Public Works/Hydrology

A13/D5

0000 0000 0697

A13/D5

25×10 32×10

0000 0000 0698

DRAINAGE INFORMATION SHEET

ZONE ATLAS/DRAINAGE FILE NO. A-13-Z105

PROJECT TITLE: Seven Bar Loop Road

LEGAL DESCRIPTION: Seven Bar Loop Road - Seven Bar Ranch from AMAFCA Drainage Right-of-Way to Westside Blvd.

CITY ADDRESS: N/A

ENGINEERING FIRM: Easterling & Assoc. Inc. CONTACT: David Harrison

ADDRESS: 5643 Paradise Blvd. N.W. PHONE: 898-8021

OWNER: ABQ Development CONTACT: Jay Chester

ADDRESS: P.O. Box 25625 87125 PHONE: 242-3330

ARCHITECT: CONTACT:

ADDRESS: PHONE:

SURVEYOR: CONTACT:

ADDRESS: PHONE:

CONTRACTOR: CONTACT:

ADDRESS: PHONE:

RECEIVED MAY 12 1989 HYDROLOGY SECTION

RECEIVED MAY 12 1989 HYDROLOGY SECTION

PRE-DESIGN MEETING:

___ YES

X NO

___ COPY OF CONFERENCE RECAP SHEET PROVIDED

DRB NO. N/A

EPC NO. N/A

PROJECT NO. 3730

TYPE OF SUBMITTAL:

X DRAINAGE REPORT

___ DRAINAGE PLAN

___ CONCEPTUAL GRADING & DRAINAGE PLAN

___ GRADING PLAN

___ GRADING & DRAINAGE PLAN

___ EROSION CONTROL PLAN

___ ENGINEER'S CERTIFICATION

CHECK TYPE OF APPROVAL SOUGHT:

___ SKETCH PLAT APPROVAL

___ PRELIMINARY PLAT APPROVAL

___ SITE DEVELOPMENT PLAN APPROVAL

___ FINAL PLAT APPROVAL

___ BUILDING PERMIT APPROVAL

___ FOUNDATION PERMIT APPROVAL

___ CERTIFICATE OF OCCUPANCY APPROVAL

___ ROUGH GRADING PERMIT APPROVAL

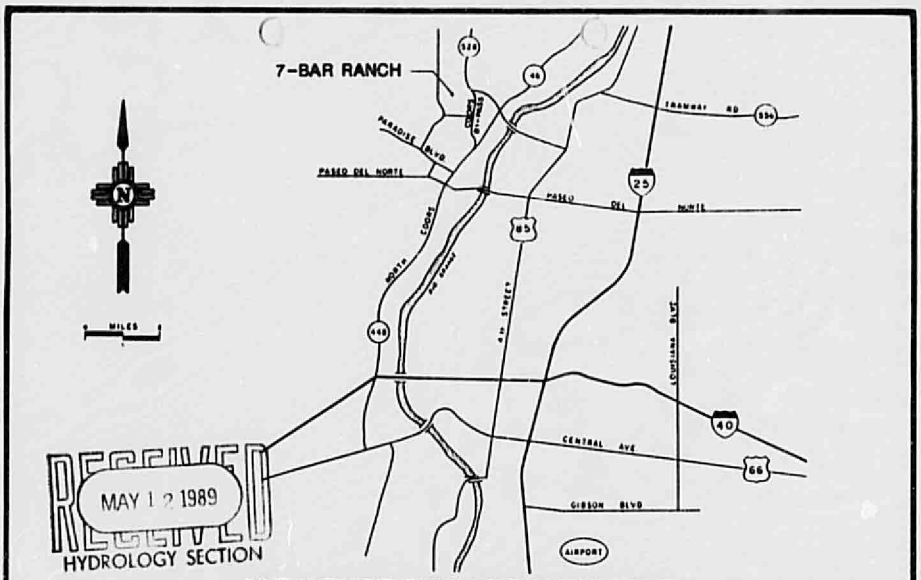
___ GRADING/PAVING PERMIT APPROVAL

X OTHER Work Order (SPECIFY)

DATE SUBMITTED: 5-9-89 BY: David B. Harrison

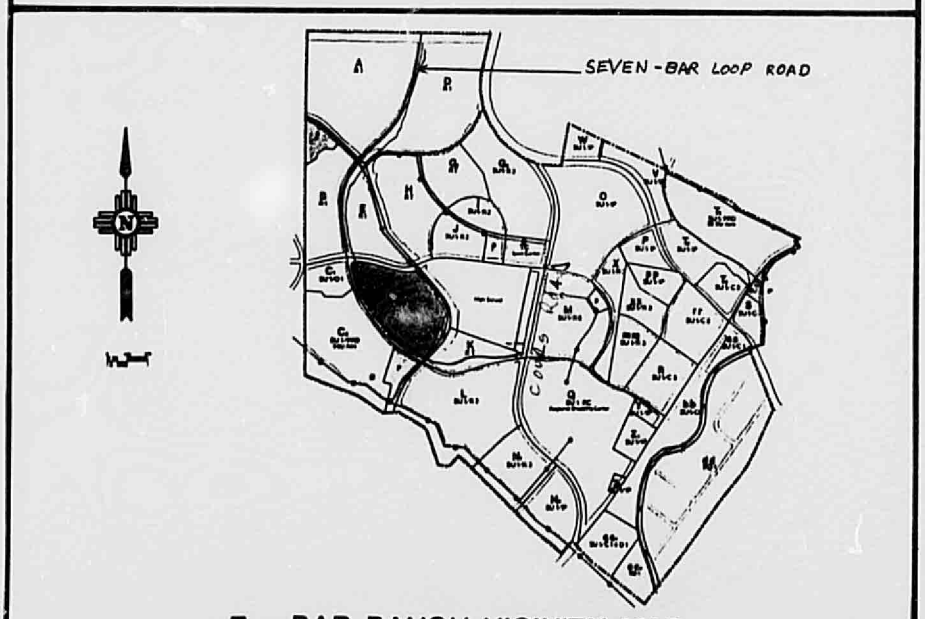
25×10 32×10

0000 0000 0699



RECEIVED
MAY 1 2 1989
HYDROLOGY SECTION

ALBUQUERQUE VICINITY MAP



7 - BAR RANCH VICINITY MAP

25×10 32×10

0000 0000 0700

EASTERLING & ASSOCIATES, INC.
5643 Paradise Blvd., NW
ALBUQUERQUE, NEW MEXICO 87114

(505) 898-8021

LETTER OF TRANSMITTAL

DATE 5-11-89	JOB NO. 2602
ATTENTION	
RE: SEVEN-BAR LOOP RD. - STORM DRAIN DESIGN REPORT	

TO CITY OF ALBUQUERQUE HYDROLOGY

WE ARE SENDING YOU ☑ Attached ☐ Under separate cover via _____ the following items:

☐ Shop drawings ☐ Prints ☐ Plans ☐ Samples ☐ Specifications
☐ Copy of letter ☐ Change order ☐ _____

COPIES	DATE	NO.	DESCRIPTION
1			Vicinity map

RECEIVED
MAY 12 1989
HYDROLOGY SECTION

THESE ARE TRANSMITTED as checked below:

☐ For approval ☐ Approved as submitted ☐ Resubmit _____ copies for approval
☑ For your use ☐ Approved as noted ☐ Submit _____ copies for distribution
☑ As requested ☐ Returned for corrections ☐ Return _____ corrected prints
☐ For review and comment ☐ _____
☐ FOR BIDS DUE _____ 19 _____ ☐ PRINTS RETURNED AFTER LOAN TO US

REMARKS _____

COPY TO Phoenix 5/12

SIGNED: Daniel Hanson

If enclosures are not as noted, kindly notify us at once.

