DRAINAGE INFORMATION SHEET

PROJECT TITLE: TRACT IV ZONE ATLAS/DRNG. FILE #: H9 ~~G-9~~ / D102

LEGAL DESCRIPTION: TRACT IV, LAURELWOOD II SUBDIVISION

CITY ADDRESS:

ENGINEERING FIRM: FRED DENNEY & ASSOCIATES, INC. CONTACT: RICK BELTRAMO

ADDRESS: 2400 COMANCHE NE, ALBUQUERQUE, NM 87107 PHONE: 884-0696

OWNER: LAURELWOOD II JOINT VENTURE CONTACT: SKIP BUCHANAN

ADDRESS: 4520 MONTGOMERY NE # 4A 87109 PHONE: 883-9393

ARCHITECT: N/A CONTACT: N/A

ADDRESS: PHONE:

SURVEYOR: FRED DENNEY & ASSOCIATES, INC. CONTACT: KEVIN DALY

ADDRESS: 2400 COMANCHE NE, ALBUQUERQUE, NM 87107 PHONE: 884-0696

CONTRACTOR: CONTACT:

ADDRESS: PHONE:

RECEIVED
MAR 10 1989
HYDROLOGY SECTION

PRE-DESIGN MEETING:

____ YES
X NO
____ COPY OF CONFERENCE RECAP
____ SHEET PROVIDED

DRB No. 88-349
EPC No.
PROJ. No. 3765

TYPE OF SUBMITTAL:

X DRAINAGE REPORT
____ DRAINAGE PLAN
____ CONCEPTUAL GRADING & DRAINAGE PLAN
X GRADING PLAN
____ EROSION CONTROL PLAN
____ ENGINEER'S CERTIFICATION

CHECK TYPE OF APPROVAL SOUGHT:

____ SECTOR PLAN APPROVAL
____ SKETCH PLAT APPROVAL
X 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 PERMIT (SPECIFY)

DATE SUBMITTED: March 9, 1989

BY: Rick Beltramo
Rick Beltramo, Fred Denney & Assoc., Inc.

REV. 10/85

City of Albuquerque
P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

KEN SCHULTZ
MAYOR

June 8, 1989

Fred Denny, P.E.
Fred Denney and Associates, Inc.
2400 Comanche Road, NE
Albuquerque, New Mexico 87107

RE: WORK ORDER APPROVALS FOR LAURELWOOD II SUBDIVISION (H-9/D1D, W.O. 3411), AND MONUMENT POINTE, TRACT IV OF THE LAURELWOOD II SUBDIVISION (H-9/D1D2, W.O. 3765)

Dear Mr. Denney,

The Amended Master Drainage Report for Laurelwood II Subdivision, dated December ~~1989~~ 1988, signed by Rick Beltramo, and submitted to us on December 7, ~~1989~~ 1989, is approved for Work Order sign-off by the Hydrology Section. The Work Order drawings for this project (W.O. 3411) have been reviewed. At the time the drawings were submitted, February 6, 1989, I had comments which asked for minor corrections to the drawings. We have not received a resubmittal.

The Drainage Report for Tract IV, Phase I, Monument Pointe, Laurelwood II Subdivision, March, 1989, signed by Rick Beltramo, and submitted to us on March 10, 1989, is approved for Work Order sign-off by the Hydrology Section. To date we have received no Work Order drawings for this project (W.O. 3765).

It is my understanding that this development has been temporarily stopped by the owners. I am writing this letter merely to document the status of the project, and to make certain that we are not inadvertently delaying its progress.

If you have any questions concerning either project, please call me at 768-2650.

Cordially,

Stuart Reeder

G. Stuart Reeder, P.E.
C.E./Hydrology Section

xc: Skip Buchanan, Laurelwood II Joint Venture
File H-9/D1D
File H-9/D1D2

GSR
(WP+328)

FILE COPY

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

KEN SCHULTZ
MAYOR

December 19, 1988

Richard L. Beltramo, P.E.
Fred Denney & Associates, Inc.
2401 Comanche Road, NE
Albuquerque, New Mexico 87107

RE: GRADING & DRAINAGE PLAN FOR TRACT IV, PHASE I, MONUMENT POINTE, LAURELWOOD SUBDIVISION, SUBMITTED 16 DECEMBER 1988, FOR PRELIMINARY PLAT APPROVAL (H-9/D1D2)

Dear Mr. Beltramo:

I have reviewed your submittal, referred to above, and it is approved for Preliminary Plat by the Hydrology Section. Before these project can proceed to Work Order Approval, you will need to address the following items:

1. The interim swale from Shuwimi Place to Anazazi Place which serves Subbasin 6, has a Froude number of 1.06. By DPM criterion, this number must be less than 0.7 or greater than 1.3, so that the flow is either clearly supercritical or clearly subcritical.

2. Please provide some calculations for the ponding volume required at the west property line for the entrance to the hardlined Ladera Channel, so that we may agree that the area within the easement granted by Westland Development Co. is adequate. The easement provided is being reviewed and comments will be forthcoming.

As we discussed in our meeting with Cliff Anderson of AMAFCA last week, the downstream capacity of the Ladera Channel is not adequate to handle the 900 cfs that this hardlined section can carry. No one is sure at this point just how much of the estimated 900 cfs peak flow is from undeveloped areas that will remain undeveloped, and how much is flow from (proposed) fully developed areas. Although this development and the portion of Tract III that has preliminary plat approval are granted free discharge, we need to look closely at the remaining areas in this basin to determine if some retention of fully developed runoff is necessary.

Finally, for Final Plat approval, please submit the necessary data for a Letter of Map Amendment (LOMA) to us so that we may review it and forward it to the Federal Emergency Management Agency to remove those areas of Tract IV from the flood plain. This will qualify the subdivision to receive federal flood insurance, and to be built with federally insured funds.

If you have any questions, please do not hesitate to call me at 768-2650.

Cordially,

for G. Stuart Reeder, P.E.
C.E./Hydrology Section

xc: owner
Cliff Anderson, AMAFCA
(WP+971)

DRAINAGE PLAN FOR

TRACT IV, PHASE I
"MONUMENT POINTE"

LAURELWOOD II SUBDIVISION

MARCH, 1989

PREPARED BY:
FRED DENNEY & ASSOCIATES, INC.
CONSULTING ENGINEERS AND LAND SURVEYORS
2400 COMANCHE ROAD NE
ALBUQUERQUE, NM 87107
(505) 884-0696

I, Richard Lynn Beltramo, hereby certify that the enclosed documents and drawings were prepared under my supervision and are true and correct to the best of my knowledge and belief.

New Mexico Registered
Professional Engineer No. 10596

SEAL

TABLE OF CONTENTS

TRACT IV, PHASE I
"MONUMENT POINT"
LAURELWOOD II SUBDIVISION

I. PURPOSE

The purpose of this report is to determine an economical and effective storm water management plan for Tract IV of Laurelwood II Subdivision. This report will also identify the major infrastructure necessary to satisfy drainage requirements.

II. GENERAL

The proposed development site consists of approximately 14 acres and is located near Unser Boulevard, between 98th Street and Ouray Road. The site generally slopes from west to east at approximately 3%. At present, a portion of the site is located within a floodplain; however, this floodplain will be removed with the concrete lining of the Ladera Channel under Work Order 3411. The soil on-site is of the BCC, BKD and PAC series, Types A and B. For purposes of drainage calculations, it will be assumed that all on-site soils are Type 'B'.

Tract IV will be the first of the Laurelwood development. Construction of portions of Monument Pointe Drive (a/k/a Lava Bluff Drive) and the Ladera Channel will precede the construction of Tract IV, and at some time may be under construction simultaneously.

II. GENERAL - CONTINUED

As demand warrants, additional tracts of Laurelwood II will be designed and built. For the purpose of clarification, this report will be directed to that portion of Tract IV known as Phase I.

As stated in the Master Drainage Plan, each tract and phase will have its own drainage report which will address detailed drainage issues and design. These reports will consider ultimate developed conditions as well as the interim or phased conditions.

III. DRAINAGE

The primary drainage outfall for Tract IV is the Ladera Channel which is located adjacent to the south boundary of the site. The Ladera Channel will be constructed prior to final plat approval of Tract IV.

In conjunction with the development of Tract IV, a 24" RCP storm drain will be constructed on-site to discharge 21 cfs of runoff into the Ladera Channel adjacent to Monument Pointe Drive.

In addition to this outfall, a second storm drain discharges to the Ladera Channel through Tract III, adjacent to Unser Boulevard. The ultimate storm drain will consist of a network of 36" and 42" RCP culverts which collect runoff at Monument Pointe Drive and Dawn Place, and convey the flows through Tract III to the outfall at the Ladera Channel.

The interim system will consist of the upstream collector system in Monument Point Drive and Dawn Place. This facility

III. DRAINAGE - CONTINUED

will then drain into Pond No. 7, a desilting pond, with the final outfall to the Ladera Channel.

The ultimate system will be constructed under Tract III improvements. Detailed and final hydraulic computations of the system will be submitted with the Tract III Drainage Report. Enough analysis has been provided to size the system and design the collector facilities.

The only basin which does not discharge to the Ladera Channel is Pond No. 8. Only portions of Monument Pointe Drive are to be constructed under Work Order 3411. Because of this, an outfall to the Ouray Storm Drain is unpractical. Therefore, a small detention basin collects, then discharges the runoff at a controlled release rate.

IV. HYDROLOGY

All basins and subbasins have been analyzed using the "Rational Method" utilizing the City of Albuquerque design standards. Flow rates identified in the Master Drainage Plan are slightly different from those found in this report. Revised versions of Exhibits I and II are included which incorporate these changes. A Summary Table is provided of the hydrologic computations and can be found in the Calculations Section.

V. PROJECT 3411

For processing purposes, the construction of Tract IV, Phase I, and Work Order 3411 (Monument Pointe Drive and the Ladera Channel) have been linked by the infrastructure listing required for preliminary plat approval. The approved infrastructure listing for Tract III also includes items for Project 3411. This has happened due to the scheduling of Tract IV, Phase I, for construction ahead of Tract III. Items related to Project 3411 found on the infrastructure list are identified by notation. Exhibits within this report consider Project 3411 as completed. The Grading and Drainage Plan represents the channel and roadway as existing.

VI. GRADING PLAN

A Grading Plan is provided showing detailed information including spot elevation, existing contours, lot placement, pad size and placement, street grades, and retaining walls. Typical sections are presented which illustrate the grading concepts.

In general, most building pads are 50 feet wide by 60 feet in length. The minimum elevation above the top of curb is 0.5 feet and the maximum is intended to be 2.0 feet for most cases. Maximum grading slopes are 3:1.

IV. CONCLUSION

Tract IV, Phase I of Laurelwood II Subdivision is situated such that there are three drainage outfalls. The majority of the runoff will be directed to the Ladera Channel while the remaining runoff will be directed to the storm drain located in Ouray Road. Both the Ladera Channel and Ouray Storm Drain are designed to accept the developed runoff.

CALCULATIONS

Storm Drain Design
Eyebrow at Anazazi & Kasiiki to Ladera Channel

This system consists of a C.O.A. type "A" drop inlet discharging to the existing concrete lined Ladera channel through a 132.2 foot long 24" RCP on a grade of one percent.

Inlet:

The inlet is in a sump condition. For the sake of analysis, ponding in the street was assumed with 20.5 cfs flow passing through critical depth around the edge of the grate and the length of the side curb opening. This is conservative since critical depth will be closer to the grade break

$$T = \frac{2 \times 25'' + 40''}{12} + 4 = 11.5'$$

$$A = dT \quad \& \quad \frac{A^2}{1} = \frac{Q^2}{gA^2d} = \frac{Q^2}{g \cdot T^2 d^3}$$

$$\therefore d = \sqrt[3]{\frac{Q^2}{gT^2}} = \sqrt[3]{\frac{20.5^2}{32.2 \times 11.5^2}} = 0.46 \text{ ft.}$$

$$A = 11.5 \times .46 = 5.31 \text{ sq ft.} \quad V = 3.86 \text{ fps} \quad h_v = 0.23 \text{ ft.}$$

$$E = 0.46 + 0.23 = 0.69 < 0.9 = \text{T.C.} - \text{T.G.}$$

Connector pipe:

The connector pipe is 132.2 ft. of 24" RCP ($n = 0.013$) on a grade of one percent. The downstream invert is 0.25 ft above the invert of the Ladera channel.

The depth of flow in the channel for the 10-yr. storm may be the controlling elevation of the hydraulic grade line in the connector pipe.

$Q_{10} = 0.657 \times 900 = 591.3$ cfs $\quad S_o = 0.0234$ ft/ft

$y = 1.92$ ft, $A = 26.62$ sq ft $\quad P = 18.56 \quad R = 1.43$

$$Q = \frac{1.486}{n} A R^{2/3} S^{1/2} = \frac{1.486}{.013} \times 26.62 \times 1.43^{2/3} \times .0234^{1/2} = 590.8 \text{ cfs (OK!)}$$

Critical depth in the 24" RCP is 1.62 ft. and normal depth is 1.50 ft. The channel flow is ... above both normal and critical depth. An S-1 profile will try to form; but, ~~the~~ since the channel flow is only 0.05 feet above critical depth, conjugate depth for anything near normal depth is not available and supercritical flow will issue into the

channel before jumping. The flow in the pipe will be an S2 profile with critical depth at the drop inlet.

The invert of the drop inlet is 5227.45, the top of curb is 5231.90 and the top of grate is 5231.00. Critical velocity is 7.52 fps and the velocity head is 0.88 ft. The water surface elevation is:

$$Inv + y_c + 1.2 h_v = 5227.45 + 1.62 + 1.2 \times 0.88 = 5230.13 \text{ ft.}$$

This leaves 0.87 feet for freeboard.

