D. MARK GOODWIN & ASSOCIATES, P.A.
CONSULTING ENGINEERS & SURVEYORS

PROJECT
SUBJECT
BY DATE
CHECKED DATE
SHEET OF

Design Analysis for Channelization of The North Branch - South Domingo Baca Arroyo

JOHN M. MACKENZIE
NEW MEXICO
11818
12-30-93
REGISTERED PROFESSIONAL ENGINEER

Revised December 1993

dmg D. Mark Goodwin & Associates, P.A.
Consulting Engineers and Surveyors

PROJECT N. Br. S. Domingo Baca
SUBJECT Arroyo Channelization
BY GMM DATE 11/10/93
CHECKED _____ DATE _____
SHEET 2 OF _____

SCOUR ANALYSIS - MAIN CHANNEL

Sec. No. (supercrit.)	(pt. A - Sht. 3) Elev. @ Channel Bottom	Hyd. Depth	F_r	y_s	VCH	$\frac{1}{2} h_a$	Total Scour	(pt. B-sht. 3) Elev. @ Base of Subsurface Channel Penetration
2	83.65	1.58	1.19	6.71	9.58	1.25	7.96	75.69
3	81.84	1.30	1.90	6.41	12.61	2.17	8.58	73.26
4	78.90	1.29	1.88	6.33	12.68	2.20	8.53	70.37
5	75.81	1.08	2.24	5.66	13.21	2.38	8.02	67.79
6	73.04	1.13	1.70	5.40	9.71	1.29	6.69	66.35
7	70.20	0.99	1.68	4.69	10.79	1.59	6.28	63.92
8	67.48	0.82	1.88	4.06	11.12	1.69	5.75	61.73
9	64.30	1.18	1.55	5.45	9.85	1.32	6.78	57.52
10	61.25	1.27	1.70	6.04	10.93	1.63	7.67	53.58
11	58.21	1.50	1.68	7.13	11.76	1.89	9.02	49.19
4*	53.71	2.42	0.74	8.76	6.63	0.60	9.36	44.35
3*	48.97	4.09	0.12	8.12	1.87	0.48	8.17	40.79

$y_s = h_d (4)(F_R)^{0.33}$ Local Scour

$\frac{1}{2} h_a = 0.07 \frac{2\pi V^2}{g}$ Anti-Dune Scour

* Subcritical Flow Sections

D. Mark Goodwin & Associates, P.A.
Consulting Engineers and Surveyors

PROJECT N. Br. S. Domingo Baca
SUBJECT Arroyo Channelization
BY JMM DATE 11/10/93
CHECKED ____ DATE ____
SHEET 3 OF ____

MINIMUM CHANNEL EMBANKMENT ELEVATIONS

MAIN CHANNEL

HEC-2 Sec. No	EGL (HEC-2)	Depth (ft.)	Vel (fps)	FB (ft.)	b (ft.)	z	r (ft.)	SE (ft.)	Minimum Embankment Elevation
1 *	58.17	12.47	6.28	1.65					58.82
2 *	58.22	11.38	1.75	1.47					59.69
3 *	58.23	9.23	1.87	1.47					59.70
4 *	58.48	4.88	6.63	1.60					60.08
11	63.07	2.52	11.76	1.68	12	2.2	358	0.36	65.11
10	65.47	2.23	10.93	1.65	12	2.2	358	0.29	67.41
9	67.76	2.11	9.85	1.62	12	2.2	358	0.23	69.61
8	70.27	1.51	11.12	1.63	12	2.2	358	0.26	72.16
7	73.10	1.59	10.79	1.62					74.72
6	75.17	2.06	9.71	1.62					76.79
5	78.97	1.58	13.21	1.67					80.64
4	82.53	1.63	12.68	1.66					84.19
3	85.32	2.20	12.61	1.69	12	1.9	287	0.45	87.45
2	86.87	2.39	9.58	1.62	12	7.0	382	0.32	88.81

* subcritical flow

Freeboard

$$FB = 0.7(z + 0.025 v d^{1/3})$$

Superelevation

$$SE = \frac{1.3 v^2 (b + 2zd)}{gr}$$

z = cotangent of embankment slope

b = channel bottom width

r = radius of channel curve @ toe

D. Mark Goodwin & Associates, P.A.
Consulting Engineers and Surveyors

PROJECT N. Br. S. Domingo Baca
SUBJECT Arroyo Channelization
BY JMM DATE 11/10/93
CHECKED _____ DATE _____
SHEET 4 OF ____

MAIN CHANNEL

Easement Curves were designed into the channel on each side of the two inside curves, as shown on sheet 1. The minimum length of the easement curve at the temporary diversion is:

$L_E = 0.32(b + 2zd)\frac{V}{\sqrt{d}}$ — at sec. 10 of the supercritical HEC 2 analysis

$b = 12$ ft $z = 2.2$

$V = 10.93$ fps $d = 2.23$

$L_E = 53$ ft

For the curve just downstream of Tramway Lane, the minimum L_E is

@ sec. 3 of the supercritical analysis:

$b = 12$ ft $z = 1.9$ $d = 2.20$ ft $V = 12.61$ fps

$L_E = 55$ ft

D. Mark Goodwin & Associates, P.A.
Consulting Engineers and Surveyors

PROJECT N. Br. S. Domingo Baca
SUBJECT Arroyo Channelization
BY JMM DATE 11/10/93
CHECKED _____ DATE _____
SHEET 5 OF _____

Freeboard and Superelevation - Temporary Diversion

Freeboard = $0.7(2.0 + 0.025 V d^{.33})$

Superelevation = $1.3 V^2 [(b + 2zd)/gr]$

At Section No. 8 of HEC2 – Diversion Structure Run:

$V = 7.66$ fps $d = 1.88$ ft $z = 3.5$ $b = 13$ ft $r = 210$ ft

$FB = 0.7(2.0 + 0.025(7.66)(1.88)^{.33})$

→ $FB = 1.43$ ft

$SE = 1.3(7.66)^2 [(13 + 2(3.5)(1.88)/(32.2)(210)]$

$SE = 0.23$ ft

Energy Grade @ Sec. 8 = 6070.78

Design Elevation for Rip-Rap Placement @ Sec 8

EG + FB + SE = 70.78 + 1.43 + 0.23 = 6072.44

D. Mark Goodwin & Associates, P.A.
Consulting Engineers and Surveyors

PROJECT N. Br. S. Domingo Baca
SUBJECT Arroyo Channelization
BY DMM DATE 11/10/93
CHECKED _____ DATE _____
SHEET 6 OF _____

At Section No. 7 of HEC 2 - Diversion Structure Run:

$V = 9.37$ fps $d = 1.47$ $z = 2.74$ $b = 13$ ft $r = 210$ ft

$FB = 0.7(2.0 + 0.025(9.37)(1.47)^{0.33})$

$FB = 1.59$ ft

$SE = 1.3(9.37)^2 [13 + 2(2.74)(1.47)]/[(32.2)(210)]$

$SE = 0.36$ ft

Energy Grade @ Sec No. 7 = 6072.82

Design Elevation for Rip Rap Placement @ Sec 7

EG + FB + SE = 72.82 + 1.59 + 0.36 = 6074.77

D. Mark Goodwin & Associates, P.A.
Consulting Engineers and Surveyors

PROJECT N. Br. S. Domingo Baca
SUBJECT Arroyo Channelization
BY GMM DATE 11/10/93
CHECKED ____ DATE ____
SHEET 7 OF ____

Temporary Diversion Structure - Rip Rap Sizing

For the temporary Diversion, we will evaluate side slope shear at Sec. No. 9 of the HEC-2 run (highest velocity along the diversion) and we will evaluate boundary shear at Sec No. 8 (in the middle of the curve).