25×10 32×10

0000 0000 0701

EASTERLING & ASSOCIATES, INC.
5643 Paradise Blvd. NW
ALBUQUERQUE, NEW MEXICO 87114

(505) 898-8021

LETTER OF TRANSMITTAL

DATE 5/8/89 JOB NO. 2608
ATTENTION TERRI MARTIN / ROGER GREEN
RE PROJECT #3730

TO COA
3rd Floor
768-2559

RECEIVED MAY 12 1989 HYDROLOGY SECTION

RECEIVED MAY 02 1989 HYDROLOGY SECTION

WE ARE SENDING YOU ☒ Attached ☐ Under separate cover, via _____ the following items:

☐ Shop drawings ☐ Prints ☐ Plans ☐ Samples ☐ Specifications
☐ Copy of letter ☐ Change order ☐ _____

COPIES	DATE	NO.	DESCRIPTION
3	5/5/89		[redacted] DESIGN REPORTS THAT WERE NOT INCLUDED WITH OUR SUBMITTAL FRIDAY 5/5/89 WHICH INCLUDED ⑧ SETS OF PLANS ① PRELIM. ENGINEER'S EST. ① CALCULATION SHEET + PAYMENT (DEPOSIT FEE) OF $500.25 - PAID AT TREASURERS OFFICE

THESE ARE TRANSMITTED as checked below:

☐ For approval ☐ Approved as submitted ☐ Resubmit ____ copies for approval
☒ For your use ☐ Approved as noted ☐ Submit ____ copies for distribution
☒ As requested ☐ Returned for corrections ☐ Return ____ corrected prints
☐ For review and comment ☐ _____
☐ FOR BIDS DUE _____ 19____ ☐ PRINTS RETURNED AFTER LOAN TO US

REMARKS _____

COPY TO _____

SIGNED: DAVID L. HARRISON

If enclosures are not as noted, kindly notify us at once.

25×10 32×10

0000 0000 0702

DESIGN REPORT

FOR

SEVEN BAR LOOP ROAD
STORM DRAIN

MAY 1989

RECEIVED
MAY 12 1989
HYDROLOGY SECTION

RECEIVED
MAY 12 1989
HYDROLOGY SECTION

25×10 32×10

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DESIGN REPORT
FOR
SEVEN BAR LOOP ROAD
STORM DRAIN

PROJECT SCOPE

Early in 1989, ABQ Development retained Easterling & Associates, Inc. to design infrastructure improvements located in Seven Bar Ranch. One such improvement is the extension of Seven Bar Loop Road from the Salida del Sol Subdivision north to Westside Boulevard. In order to meet the 10-year and 100-year street drainage criteria, a storm drain is required.

The storm drain begins in Westside Boulevard approximately 1,250 feet west of the Seven Bar Loop Road intersection. From the intersection, the storm drain runs in Seven Bar Loop Road until it reaches the Black Arroyo where it terminates. This report will only cover the portion of the storm drain from the outlet at the Black Arroyo to Sta. 35+08 near the Westside Boulevard intersection. For information regarding contributions from Westside Boulevard, please refer to the design report for the Westside Boulevard storm drain.

HYDROLOGY

Information regarding the hydrological analyses preformed for this design can be found in the addendum to the Seven Bar Ranch Drainage Management Plan.

HYDRAULICS

The Seven Bar Loop storm drain was designed to carry the 100-year developed condition flow rate. The water surface elevation at the discharge point into the Black Arroyo Channel was

25×10 32×10

0000 0000 0704

DESIGN REPORT

FOR

SEVEN BAR LOOP ROAD
STORM DRAIN

PREPARED FOR:

ABQ DEVELOPMENT
POST OFFICE BOX 25625
ALBUQUERQUE, NEW MEXICO 87125

PREPARED BY:

EASTERLING & ASSOCIATES, INC.
5643 PARADISE BOULEVARD, N.W.
ALBUQUERQUE, NEW MEXICO 87114

MAY 1989

I, Charles M. Easterling, state that I am a Registered Professional Engineer, qualified in Civil Engineering, and that the accompanying documents and drawings were prepared by me or under my direction.

Charles M. Easterling, P.E.
N.M.P.E. No. 6411

25×10 32×10

0000 0000 0705

assumed to be equal to the 10-year flow rate in the Black Arroyo. An attempt was made to size the pipe to flow full or under pressure. However, hydraulic grade line requirements in Westside Boulevard made this impossible. The subsequent storm drain hydraulics can be divided into four different categories.

1. Transition - ~Sta. 9+24 to ~Sta. 10+05 and ~Sta. 30+80 to ~31+60 - In these reaches, a transition from pressure flow to open channel flow takes place. The location of the HGL and EGL is approximate in these reaches.

2. Pressure Flow - ~Sta. 10+05 to ~Sta. 13+95 and ~Sta 31+60 to Sta. ~35+08 - In these reaches, the storm drain operates in a pressure condition at the design flow rate.

3. Open Channel Flow - ~Sta. 17+85 to ~Sta. 30+80 - In this reach, open channel flow occurs. The friction slope is assumed equal to the pipe slope and manhole losses are considered negligible.

4. Hydraulic Jump - ~Sta. 13+95 to ~Sta. 17+85 - In this reach, a hydraulic jump is likely to occur. Providing exact locations for the HGL and EGL in this region is virtually impossible without building a model. However, it is important to note that the HGL will never jump past the EGL which is located below the finish road grade. Therefore, the jump should present no significant problem. A summary of the analysis can be found in Appendix B of this report.

The Development Process Manual procedures for calculating losses were used where applicable. A Manning's "N" value of 0.013 was used throughout. A complete set of hydraulic calculations and assumptions is provided in Appendix A.

25×10 32×10

In addition to the 100-year design analysis, the storm drain was examined under the 10-year developed condition assuming a 100-year water surface elevation in the proposed Black Arroyo Channel. The results indicate that the hydraulics will consist primarily of cpen channel flow. The one exception is a small transition section near the Black Arroyo. This transition is due to the outlet control condition present at the arroyo during the 100-year event. It was also determined that there is a high probability of a hydraulic jump occurring in the vicinity of manhole No. 2. It is felt that the jump will not create any significant problems even though it is not a desirable condition. Significant problems are not anticipated because the HGL cannot exceed the EGL. The EGL is located ~6.0 feet below street grade in the area of the jump.

The runoff generated by Seven Bar Loop Road can be carried in the street without exceeding street capacity until it enters the storm drain through a series of catch basins. The number of catch basins required was determined assuming that the 100-year flow had to be accepted to prevent significant runoff from crossing the bridge. Catch basin calculations found in Appendix B demonstrate that four Type A catch basins will provide sufficient capacity to accept street flows. It is envisioned that the $Q_{100} \cong 0.9$ CFS not picked up by these basins, plus the runoff generated south of the inlets, will be carried in Seven Bar Loop Road until it reaches Alba Place, NW, where it will exit the street via an existing rundown located in the southeast corner of the cul-de-sac.

The Seven Bar storm drain will discharge a Q_{100} of 65.6 CFS into the Black Arroyo through a 36" RCP. The outlet is located approximately 500 ft. upstream of the confluence of the Seven Bar Channel and the Black No. 2 Diversion Channel. The storm drain will discharge into the arroyo through an outlet structure designed to:

25×10 32×10

- Provide protection for the outlet pipe from arroyo erosion.

