PUBLIC WORKS/HYDROLOGY

F17/D20

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Drainage file

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

April 11, 1978

Goldberg-Mann & Assoc.
2329 Wisconsin NE
Albuquerque, New Mexico

RE: Southwest Skateboard Park

Gentlemen:

I have reviewed the drainage report for the Southwest Skateboard Park and I am in agreement with the concept submitted. The construction plans will have to supply adequate details to show how the concept will be implemented.

Very truly yours,

Bruno Conegliano
Asst. City Engineer

BC/gm

cc; Jim Smith
V.M. Kimmick
Drainage file

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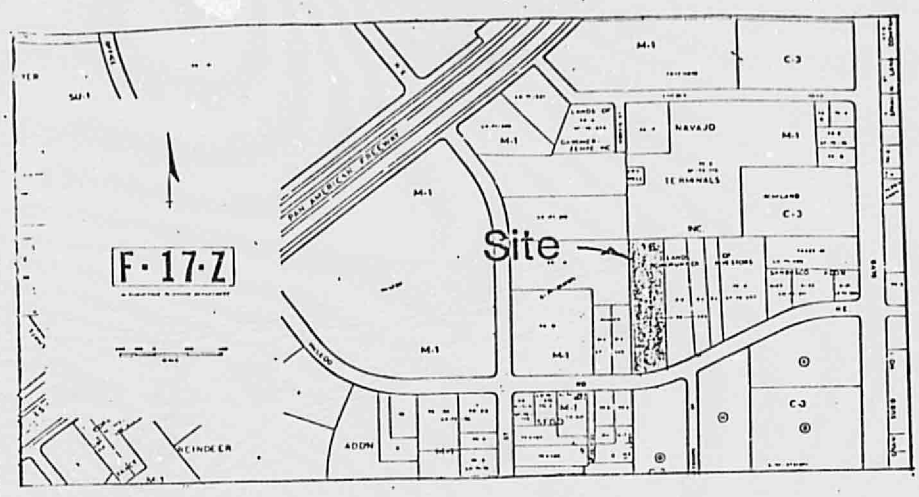
REPRODUCTION BY
OF THE ORIGINAL DOCUMENT.

CITY OF ALBUQUERQUE

DRAINAGE FACILITIES WITHIN CITY RIGHT-OF-WAY



VICINITY MAP
scale: 1"=750'

Legal: Lot B-1 of the Lands of Roadrunner Investors, SP-78-365

FRED C. ARFMAN NEW MEXICO 7322 REGISTERED PROFESSIONAL ENGINEER 1-13-84

Permit # 11889

NOTICE TO CONTRACTOR

F17-D20
D35

1. An excavation/construction permit will be required before beginning any work within City right-of-way. An approved copy of these plans must be submitted at the time of application for this permit.
2. All work detailed on these plans to be performed, except as otherwise stated or provided hereon, shall be constructed in accordance with "Contract Documents for City-Wide Utilities and Cash Paving No. 31 ".
3. Two working days prior to any excavation, contractor must contact Line Locating Service, 765-1234, for location of existing utilities.
4. Prior to construction, the contractor shall excavate and verify the horizontal and vertical locations of all obstructions. Should a conflict exist, the contractor shall notify the engineer so that the conflict can be resolved with a minimum amount of delay.
5. Backfill compaction shall be according to collector street use.

D-9

APPROVALS	NAME	DATE	TITLE: McLeod Mini-Warehouses 4715 McLeod Rd.
ACE/DESIGN	[illegible]	13 Jan 84	
INSPECTOR	R. Salas	5-25-84	PERMIT NO.
ACE/FIELD	W. F. McNamara	5-25-84	SHEET 1 OF 2