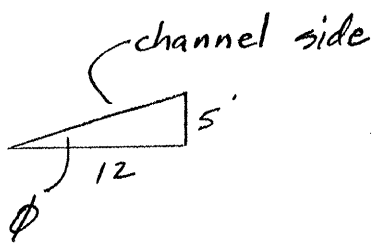
At Sec No. 9, $V = 5.71$ fps (overbank) $\quad d = 2.08$ ft

check VL Rip Rap $D_{50} = 0.5$ ft

$$\tau = a(\gamma_s - \gamma) D_{50} = .04(155 - 62.4)(0.5)$$

$$\tau = 1.85 \text{ psf}$$

$$\tau'_{(allowable)} = \tau\left(1 - \frac{\sin^2\phi}{\sin^2\theta}\right)^{0.5}$$



$$\tau' = 1.85\left(1 - \frac{\left(\frac{5}{13}\right)^2}{(0.64)^2}\right)^{0.5}$$

$\theta = 40°$ = angle of repose for Rip Rap

$$\tau' = 1.48 \text{ psf (allowable)}$$

D. Mark Goodwin & Associates, P.A.
Consulting Engineers and Surveyors

PROJECT N. Br. S. Domingo Baca
SUBJECT Arroyo Channelization
BY gmm DATE 11/10/93
CHECKED ____ DATE ____
SHEET 8 OF ____

Temporary Diversion

Actual Shear Stress on Channel Side Slope

$$\tau_o' = \frac{\gamma (d)^2}{\left[32.6 \log \frac{12.2(V)}{D_{50}}\right]^2} = \frac{62.4\ (5.71)^2}{\left[32.6 \log \frac{12.2(2.08)}{(0.5)}\right]^2}$$

$$\tau_o' = 0.67 \text{ psf}$$

→ Since $0.67 < 1.48$ side slope shear is acceptable for VL size

---

Boundary shear stress along Inside of Channel Curve

$\tau'_{allowable} = 1.48$ psf

@ Sec 8: $V = 4.73$ fps $d = 1.88$ ft (overbank)

$\frac{\text{Radius}}{\text{Top Width}} = \frac{202'}{181} = 1.12$

From Corps of Engineers E 1110-2-1601, plate 34, (1970):

VL riprap

$\frac{R}{W} = 1.12 \rightarrow \tau_b/\tau_o' = 2.90$

$$\tau_o' = \frac{62.4\ (4.73)^2}{\left[32.6 \log \frac{12.2(1.88)}{0.5}\right]^2} = 0.48 \text{ psf}$$

Boundary Shear → $\tau_b = 2.90\ (0.48) = 1.39$ psf

→ Boundary Shear OK since $1.39 < 1.48$ VL-OK

Sec No. (Supercritical)	(pt. C - sht. 3) Elev. @ Exposed Channel Bottom	Hyd Depth	F_r	y_s	V_{CH}	$\frac{1}{2}h_a$	Total Scour	(pt. D sht. 3) Elev. @ Base of Subsurface Channel Penetration
7 (sta 14+77)	70.00	0.93	1.71	4.44	9.37	1.20	5.64	64.36
8 (sta 14+14)	67.64	1.20	1.23	5.14	7.66	0.80	5.94	61.70
9 (sta 13+39)	64.84	1.05	1.67	4.97	11.95	1.95	6.92	57.92
Bet. 9 & 10 * (sta 12+92)	62.75	1.01	1.67	4.78	11.95	1.95	6.73	56.02

* avg. hydraulic values utilized

D. Mark Goodwin & Associates, P.A.
Consulting Engineers and Surveyors

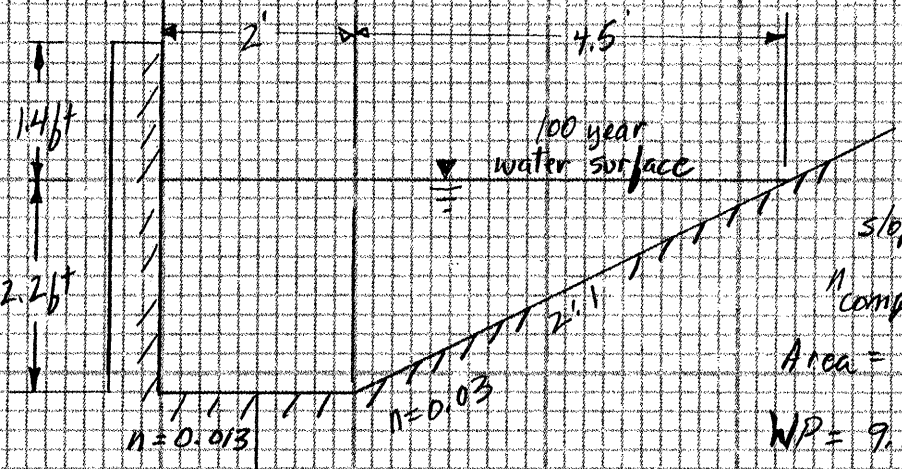
SCOUR ANALYSIS
TEMPORARY DIVERSION STRUCTURE

PROJECT N. Br. S. Domingo Baca
SUBJECT Arroyo Channelization
BY QMM DATE 11/10/93
CHECKED _____ DATE _____
SHEET 9 OF _____

D. MARK GOODWIN & ASSOCIATES, P.A.
CONSULTING ENGINEERS & SURVEYORS

PROJECT N. Br. S. Domingo Baca Arroyo
SUBJECT Tributary channel
BY JMM DATE 12/30/93
CHECKED _____ DATE _____
SHEET 10 OF _____

TRIBUTARY CHANNEL AT SECTION A (SEE SHT. 3 OF PLANS)



$n_{composite} = 0.024$

Area = 9.3 ft²

WP = 9.25 ft

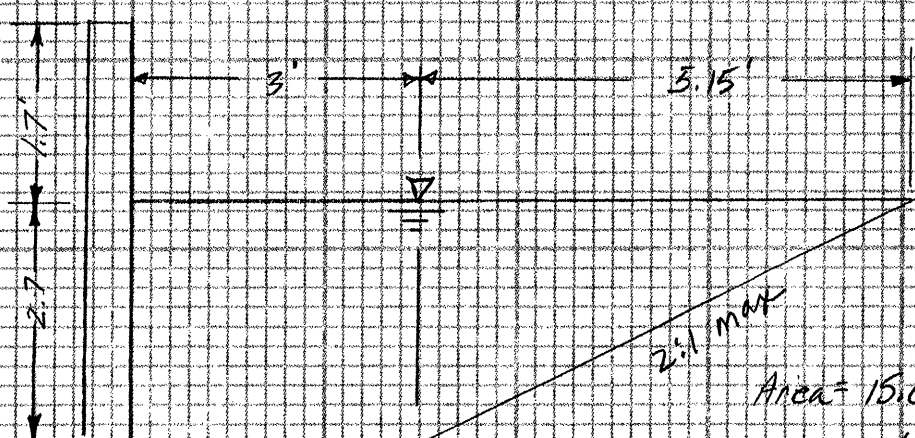
$FB = 1 + 0.025(10.6)(2.2)^{.33}$

$FB = 1.34$ ft

$Q = \frac{1.49}{.024}(9.3)\left(\frac{9.3}{9.25}\right)^{0.67}(.029)^{0.5}$

$Q = 98.7$ cfs $V = 10.6$ fps

TRIBUTARY CHANNEL AT SECTION B



Area = 15.6 ft² WP = 11.9 ft

$FB = 0.7\left[2 + 0.025(12.67)(2.7)^{.33}\right] = 1.7$ ft

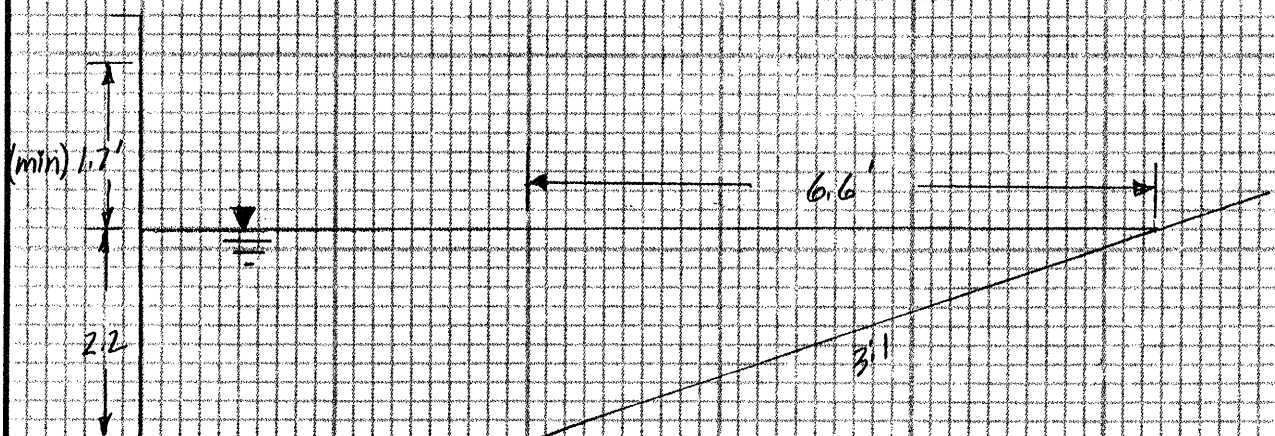
$Q = \frac{1.49}{.024}(15.6)\left(\frac{15.6}{11.9}\right)^{.67}(.024)^{.5}$