- Provide necessary energy dissipation and/or erosion control devices so that water discharge does not adversely affect the arroyo downstream.

25×10 32×10

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APPENDIX A

100-YEAR
MAINLINE PIPE
HYDRAULICS CALCULATIONS

25×10 32×10

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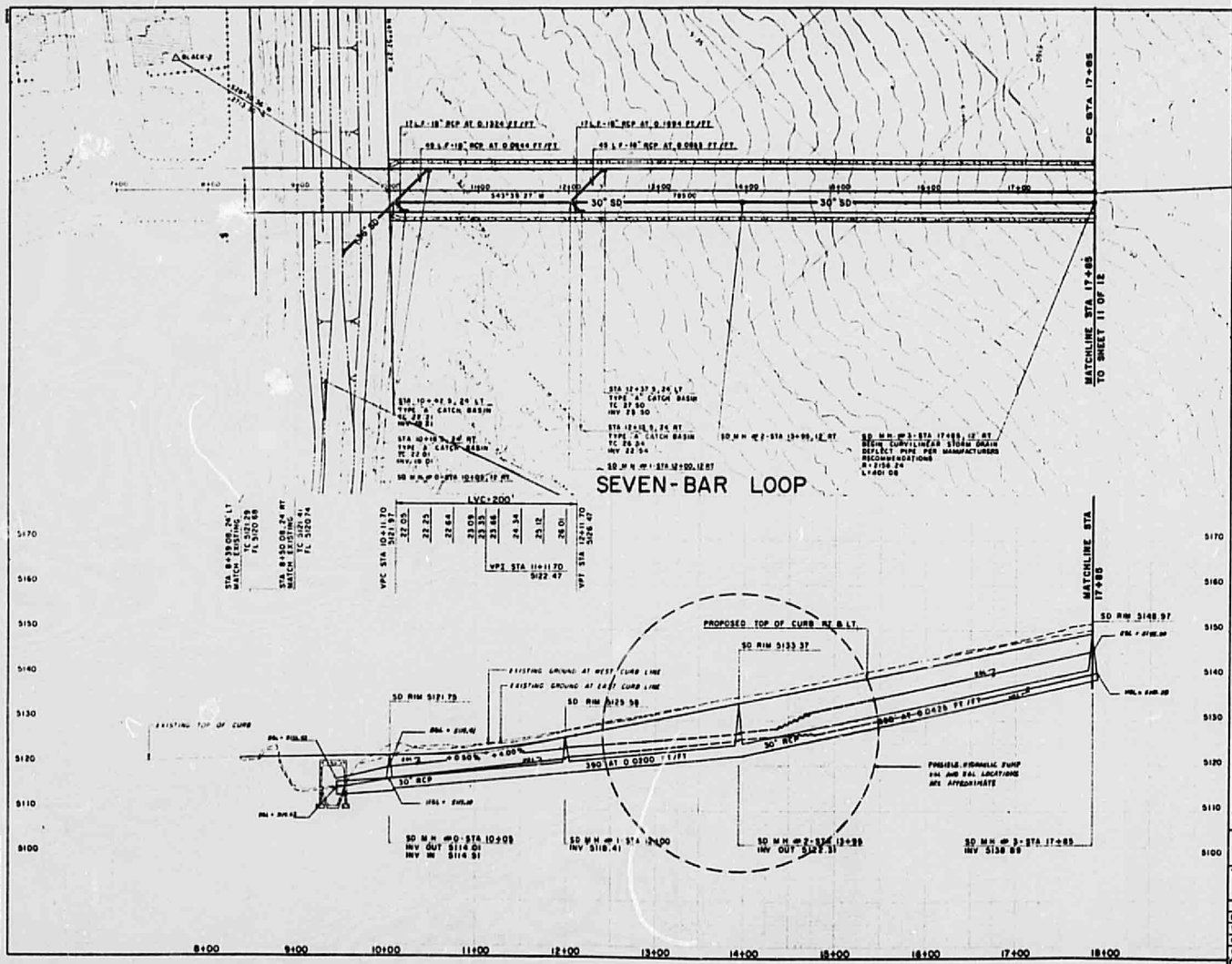

AS BUILT INFORMATION

BENCH MARKS

USGS BRASS TABLET STAMPED "BLACK 2 1977" ELEV 5215.928, LOCATED 217 ± S. SOUTH OF MENAUL BLVD. CENTERLINE, AND 365' ± WEST OF GOLF COURSE ROAD CENTERLINE

SURVEY INFORMATION

NO	BY	FIELD NOTES	DATE

ENGINEER'S SEAL

NO	DATE	REMARKS	BY

REVISIONS

DESIGN

DRAWING BY: BSP DATE 4/89
DRAWN BY: DATE
CHECKED BY: DATE

MICRO-FILM INFORMATION

NO	DATE	REVISIONS BY

SCALE 1"=50' HORIZ
1"=10' VERT

CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT
ENGINEERING GROUP

TITLE **SEVEN BAR LOOP RD.(NORTH)**
STA 8+39 TO STA 17+85

APPROVALS	ENGINEER	DATE	APPROVALS	ENGINEER	DATE
D.R.C. Chair					
Trans. Div.					
Utility Div.					
Hydrology					

DRAWING NO. 3730 | MAP NO. A-13-Z | SHEET 5 OF

25×10 32×10 25×11

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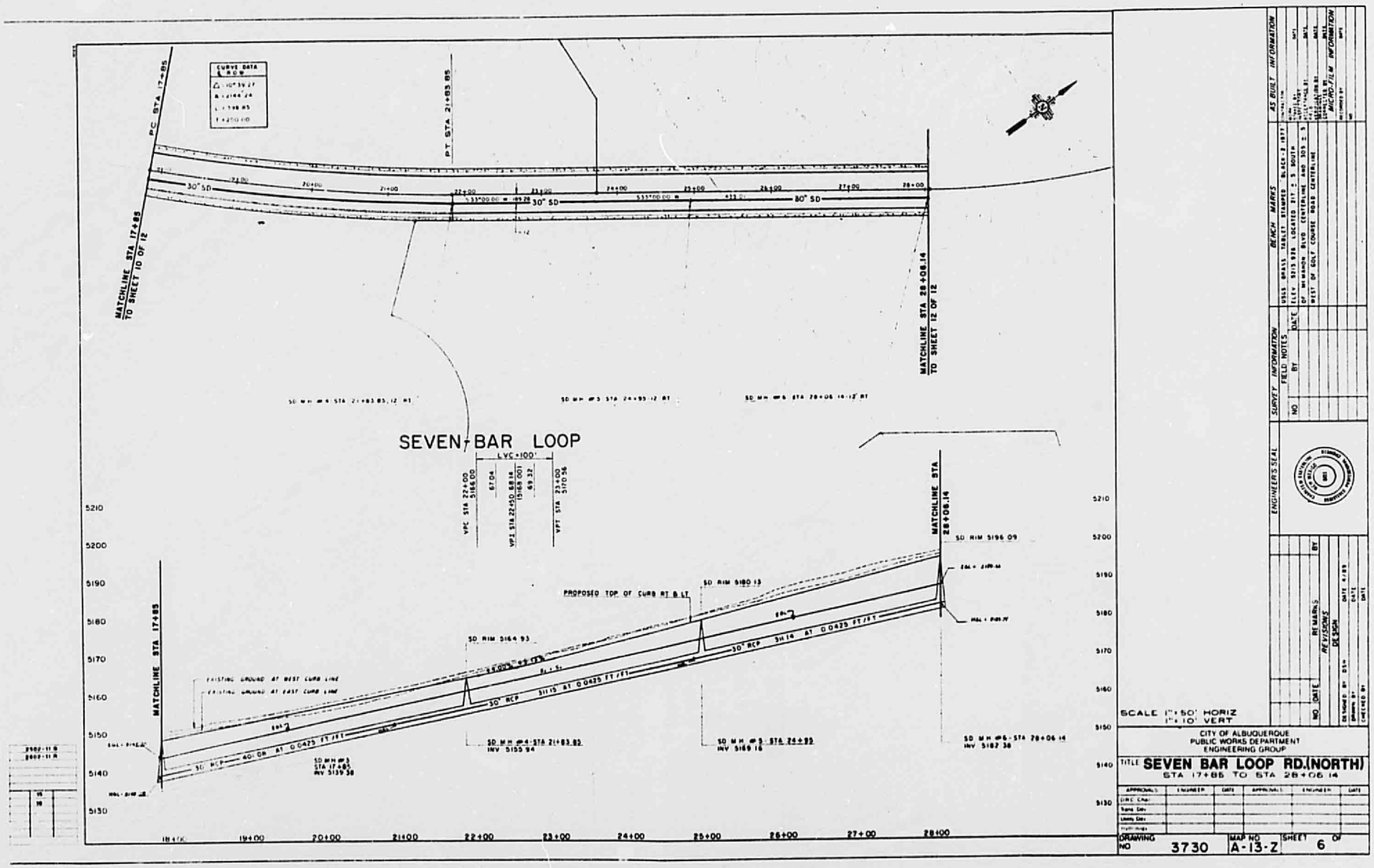

