PHASE I ALTERNATIVE STUDY
FOR
SOSSAMAN ROAD BOX CULVERT
FCD 91-06

PRESENTED TO THE

MARICOPA COUNTY FLOOD CONTROL DISTRICT

WELLS ENGINEERS, INC.

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PHASE I ALTERNATIVE STUDY
FOR
SOSSAMAN ROAD BOX CULVERT
FCD 91-06

PRESENTED TO THE

MARICOPA COUNTY FLOOD CONTROL DISTRICT

BY

WELLS ENGINEERS, INC.
3737 NORTH 7TH STREET, SUITE 201
PHOENIX, ARIZONA 85014
WE NO. 910431

230-2221

AUGUST 30, 1991

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WELLS ENGINEERS, INC.
Sossaman Road Box Culvert
FCD 91-06
August 29, 1991
WE No. 910431

I. INTRODUCTION

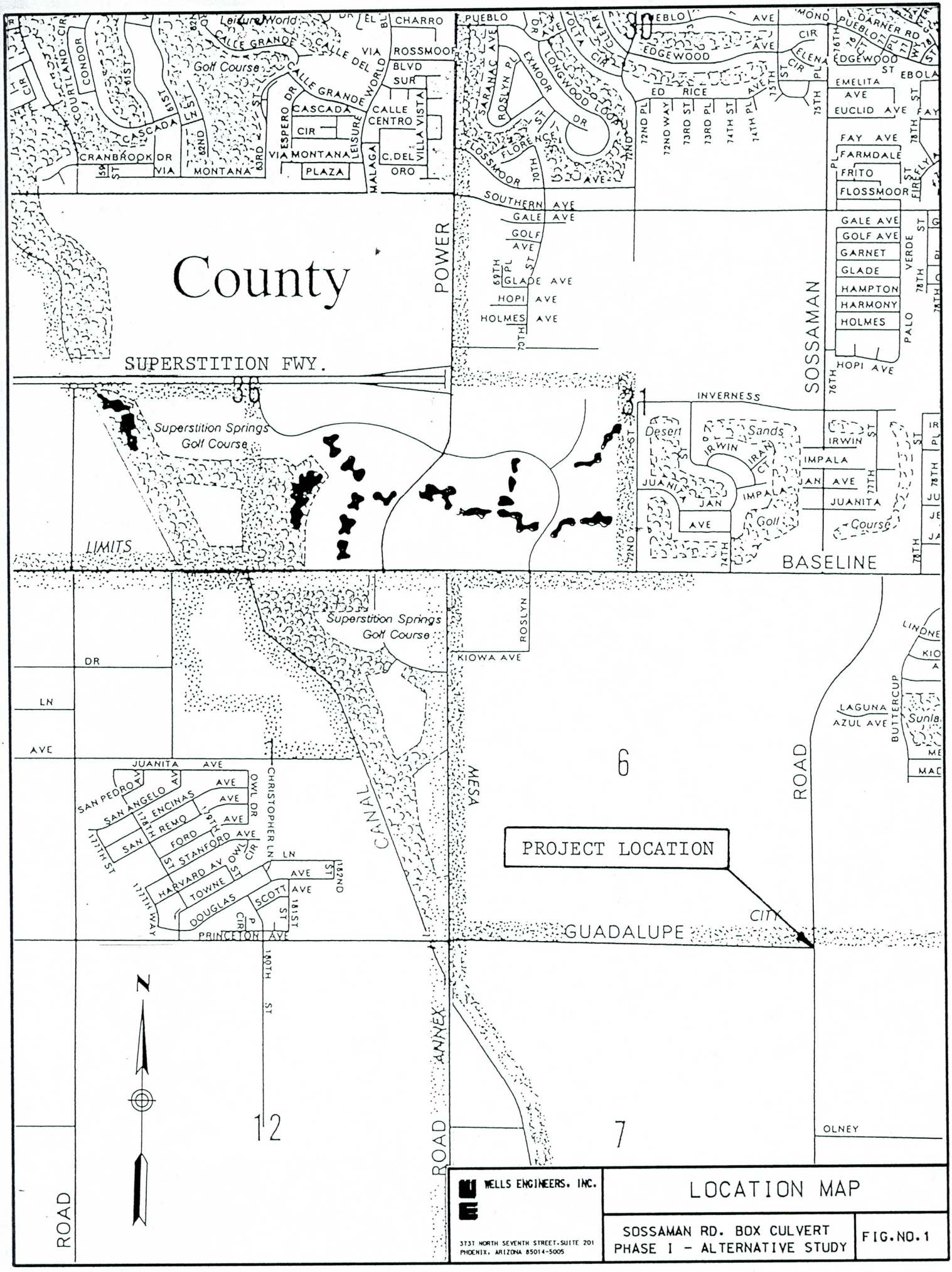
A. Purpose

The purpose of this report is to present the results of an engineering study which explored the costs and hydraulics of three alternatives. Two of the alternatives consist of modifying the existing box culvert at Sossaman and Guadalupe Roads. The other alternative consists of removing the existing box culvert and constructing a new box culvert north of the existing culvert. Each alternative is required to convey 2400 cfs. Additionally, each must accommodate a roadway section of 123 feet, including sidewalks. The Flood Control District shall select the alternative for final design. The alternative that is chosen for design shall connect into the channel downstream currently being designed by the Flood Control District.

B. Site Description

The study site is located in the right-of-way of Sossaman Road +/- 100 feet north of the centerline of Guadalupe Road in southeast Mesa. The region is presently rural/agricultural with some residential development nearby. The potential for future development is high because of the recent opening of the Superstition Freeway east of Power Road and the inclusion of Sossaman Road in the City of Mesa's Five-Year Plan for street improvements.

The existing box culvert is the connection between a large earthen flood control channel which flows southward along the east side of Sossaman Road and the newly constructed concrete-lined rectangular channel which drains westward along the north side of Guadalupe Road. Presently storm runoff in the channel must make a right-angle change in direction to enter the existing box culvert. The concrete lined rectangular channel begins about 450 feet downstream of the existing culvert and is not aligned with the culvert. If the culvert is extended the extension will angle northward to allow the culvert outlet to match the alignment of the channel.


County
SUPERSTITION FWY.
POWER
SOSSAMAN
BASELINE
LIMITS
Superstition Springs Golf Course
Superstition Springs Golf Course
Leisure World
Golf Course
CALLE GRANDE
CALLE DEL
CHARRO
ROSSMOOR
BLVD
SUR
CASCADA
CIR
CALLE CENTRO
VILLA VISTA
C.DEL ORO
MALAGA
PLAZA
VIA MONTANA
CRANBROOK DR
CONDOR
COURTLAND CIR
PUEBLO
EDGEWOOD
ED RICE
SARANAC AVE
ROSLYN PL
EXMOOR
LONGWOOD LOOP
FLORENCE
FLOSSMOOR
SOUTHERN AVE
GALE AVE
GOLF AVE
GLADE AVE
HOPI AVE
HOLMES AVE
EMELITA AVE
EUCLID AVE
FAY AVE
FARMDALE
FRITO
FLOSSMOOR
GALE AVE
GOLF AVE
GARNET
GLADE
HAMPTON
HARMONY
HOLMES
HOPI AVE
INVERNESS
Desert Sands
IRWIN
IRAN CT
IMPALA
JAN AVE
JUANITA
JAN AVE
Golf Course
ROSLYN
KIOWA AVE
DR
LN
AVE
JUANITA AVE
SAN PEDRO AV
SAN ANGELO AV
ENCINAS AVE
SAN REMO AVE
FORD AVE
STANFORD AVE
HARVARD AV
TOWNE
DOUGLAS
SCOTT AVE
PRINCETON AVE
OWL DR
CHRISTOPHER LN
CANAL
MESA
ROAD
6
PROJECT LOCATION
GUADALUPE
CITY
LAGUNA
AZUL AVE
BUTTERCUP
LINDNE
N
12
7
ANNEX
ROAD
OLNEY
ROAD
WELLS ENGINEERS, INC.
3737 NORTH SEVENTH STREET, SUITE 201
PHOENIX, ARIZONA 85014-5005
LOCATION MAP
SOSSAMAN RD. BOX CULVERT
PHASE I - ALTERNATIVE STUDY
FIG.NO.1

II. ANALYSIS OF ALTERNATIVES

Each of the alternatives is intended to accomplish two important functions. First, to extend the culvert beyond the limits of future improvements to Sossaman Road; and second, to improve the hydraulics of the existing culvert thereby reducing potential headwater depth and reduce maintenance problems caused by the deposition of sediment and debris.

A. Overview of Alternatives

Alternative No. 1 is simply the extension of the existing box culvert with straight-walled extensions which are angled slightly to better align the box culvert openings with the upstream and downstream channels, (see Exhibit A). This alternative will also require the construction of an additional barrel, 1-6' x 6', alongside the existing 4-10'x 6' box culvert.

Alternative No. 2 consists of completely removing the existing culvert and replacing it with a new concrete box culvert which crosses Sossaman Road at about a 45 degree skew instead of at a right angle. This alternative requires a much longer culvert but it is better aligned to the upstream and downstream channels and presents less of a maintenance problem. This culvert would have gently curving 45 degree bends on either side of the roadway, (see Exhibit B). It has been determined that a 4-10' x 7' CBC will convey the flow adequately.

Alternative No. 3 combines features of both of the alternatives described above. It is an extension of the existing culvert with an additional barrel like Alternative No. 1. The downstream extension is exactly the same as in the first alternative but the upstream extension is curved so that the box culvert opening is fully aligned with the incoming channel, (see Exhibit C).

