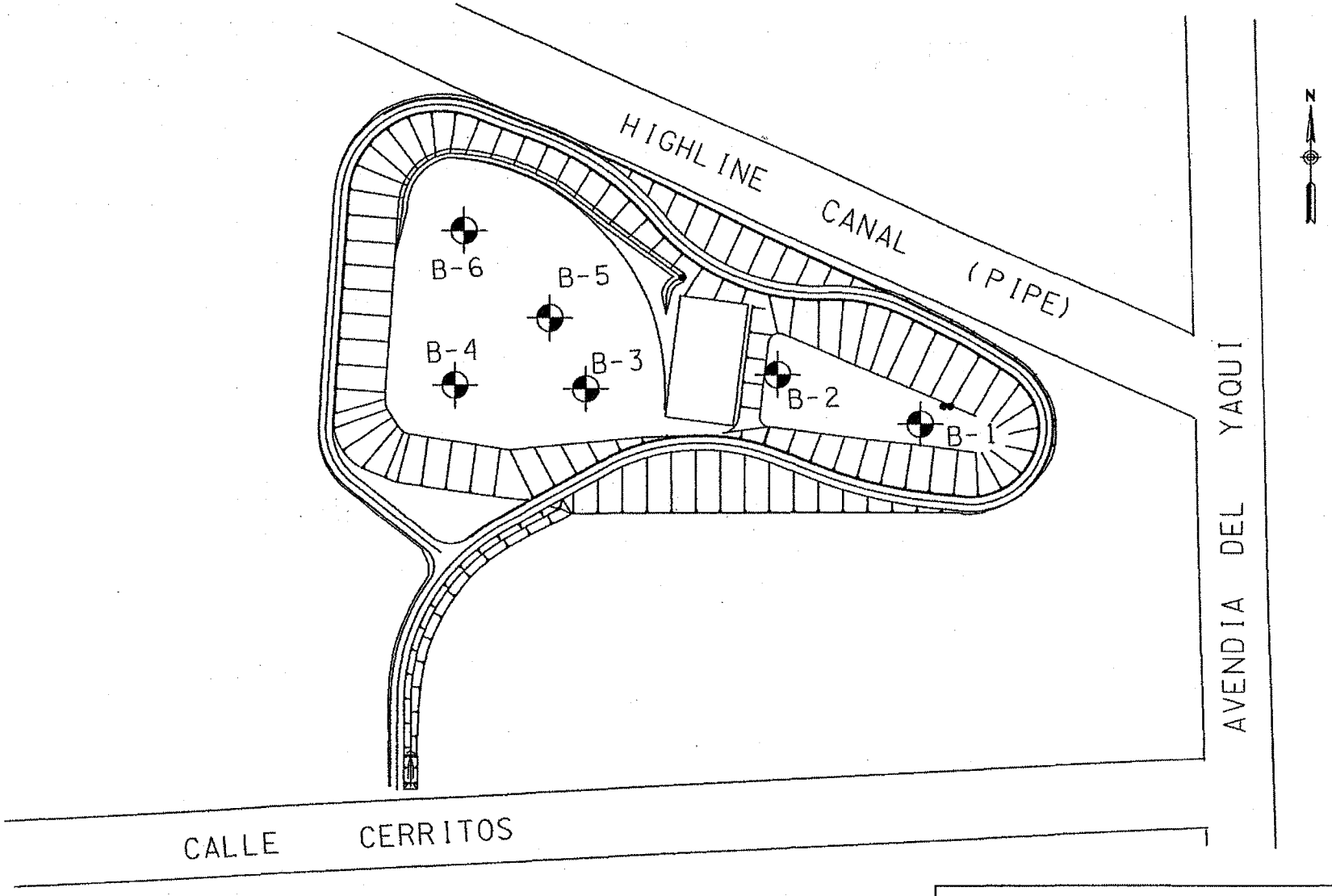
AGRONOMY LAB TESTS

FIELD AND LABORATORY INVESTIGATION

Only July 20, 2001 soil test borings were drilled at the approximate locations shown on the attached Soil Boring Location Plans. All exploration work was carried out under the full-time supervision of our staff geologist, who recorded subsurface conditions and obtained bulk samples for agronomy laboratory testing. The soil borings were advanced with truck-mounted CME-75 drill rig utilizing 7-inch diameter hollow stem flight augers.

Bulk samples were submitted to Laboratory Consultants for determining the soil fertility conditions and for recommendations for planting. All laboratory data is presented in this Appendix C.

Lab Sample No.	Boring	Sample Number	Depth, ft.
F9317	B-1	BS-1	0
F9318	B-1	BS-2	6
F9319	B-2	BS-1	0
F9320	B-2	BS-2	6
F9321	B-3	BS-1	0
F9322	B-3	BS-2	4
F9323	B-4	BS-1	0
F9324	B-4	BS-2	4.5
F9325	B-5	BS-1	0
F9326	B-5	BS-2	3
F9327	B-6	BS-1	0
F9328	B-6	BS-2	2.5
F9329	B-7	BS-1	0
F9330	B-7	BS-2	8.5
F9331	B-8	BS-1	0
F9332	B-8	BS-2	10
F9333	B-9	BS-1	0
F9334	B-9	BS-2	0
F9335	B-9	BS-3	8
F9336	B-10	BS-1	0
F9337	B-10	BS-2	0
F9338	B-10	BS-3	4.5



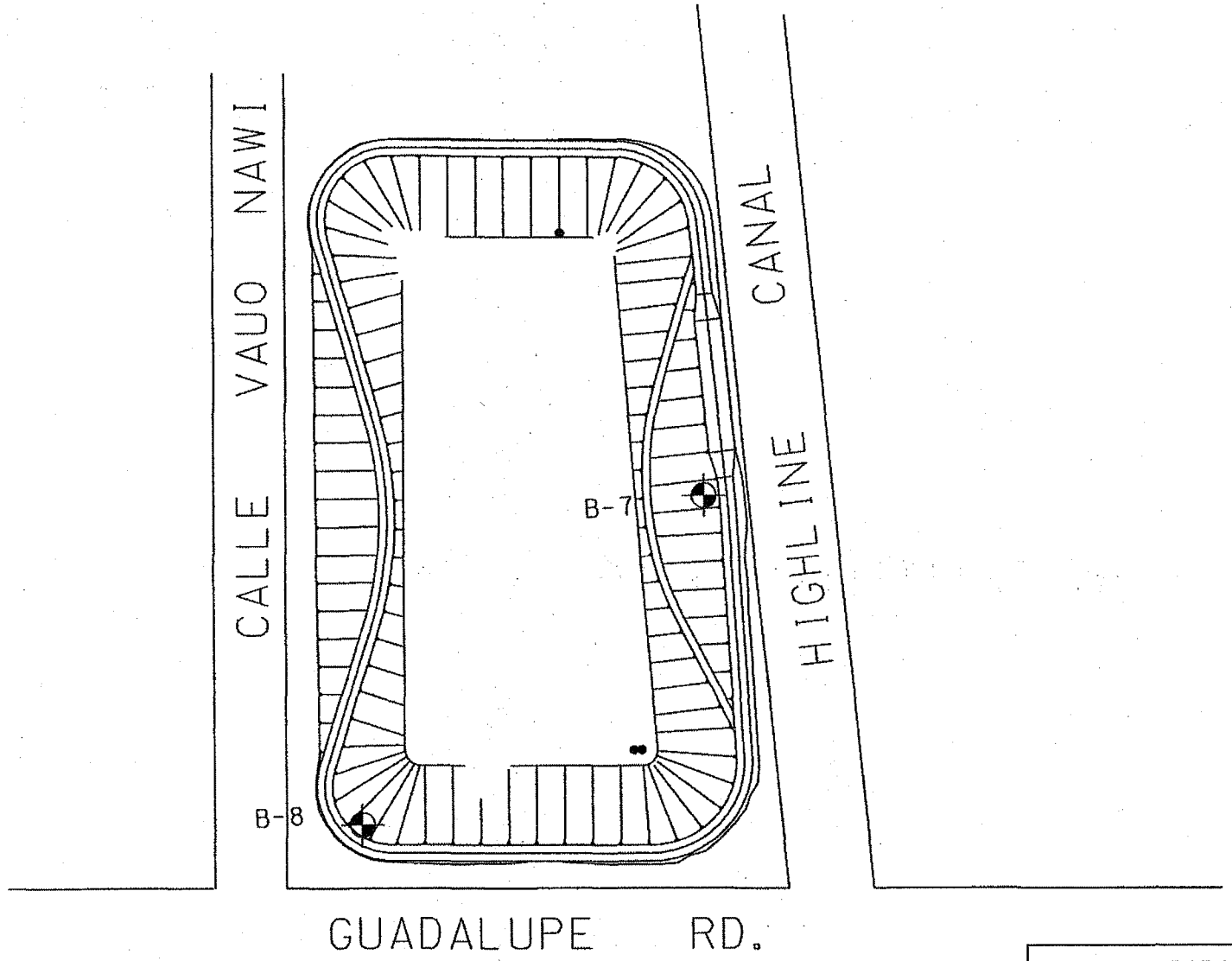
- APPROXIMATE SOIL BORING LOCATION

SOIL BORING LOCATION PLAN

GUADALUPE DRAINAGE IMPROVEMENTS
GUADALUPE & AVENDIA DEL YAQUI
GUADALUPE, ARIZONA

SPEEDIE AND ASSOCIATES
GEOTECHNICAL/ENVIRONMENTAL/MATERIALS ENGINEERS

DES:	DR: CMW	CHK: GC	DATE: 8/3/01	PROJ. NO.: 990906SB



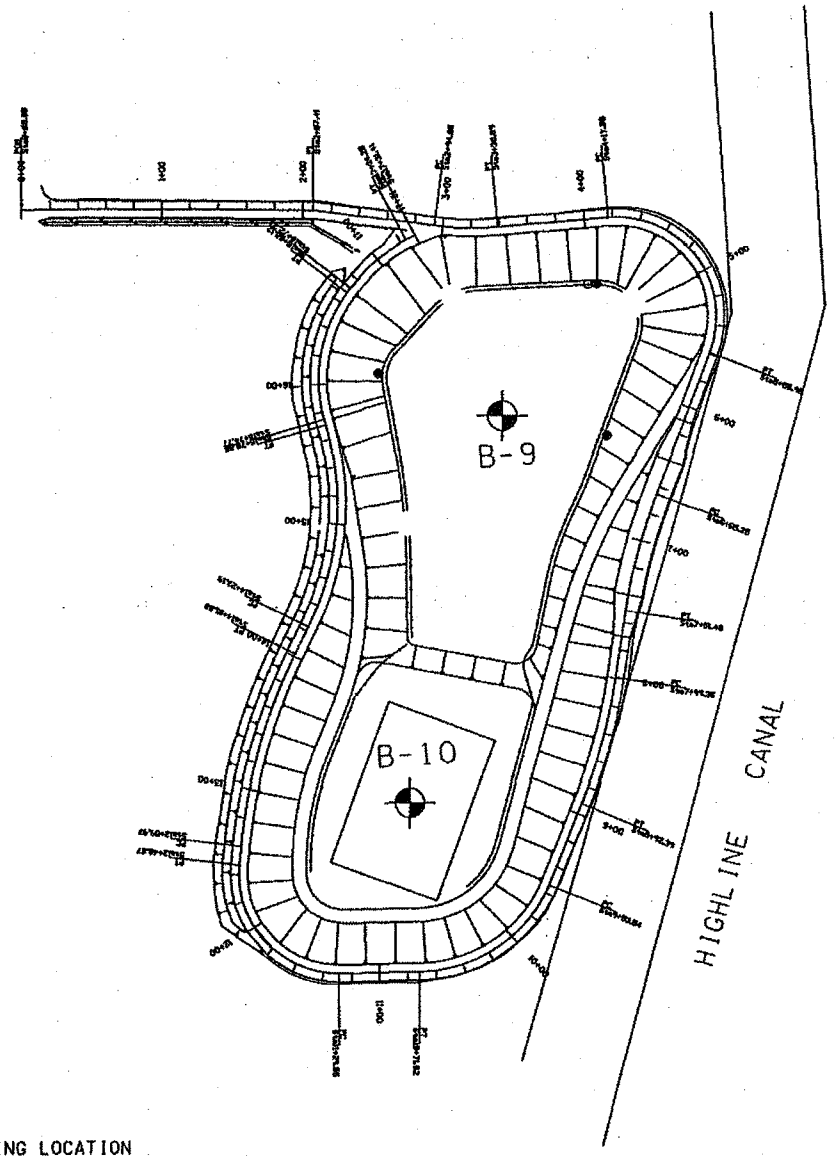
- APPROXIMATE SOIL BORING LOCATION

SOIL BORING LOCATION PLAN

GUADALUPE DRAINAGE IMPROVEMENTS
GUADALUPE & AVENIDA DEL YAQUI
GUADALUPE, ARIZONA

SPEEDIE AND ASSOCIATES
GEOTECHNICAL/ENVIRONMENTAL/MATERIALS ENGINEERS

DES:	DR: CMW	CHK: GC	DATE: 8/3/01	PROJ. NO.: 990906SB



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- APPROXIMATE SOIL BORING LOCATION