USE [illegible]

ELEV= 5.62 + .5' + 2.9' = 8.92'

SUMMARY OF HYDRAULIC CALCULATIONS

CLOSED CONDUIT

PROJECT: LWCII, TC IV-1

LINE: A Through TK III

BY: [illegible]

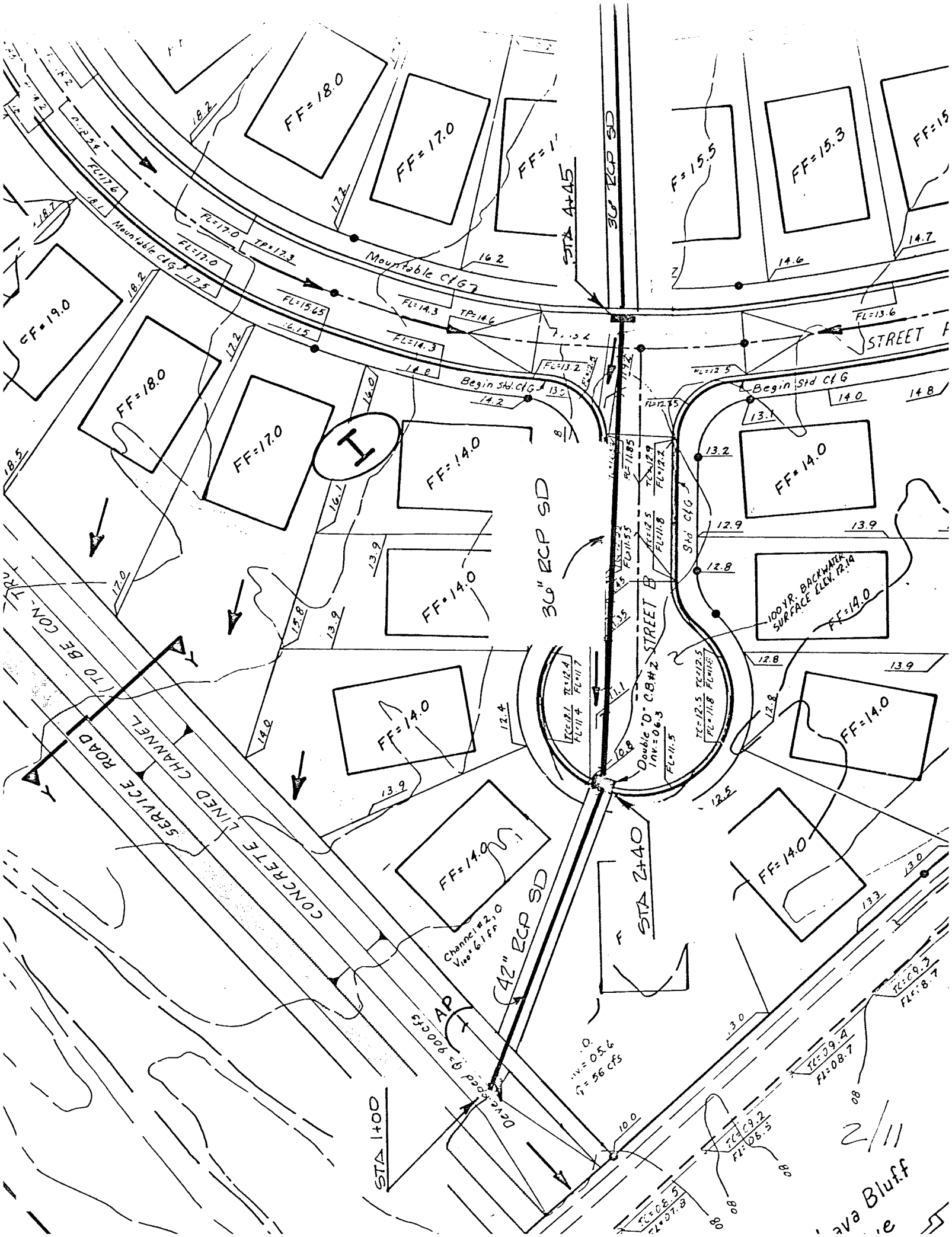
DATE: 6/83

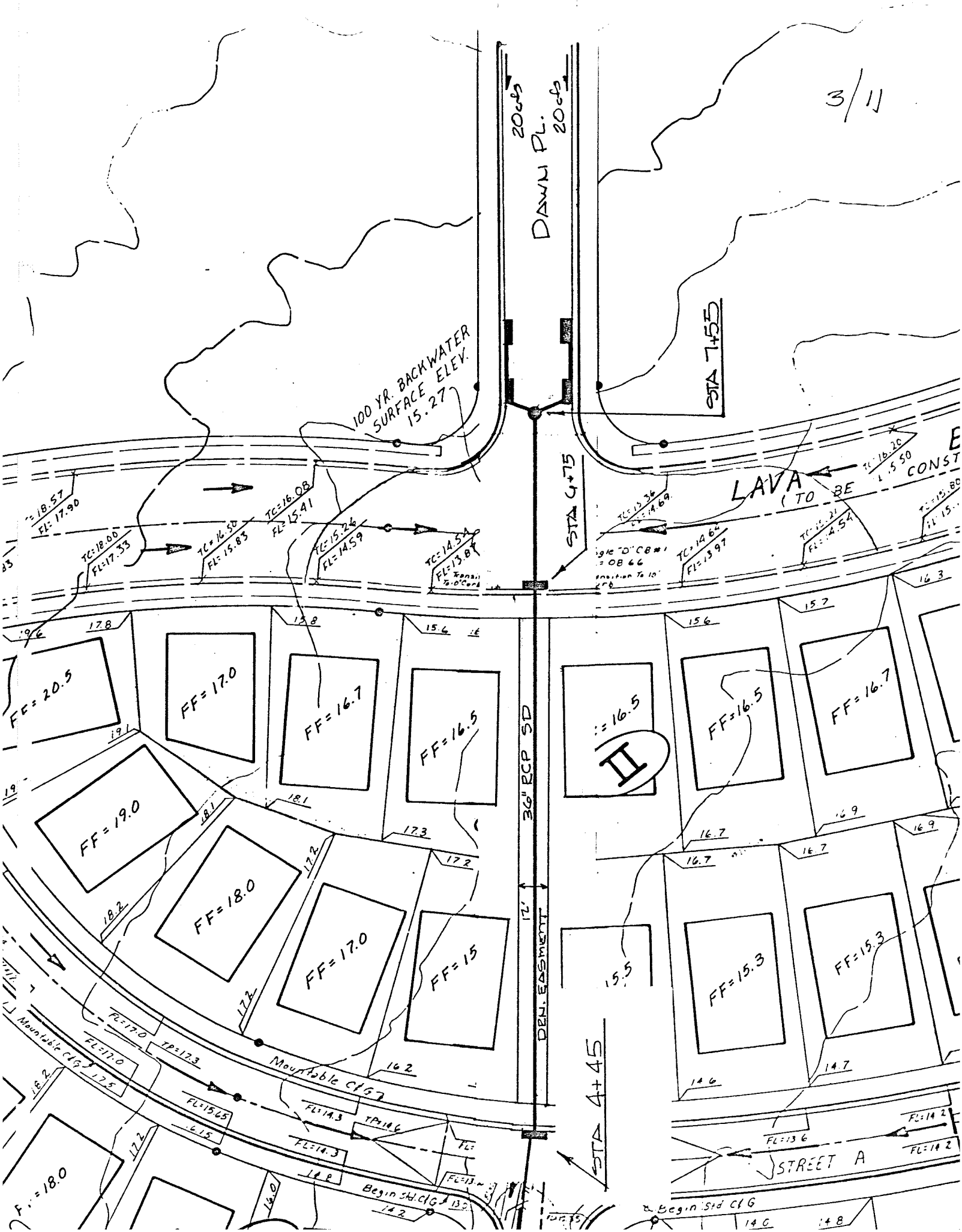
SHEET: 1 OF 11

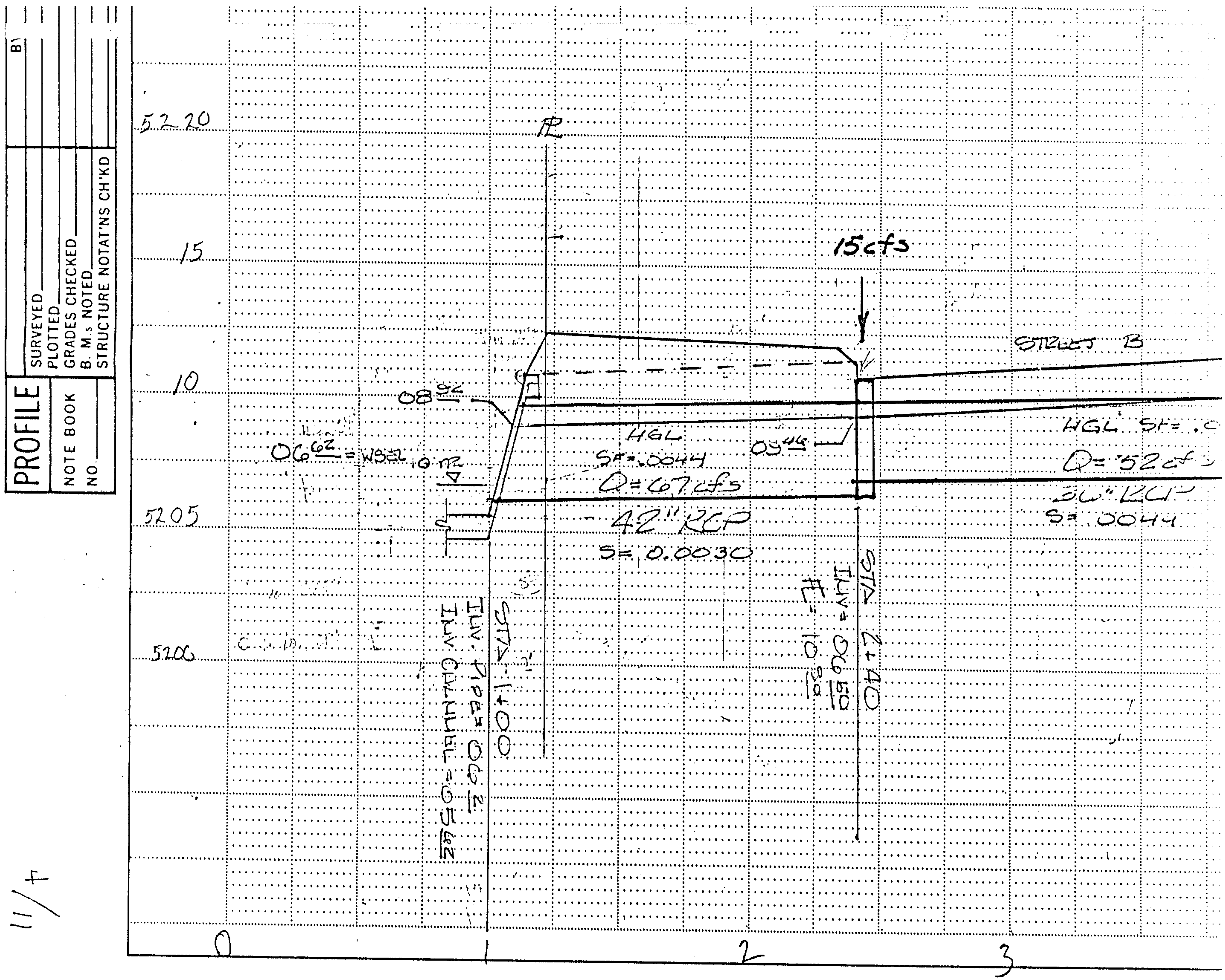
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
										JUNCTION		LOSSES									
STATION	STRUCT	D	Q	A	V	K	S_f	L	Δ	D	θ	h_f	h_b	h_j	h_{mh}	h_t	h_{misc}	Σ	E.G.	h_v	HG
1+00																					
		42	67	9.621	6.96	1006	.0044	100				.44						.44	9.67	.75	08.92
2+40	CS										20°		.07		.02	.01		.10	10.11	.75	09.36
		36	52	7.068	7.36	666.9	.0081	205				1.25						1.25	10.21	.75	09.46
4+45	CS										5°		.04		.02			.06	11.46	.84	10.62
		36	44	7.068	6.2[illegible]	666.9	.0044	250				1.01						1.01	11.52	.84	10.6[illegible]
5+75	CS										8°		.04		.01			.05	12.53	.60	11.93
		36	40	7.0[illegible]	5.65	666.9	.0036	80				.29						.29	12.58	.60	11.98
7+55	MH										45°		.04		.01		.25	.30	12.87	.50	12.37
		24"	18	3.14	5.73	226.2	.0063	17.5				.08					.04	.12	13.17	.51	12.66
7+77.5	DI	type "B"															.15	.15	13.29	.76	12.53
		24"	8	2.69	2.97	221.9	.0013	24				.03						.03	13.44	—	13.44
8+05	DI	type "A"															.05	.05	13.47	.23	13.24
																			13.52	0	13.52

REMARKS:

MANNING'S n: 0.013


FF=18.0
FF=17.0
FF=15.3
FF=19.0
FF=14.0
30" RCP SD
STA 44+45
Mountable C/G
Begin Std C/G
STREET
100 YR. BACKWATER SURFACE ELEV. 12.19
Double "D" C.B.#2
42" RCP SD
STA 24+40
STA 14+00
SERVICE ROAD
CONCRETE LINED CHANNEL
TO BE CON.
Channel #2,0
Q100 = 61 cfs
Q = 56 cfs
AP
Q = 900 cfs
Bluff