B. Hydraulics of Alternatives

All three alternative designs were analyzed for a peak discharge of 2400 cfs, as requested by the Maricopa County Flood Control District. Charts and monographs from HDS-5 were used to analyze the culverts and head losses were computed for angle-point and bends, these losses being added to the outlet control head. The results are that all three culverts operate under inlet control even with bends and angle-points. It is difficult to quantify all the minor losses in box culverts because few laboratory tests have been conducted on rectangular conduits for liquid flow in large systems but the calculations for losses in the Appendix adequately demonstrate that the minor head loss in the three alternatives are not the determining factors in the selection of an alternative.

The hydraulics of a culvert entrance which is skewed to the direction of incoming flow is also difficult to analyze quantitatively. So assumptions combined with practical experience and sound engineering judgement must be used. Alternatives 2 and 3 have entrances which are aligned with the incoming flow so that the quantity of runoff entering each barrel and the velocity of flow through it is essentially the same as the next barrel.

Alternative No. 1 does not have its barrel openings aligned with the incoming channel. As the culvert is shown in Exhibit A the tendency of the runoff would be to flow across the inlet apron towards the southmost barrel. This barrel then would carry a disproportionate amount of the discharge and the proportion would decrease from barrel to barrel so that the discharge and resultant velocity in the northern most barrel would be substantially less than in the southernmost barrel. Culverts which are aligned this way tend to have sediment build up in the barrel or barrels on the inside of the turn because of the disparity in velocities and/or eddies which form along the inside of the turn.

III. COST ESTIMATE SUMMARY

A cost estimate for each of the three alternatives has been prepared and the results are summarized in the following tables. The numerical designation of the tables correspond with the numbered alternatives; the back-up data and quantities are included in the Appendix. All of the cost estimates include the cost of constructing and maintaining a detour for traffic on Sossaman Road and relocating or rerouting an existing 16" waterline in Sossaman Road.

30-Aug-91

TABLE 1

W WELLS ENGINEERS INC.
E

CONTRACT FCD 91-06

ALTERNATIVE NO. 1

SOSSAMAN RD BOX CULVERT
SOSSAMAN RD @ GUADALUPE RD

BIDDING SCHEDULE

PAY ITEM NO.	ITEM DESCRIPTION	UNIT	BID QUANTITY	UNIT PRICE	BID TOTAL
109.2	MOBILIZATION	L.SUM.	1	$6,000.00	$6,000.00
350	REMOVAL OF EXISTING IMPROVEMENTS*	L.SUM	1	$34,857.00	$34,857.00
350.3	MISC. REMOVAL AND OTHER WORK*	L.SUM	1	$1,150.00	$1,150.00
401	TRAFFIC CONTROL	L.SUM	1	$3,000.00	$3,000.00
610.9	WATER LINE RELOCATION 16"	EA.	1	$2,800.00	$2,800.00
702	UNTREATED BASE**	TON	473	$10.00	$4,730.00
710	ASPHALT CONCRETE**	TON	237	$30.00	$7,110.00
725	CONCRETE, CLASS A	CU.YD.	510	$240.00	$122,400.00
727	REINFORCING STEEL	LBS.	74,706	$0.45	$33,617.70
				SUBTOTAL	$215,664.70
				+15% CONTINGENCY	$32,349.71
				GRAND TOTAL	$248,014.41

DESIGNED BY TAB DATE: 8-23-91
CHECKED BY MOF DATE: 8-30-91

* SEE TABLE A-1, APPENDIX.
** ASSUMED 3" AC OVER 6" ABC FOR TEMP. PAVEMENT.

FILE SOSSBID.WQ1

30-Aug-91

TABLE 2

W WELLS ENGINEERS INC.
E

CONTRACT FCD 91-06

ALTERNATIVE NO. 2

SOSSAMAN RD BOX CULVERT
SOSSAMAN RD @ GUADALUPE RD

BIDDING SCHEDULE

PAY ITEM NO.	ITEM DESCRIPTION	UNIT	BID QUANTITY	UNIT PRICE	BID TOTAL
109.2	MOBILIZATION	L.SUM.	1	$12,500.00	$12,500.00
350	REMOVAL OF EXISTING IMPROVEMENTS*	L.SUM	1	$91,547.00	$91,547.00
350.3	MISC. REMOVAL AND OTHER WORK*	L.SUM	1	$4,150.00	$4,150.00
401	TRAFFIC CONTROL	L.SUM	1	$3,000.00	$3,000.00
610.9	WATER LINE RELOCATION 16"	EA.	1	$2,800.00	$2,800.00
702	UNTREATED BASE**	TON	473	$10.00	$4,730.00
710	ASPHALT CONCRETE**	TON	305	$30.00	$9,150.00
725	CONCRETE, CLASS A	CU.YD.	1,099	$240.00	$263,760.00
727	REINFORCING STEEL	LBS.	155,977	$0.45	$70,189.65
				SUBTOTAL	$461,826.65
				+15% CONTINGENCY	$69,274.00
				GRAND TOTAL	$531,100.65

DESIGNED BY TAB DATE: 8-29-91
CHECKED BY MAL DATE: 8-30-91
MAJ

* SEE TABLE A-1, APPENDIX.
** ASSUMED 3" AC OVER 6" ABC FOR TEMP. PAVEMENT.

FILE SOSSBID.WQ1

TABLE 3

W WELLS ENGINEERS INC.
E

CONTRACT FCD 91-06

ALTERNATIVE NO. 3

SOSSAMAN RD BOX CULVERT
SOSSAMAN RD @ GUADALUPE RD

BIDDING SCHEDULE

PAY ITEM NO.	ITEM DESCRIPTION	UNIT	BID QUANTITY	UNIT PRICE	BID TOTAL
109.2	MOBILIZATION	L.SUM.	1	$7,500.00	$7,500.00
350	REMOVAL OF EXISTING IMPROVEMENTS*	L.SUM	1	$34,857.00	$34,857.00
350.3	MISC. REMOVAL AND OTHER WORK*	L.SUM	1	$1,150.00	$1,150.00
401	TRAFFIC CONTROL	L.SUM	1	$3,000.00	$3,000.00
610.9	WATER LINE RELOCATION 16"	EA.	1	$2,800.00	$2,800.00
702	UNTREATED BASE**	TON	473	$10.00	$4,730.00
710	ASPHALT CONCRETE**	TON	237	$30.00	$7,110.00
725	CONCRETE, CLASS A	CU.YD.	697	$240.00	$167,280.00
727	REINFORCING STEEL	LBS.	101,919	$0.45	$45,863.55
				SUBTOTAL	$274,290.55
			+15%	CONTINGENCY	$41,143.58
				GRAND TOTAL	$315,434.13

DESIGNED BY TAB DATE: 8-23-91
CHECKED BY MBF DATE: 8-30-91

* SEE TABLE A-1, APPENDIX.

FILE SOSSBID.WQ1

APPENDIX

EXHIBITS

N

1" = 40'

SOSSAMAN ROAD

PROPOSED IMPROVEMENTS

DIRT CHANNEL

DIRT CHANNEL

CONCRETE APRON

A

B

C

D

GRAVEL ROAD

GUADALUPE ROAD

CONCRETE SPILLWAY

ASPHALT PAVEMENT

OP

EXHIBIT A

ALTERNATIVE 1

N

1" = 40'

SOSSAMAN ROAD

DIRT CHANNEL

PROPOSED IMPROVEMENTS

CONCRETE APPRON

GRAVEL ROAD

GUADALUPE ROAD

CONCRETE SPILLWAY

ASPHALT PAVEMENT

EXHIBIT B

ALTERNATIVE 2

N

1" = 40'

PROPOSED IMPROVEMENTS

SOSSAMAN ROAD

DIRT CHANNEL

CONCRETE APPRON

CONCRETE SPILLWAY

DIRT CHANNEL

GRAVEL ROAD

GUADALUPE ROAD

ASPHALT PAVEMENT

OP

A

C

D

EXHIBIT C

ALTERNATIVE 3

HYDRAULIC CALCULATIONS

PROJECT: Sossaman Rd. Box Culvert

ALTERNATIVE #1

DESIGNER: TAB

DATE: 8-29-91

HYDROLOGIC AND CHANNEL INFORMATION

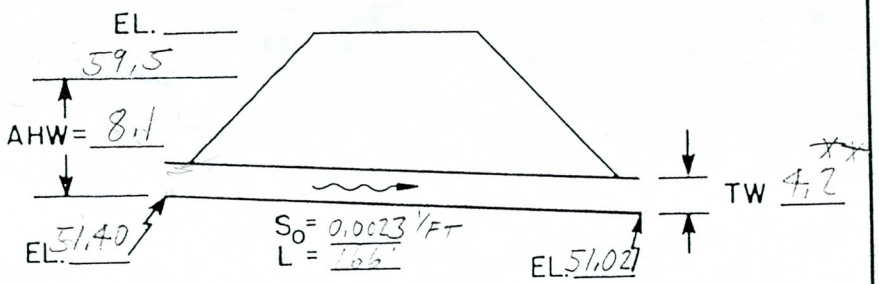
Q_1 = 2400 TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: 5+65



MEAN STREAM VELOCITY = _____

MAX. STREAM VELOCITY = _____

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION										CONTROLLING H.W.	OUTLET VELOCITY	COST	COMMENTS
			INLET CONT.		OUTLET CONTROL HW=H + h_o − LS_o											
			HW/D	HW	K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW				
4-10'x6' CBC	2400/4		1.45	8.7	0.2	3.1*	4.8	5.4	4.2	5.4	.38	8.1	8.7			HW TOO HIGH
						+0.2			4.8							TRY ADDING A BARREL
1-6'x6' CBC	300		1.25	7.5	.5	2.7*	4.2	5.1	4.2	5.1	.4	7.4	7.5			THIS COMB. OF BARREL SIZES WORKS
4-10'x6' CBC	2100/4		1.28	7.7	.5	2.7*	4.3	5.2	4.2	5.2	.4	7.5	7.7			
						+1.			4.5							

for 4 barrels.