MAP NO. F 17

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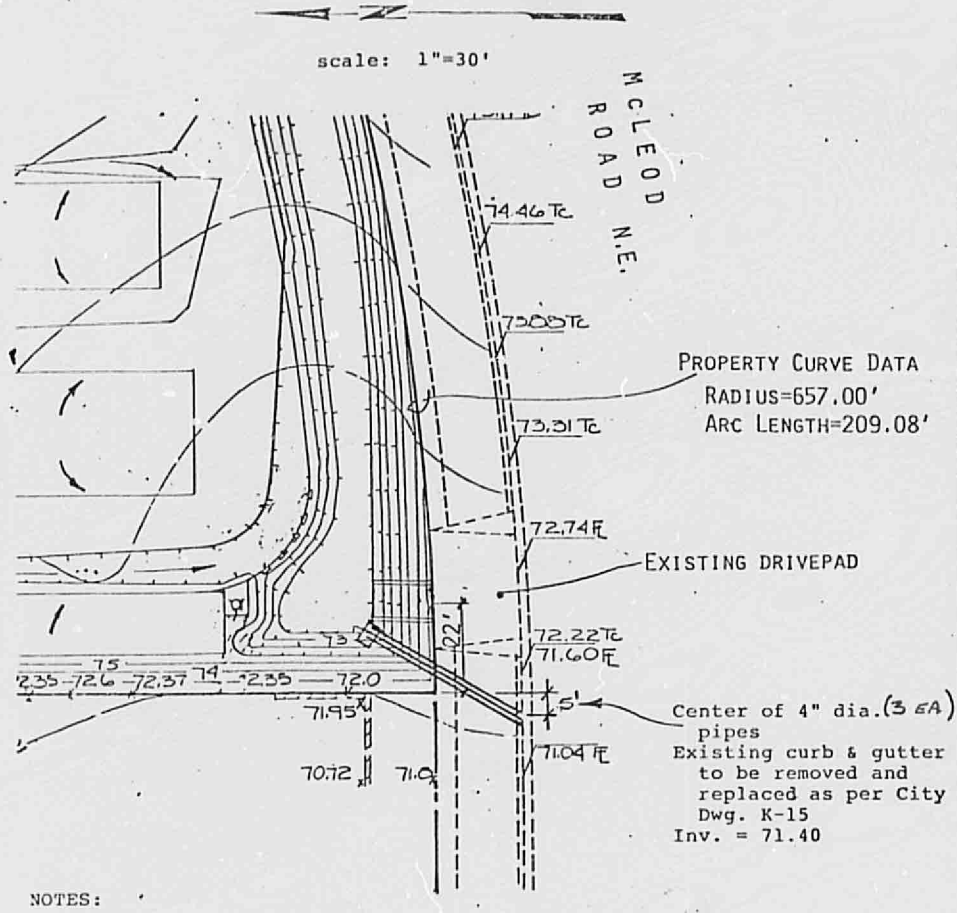
OF THE ORIGINAL DOCUMENT



NOTES:

1. BM-City BM 5-F17 on the north side of Montgomery Blvd., opposite the junction with Monroe St. A square, ∅, chiseled on top of concrete curb.
   ELEVATION = 5173.556

2. TBM-A slash on the top of curb along the projection of the east property line into the right-of-way of McLeod Rd.
   ELEVATION = 5177.647

FRED C. ARFMAN
NEW MEXICO
7322
REGISTERED PROFESSIONAL ENGINEER
1-13-84

CITY OF ALBUQUERQUE

APPROVALS	ENGINEER	DATE	TITLE: McLeod Mini-Warehouses 4715 McLeod Rd.
C.E. DESIGN	[illegible]	13 Jan 84	
WATER RESOURCES	[illegible]	5-25-84	PROJECT NO.
CITY ENGINEER	[illegible]	5-25-84	MAP NO.

25×10 32×10

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GRANT LINE ARROYO PROJECT

MONTGOMERY SQUARE DEVELOPMENT

DRAINAGE STUDY

PREPARED FOR

AMERICON CONSTRUCTION

JANAURY, 1986

DTM JOB NO. 838.12

PREPARED BY:

DENNEY-TIBLJAS-McLEAN & ASSOCIATES, INC.
CONSULTING ENGINEERS, SURVEYORS, PLANNERS
2400 COMANCHE ROAD NE
ALBUQUERQUE, NM 87107
(505) 884-0696

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RECEIVED
JAN 21 1986
HYDROLOGY SECTION

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DRAINAGE INFORMATION SHEET

PROJECT TITLE: Grant Line Arroyo Project ZONE ATLAS/DRNG. FILE #: F-17

LEGAL DESCRIPTION: The north 30' of a 50' easement on the north side of the south boundary of Elena Gallegos Grant.

CITY ADDRESS: Between Jefferson Street NE and San Mateo Boulevard NE

ENGINEERING FIRM: DENNEY-TIBLJAS-McLEAN & ASSOC, INC. CONTACT: Ross Schmidt

ADDRESS: 2400 Comanche NE, Albuquerque, NM 87107 PHONE: 884-0696

OWNER: Americon Construction CONTACT: Ken Cline

ADDRESS: 5001 Montgomery Blvd. NE, Albq. NM 87109 PHONE: 881-7957

ARCHITECT: N/A CONTACT: N/A

ADDRESS: PHONE:

SURVEYOR: DENNEY-TIBLJAS-McLEAN & ASSOC, INC. CONTACT: Thomas N. Burlison

ADDRESS: 2400 Comanche NE, Albuquerque, NM 87107 PHONE: 884-0696

CONTRACTOR: CONTACT:

ADDRESS: PHONE:

PRE-DESIGN MEETING:

XX YES
NO
XX COPY OF CONFERENCE RECAP SHEET PROVIDED

RECEIVED JAN 21 1986 HYDROLOGY SECTION

DRB No.
EPC No.
PROJ. No.