$Q = 197.7$ cfs $V = 12.7$ fps

D. MARK GOODWIN & ASSOCIATES, P.A.
CONSULTING ENGINEERS & SURVEYORS

PROJECT N. Br. S. Domingo Baca
SUBJECT Tributary Channel
BY JMM DATE 12/30/93
CHECKED _____ DATE _____
SHEET 11 OF _____

TRIBUTARY CHANNEL AT SECTION C (SHT. 3 OF PLANS)



Slope = .027

$n_{composite}$ = 0.024

Area = 16.72 ft² WP = 13.15 ft

$$Q = \frac{1.49}{.024}(16.72)\left(\frac{16.72}{13.15}\right)^{.67}(0.027)^{.5}$$

$$FB = 0.7\left(2 + 0.025(12)(2.2)^{.33}\right)$$

FB = 1.7 ft

Q = 200 cfs V = 12 fps

TABLE "A"

STATION	ELEVATION "A"	ELEVATION "B"
10+52.83, 6.5' RT.	6048.97	6040.79
11+25.10, 6.5' RT.	6053.71	6044.35
11+96.02, 6.5' RT.	6058.21	6049.19
12+64.99, 6.5' RT.	6061.25	6053.58
13+36.32, 6.5' RT.	6064.30	6057.52
14+07.39, 6.5' RT.	6067.48	6061.73
14+76.71, 6.5' RT.	6070.20	6063.92
15+48.77, 6.5' RT.	6073.04	6066.35
16+14.83, 6.5' RT.	6075.81	6067.79
16+89.98, 6.5' RT.	6078.90	6070.37
17+61.32, 6.5' RT.	6081.84	6073.26
18+31.50, 6.5' RT.	6083.65	6075.69

TABLE "B"

STATION	ELEVATION "C"	ELEVATION "D"
12+91.85, 20.53' LT. *	6062.75	6056.02
13+38.62, 41.13' LT.	6064.84	6057.92
14+14.89, 19.08' LT.	6067.64	6061.70
14+77.62, 2.20' RT.	6070.00	6064.36

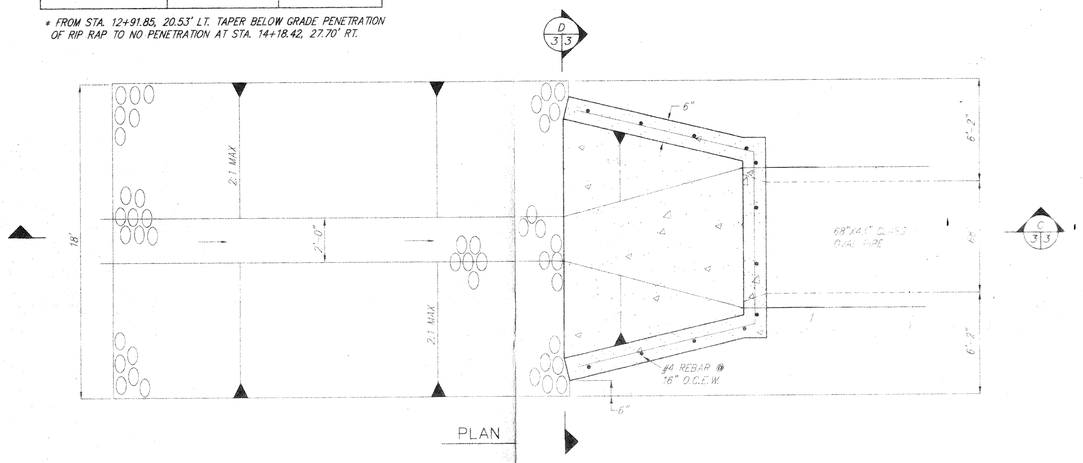
* FROM STA. 12+91.85, 20.53' LT. TAPER BELOW GRADE PENETRATION OF RIP RAP TO NO PENETRATION AT STA. 14+18.42, 27.70' RT.

TYPE II GRANULAR BEDDING GRADATION

U.S. STD. SIEVES SIZE	PERCENT PASSING BY WEIGHT SQUARE MESH SIEVES
3"	90–100
3/4"	20–90
#4	0–20
#200	0–3

CLASSIFICATION AND GRADATION OF RIPRAP

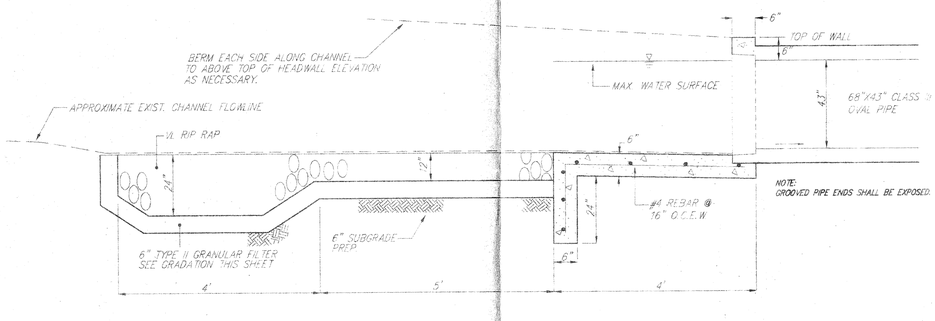
RIPRAP DESIGNATION	% SMALLER THAN GIVEN SIZE BY WEIGHT	INTERMEDIATE ROCK DIMENSION (INCHES)	MEAN PARTICLE SIZE – D_{50} (INCHES)
TYPE VL	70–100	12	
	50–70	9	
	35–50	6	6
	2–10	2	



PLAN

TRIBUTARY CHANNEL HEADWALL

SCALE: NONE A 1|3



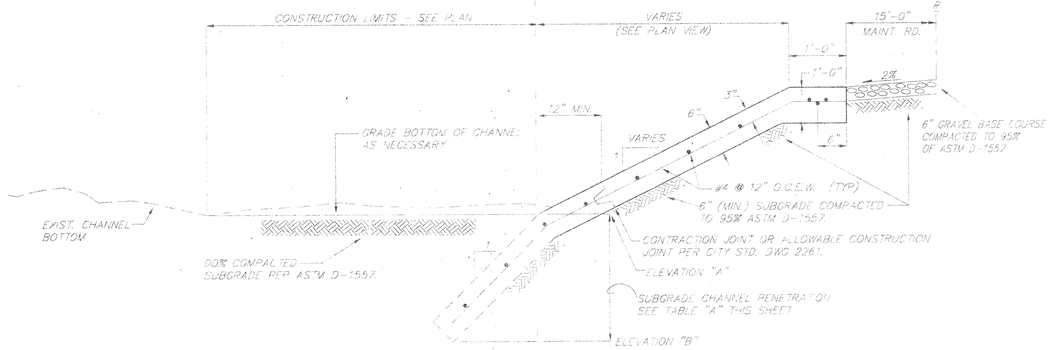
PROFILE

TRIBUTARY CHANNEL HEADWALL

SCALE: NONE C 3|3

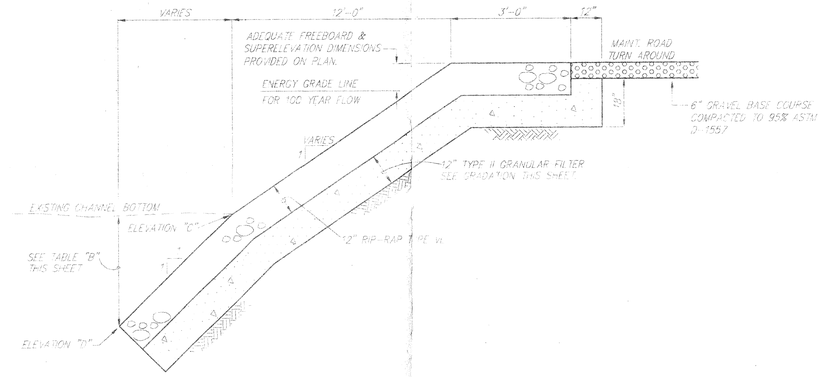
NOTES

1. CHANNEL EMBANKMENT MATERIAL PLACED BENEATH CHANNEL LINING AND FINAL SUBGRADE SHALL BE COMPACTED TO A MIN. OF 90% OF ASTM D-1557.