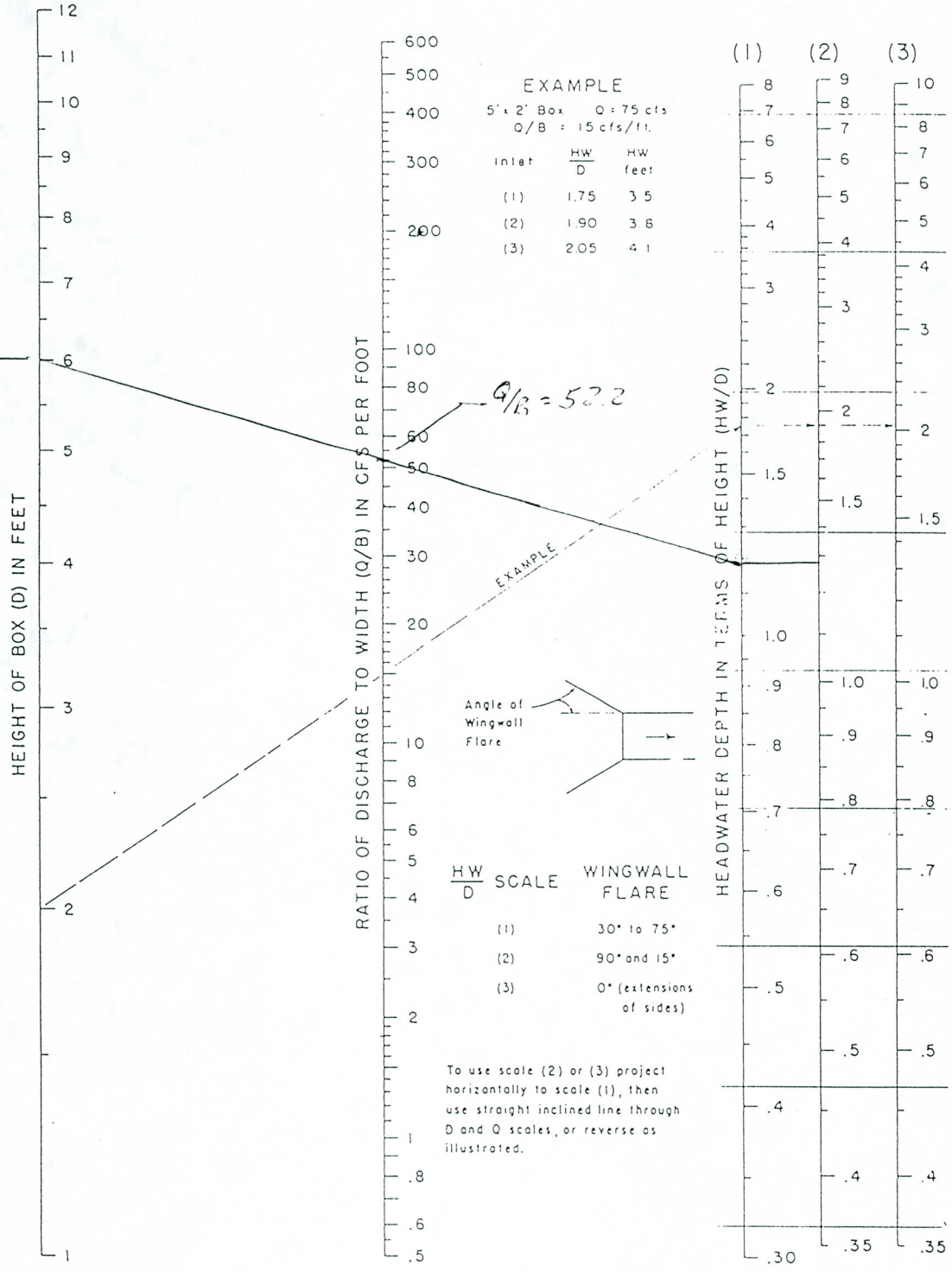
SUMMARY & RECOMMENDATIONS:

* $H = 2.3$ (HDS-5, CHART 8) + $K_a\left(\frac{V^2}{2g}\right)$, See calculation of head loss for angle points, 2.1 + .6

** CONCRETE LINED 40' WIDE RECT. CHANNEL W/ S_o = 0.30%

Figure 7

CHART 1



HEADWATER DEPTH FOR BOX CULVERTS WITH INLET CONTROL

BUREAU OF PUBLIC ROADS JAN. 1963

ALT - 1

Q/B = 2400/[(4·10)+C]

= 52.2

H = 6'

WELLS ENGINEERS, INC.	PROJECT Sossaman Box Culvert		
	DESIGNED TAB	DATE 8-15-91	JOB # 910431
ITEM Box Culvert Analysis	CHECKED	DATE	PAGE 1 OF 2

ALTERNATIVE #1

℄ LENGTH OF CULVERT SECTIONS

$L_A = 28'$

$L_B = 14'$

$L_C = 82'$ (EXISTING)

$L_D = 42'$

DEFLECTION ANGLE BETWEEN CULVERT SECTIONS

$\measuredangle AB = 30°$

$\measuredangle BC = 0°$

$\measuredangle CD = 15°$

WELLS ENGINEERS, INC.	PROJECT Sossaman Rd. Box Culvert		
	DESIGNED TAB	DATE 8-16-91	JOB # 910431
ITEM	CHECKED	DATE	PAGE 2 OF 2

ANALYZE ALT #1

Use HDS-5 nomographs to compute inlet control head and outlet control head. Compute head loss at culvert angle-points by adding

$$\Sigma H_a^i = K_a^1\left(\frac{V_1^2}{2g}\right) + K_a^2\left(\frac{V_2^2}{2g}\right) + \ldots$$

where V_i = velocity of flow in a barrel of the culvert assumed to be flowing full, e.g.,

$$V_i = \frac{Q}{A_i},$$

and where $K_a^i = 0.20$, $\Delta = 15°$

$K_a^i = 0.30$, $\Delta = 30°$

REFERENCE: Applied Hydraulics in Engineering, Morris & Wiggert

ANGLE-POINT LOSSES (computed for 4-10'x6' only)

$$H_a^{AB} = 0.30\left(\frac{8.75^2}{64.4}\right) \qquad \left(V = \frac{2100/4}{10'\times 6'} = 8.75 fps\right)$$

$$H_a^{AB} = 0.36'$$

$$H_a^{CD} = 0.20\left(\frac{8.75^2}{64.4}\right)$$

$$H_a^{CD} = 0.24'$$

$$\Sigma H_a = 0.60'$$

PROJECT: Sossaman Rd. - Box Culvert Alternative #2

DESIGNER: TAB

DATE: 8-29-91

HYDROLOGIC AND CHANNEL INFORMATION

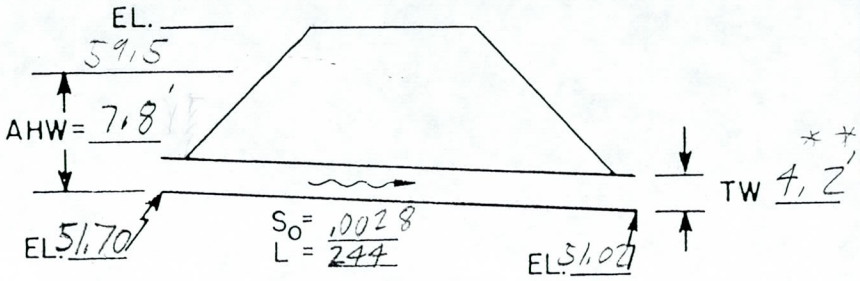
Q_1 = 2400 cfs TW_1 = 4.2'

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: 5+65



MEAN STREAM VELOCITY = _____

MAX. STREAM VELOCITY = _____

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION										CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
			INLET CONT.		OUTLET CONTROL HW=H + h_o - LS_o											
			$\frac{HW}{D}$	HW	K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW				
4-10'x6' CBC.	2400/4		1.45	8.7	0.2	2.9*	4.8	5.4	4.2	5.4	.43	7.9	8.7			HW TOO HIGH.
4-10'x7' CBC	2400/4		1.10	7.7	0.2	2.2*	4.8	5.9	4.2	5.9	.43	7.7	7.7			✓

SUMMARY & RECOMMENDATIONS:

* H = 2.4 (HDS-5, CHART 8) + Angle point & Bend losses, See Calcs.

** CONCRETE 40' WIDE RECT. CHANNEL, S_o = 0.30%

Figure 7

WELLS ENGINEERS, INC.	PROJECT Sossaman Box Culvert		
	DESIGNED TAD	DATE 8-19-91	JOB # 910431
ITEM	CHECKED	DATE	PAGE 1 OF 1

ANALYZE ALT #2

Use HDS-5 nomographs to compute inlet control head and outlet control head.

Compute head loss at culvert bend.