SOIL BORING LOCATION PLAN

GUADALUPE DRAINAGE IMPROVEMENTS
GUADALUPE & AVENIDA DEL YAQUI
GUADALUPE, ARIZONA

SPEEDIE AND ASSOCIATES
GEOTECHNICAL/ENVIRONMENTAL/MATERIALS ENGINEERS

DES:	DR: CMW	CHK: GC	DATE: 8/3/01	PROJ. NO.: 99090658

Laboratory Consultants, Ltd.

August 3, 2001

Speedie & Associates
Mr. Dave Rath
3331 E. Wood Street
Phoenix, Arizona 85040

RE: Soil samples, Laboratory #20010657
Project: 990906SB

Dear Mr. Rath:

Based on the enclosed soil fertility reports, pH is slightly to strongly alkaline. Normally, a preplant sulfur application is advisable to lower soil pH and improve nutrient availability. However, these soils have high boron levels. Acid amendments such as sulfur release bound boron form the soil, compounding the existing boron problem. Desert adapted species will tolerate alkaline pH better than high boron concentrations.

Salinity (electrical conductivity) is low in samples F9317, F9319, F9321, F9323, F9324, F9327, F9331, F9333, F9338, and F9336. No adverse effects due to salinity would be expected at these levels.

Salinity is high to very high in samples F9318, F9320, F9322, F9325, F9326, F9328, F9329, F9330, F9332, and F9335. Salinity in this range will have a negative effect on plant material in the form of slow growth, leaf burn and possibly plant mortality. It is imperative to reduce salinity in these areas before or at planting.

To correct the salinity problem, first determine if any soil physical problems such as compaction or abrupt textural change are present at the surface or in the subsoils. These conditions will restrict water movement into and through the root zone. If present, restrictive layers must be resolved to establish good drainage and reclaim the growing medium.

After drainage is established, apply a heavy irrigation to leach excess salts down and out of the root zone. Allow the soil to dry then apply another heavy irrigation. Repeat the irrigation and drying cycle 3 to 4 times.

Exchangeable sodium percentages are within the acceptable range. Water permeability problems and/or foliar burn due to excess sodium will not occur.

The organic matter content of these soils is low. An application of nitrogen stabilized mulch will increase water and nutrient holding capacity of the native soil.

Of the nutrients tested, only phosphorus is in the low to deficient range. Supplemental phosphorus should be applied preplant.

Boron is at potentially toxic levels in samples F9318, F9319, F9320, F9321, F9322, F9323, F9325, F9327, F9328, F9329, F9330, F9331, F9332, F9333, F9335, F9336, and F9338. Boron must be reduced by leaching as described above to reduce salinity. Because boron is released by acid amendment, soil sulfur should not be applied on this project.

Soil texture ranges from sandy loam to loam. Given the high salinity and boron levels present on this project, the light soil texture is quite desirable. While sandy loam soil has moderate water and nutrient holding capacity, this texture does have relatively high water permeability. As stated above, a porous, well-drained soil is necessary to leach salts and boron out of the root zone.

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Speedie & Associates
Project: 990906SB
Laboratory #20010657

Calcium carbonate content of these soils varies from a low of 1.2 percent to a high of 14.3 percent. These levels are typical for Southwest soils and suitable for growth of desert adapted species. In addition, excess calcium is desirable in this soil because calcium will mitigate the toxicity of boron.

On turf areas, apply 10 pounds ammonium phosphate (11-52-0) per 1000 square feet, preplant. Incorporate this material into the top 2 to 3 inches of soil. Organic matter is not cost effective on new turf. As the turf matures, organic matter will increase.

In planters, apply 15 pounds ammonium phosphate (11-52-0) and 5 cubic yards nitrogen stabilized mulch per 1000 square feet preplant. Incorporate these materials into the top 6 to 8 inches of soil.

For trees or shrubs under drip or bubbler irrigation, use a backfill mix consisting of 4 parts soil and 1 part nitrogen stabilized organic material. To this mix, add 0.5-pound ammonium phosphate (11-52-0) per cubic yard of backfill.

After plants are established maintain adequate available nitrogen levels. Apply fertilizer spikes or tablets to trees, shrubs or ground covers under drip or bubbler irrigation, according to label directions. To annuals and ground covers in beds, apply 1 pound actual nitrogen per 1000 square feet every 6 to 8 weeks during the active growing season. In turf areas, apply 1 pound nitrogen per 1000 square feet per month during active growing seasons. Water in nitrogen applications to incorporate.

Develop an irrigation schedule that applies heavy, infrequent waterings. This type of schedule promotes deep rooting, leaches salts, and allows root aeration.

If I can be of further assistance regarding this report, please call at your convenience.

Respectfully submitted,

Harry Owens
Laboratory Director
Certified Crop Advisor

SPEEDIE20010657.doc

Laboratory Consultants, Ltd.

SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-01

SAMPLE MARKING	F9317	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
pH, S.U.	7.8		
ELECTRICAL CONDUCTIVITY, mmhos/CM	1.3	L	
FREE LIME, --	Yes		
ORGANIC MATTER, %	0.4		
NITRATE-N, PPM	19		
AVAILABLE NITROGEN, lbs/A	89		3 Lbs/1000 Sq.Ft.
BICARBONATE PHOSPHORUS, PPM	7	L	3 Lbs/1000 Sq.Ft.
EXCHANGEABLE POTASSIUM, PPM	125	M	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE MAGNESIUM, PPM	240	M	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE CALCIUM, PPM	4901	VH	
EXCHANGEABLE SODIUM, PPM	170	M	
EXCHANGEABLE SODIUM PERCENTAGE, %	2.7		
COPPER, PPM	1.1	H	0 Oz/1000 Sq.Ft.
IRON, PPM	9.1	H	0 Oz/1000 Sq.Ft.
MANGANESE, PPM	6.5	H	0 Oz/1000 Sq.Ft.
ZINC, PPM	1.2	H	0 Oz/1000 Sq.Ft.
BORON, PPM	1.0	M	0 Oz/1000 Sq.Ft.
SULFATE-SULFUR, PPM	30		0 Lbs/1000 Sq.Ft.

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SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-01

SAMPLE MARKING	F9317	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
SAND, %	60.4		
SILT, %	26.8		
CLAY, %	12.8		
CLASSIFICATION, --	Sandy Loam		
CALCIUM CARBONATE, %	2.0		

Soil Depth = 12 Inches

There were no problems with the analyses and all data met laboratory quality assurance specifications.

Analyst

Laboratory Consultants, Ltd.

SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-02

SAMPLE MARKING	F9318	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
pH, S.U.	8.4		
ELECTRICAL CONDUCTIVITY, mmhos/CM	3.5	H	
FREE LIME, --	Yes		
ORGANIC MATTER, %	0.4		
NITRATE-N, PPM	48		
AVAILABLE NITROGEN, lbs/A	194		1 Lbs/1000 Sq.Ft.
BICARBONATE PHOSPHORUS, PPM	5	VL	5 Lbs/1000 Sq.Ft.
EXCHANGEABLE POTASSIUM, PPM	439	VH	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE MAGNESIUM, PPM	194	M	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE CALCIUM, PPM	2503	H	
EXCHANGEABLE SODIUM, PPM	65	L	
EXCHANGEABLE SODIUM PERCENTAGE, %	1.8		
COPPER, PPM	4.3	H	0 Oz/1000 Sq.Ft.
IRON, PPM	12.4	H	0 Oz/1000 Sq.Ft.
MANGANESE, PPM	4.6	H	0 Oz/1000 Sq.Ft.
ZINC, PPM	2.4	H	0 Oz/1000 Sq.Ft.
BORON, PPM	8.9	VH	0 Oz/1000 Sq.Ft.
SULFATE-SULFUR, PPM	240		0 Lbs/1000 Sq.Ft.

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SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-02

SAMPLE MARKING	F9318	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
SAND, %	42.4		
SILT, %	34.8		
CLAY, %	22.8		
CLASSIFICATION, --	Loam		
CALCIUM CARBONATE, %	14.3		

Soil Depth = 12 Inches

There were no problems with the analyses and all data met laboratory quality assurance specifications.

Analyst

Laboratory Consultants, Ltd.

SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-03

SAMPLE MARKING	F9319	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
pH, S.U.	7.6		
ELECTRICAL CONDUCTIVITY, mmhos/CM	0.6	VL	
FREE LIME, --	No		
ORGANIC MATTER, %	0.2		
NITRATE-N, PPM	15		
AVAILABLE NITROGEN, lbs/A	64		4 Lbs/1000 Sq.Ft.
BICARBONATE PHOSPHORUS, PPM	9	L	3 Lbs/1000 Sq.Ft.
EXCHANGEABLE POTASSIUM, PPM	139	M	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE MAGNESIUM, PPM	170	M	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE CALCIUM, PPM	1823	M	
EXCHANGEABLE SODIUM, PPM	98	L	
EXCHANGEABLE SODIUM PERCENTAGE, %	3.8		
COPPER, PPM	1.4	H	0 Oz/1000 Sq.Ft.
IRON, PPM	9.8	H	0 Oz/1000 Sq.Ft.
MANGANESE, PPM	6.3	H	0 Oz/1000 Sq.Ft.
ZINC, PPM	1.6	H	0 Oz/1000 Sq.Ft.
BORON, PPM	2.5	H	0 Oz/1000 Sq.Ft.
SULFATE-SULFUR, PPM	30		0 Lbs/1000 Sq.Ft.

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SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-03

SAMPLE MARKING	F9319	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
SAND, %	66.4		
SILT, %	22.8		
CLAY, %	10.8		
CLASSIFICATION, --	Sandy Loam		
CALCIUM CARBONATE, %	1.2		

Soil Depth = 12 Inches

There were no problems with the analyses and all data met laboratory quality assurance specifications.

Analyst

Laboratory Consultants, Ltd.

SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-04

SAMPLE MARKING	F9320	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
pH, S.U.	8.0		
ELECTRICAL CONDUCTIVITY, mmhos/CM	4.2	VH	
FREE LIME, --	Yes		
ORGANIC MATTER, %	0.6		
NITRATE-N, PPM	82		
AVAILABLE NITROGEN, lbs/A	327		0 Lbs/1000 Sq.Ft.
BICARBONATE PHOSPHORUS, PPM	4	VL	5 Lbs/1000 Sq.Ft.
EXCHANGEABLE POTASSIUM, PPM	322	VH	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE MAGNESIUM, PPM	182	M	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE CALCIUM, PPM	3937	H	
EXCHANGEABLE SODIUM, PPM	89	L	
EXCHANGEABLE SODIUM PERCENTAGE, %	1.7		
COPPER, PPM	7.6	H	0 Oz/1000 Sq.Ft.
IRON, PPM	10.4	H	0 Oz/1000 Sq.Ft.
MANGANESE, PPM	5.3	H	0 Oz/1000 Sq.Ft.
ZINC, PPM	4.8	H	0 Oz/1000 Sq.Ft.
BORON, PPM	3.1	VH	0 Oz/1000 Sq.Ft.
SULFATE-SULFUR, PPM	189		0 Lbs/1000 Sq.Ft.

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SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-04

SAMPLE MARKING	F9320	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
SAND, %	66.4		
SILT, %	24.8		
CLAY, %	8.8		
CLASSIFICATION, --	Sandy Loam		
CALCIUM CARBONATE, %	7.4		

Soil Depth = 12 Inches

There were no problems with the analyses and all data met laboratory quality assurance specifications.

Analyst

Laboratory Consultants, Ltd.

SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-05

SAMPLE MARKING	F9321	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
pH, S.U.	7.6		
ELECTRICAL CONDUCTIVITY, mmhos/CM	0.7	VL	
FREE LIME, --	Yes		
ORGANIC MATTER, %	1.0		
NITRATE-N, PPM	15		
AVAILABLE NITROGEN, lbs/A	106		3 Lbs/1000 Sq.Ft.
BICARBONATE PHOSPHORUS, PPM	11	M	2 Lbs/1000 Sq.Ft.
EXCHANGEABLE POTASSIUM, PPM	192	H	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE MAGNESIUM, PPM	378	H	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE CALCIUM, PPM	4512	VH	
EXCHANGEABLE SODIUM, PPM	78	L	
EXCHANGEABLE SODIUM PERCENTAGE, %	1.3		
COPPER, PPM	1.3	H	0 Oz/1000 Sq.Ft.
IRON, PPM	10.4	H	0 Oz/1000 Sq.Ft.
MANGANESE, PPM	10.9	H	0 Oz/1000 Sq.Ft.
ZINC, PPM	2.6	H	0 Oz/1000 Sq.Ft.
BORON, PPM	2.3	H	0 Oz/1000 Sq.Ft.
SULFATE-SULFUR, PPM	32		0 Lbs/1000 Sq.Ft.

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SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-05

SAMPLE MARKING	F9321	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
SAND, %	62.4		
SILT, %	24.8		
CLAY, %	12.8		
CLASSIFICATION, --	Sandy Loam		
CALCIUM CARBONATE, %	1.7		

Soil Depth = 12 Inches

There were no problems with the analyses and all data met laboratory quality assurance specifications.

Analyst

Laboratory Consultants, Ltd.

SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-06

SAMPLE MARKING	F9322	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
pH, S.U.	7.8		
ELECTRICAL CONDUCTIVITY, mmhos/CM	3.2	H	
FREE LIME, --	Yes		
ORGANIC MATTER, %	0.6		
NITRATE-N, PPM	48		
AVAILABLE NITROGEN, lbs/A	204		.5 Lbs/1000 Sq.Ft.
BICARBONATE PHOSPHORUS, PPM	9	L	3 Lbs/1000 Sq.Ft.
EXCHANGEABLE POTASSIUM, PPM	329	VH	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE MAGNESIUM, PPM	181	M	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE CALCIUM, PPM	2759	H	
EXCHANGEABLE SODIUM, PPM	77	L	
EXCHANGEABLE SODIUM PERCENTAGE, %	2.0		
COPPER, PPM	13.1	H	0 Oz/1000 Sq.Ft.
IRON, PPM	9.4	H	0 Oz/1000 Sq.Ft.
MANGANESE, PPM	7.9	H	0 Oz/1000 Sq.Ft.
ZINC, PPM	13.7	H	0 Oz/1000 Sq.Ft.
BORON, PPM	1.5	H	0 Oz/1000 Sq.Ft.
SULFATE-SULFUR, PPM	269		0 Lbs/1000 Sq.Ft.

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SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-06

SAMPLE MARKING	F9322	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
SAND, %	58.4		
SILT, %	26.8		
CLAY, %	14.8		
CLASSIFICATION, --	Sandy Loam		
CALCIUM CARBONATE, %	11.3		

Soil Depth = 12 Inches

There were no problems with the analyses and all data met laboratory quality assurance specifications.

Analyst

Laboratory Consultants, Ltd.

SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-07

SAMPLE MARKING	F9323	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
pH, S.U.	7.3		
ELECTRICAL CONDUCTIVITY, mmhos/CM	0.6	VL	
FREE LIME, --	No		
ORGANIC MATTER, %	1.8		
NITRATE-N, PPM	9		
AVAILABLE NITROGEN, lbs/A	126		2 Lbs/1000 Sq.Ft.
BICARBONATE PHOSPHORUS, PPM	19	H	1 Lbs/1000 Sq.Ft.
EXCHANGEABLE POTASSIUM, PPM	199	H	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE MAGNESIUM, PPM	369	H	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE CALCIUM, PPM	4676	VH	
EXCHANGEABLE SODIUM, PPM	66	L	
EXCHANGEABLE SODIUM PERCENTAGE, %	1.1		
COPPER, PPM	2.4	H	0 Oz/1000 Sq.Ft.
IRON, PPM	18.7	H	0 Oz/1000 Sq.Ft.
MANGANESE, PPM	20.9	H	0 Oz/1000 Sq.Ft.
ZINC, PPM	9.5	H	0 Oz/1000 Sq.Ft.
BORON, PPM	2.5	H	0 Oz/1000 Sq.Ft.
SULFATE-SULFUR, PPM	25		0 Lbs/1000 Sq.Ft.

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MEMBER ACIL

SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-07

SAMPLE MARKING	F9323	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
SAND, %	54.4		
SILT, %	32.8		
CLAY, %	12.8		
CLASSIFICATION, --	Sandy Loam		
CALCIUM CARBONATE, %	1.6		

Soil Depth = 12 Inches

There were no problems with the analyses and all data met laboratory quality assurance specifications.

Analyst

Laboratory Consultants, Ltd.

SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-08

SAMPLE MARKING	F9324	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
pH, S.U.	8.2		
ELECTRICAL CONDUCTIVITY, mmhos/CM	0.5	VL	
FREE LIME, --	Yes		
ORGANIC MATTER, %	0.0		
NITRATE-N, PPM	15		
AVAILABLE NITROGEN, lbs/A	54		4 Lbs/1000 Sq.Ft.
BICARBONATE PHOSPHORUS, PPM	2	VL	5 Lbs/1000 Sq.Ft.
EXCHANGEABLE POTASSIUM, PPM	227	H	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE MAGNESIUM, PPM	150	M	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE CALCIUM, PPM	4676	VH	
EXCHANGEABLE SODIUM, PPM	221	M	
EXCHANGEABLE SODIUM PERCENTAGE, %	3.7		
COPPER, PPM	4.6	H	0 Oz/1000 Sq.Ft.
IRON, PPM	13.6	H	0 Oz/1000 Sq.Ft.
MANGANESE, PPM	5.3	H	0 Oz/1000 Sq.Ft.
ZINC, PPM	3.7	H	0 Oz/1000 Sq.Ft.
BORON, PPM	0.7	M	0 Oz/1000 Sq.Ft.
SULFATE-SULFUR, PPM	73		0 Lbs/1000 Sq.Ft.

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MEMBER ACIL

SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-08

SAMPLE MARKING	F9324	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
SAND, %	62.4		
SILT, %	22.8		
CLAY, %	14.8		
CLASSIFICATION, --	Sandy Loam		
CALCIUM CARBONATE, %	6.4		

Soil Depth = 12 Inches

There were no problems with the analyses and all data met laboratory quality assurance specifications.

Analyst

Laboratory Consultants, Ltd.

SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-09

SAMPLE MARKING	F9325	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
pH, S.U.	7.5		
ELECTRICAL CONDUCTIVITY, mmhos/CM	3.9	H	
FREE LIME, --	No		
ORGANIC MATTER, %	0.5		
NITRATE-N, PPM	10		
AVAILABLE NITROGEN, lbs/A	62		4 Lbs/1000 Sq.Ft.
BICARBONATE PHOSPHORUS, PPM	9	L	3 Lbs/1000 Sq.Ft.
EXCHANGEABLE POTASSIUM, PPM	360	VH	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE MAGNESIUM, PPM	335	H	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE CALCIUM, PPM	4875	VH	
EXCHANGEABLE SODIUM, PPM	496	H	
EXCHANGEABLE SODIUM PERCENTAGE, %	7.2		
COPPER, PPM	1.4	H	0 Oz/1000 Sq.Ft.
IRON, PPM	19.8	H	0 Oz/1000 Sq.Ft.
MANGANESE, PPM	11.0	H	0 Oz/1000 Sq.Ft.
ZINC, PPM	4.3	H	0 Oz/1000 Sq.Ft.
BORON, PPM	10.0	VH	0 Oz/1000 Sq.Ft.
SULFATE-SULFUR, PPM	24		0 Lbs/1000 Sq.Ft.

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SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-09

SAMPLE MARKING	F9325	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
SAND, %	56.4		
SILT, %	32.8		
CLAY, %	10.8		
CLASSIFICATION, --	Sandy Loam		
CALCIUM CARBONATE, %	1.5		

Soil Depth = 12 Inches

There were no problems with the analyses and all data met laboratory quality assurance specifications.

Analyst

Laboratory Consultants, Ltd.

SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-10

SAMPLE MARKING	F9326	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
pH, S.U.	8.2		
ELECTRICAL CONDUCTIVITY, mmhos/CM	3.5	H	
FREE LIME, --	Yes		
ORGANIC MATTER, %	0.3		
NITRATE-N, PPM	13		
AVAILABLE NITROGEN, lbs/A	62		4 Lbs/1000 Sq.Ft.
BICARBONATE PHOSPHORUS, PPM	6	L	3 Lbs/1000 Sq.Ft.
EXCHANGEABLE POTASSIUM, PPM	156	M	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE MAGNESIUM, PPM	198	M	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE CALCIUM, PPM	5336	VH	
EXCHANGEABLE SODIUM, PPM	206	M	
EXCHANGEABLE SODIUM PERCENTAGE, %	3.0		
COPPER, PPM	6.4	H	0 Oz/1000 Sq.Ft.
IRON, PPM	10.8	H	0 Oz/1000 Sq.Ft.
MANGANESE, PPM	7.1	H	0 Oz/1000 Sq.Ft.
ZINC, PPM	3.2	H	0 Oz/1000 Sq.Ft.
BORON, PPM	1.0	M	0 Oz/1000 Sq.Ft.
SULFATE-SULFUR, PPM	47		0 Lbs/1000 Sq.Ft.

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SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-10

SAMPLE MARKING	F9326	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
SAND, %	66.4		
SILT, %	22.8		
CLAY, %	10.8		
CLASSIFICATION, –	Sandy Loam		
CALCIUM CARBONATE, %	3.0		

Soil Depth = 12 Inches

There were no problems with the analyses and all data met laboratory quality assurance specifications.

Analyst

Laboratory Consultants, Ltd.

SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-11

SAMPLE MARKING	F9327	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
pH, S.U.	7.5		
ELECTRICAL CONDUCTIVITY, mmhos/CM	0.6	VL	
FREE LIME, --	Yes		
ORGANIC MATTER, %	0.7		
NITRATE-N, PPM	21		
AVAILABLE NITROGEN, lbs/A	112		3 Lbs/1000 Sq.Ft.
BICARBONATE PHOSPHORUS, PPM	19	H	1 Lbs/1000 Sq.Ft.
EXCHANGEABLE POTASSIUM, PPM	557	VH	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE MAGNESIUM, PPM	271	M	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE CALCIUM, PPM	4732	VH	
EXCHANGEABLE SODIUM, PPM	93	L	
EXCHANGEABLE SODIUM PERCENTAGE, %	1.5		
COPPER, PPM	3.0	H	0 Oz/1000 Sq.Ft.
IRON, PPM	20.8	H	0 Oz/1000 Sq.Ft.
MANGANESE, PPM	15.9	H	0 Oz/1000 Sq.Ft.
ZINC, PPM	8.2	H	0 Oz/1000 Sq.Ft.
BORON, PPM	4.2	VH	0 Oz/1000 Sq.Ft.
SULFATE-SULFUR, PPM	50		0 Lbs/1000 Sq.Ft.

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SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-11

SAMPLE MARKING	F9327	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
SAND, %	53.6		
SILT, %	34.8		
CLAY, %	11.6		
CLASSIFICATION, --	Sandy Loam		
CALCIUM CARBONATE, %	2.0		

Soil Depth = 12 Inches

There were no problems with the analyses and all data met laboratory quality assurance specifications.

Analyst

Laboratory Consultants, Ltd.

SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-12

SAMPLE MARKING	F9328	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
pH, S.U.	7.8		
ELECTRICAL CONDUCTIVITY, mmhos/CM	2.7	H	
FREE LIME, --	Yes		
ORGANIC MATTER, %	0.8		
NITRATE-N, PPM	24		
AVAILABLE NITROGEN, lbs/A	128		2 Lbs/1000 Sq.Ft.
BICARBONATE PHOSPHORUS, PPM	4	VL	5 Lbs/1000 Sq.Ft.
EXCHANGEABLE POTASSIUM, PPM	124	M	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE MAGNESIUM, PPM	184	M	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE CALCIUM, PPM	5412	VH	
EXCHANGEABLE SODIUM, PPM	81	L	
EXCHANGEABLE SODIUM PERCENTAGE, %	1.2		
COPPER, PPM	6.7	H	0 Oz/1000 Sq.Ft.
IRON, PPM	13.7	H	0 Oz/1000 Sq.Ft.
MANGANESE, PPM	6.0	H	0 Oz/1000 Sq.Ft.
ZINC, PPM	3.9	H	0 Oz/1000 Sq.Ft.
BORON, PPM	2.5	H	0 Oz/1000 Sq.Ft.
SULFATE-SULFUR, PPM	119		0 Lbs/1000 Sq.Ft.

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SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-12

SAMPLE MARKING	F9328	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
SAND, %	71.6		
SILT, %	16.8		
CLAY, %	11.6		
CLASSIFICATION, --	Sandy Loam		
CALCIUM CARBONATE, %	14.3		

Soil Depth = 12 Inches

There were no problems with the analyses and all data met laboratory quality assurance specifications.

Analyst

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SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-13

SAMPLE MARKING	F9329	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
pH, S.U.	7.6		
ELECTRICAL CONDUCTIVITY, mmhos/CM	2.9	H	
FREE LIME, --	Yes		
ORGANIC MATTER, %	0.4		
NITRATE-N, PPM	56		
AVAILABLE NITROGEN, lbs/A	222		.5 Lbs/1000 Sq.Ft.
BICARBONATE PHOSPHORUS, PPM	21	H	1 Lbs/1000 Sq.Ft.
EXCHANGEABLE POTASSIUM, PPM	601	VH	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE MAGNESIUM, PPM	342	H	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE CALCIUM, PPM	4546	VH	
EXCHANGEABLE SODIUM, PPM	280	M	
EXCHANGEABLE SODIUM PERCENTAGE, %	4.3		
COPPER, PPM	9.1	H	0 Oz/1000 Sq.Ft.
IRON, PPM	12.1	H	0 Oz/1000 Sq.Ft.
MANGANESE, PPM	9.4	H	0 Oz/1000 Sq.Ft.
ZINC, PPM	8.6	H	0 Oz/1000 Sq.Ft.
BORON, PPM	8.2	VH	0 Oz/1000 Sq.Ft.
SULFATE-SULFUR, PPM	505		0 Lbs/1000 Sq.Ft.

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SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-13

SAMPLE MARKING	F9329	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
SAND, %	55.6		
SILT, %	30.8		
CLAY, %	13.6		
CLASSIFICATION, --	Sandy Loam		
CALCIUM CARBONATE, %	1.2		

Soil Depth = 12 Inches

There were no problems with the analyses and all data met laboratory quality assurance specifications.

Analyst

Laboratory Consultants, Ltd.

SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-14

SAMPLE MARKING	F9330	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
pH, S.U.	8.0		
ELECTRICAL CONDUCTIVITY, mmhos/CM	3.0	H	
FREE LIME, --	Yes		
ORGANIC MATTER, %	0.7		
NITRATE-N, PPM	136		
AVAILABLE NITROGEN, lbs/A	526		0 Lbs/1000 Sq.Ft.
BICARBONATE PHOSPHORUS, PPM	4	VL	5 Lbs/1000 Sq.Ft.
EXCHANGEABLE POTASSIUM, PPM	158	M	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE MAGNESIUM, PPM	548	VH	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE CALCIUM, PPM	5254	VH	
EXCHANGEABLE SODIUM, PPM	630	H	
EXCHANGEABLE SODIUM PERCENTAGE, %	8.1		
COPPER, PPM	3.2	H	0 Oz/1000 Sq.Ft.
IRON, PPM	8.9	H	0 Oz/1000 Sq.Ft.
MANGANESE, PPM	3.1	H	0 Oz/1000 Sq.Ft.
ZINC, PPM	4.3	H	0 Oz/1000 Sq.Ft.
BORON, PPM	3.8	VH	0 Oz/1000 Sq.Ft.
SULFATE-SULFUR, PPM	80		0 Lbs/1000 Sq.Ft.

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SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-14

SAMPLE MARKING	F9330	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
SAND, %	47.6		
SILT, %	34.8		
CLAY, %	17.6		
CLASSIFICATION, --	Loam		
CALCIUM CARBONATE, %	7.4		

Soil Depth = 12 Inches

There were no problems with the analyses and all data met laboratory quality assurance specifications.

Analyst

Laboratory Consultants, Ltd.

SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-15

SAMPLE MARKING	F9331	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
pH, S.U.	7.9		
ELECTRICAL CONDUCTIVITY, mmhos/CM	0.5	VL	
FREE LIME, --	Yes		
ORGANIC MATTER, %	0.4		
NITRATE-N, PPM	34		
AVAILABLE NITROGEN, lbs/A	143		2 Lbs/1000 Sq.Ft.
BICARBONATE PHOSPHORUS, PPM	9	L	3 Lbs/1000 Sq.Ft.
EXCHANGEABLE POTASSIUM, PPM	360	VH	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE MAGNESIUM, PPM	260	M	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE CALCIUM, PPM	4947	VH	
EXCHANGEABLE SODIUM, PPM	116	M	
EXCHANGEABLE SODIUM PERCENTAGE, %	1.8		
COPPER, PPM	2.1	H	0 Oz/1000 Sq.Ft.
IRON, PPM	13.9	H	0 Oz/1000 Sq.Ft.
MANGANESE, PPM	7.0	H	0 Oz/1000 Sq.Ft.
ZINC, PPM	7.5	H	0 Oz/1000 Sq.Ft.
BORON, PPM	4.3	VH	0 Oz/1000 Sq.Ft.
SULFATE-SULFUR, PPM	38		0 Lbs/1000 Sq.Ft.

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SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-15

SAMPLE MARKING	F9331	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
SAND, %	65.6		
SILT, %	22.8		
CLAY, %	11.6		
CLASSIFICATION, --	Sandy Loam		
CALCIUM CARBONATE, %	1.7		

Soil Depth = 12 Inches

There were no problems with the analyses and all data met laboratory quality assurance specifications.

Analyst

Laboratory Consultants, Ltd.

SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-16

SAMPLE MARKING	F9332	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
pH, S.U.	8.4		
ELECTRICAL CONDUCTIVITY, mmhos/CM	3.4	H	
FREE LIME, --	Yes		
ORGANIC MATTER, %	0.6		
NITRATE-N, PPM	71		
AVAILABLE NITROGEN, lbs/A	287		0 Lbs/1000 Sq.Ft.
BICARBONATE PHOSPHORUS, PPM	4	VL	5 Lbs/1000 Sq.Ft.
EXCHANGEABLE POTASSIUM, PPM	165	M	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE MAGNESIUM, PPM	644	VH	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE CALCIUM, PPM	5082	VH	
EXCHANGEABLE SODIUM, PPM	1420	H	
EXCHANGEABLE SODIUM PERCENTAGE, %	16.6		
COPPER, PPM	3.9	H	0 Oz/1000 Sq.Ft.
IRON, PPM	9.8	H	0 Oz/1000 Sq.Ft.
MANGANESE, PPM	2.7	H	0 Oz/1000 Sq.Ft.
ZINC, PPM	4.3	H	0 Oz/1000 Sq.Ft.
BORON, PPM	6.8	VH	0 Oz/1000 Sq.Ft.
SULFATE-SULFUR, PPM	142		0 Lbs/1000 Sq.Ft.

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ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-16

SAMPLE MARKING	F9332	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
SAND, %	49.6		
SILT, %	30.8		
CLAY, %	19.6		
CLASSIFICATION, --	Loam		
CALCIUM CARBONATE, %	11.3		

Soil Depth = 12 Inches

There were no problems with the analyses and all data met laboratory quality assurance specifications.

Analyst

Laboratory Consultants, Ltd.

SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-17

SAMPLE MARKING	F9333	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
pH, S.U.	7.4		
ELECTRICAL CONDUCTIVITY, mmhos/CM	0.6	VL	
FREE LIME, --	Yes		
ORGANIC MATTER, %	0.7		
NITRATE-N, PPM	15		
AVAILABLE NITROGEN, lbs/A	91		3 Lbs/1000 Sq.Ft.
BICARBONATE PHOSPHORUS, PPM	9	L	3 Lbs/1000 Sq.Ft.
EXCHANGEABLE POTASSIUM, PPM	459	VH	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE MAGNESIUM, PPM	333	H	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE CALCIUM, PPM	4156	VH	
EXCHANGEABLE SODIUM, PPM	114	M	
EXCHANGEABLE SODIUM PERCENTAGE, %	2.0		
COPPER, PPM	2.1	H	0 Oz/1000 Sq.Ft.
IRON, PPM	13.6	H	0 Oz/1000 Sq.Ft.
MANGANESE, PPM	12.2	H	0 Oz/1000 Sq.Ft.
ZINC, PPM	4.9	H	0 Oz/1000 Sq.Ft.
BORON, PPM	5.4	VH	0 Oz/1000 Sq.Ft.
SULFATE-SULFUR, PPM	29		0 Lbs/1000 Sq.Ft.

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Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-17

SAMPLE MARKING	F9333	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
SAND, %	61.6		
SILT, %	24.8		
CLAY, %	13.6		
CLASSIFICATION, --	Sandy Loam		
CALCIUM CARBONATE, %	1.6		

Soil Depth = 12 Inches

There were no problems with the analyses and all data met laboratory quality assurance specifications.

Analyst

Laboratory Consultants, Ltd.

SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-18

SAMPLE MARKING	F9338	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
pH, S.U.	7.7		
ELECTRICAL CONDUCTIVITY, mmhos/CM	1.4	L	
FREE LIME, --	Yes		
ORGANIC MATTER, %	1.0		
NITRATE-N, PPM	82		
AVAILABLE NITROGEN, lbs/A	347		0 Lbs/1000 Sq.Ft.
BICARBONATE PHOSPHORUS, PPM	8	L	3 Lbs/1000 Sq.Ft.
EXCHANGEABLE POTASSIUM, PPM	234	H	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE MAGNESIUM, PPM	458	H	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE CALCIUM, PPM	5914	VH	
EXCHANGEABLE SODIUM, PPM	310	H	
EXCHANGEABLE SODIUM PERCENTAGE, %	3.8		
COPPER, PPM	5.6	H	0 Oz/1000 Sq.Ft.
IRON, PPM	17.5	H	0 Oz/1000 Sq.Ft.
MANGANESE, PPM	9.2	H	0 Oz/1000 Sq.Ft.
ZINC, PPM	7.1	H	0 Oz/1000 Sq.Ft.
BORON, PPM	1.4	H	0 Oz/1000 Sq.Ft.
SULFATE-SULFUR, PPM	139		0 Lbs/1000 Sq.Ft.