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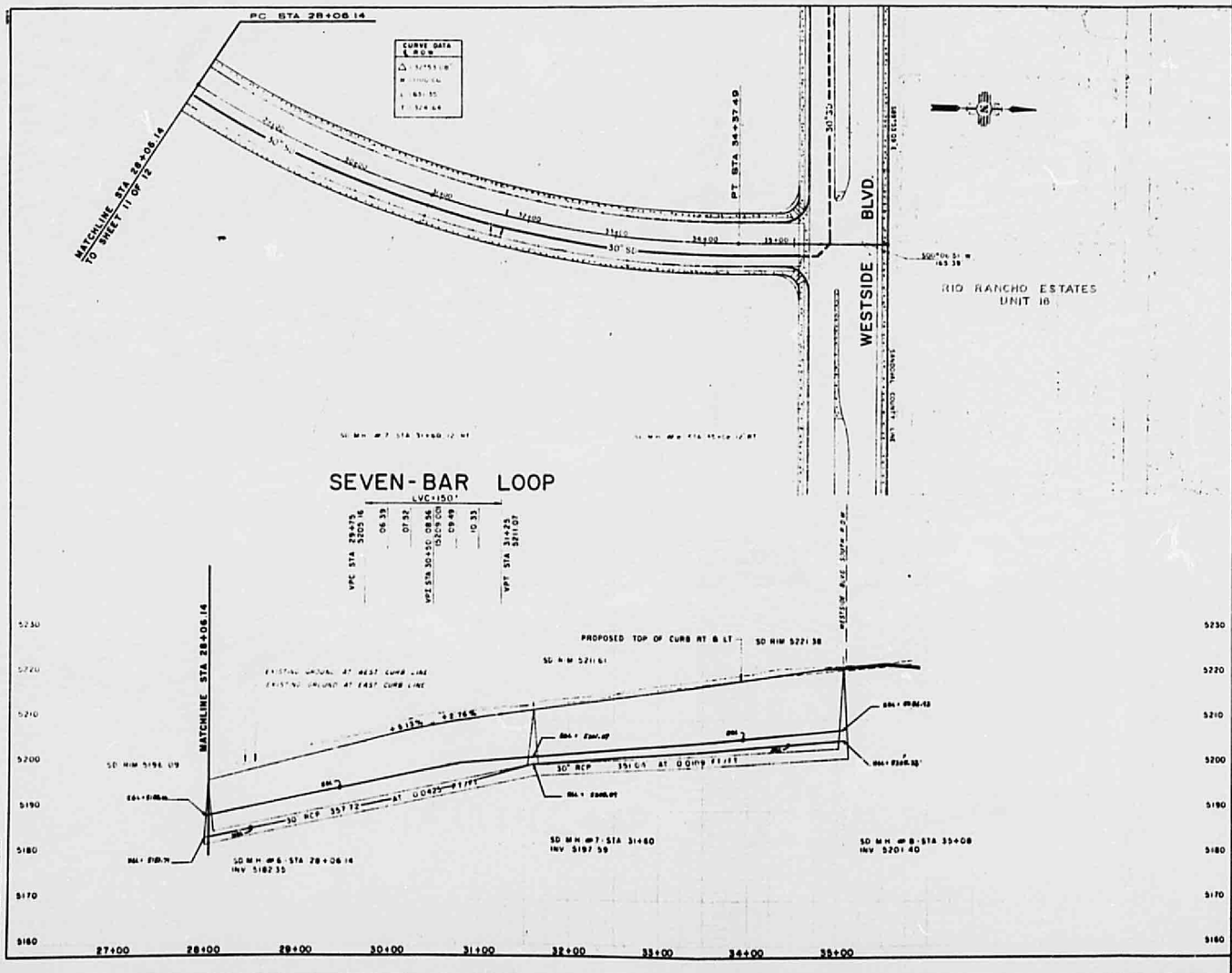


SCALE 1"=50' HORIZ
1"=10' VERT

CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT
ENGINEERING GROUP

TITLE **SEVEN BAR LOOP RD.(NORTH)**
STA 28+06.14 TO STA 35+53.88

APPROVALS	ENGINEER	DATE	APPROVALS	ENGINEER	DATE
DRC Chair					
Trans Div					
Utility Div					
Hydrology					

DRAWING NO 3730 | MAP NO A-13-Z | SHEET 7 OF

AS BUILT INFORMATION

BENCH MARKS

SURVEY INFORMATION

FIELD NOTES

ENGINEER'S SEAL

REVISIONS

DESIGN

MICRO-FILM INFORMATION

25×10 32×10 25×100

0000 0000 0712

Easterling & Associates, Inc.
5643 Paradise Boulevard, NW
Albuquerque, New Mexico 87114
(505) 898-8021

Project Name SEVEN-BAR LOOP RD.
Project No. 2602 Date 4-20-89
Subject STORM DRAIN DESIGN
MAINLINE PIPE HYDRAULICS
By LCH Sheet 1 of 10

100 YEAR PIPE - 10 YEAR CHANNEL

PIPE LOSSES WERE CALCULATED AS FOLLOWS:

CURVES: $H_b = 0.002 \times \Delta \times \frac{V^2}{2g}$

BENDS: $H_b = 0.20 \sqrt{\Delta/90} \, \frac{V^2}{2g}$

MANHOLES: $H_{MH} = 0.05 \, \frac{V^2}{2g}$

TRANSITIONS: $H_T = K_e \frac{(V_1 - V_2)^2}{2g}$ EXPANSION

$H_T = \frac{K_e}{2} \frac{(V_2 - V_1)^2}{2g}$ CONTRACTION

$K_e = 3.50 (\tan \theta/2)^{1.72}$

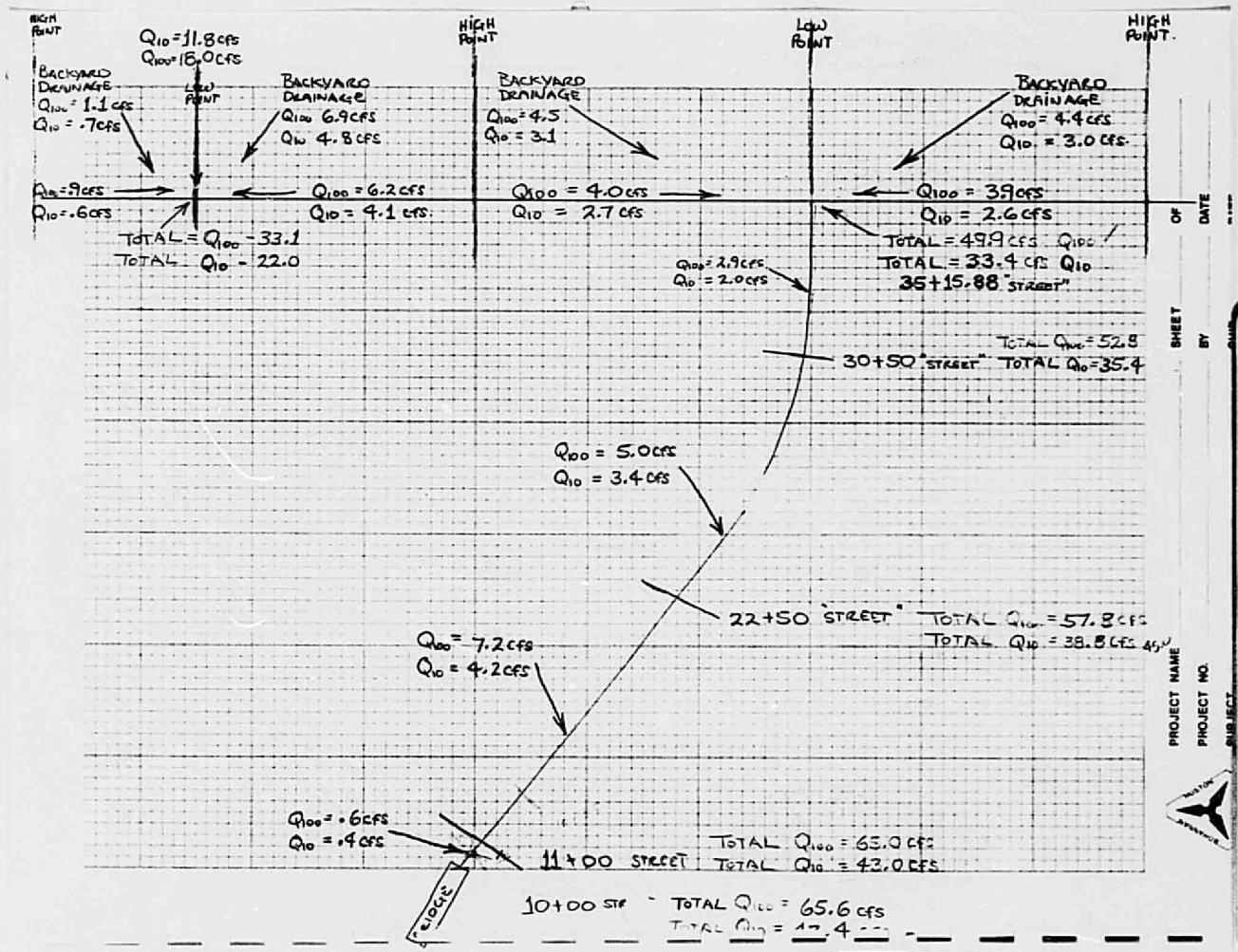
JUNCTIONS: $\Delta y = \frac{Q_2 V_2 - Q_1 V_1 - Q_3 V_3 \cos\theta}{A_{AVG} \cdot g}$

$A_{AVG} = \frac{1}{6}(A_1 + 4(A_m) + A_2)$

$H_J = \Delta y + \frac{V_1^2}{2g} - \frac{V_2^2}{2g}$

FRICTION $H_F = S_F \times L$ $S_F = \left(\frac{Q_f}{K}\right)^2$

25×10 32×10



PROJECT NAME
PROJECT NO.
SUBJECT
SHEET OF
BY DATE

C. M. EASTERLING
& ASSOCIATES
ALBUQUERQUE, N.M.

SUMMARY OF HYDRAULIC CALCULATIONS

CLOSED CONDUIT — 100 YEAR

BY: DCH
DATE: 5-02-89
SHEET: 3 OF 10

PROJECT: SEVEN-BAR LOOP ROAD
LINE: STA 10+05 - STA 17+85

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
STATION	STRUCT.	INV.	D	Q	A	V	K	S_f	L	Δ	LOSSES H_F	H_B	H_J	H_{MH}	H_T	H_{MISC}	ΣH_L	E.G.	h_v	H.G.
10+05	MH#0	5114.5																		
			30	59.4	4.91	12.10	410.1	0.0213	195		4.160						4.160	5119.41	2.31	5117.10
12+00	MH#1													0.115			0.115	5123.57	2.31	5121.26
	TRANSITION												0.454				0.454	5123.69	2.31	5121.38
			30	115.0	4.91	10.16	410.1	0.0419	195		2.897						2.897	5124.14	2.31	5121.83
12+95	MH#2													0.080			0.080	5128.03	1.603	5126.427
		*	30	46.4	4.91	10.16	410.1	0.0416	290		5.772						5.772	5127.11	1.603	5125.51
17+85	MH#3																	5132.88	1.603	5131.28

REMARKS:

25 X 10

32 X 10

C. M. EASTER & ASSOCIATES
ALBUQUERQUE, N.M.

SUMMARY OF HYDRAULIC CALCULATIONS

CLOSED CONDUIT — 100 YEAR

BY: DSH
DATE: 4-10-80
SHEET: 4 OF 10

PROJECT: SEVEN BAR LOOP (NORTH)
LINE: STA 31+60 TO STA 35+08

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
STATION	STRUCT.	INV.	D	Q	A	V	K	S_F	L	Δ	LOSSES H_F	H_B	H_J	H_{MH}	H_T	H_{MISC}	ΣH_L	E.G.	$-h_v$	H.G.
31+60	MH #7	5197.59																5201.69	1.603	5200.09
			30"	49.9	4.91	10.16	410.1	0.0146	357.04		5.195						5.195	5206.88	1.603	5205.27
	CURVE									N.5343°		0.046					0.046	5206.93	1.603	5205.33
35+08	MH #8																			

REMARKS:

25X
32X

0000 0000 0715

0000 0000 0716

Easterling & Associates, Inc.
5643 Paradise Boulevard, NW
Albuquerque, New Mexico 87114
(505) 898-8021

Project Name SEVEN - BAR LOOP RD.
Project No. 2602 Date 5-2-89
Subject STORM DRAIN DESIGN
HANDLIAR PIPE HYDRAULICS
By LCH Sheet 5 of 10

100 YR PIPE - 10 YR CHANNEL

OUTLET STA 9+24.39 TO MH #0 STA 10+05 TRANSITION

10 YR WSEL = 5114.62

THE 10 YR WSEL IN THE PROPOSED BLACK ARROYO CHANNEL COMBINED WITH THE CAPACITY OF A 36" PIPE @ S_o = 1% INDICATES THAT THE HYDRAULICS IN THIS REACH WILL BE CHARACTERISED BY OPEN CHANNEL FLOW SUGGESTING AN INLET CONTROL CONDITION. THE INLET CONTROL POINT IS LOCATED AT MH #0 - STA 10+05 WHERE THE FOLLOWING CONDITION WAS ASSUMED

1. HGL IS EQUAL TO THE SOFFIT OF THE 30" PIPE @ MH #0

NORMAL DEPTH FLOW - 36" RCP - STA 9+24 TO STA 10+05

Q_{P100} = 65.6 CFS D = 3.0 FT n = 0.013

S_o = 1.0% d = 0.8 FT

A/D^2 = 0.6735 ⇒ *REFERENCE HYDRAULIC PROPERTIES OF PIPE, BOXES, AND RECTANGULAR CHANNELS - STORM DRAIN DESIGN - CITY OF LOS ANGELES.