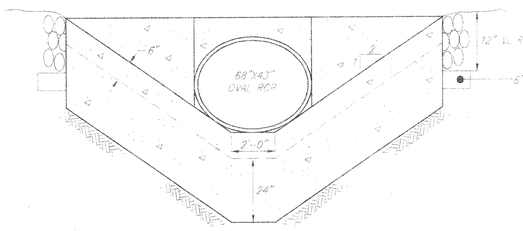
TYPICAL CHANNEL SECTION

SCALE: NONE



TEMPORARY DIVERSION STRUCTURE (THIS PHASE)

SCALE: NONE B 1|3



SECTION

TRIBUTARY CHANNEL HEADWALL

SCALE: NONE D 3|3

MGR/CHANLDTL

NORTH BRANCH – SOUTH DOMINGO BACA ARROYO

ARROYO CHANNELIZATION DETAILS

D. MARK GOODWIN & ASSOCIATES, P.A.
CONSULTING ENGINEERS & SURVEYORS
P.O. BOX 90606
ALBUQUERQUE, NEW MEXICO 87199
(505) 828–2200

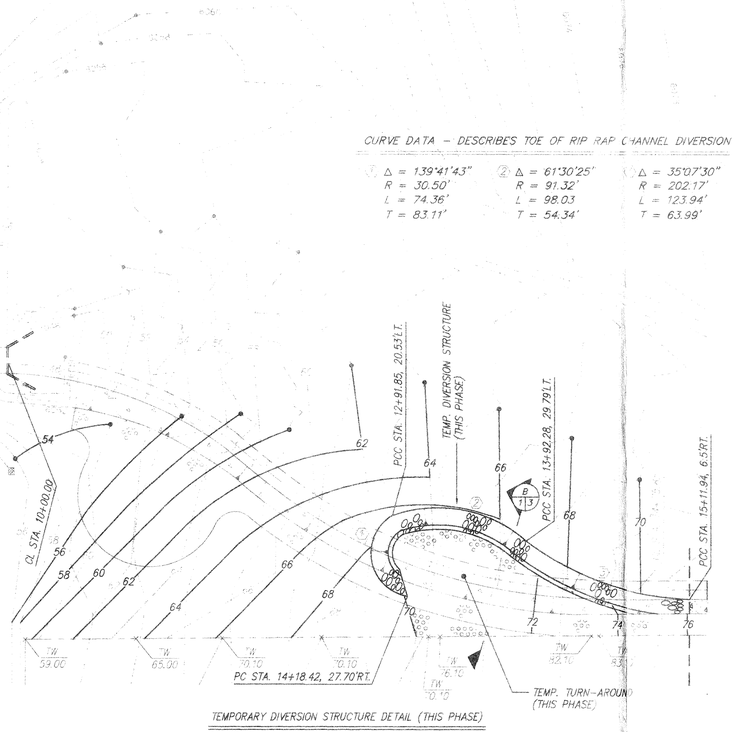
Designed: JMM	Drawn: STAFF	Checked: DMG	Sheet 3 of 3
Scale: NONE	Date: 11/93	Job: 9309.3	

CURVE DATA – DESCRIBES TOE OF CONCRETE CHANNEL

① Δ = 34°05'26"	② Δ = 04°38'29"	③ Δ = 31°57'51"
R = 270.11'	R = 716.00'	R = 358.50'
L = 160.71'	L = 58.00'	L = 200.00'
T = 82.81'	T = 29.02'	T = 102.68'
④ Δ = 04°38'17"	⑤ Δ = 08°14'58"	⑥ Δ = 11°04'13"
R = 715.96'	R = 382.00'	R = 191.50'
L = 57.96'	L = 55.00'	L = 37.00'
T = 28.99'	T = 27.55'	T = 18.56'
⑦ Δ = 08°14'58"	⑧ Δ = 87°42'47"	⑨ Δ = 39°36'09"
R = 382.00	R = 75.00'	R = 75.00'
L = 55.00'	L = 114.82'	L = 51.84'
T = 27.55	T = 72.06'	T = 27.00'

CURVE DATA – DESCRIBES TOE OF RIP RAP CHANNEL DIVERSION

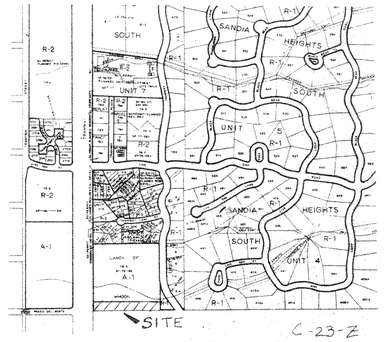
① Δ = 139°41'43"	② Δ = 61°30'25"	Δ = 35°07'30"
R = 30.50'	R = 91.32'	R = 202.17'
L = 74.36'	L = 98.03	L = 123.94'
T = 83.11'	T = 54.34'	T = 63.99'



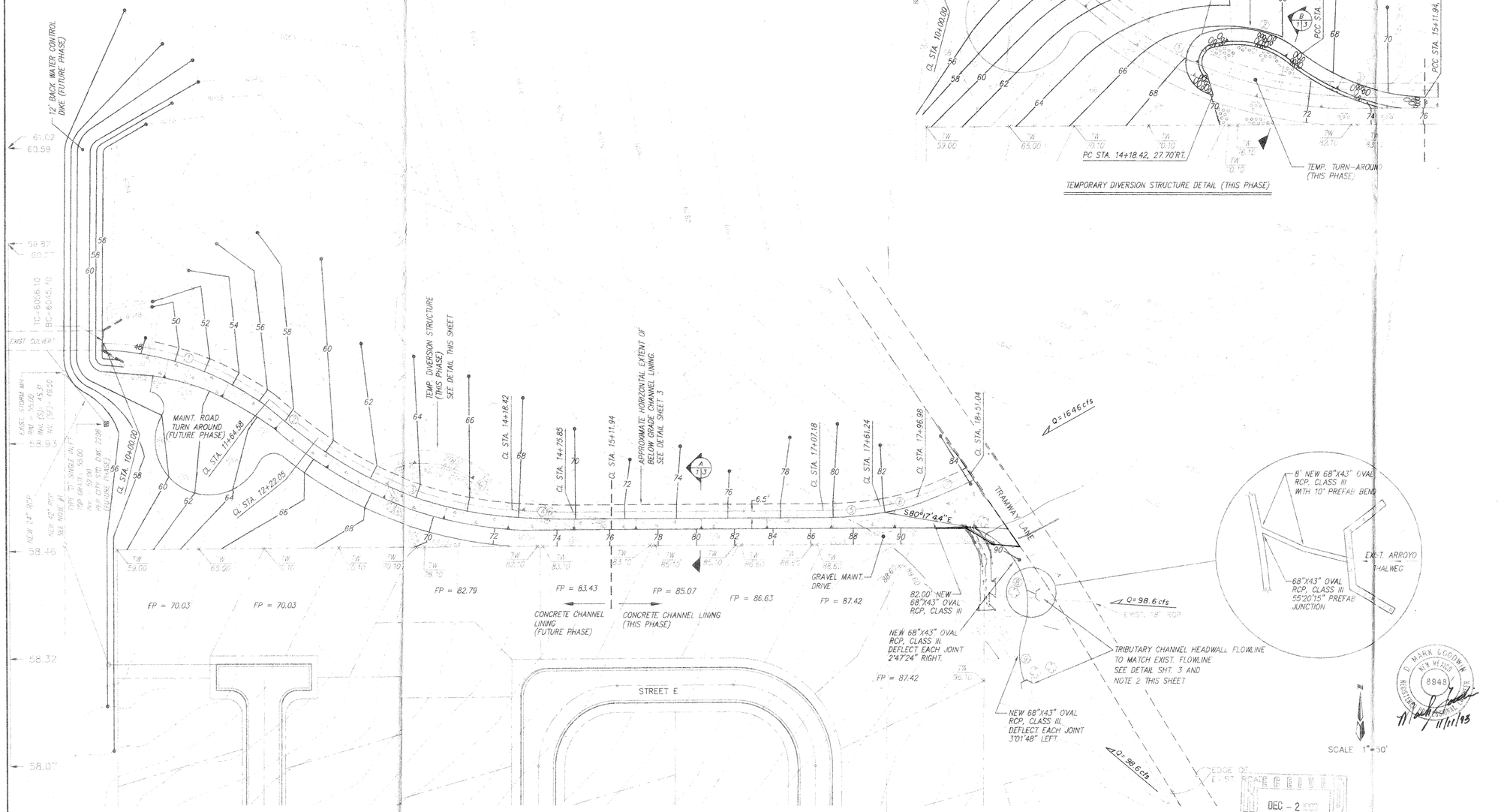
TEMPORARY DIVERSION STRUCTURE DETAIL (THIS PHASE)