TYPE OF SUBMITTAL:

XX DRAINAGE REPORT
XX DRAINAGE PLAN
CONCEPTUAL GRADING & DRAINAGE PLAN
GRADING 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
XX OTHER STORM DRAIN PLAN (SPECIFY)

DATE SUBMITTED: 1/20/86

BY: Ross Schmidt
ROSS SCHMIDT

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I, Ross E. Schmidt, 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.

1/20/86

New Mexico Professional Engineer No. 6133

ROSS E. SCHMIDT
NEW MEXICO
REGISTERED PROFESSIONAL ENGINEER

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TABLE OF CONTENTS

		Page
1.	PURPOSE OF STUDY	1
2.	LOCATION	1
3.	DEVELOPMENT	1
4.	TOPOGRAPHY AND SOILS	1
5.	EXTRANEOUS FLOWS	2
6.	COMPUTATIONS	2
7.	CONCLUSIONS	3

Hydrology - Hydrograph Computation Drainage Areas 1, 2 & 3
- Hydrograph and Rational Method Data
- Drainage Areas
- Hydrographs

Sketch A - Water Surface Profile
Sketch B - Grant Line Arroyo

Hydraulic Calculations
- Existing 84-Inch RCP Storm Drain
- Existing 84-Inch RCP Storm Drain Design Criteria
- Existing 84-Inch RCP Storm Drain Total Capacity
- Proposed 45-Inch RCP Storm Drain Design Criteria
- Drop Through Transition Between 84" and 45" Discharge From 84" RCP at Normal Depth
- Right-of-Way and Easements, Required Easement Width Storm Drain

Exhibit I - Location Map
Exhibit II - Flood Map
Exhibit III - Topographic Map
Exhibit IV - Drainage Area Map
Exhibit V - Local Drainage Area Map
Exhibit VI - Area Soil Map
Exhibit VII - Grading & Drainage Plan

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GRANT LINE ARROYO PROJECT
MONTGOMERY SQUARE DEVELOPMENT
DRAINAGE STUDY

PURPOSE OF STUDY:

The purpose of this drainage study is to investigate the possibility of enclosing the storm flows in the open channel along the South Elena Gallegos Grant Boundary. It is also the intent of this report to explore the possibility of reducing the size of the existing 84-inch RCP storm drain to some nominal size through the proposed development. (See Grading and Drainage Plan - Exhibit VII)

LOCATION:

The proposed site is located to the north of the Elena Gallegos South Grant Boundary along the Grant Line Channel. The development is midway between San Mateo Boulevard, on the east, and Jefferson Street, on the west. (See Location Map - Exhibit I)

DEVELOPMENT:

The site is being developed into commercial property consisting of several buildings and required parking lots. The existing open channel along the south side of the site (Grant Line Arroyo) is to be enclosed in a pipe for additional parking area.

TOPOGRAPHY AND SOILS:

The slope of the drainage area is approximately 0.0217 feet per foot from east to west. The major soil group in the area is Tijeras Gravelly Fine Sandy Loam (TgB). The hydrologic soils group is "B". The series consists of deep, well-drained soils that formed into decomposed granitic alluvium on old alluvial fans. Slopes are from 1 to 9 percent. Tijeras (TgB) Soils are associated with Embudo (EmB), Embudo-Tijeras Complex (EtC), Millet, Tesajo and Wink Soils. (See Soils Map of Area - Exhibit II)

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EXTRANEOUS FLOWS:

The Grant Line Drainage Ditch is located along the south boundary of the proposed site within a 30-foot drainage easement. The 84-inch RCP storm drain from the east is constructed on a slope of 0.0145. From the Albuquerque Drainage Study Volume III, Page 3E1, Grant Line at San Mateo Boulevard, 84-inch RCP, the 100-year peak discharge is 107 cfs and the total capacity of the pipe is 591 cfs. The proposed storm drain downstream should be designed to handle the peak 100-year flow of 107 cfs, plus the onsite flows from the development west of San Mateo Boulevard.

We have also developed unit Hydrographs for the total area contributing to the 84-inch drain, the general site area west of San Mateo and the over all additive area to the Grant Line Arroyo Channel. (See Drainage Area Map - Exhibit IV and ALBUQHYD Hydrographs)

The peak Qs from the ALBQUHYD Hydrographs are slightly lower in some runs than those given in the Drainage Study. The higher Qs will be used to calculate the required pipe size downstream from the existing 84-inch RCP storm drain.

COMPUTATIONS:

The Q_{100} of 107 cfs will be used in the existing 84-inch RCP storm drain west of San Mateo Boulevard. One hundred seven (107) cfs is larger than the 103.02 cfs peak from the check Hydrograph.