P/D = 0.3041 ⇒ *REFERENCE HYDRAULIC PROPERTIES OF PIPE, BOXES, AND RECTANGULAR CHANNELS - STORM DRAIN DESIGN - CITY OF LOS ANGELES.

$A_N = 0.6735 \times D^2 = 0.6735 \times (3.0)^2 = 6.0615 \text{ FT}^2$

$R_N = 0.3041 \times D = 0.3041 \times (3.0) = 0.9123$

$Q_N = \frac{1.486}{n} A R^{2/3} S^{1/2} = \frac{1.486}{0.013} (6.0615)(0.9123)^{0.67} (0.01)^{0.50}$

$Q_N = 114.31 (6.0615)(0.9404)(0.10) = 65.156 \text{ CFS}$

$Q_N = 65.156 \text{ CFS} \cong Q_{P100}$ ✓

$V_N = \frac{Q_{P100}}{A_N} = \frac{65.6 \text{ CFS}}{6.0615 \text{ FT}^2} = 10.822 \text{ FT/SEC}$

V_N = 10.822 FT/SEC

25× 32×

Easterling & Associates, Inc.
5643 Paradise Boulevard, NW
Albuquerque, New Mexico 87114
(505) 898-8021

Project Name SEVEN-BAR LOOP RD
Project No. 2602 Date 5-3-89
Subject STORM DRAIN DESIGN
MAINLINE PIPE HYDRAULICS
By DSN Sheet 6 of 10

100YR PIPE - 100YR CHANNEL

$$HV_N = \frac{(V_N)^2}{2g} = \frac{10.822 \text{ FT/SEC}}{64.4} = 1.818 \text{ FT}$$

$HV_N = 1.818$ FT

MH H0 STA 10+05 TO MH H1 STA 13+95 PRESSURE FLOW

THE CAPACITY OF A 30" RCP @ 2% INDICATES THAT THE STORM DRAIN WILL BE UNDER PRESSURE IN THIS REACH.

ASSUME HGL = TOP OF 30" PIPE @ MH H0

MH H0 STA 10+05 TO MH H1 STA 12+00

INV 5114.51 D = 2.5 FT K = 410.1 $V = Q/A = \frac{59.9 \text{ CFS}}{4.91 \text{ FT}^2}$

$Q_{100} = 59.9$ CFS A = 4.91 FT² L = 195.0 FT V = 12.19 FT/SEC

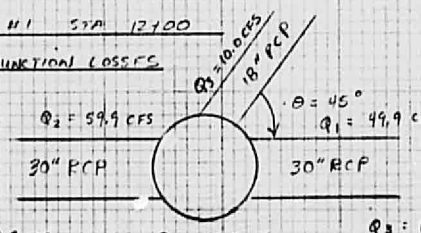
$$S_F = \left(\frac{Q}{K}\right)^2 = \left(\frac{59.9}{410.1}\right)^2 = 0.0213$$

$H_F = S_F \times L = 0.0213 \times 195.0 = 4.160$ FT

$H_F = 4.160$ FT

MH H1 STA 12+00

JUNCTION LOSSES



$Q_1 = 49.9$ CFS
$D_1 = 2.5$ FT
$A_1 = 4.91$ FT²
$V_1 = 10.16$ FT/SEC
$S_{F_1} = 0.0148$ FT/FT
$HV_1 = 1.60$ FT

$Q_2 = 59.9$ CFS
$D_2 = 2.5$ FT
$A_2 = 4.91$ FT²
$V_2 = 12.19$ FT/SEC
$S_{F_2} = 0.0213$ FT/FT
$HV_2 = 2.311$ FT

$Q_3 = 10.0$ CFS
$D_3 = 1.5$ FT
$A_3 = 1.767$ FT²
$V_3 = 5.658$ FT/SEC
$S_{F_3} = 0.0091$ FT/FT
$HV_3 = 0.4971$ FT

25× 32×

0000 0000 0718

Easterling & Associates, Inc.
5643 Paradise Boulevard, NW
Albuquerque, New Mexico 87114
(505) 998-8021

Project Name SEVEN-BAR LOOP RD.
Project No. 1602 Date 5-3-89
Subject STORM DRAIN DESIGN
MAINLINE PIPE HYDRAULICS
By DSH Sheet 7 of 10

$$\Delta y = \frac{Q_2 V_2 - Q_1 V_1 - Q_3 V_3 \cos\theta}{1/2 (A_1 + A_2)(g)}$$

$$\Delta y = \frac{59.9(12.19) - 49.9(10.16) - 10.0(5.66)\cos 45^\circ}{1/2(4.91 + 4.91)\,32.2}$$

$$\Delta y = \frac{730.756 - 507.128 - 56.588 \cos 45^\circ}{158.102}$$

$$\Delta y = \frac{183.614}{158.102} = 1.161$$

$$\Delta y = 1.161$$

$$H_J = \Delta y + H_{V_1} - H_{V_2} = 1.161 + 1.604 - 2.311 = 0.4542 \text{ FT.}$$

$$\boxed{H_J = 0.4542 \text{ FT}}$$

MANHOLE LOSSES

$$H_{MH} = 0.05 \frac{V^2}{2g} = 0.05 \frac{(12.19 \text{ FT/SEC})^2}{64.4} = 0.1154 \text{ FT}$$

$$\boxed{H_{MH} = 0.115 \text{ FT}}$$

MH #1 STA 2+00 TO MH #2 STA 13+95

INV = 5122.31' D = 2.5 FT K = 410.1 $V = Q/A = \frac{49.9 \text{ CFS}}{4.91 \text{ FT}^2}$

Q_{Q100} = 49.9 CFS A = 4.91 FT² L = 195.0 FT V = 10.16 FT/SEC

$$S_F = \left(\frac{Q}{K}\right)^2 = \left(\frac{49.9}{410.1}\right)^2 = 0.0148$$

$$H_F = S_F \times L = 0.0148 \times 195.0 = 2.8871 \text{ FT}$$

$$\boxed{H_F = 2.887 \text{ FT}}$$

MH #2 STA 13+95

MANHOLE LOSSES

$$H_{MH} = 0.05 \frac{V^2}{2g} = 0.05 \frac{(10.61 \text{ FT/SEC})^2}{64.4} = 0.0801 \text{ FT}$$

$$\boxed{H_{MH} = 0.0801 \text{ FT}}$$

25× 32×

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Easterling & Associates, Inc.
5643 Paradise Boulevard, NW
Albuquerque, New Mexico 87114
(505) 898-8021

Project Name SEVEN-BAR LOOP RD.
Project No. 2602 Date 5-3-89
Subject STORM DRAIN DESIGN
MAINLINE PIPE HYDRAULICS
By LSH Sheet 8 of 10

MH #2 STA 13+95 TO MH #3 STA 17+85 (TRANSITION)

INV. = 5138.89 D = 2.5 FT K = 410.1 $V = \frac{Q}{A} \frac{49.9 \text{ CFS}}{4.91 \text{ FT}^2}$

Q_{100} = 49.9 CFS A = 4.91 FT² L = 390.0 FT V = 10.16 FT/SEC

$$S_F = \left(\frac{Q}{K}\right)^2 = \left(\frac{49.9}{410.1}\right)^2 = 0.0148$$

$$H_F = S_F \times L = 0.0148 \times 390 = 5.774 \text{ FT}$$

$$\boxed{H_F = 5.774 \text{ FT}}$$

NOTES:

(1) SEE SUMMARY OF HYDRAULIC CALCULATIONS FOR TABULATION OF PRESSURE FLOW CALCULATIONS

(2) CALCULATION INDICATE THE STORM DRAIN WILL BECOME UNSEALED BEFORE REACHING MH #3.