3/11
20ds
DAWN PL.
20ds
STA 7+55
100 YR. BACKWATER SURFACE ELEV. 15.27
STA 6+75
LAVA
TO BE
CONST
TC=18.57
FL=17.90
TC=18.00
FL=17.33
TC=16.30
FL=15.83
TC=16.08
FL=15.41
TC=15.26
FL=14.59
TC=14.54
FL=13.8
TC=13.36
FL=14.69
TC=14.64
FL=13.97
TC=15.21
FL=14.54
TC=16.20
FL=15.50
FF=20.5
FF=17.0
FF=16.7
FF=16.5
FF=19.0
FF=18.0
FF=17.0
FF=15
FF=16.5
FF=16.7
FF=15.3
FF=15.3
36" RCP SD
DEN. EASEMENT
12'
STA 4+45
Mountable C/G
Begin Std C/G
STREET A
Begin Std C/G


PROFILE
NOTE BOOK
NO.
SURVEYED
PLOTTED
GRADES CHECKED
B. M.s NOTED
STRUCTURE NOTAT'NS CH'KD
5220
15
10
5205
5200
0
1
2
3
15cfs
STREET B
HGL Sf=.0044
Q=67cfs
42" RCP
S=0.0030
HGL Sf=.0
Q=52cfs
36" RCP
S=.0044
08.92
09.44
06.62 = WSEL
STA 1+00
INV. PIPE = 06.12
INV CHANNEL = 05.62
STA 2+40
INV = 06.50
FL = 10.30
11/4

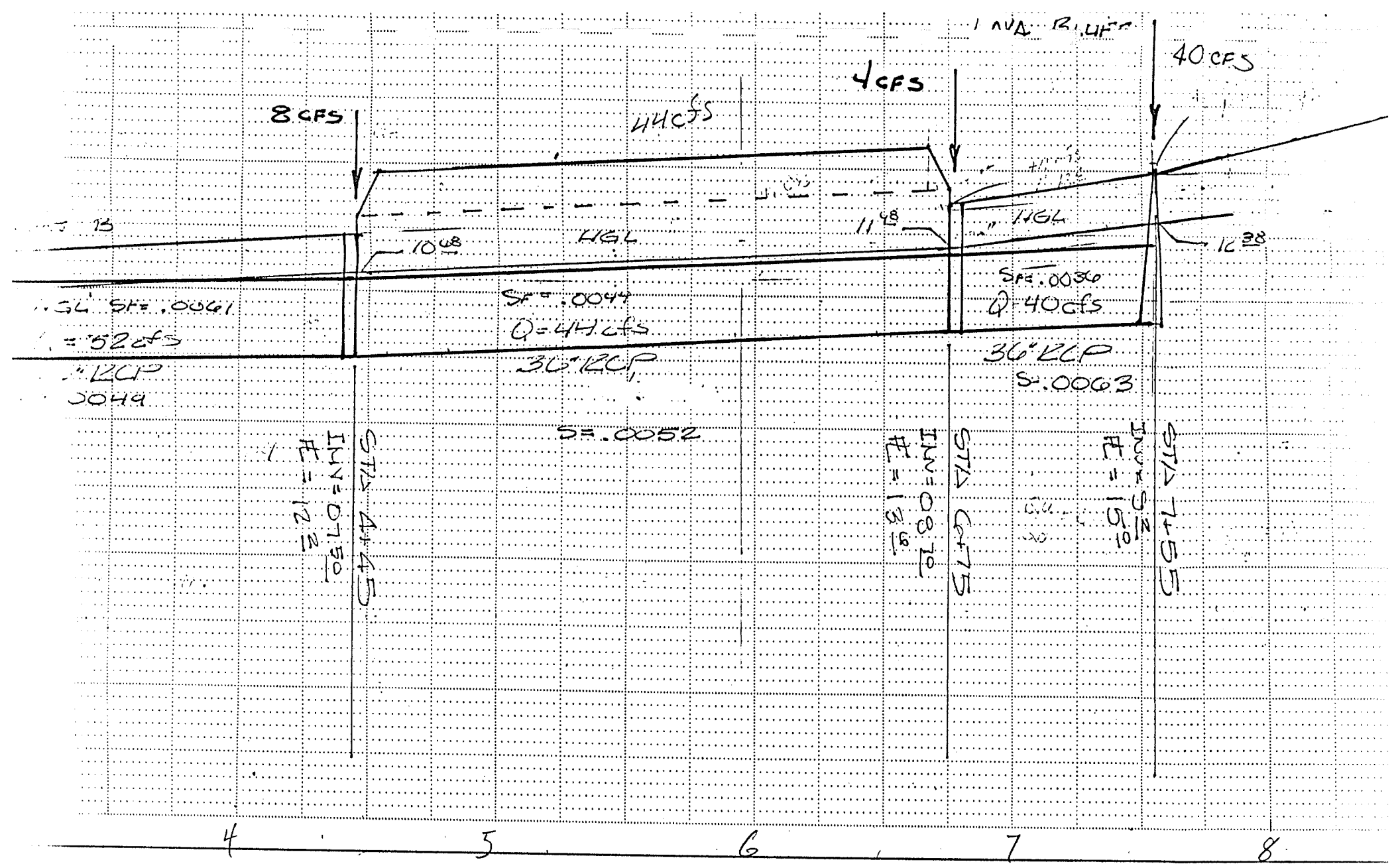
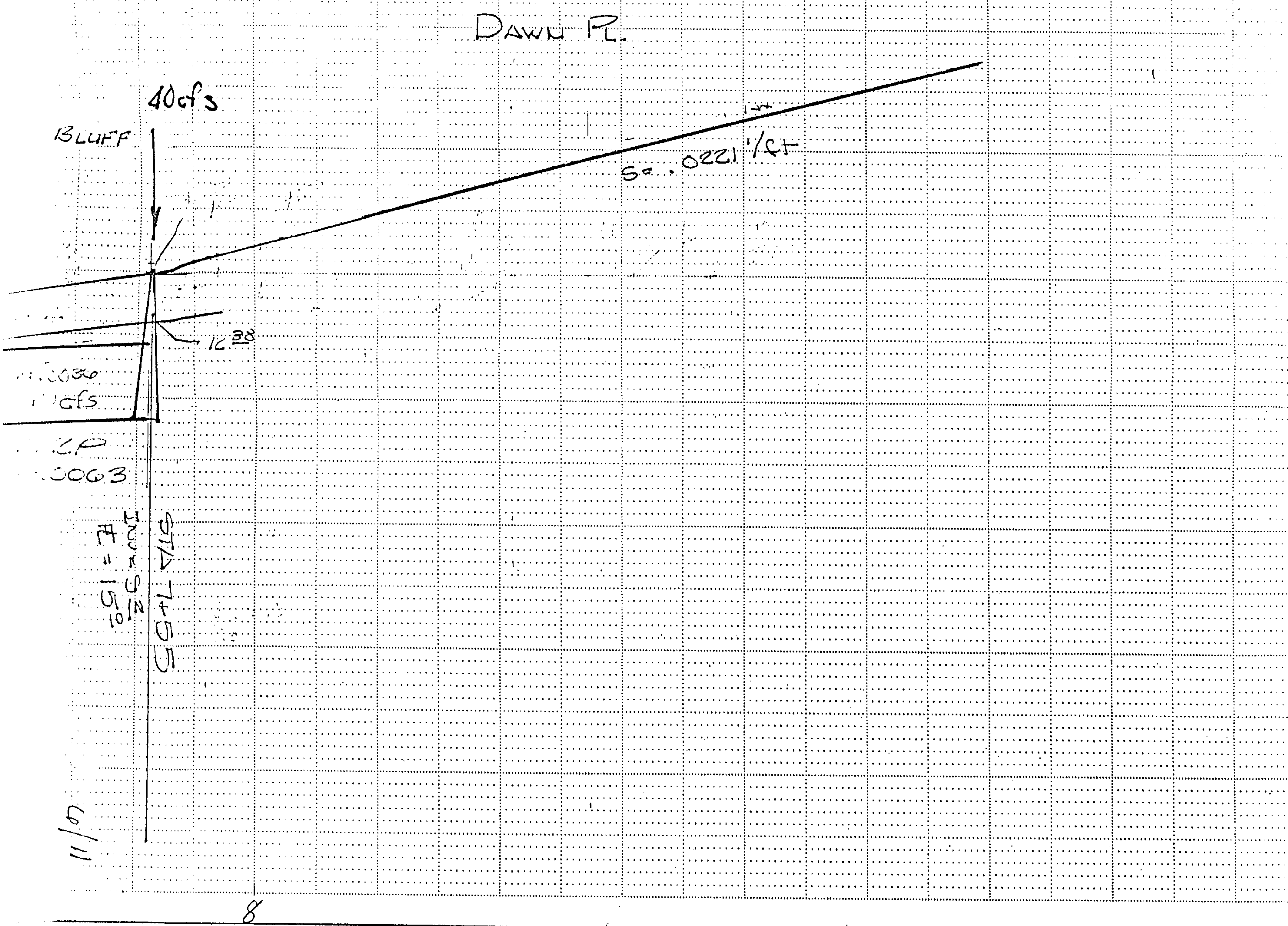


PLATE 1 SINGLE PLAN - PROFILE -

CHARLES BRUNING COMPANY

MADE IN U.S.A.

11/61



DAWN PL.
40cfs
BLUFF
S= .0221 '/ft
IE 38
.0030
cfs
.0063
STA 7+55
INV = 9.2
= 15.0
8
6/11

FRED DENNEY & ASSOCIATES, INC.
2400 Comanche Road, NE
Albuquerque, New Mexico 87107

LOCATION _____

PROJ. NO. 9041.11

DATE 12/88

DESIGNER RLB

PAGE ~~8~~ 7/11

SOLVE FOR Allowable Min Slope @ ½ depth flow.

MIN. Vel = 3 ft/sec.

$Q = \frac{1.486}{n} A R_H^{2/3} S^{1/2}$

$V = \frac{1.486}{n} R_H^{2/3} S^{1/2}$

D = depth = .75 ft

d = DIA = 3 ft

$\frac{D}{d} = .25$

$\frac{R_H}{d} = .1466$ $R_H = .1466 \times d =$
$\times .4398$

n = .013

V = 3 ft/sec

$3 = \frac{1.486}{.013} (.4398)^{2/3} S^{1/2}$

$.0454 = S^{1/2}$

$S = .0059$ ft/ft

$S = .0021$ ft/ft

LEVELWASTE FOR 42" PIPE

$\frac{R_H}{d} = .1464$ $R_H = .1464 \times 3.5$
$= .5131$

$S = .0017$ ft/ft

FRED DENNEY & ASSOCIATES, INC.
2400 Comanche Road, NE
Albuquerque, New Mexico 87107

LOCATION _____

PROJ. NO. _____

DATE 12/88

DESIGNER RLB

PAGE ~~3~~ 8/11

CHECK MIN. 10 MIN FLOW VELOCITY

42" CULVERT Q= 67 cfs x .657 = 44 cfs

es= .0017 [d > dia, pressure flow]

Q/A = V= 4.57 fps > 3 fps [ok]

36" CULVERT Q/A = 40/7.068 = 5.66

Q10/A = 40 x .657 / 7.068 = 3.72 fps [ok]

Inlets in Dawn Place

9/11

Interim hydraulics

The water surface elevation in the existing temporary earthen channel is 5209.1 ft. This is only 0.5 feet above the invert of the outlet of the 36" RCP storm drain, which was designed to be a part of a future storm drain flowing under pressure. Hence, the water levels in this portion will be no higher than in the future condition.

The inlet design is summarized on the following sheets.

CATCH BASIN CALCULATION SHEET

Sht ___ of 11

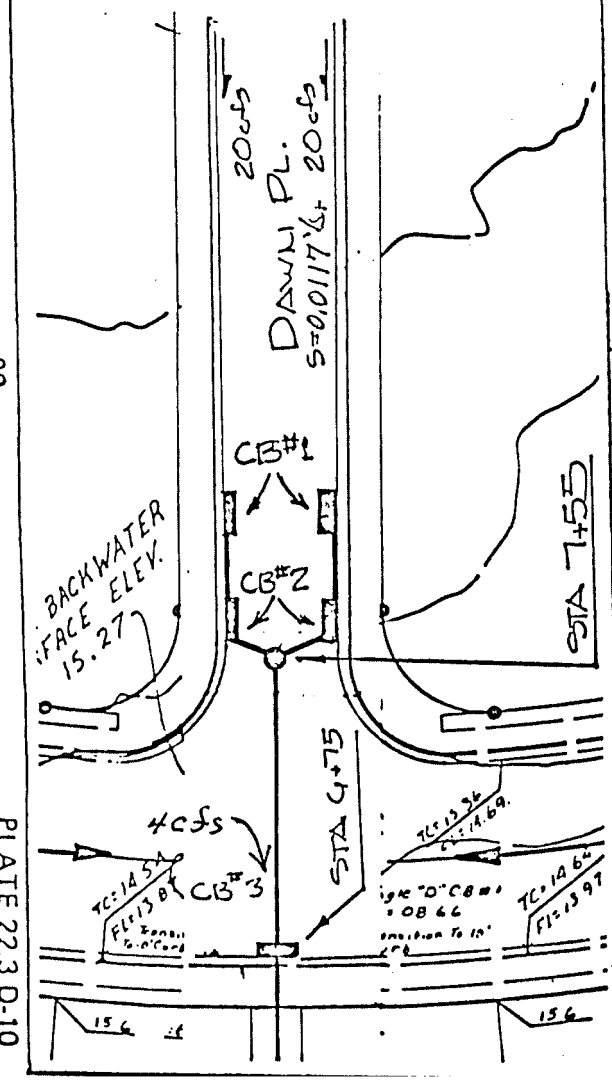
PROJECT TR IV PH 1

DESIGN FREQUENCY 100 YR

CALCULATED BY GD & JC

DATE 3/89

FLOW DIAGRAM
(Indicate street slopes)