211 Shakespeare Lordsburg, New Mexico 88045 Phone (505) 542-3331 Fax (505) 542-3334
Toll Free (866) 452-2266 Email: labconsultants@yahoo.com www.laboratoryconsultantsltd.com

MEMBER ACIL

SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-18

SAMPLE MARKING	F9338	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
SAND, %	45.6		
SILT, %	34.8		
CLAY, %	19.6		
CLASSIFICATION, --	Loam		
CALCIUM CARBONATE, %	6.4		

Soil Depth = 12 Inches

There were no problems with the analyses and all data met laboratory quality assurance specifications.

Analyst

Laboratory Consultants, Ltd.

SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-19

SAMPLE MARKING	F9335	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
pH, S.U.	8.1		
ELECTRICAL CONDUCTIVITY, mmhos/CM	2.8	H	
FREE LIME, --	Yes		
ORGANIC MATTER, %	0.4		
NITRATE-N, PPM	67		
AVAILABLE NITROGEN, lbs/A	262		0 Lbs/1000 Sq.Ft.
BICARBONATE PHOSPHORUS, PPM	2	VL	5 Lbs/1000 Sq.Ft.
EXCHANGEABLE POTASSIUM, PPM	183	H	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE MAGNESIUM, PPM	544	VH	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE CALCIUM, PPM	5754	VH	
EXCHANGEABLE SODIUM, PPM	768	H	
EXCHANGEABLE SODIUM PERCENTAGE, %	9.0		
COPPER, PPM	2.9	H	0 Oz/1000 Sq.Ft.
IRON, PPM	10.9	H	0 Oz/1000 Sq.Ft.
MANGANESE, PPM	3.3	H	0 Oz/1000 Sq.Ft.
ZINC, PPM	4.9	H	0 Oz/1000 Sq.Ft.
BORON, PPM	3.5	VH	0 Oz/1000 Sq.Ft.
SULFATE-SULFUR, PPM	100		0 Lbs/1000 Sq.Ft.

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MEMBER ACIL

SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-19

SAMPLE MARKING	F9335	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
SAND, %	51.6		
SILT, %	34.8		
CLAY, %	13.6		
CLASSIFICATION, –	Loam		
CALCIUM CARBONATE, %	1.5		

Soil Depth = 12 Inches

There were no problems with the analyses and all data met laboratory quality assurance specifications.

Analyst

Laboratory Consultants, Ltd.

SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-20

SAMPLE MARKING	F9336	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
pH, S.U.	7.4		
ELECTRICAL CONDUCTIVITY, mmhos/CM	0.5	VL	
FREE LIME, --	No		
ORGANIC MATTER, %	1.1		
NITRATE-N, PPM	11		
AVAILABLE NITROGEN, lbs/A	97		3 Lbs/1000 Sq.Ft.
BICARBONATE PHOSPHORUS, PPM	15	M	2 Lbs/1000 Sq.Ft.
EXCHANGEABLE POTASSIUM, PPM	698	VH	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE MAGNESIUM, PPM	371	H	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE CALCIUM, PPM	3388	H	
EXCHANGEABLE SODIUM, PPM	85	L	
EXCHANGEABLE SODIUM PERCENTAGE, %	1.7		
COPPER, PPM	1.8	H	0 Oz/1000 Sq.Ft.
IRON, PPM	14.6	H	0 Oz/1000 Sq.Ft.
MANGANESE, PPM	13.8	H	0 Oz/1000 Sq.Ft.
ZINC, PPM	5.0	H	0 Oz/1000 Sq.Ft.
BORON, PPM	3.8	VH	0 Oz/1000 Sq.Ft.
SULFATE-SULFUR, PPM	48		0 Lbs/1000 Sq.Ft.

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Toll Free (866) 452-2266 Email: labconsultants@yahoo.com www.laboratoryconsultantsltd.com

MEMBER ACIL

SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-20

SAMPLE MARKING	F9336	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
SAND, %	57.6		
SILT, %	28.8		
CLAY, %	13.6		
CLASSIFICATION, --	Sandy Loam		
CALCIUM CARBONATE, %	3.0		

Soil Depth = 12 Inches

There were no problems with the analyses and all data met laboratory quality assurance specifications.

Analyst

AGRI SERVICES

January 10, 2000

Mr. Harry Owens
Laboratory Consultants
947 South 48th Street
Suite 127
Tempe, Arizona 85281

Dear Harry,

This report is in regard to samples 99165201-99165205 which you had submitted for bioassay analyses. There are no detectable levels of herbicides noted via a bioassay technique in any of the above samples submitted.

As always, caution needs to be exercised when interpreting these results because of problems associated with obtaining samples. Often, the results are only as good as the sampling technique.

Should you or others have any questions in regard to this matter, please feel free to contact me.

Best regards,

Dr. Michael Pfeiffer
Plant Pathologist

2525 EAST SENECA • TUCSON, ARIZONA 85716-3018 • (520) 323-3135
a division of PTI TECH, Inc.

APPENDIX "D"

DRYWELL REGISTRATION FORMS

APPENDIX "D"

DRYWELL REGISTRATION FORMS

ADEQ *Drywell Registration Form (2-2001)*

For ADEQ Use Only

REGISTRATION NUMBERS: 07-- 22456 -- 00 **through** 22457	**The Drywell Registration Form for disposal of stormwater was received and registered on** _____.
Reviewed by K. Lincoln Date(s) 9/28/01 **Industrial & Drywell Unit, WPS - Phone (602) 207-4686**	G **Supplemental Information Request (SIR) form needed.** Complete attached form and submit within 45 days of _____.
G Change to drywell registration status has been entered in the file as requested. Date _____	G **APP is required.** Submit an application (for Individual APP, or General Permit per R18-9-C301) within 90 days of _____. (contact Dept. if more information needed.)
G Drywell has been abandoned according to ADEQ Drywell Decommissioning Guidelines. Date _____	G Submit a **Best Management Practices Plan** (BMPP) within 30 days of _____ (see attached guidelines).
G **Incomplete.** Resubmit returned form with additional information requested (see items circled below) within 30 days of _____.	G Submit **a drywell Closure Plan** within 30 days of closure. The closure is to follow the attached ADEQ Drywell Decommisioning Guidelines or equivalent.
✓ Submit the **Driller's log for proposed drywell(s)** within 30 days of installation. 9/28/01 KL	G Fee remitted $ 20.00 G **Additional fee needed $** _____

G *On _____, you were notified that additional information is required to complete the drywell registration process or asked to submit a SIR form. If all information requested is not submitted within 45 days of _____, ADEQ may schedule a facility compliance inspection to determine the drywell status.*

✓ You have complied with state drywell registration requirements. Drywell(s) are authorized to receive **stormwater only**. Date 9/28/01. NOTE: This completed form is to be kept at the facility and available to ADEQ upon request. **Please inform this office in writing** of any changes to the information indicated herein, including property owner (lessor), facility owner (lessee), areas drained by the drywell(s), nature of business, well operational status, and fluids received other than stormwater, etc. KL

Attachments: G SIR form G BMPP Guidelines G Drywell Decommissioning Guidelines G Application information G None

Facility Information

A. Facility / Project Name NORTH DETENTION BASIN
Location Address NORTHWEST CORNER OF CALLE CERRITOS AND PRIEST Zip Code _____

B. Drywell Owner TOWN OF GUADALUPE
Mailing address 9241 South Avenida Del Yaqui
Guadalupe, Arizona Zip Code 85283-2598
Telephone No. (____) _____

C. Contact Person BOB STEVENS Business Name FLOOD CONTROL DISTRICT
Mailing Address 2801 W. DURANGO AVENUE
PHOENIX, ARIZONA Zip Code 85009-6399
Telephone No. (602) 506-4073

D. Physical Location: Township 1S Range 4E Section 5, ____ ¼ ____ ¼ NE ¼ NE ¼

E. Nature of Business(es) conducted on the property

- 9 (00) Residential
- 9 (01) Schools, Churches & Recreational Facilities without vehicular maintenance operations.
- 9 (02) Offices & Retail Only
- 9 (03a) Warehouse - General
- 9 (03b) Warehouse- Industrial (stores hazardous chemicals)
- 9 (04) Manufacturing
- 9 (05) Industrial/Agriculture Processing
- 9 (06) Mining/Milling
- 9 (07) Chemical & Fuel Storage
- 9 (08) Vehicular Service Facilities
- 9 (09) Schools, Churches & Recreational Facilities with vehicular maintenance operations.
- 9 (10) Other _____

F. For Drywell(s) already constructed, does the drywell penetrate groundwater? Yes ( ) No (✓)

G. Have you attached a site plan identifying the location of the all stormwater drywells and the areas which they drain? Yes (✓) No ( )

INDUSTRIAL & STORM WATER
SEP 21 2001

H. **Drywell Data** (Please check or complete all items that apply)

DRYWELL NUMBER	1	2	3	4	5	6	7	8	9	10
Owner's Identification name or number										
STATUS										
Active										
Proposed (future or under construction)	✓	✓								
Closed										
Other (describe)										
DRAINAGE AREA										
Driveways & parking lots										
Rooftops										
Streets and landscaped areas	✓	✓								
Loading docks (haz materials handled)										
Loading docks (w/ no haz materials)										
Chemical storage										
Livestock containment										
Agricultural area										
Other (Describe)										
OTHER FLUIDS										
Describe fluids received by drywell										

Total Drywell(s) being registered 2 **Fee Remitted $** 20 **($10.00 per Drywell)**

I, THOMAS F. MORALES JR. **, certify that the information provided on this form is true to the best of my knowledge.**
(Please print or type)

Thomas F. Morales Jr. — **Signature**

Manager, Town of Guadalupe — **Title, Company**

30 August 2001 — **Date**

ADEQ *Drywell Registration Form (2-2001)*

For ADEQ Use Only

REGISTRATION NUMBERS: 07-22458-00 **through** 22465	**The Drywell Registration Form for disposal of stormwater was received and registered on** _____.
Reviewed by K. Lincoln Date(s) 9/28/01 **Industrial & Drywell Unit, WPS - Phone (602) 207-4686**	G **Supplemental Information Request (SIR) form needed.** Complete attached form and submit within 45 days of _____.
G Change to drywell registration status has been entered in the file as requested. Date _____	G **APP is required.** Submit an application (for Individual APP, or General Permit per R18-9-C301) within 90 days of _____. (contact Dept. if more information needed.)
G Drywell has been abandoned according to ADEQ Drywell Decommissioning Guidelines. Date _____	G Submit a **Best Management Practices Plan** (BMPP) within 30 days of _____ (see attached guidelines).
G **Incomplete.** Resubmit returned form with additional information requested (see items circled below) within 30 days of _____.	G Submit **a drywell Closure Plan** within 30 days of closure. The closure is to follow the attached ADEQ Drywell Decommisioning Guidelines or equivalent.
✓ Submit the **Driller's log for proposed drywell(s)** within 30 days of installation. 9/20/01 KL	G Fee remitted $ _____ G **Additional fee needed $** _____

G *On _____, you were notified that additional information is required to complete the drywell registration process or asked to submit a SIR form. If all information requested is not submitted within 45 days of _____, ADEQ may schedule a facility compliance inspection to determine the drywell status.*