25×10 32×10

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Easterling & Associates, Inc.
5643 Paradise Boulevard, NW
Albuquerque, New Mexico 87114
(505) 898-8021

Project Name: SEVEN BAR LOOP RD
Project No. 2602 Date 5-3-89
Subject: STORM DRAIN DESIGN
HYDRAULIC PIPE HYDRAULICS
By: LSH Sheet 9 of 10

MH #3 STA 17+85 TO MH # 7 STA 31+06 - OPEN CHANNEL FLOW

NORMAL DEPTH FLOW - 30" RCP - STA 17+85 TO STA 31+60

$Q_{P100} = 49.9$ CFS $D = 2.5$ FT $n = 0.013$

$S_o = 4.25\%$ $d = 1.39$ FT

$d/D = \frac{1.39}{2.5} = 0.5560$

$A/D^2 = 0.4485^*$ ⟹ $A = 0.4485 \times (2.5)^2 = 2.8031$ FT²

$A = 2.8031$ FT²

$R/D = 0.2665^*$ ⟹ $R = 0.2665 \times (2.5) = 0.6663$

$R = 0.6663$

$Q = \frac{1.486}{n} A R^{2/3} S^{1/2} = \frac{1.486}{0.013}(2.8031)(0.6663)^{0.67}(0.0425)^{0.5}$

$Q = 114.31(2.8031)(0.7618)(0.2062)$

$Q = 50.33 \neq Q_{P100}$ ✓

$V = \frac{Q_{P100}}{A} = \frac{49.9 \text{ CFS}}{2.8031 \text{ FT}^2} = 17.8017$ FT/SEC

$H_V = \frac{V^2}{2g} = \frac{(17.8017 \text{ FT/SEC})^2}{64.4} = 4.9208$ FT

$H_V = 4.9208$ FT

MH #7 STA 31+60 TO MH #8 STA 35+08 - PRESSURE FLOW

THE CAPACITY OF A 30" RCP @ 1.09% INDICATES THAT THE STORM DRAIN WILL BE PRESSURIZED IN THIS REACH.

ASSUME HGL ELEV IS EQUAL TO PIPE SOFFIT ELEV.

MH #7 STA 31+60 TO MH #8 35+08

INV. 51 $D = 2.5$ FT $R = 410.1$ $V = Q/A = \frac{49.9 \text{ CFS}}{4.91 \text{ FT}^2}$

$Q_{P100} = 49.9$ CFS $A = 4.91$ FT² $L = 351.04$ FT $V = 10.16$ FT/SEC.

25× 32×

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5643 Paradise Boulevard, NW
Albuquerque, New Mexico 87114
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Project Name SEVEN-BAR LOOP RD
Project No. 2602 Date 5-3-89
Subject STORM DRAIN DESIGN
MAINLINE PIPE HYDRAULICS
By DSH Sheet 10 of 10

$$S_f = \left(\frac{Q}{K}\right)^2 = \left(\frac{449.9}{410.1}\right)^2 = 0.0148$$

$$H_f = S_f \times L = 0.0148 \times 351.09 = 5.195 \text{ FT}$$

$$\boxed{H_f = 5.195 \text{ FT}}$$

CURVE LOSSES

$$H_c = 0.002 \times \Delta \times \frac{V^2}{2g}$$

$$H_c = 0.002 \times 14.5343 \times \frac{(10.61)^2}{64.4}$$

$$\boxed{H_c = 0.0463}$$

$$L = 0.0174533 \times \Delta \times R$$

$$L = 280.53$$

$$R = 1112.0$$

$$\Delta = \frac{L}{0.0174533 \times R} = \frac{280.53}{19.408}$$

$$\Delta = 14.5343^\circ$$

NOTES:

1. SEE SUMMARY OF HYDRAULIC CALCULATIONS FOR TABULATION OF PRESSURE FLOW CALCULATIONS
2. PLEASE REFERENCE WEST SIDE BLVD. STORM DRAIN DESIGN REPORT FOR CONTINUATION OF ANALYSIS UPSTREAM.

25×10 32×10

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APPENDIX B

CATCH BASIN CALCULATIONS

25×10 32×10

CATCH BASIN CALCULATION SHEET

Sht 1 of 2

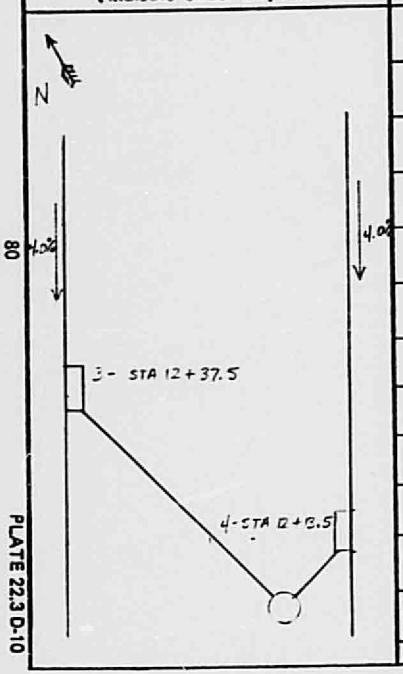
PROJECT SEVEN-BAR LOOP

DESIGN FREQUENCY Q10 & Q100

CALCULATED BY DSH

DATE 5-04-89

FLOW DIAGRAM (Indicate street slopes)



Sym.	Drain. Area	Q Total	Q Inter.	Cap. of ½ Street	Gutter "d"	C.B. No.	C.B. Size	Connector Pipe Head	Connector Pipe L	Connector Pipe Dia.	V Depth
		Q10									
3		4.55	4.20		0.30	1	A				
4		4.59	4.20		0.30	1	A				
		Q100									
3		7.12	5.0		0.33	1	A	1.96	45	18"	4.0
4		7.19	5.0		0.33	1	A	1.00	17	18"	4.0

4-82

80

PLATE 22.3 D-10

22.3

25×10

32×10

CATCH BASIN CALCULATION SHEET

Sht 2 of 2

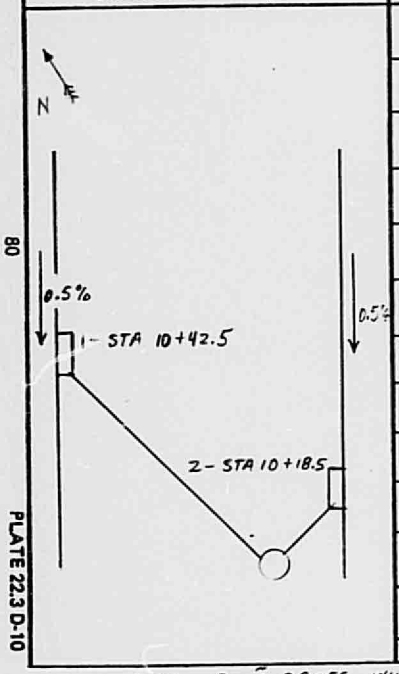
PROJECT SEVEN-BAR LOOP

DESIGN FREQUENCY Q10 & Q100

CALCULATED BY DSH

DATE 4-20-89

FLOW DIAGRAM (Indicate street slopes)