BEND LOSSES

BEND AC

$R = 83.5'$
$\Delta = 59°$

$$H_b = \frac{\Delta}{90}\left[280 f_u^3\left(21.8 + \frac{43.7}{r/D}\right) + \frac{1}{5\sqrt{r/D}}\right]\frac{V^2}{2g}$$

$f_u = 0.02$ (Moody Diagram, $\frac{e}{D} = 0.0017$)

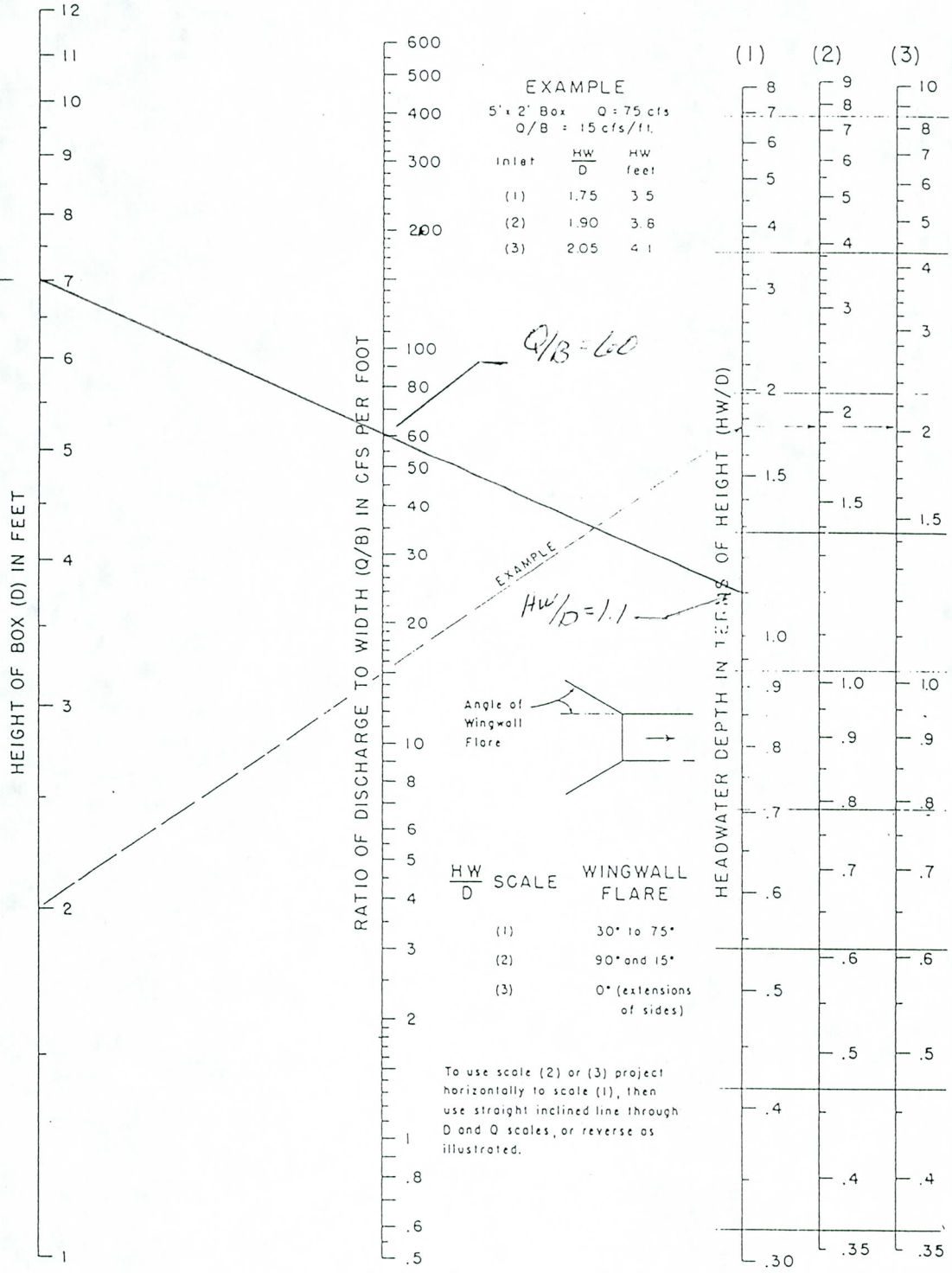
$$H_b = \frac{59}{90}\left[280(.02)^3\left(21.8 + \frac{43.7}{r/D}\right) + \frac{1}{5\sqrt{r/D}}\right]\frac{V^2}{2g}$$

$D = 10'$
$V = 8.6$ fps for full flow

$$H_b = \frac{59}{90}\left[0.13\right]\frac{8.6^2}{64.4}$$

$\boxed{H_b = 0.10'}$

CHART 1



HEADWATER DEPTH FOR BOX CULVERTS WITH INLET CONTROL

BUREAU OF PUBLIC ROADS JAN. 1963

ALT - 2

Q/B = 2400/(4·10)

= 60

H = 7'

PROJECT: Sossaman Rd. - Box Culvert

DESIGNER: TAB

ALTERNATIVE #3

DATE: 8-29-91

HYDROLOGIC AND CHANNEL INFORMATION

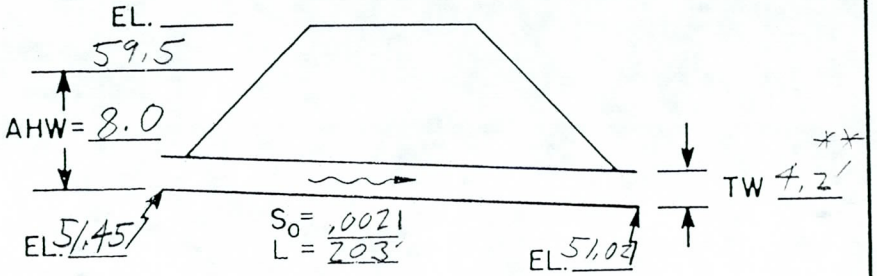
Q_1 = 2400 cfs TW_1 = 4.2'

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: 5+65



MEAN STREAM VELOCITY = _____

MAX. STREAM VELOCITY = _____

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION										CONTROLLING H.W.	OUTLET VELOCITY	COST	COMMENTS
			INLET CONT.		OUTLET CONTROL HW=H + h_o - LS_o											
			HW/D	HW	K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW				
4-10'X6' CBC	2400/4		1.45	8.7	0.2	2.7*	4.8	5.4	4.2	5.4	.68	7.4	8.7			HW TOO HIGH!
																TRY ADDING A BARREL
1-6'X6' CBC	300		1.25	7.5	.5	2.5*	4.2	5.1	4.2	5.1	.7	6.9	7.5			THIS COMB. OF BARREL
4-10'X6' CBC	2100/4		1.28	7.7	.5	2.5*	4.3	5.2	4.2	5.2	.7	7.0	7.7			SIZES WORKS.

SUMMARY & RECOMMENDATIONS:

*$H = 2.6 + \frac{\Delta}{90} K_b \frac{V_c^2}{2g}$, See calculation of head loss for bend.

** CONCRETE 40' WIDE RECT. CHANNEL

Figure 7

WELLS ENGINEERS, INC.	PROJECT Sossaman Box Culvert		
	DESIGNED TAB	DATE 8-29-91	JOB # 910431
ITEM Box Culvert Analysis	CHECKED	DATE	PAGE 1 OF 2

Alternative #3

- ℄ LENGTH OF CULVERT SECTIONS

$L_A = 56'$

~~$L_B = 14'$~~

$L_C = 82'$ (EXISTING)

$L_D = 42'$

GEOMETRY

Sect. A. - Radius = 60'
$\Delta = 75°$

∡ PT. AC = 0°

∡ PT CD = 15°

WELLS ENGINEERS, INC.	PROJECT Sossaman		
	DESIGNED TAB	DATE 8-29-91	JOB # 910431
ITEM	CHECKED	DATE	PAGE 2 OF 2

ANALYZE ALT #3

Use HDS-5 nomographs to compute inlet control head and outlet control head.

Compute head loss at culvert angle-points by adding $\Sigma H_a' = K_a'\left(\frac{V_1^2}{2g}\right) + K_a''\left(\frac{V_2^2}{2g}\right) + \ldots$

and at culvert bends by the formula below.

ANGLE-POINT LOSSES

$H_a^{cp} = 0.20\left(\frac{8.75^2}{64.4}\right)$

$H_a^{cp} = 0.24'$

V = VELOCITY FOR FULL FLOW
V = 8.75 fps
(H_L & V computed for 4-10'x6' only)

BEND & ANGLE-POINT LOSSES

K_b

BEND AC

R = 60'
Δ = 75°
D = 10', ℓ_L = 78.5'

$H_b = \frac{\Delta}{90}\left[290 f_u^3\left(21.8 + \frac{43.7}{r/D}\right) + \frac{1}{5\sqrt{r/D}}\right]\frac{V^2}{2g}$

f_u = 0.02 (Moody diagram, $\frac{\varepsilon}{D} = 0.0012$)

$K_b = 0.147 \simeq 0.15$

Reference: Applied Hydraulics in Engineering
Morris and Wiggert, 2nd Ed., pg. 113.