	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
CB#1	20	8		0.53'	1	grate "A"	0.08'	17.5'	24"	3.91'
CB#2	12	10		0.46'		2 grate "B"	0.78' TOTAL	24' INT. =	24" 18cfs	4.59'
		2		REM. UNDER		TO	BYBASS TO	CB#	3	
CB #3	8cfs	8								

4-82

80

PLATE 22.3 D-10

10/11

22.3

FRED DENNEY & ASSOCIATES, INC.
2400 Comanche Road, NE
Albuquerque, New Mexico 87107

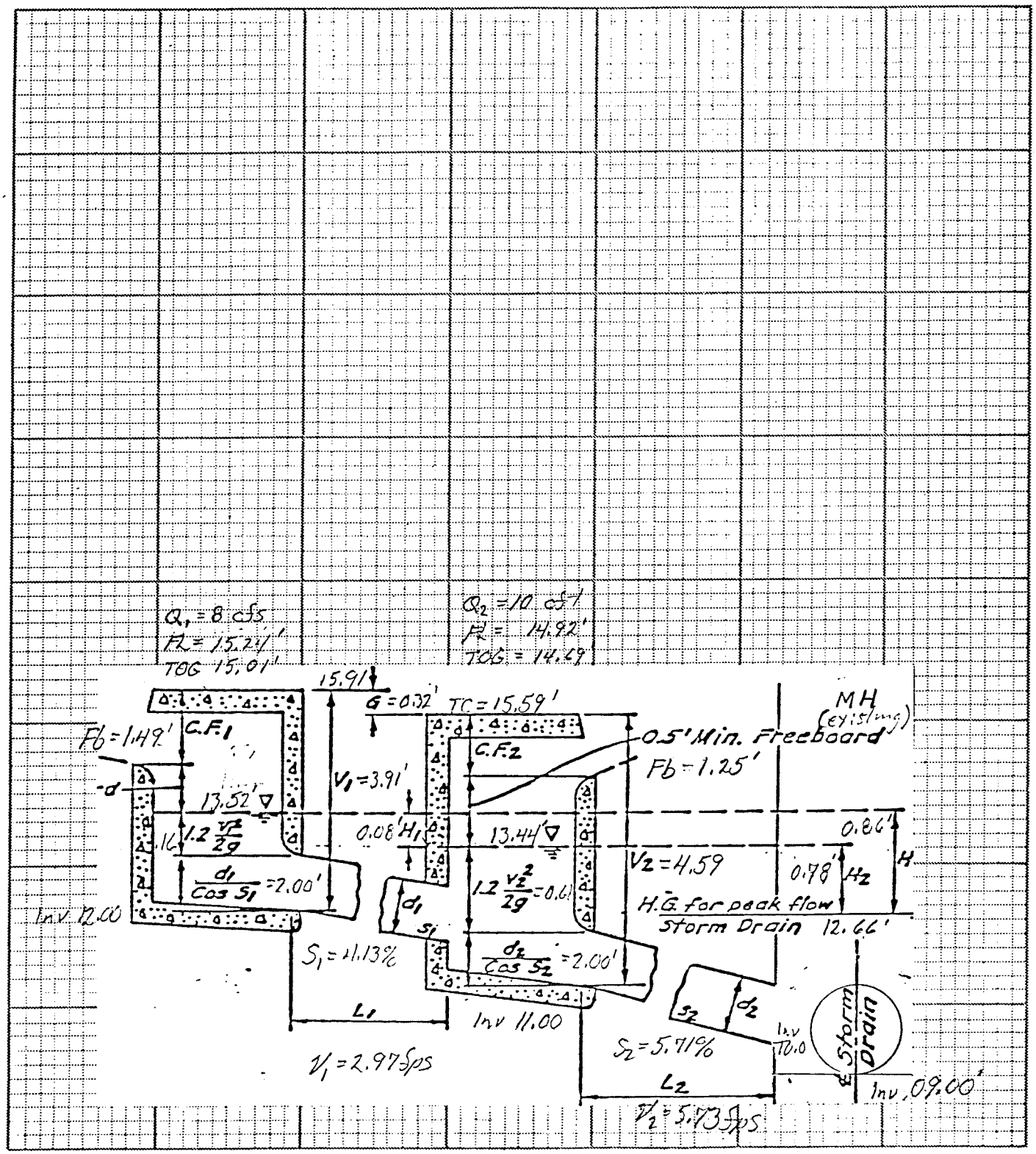
LOCATION Tr IV Ph 1

PROJ. NO. 964.41

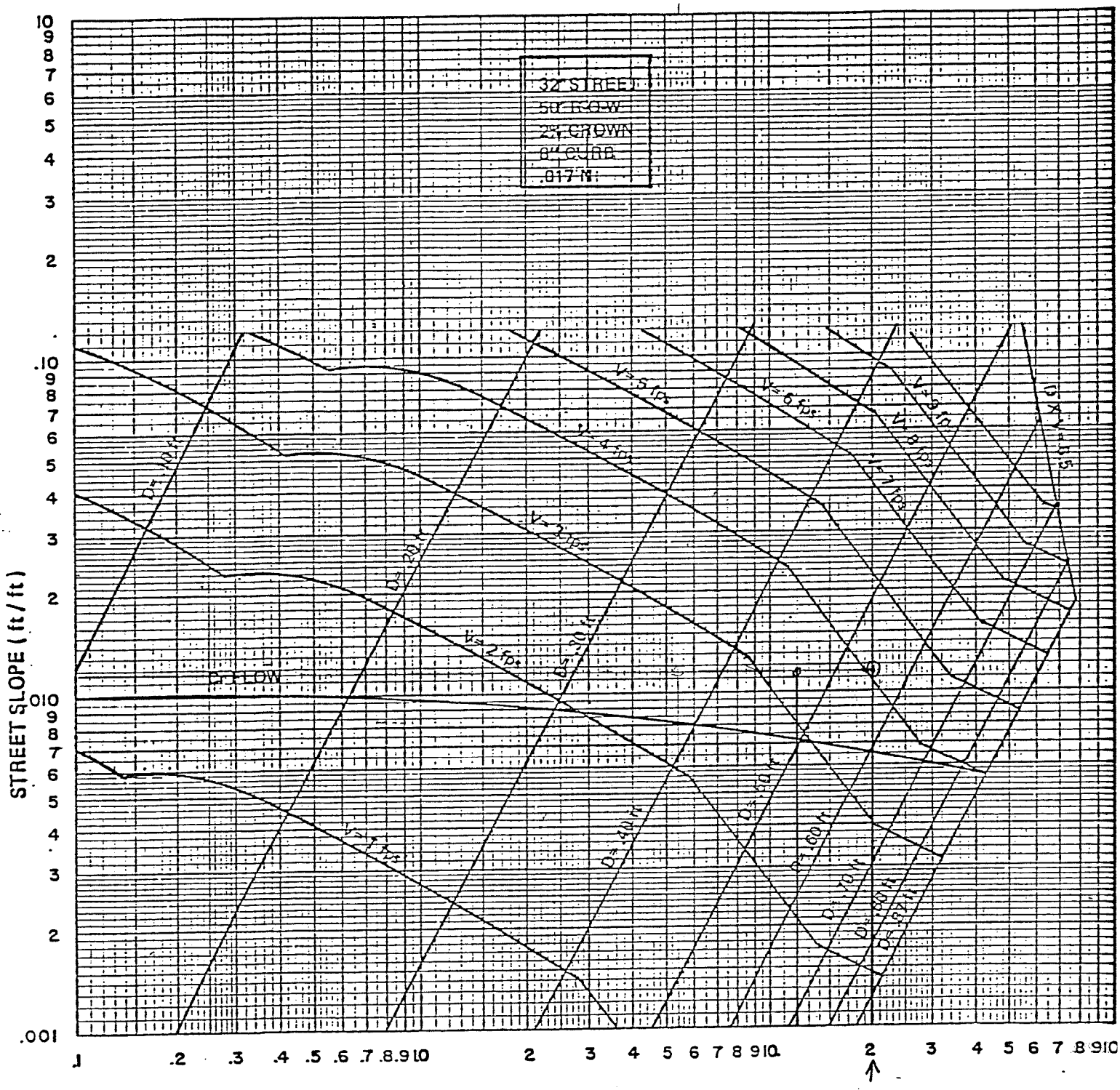
DATE 3/89

DESIGNER JC

PAGE 11/11



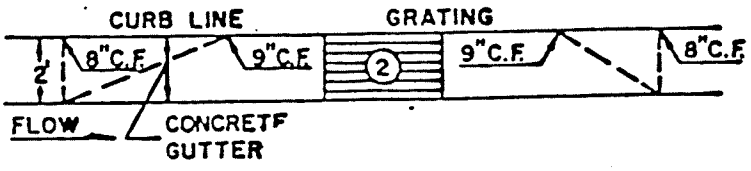
STREET CAPACITY



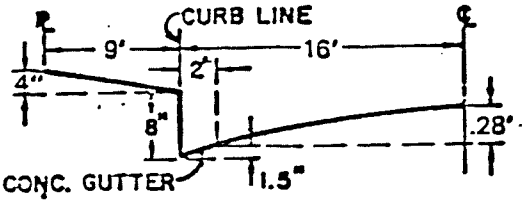
REV. 3-83

PLATE 22.3 D-1

GRATING CAPACITIES FOR TYPE "A", "C" and "D"

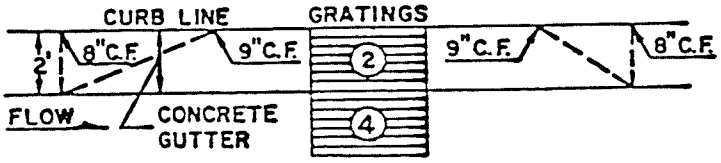


GRATING & GUTTER PLAN

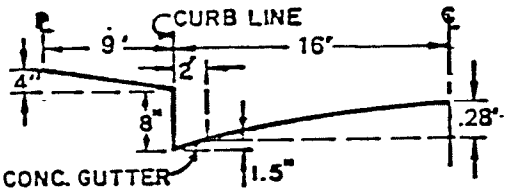


TYPICAL HALF STREET SECTION
(ABOVE BASIN)

GRATING CAPACITIES FOR TYPE "B"



GRATING & GUTTER PLAN



TYPICAL HALF STREET SECTION
(ABOVE BASIN)

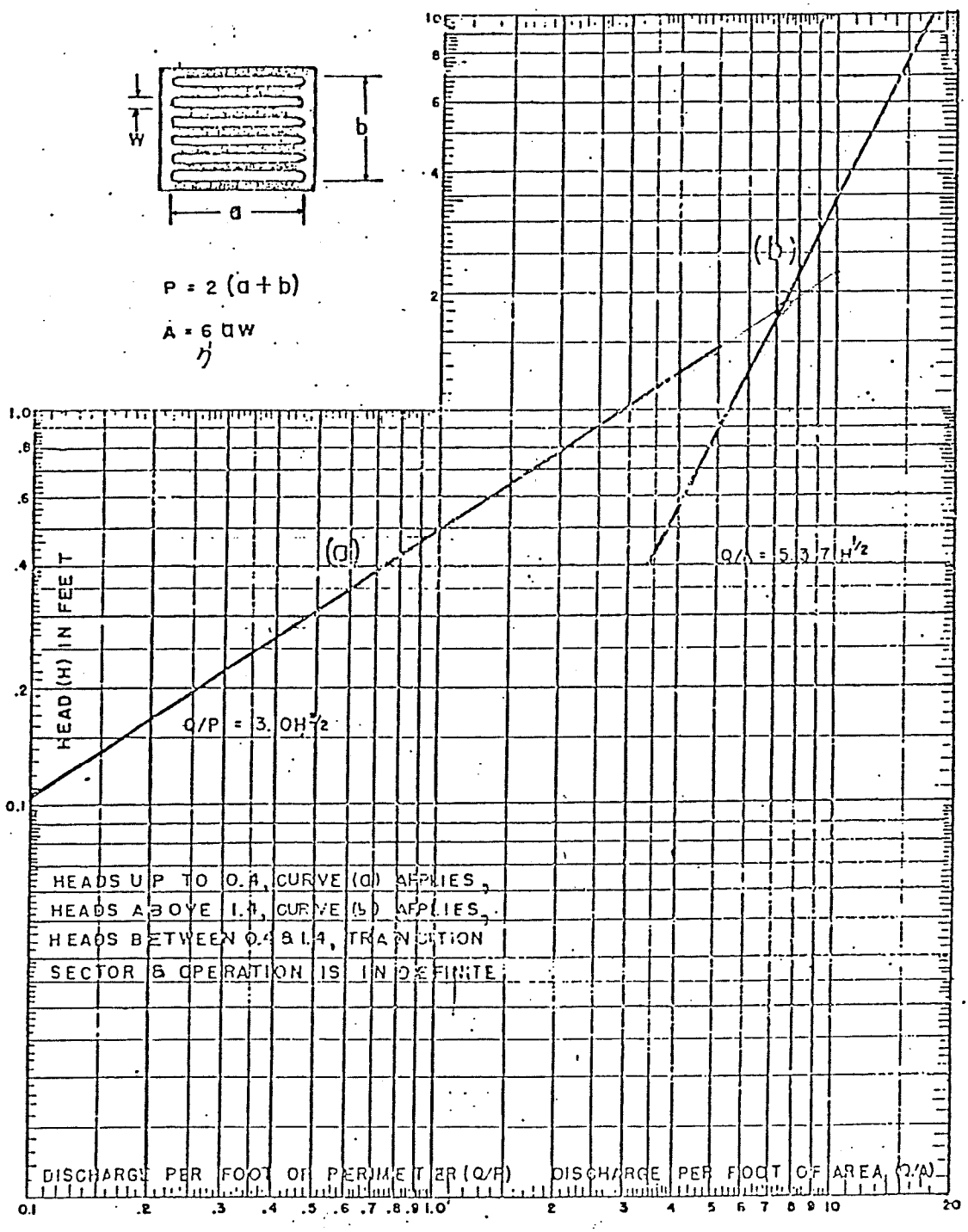
11/11

CB#3

$Q_{100} = 12.8$ cfs MAX DEPTH = .67 ft

TRY 2 TYPE "S" $P = \frac{2(24") + 2(39")}{12} = 10.5$ ft $\left(\frac{12.8 \text{ cfs}}{10.5' \times 3.0}\right)^{2/3} = 0.56' = 1$ ft [ok]