✓ You have complied with state drywell registration requirements. Drywell(s) are authorized to receive **stormwater only.** Date 9/20/01. NOTE: This completed form is to be kept at the facility and available to ADEQ upon request. **Please inform this office in writing** of any changes to the information indicated herein, including property owner (lessor), facility owner (lessee), areas drained by the drywell(s), nature of business, well operational status, and fluids received other than stormwater, etc. KL

Attachments: G SIR form G BMPP Guidelines G Drywell Decommissioning Guidelines G Application information G None

Facility Information

A. Facility / Project Name: Northeast Retention Basin
Location Address: Along Highline canal, adjacent to Oxford Drive
Zip Code 85233

B. Drywell Owner: Town of Guadalupe
Mailing address: 9241 South Avenida Del Yaqui
Guadalupe, Arizona Zip Code 85283-2598
Telephone No. (480) 730-3080

C. Contact Person: BOB STEVENS Business Name: FLOOD CONTROL DISTRICT
Mailing Address: 2801 W. Durango STREET
Phoenix, Arizona Zip Code 85009-6399
Telephone No. (602) 506-4073

D. Physical Location: Township 1S Range 4E Section 4 ¼ NW ¼ SW ¼ NW ¼

E. Nature of Business(es) conducted on the property

- 9 (●) Residential
- 9 (01) Schools, Churches & Recreational Facilities without vehicular maintenance operations.
- 9 (02) Offices & Retail Only
- 9 (03a) Warehouse - General
- 9 (03b) Warehouse- Industrial (stores hazardous chemicals)
- 9 (04) Manufacturing
- 9 (05) Industrial/Agriculture Processing
- 9 (06) Mining/Milling
- 9 (07) Chemical & Fuel Storage
- 9 (08) Vehicular Service Facilities
- 9 (09) Schools, Churches & Recreational Facilities with vehicular maintenance operations.
- 9 (10) Other_____

F. For Drywell(s) already constructed, does the drywell penetrate groundwater? Yes ( ) No (✓)

G. Have you attached a site plan identifying the location of the all stormwater drywells and the areas which they drain? Yes (✓) No ( )

INDUSTRIAL & STORM WATER SEP 21 2001

H. **Drywell Data** (Please check or complete all items that apply)

DRYWELL NUMBER	1	2	3	4	5	6	7	8	9	10
Owner's Identification name or number										
STATUS										
Active										
Proposed (future or under construction)	✓	✓	✓	✓	✓	✓	✓	✓		
Closed										
Other (describe)										
DRAINAGE AREA										
Driveways & parking lots										
Rooftops										
Streets and landscaped areas	✓	✓	✓	✓	✓	✓	✓	✓		
Loading docks (haz materials handled)										
Loading docks (w/ no haz materials)										
Chemical storage										
Livestock containment										
Agricultural area										
Other (Describe)										
OTHER FLUIDS										
Describe fluids received by drywell										

Total Drywell(s) being registered 8 **Fee Remitted $** 80 **($10.00 per Drywell)**

I, THOMAS F. MORALES JR. **, certify that the information provided on this form is true to the best of my knowledge.**
(Please print or type)

Thomas F. Morales, Jr. — **Signature**

Manager, Town of Guadalupe — **Title, Company**

30 August 2001 — **Date**

ADEQ *Drywell Registration Form (2-2001)*

For ADEQ Use Only

REGISTRATION NUMBERS: 07-- 22468 -- 00 **through** 22470	**The Drywell Registration Form for disposal of stormwater was received and registered on** _____.
Reviewed by K. Lincoln Date(s) 9/28/01 **Industrial & Drywell Unit, WPS - Phone (602) 207-4686**	G **Supplemental Information Request (SIR) form needed.** Complete attached form and submit within 45 days of _____.
G Change to drywell registration status has been entered in the file as requested. Date _____	G **APP is required.** Submit an application (for Individual APP, or General Permit per R18-9-C301) within 90 days of _____. (contact Dept. if more information needed.)
G Drywell has been abandoned according to ADEQ Drywell Decommissioning Guidelines. Date _____	G Submit a **Best Management Practices Plan** (BMPP) within 30 days of _____ (see attached guidelines).
G **Incomplete.** Resubmit returned form with additional information requested (see items circled below) within 30 days of _____.	G Submit **a drywell Closure Plan** within 30 days of closure. The closure is to follow the attached ADEQ Drywell Decommisioning Guidelines or equivalent.
✓ Submit the **Driller's log for proposed drywell(s)** within 30 days of installation. 9/28/01 KL	G Fee remitted $ _____ G **Additional fee needed $** _____

G *On _____, you were notified that additional information is required to complete the drywell registration process or asked to submit a SIR form. If all information requested is not submitted within 45 days of _____, ADEQ may schedule a facility compliance inspection to determine the drywell status.*

✓ You have complied with state drywell registration requirements. Drywell(s) are authorized to receive **stormwater only.** Date 9/28/01. NOTE: This completed form is to be kept at the facility and available to ADEQ upon request. **Please inform this office in writing** of any changes to the information indicated herein, including property owner (lessor), facility owner (lessee), areas drained by the drywell(s), nature of business, well operational status, and fluids received other than stormwater, etc. KL

Attachments: G SIR form G BMPP Guidelines G Drywell Decommissioning Guidelines G Application information G None

Facility Information

A. Facility / Project Name: South Retention Basin
Location Address: To the west of the Highline Canal
Zip Code 85283

B. Drywell Owner: Town at Guadalupe
Mailing address: 9241 South Avenida Del Yaqui
Guadalupe, Arizona Zip Code 85283-2598
Telephone No. ( )

C. Contact Person: BOB STEVENS Business Name: FLOOD CONTROL DISTRICT
Mailing Address: 2801 W. DURANGO STREET
Zip Code 85009-6399
Telephone No. (602) 506-4073

D. Physical Location: Township 1S Range 4E Section 9, ___ ¼ ___ ¼ SE ¼ NW ¼

E. Nature of Business(es) conducted on the property

- 9 (00) Residential
- 9 (01) Schools, Churches & Recreational Facilities without vehicular maintenance operations.
- 9 (02) Offices & Retail Only
- 9 (03a) Warehouse - General
- 9 (03b) Warehouse- Industrial (stores hazardous chemicals)
- 9 (04) Manufacturing
- 9 (05) Industrial/Agriculture Processing
- 9 (06) Mining/Milling
- 9 (07) Chemical & Fuel Storage
- 9 (08) Vehicular Service Facilities
- 9 (09) Schools, Churches & Recreational Facilities with vehicular maintenance operations.
- 9 (10) Other _____

F. For Drywell(s) already constructed, does the drywell penetrate groundwater? Yes ( ) No (✓)

G. Have you attached a site plan identifying the location of the all stormwater drywells and the areas which they drain? Yes (✓) No ( )

SEP 21 2001
INDUSTRIAL & STORMWATER

H. **Drywell Data** (Please check or complete all items that apply)

DRYWELL NUMBER	1	2	3	4	5	6	7	8	9	10
Owner's Identification name or number	1	2	3							
STATUS										
Active										
Proposed (future or under construction)	✓	✓	✓							
Closed										
Other (describe)										
DRAINAGE AREA										
Driveways & parking lots										
Rooftops										
Streets and landscaped areas	✓	✓	✓							
Loading docks (haz materials handled)										
Loading docks (w/ no haz materials)										
Chemical storage										
Livestock containment										
Agricultural area										
Other (Describe)										
OTHER FLUIDS										
Describe fluids received by drywell										

Total Drywell(s) being registered 3 **Fee Remitted $** 30 **($10.00 per Drywell)**

I, Thomas F. Morales Jr. **, certify that the information provided on this form is true to the best of my knowledge.**
(Please print or type)

Thomas F. Morales Jr. — **Signature**

Manager Town of Guadalupe — **Title, Company**

30 August 2011 — **Date**

ADEQ

Drywell Registration Form (2-2001)

For ADEQ Use Only

REGISTRATION NUMBERS: 07-- 22466 -- 00 **through** 22467	**The Drywell Registration Form for disposal of stormwater was received and registered on** _____.
Reviewed by K. Lincoln Date(s) 9/28/01 **Industrial & Drywell Unit, WPS - Phone (602) 207-4686**	G **Supplemental Information Request (SIR) form needed.** Complete attached form and submit within 45 days of _____.
G Change to drywell registration status has been entered in the file as requested. Date _____	G **APP is required.** Submit an application (for Individual APP, or General Permit per R18-9-C301) within 90 days of _____. (contact Dept. if more information needed.)
G Drywell has been abandoned according to ADEQ Drywell Decommissioning Guidelines. Date _____	G Submit a **Best Management Practices Plan** (BMPP) within 30 days of _____ (see attached guidelines).
G **Incomplete.** Resubmit returned form with additional information requested (see items circled below) within 30 days of _____.	G Submit **a drywell Closure Plan** within 30 days of closure. The closure is to follow the attached ADEQ Drywell Decommisioning Guidelines or equivalent.
✓ Submit the **Driller's log for proposed drywell(s)** within 30 days of installation. KL 9/28/01	G Fee remitted $ _____ G **Additional fee needed $** _____

G *On _____, you were notified that additional information is required to complete the drywell registration process or asked to submit a SIR form. If all information requested is not submitted within 45 days of _____, ADEQ may schedule a facility compliance inspection to determine the drywell status.*

✓ You have complied with state drywell registration requirements. Drywell(s) are authorized to receive **stormwater only**. Date 9/20/01. NOTE: This completed form is to be kept at the facility and available to ADEQ upon request. **Please inform this office in writing** of any changes to the information indicated herein, including property owner (lessor), facility owner (lessee), areas drained by the drywell(s), nature of business, well operational status, and fluids received other than stormwater, etc. KL

Attachments: G SIR form G BMPP Guidelines G Drywell Decommissioning Guidelines G Application information G None

Facility Information

A. Facility / Project Name: Central Basin

Location Address: Northwest corner of Highline Canal and Guadalupe Road Zip Code 85283

B. Drywell Owner: Town of Guadalupe

Mailing address: 9241 South Avenida Del Yaqui

Guadalupe, Arizona Zip Code 85283-2598

Telephone No. (____) _____

C. Contact Person: BOB STEVENS Business Name: FLOOD CONTROL DISTRICT

Mailing Address: 2801 W. Durango Street

Phoenix, Arizona Zip Code 85009-6399

Telephone No. (602) 506-4073

D. Physical Location: Township 1S Range 4E Section 4, ¼ SW ¼ SE ¼ SW ¼

E. Nature of Business(es) conducted on the property

- 9 (00) Residential
- 9 (01) Schools, Churches & Recreational Facilities without vehicular maintenance operations.
- 9 (02) Offices & Retail Only
- 9 (03a) Warehouse - General
- 9 (03b) Warehouse- Industrial (stores hazardous chemicals)
- 9 (04) Manufacturing
- 9 (05) Industrial/Agriculture Processing
- 9 (06) Mining/Milling
- 9 (07) Chemical & Fuel Storage
- 9 (08) Vehicular Service Facilities
- 9 (09) Schools, Churches & Recreational Facilities with vehicular maintenance operations.
- 9 (10) Other_____

F. For Drywell(s) already constructed, does the drywell penetrate groundwater? Yes ( ) No (✓)

G. Have you attached a site plan identifying the location of the all stormwater drywells and the areas which they drain? Yes (✓) No ( )

SEP 21 2001

H. **Drywell Data** (Please check or complete all items that apply)

DRYWELL NUMBER	1	2	3	4	5	6	7	8	9	10
Owner's Identification name or number	1	2								
STATUS										
Active										
Proposed (future or under construction)	✓	✓								
Closed										
Other (describe)										
DRAINAGE AREA										
Driveways & parking lots										
Rooftops										
Streets and landscaped areas	✓	✓								
Loading docks (haz materials handled)										
Loading docks (w/ no haz materials)										
Chemical storage										
Livestock containment										
Agricultural area										
Other (Describe)										
OTHER FLUIDS										
Describe fluids received by drywell										