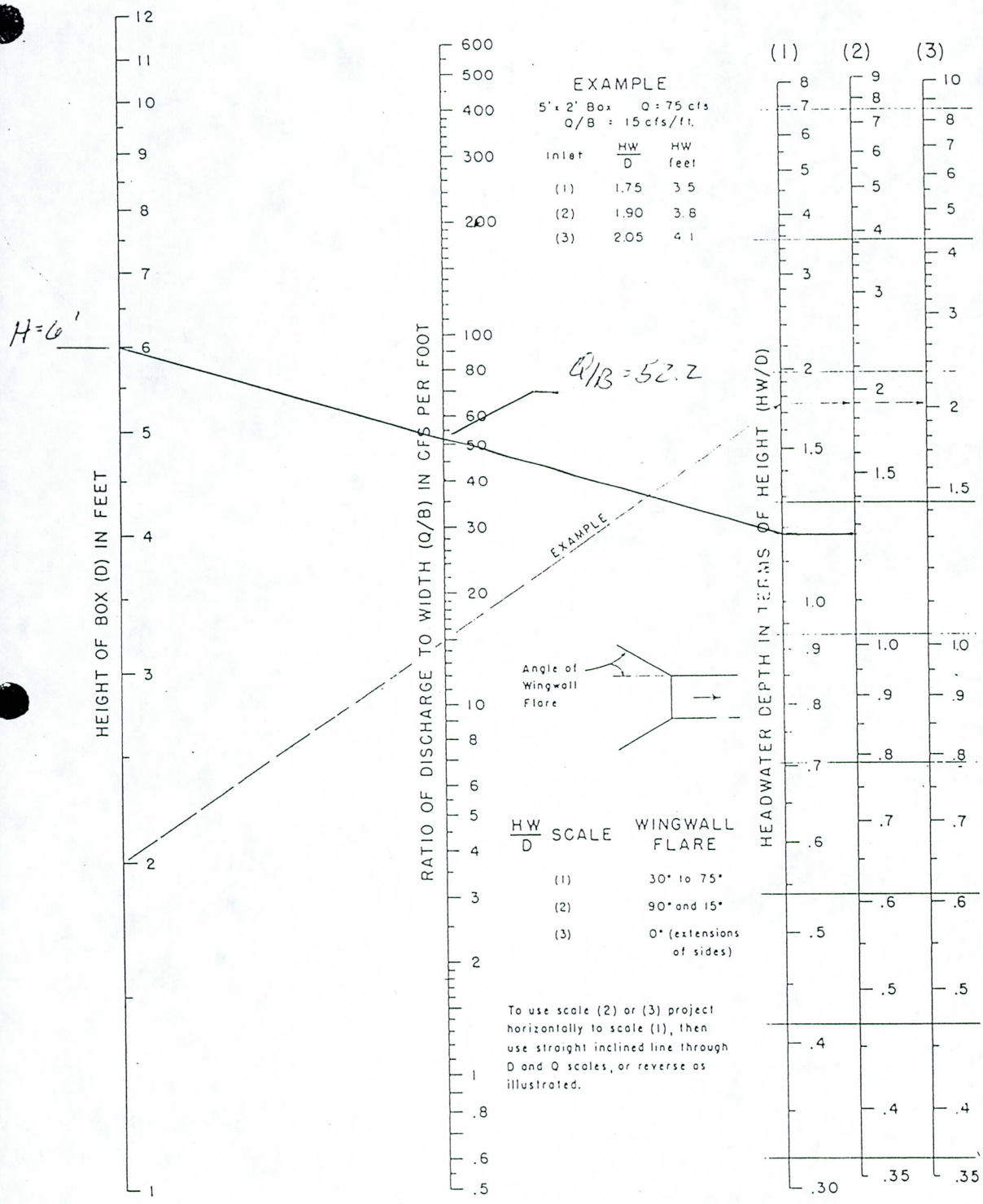
$H_b = \frac{75}{90}\left[0.15\right]\frac{V^2}{2g}$

where V = VELOCITY FOR FULL FLOW
$= \frac{2100}{4\times(10'\times 6')} = 8.75$ fps

$H_b = 0.15'$

$H_L = H_a + H_b = 0.24' + 0.15' = \underline{0.39'}$

CHART 1



HEADWATER DEPTH FOR BOX CULVERTS WITH INLET CONTROL

BUREAU OF PUBLIC ROADS JAN. 1963

ALT - 3

$Q/B = 2400/[(4.10)+6]$

$= 52.2$

$H = 6'$

QUANTITY CALCULATIONS

TABLE A-1

W E WELLS ENGINEERS, INC.	PROJECT: SOSSAMAN BOX CULVERT SOSSAMAN RD @ GUADALUPE RD FOR: MARICOPA COUNTY FLOOD CONTROL DISTRICT CONTRACT FCD 91-06

DESIGNED BY TAB	DATE 8-30-91	JOB# 910431		
ITEM REMOVALS AND RELOCATIONS	CHECKED BY MAI	DATE 8-30-91	PAGE 1 OF 1	

	ITEMS				
ALTERNATIVE	REMOVAL OF STRUCTURAL CONCRETE (CY)	REMOVE AND REPLACE POWER POLES (EA)	REMOVE AND REPLACE MISC. SIGNS (EA)	REMOVAL OF MISC. CONCRETE (L. SUM)	REMOVE AND REPLACE A.C. PVMT (SY)
# 1	217	0	5	650	65
# 2	566	1	5	650	470
# 3	217	0	5	650	65
UNIT COST	$160.00	$3,000.00	$100.00	$1.00	$2.10

TABLE A-2

W E WELLS ENGINEERS, INC.

PROJECT: SOSSAMAN BOX CULVERT
SOSSAMAN RD @ GUADALUPE RD
FOR: MARICOPA COUNTY FLOOD CONTROL DISTRICT
CONTRACT FCD 91-06

DESIGNED BY TAB DATE: 8-30-91 JOB# 910431

ITEM BOX CULVERT QUANTITIES CHECKED BY MAL DATE: 8-30-91 PAGE OF

ALTERNATIVE	CBC SIZE SPAN X HT.	LENGTH (FT)	UNIT QTY./LF		TOTAL BARREL		HEADWALL		TOTALS	
			CONC. (CY)	STEEL (Lbs)	CONC. (CY)	STEEL (Lbs)	CONC. (CY)	STEEL (Lbs)	CONC. (CY)	STEEL (Lbs)
# 1	4 -10' X 6'	84	4.246	597.7	356.7	50,207	20.0	1,624	509.8	74,706
	1 - 6' X 6'	166	0.802	137.8	133.1	22,875				
# 2	4 -10' X 7'	244	4.416	632.1	1077.5	154,232	21.6	1,745	1,099.1	155,977
# 3	4 -10' X 6'	121	4.246	597.7	513.8	72,322	20.0	1,624	696.6	101,919
	1 - 6' X 6'	203	0.802	137.8	162.8	27,973				

NOTE: INLET HEADWALL INCLUDES WINGWALLS WITH AN ASSUMED SLOPE OF 4:1, AND OUTLET HEADWALL DOES NOT INCLUDE WINGWALLS OR OUTLET APRON.
FILL HEIGHT IS LESS THAN 10', TABLE 1.

REFERENCE: ADOT STRUCTURES DIVISION STANDARD DRAWINGS, 1988: B-02.70, B-05.20 AND B-05.10.

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

INTEROFFICE MEMORANDUM

Subject:SOSSAMAN BOX CONCEPTS REVIEW File:FCD 91-06

To:SCOTT CLEMENT From:C G WAINWRIGHT Date:OCT. 16,1991
Via:ED RALEIGH

REVIEW OF
PHASE I ALTERNATIVE STUDY FOR SOSSAMAN ROAD BOX CULVERT

THE COST ESTIMATES FOR THE THREE ALTERNATES APPEAR TO BE REASONABLE EXCEPT FOR ALTERNATE 2.
THE ALTERNATE 2 ITEM 350 REMOVAL OF EXISTING IMPROVEMENTS IS LISTED AT $91,000, OF WHICH APPARENTLY $56,690 WOULD BE FOR THE REMOVAL OF THE EXISTING SOSSAMAN BOX. THE COUNTY HIGHWAY DEPT. ESTIMATED THAT A FIGURE OF $30,000 WOULD BE MORE REASONABLE. THEREFORE, ITEM 350 WOULD BE REDUCED TO $64,857, AND THE REVISED TOTAL WOULD BE $395,048.

IV. REVISED COMPARISON OF ALTERNATIVES

TABLE 4

ITEM	ALT.#1	ALT.#2	ALT.#3
TOTAL EST. COST	$287,044	$395,048	$266,787
DIFFERENCE (FROM ALT.#3)	$20,257	$128,261	--------

N

1" = 40'

SOSSAMAN ROAD

7+00

69'

38'

NEW IMPROVEMENTS

DIRT CHANNEL

6+00

CONCRETE APRON

OP

DIRT CHANNEL

40'

5+00

GUADALUPE ROAD

GRAVEL ROAD

67'

CONCRETE SPILLWAY

51'

56'

4+00

EXHIBIT A

ALTERNATIVE 1

N

1" = 40'

SOSSAMAN ROAD

69'

7+00

38'

PROPOSED IMPROVEMENTS

DIRT CHANNEL

6+00

CONCRETE APRON

DIRT CHANNEL

40'

GRAVEL ROAD

67'

GUADALUPE ROAD

5+00

4+00

51'

56'

CONCRETE SPILLWAY

EXHIBIT B

ALTERNATIVE 2

N

1" = 40'

SOSSAMAN ROAD

7+00

69'

38'

DIRT CHANNEL

PROPOSED IMPROVEMENTS

OP

6+00

CONCRETE APRON

DIRT CHANNEL

5+00

GUADALUPE ROAD

GRAVEL ROAD

40'

67'

51'

56'

CONCRETE SPILLWAY

4+00

EXHIBIT C

ALTERNATIVE 3

WELLS ENGINEERS, INC.