FIGURE 7



CAPACITY OF GRATE INLET IN SUMP
WATER PONDED ON GRATE

FRED DENNEY & ASSOCIATES, INC.
2400 Comanche Road, NE
Albuquerque, New Mexico 87107

LOCATION _____

PROJ. NO. _____

DATE _____

DESIGNER _____

PAGE _____

Basin ⑥ Interim Swale

Grade Swale from Shawnee Place to Amazazi Place

$L = 670$ ft $S = 0.0319$ ft/ft

Design Q AP1

$A = 5.2$ ac $I = 4.65$ $C = .71 \times .65 + .4 \times .35 = .60$

$Q = 5.2 \times 4.65 \times .60 = 14.5$ cfs

Use $B = 5$ ft. $S = .0319$ $SS = 3:1$ $N = .025$ soil cement

$y = 0.45$ ft. $V = 5.41$ fps

$T = 6y + 5 = 7.70$ ft

$$F^2 = \frac{Q^2 T}{g A^3} = \frac{14.5^2 \times 7.70'}{32.2 \times 2.86^3} = 2.15$$

$F = 1.47 > 1.3$

∴ Flow is strongly supercritical!

FRED DENNEY & ASSOCIATES, INC.
2400 Comanche Road, NE
Albuquerque, New Mexico 87107

LOCATION _____

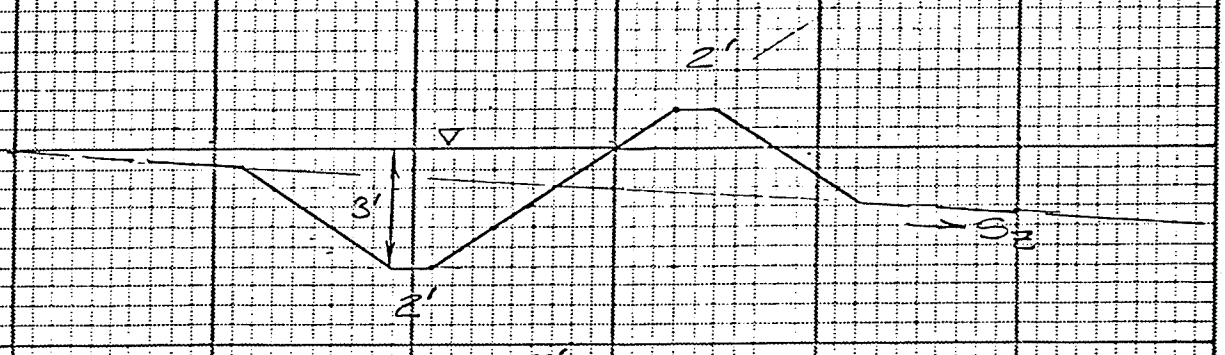
PROJ. NO. _____

DATE 12/88

DESIGNER RLB

PAGE 2/2

DIVERSION BERM



$n = .030$ EARTH LINED

$S_x = 0.3\%$ Channel Slope

$S_2 = 33\%$ Cross Slope

FREEBOARD = 1 ft

$Q_{DESIGN} = 45\,ac \times .4 \times 4.65^{cfs}/_{ac} = 84\,cfs$

$d = 2.9$ ft $A = 3.03\,ft^2$

$V = 2.71\,FPS < 3$ [OK]

BERM DISCHARGE = 170 cfs $A = 56\,ft^2$

$d = 4.0$ ft $V = 3.03\,FPS$

EXHIBITS

OFFSITE BASINS
SUMMARY TABLE

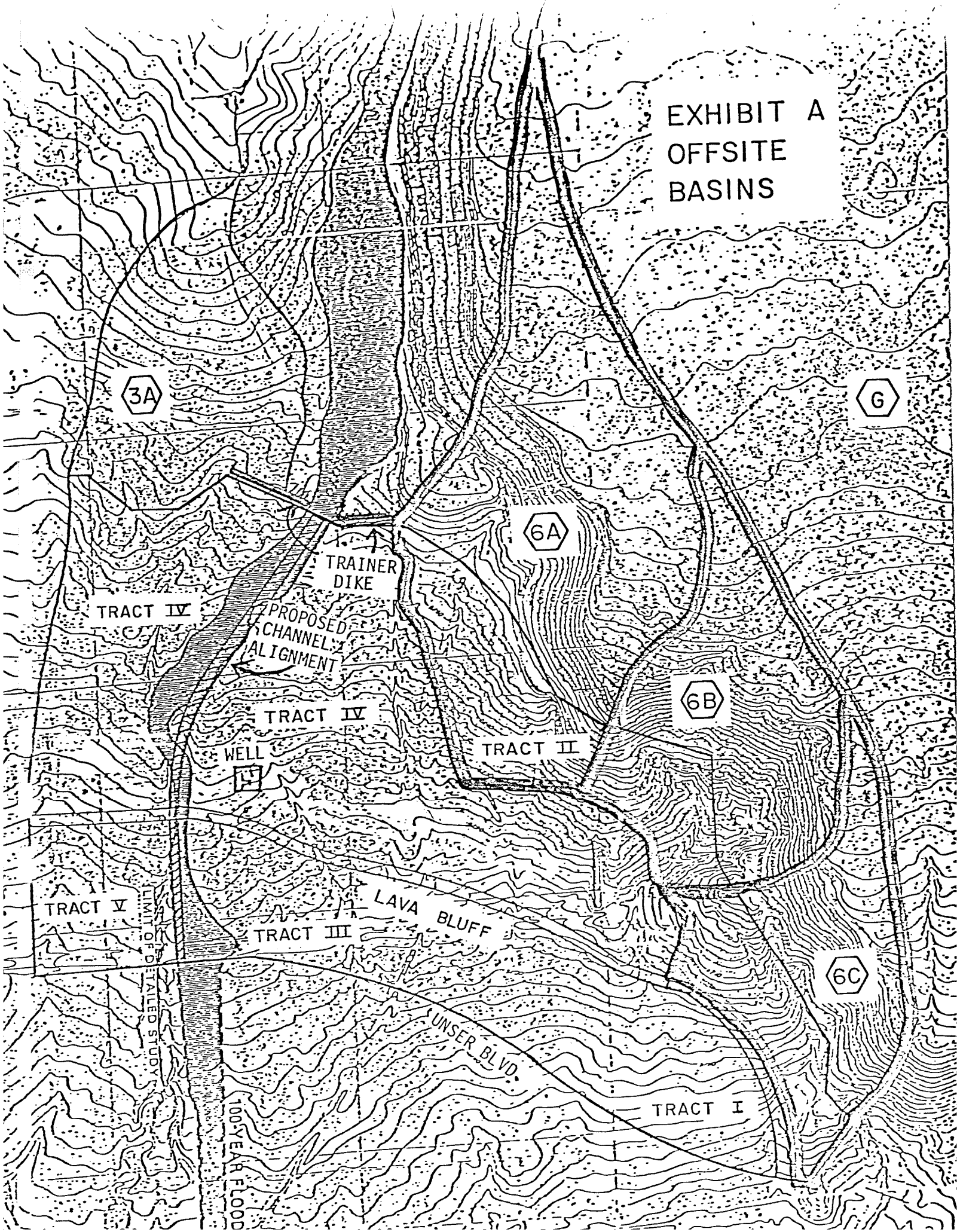


EXHIBIT A
OFFSITE
BASINS
3A
G
6A
6B
6C
TRAINER
DIKE
PROPOSED
CHANNEL
ALIGNMENT
TRACT IV
TRACT IV
WELL
TRACT II
TRACT V
LIMIT OF
FAILED STUDY
LAVA BLUFF
TRACT III
UNSER BLVD.
TRACT I
100-YEAR FLOOD

88101448

TEMPORARY DRAINAGE EASEMENT

This grant of Easement, between: Westland Development Co., Inc., a New Mexico corporation ("Grantor"), whose address is 401 Coors Boulevard NW, Albuquerque, New Mexico 87105 and Laurelwood II Joint Venture, a joint venture, ("Grantee"), whose address is 2400 Comanche Road NE, Albuquerque, New Mexico 87107, is made in Albuquerque, Bernalillo County, New Mexico and is entered into as of the date Grantor signs this Easement.

1. Recital. Grantor is the owner of certain unplatted real property located adjacent to the West Boundary of Laurelwood II Subdivision in Bernalillo County, New Mexico (the "Property").

2. Grant of Easement. The Grantor grants to the Grantee a temporary easement ("Easement") in, over, upon and across the Property for: Drainage Facilities. The Easement is more particularly described in the attached Exhibit "A" and is illustrated on the attached Exhibit "B".

The grant of the Easement includes the right of the Grantee to enter upon the Easement at any time for inspection, installation, maintenance, repair or modification to its drainage facilities and the right to remove trees, bushes, undergrowth and any other obstacles if the Grantee determines they interfere with the appropriate use of the Easement for its drainage facilities.

3. Binding on Grantor's Property. The grant and other provisions of this Easement constitute covenants running with the land for the benefit of the Grantee and its successors and assigns.

4. Indemnification. As a part of the consideration for this grant, the Grantee agrees to save Grantor harmless from any and all liability arising from the Grantee's negligent use of the Easement for the purposes set forth herein. The Grantee does not agree to save Grantor harmless from any liability which may arise from Grantor's use of the easement and the Property.

5. This grant of Easement shall be relinquished by the Grantee at that point in time when the Grantor and Grantee both agree that the Easement is no longer needed or when the City of Albuquerque no longer requires said Easement.

6. This Easement shall extend to and bind the heirs personal representatives and assigns of each of the parties and shall inure to the benefit of all successors, transferees and assigns of the parties.

GRANTEE:

LAURELWOOD II JOINT VENTURE

By: Skip Buchanan

Title: MANAGING PARTNER
Dated: 9/26/88

GRANTOR:

WESTLAND DEVELOPMENT CO., INC.

By: Gil E. Cordova
Gil Cordova
Its President and C.E.O.
Dated: 9/13/88

STATE OF NEW MEXICO)
) ss.
COUNTY OF BERNALILLO)

The foregoing instrument was acknowledged before me this 13th day of September, 1988, by Gil Cordova, President, of Westland Development Co., Inc., a New Mexico corporation, on behalf of said corporation.

Veronica Herrera
NOTARY PUBLIC

My Commission Expires:

8/2/92

STATE OF NEW MEXICO)
) ss.
COUNTY OF BERNALILLO)

The foregoing instrument was acknowledged before me this 26th day of September, 1988, by SKIP BUCHANAN, MANAGING PARTNER, of LAURELWOOD II JOINT VENTURE a New Mexico joint venture, on behalf of said joint venture.

Janet Garland
NOTARY PUBLIC

My Commission Expires:

3-14-92

August 22, 1988

EXHIBIT "A"

329

That certain parcel of land situate within projected Section 9, Township 10 North, Range 2 East of the New Mexico Principal Meridian; lying within the Town of Atrisco Land Grant, Bernalillo County, New Mexico; and being more particularly described as follows:

BEGINNING at a point on the west boundary of the parcel of land shown on the plat entitled "Plat of Laurelwood II Subdivision", as filed for public record with the Office of the Bernalillo County Clerk on February 11, 1988, in Volume C35, Folio 170; whence, the southwest corner of said Laurelwood II Subdivision bears S 16° 44' 13" W, 860.36 feet; and whence, the New Mexico State Highway Commission/Albuquerque City Survey monument "I40-19" bears S 27° 47' 01" E, 7039.36 feet;

Thence, N 54° 18' 19" W, 65.00 feet leaving said west boundary;

Thence, N 08° 45' 00" E, 290.00 feet;

Thence, N 39° 31' 37" E, 315.82 feet;

Thence, S 57° 22' 44" E, 30.00 feet to said west boundary;

Thence, following said west boundary for the remaining three (3) courses:

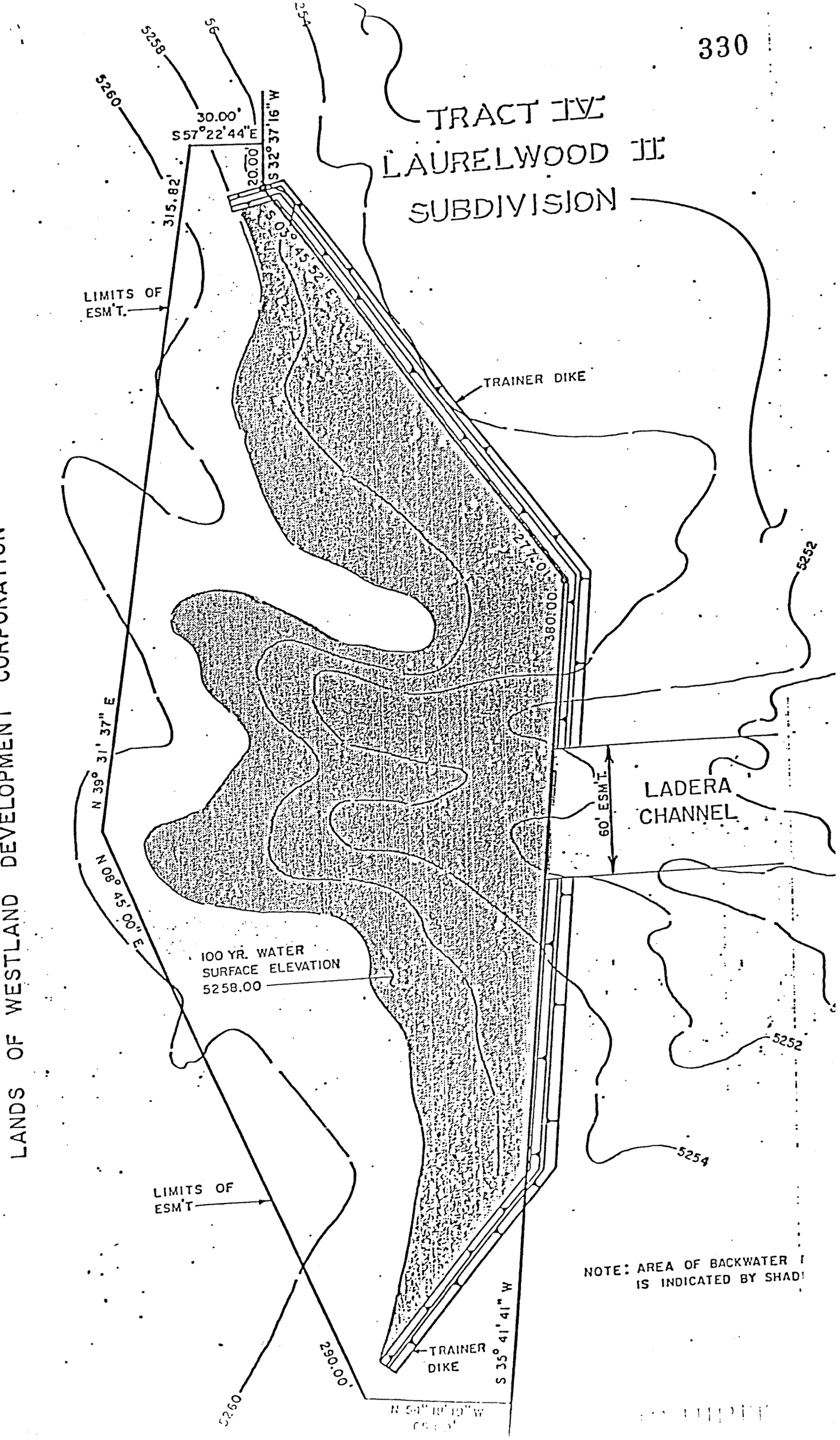
S 32° 37' 16" W, 20.00 feet;

Thence, S 03° 45' 52" E, 227.01 feet;

Thence, S 35° 41' 41" W, 380.00 feet to the POINT OF BEGINNING of the parcel of land herein described.

The above delineated parcel of land contains 1.7695 acres, more or less.

STATE OF NEW MEXICO
COUNTY OF BERNALILLO
FILED FOR RECORD
88 NOV 10 PM 4:20
M568A PG 327330
GLADYS M. DAVIS
COUNTY CLERK


TRACT IV
LAURELWOOD II
SUBDIVISION
LANDS OF WESTLAND DEVELOPMENT CORPORATION
5260
5258
5256
5254
30.00'
S 57° 22' 44" E
S 32° 37' 16" W
20.00'
315.82'
S 03° 45' 52" E
LIMITS OF ESM'T.
TRAINER DIKE
217.00'
380.00'
5252
N 39° 31' 37" E
N 08° 45' 00" E
60' ESM'T.
LADERA CHANNEL
100 YR. WATER SURFACE ELEVATION 5258.00
5252
5254
LIMITS OF ESM'T
290.00'
5260
S 35° 41' 41" W
TRAINER DIKE
N 54° 18' 19" W
NOTE: AREA OF BACKWATER
IS INDICATED BY SHAD

D.R.B. Case No. 88-349
D.R.C. Project No.
Date Submitted 12/16/88

FIGURE 11

EXHIBIT "D"
to Subdivision Improvements Agreement

DEVELOPMENT REVIEW BOARD (D.R.B.)
REQUIRED INFRASTRUCTURE LISTING

for Monument Pointe

Following is a summary of Public/Private Infrastructure required to be constructed or financially guaranteed to be constructed for the above development.

	Size	*Type Improvement	Location	From	To
	32'	Residential Pavement	Dawn Place	Lava Bluff Drive	Anazazi Street
	32'	Residential Pavement	Anazazi Street	Kasiiki Road	North End of Anazazi Street
	32'	Residential Pavement	Quivira Place	Kasiiki Road	North End of Quivira Place
	32'	Residential Pavement	Shuwimi Court	Kasiiki Road	North End of Shuwimi Court
	32'	Residential Pavement	Kasiiki Road	Anazazi Street	Cul-De-Sac
[1]	52'	Residential Pavement	Lava Bluff Drive	98th Street	North End of Block 7
[1]		Left Turn Bay	98th Street	98th Street	Lava Bluff Drive

Prepared by: Rick Beltramo
Print Name: Rick Beltramo
Firm: Fred Denney & Assoc., Inc.

****

Development Review Board Member Approvals

Traffic Date

WUD Date

Parks & Rec. Date

City Engineer/AMAFCA Date

DRB Chairman Date

FIGURE 11
(CONTINUED)

	Size	*Type Improvement	Location	From	To
	40' Radius	Temporary 2" Asphalt Surface Turnaround	North End of Anazazi Street		
	40' Radius	Temporary 2" Asphalt Surface Turnaround	North End of Quivira Place		
	40' Radius	Temporary 2" Asphalt Surface Turnaround	North End of Shuwimi Court		
[1]	40' Radius	Temporary 2" Asphalt Surface Turnaround	North End of Lava Bluff Drive		
	32'	Curb, Gutter, and 4' Sidewalk	Dawn Place	Lava Bluff Drive	Anazazi Street
	32'	Curb, Gutter, and 4' Sidewalk	Anazazi Street	Kasiiki Road	North End of Anazazi Street
	32'	Curb, Gutter, and 4' Sidewalk	Quivira Place	Kasiiki Road	North End of Quivira Place
	32'	Curb, Gutter, and 4' Sidewalk	Shuwimi Court	Kasiiki Road	North End of Shuwimi Court
	32'	Curb, Gutter, and 4' Sidewalk	Kasiiki Road	Anazazi Street	Cul-De-Sac
	52'	Curb, Gutter, and 4' Sidewalk	Lava Bluff Drive	98th Street	North End of Block 7
[1]	____	Curb and Gutter	Left Turn Bay on 98th Street	98th Street	Lava Bluff Drive
	8"	Asphalt Curb	North End of Anazazi Street		
	8"	Asphalt Curb	North End of Quivira Place		
[1]	8"	Asphalt Curb	North End of Shuwimi Court		
	8"	Asphalt Curb	North End of Lava Bluff Drive		

FIGURE 11
(CONTINUED)

	Size	*Type Improvement	Location	From	To
	24'	Graded Emergency Access Road	Tract IV-C	Quivira Place Turnaround	Anazazi Street Turnaround
	24'	Graded Emergency Access Road	Tract IV-C	Anazazi Street Turnaround	Lava Bluff Drive Turnaround
		STREET LIGHTS (NOT FINANCIALLY GUARANTEED)			
	8"	Waterline	Dawn Place	Lava Bluff Drive	Anazazi Street
	6"	Waterline	Anazazi Street	Kasiiki Road	Dawn Place
	8"	Waterline	Anazazi Street	Dawn Place	North End of Anazazi Street
	6"	Waterline	Quivira Place	Kasiiki Road	North End of Quivira Place
	6"	Waterline	Shuwimi Court	Kasiiki Road	North End of Shuwimi Court
	6"	Waterline	Kasiiki Road	Anazazi Street	Cul-De-Sac
[1]	8"	Waterline	Lava Bluff Drive	98th Street	Ouray Road
	8"	Sanitary Sewer	Dawn Place	Lava Bluff Drive	Anazazi Street
	8"	Sanitary Sewer	Anazazi Street	Kasiiki Road	North End of Anazazi Street
	8"	Sanitary Sewer	Quivira Place	Kasiiki Road	North End of Quivira Place
	8"	Sanitary Sewer	Shuwimi Court	Kasiiki Road	North End of Shuwimi Court
	8"	Sanitary Sewer	Kasiiki Road	Anazazi Street	Cul-De-Sac
[1]	8"	Sanitary Sewer	Lava Bluff Drive	350' North of 98th Street	Ouray Road
[2]	6"	Temporary, Phased Waterline	Tract IV-C	Quivira Place Turnaround	Anazazi Street Turnaround
[2]	6"	Temporary, Phased Waterline	Tract IV-C	Anazazi Street Turnaround	Lava Bluff Drive Turnaround

MANHOLES, VALVES & FIRE HYDRANTS AS PER CITY CITY REQUIREMENTS

FIGURE 11
(CONTINUED)

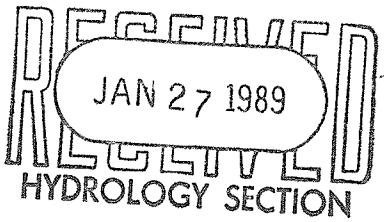
	Size	*Type Improvement	Location	From	To
	10'	Concrete Drainage Channel	12' Drainage ROW	Anazazi Street	60' Drainage ROW
[1]	12'	Service Road	60' Drainage ROW	West Property Line of Tract IV	Unser Boulevard
[1]	10'	Concrete-Lined Channel with Appurtenances	60' Drainage ROW	West Property Line of Tract IV	Unser Boulevard
[1]	92'	Concrete Box Culvert	Ladera Channel	West ROW of Lava Bluff Drive	East ROW of Lava Bluff Drive
[1]	___	Soil Cement Trainer Dike	Along Western Boundary of Tract IV		
[1]	12"	Well Drain	Outfall	Well House on Tract IV	Ladera Channel
	12'	Interim Soil Cement Channel	Tract IV-C	Shuwimi Court Turnaround	Anazazi Street Turnaround
	2'	Desiltation Pond	Lava Bluff Drive ROW North of Block 7		
	2'	Interim Diversion Swale	Tract IV-C	Anazazi Street	Lava Bluff Drive Turnaround
	2'	Interim Swale	Tract III	Lava Bluff Drive @ Dawn Place	Ladera Channel @ Unser Boulevard
	2'	Desiltation Pond	Tract III	@ West end of Ladera Channel	
	2'	Desiltation Pond	Tract III	@ Ladera Channel	& Lava Bluff Drive
	2'	Desiltation Pond	Tract III	@ 98th Street &	Lava Bluff Drive
	2'	Desiltation Pond	Tract III	@ Unser Blvd &	South End of Ladera Channel
	2'	Desiltation Pond	Tract III	@ Unser Blvd.,	North of Ladera Channel
	36"	Storm Drain Lines, Manholes, and Catch Basins	Lava Bluff Drive	Dawn Place	East ROW of Lava Bluff Drive

NOTES: [1] Type of Improvements found on Infrastructure List for Laurelwood II, Tract III.
[2] Phased Improvements to be installed when building construction is on lots west of Lot 20, Block 4, or west of where Kasiki Place begins.

HYDRAULIC DESIGN
OF DRAINAGE STRUCTURES

FOR
MONUMENT POINTE DRIVE AND THE LADERA CHANNEL
LAURELWOOD II SUBDIVISION

CITY OF ALBUQUERQUE
BERNALILLO COUNTY
NEW MEXICO



JANUARY, 1989

PREPARED BY:
FRED DENNEY & ASSOCIATES, INC.
CONSULTING ENGINEERS AND LAND SURVEYORS
2400 COMANCHE ROAD NE
ALBUQUERQUE, NM 87107
(505) 884-0696

TABLE OF CONTENTS

HYDRAULIC DESIGN
OF DRAINAGE STRUCTURES
FOR
MONUMENT POINTE DRIVE AND THE LADERA CHANNEL

I. HYDROLOGY

The 100-year flow rate of 900 cfs in the Ladera Channel was stipulated by the Northwest Mesa Drainage Management Plan. At this time the study is under review and is not yet approved. However, it does provide the most current design hydrology. The 10-year flow rate was taken as 0.657 times the 100-year rate or 590 cfs.

All other design flows, volumes, etc., were taken from the report entitled "Drainage Plan for Tract IV, Phase I 'Monument Pointe' Laurelwood II Subdivision" as prepared by Richard Beltramo of Fred Denney & Associates, Inc.