Sym.	Drain. Area	Q Total	Q Inter.	Cap. of ½ Street	Gutter "d"	C.B. No.	C.B. Size	Connector Pipe Head	Connector Pipe L	Connector Pipe Dia.	V Depth
		Q10									
1		0.80	0.80			1	A				
2		0.80	0.80			1	A				
	Q100										
1		2.75	2.30*			1	A	3.29	45	18"	4.0
2		2.75	2.30*			1	A	3.09	17	18"	4.0

* NOTE: Q100 = 0.9 CFS WILL RUN BY THESE CATCH BASINS IN THE 100YR STORM

4-82

80

PLATE 22.3 D-10

22.3

25X

32X

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CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT

ENGINEERING GROUP

INTER-OFFICE CORRESPONDENCE

TO: Roger Green, Chairman; DRC

FROM: Loren Meinz, Hydrology Division

SUBJECT: City Engr. Proj. No. 3972

STANDARD DRC REVIEW COMMENT SHEET
December 11, 1989

PROJECT:
Black Arroyo Channel
@ Sever Bar_Ranch

PROJECT DESCRIPTION STATUS: Prelim. Plan Review

GENERAL COMMENTS:

1) Submit hydrology report to verify design flows.

2) Indicated design flows are constant throughout the project length, yet there are several locations of point inflow. Reason??

3) Structure detail for 7-Bar Loop Road is not sufficient to determine proposed cross-section.

4) Storm sewer connection to channel from north 7-Bar Loop Rd. is shown as 48 inch pipe. The drainage report for 7-Bar Loop Rd. calls for a 36 inch pipe discharge. Difference??

5) All proposed pipe connections to the channel should include pipe extensions of sufficient length to allow future connection to pipe without disturbing the channel lining, or the service road.

6) Location information for side channel appears incorrect. (approx. Sta. 24+00, Black Channel centerline, left side)

7) The rundown near Golf Course Road should be designed to conform to DPM criteria for V x d = 6.5 or less.

8) See plan set for additional minor notations.

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FIGURE 6 Loren Meinz

CITY OF ALBUQUERQUE
DESIGN REVIEW COMMITTEE
NOTICE OF D.R.C. MEETING

12-1-89 (DATE) PROJECT NO: 3972

PROJECT NAME: BLACK ARROYO CHANNEL @ SOUTH BAR RANCH

TYPE OF PROJECT: CIP XX PWC ____ SAD ____ PRIVATE ____

Contact Person: JOHN KELLY Phone: 884-2215
Firm: AMAFCA

Scheduled with the D.R.C. on 12-14-89 at 1:30 in Conf. Room 303 on the 3rd Floor of the old City Hall Building.

The Project Is Scheduled For:
/ / Design Report Review / / Final Plan Review (Appr. Infra. List)
/ / Pre-Design Meeting / / Signoff of Plans (Mylars Required)
XX Preliminary Plan Review / / ____

The Project Relates To:
/ / Water / / San. Sewer / / Paving XX Storm Drainage / / ____

The Attached Package Includes:
XX Drawings / / Spec's / / Estimate / / Report XX Memo Only

Indicated below are the Departments/Divisions that have received project documents and are invited to attend. It will be the Project Managers responsiblity to notify consulting engineering firms of date and time of scheduled meetings on all CIP projects.

On Private Plans: First 8 Receive Prel. Plans--First 4 Receive Final Plans

XX	Roger Green/Carlos Montoya	Project Review	All
XX	Richard Dourte	Transportation Dev.	All
XX	Robert Kane	Utility Design	All
XX	Hydro Repres.	Hydrology	All
XX	Brian Speicher	Construction	All
/ /	Bill Coleman	Traffic Operations	All
/ /	Ray Chavez	Street Maint.	All
/ /	Sergio Miranda	Water -Shutoff Plan: Yes/No	All
XX	~~Diane Seone~~ (PAT WESTBROOK)	Parks & Rec.	Memos
/ /	Robert McArthur	Transit Dept.	Memos
XX	Joe Luehring	Utility Coordinator	PWC & Masterplans
/ /	Jim Fink	Line Maintenance	CIP/SAS
/ /	Joe Dellalonga	City Architect	ARCHITECTURAL
/ /	Lee Lunsford	SAD Engineer	SAD
/ /	Greg Olson	Project Design	PWC
/ /	Brett Locke	Transportation Dev.	CIP/TRANS.
/ /	Billy Goolsby	Utility Design	CIP/WATER & SAS
/ /	Gene Frey	Project Coordinator	CIP/ALL MEMOS
/ /	Glenn Coontz	General Services Dept.	BUILDINGS
/ /	Mark Shoesmith	PWD/City Attorney	SPECIFICATIONS
XX	Cynthia Bruce	Planning Department	CIP/Memos
XX	CIP Manager	CIP	CIP/Memos
/ /	____	____	____

RG/tm (WP+123400) Rev. 10/10/89

25×10 32×10

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R. WARD HUNNICUTT, CHAIRMAN
PAT D. HIGDON, VICE-CHAIRMAN
REX FUNK, SECRETARY-TREASURER
DANIEL W. COOK, DIRECTOR
RONALD D. BROWN, DIRECTOR

LARRY A. BLAIR
EXECUTIVE ENGINEER

Albuquerque
Metropolitan
Arroyo
Flood
Control
Authority
2600 PROSPECT N.E. · ALBUQUERQUE, N.M. 87107
TELEPHONE (505) 884-2215

December 1, 1989

Roger Green
DRC Chairman
City of Albuquerque
P.O. Box 1293
Albuquerque, NM 87103

RE: AMAFCA Project: Black Arroyo Channel

Dear Roger:

Please schedule this project for Preliminary Plan Review at the next available DRC meeting. The project includes a bridge which will be turned over to the City. We need Transportation review, as well as Hydrology, Utility Coordination and Parks and Recreation. The project is within the New Mexico Utilities Franchise Area.

Transmitted herewith are four plan sets for distribution.

If you have any questions, please call me at 884-2215.

Sincerely,
AMAFCA

John Kelly

John Kelly
Field Engineer

25×10 32×10

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Easterling & Associates, Inc.

5643 Paradise Boulevard, NW
Albuquerque, New Mexico 87114
(505) 898-8021

March 5, 1990

Roger Green, P.E.
DRC Chairman
Design Review Section
Engineering Group
Public Works Department
City of Albuquerque
P.O. Box 1293
Albuquerque, NM 87103

RE: SEVEN BAR LOOP ROAD BRIDGE AT THE BLACK ARROYO

Dear Roger:

This letter is to inform you that the agreement for the construction of the Seven Bar Loop bridge has fallen through. Therefore, I do not intend to submit bridge plans for final review and approval, at this time.

In order to facilitate the completion of the bridge at a later date, AMAFCA has agreed to include the construction of the bridge substructure with the channel project. The construction of the channel is scheduled to begin in late March. I have enclosed original DRC review plan sets for your records.

If you have any questions, please call me.

Sincerely,

David S. Harrison

David S. Harrison

DSH/dlh
Job No. 2641

Enclosures

cc: Mr. John Kelly, AMAFCA

25×10 32×10

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PLANS/PLATS ON FILE

FILE DESC: A13/D5

PLANS/PLATS 5

25×10 32×10

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