FACSIMILE COVER SHEET

FROM: T. Bokich

WE NO. 910431

DATE: 9-3-91

WELLS ENGINEERS, INC.
3737 NORTH 7TH STREET, SUITE 201
PHOENIX, ARIZONA 85014-5005
(602)230-2221

FAX NO. (602) 230-0817

TOTAL NO. OF PAGES (including cover sheet) 14

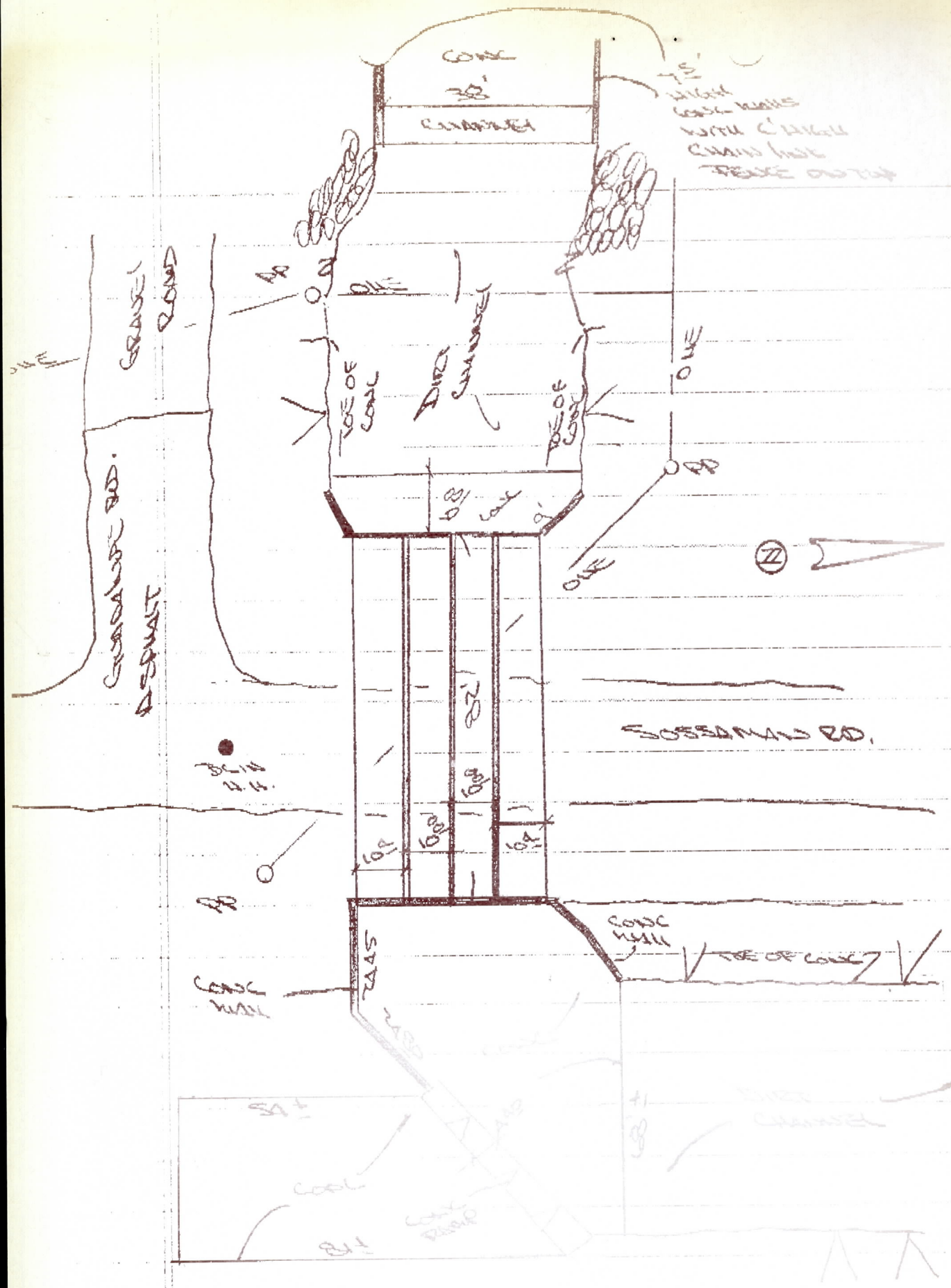
PRIORITY: URGENT _____ NORMAL ✓

TO: Scott Clement
Maricopa County Flood Control
District

FAX NO: 269-4601

COMMENTS:

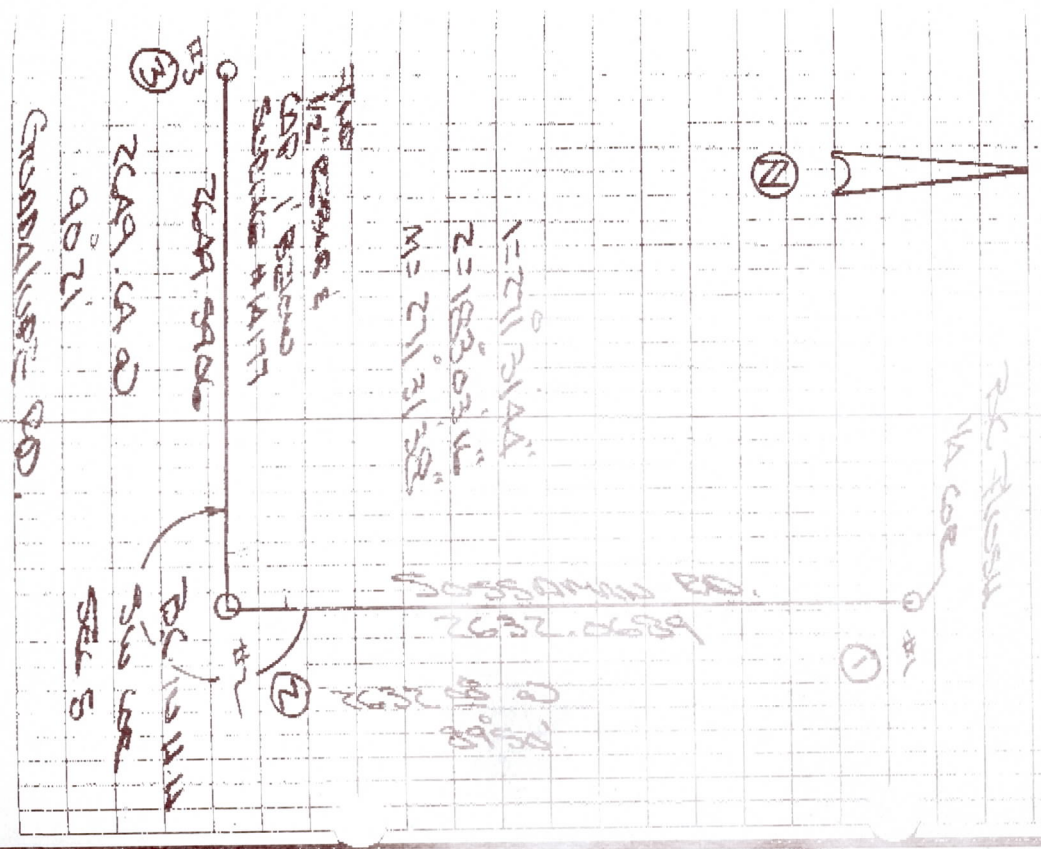
FORMS\FAXSHT


SOSSAMAN RD.

BENCHMARK

CHISELED SQUARE TOP OF CURB LOCATED AT THE NORTHEAST CORNER OF BASELINE ROAD AND SOSSAMAN ROAD.
ELEVATION = 1387.89 (CITY OF MESA DATUM)

BRASS CAP IN HAND HOLE LOCATED AT THE INTYERSECTION OF GUADALUPE ROAD AND SOSSAMAN ROAD.
ELEVATION = 1359.94 (BEING THE MARICOPA COUNTY ASSUMED DATUM OF THE IMPROVEMENT PLANS PREPARED FOR THIS IMMEDIATE AREA AS PROVIDED BY JOHN SVECHOVSHY OF THE MARICOPA COUNTY FLOOD CONTROL DISTRICT 08/02/91)



WELLS ENGINEERS, PHOENIX 6022300817 P.02

T @ 2 Sighting 1

STA	Horz	Dist	Vert	Rod	Elev.
	HI > 1365.42				
℄ Rd	00°00'	50.00	4	4.66	60.76
℄ Rd	00°00'	100.00	5	4.39	61.03
℄ Rd	00°00'	150.00	6	4.05	61.37
℄ Rd.	00°00"	200.00	7	3.81	61.61
E.P.	356°05'	205.20	8	4.12	61.30
TOE	350°47'	207.38	9	5.10	60.32
TOP	347°46"	208.54	10	4.40	61.02
TOE	346°44'	209.60	11	5.90	59.52
E.P.	03°53'	204.14	12	4.11	61.31
TOE	08°59'	205.72	13	5.10	60.32
TOP	11°46'	208.34	14	2.90	62.52
COR. CONC.	13°21'	204.90	15	4.18	61.24
E.P.	355°07'	164.84	16	4.27	61.15
TOE	348°49'	167.78	17	5.10	60.32
TOP	345°59'	168.70	18	4.90	60.52
TOE	342°35'	170.84	19	6.00	59.42
E.P.	04°50'	163.48	20	4.31	61.11
TOE	11°04'	164.94	21	5.40	60.02
TOP	14°33'	166.92	22	2.90	59.52
Edge CONC.	17°32'	168.80	23	4.56	60.86
TOE Edge CONC.	21°50'	173.84	24	13.25	52.17
COR TOE CONC.	52°38'	159.66	25	14.06	51.36
TOP	57°41'	182.12	26	3.83	61.59