Additional Q_{100} storm flow is added below the transition structure, between the existing 84-inch RCP and the proposed 45-inch RCP, from Area 4-5-6-7.

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CONCLUSIONS:

Based on the hydraulic calculations, a 45-inch RCP will accept the Peak Flow of 107 cfs from the 84-inch RCP with a drop of 1.25 feet through a 10.0 foot long transition between pipes. Therefore, the Developers should be allowed to construct a 45-inch RCP through his property with the proper transition on each end.

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HYDROLOGY

Program

"ALBUQHYD:HP,700,1"

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HYDROGRAPH

GRANT LINE ARROYO PROJECT
MONTGOMERY SQUARE DEVELOPMENT

HYDROGRAPH COMPUTATION
DRAINAGE AREAS 1, 2 and 3

Analysis Point No./etc.		End of	84" RCP
Watershed Area	A	148	Acres
Length of Run	L	10,300	Feet
Elevation Difference	H	190	Feet
Average Slope	So	0.01845	
	$L^{0.77}$	1229.9	
	$S^{0.385}$	0.215	
$Tc=0.0078\ (L^{0.77}/S^{0.385})$	Tc	44.6	Min.
Minimum Time of Conc.		10	Min.
Average Velocity = L/Tc x 60	V	3.85	fps
3.00 3.85 6.00		ok	
Rainfall Rate (6 hour, 100-year)	P	2.2 ✓	Inch
SCS Soil Survey			
Soils Type (Embudo-Tijeras Comp)		EtC	
Hydrologic Soil Group		B ✓	
Land Use (Plate 2.22 C-2)		Residential	
Average Percent Impervious		52 ✓	%
Runoff Curve Number	Cn	80 ✓	
"Q" Direct Runoff (Pl.22.2C-4)	R	0.70 ✓	Inch
Tp=Tc	Tp	45 ✓	Min.
Cfs per Inch of Runoff (45.4A/Tp)	gp	149.3 ✓	cfs
Peak Q (R x gp)	Q_{100}	104.5 ✓	cfs
Time in Minutes = Tp(t/Tp)	t	0.10	Min.
Flow Q = y (Peak Q_{100})	Q	3.14	cfs
Volume of Runoff			
Volume = AxR/12	Vol	8.63	Ac.Ft.

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GRANT LINE ARROYO PROJECT
MONTGOMERY SQUARE PLAZA

HYDROLOGY
HYDROGRAPH AND RATIONAL METHOD DATA

Rainfall Rate from COA			
DPM-2 (6-hour, 100-year)	P_{100}	2.20 ✓	inch
Rainfall Rate (10-year)			
DPM-2 (2.20 x 0.657) Plate D-1	P_{10}	1.45	inch

Soil Conservation Service - Soil Survey			
Soil Symbol - Soil Type		EtC	
Soil name		Embudo-Tijeras Complex	
Hydrologic Soil Group		B ✓	
Land Use		Commercial ✓	
Average Percent Impervious			
Plate 22.2 C-2	%I	85 ✓	%
Runoff Curve Number	Cn	92 ✓	
C Factor Plate 22.2 C-1	C	0.82 ✓	

Land use		Residential	
Average Percent Impervious	%I	65 52	%
Runoff Curve Number	Cn	85 80	
C Factor	C	0.66 ✓	

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GRANT LINE ARROYO PROJECT
MONTGOMERY SQUARE DEVELOPMENT

DRAINAGE AREAS

Area No	Area Acres	Length L Feet	Elevation H Feet	Curve Number	Rainfall P Inch	Peak Flow
1	24.4	4,700	90.0	80.0	2.20	31.76
2	103.9	10,300	190.0	80.0	2.20	72.13
3	20.1	3,100	35.0	80.0	2.20	29.90
1-2-3	148.4	10,300	190.0	80.0	2.20	103.02
4	11.0	1,250	10.0	92.0	2.20	38.00
6	7.4	1,050	16.0	92.0	2.20	28.22
5	5.0	930	22.5	92.0	2.20	19.07
7	4.8	1,150	16.0	92.0	2.20	18.30
4-5-6-7	28.2	1,250	22.5	92.0	2.20	
Total	176.6	11,200	215.0	82.0	2.20	133.72

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[illegible] ENGINEERING, INC.
12 / 21 / 85
MODIFIED SCS HYDROGRAPH, CHAPTER 22.2
CITY OF ALBUQUERQUE DEVELOPMENT PROCESS MANUAL