NOTE:

1. REFER TO SHEET 13 OF MORGAN SUBDIVISION PLANS FOR DETAILS OF NEW DRAINAGE IMPROVEMENTS, DATED 2/93.
2. CONTRACTOR SHALL MAKE EFFORT TO MINIMIZE CONSTRUCTION DAMAGE TO EXISTING TREES IN THE VICINITY OF THE SUBSURFACE STORM DRAIN. CONTACT THE ENGINEER IF ANY CONFLICTS ARISE.



C-23-Z



SCALE 1" = 50'

LEGEND:

70	PROPOSED CONTOUR
FP = 87.42	FINISHED PAD ELEVATION
	EXISTING CONTOUR
59.63	EXISTING SPOT ELEVATION
	RIP RAP
	CONCRETE CHANNEL LINNING
	GRAVEL DRIVEWAY SURFACE & TURN AROUND
	EXISTING TREES

D. MARK GOODWIN NEW MEXICO 8948 REGISTERED PROFESSIONAL ENGINEER 11/11/93

RECEIVED DEC – 2 1993 HYDROLOGY DIVISION

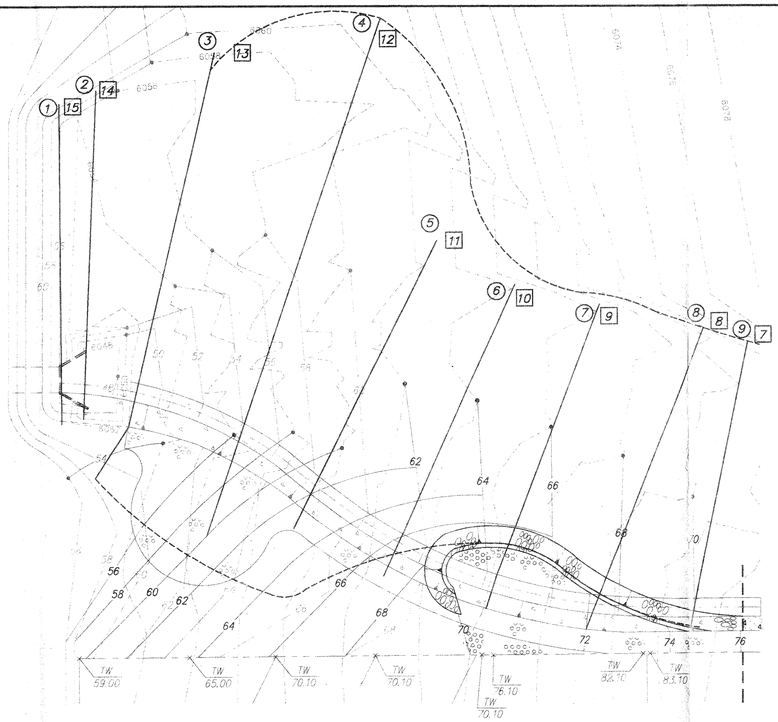
NORTH BRANCH – SOUTH DOMINGO BACA ARROYO

ARROYO CHANNELIZATION

dmg D. MARK GOODWIN & ASSOCIATES, P.A.
CONSULTING ENGINEERS & SURVEYORS
P.O. BOX 90606
ALBUQUERQUE, NEW MEXICO 87199
(505) 828–2200

Designed: DMG	Drawn: STAFF	Checked: DMG	Sheet 1 of 3
Scale: 1"=50'	Date: 11/93	Job: 9309.3	

WORK\CHANL



TEMPORARY DIVERSION STRUCTURE DETAIL (THIS PHASE)

LEGEND:

70	PROPOSED CONTOUR
	ENERGY GRADE LINE
6045	EXISTING CONTOUR
× 86.60	EXISTING SPOT ELEVATION
(4)	SUBCRITICAL HEC-2 ANALYSIS
12	SUPERCRITICAL HEC-2 ANALYSIS

D. MARK GOODWIN NEW MEXICO 8948 REGISTERED PROFESSIONAL ENGINEER
11/11/93

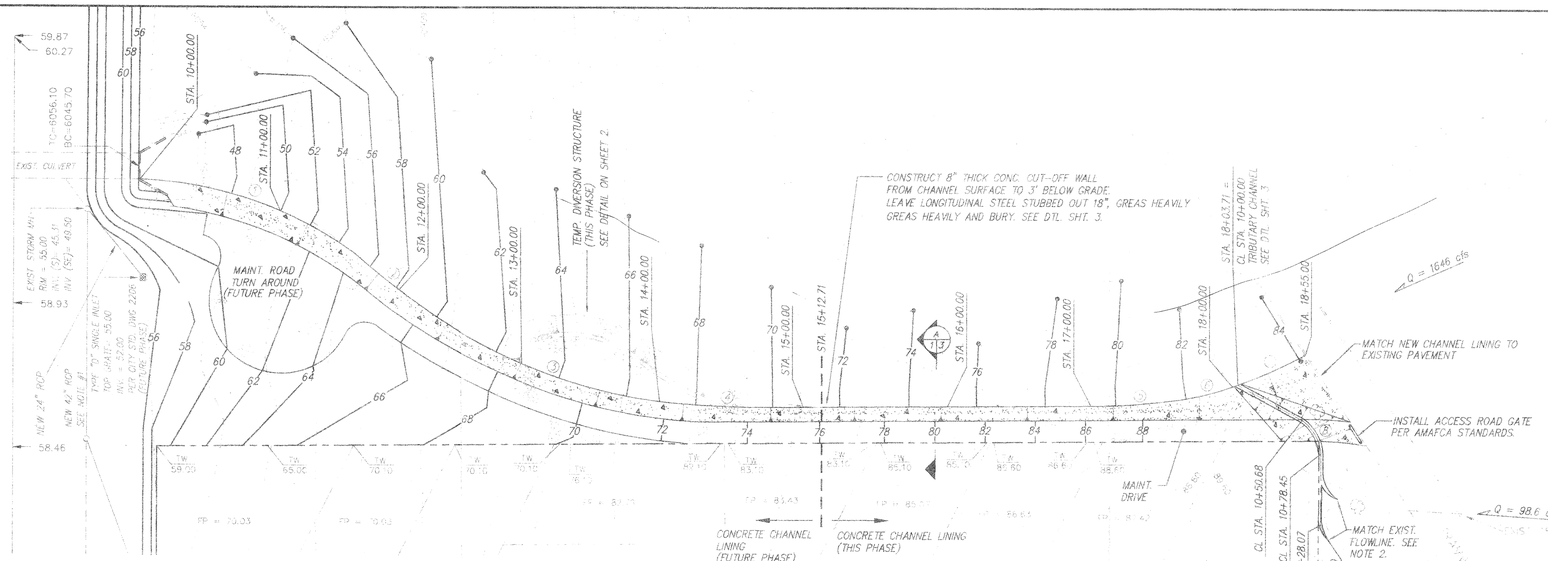
RECEIVED
DEC - 2
PROJECT MGT.