Total Drywell(s) being registered 2 **Fee Remitted $** 20 **($10.00 per Drywell)**

I, THOMAS F. MORALES JR. **, certify that the information provided on this form is true to the best of my knowledge.**
(Please print or type)

Thomas F. Morales Jr. — **Signature**

Manager, Town of Guadalupe — **Title, Company**

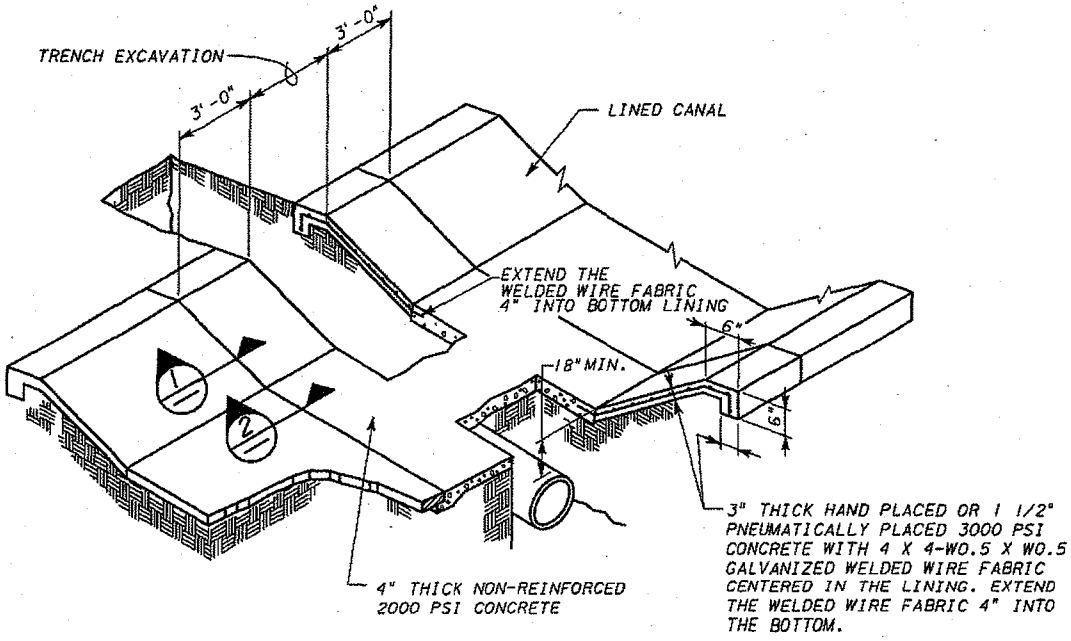
30 August 2001 — **Date**

APPENDIX "E"

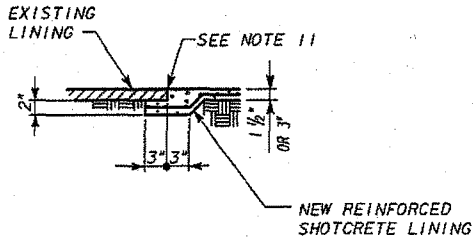
SALT RIVER PROJECT
DETAILS FOR
LINED CANAL UNDERCROSSING
AND
PIPE CONNECTION TO EXISTING STRUCTURE

APPENDIX "E"

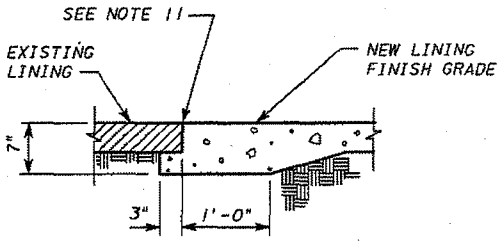
SALT RIVER PROJECT
DETAILS FOR
LINED CANAL UNDERCROSSING
AND
PIPE CONNECTION TO EXISTING STRUCTURE



UNDERCROSSING LINED CANAL



BANK LINING TIE DETAIL 1



BOTTOM LINING TIE DETAIL 2

NOTES

1. NO MANHOLES, RISERS, VALVES OR OTHER SIMILAR FACILITIES ARE TO BE PLACED IN ANY PORTION OF SRP RIGHT-OF-WAY WITHOUT SPECIFIC AUTHORIZATION IN AN SRP LICENSE.
2. TOP OF PIPE, CONDUIT, CABLE OR ENCASEMENT IN SRP RIGHT-OF-WAY IS TO BE A MINIMUM OF 36 INCHES BELOW GRADE OR ROAD SURFACE.
3. ALL AFFECTED PORTIONS OF SRP RIGHT-OF-WAY, INCLUDING ROAD SURFACES, SHALL BE RESTORED TO THEIR ORIGINAL CONDITION OR BETTER.
4. SRP FACILITIES DAMAGED OR DESTROYED SHALL BE REPAIRED OR REPLACED TO THE SATISFACTION OF THE SRP ENGINEER.
5. COMPLETELY REMOVE ALL DIRT AND DEBRIS AFTER COMPLETION OF CROSSING CONSTRUCTION.
6. REMOVE UNSUITABLE/DELETERIOUS MATERIAL TO A MINIMUM TWO FOOT DEPTH AND REPLACE WITH APPROVED BACKFILL.
7. BACKFILL SHALL BE CLEAN, COHESIVE NATIVE MATERIAL AS APPROVED BY THE SRP ENGINEER.
8. PLACE BACKFILL AT OPTIMUM MOISTURE CONTENT IN 6 INCH LIFTS AND COMPACT TO 90 PERCENT OF MAXIMUM PROCTOR DENSITY (ASTM D698 STANDARD PROCTOR).
9. ELEVATIONS AND SLOPES SHALL BE AS DETERMINED BY THE SRP ENGINEER.
10. APPLY WHITE PIGMENTED CURING COMPOUND WITHIN ONE HOUR AFTER PLACING/FINISHING CONCRETE.
11. EXISTING BANK AND BOTTOM LINING SHALL BE SAWCUT OR MECHANICALLY SCORED AND REMOVED 36 INCHES (EACH SIDE) FROM THE EDGE OF EXCAVATION TO A NEAT VERTICAL EDGE. REMOVE ANY LOOSE OR FOREIGN MATERIAL.
12. THE TOP OF PIPE AND/OR CONCRETE ENCASEMENT WITHIN THE CANAL SECTION IS TO BE A MINIMUM OF 18 INCHES BELOW THE BOTTOM OF THE CANAL BOTTOM CONCRETE.

THIS DRAWING REPLACES B-54-225

REFERENCES

PREPARATION OF SUBGRADE FOR CANAL LINING SPECIFICATION	CE 02.490
CANAL BANK REINFORCEMENT SPECIFICATION	CE 03.212
CONCRETE MATERIALS & CONCRETE SPECIFICATION	SRP 03300
PLACEMENT OF CANAL BOTTOM CONCRETE SPECIFICATION	CE 03.361
PLACEMENT OF CANAL BANK SHOTCRETE SPECIFICATION	CE 03.362

REVISIONS

REV NO.	DFTR	DSGN	ENGR CHK	ISSUE AUTH	DATE
INITIAL ISSUE					
0	MOD	CWT	CWT	REL	01/20/98
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SALT RIVER PROJECT
WATER ENGINEERING STANDARD

LINED CANAL UNDERCROSSING

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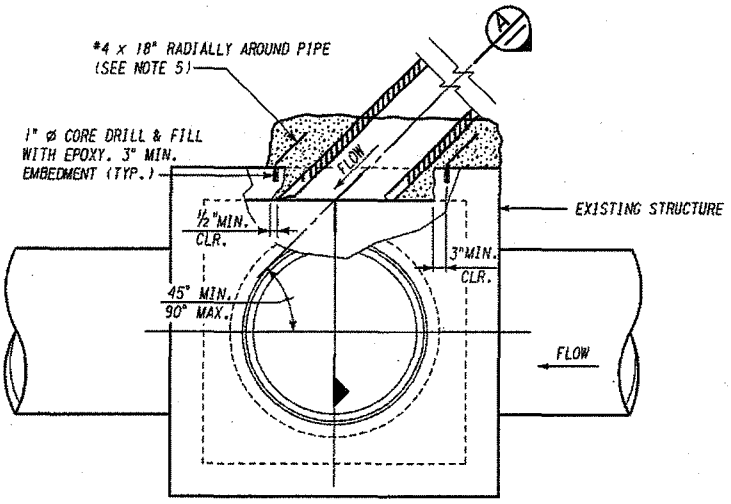
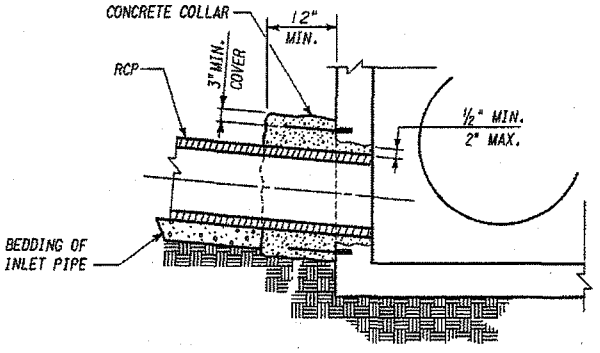
WES-30100-007



PLAN



SECTION A

NOTES

1. THE MINIMUM OPENING INTO THE EXISTING STRUCTURE SHALL BE OUTSIDE DIMENSION OF THE INLET PIPE PLUS ONE INCH.
2. ALL PIPE SURFACES TO BE COVERED BY COLLAR SHALL BE THOROUGHLY CLEANED AND MOISTENED PRIOR TO APPLYING CONCRETE.
3. ALL CONCRETE SHALL BE A MINIMUM OF 3000 PSI AT 28 DAYS AND SHALL BE CONSOLIDATED BY MECHANICAL VIBRATOR OR EQUIVALENT METHOD.
4. ALL REINFORCING STEEL BARS SHALL BE A615 GR40 MINIMUM.
5. (4)#4 EQ. SP. FOR 24" DIA. PIPE & SMALLER. (8)#4 EQ. SP. FOR 30" DIA. PIPE & LARGER. FIELD BEND AS REQ'D. AFTER EPOXY HAS CURED.

REFERENCES

PRECAST CONCRETE PIPE SPECIFICATION ____ CE 02.614
CONCRETE AND NON-STRUCTURAL GROUT SPECIFICATION ____ CE 03.300

REVISIONS

REV NO.	DFTR	DSGN	ENGR CHK	ISSUE AUTH	DATE
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0	MOD	SWT	SWT	REL	3 /30/98
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SALT RIVER PROJECT
WATER ENGINEERING STANDARD

PIPE CONNECTION TO EXISTING STRUCTURE

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APPENDIX "F"

SALT RIVER PROJECT
BACKFILL SPECIFICATIONS
FOR
STORM DRAINS #5 & #6

APPENDIX "F"

SALT RIVER PROJECT
BACKFILL SPECIFICATIONS
FOR
STORM DRAINS #5 & #6

SALT RIVER PROJECT

STANDARD SPECIFICATION FOR UTILITY TRENCH EXCAVATION AND BACKFILLING (SRP 02224)

1.0 GENERAL

1.1 Work Specified Herein

This specification covers the furnishing of all labor, materials and equipment necessary to complete trench excavation, backfilling, compaction and related items. Excavation for structures such as manholes, inlets, transition structures, junction structures, vaults, valve boxes, catch basins, etc., shall meet the requirements of this specification.