II. HYDRAULIC DESIGN

A. Ladera Channel

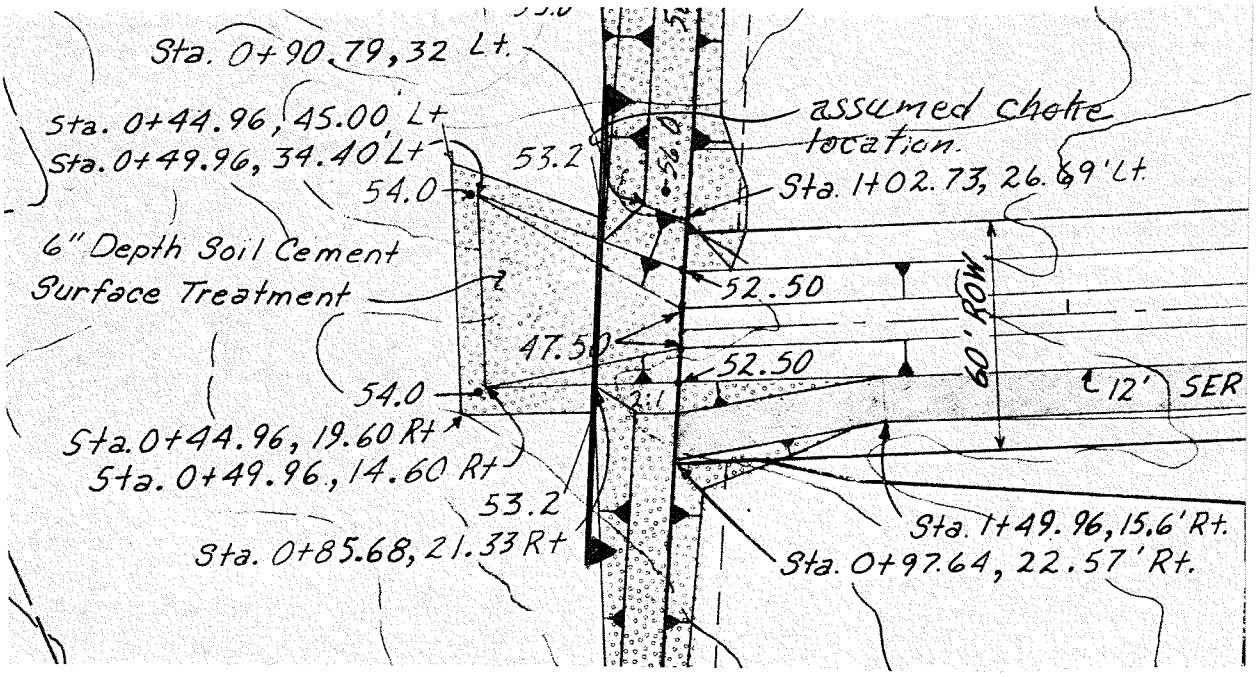
1. Design Objectives:
    a. Convey runoff (no attenuation required);
    b. Concrete-lined channel (C.O.A. standards);
    c. Discharge into existing concrete box culvert at Unser Boulevard so as not to erode the existing earthen channel downstream;
    d. Prevent head cutting or other damage upstream of proposed channel;
    e. Minimize maintenance (discourage silt deposition, erosion, etc.).

2. Inlet (Station 1+00)

The existing waterway upstream of the channel is a winding swale on a grade of approximately 2%. Due to the ill definition of a channel, a trainer dike or berm will be used to intercept and direct flows into the concrete-lined channel. To minimize maintenance, ponding (thus desiltation) upstream of the berm will be minimized. Since flow in natural arroyos and channels is almost certainly supercritical, a nonerosive grade check at natural grade will prevent headcutting upstream.

The maximum velocity obtained at the inlet is 9.18 Fps. Soil cement is used to protect both the diversion berm and the inlet.

Hydraulic analysis is based on analyzing the section where flow is restricted the most. For this case, that section is located in the channel at the berm (see Sketch). Assuming zero velocity in the upstream pool, and critical depth at the choke section, the following equations apply.



2. Inlet (Station 1+00) (Continued)

$$Y_c = 3.22' \quad A_c = 97.98 \text{ sq.ft.} \quad V_c = 9.18 \text{ Fps}$$

$$T_c = 37.25' \quad d_c = \frac{Ac}{Tc} = 2.63'$$

$$Fr^2 = \frac{V^2}{gd} = \frac{9.18^2}{32.2 \times 2.63} = 1.00$$

$$h_v = \frac{Vc^2}{2g} = \frac{9.18^2}{2 \times 32.2} = 1.31'$$

$$H = \text{elev.} + y + h_v = 5{,}250 + 3.22 + 1.31 = 5{,}254.53'$$

Thus, the maximum elevation of water in a pooled condition will be 5,254.53 feet. The top of the berm is placed at 5,256 feet providing 1.5 feet of freeboard. The assumption that the inflow has a zero velocity is conservative. The actual case has some velocity and therefore the standing pool is less than the 5,254.53 foot elevation, depending on the magnitude of this velocity.

3. Channel

In general, the frictional grade of the flow or the slope of the total energy line must remain greater than the grade of the silt source or silt deposition will occur in the channel. By placing the top of the channel at natural grade, not only is the aesthetics and adjoining drainage improved, but self-cleaning is assured. A trapezoidal cross section with a ten foot bottom and 2:1 side slopes was sized for depth (n = 0.013 for concrete). For a design grade of 2.34%:

3. Channel (Continued)

$$Y_n = 2.42'$$

$$A_n = (2y+10)y = (2x2.42+10)x2.42 = 35.91 \text{ sq.ft.}$$

$$P_n = 2\sqrt{5}y+10 = 2x2.236x2.42+10 = 20.82'$$

$$R_n = A/P = 35.91/20.82 = 1.72'$$

$$Q = \frac{1.486}{n}AR^{2/3}S^{1/2} = \frac{1.486}{.013} \times 35.91x(1.72)^{2/3}$$

$$x(0.0234)^{1/2} = 903.1 \text{ cfs } \underline{\text{chk}}.$$

$$V_n = Q/A = 900/35.91 = 25.06 \text{ Fps}$$

$$h_v = \frac{V^2}{2g} = \frac{25.06^2}{2x32.2} = 9.75'$$

$$T_n = 4y+10 = 4x2.42+10 = 19.68'$$

$$d_n = A/T = 35.91/19.68 = 1.82'$$

$$Fr^2 = \frac{v^2}{gd} = \frac{25.06^2}{32.2x1.82} = 10.72 \text{ (supercritical)}$$

Therefore, flow will assume an S_2 profile beginning at critical depth at the inlet of the channel.

A five-foot deep channel will provide 2.6 feet of freeboard at normal depth.

In the curve (Stations 8+05.44 to 11+16.58) superelevation on the south side of the channel will be needed.

$$S = \frac{V^2(b+2zd)}{2gr} = \frac{24.84^2(10+2x2x2.44)}{2x32.2x594.4} = 0.32'$$

For simplicity, superelevation of one foot was used in lieu of 0.32 feet.

3. Channel (Continued)

The proposed ten-foot span concrete box culvert at Monument Pointe Drive (Station 12+02.81) requires a drop in the channel upstream of the crossing (Station 11+82.81 to 12+02.81). Several combinations of cross-sectional transit (Station 11+52.81 to 12+02.81) and drops were analyzed. The drop in the last 20 feet of the transition resulted in the smallest choke.

The drop serves to accelerate the flow to a velocity well above normal velocity. The grade through the box culvert and downstream must be considerably less to bring the channel back to ground level. Normal depth at a grade of 1% is 3.03 feet. This is less than critical depth of 4.64 feet. Therefore, unless the flow slows a great deal in the hydraulically more efficient cross section of the box culvert, flow will assume an S_3 profile. The depth of the flow will quickly increase and then approach normal depth from below. From the water surface profile analysis, the frictional grade at the grade break downstream of Monument Pointe Drive (Station 15+00) is 1.69%. Although this indicates silt deposition would be imminent with full silt load, some desiltation will occur at the inlet to the channel. We, therefore, feel that with proper maintenance of the inlet, silt accumulation in this reach will not be a problem.

When the flow passes the grade break (Station 15+00) downstream of Monument Pointe Drive, it will be between critical and the new normal depth. An S_2 profile will result.

In the horizontal transition to the existing concrete box culvert at Unser Boulevard (Station 18+12.21 to 19+12.00) the width of flow

3. Channel (Continued)

will increase, the water surface will drop and thus the velocity will increase. The channel must then drop in elevation (Station 19+12.00 to 19+32) and the flow will be further accelerated.

Upon emergence from the box culvert, the existing channel further widens in a concrete section. Concrete parking bumpers, comparable in height to the depth of flow, serve as energy dissipaters in this section. A rip rap section between the concrete section and the earthen channel downstream also exists. If the flow is to not adversely affect the earthen channel, it must be at less than normal velocity before reaching this section.

The water surface profile analysis indicates the flow will assume an M_3 profile. The depth is increasing toward critical depth by Station 21+50.

A check of normal depths on the rip rap section and on the earthen section indicates the rip rap section to be a mild slope, whereas the earthen section is a steep slope. Therefore, critical depth will occur near the downstream edge of the rip rap (approx. Station 21+85). Running a water surface profile analysis upstream from this point and comparing conjugate depth with the profile from above locates a hydraulic jump of .035 feet at Station 21+51 (see Chart 1).

The above analysis was undertaken as the worst case. In all likelihood, the parking bumpers will supply enough upstream thrust to force the hydraulic jump sooner. The flow will then be subcritical longer, but will still go through critical depth at the same point.

3. Channel (Continued)

The existing arroyo has slower velocities than the proposed concrete channel and consequentially the hydraulic jump is even further upstream. Thus, the conditions in the existing earthen channel will be unchanged by the proposed improvements.

B. INTERIM PONDS

Six desiltation-detention ponds are shown as interim ponds on the drainage report. Each pond will be designated by the number of its respective drainage basin.

1. Pond 1

This pond was eliminated by the proposed installation of a 30" diameter reinforced concrete pipe culvert under Monument Pointe Drive at Station 2+75. This is intended to be temporary; when the southern portion of Tract IV is developed, grading and/or a storm drain will intercept and discharge the flows into the Ladera Channel at Monument Pointe Drive. In the time being, flow will follow its historic path to the storm drain inlet north of 98th Street on Unser Boulevard.

Each of the remaining five ponds were sized to hold the entire runoff of their respective basins in the event an outlet should become blocked. This was deemed prudent due to the danger of blockage of the relatively small outlet structures.

2. Pond 2 (See Chart 2)

The hydrology indicates a peak inflow of 7 cfs, a time to peak of 10 minutes, and a total volume of 0.264 acre-feet or 11,500 cubic feet.

2. Pond 2 (Continued)

A hydrograph having this peak, time to peak, and runoff of 80% of the total volume (9,200 cf) within the first hour was sketched using the assumption that the remaining 20% (2,300 cf) of the volume would be an exponential decay.

$$q(t) = Ae^{-60Bt} \qquad t>60 \text{ minutes}$$

$$20\%\ V = \int_{60}^{\infty} Ae^{-60Bt}\,dt = \frac{Ae^{-3600B}}{60B} = \frac{1}{60B}q(60)$$

$$\therefore \quad B = \frac{q(60)}{.2x60V}$$

The hydrograph should be smooth at the one-hour point. The flow as well as the grade of the hydrograph will have to match at the one-hour point.

$$\frac{d}{dt}q(t) = -60ABe^{-60Bt} = -60Bq(t)$$

$$\text{or} \quad \frac{d}{dt}q(60) = -60 \cdot \frac{q^2(60)}{.2x60V}$$

Thus, the slope of the hydrograph for any flow is known.

Discharges [q(60)] were assumed, the slopes plotted, and curves sketched and adjusted until a reasonably shaped hydrograph was obtained.

The outlet structure was sized to give a discharge of three cfs at a depth of approximately three feet. The geometry of the pond was adjusted to give a maximum depth of approximately three feet.

The outlet structure selected is a 12" PVC standpipe with 6 one-inch wide vertical slots three feet long. Six inches above the slots, the standpipe will be left uncapped to act as a spillway in case of blockage of the slots.

3. Pond 3 (See Chart 3)

The hydrology of Basin 3 indicates a peak inflow of 18 cfs, a time to peak of 10 minutes, and a volume of 0.6967 acre-feet or 30,350 cf. The same process to obtain a hydrograph was used as for Pond 2.

The same 12" PVC standpipe was used for an outlet for Pond 2.

The geometry of the pond was adjusted until a maximum depth of approximately three feet was obtained.

4. Pond 4 (See Chart 4)

The hydrograph having a peak inflow of 26 cfs, a time to peak of 10 minutes, and a volume of 0.9973 acre-feet or 43,440 cf for Basin 4 was sketched as above.

The same 12" PVC slotted standpipe outlet was used for Pond 4.

Due to the length of the diversion ditch for this pond, the volume of the ditch is more than enough and no pond is needed. A berm downstream of the ditch provided enough volume to impound the total runoff if needed.

This resulted in a maximum depth of 2.1 feet.

5. Pond 7 (See Chart 5)

The hydrograph having a peak inflow of 39 cfs, a time to peak of 10 minutes, and a volume of 1.5168 acre-feet or 66,075 cf for Basin 7 was sketched as above.

The length of the channel and the required depths of each end indicated the ditch could serve as the pond as in Pond 4 above.

The outlet structure selected is the lower 15 inches of a 42" RCP being left open, the rest being closed by a concrete plug. A three-inch wide vertical slot was provided to help prevent blockage by sand.

5. Pond 7 (Continued)

This resulted in a maximum depth of 3¼ feet and the ditch has adequate capacity to impound the total runoff if necessary.

6. Pond 8 (See Chart 6)

The hydrograph having a peak inflow of 13 cfs, a time to peak of 10 minutes, and a volume of 0.4816 acre-feet or 21,000 cf for Basin 8 was sketched as before.

The 12" PVC slotted standpipe was used for the outlet.

The geometry of the basin was selected so that the maximum depth would be 2.4 feet.

All ponds will have soil-cement slope where inflows are expected to prevent erosion. The shallow depths and 3:1 side slopes have been selected for safety reasons.