NORTH BRANCH – SOUTH DOMINGO BACA ARROYO

ARROYO CHANNELIZATION HYDRAULICS

dmg D. MARK GOODWIN & ASSOCIATES, P.A.
CONSULTING ENGINEERS & SURVEYORS
P.O. BOX 90606
ALBUQUERQUE, NEW MEXICO 87199
(505) 828-2200

Designed: JMM	Drawn: STAFF	Checked: DMG	Sheet: 2 of 3	MOR\CHANL2
Scale: 1"=50'	Date: 11/93	Job: 9309.3		



CURVE DATA – DESCRIBES TOE OF CONCRETE CHANNEL

① Δ = 34°05'26"
R = 270.11'
L = 160.71'
T = 82.81'

② Δ = 04°38'29"
R = 716.00'
L = 58.00'
T = 29.02'

③ Δ = 31°57'51"
R = 358.50'
L = 200.00'
T = 102.68'

④ Δ = 04°38'17"
R = 715.96'
L = 57.96'
T = 28.99'

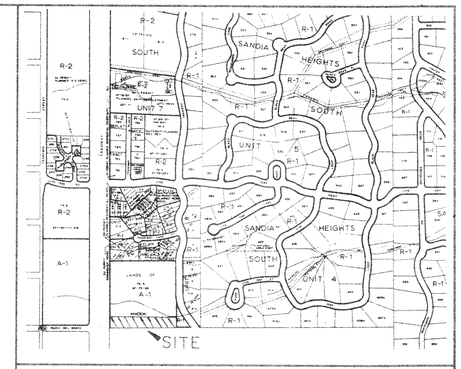
⑤ Δ = 08°14'58"
R = 382.00'
L = 55.00'
T = 27.55'

⑥ Δ = 11°04'13"
R = 191.50'
L = 37.00'
T = 18.56'

⑦ Δ = 08°14'58"
R = 382.00
L = 55.00'
T = 27.55

DESCRIBES CENTER LINE

⑧ Δ = 51°19'01"
R = 31.00'
L = 27.77'
T = 14.89'



VICINITY MAP ZONE MAP: C-23-Z

SCALE: HORZ, 1"=50'
VERT, 1"=10'

NOTES:

1. REFER TO SHEET 13 OF MORGAN SUBDIVISION PLANS FOR DETAILS OF NEW DRAINAGE IMPROVEMENTS, DATED 2/93.
2. CONTRACTOR SHALL MAKE EFFORT TO MINIMIZE CONSTRUCTION DAMAGE TO EXISTING TREES AND NATURAL SURFACE CONDITIONS IN THE VICINITY OF THE TRIBUTARY CHANNEL. CONTACT THE ENGINEER IF ANY CONFLICTS ARISE.
3. STATIONING FOR THE NEW CONCRETE CHANNEL SHALL BE ALONG THE TOE OF THE SOUTH EMBANKMENT WITH STATIONING FOR THE TRIBUTARY CHANNEL ALONG CENTERLINE.
4. CHANNEL EMBANKMENT FILL MATERIAL PLACED BENEATH CHANNEL LINING AND FINAL SUBGRADE SHALL BE COMPACTED TO A MIN. OF 90% OF ASTM D-1557.
5. AMAFCA SHALL BE NOTIFIED AT LEAST 48 HOURS PRIOR TO INITIATION OF CONSTRUCTION AND AT LEAST 24 HOURS PRIOR TO PLACEMENT OF CONCRETE TO INSPECT STEEL.
6. CONTRACTOR MUST OBTAIN A TOPSOIL DISTURBANCE PERMIT FROM ENVIRONMENTAL HEALTH PRIOR TO CONSTRUCTION.
7. CITY OF ALBUQUERQUE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, 1986 EDITION, AS AMENDED THROUGH UPDATE 4 AND TO INCLUDE SUPPLEMENTAL SPECIFICATIONS TO BE PROVIDED BY THE ENGINEER, SHALL GOVERN ALL WORK.

EXPLANATION OF CONSTRUCTION PHASING:

CONSTRUCTION OF THE CONCRETE CHANNEL LINING FOR THIS PHASE WILL BEGIN AT STA. 15+12.71 AND EXTEND TO STA. 18+55.00 (TO STA. 11+39.90 ALONG THE TRIBUTARY CHANNEL). A TEMPORARY RIP-RAP DIVERSION WILL BE CONSTRUCTED BETWEEN STATIONS 12+80.00 AND 15+12.71 DURING THIS PHASE. CONSTRUCTION OF THE CONCRETE CHANNEL FROM STA. 10+00.00 TO STA. 15+12.71 WILL OCCUR DURING A FUTURE PHASE. INTERIM GRADING BETWEEN THIS FUTURE PHASE AND THE NORTH SIDE OF THE NEW MORGAN SUBDIVISION WILL BE PERFORMED AS INDICATED ON THE PLAN.

LEGEND:

70 — PROPOSED CONTOUR
FP = 87.42 — FINISHED PAD ELEVATION
EXISTING CONTOUR
86.64 — EXISTING SPOT ELEVATION
RIP RAP
CONCRETE CHANNEL LINNING
MAINTENANCE DRIVEWAY SURFACE & TURN AROUND
EXISTING TREES

NORTH BRANCH – SOUTH DOMINGO BACA ARROYO

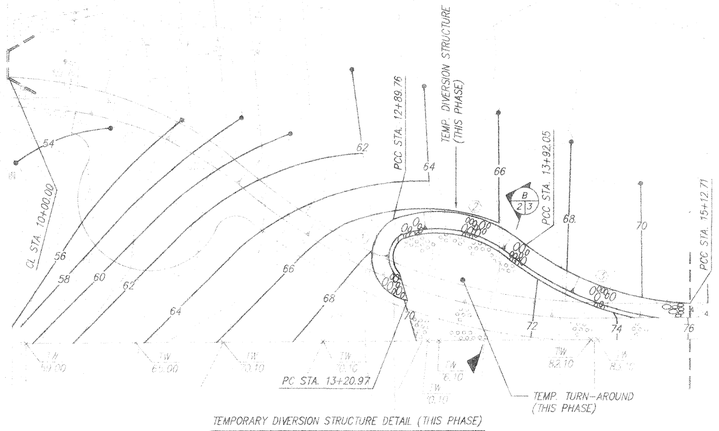
ARROYO CHANNELIZATION PLAN & PROFILE

D. MARK GOODWIN & ASSOCIATES, P.A.
CONSULTING ENGINEERS & SURVEYORS
P.O. BOX 90606
ALBUQUERQUE, NEW MEXICO 87199
(505) 828-2200

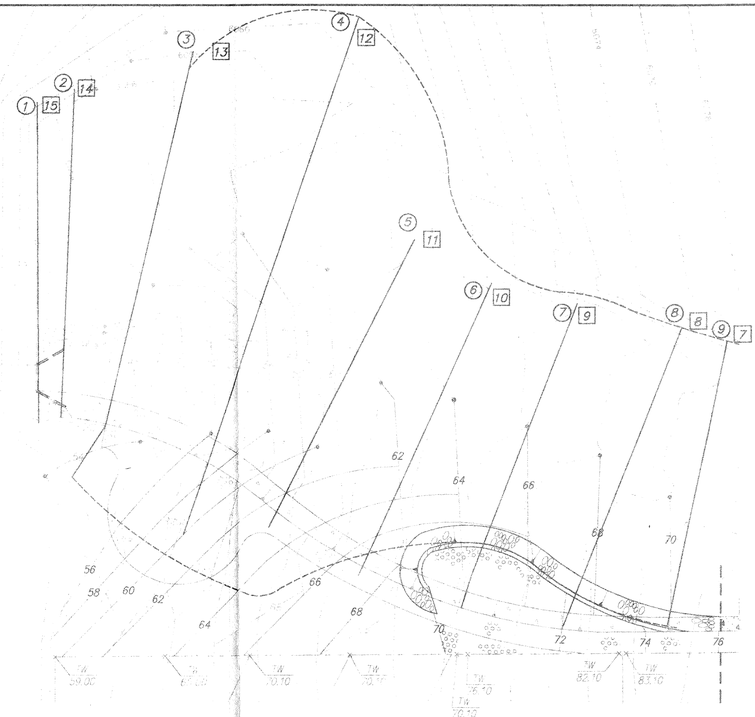
Designed: JMM	Drawn: STAFF	Checked: DMG	Sheet 1 of 3
Scale: 1"=50'	Date: 2/93	Job: 9303.3	