Cont On Next Pg

+5.48 FROM BC. IN H.H. AT
GUADALUPE & SOSSAMAN 1359.94
MARICOPA COUNTY DATUM

WELLS ENGINEERS PHOENIX 602230817 P.03

STA	Horz	Dist	Vert	Rod	
TOP	45°40'	216.86	27	4.00	61.42
TOE	38°18'	196.40	28	13.76	51.66
North Edge Conc	44°01'	136.48	29	14.18	51.24
TOE CONC.	56°54'	151.20	30	13.78	51.64
TOP CONC	58°47'	149.16	31	11.56	53.86
TOP CONC.	59°16'	102.22	32	11.29	54.13
TOE CONC.	57°25'	102.88	33	14.00	51.42
SOUTH TOE Edge Conc	91°36'	83.92	34	11.48	53.94
TOE SOUTH Edge Conc.	91°36'	116.00	35	11.50	53.92
TOP	91°32'	140.60	36	4.70	60.72
& Wash	83°59'	186.02	37	7.40	58.02
TOP Wash	82°56'	138.90	38	6.40	59.02
& Wash	80°49'	138.52	39	9.40	56.02
TOP Wash	77°09'	141.38	40	6.51	58.91
E. Edge Conc. & Wash	80°05'	123.26	41	11.40	54.02
TOP CONC.	58°59'	126.28	42	11.40	54.02
SOUTH EAST COR Wall	58°15'	102.50	43	10.00	55.42
& Back Wall	57°53'	77.52	44	8.61	56.81
North Face & Conc. Wall	—	—		14.02	51.40
Southeast Cor Retain. Wall	44°46'	58.00	45	7.11	58.31
Conc. North Face Wall	—	—		14.05	51.37
& TOP Conc. Retain. Wall	32°49'	74.60	46	2.28	63.14
Conc. East Face	—	—		14.04	51.38
Ground West Face	—	—		3.80	61.62

Cont On Next Pg.

South Edge Conc. Wall

WELLS ENGINEERS, PHOENIX 6022300817 P.04

STA	Horz	Dist	Vert	Rod	Elev.
TOE	24°47'	69.36	47	6.10	59.32
E.P.	12°26'	64.90	48	4.90	60.52
E.P.	08°06'	99.78	49	4.56	60.86
TOE	17°17'	102.52	50	5.88	59.54
TOP	22°12'	105.64	51	3.70	61.72
℄ Back Wall	29°39'	113.78	52	5.00	60.42
East Face CONC.	—	—		14.07	51.35
℄ Back Wall	26°58'	102.24	53	7.15	58.27
CONC. Face Wall	—	—		14.03	51.39
Northeast Cor. Conc.	25°34'	94.56	54	—	
Hazord Sign	24°14'	93.58	55	—	
NO TRESS Sign	23°10'	107.92	56	—	
Hazord Sign	43°16'	55.36	57	—	
City of Mesa Sign	29°33'	37.50	58	—	
NO TRESS Sign	69°23'	45.02	59	—	
P.P.	79°27'	40.36	60	5.60	59.82
Guide Wire	115°00'	43.96	61	5.70	59.72
Rebar ℄ Cap ℄ 14177	91°36'10"	50.20	62	—	
TOP	89°00'	34.84	63	4.90	60.52
TOE	90°38'	29.86	64	6.90	58.52
E.P.	93°24'	13.62	65	5.43	59.99
℄ Rd	182°07'	100.00	66	6.18	59.24
℄ Rd	182°29'	200.00	67	7.40	58.02
E.P.	350°32'	101.30	68	4.65	60.77

Retaining Wall

WELLS ENGINEERS, PHOENIX 6022390817 P.05

STA	Horz	Dist	Vert	Rod	Elev.
TOE	342°21'	105.46	69	5.35	6007
TOP	338°14'	107.84	70	4.70	60.72
P.P.	333°49'	111.28	71	5.80	59.62
Guide Wire	339°11'	137.68	72		
Rebar+Cap #14177	339°33'36"	140.72	73		
Rebar+Cap #14177	325°40'06"	135.88	74		

WELLS ENGINEERS, PHOENIX 6022300817 P.06

T @ #2 SIGHTING #1 & SPT

STA	HORZ	DIST	VERT	ROD	ELEV
	HI =	1365.47			
E.P. C.R.	339°03'	49.32	75	5.21	60.26
E.P. M.P.O.C.	309°06'	34.72	76	6.10	59.37
E.P. PT.	273°51'	53.28	77	6.73	58.74
℄ Rd.	260°04'	54.04	78	6.46	59.01
E.P. C.R.	205°49'	51.12	79	5.90	59.57
E.P. M.P.O.C.	218°53'	41.80	80	5.92	59.55
E.P. Pt.	243°03'	50.02	81	6.13	59.34
Southwest Cor. A.C.	262°15'	152.16	82	7.88	57.59
Northwest Cor. A.C.	272°28'	150.48	83	8.14	57.33
TOP	276°19'	151.08	84	8.70	56.77
TOE	284°31'	153.28	85	14.30	51.17
TOE	209°21'	170.56	86	13.80	51.67
TOP	305°51'	181.24	87	6.70	58.77
N/G	317°05'	216.76	88	7.20	58.27
N/G	322°29'	150.70	89	5.30	60.17
Northwest Cor. Conc.	317°54'	135.22	90	6.80	58.67
℄ Conc.	333°36'	105.40	91	7.33	58.14
END CONC. At Wing Wall	333°44'	95.46	92	7.22	58.25
South Face Wing Wall	—	—		14.18	51.29
Northwest Cor. Retain Wall	334°07'	95.04	93	—	
Hazard Sign	335°38'	94.58	94	—	
℄ Retaining Wall	326°59'	75.56	95	2.36	63.11
West Face Conc Retaining Wall	—	—		14.33	51.14
East Face Retaing wall Dirt	—	—		4.90	60.57

+5.53 FROM BC [illegible] H.H. [illegible]
[illegible] & [illegible]

WELLS ENGINEERS, PHOENIX 6022300817 P.07

STA	Horz	Dist	Vert	Rod	Elev
TOE	335°15'	70.76	96	6.00	59.47
Hazard Sign	316°09'	56.56	97	—	
Southwest Cor. Retain Wall	113°45'	58.48	98	—	
End Conc. At Wing Wall	3°42'	58.92	99	7.21	58.36
North Face Wing Wall	—	—		14.26	51.21
TOP Conc.	304°25'	57.56	100	7.24	58.23
Southwest Cor Conc.	282°10'	90.28	101	7.53	57.94
Northwest Cor Conc.	290°07'	97.90	102	14.17	51.30
Southwest Cor. Conc.	306°27'	65.10	103	14.28	51.19
Northwest Cor Wing Wall	308°08'	63.66	104	11.39	54.08
North Face Wing Wall	—	—		14.22	51.25
Southwest Cor Wing Wall	330°21'	100.98	105	11.37	54.10
South Face Wing Wall	—	—		14.24	51.23
West Edge Conc 10.8'	—	—		14.28	51.19
Southwest Cor Conc.	313°08'	125.34	106	14.10	51.37
PP	275°36'	177.06	107	9.13	56.34
TOP	273°43'	262.52	108	9.44	56.03
TOE	279°14'	263.66	109	14.40	51.07
TOE	288°20'	271.32	110	14.00	51.47
TOP	292°26'	278.84	111	6.80	58.67
PP & TBM	290°28'	303.62	112	6.30	59.17
WEI. TBM #9	—	—		6.18	MARKED 1358.99
Guide Wire	292°03'	308.12	113	—	
East End Conc. 38' Wide Chanel	281°34'	496.82	114	15.64	49.83
E 38' Wide Chanel	279°55'	594.78	115	16.05	49.42

West & Box Culvert

MEAS = 59.29 MARICOPA COUNTY DATUM

− 0.71

58.58 CITY OF MESA DATUM

WELLS ENGINEERS, PHOENIX 6022300817 P.08

STA	Horz	Dist	Vert	Rod	Elev.
℄ 38' wide Channel	279°26'	361.42	116	16.20	49.27
TOE East Edge Riprap	283°44'	390.20	117	14.80	50.67
TOE East Edge Riprap	277°41'	386.14	118	15.00	50.47
℄ Gravel Rd.	268°33'	265.48	119	8.66	56.81
℄ Air Release MH	214°37'	56.42	120		

WELLS ENGINEERS, PHOENIX 6022300817 P.09

T @ #2 SIGHTING #1 [illegible]

HI = 1365.42

TOP Edge Riprap	275°53'	390.46	121	9.10	56.32
TOP Edge Riprap	286°11'	391.92	122	7.90	57.52
P.P. & TOP	08°17'	280.06	123	2.30	63.12
TOE	14°28'	288.36	124	13.70	51.72
TOE	24°40'	301.66	125	13.50	51.92
TOP	29°37'	314.78	126	3.40	62.02
TOP	36°54'	256.34	127	3.70	61.72
TOE	31°54'	234.50	128	13.70	51.72
TOE	19°03'	211.46	129	13.20	52.22