TRAPEZOIDAL CHANNEL

Flow Rate	(cfs)	=	14.5
Depth	(ft)	=	.5133278
Velocity	(ft/s)	=	4.319134
Mannings n		=	.03
Slope	(ft/ft)	=	.0252
Side Slope	(H:V)	=	3
Bottom Width	(ft)	=	5
Top Width	(ft)	=	8.079966
Area	(ft^2)	=	3.357155
Hydraulic Radius		=	.4070972
Freeboard	(ft)	=	1.086457
Top Width (w/ freebrd)		=	14.59871
Froude Number		=	1.062854

STRIKE ANY KEY TO CONTINUE

MONUMENT POINTE
GRADING & DRAINAGE PLAN
EXHIBIT III

The Contractor shall seed all disturbed areas outside of the right-of-way as determined by the Engineer. Seeding shall be in accordance with City of Albuquerque Specifications and shall be considered incidental to the project.

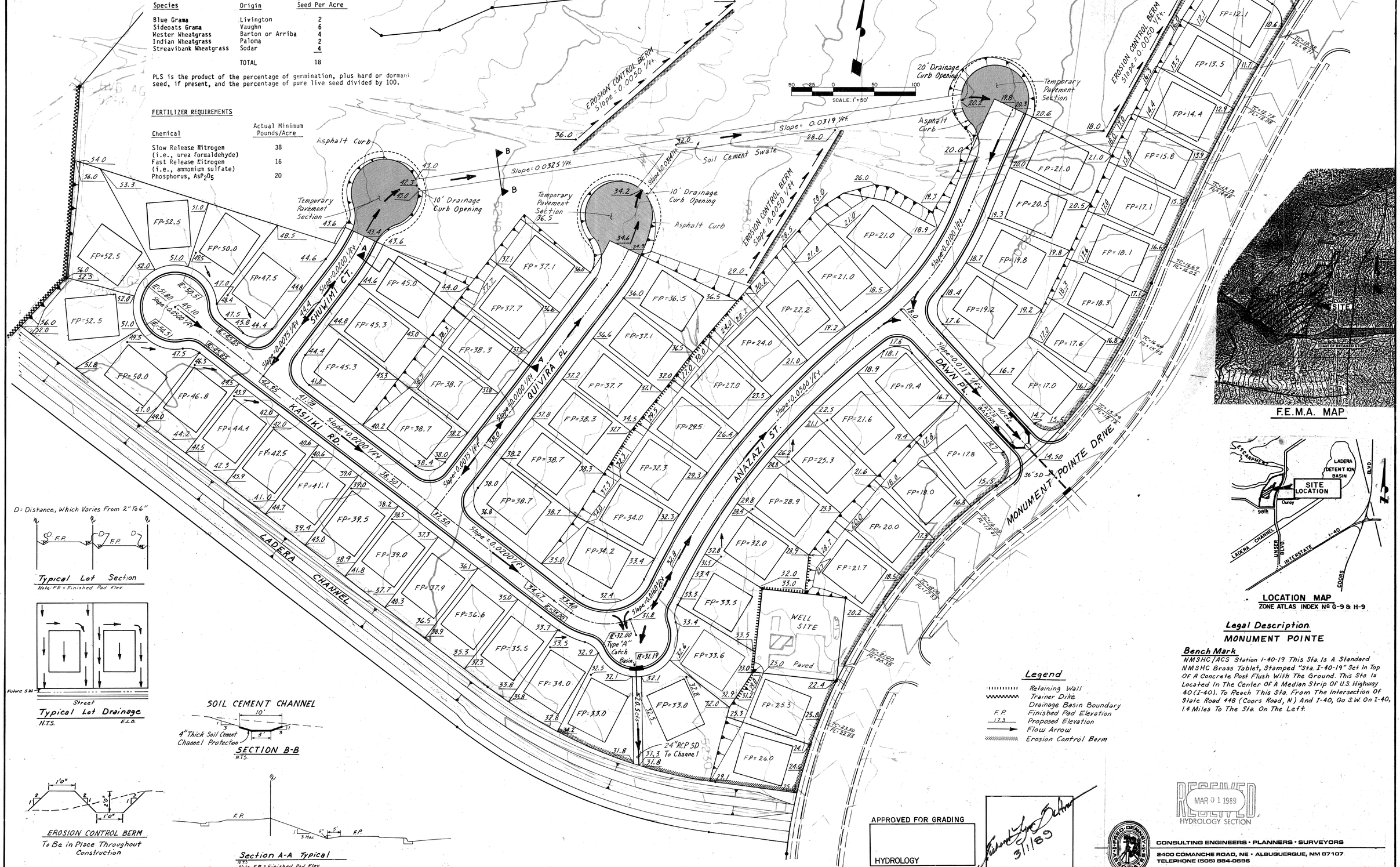
SEED MIX

Species	Origin	Lbs. Pure Live Seed Per Acre
Blue Grama	Livington	2
Sideoats Grama	Vaughn	6
Wester Wheatgrass	Barton or Arriba	4
Indian Wheatgrass	Paloma	2
Streavibank Wheatgrass	Sodar	4
	TOTAL	18

PLS is the product of the percentage of germination, plus hard or dormant seed, if present, and the percentage of pure live seed divided by 100.

FERTILIZER REQUIREMENTS

Chemical	Actual Minimum Pounds/Acre
Slow Release Nitrogen (i.e., urea formaldehyde)	38
Fast Release Nitrogen (i.e., ammonium sulfate)	16
Phosphorus, AsP_2O_5	20



F.E.M.A. MAP

LOCATION MAP
ZONE ATLAS INDEX Nº G-9 & H-9

D = Distance, Which Varies From 2" To 6"

Typical Lot Section
Note: FP = Finished Pad Elev.

Typical Lot Drainage
N.T.S. E.L.O.

SECTION B-B
N.T.S.

EROSION CONTROL BERM
To Be in Place Throughout Construction

Section A-A Typical
N.T.S.
Note: F.P. = Finished Pad Elev.

Legend

- Retaining Wall
- Trainer Dike
- Drainage Basin Boundary
- F.P. Finished Pad Elevation
- 17.3 Proposed Elevation
- Flow Arrow
- Erosion Control Berm

Legal Description
MONUMENT POINTE

Bench Mark
NMSHC/ACS Station I-40-19 This Sta. Is A Standard NMSHC Brass Tablet, Stamped "Sta. I-40-19" Set In Top Of A Concrete Post Flush With The Ground. This Sta Is Located In The Center Of A Median Strip Of U.S. Highway 40 (I-40). To Reach This Sta. From The Intersection Of State Road 448 (Coors Road, N) And I-40, Go S.W. On I-40, 1.4 Miles To The Sta. On The Left.

APPROVED FOR GRADING
HYDROLOGY

ENGINEER'S STAMP
3/1/89

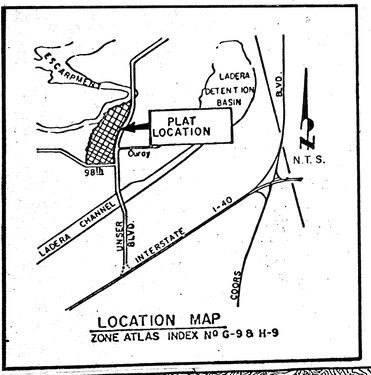
RECEIVED
MAR 0 1 1989
HYDROLOGY SECTION

CONSULTING ENGINEERS • PLANNERS • SURVEYORS
2400 COMANCHE ROAD, NE • ALBUQUERQUE, NM 87107
TELEPHONE (505) 884-0696

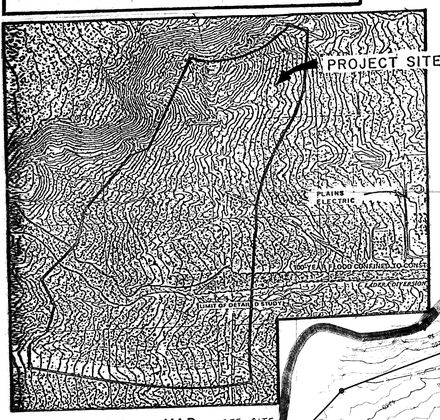
MASTER DRAINAGE PLAN
LAUREL WOOD II

EXHIBIT I

LEGAL DESCRIPTION:
TRACT A-1, EL RANCHO ATRISCO PHASE IV



LOCATION MAP
ZONE ATLAS INDEX No G-9 & H-9



FEMA MAP
N.T.S.

NOTES

1. OFFSITE DRAINAGE EASEMENTS MAY BE REQUIRED. THESE WILL BE OBTAINED PRIOR TO FINAL PLAT APPROVAL.
2. APPROPRIATE ONSITE DRAINAGE ESMT'S. WILL BE GRANTED WITH THE PLATTING.
3. AN INDEPENDENT DRAINAGE ANALYSIS WILL ACCOMPANY EACH TRACT AS DEVELOPMENT WARRANTS.

BENCH MARK DATA
"BH-39" B & H BRASS CAP
ELEVATION = 5195.46 FT.

LEGEND

- FLOW ARROWS
- (AP2) ANALYSIS POINT
- 24.0 PROPOSED SPOT ELEVATION
- TRAINER DIKE
- BASIN DIVIDE
- MAJOR BASIN DIVIDE
- (4) BASIN ID

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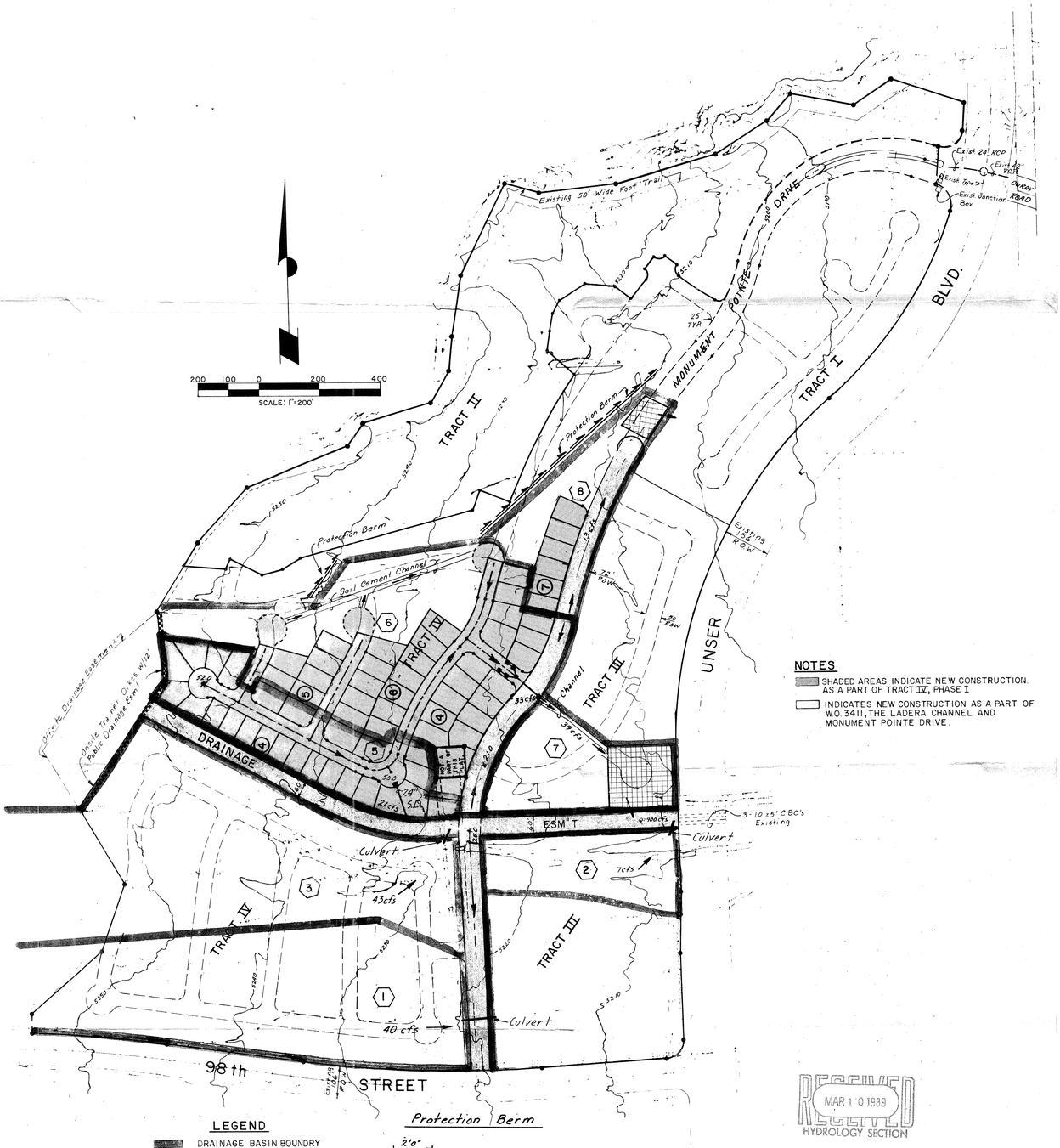
F.D.A. JOB NO. 765.12

DRAINAGE PLAN FOR TRACT IV, PHASE I LAUREL WOOD II SUBDIVISION

EXHIBIT II



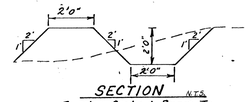
NOTES

- SHADED AREAS INDICATE NEW CONSTRUCTION AS A PART OF TRACT IV, PHASE I
- INDICATES NEW CONSTRUCTION AS A PART OF W.O. 3411, THE LADERA CHANNEL AND MONUMENT POINTE DRIVE.

LEGEND

- DRAINAGE BASIN BOUNDRY
- (2) DRAINAGE BASIN #
- DIVERSION BERM & SWALE (SEE SECTION DETAIL)
- (5) BLOCK NUMBER
- DESILTATION POND
- FUTURE ROAD

Protection Berm



SECTION N.T.S.
Erosion Control Berm, To Be in Place Throughout Construction

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