CURVE DATA – DESCRIBES TOE OF RIP RAP CHANNEL DIVERSION

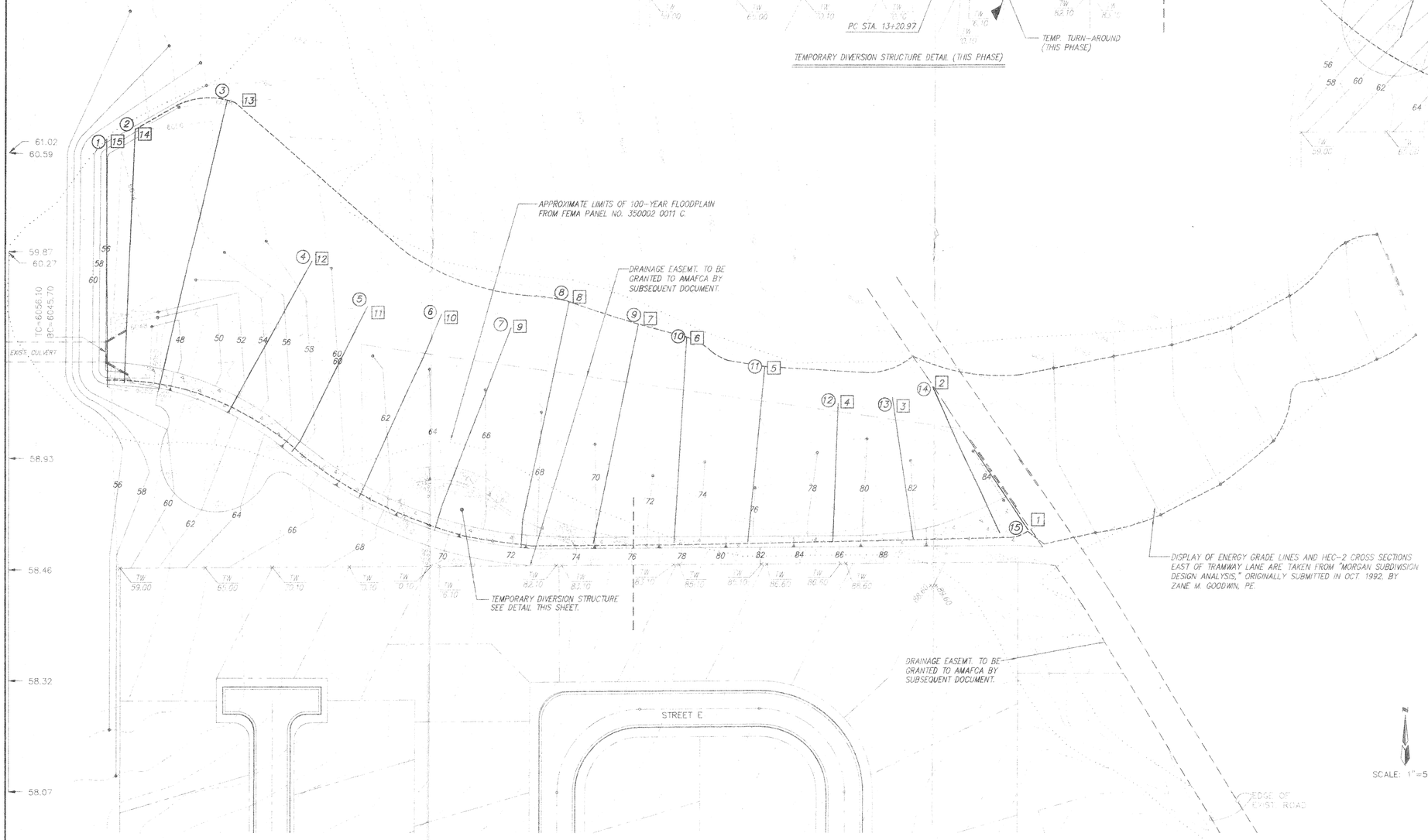
① Δ = 139°41'43"	② Δ = 61°30'25"	③ Δ = 35°07'30"
R = 30.50'	R = 91.32'	R = 202.17'
L = 74.36'	L = 98.03	L = 123.94'
T = 83.11'	T = 54.34'	T = 63.99'



TEMPORARY DIVERSION STRUCTURE DETAIL (THIS PHASE)



TEMPORARY DIVERSION STRUCTURE DETAIL (THIS PHASE)



SCALE: 1"=50'

LEGEND:

70	PROPOSED CONTOUR
	ENERGY GRADE LINE
	EXISTING CONTOUR
x 66.80	EXISTING SPOT ELEVATION
(4)	SUBCRITICAL HEC-2 ANALYSIS
12	SUPERCRITICAL HEC-2 ANALYSIS

NEW MEXICO
JOHN M. MACKEY
12-30-93
PROFESSIONAL ENGINEER

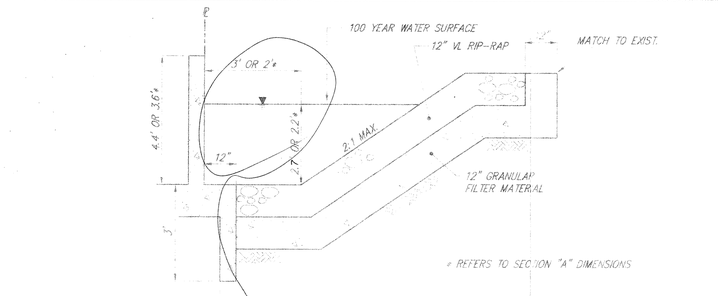
NORTH BRANCH – SOUTH DOMINGO BACA ARROYO

ARROYO CHANNELIZATION HYDRAULICS

D. MARK GOODWIN & ASSOCIATES, P.A.
CONSULTING ENGINEERS & SURVEYORS
P.O. BOX 90606
ALBUQUERQUE, NEW MEXICO 87199
(505) 828-2200

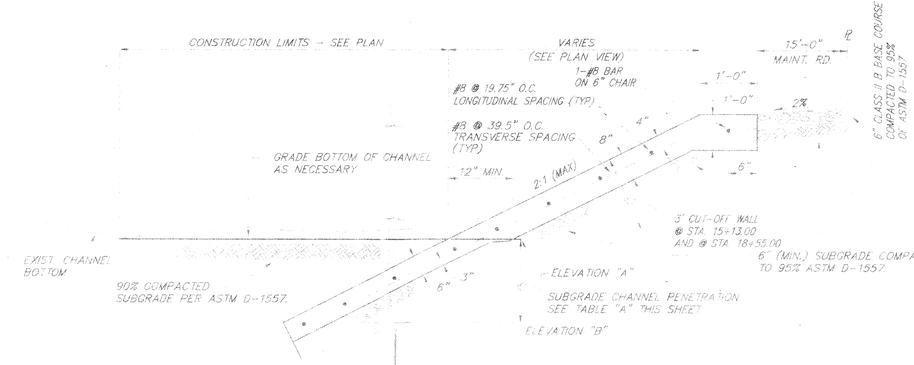
Designed: JMM	Drawn: STAFF	Checked: DMG		Sheet 2 of 3
Scale: 1"=50'	Date: 12/93	Job: 9303.3		