1.2 Reference Standards

1.2.1 Reference to standards and/or specifications herein shall be interpreted to mean the latest revision unless noted otherwise. The following abbreviations appear in this Specification:

ASB	Aggregate Slurry Backfill
ASTM	American Society for Testing and Materials
LMB	Lean Mix Backfill (cement stabilized slurry backfill)
OSHA	Occupational Safety and Health Administration
SRP	Salt River Project (Standard Specifications)

1.2.2 The following standards shall be made a part of this Specification:

ASTM D698	Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 5.5 lb. (2.48 kg) Rammer and 12-in. (305 mm) Drop (Standard Proctor)
SRP 02270	Salt River Project Standard Specification for Slurry Backfill Materials
SRP 02230	Salt River Project Standard Specification for Aggregate Base, Select and Surface Aggregate Materials

1.2.3 Permission for deviation from these standards and/or specifications must be approved in writing by the Engineer prior to award of Contract.

1.3 Definition of Rock

1.3.1 Rock shall be defined as materials, including boulders and granite, that cannot be removed by conventional earth moving or ripping equipment and require removal by techniques such as drilling and blasting/splitting or jackhammering.

1.3.2 Material shall not be considered rock when it is disintegrated, weathered, loose or fractured to such an extent that it works and handles like soil.

1.3.3 Rock encountered during construction shall be determined and agreed on by Contractor and the Engineer. Contractor shall note location of rock encountered during excavation on installation record drawings.

1.4 Bluestake and Clearances

Maintain underground and overhead utilities in continuous service unless prior approval has been obtained from the Engineer. Locate, safeguard and maintain conflicting utilities shown on drawings and identified in field. Comply with state and local Blue Stake requirements for locating all utilities, including private lines. Utility lines identified prior to excavation work which are damaged by Contractor shall be repaired at Contractor's expense. Contractor shall identify conflicts by potholing for true depths and is responsible for relocation work needed to resolve conflicts.

1.5 Protection of Structures

1.5.1 Take necessary precautions to protect buildings, foundations and structures against damage. Contractor shall be liable for all damage.

1.5.2 Provide necessary support systems to meet all federal and state OSHA requirements for maintaining the stability of structures adjacent to excavations and excavation activities.

2.0 PRODUCT

2.1 Backfill/Bedding Material

2.1.1 Class D: Native material with a maximum of 50% (by weight) retained on the 3/4-inch (19mm) sieve, free from broken concrete, timber, roots, and other debris. The suitability of this material shall be approved by the Engineer.

2.1.2 Class C: Processed granular material (aggregate base material) meeting the requirements of SRP 02230.

2.1.3 Electric Conduit: Native soil free from broken concrete, timber, roots or other debris; processed granular material (aggregate base or select material); ASB or LMB. Backfill within 6 inches (152mm) of conduit shall have no solid material with sharp edges greater than 1-½ inches (38mm) in maximum dimension and contain more than 50% passing the 3/8-inch (9.53mm) sieve. The balance of the trench backfill shall have no solid material with sharp edges greater than 4 inches (102mm) in maximum dimension and contain more than 50% passing the 3/8-inch (9.53mm) sieve.

2.1.4 Direct Burial Cable: Backfill within 6 inches (152mm) of the cable shall be processed sand or native material free of angular (sharp) rocks, broken concrete, timber, roots or other debris, which contains no particles larger than 3/8-inch (9.5mm) in greatest dimension. The balance of the trench backfill shall be native soil free from broken concrete, timber, roots or other debris, or processed granular material (aggregate base or select material), with no solid material with sharp edges greater than 4 inches (102mm) in maximum dimension and contain more than 50% passing the 3/8-inch (9.53mm) sieve.

2.1.5 Gas Pipe: Processed granular or sand material free of broken concrete, timber, roots or other debris, which contains no particles larger than 1/8-inch (3.2mm) in greatest dimension.

2.1.6 Aggregate Slurry Backfill (ASB): Material meeting the requirements of SRP 02227 (SRP Stock Code No. 00-0100).

2.1.7 Lean Mix Backfill (LMB): Material meeting the requirements of SRP 02227. Unless otherwise specified, LMB ½-sack (SRP Stock Code No. 00-0104) shall be used for slurry applications with trench backfill.

2.1.8 Unless otherwise specified, processed granular material shall be aggregate base or select material meeting the requirements of SRP 02230.

2.1.9 Unless otherwise specified or noted on the plans, backfill shall be native material that is stable, meets compaction requirements and is acceptable to the Engineer. Unsuitable materials include silt and clay soils with a moisture content so significantly over optimum that they cannot be compacted to the required maximum density. Sod, matted or decayed vegetation, expansive soil and other deleterious material are also considered unsuitable backfill material and shall be removed from the jobsite.

3.0 EXECUTION

3.1 General

3.1.1 Use excavation shoring, bracing, sheeting, barricading and plating necessary to perform work and protect excavation and personnel as required for

safety and conformance to governing law, including OSHA Construction Standards, Subpart P, and Salt River Project Excavation Safety Resource Manual. Cost of protection systems shall be included in Contractor bid price.

3.1.2 Sawcutting of the concrete and asphalt shall be required for trenches in paved streets, alleys, driveways, sidewalks, etc. Sawcuts shall be to the full depth of the material, leaving neat, vertical, true lines in such a manner that adjoining surfaces will not be damaged.

3.1.3 Maximum continuous length of open trench shall not exceed the requirements of the governing municipality. A trench shall be considered open until backfilled to the top of subgrade on unsurfaced areas and the top of base course on pavements.

3.1.4 Trenches crossing streets shall be backfilled as soon as possible after placement of conduit, pipe or structures. Substantial steel plates with adequate trench bracing shall be used to bridge across trenches at street crossings where backfill and patching have not been completed during work hours.

3.1.5 Provide safe and convenient passage for pedestrians. Maintain access to hospitals, fire stations, fire hydrants at all times. The Engineer retains the option to designate a passage to be provided at any point he deems necessary.

3.2 Excavation

3.2.1 Excavations for utility trenches shall conform to the dimensions, elevations, grades and tolerances indicated, with allowances for minimum required bedding width, accommodation of compaction equipment and erection of forms. Lines and grades shall be established prior to excavating.

3.2.2 If excavation is carried beyond the dimensions, elevations or grades indicated on the Drawings without the Engineer's approval (except where necessary to meet bedding, compaction or forming requirements), the overexcavated area shall be cleaned of all loose material and backfilled at the Contractor's expense. Backfill material and compaction requirements shall be specified by the Engineer.

3.2.3 The trench bottom shall be level for its full width to provide uniform bearing and support. Excessive tooth marks shall be removed or compacted level. In rock, bottom of trench may be over-excavated a maximum of 6 inches (152mm) and filled with granular material to provide a smooth surface. Granular material shall be compacted to meet requirements shown on the Drawings.

3.2.4 Use of explosives is generally not permitted. If explosives are to be used, a controlled blasting plan that meets the requirements of Appendix A must be submitted and approved by the Engineer prior to such use. Contractor shall

comply with applicable ordinances and regulations, and shall state in his proposal if bid is based on use of explosives. Contractor shall be responsible for any damages occurring due to use of controlled blasting.

3.2.5 Where non-blast related construction activities have the capability to cause vibrations of sufficient intensity to damage structures, Contractor shall meet vibration requirements of Appendix A.

3.2.6 Where soil incapable of supporting the conduit, pipe or structure is encountered, Contractor will notify the Engineer and a determination will be made as to the depth of over-excavation and the type of granular fill required.

3.2.7 Berm or otherwise protect trenches from surface drainage or runoff.

3.3 Bedding

3.3.1 Clean trench of loose material, rocks, weld rod, or other debris prior to placement of bedding.

3.3.2 Material upon which conduit, pipe or structure is to be placed shall be accurately finished and compacted to the grade or dimensions shown on the plans. Bedding or trench bottom shall be brought to final grade so conduit, pipe or structure will be continuously in contact with material on which it is placed. Bedding material shall be within 2% of optimum moisture and compacted to the required density by the specified method in 6 inch (0.15m) or smaller uncompacted lifts.

3.3.3 Bedding material shall be as noted on the plans or in the specifications.

3.4 Backfilling

3.4.1 Backfill material shall be uniformly within 2% of optimum moisture content prior to placement in the trench. Place backfill in level lifts simultaneously on both sides of the conduit, pipe or structure unless otherwise specified.

3.4.2 Backfill trenches in such a manner as to prevent disturbance to the pipe or conduit.

3.4.3 Backfill from bedding to a point approximately 6 inches (152mm) above the top of pipe or conduit shall be placed as follows (backfill material shall be as specified on the plans):

(a) Native material: Place in maximum uncompacted lifts of 8 inches (0.2m) and compact to the required density by the specified method. Native material shall contain no aggregate or pieces greater than 1/3 the width of the trench on each side of the conduit, pipe or structure and in no case exceed 3 inches (76mm) in maximum dimension.

(b) Processed granular and sand material: Place in maximum uncompacted lifts of 12 inches (0.3m) and compact to the required density by the specified method.

(c) ASB: Discharge directlly into the trench from the mixer, with even distribution on each side of conduit or pipe. ASB shall flow freely and uniformly around and under conduit or pipe without leaving voids.

3.4.4 Backfill shall be placed from 6 inches (152mm) above top of pipe or conduit to finished surface as follows:

(a) Unless otherwise specified, native material containing aggregate or pieces up to 6 inches (0.15m) in maximum dimension may be used. Under pavements, sidewalks, curbs, etc., pieces larger than 3 inches (0.1m) will not be allowed for use in the final 12 inches (305mm) below pavement base.

(b) The Engineer may allow Contractor to exceed specified lift depth limits where Contractor demonstrates the ability to meet compaction requirements with proposed equipment and methods. Lift thicknesses shall not exceed that which can be effectively compacted by type of equipment and method used.

3.4.5 When backfilling with ASB or LMB, place in lift depths that will not allow the conduit, pipe or structure to move (float).

3.4.6 Backfill around existing utilities exposed during trench excavation in accordance with bedding methods, Section 3.3.

3.5 Quality Control

3.5.1 Inspection and compaction tests are required on trench beddings and backfills unless LMB slurries are used.

3.5.2 Density and moisture content will be verified during construction by the Engineer at no cost to Contractor. Test will be made at the discretion of the Engineer. Retesting for non-compliance shall be at Contractor's expense.

3.5.3 Do not cover lifts before compaction tests are performed. If lifts are covered prior to testing, excavate test pits for making density tests on lower portions of backfill at instruction of the Engineer. Refill and compact test pits in accordance with the specifications. Excavating, refilling and compacting test pits shall be at Contractor's expense.

3.6 Compaction

3.6.1 Trench bedding and backfill shall be thoroughly compacted to no less than the following percentage of maximum density specified in accordance with ASTM D698.

Compaction Type	Location	From Surface to 2' (0.6m) Below Surface	From 2' (0.6m) Below Surface to 1' (0.3m) Above top of Pipe/Conduit	From 1' (0.3m) Above Top of Pipe/Conduit to Bottom of Trench
I	Under or within 2' (0.6m) of existing or proposed pavement, curb, gutter or sidewalk, or when any part of the trench excavation is within 2' (0.6m) of the above	Granular: 100% Non-Granular: 95%	90% (1)	90% (1)
II	On utility easement in street, road or alley right-of-way outside limits of I.	85%	85%	90% (1)
III	Around any structure, exposed utilities and in overexcavated areas	95%	95%	95%
IV	All other areas	80%	80%	80%

Note (1): 95% for projects administered by Arizona Department of Transporation, or for projects within City of Phoenix rights-of-way.

3.6.2 Consolidation of backfill by flooding or jetting is permitted only with prior assessment by and written approval of the Engineer.

3.6.3 Mechanical compaction shall not be used within 6 inches (152m) of electrical cable or conduit.

3.7 Cleanup

3.7.1 Adjacent grades will be dressed as needed to leave in a workmanlike appearance.

3.7.2 All pavement, sidewalks, curbs or other surfaces which were broken or cut into during construction shall be repaired in kind to the satisfaction of the Engineer. The cost of this repair shall be included in the excavation unit price bid.