PROJECT : GRANT LINE ARROYO CHANNEL
JOB NUMBER : 838.12
LOCATION : AREA #1
EVENT : 100 YEAR

LENGTH OF BASIN (FT.)	=	4700.
DELTA ELEVATION (FT.)	=	90.
BASIN SLOPE (FT./FT.)	=	.0191
TIME OF CONCENTRATION (MIN.)	=	24.04
TIME TO PEAK (MIN.)	=	24.00
AVERAGE VELOCITY (FPS)	=	3.3
DRAINAGE AREA (ACRES)	=	24.40
DRAINAGE AREA (SQ.MI.)	=	.0381
CURVE NUMBER	=	80.0
RAINFALL DEPTH (IN.)	=	2.20
RUNOFF VOLUME (INCHES)	=	.688
RUNOFF VOLUME (AC.FT.)	=	1.399
PEAK DISCHARGE (CFS)	=	31.76

RUNOFF HYDROGRAPH

NUMBER	t/Tp	t Min.	Y	Q CFS
1	0.0	0.0	0.000	0.00
2	.1	2.4	.030	.95
3	.2	4.8	.100	3.18
4	.3	7.2	.190	6.03
5	.4	9.6	.310	9.85
6	.5	12.0	.470	14.93
7	.6	14.4	.660	20.96
8	.7	16.8	.820	26.04
9	.8	19.2	.930	29.54
10	.9	21.6	.990	31.44
11	1.0	24.0	1.000	31.76
12	1.1	26.4	.990	31.44
13	1.2	28.8	.930	29.54
14	1.3	31.2	.860	27.31
15	1.4	33.6	.780	24.77
16	1.5	36.0	.680	21.60
17	1.6	38.4	.560	17.79
18	1.7	40.8	.460	14.61
19	1.8	43.2	.390	12.39
20	1.9	45.6	.330	10.48
21	2.0	48.0	.280	8.89
22	2.2	52.8	.207	6.57
23	2.4	57.6	.147	4.67
24	2.6	62.4	.107	3.40
25	2.8	67.2	.077	2.45
26	3.0	72.0	.055	1.75
27	3.2	76.8	.040	1.27
28	3.4	81.6	.029	.92
29	3.6	86.4	.021	.67
30	3.8	91.2	.015	.48
31	4.0	96.0	.011	.35
32	4.5	108.0	.005	.16
33	5.0	120.0	0.000	0.00

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[illegible], INC.
12 / 21 / 95
MODIFIED SCS HYDROGRAPH, CHAPTER 22.2
CITY OF ALBUQUERQUE DEVELOPMENT PROCESS MANUAL

PROJECT : GRANT LINE ARROYO CHANNEL
JOB NUMBER : 838.12
LOCATION : AREA #2
EVENT : 100 YEAR

LENGTH OF BASIN (FT.)	=	10300.
DELTA ELEVATION (FT.)	=	190.
BASIN SLOPE (FT./FT.)	=	.0184
TIME OF CONCENTRATION (MIN.)	=	44.63
TIME TO PEAK (MIN.)	=	45.00
AVERAGE VELOCITY (FPS)	=	3.8
DRAINAGE AREA (ACRES)	=	103.90
DRAINAGE AREA (SQ.MI.)	=	.1623
CURVE NUMBER	=	80.0
RAINFALL DEPTH (IN.)	=	2.20
RUNOFF VOLUME (INCHES)	=	.688
RUNOFF VOLUME (AC.FT.)	=	5.938
PEAK DISCHARGE (CFS)	=	72.13

RUNOFF HYDROGRAPH

NUMBER	t/Tp	t Min.	Y	Q CFS
1	0.0	0.0	0.000	0.00
2	.1	4.5	.030	2.16
3	.2	9.0	.100	7.21
4	.3	13.5	.190	13.70
5	.4	18.0	.310	22.36
6	.5	22.5	.470	33.90
7	.6	27.0	.660	47.60
8	.7	31.5	.820	59.15
9	.8	36.0	.930	67.08
10	.9	40.5	.990	71.41
11	1.0	45.0	1.000	72.13
12	1.1	49.5	.990	71.41
13	1.2	54.0	.930	67.08
14	1.3	58.5	.860	62.03
15	1.4	63.0	.780	56.26
16	1.5	67.5	.680	49.05
17	1.6	72.0	.560	40.39
18	1.7	76.5	.460	33.18
19	1.8	81.0	.390	28.13
20	1.9	85.5	.330	23.80
21	2.0	90.0	.280	20.20
22	2.2	99.0	.207	14.93
23	2.4	108.0	.147	10.60
24	2.6	117.0	.107	7.72
25	2.8	126.0	.077	5.55
26	3.0	135.0	.055	3.97
27	3.2	144.0	.040	2.89
28	3.4	153.0	.029	2.09
29	3.6	162.0	.021	1.51
30	3.8	171.0	.015	1.08
31	4.0	180.0	.011	.79
32	4.5	202.5	.005	.36
33	5.0	225.0	0.000	0.00