MDR\CHANL2

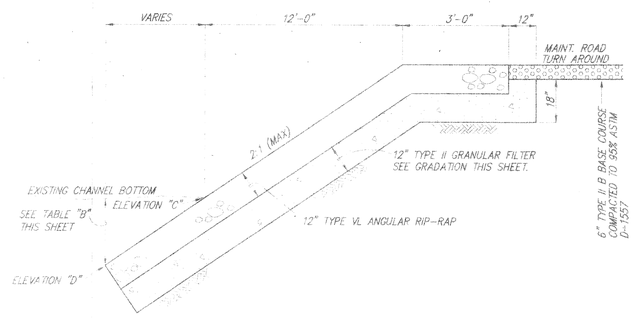


TRIBUTARY CHANNEL DETAIL

A 3|3 B 3|3



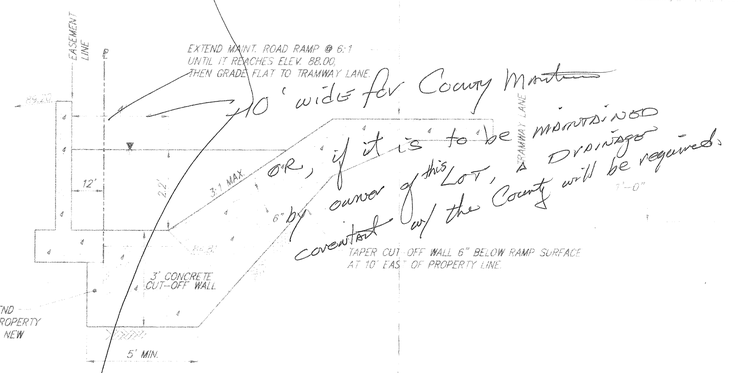
TYPICAL CHANNEL SECTION



TEMPORARY DIVERSION STRUCTURE (THIS PHASE)

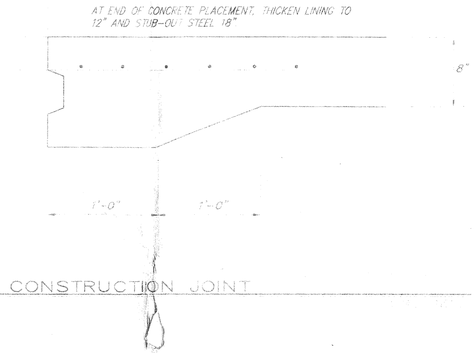
SCALE: NONE

B 2|3

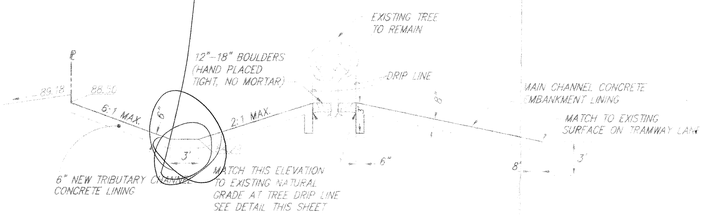


TRIBUTARY CHANNEL DETAIL

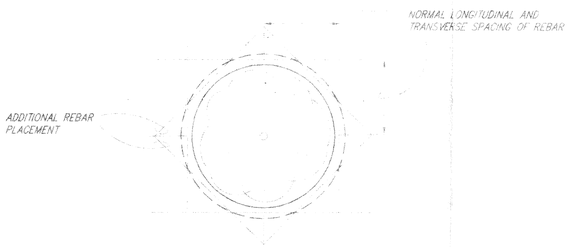
C 3|3



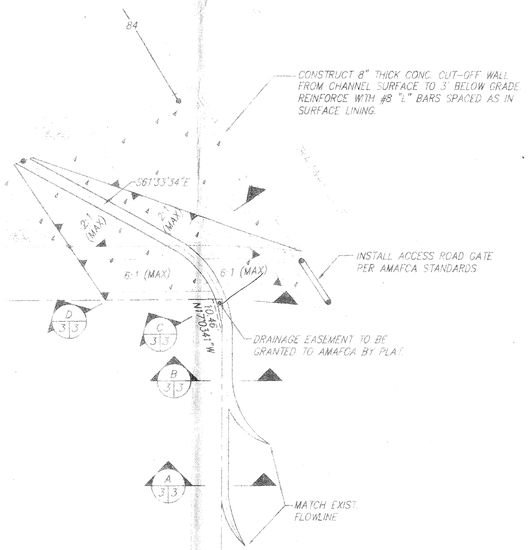
TYPICAL TRANSVERSE CONSTRUCTION JOINT



D 3|3 TRIBUTARY CHANNEL — BETWEEN MAINTENANCE ROAD AND MAIN CHANNEL



EXISTING TREE REINFORCEMENT PLAN DETAIL



TRIBUTARY CHANNEL PLAN DETAIL

TYPE II GRANULAR BEDDING GRADATION

U.S. STD. SIEVES SIZE	PERCENT PASSING BY WEIGHT SQUARE MESH SIEVES
3"	90–100
3/4"	20–90
#4	0–20
#200	0–3

CLASSIFICATION AND GRADATION OF RIPRAP

RIPRAP DESIGNATION	% SMALLER THAN GIVEN SIZE BY WEIGHT	INTERMEDIATE ROCK DIMENSION (INCHES)	MEAN PARTICLE SIZE — D_{50} (INCHES)
TYPE VL	70–100	12	
	50–70	9	
	35–50	6	6
	2–10	2	

TABLE "A"

STATION	ELEVATION "A"	ELEVATION "B"
10+52.83	6048.97	6040.79
11+25.10	6053.71	6044.35
11+96.02	6058.21	6049.19
12+64.99	6061.25	6053.58
13+36.32	6064.30	6057.52
14+07.39	6067.48	6061.73
14+76.71	6070.20	6063.92
15+48.77	6073.04	6066.35
16+14.83	6075.81	6067.79
16+89.98	6078.90	6070.37
17+61.32	6081.84	6073.26
18+31.50	6083.65	6075.69

TABLE "B"

STATION	ELEVATION "C"	ELEVATION "D"
12+91.85, 20.53' LT. *	6062.75	6056.02
13+38.62, 41.13' LT.	6064.84	6057.92
14+14.89, 19.08' LT.	6067.64	6061.70
14+77.62, 2.20' RT.	6070.00	6064.36

* FROM STA. 12+91.85, 20.53' LT. TAPER BELOW GRADE PENETRATION OF RIP RAP TO NO PENETRATION AT STA. 14+18.42, 27.70' RT.

CHANNEL CONCRETE NOTES:

1. TYPE IIA OR I-IIA (NO CALCIUM).
2. MINIMUM OF 5.5 SACKS CEMENT / C.Y.
3. MAXIMUM W/C RATIO OF 0.53.
4. SIZES OF COARSE AGGREGATE SHALL RANGE FROM #4 TO 1" IN DIA.
5. 20% FLYASH MEETING THE REQUIREMENTS OF ASTM C618.
6. RANGE OF AIR ENTRAINMENT SHALL BE 4-7%.
7. MAXIMUM SLUMP SHALL BE 3"
8. MINIMUM COMPRESIVE STRENGTH SHALL BE 3000 PSI @ 28 DAYS.
9. ALL EXPOSED SURFACES SHALL HAVE A LIGHT BROOM FINISH.
10. ALL EXPOSED CONCRETE SHALL BE TINTED DAVIS SAN DIEGO BUFF (OR EQUIVALENT) @ 1#/SACK.
11. ALL STEEL REINFORCEMENT SHALL BE GRADE 60, ASTM 615.

RECEIVED
JAN - 3 1994
HYDROLOGY DIVISION

12-30-93

NORTH BRANCH — SOUTH DOMINGO BACA ARROYO

ARROYO CHANNELIZATION DETAILS

dmg D. MARK GOODWIN & ASSOCIATES, P.A.
CONSULTING ENGINEERS & SURVEYORS
P.O. BOX 90606
ALBUQUERQUE, NEW MEXICO 87199
(505) 828-2200

Designed: JMM	Drawn: STAFF	Checked: DMG	Sheet 3 of 3
Scale: NONE	Date: 12/93	Job: 93093	

MOR/CHL1T1.2