+ SAB FROM BC IN H.H @ GUADALUPE & SOSSAMAN

STATIONING

BASE LINE FROM POINT 2 TO 1
STARTING STATION = 5+00

POINT	STATION	OFFSET	NORTHING	EASTING	ELEVATION	DESCRIPTION
1	3132.07	0.00	10000.0000	10000.0000	0.000	
2	500.00	0.00	7368.8542	10069.7032	0.000	
3	570.62	-2648.65	7369.3038	7420.1126	0.000	
4	550.00	-0.00	7418.8367	10068.3791	0.000	
5	600.00	-0.00	7468.8191	10067.0549	0.000	
6	650.00	-0.00	7518.8016	10065.7308	0.000	
7	700.00	-0.00	7568.7841	10064.4067	0.000	
8	704.72	-14.02	7573.1320	10050.2703	0.000	
9	704.70	-33.22	7572.6055	10031.0781	0.000	
10	703.80	-44.19	7571.4172	10020.1332	0.000	
11	704.01	-48.10	7571.5182	10016.2177	0.000	
12	703.67	13.83	7572.8202	10078.1300	0.000	
13	703.20	32.12	7572.8302	10096.4334	0.000	
14	703.96	42.49	7573.8898	10106.7729	0.000	
15	699.36	47.31	7569.4003	10111.7182	0.000	
16	664.24	-14.03	7532.6666	10051.3263	0.000	
17	664.59	-32.54	7532.5289	10032.8150	0.000	
18	663.68	-40.86	7531.3918	10024.5231	0.000	
19	663.01	-51.14	7530.4504	10014.2687	0.000	
20	662.90	13.77	7532.0605	10079.1588	0.000	
21	661.87	31.66	7531.5087	10097.0657	0.000	
22	661.57	41.93	7531.4747	10107.3443	0.000	
23	660.96	50.85	7531.1023	10116.2756	0.000	
24	661.37	64.65	7531.8802	10130.0595	0.000	
25	598.90	126.89	7469.0805	10193.9852	0.000	
26	597.36	153.91	7470.2570	10220.9816	0.000	
27	651.55	155.12	7524.4575	10220.7524	0.000	
28	654.13	121.72	7526.1538	10187.3034	0.000	
29	598.15	94.84	7469.4792	10161.9063	0.000	
30	582.57	126.66	7454.7502	10194.1352	0.000	
31	577.31	127.56	7449.5113	10195.1748	0.000	
32	552.24	87.86	7423.4015	10156.1527	0.000	
33	555.40	86.69	7426.5340	10154.8932	0.000	
34	497.66	83.89	7368.7334	10153.6231	0.000	
35	496.76	115.95	7368.6872	10185.7031	0.000	
36	496.24	140.55	7368.8154	10210.3032	0.000	
37	519.50	185.00	7393.2447	10254.1172	0.000	
38	517.09	137.84	7389.5867	10207.0472	0.000	
39	522.11	136.74	7394.5747	10205.8143	0.000	
40	531.44	137.84	7403.9363	10206.6614	0.000	
41	521.23	121.42	7393.2895	10190.5168	0.000	
42	565.07	108.22	7436.7679	10176.1662	0.000	
43	553.94	87.16	7425.0804	10155.4053	0.000	
44	541.21	65.66	7411.7916	10134.2456	0.000	
45	541.18	40.84	7411.1003	10109.4432	0.000	
46	562.69	40.43	7432.5974	10108.4584	0.000	
47	562.97	29.07	7432.5740	10097.1002	0.000	
48	563.38	13.97	7432.5799	10081.9931	0.000	
49	598.78	14.06	7467.9764	10081.1413	0.000	
50	597.89	30.46	7467.5174	10097.5585	0.000	
51	597.81	39.92	7467.6859	10107.0141	0.000	
52	598.88	56.29	7469.1922	10123.3518	0.000	
53	591.12	46.36	7461.1735	10113.6367	0.000	
54	585.30	40.81	7455.2060	10108.2383	0.000	
55	585.33	38.41	7455.1753	10105.8401	0.000	
56	599.22	42.46	7469.1616	10109.5173	0.000	

WELLS ENGINEERS, PHOENIX, 6022308817

59	515.85	42.14	7385.8187	10111.4084	0.000
60	507.39	39.68	7377.2920	[illegible]9.1713	0.000
61	481.42	39.84	7351.3375	[illegible].0225	0.000
62	498.60	50.18	7368.7795	10119.9031	0.000
63	500.61	34.83	7370.3845	10104.5095	0.000
64	499.67	29.86	7369.3150	10099.5596	0.000
65	499.19	13.60	7368.4068	10083.3158	0.000
66	400.07	-3.69	7268.8597	10068.6574	0.000
67	300.19	-8.67	7168.8826	10066.3319	0.000
68	599.92	-16.66	7468.2984	10050.4017	0.000
69	600.50	-31.98	7468.4678	10035.0774	0.000
70	600.15	-39.99	7467.9113	10027.0749	0.000
71	599.86	-49.10	7467.3801	10017.9741	0.000
72	628.69	-48.93	7496.2059	10017.3837	0.000
73	631.57	-49.91	7499.0583	10016.3269	0.000
74	612.21	-76.63	7478.9933	9990.1246	0.000
75	546.06	-17.63	7414.4306	10050.8551	0.000
76	521.90	-26.94	7390.0300	10042.1884	0.000
77	503.58	-53.16	7371.0226	10016.4673	0.000
78	490.68	-53.23	7358.1258	10016.7388	0.000
79	453.98	-22.26	7322.2630	10048.6672	0.000
80	467.46	-26.24	7335.6325	10044.3347	0.000
81	477.33	-44.59	7345.0117	10025.7312	0.000
82	479.48	-150.77	7344.3498	9919.5293	0.000
83	506.48	-150.34	7371.3470	9919.2438	0.000
84	516.62	-150.16	7381.4941	9919.1528	0.000
85	538.42	-148.39	7403.3325	9920.3512	0.000
86	351.33	-83.60	7216.0252	9990.0707	0.000
87	606.15	-146.90	7471.0726	9920.0391	0.000
88	658.74	-147.60	7523.6328	9917.9518	0.000
89	619.53	-91.78	7485.9135	9974.7948	0.000
90	600.33	-90.66	7466.7482	9976.4229	0.000
91	596.73	-41.86	7464.4431	10025.2968	0.000
92	585.60	-42.25	7453.3086	10025.2052	0.000
93	585.51	-41.49	7453.2315	10025.9646	0.000
94	586.16	-39.02	7453.9458	10028.4140	0.000
95	563.36	-41.17	7431.0997	10026.8684	0.000
96	564.26	-29.62	7432.3074	10038.3874	0.000
97	540.79	-39.18	7408.5908	10029.4535	0.000
98	541.24	-41.46	7408.9850	10027.1658	0.000
99	541.19	-42.13	7408.9114	10026.4945	0.000
100	532.53	-47.48	7400.1186	10021.3742	0.000
101	519.03	-88.25	7385.5375	9980.9781	0.000
102	533.67	-91.93	7400.0790	9976.9162	0.000
103	538.68	-52.36	7406.1312	10016.3324	0.000
104	539.24	-50.13	7406.7497	10018.5511	0.000
105	587.76	-49.95	7455.2586	10017.4418	0.000
106	585.69	-91.47	7452.0966	9975.9972	0.000
107	517.28	-176.21	7381.4596	9893.0924	0.000
108	517.02	-261.97	7378.9280	9807.3765	0.000
109	542.31	-260.24	7404.2532	9808.4303	0.000
110	585.34	-257.55	7447.3461	9809.9849	0.000
111	606.41	-257.74	7468.3990	9809.2371	0.000
112	606.16	-284.45	7467.4885	9782.5372	0.000
113	615.67	-285.58	7476.9238	9781.1570	0.000
114	599.62	-486.73	7455.5459	9580.5052	0.000
115	602.43	-585.89	7455.7329	9481.3025	0.000
116	559.24	-356.53	7418.6283	9711.7270	0.000
117	592.63	-379.04	7451.4185	9688.3383	0.000
118	551.63	-382.67	7410.3282	9685.7969	0.000
119	493.28	-265.39	7355.1104	9804.5792	0.000
120	453.57	-32.05	7321.5897	10038.8628	0.000
121	540.02	-388.40	7398.5778	9680.3762	0.000
122	609.23	-376.39	7468.0809	9690.5524	0.000

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125	774.13	125.89	7646.2259	10188.2938	0.000
126	773.65	155.56	7646.5323	10[illegible].9643	0.000
127	704.99	153.91	7577.8494	1[illegible].1323	0.000
128	699.08	123.92	7571.1499	10188.3063	0.000
129	699.88	69.02	7570.4911	10133.4048	0.000

STA	+	HI	−	ROD	CB
					1387.89
	2.69	90.58			
P#1			8.67		81.91
	2.92	84.83			
P#2			8.04		76.79
	0.67	77.46			
P#3			9.44		68.02
	3.25	71.27			
P#4			6.96		64.31
	3.29	67.60			
P#5	*		8.37	*	59.23
	8.20	67.43			
P#6			3.33		64.10
	6.76	70.86			
P#7			2.33		68.53
	8.92	77.45			
P#8			1.41		76.04
	9.65	85.69			
P#9			2.64		83.05
	7.84	90.89			
POB			2.99		87.90

CHISELED "□" LOCATED AT THE TOP OF CURB AT THE NORTHEAST CORNER OF BASELINE & SOSSAMAN CITY OF MESA DATUM

BRASS CAP IN HAND HOLE AT THE INTERSECTION OF GUADALUPE & SOSSAMAN. (CITY OF MESA DATUM) = 1359 94 MARICOPA COUNTY DATUM

MARICOPA COUNTY − 0.71 = CITY OF MESA DATUM

(87.89)