25×10

[illegible], INC.
12 / 21 / 83
MODIFIED SCS HYDROGRAPH, CHAPTER 22.2
CITY OF ALBUQUERQUE DEVELOPMENT PROCESS MANUAL

PROJECT : GRANT LINE ARROYO CHANNEL
JOB NUMBER : 838.12
LOCATION : AREA #3
EVENT : 100 YEAR

LENGTH OF BASIN (FT.)	=	3100.
DELTA ELEVATION (FT.)	=	35.
BASIN SLOPE (FT./FT.)	=	.0113
TIME OF CONCENTRATION (MIN.)	=	21.39
TIME TO PEAK (MIN.)	=	21.00
AVERAGE VELOCITY (FPS)	=	2.4
DRAINAGE AREA (ACRES)	=	20.10
DRAINAGE AREA (SQ.MI.)	=	.0314
CURVE NUMBER	=	80.0
RAINFALL DEPTH (IN.)	=	2.20
RUNOFF VOLUME (INCHES)	=	.688
RUNOFF VOLUME (AC.FT.)	=	1.153
PEAK DISCHARGE (CFS)	=	29.90

RUNOFF HYDROGRAPH

NUMBER	t/Tp	t Min.	Y	Q CFS
1	0.0	0.0	0.000	0.00
2	.1	2.1	.030	.90
3	.2	4.2	.100	2.99
4	.3	6.3	.190	5.68
5	.4	8.4	.310	9.27
6	.5	10.5	.470	14.05
7	.6	12.6	.660	19.73
8	.7	14.7	.820	24.52
9	.8	16.8	.930	27.81
10	.9	18.9	.990	29.60
11	1.0	21.0	1.000	29.90
12	1.1	23.1	.990	29.60
13	1.2	25.2	.930	27.81
14	1.3	27.3	.860	25.71
15	1.4	29.4	.780	23.32
16	1.5	31.5	.680	20.33
17	1.6	33.6	.560	16.74
18	1.7	35.7	.460	13.75
19	1.8	37.8	.390	11.66
20	1.9	39.9	.330	9.87
21	2.0	42.0	.280	8.37
22	2.2	46.2	.207	6.19
23	2.4	50.4	.147	4.40
24	2.6	54.6	.107	3.20
25	2.8	58.8	.077	2.30
26	3.0	63.0	.055	1.64
27	3.2	67.2	.040	1.20
28	3.4	71.4	.029	.87
29	3.6	75.6	.021	.63
30	3.8	79.8	.015	.45
31	4.0	84.0	.011	.33
32	4.5	94.5	.005	.15
33	5.0	105.0	0.000	0.00

25×10

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[illegible]
12 / 21 / 89
MODIFIED SCS HYDROGRAPH, CHAPTER 22.2
CITY OF ALBUQUERQUE DEVELOPMENT PROCESS MANUAL

PROJECT : GRANT LINE ARROYO CHANNEL
JOB NUMBER : 838.12
LOCATION : AREA #1-#2-#3
EVENT : 100 YEAR

LENGTH OF BASIN (FT.)	=	10300.
DELTA ELEVATION (FT.)	=	190.
BASIN SLOPE (FT./FT.)	=	.0184
TIME OF CONCENTRATION (MIN.)	=	44.63
TIME TO PEAK (MIN.)	=	45.00
AVERAGE VELOCITY (FPS)	=	3.8
DRAINAGE AREA (ACRES)	=	148.40
DRAINAGE AREA (SQ.MI.)	=	.2319
CURVE NUMBER	=	80.0
RAINFALL DEPTH (IN.)	=	2.20
RUNOFF VOLUME (INCHES)	=	.688
RUNOFF VOLUME (AC.FT.)	=	8.509
PEAK DISCHARGE (CFS)	=	103.02

RUNOFF HYDROGRAPH

NUMBER	t/Tp	t Min.	Y	Q CFS
1	0.0	0.0	0.000	0.00
2	.1	4.5	.030	3.09
3	.2	9.0	.100	10.30
4	.3	13.5	.190	19.57
5	.4	18.0	.310	31.94
6	.5	22.5	.470	48.42
7	.6	27.0	.660	67.99
8	.7	31.5	.820	84.48
9	.8	36.0	.930	95.81
10	.9	40.5	.990	101.99
11	1.0	45.0	1.000	103.02
12	1.1	49.5	.990	101.99
13	1.2	54.0	.930	95.81
14	1.3	58.5	.860	88.60
15	1.4	63.0	.780	80.36
16	1.5	67.5	.680	70.05
17	1.6	72.0	.560	57.69
18	1.7	76.5	.460	47.39
19	1.8	81.0	.390	40.18
20	1.9	85.5	.330	34.00
21	2.0	90.0	.280	28.85
22	2.2	99.0	.207	21.33
23	2.4	108.0	.147	15.14
24	2.6	117.0	.107	11.02
25	2.8	126.0	.077	7.93
26	3.0	135.0	.055	5.67
27	3.2	144.0	.040	4.12
28	3.4	153.0	.029	2.99
29	3.6	162.0	.021	2.16
30	3.8	171.0	.015	1.55
31	4.0	180.0	.011	1.13
32	4.5	202.5	.005	.52
33	5.0	225.0	0.000	0.00

25×

0000 0000 0658

DENNEY-TIBLJAS-MCLEAN AND ASSOCIATES, INC.
12 / 24 / 85
RATIONAL METHOD, CHAPTER 22.2
CITY OF ALBUQUERQUE DEVELOPMENT PROCESS MANUAL

PROJECT : GRANT LINE ARROYO CHANNEL
JOB NUMBER : 838.12
LOCATION : AREA #4
EVENT : 10 YEAR

LENGTH OF BASIN (FT.)	=	1250.
DELTA ELEVATION (FT.)	=	10.
BASIN SLOPE (FT./FT.)	=	.0080
TIME OF CONCENTRATION (MIN.)	=	12.13
TIME TO PEAK (MIN.)	=	12.13
AVERAGE VELOCITY (FPS)	=	1.7
DRAINAGE AREA (ACRES)	=	11.00
DRAINAGE AREA (SQ.MI.)	=	.0172
RATIONAL C FACTOR	=	.82
RAINFALL DEPTH (IN.)	=	1.45
RAINFALL INTENSITY (IPH)	=	2.78
RUNOFF VOLUME (INCHES)	=	1.189
RUNOFF VOLUME (AC.FT.)	=	1.090
PEAK DISCHARGE (CFS)	=	25.05

TRIANGULAR RUNOFF HYDROGRAPH

T MIN	Q CFS
0.00	0.00
12.13	25.05
63.18	0.00

$$T = \frac{2V}{q_p} = \frac{(2)(1.090)(43560)}{(25.05)(60)} = 63.18 \text{ min.}$$

25×10

0000 0000 0659

DENNEY-TIBLJAS-MCLEAN AND ASSOCIATES, INC.
12 / 21 / 85
RATIONAL METHOD, CHAPTER 22.2
CITY OF ALBUQUERQUE DEVELOPMENT PROCESS MANUAL

PROJECT : GRANT LINE ARROYO CHANNEL
JOB NUMBER : 838.12
LOCATION : AREA #4
EVENT : 100 YEAR

LENGTH OF BASIN (FT.)	=	1250.
DELTA ELEVATION (FT.)	=	10.
BASIN SLOPE (FT./FT.)	=	.0080
TIME OF CONCENTRATION (MIN.)	=	12.13
TIME TO PEAK (MIN.)	=	12.13
AVERAGE VELOCITY (FPS)	=	1.7
DRAINAGE AREA (ACRES)	=	11.00
DRAINAGE AREA (SQ.MI.)	=	.0172
RATIONAL C FACTOR	=	.82
RAINFALL DEPTH (IN.)	=	2.20
RAINFALL INTENSITY (IPH)	=	4.21
RUNOFF VOLUME (INCHES)	=	1.804
RUNOFF VOLUME (AC.FT.)	=	1.654
PEAK DISCHARGE (CFS)	=	38.00

TRIANGULAR RUNOFF HYDROGRAPH

T MIN	Q CFS
0.00	0.00
12.13	38.00
63.18	0.00

25×10

0000 0000 0660

DENNEY-TIBLJAS-MCLEAN AND ASSOCIATES, INC.
12 / 24 / 85
RATIONAL METHOD, CHAPTER 22.2
CITY OF ALBUQUERQUE DEVELOPMENT PROCESS MANUAL.

PROJECT : GRANT LINE ARROYO CHANNEL
JOB NUMBER : 838.12
LOCATION : AREA #5
EVENT : 10 YEAR

LENGTH OF BASIN (FT.)	=	930.
DELTA ELEVATION (FT.)	=	23.
BASIN SLOPE (FT./FT.)	=	.0247
TIME OF CONCENTRATION (MIN.)	=	10.00
TIME TO PEAK (MIN.)	=	10.00
AVERAGE VELOCITY (FPS)	=	2.5
DRAINAGE AREA (ACRES)	=	5.00
DRAINAGE AREA (SQ.MI.)	=	.0078
RATIONAL C FACTOR	=	.82
RAINFALL DEPTH (IN.)	=	1.45
RAINFALL INTENSITY (IPH)	=	3.06
RUNOFF VOLUME (INCHES)	=	1.189
RUNOFF VOLUME (AC.FT.)	=	.495
PEAK DISCHARGE (CFS)	=	12.57

TRIANGULAR RUNOFF HYDROGRAPH

T MIN	Q CFS
0.00	0.00
10.00	12.57
57.24	0.00

25×10

0000 0000 0661

DENNEY-TIBLJAS-MCLEAN AND ASSOCIATES, INC.
12 / 21 / 85
RATIONAL METHOD, CHAPTER 22.2
CITY OF ALBUQUERQUE DEVELOPMENT PROCESS MANUAL

PROJECT : GRANT LINE ARROYO CHANNEL
JOB NUMBER : 838.12
LOCATION : AREA #5
EVENT : 100 YEAR

LENGTH OF BASIN (FT.)	=	930.
DELTA ELEVATION (FT.)	=	23.
BASIN SLOPE (FT./FT.)	=	.0242
TIME OF CONCENTRATION (MIN.)	=	10.00
TIME TO PEAK (MIN.)	=	10.00
AVERAGE VELOCITY (FPS)	=	2.5
DRAINAGE AREA (ACRES)	=	5.00
DRAINAGE AREA (SQ.MI.)	=	.0078
RATIONAL C FACTOR	=	.82
RAINFALL DEPTH (IN.)	=	2.20
RAINFALL INTENSITY (IPH)	=	4.65
RUNOFF VOLUME (INCHES)	=	1.804
RUNOFF VOLUME (AC.FT.)	=	.752
PEAK DISCHARGE (CFS)	=	19.07

TRIANGULAR RUNOFF HYDROGRAPH

T MIN	Q CFS
0.00	0.00
10.00	19.07
57.24	0.00

25×10

0000 0000 0662

DENNEY-TIBLJAS-MCLEAN AND ASSOCIATES, INC.
12 / 24 / 85
RATIONAL METHOD, CHAPTER 22.2
CITY OF ALBUQUERQUE DEVELOPMENT PROCESS MANUAL

PROJECT : GRANT LINE ARROYO CHANNEL
JOB NUMBER : 838.12
LOCATION : AREA #6
EVENT : 10 YEAR

LENGTH OF BASIN (FT.)	=	1050.
DELTA ELEVATION (FT.)	=	16.
BASIN SLOPE (FT./FT.)	=	.0152
TIME OF CONCENTRATION (MIN.)	=	10.00
TIME TO PEAK (MIN.)	=	10.00
AVERAGE VELOCITY (FPS)	=	2.1
DRAINAGE AREA (ACRES)	=	7.40
DRAINAGE AREA (SQ.MI.)	=	.0116
RATIONAL C FACTOR	=	.82
RAINFALL DEPTH (IN.)	=	1.45
RAINFALL INTENSITY (IPH)	=	3.06
RUNOFF VOLUME (INCHES)	=	1.189
RUNOFF VOLUME (AC.FT.)	=	.733
PEAK DISCHARGE (CFS)	=	18.60

TRIANGULAR RUNOFF HYDROGRAPH

T MIN	Q CFS
0.00	0.00
10.00	18.60
57.24	0.00

25×10

0000 0000 0663

DENNEY-TIBLJAS-MCLEAN AND ASSOCIATES, INC.
12 / 21 / 85
RATIONAL METHOD, CHAPTER 22.2
CITY OF ALBUQUERQUE DEVELOPMENT PROCESS MANUAL

PROJECT : GRANT LINE ARROYO CHANNEL
JOB NUMBER : 838.12
LOCATION : AREA #6
EVENT : 100 YEAR

LENGTH OF BASIN (FT.)	=	1050.
DELTA ELEVATION (FT.)	=	16.
BASIN SLOPE (FT./FT.)	=	.0152
TIME OF CONCENTRATION (MIN.)	=	10.00
TIME TO PEAK (MIN.)	=	10.00
AVERAGE VELOCITY (FPS)	=	2.1
DRAINAGE AREA (ACRES)	=	7.40
DRAINAGE AREA (SQ.MI.)	=	.0116
RATIONAL C FACTOR	=	.82
RAINFALL DEPTH (IN.)	=	2.20
RAINFALL INTENSITY (IPH)	=	4.65
RUNOFF VOLUME (INCHES)	=	1.804
RUNOFF VOLUME (AC.FT.)	=	1.112
PEAK DISCHARGE (CFS)	=	28.22

TRIANGULAR RUNOFF HYDROGRAPH

T MIN	Q CFS
0.00	0.00
10.00	28.22
57.24	0.00

25×10

0000 0000 0664

DENNEY-TIBLJAS-MCLEAN AND ASSOCIATES, INC.
12 / 24 / 85
RATIONAL METHOD, CHAPTER 22.2
CITY OF ALBUQUERQUE DEVELOPMENT PROCESS MANUAL

PROJECT : GRANT LINE ARROYO CHANNEL
JOB NUMBER : 838.12
LOCATION : AREA #7
EVENT : 10 YEAR

LENGTH OF BASIN (FT.)	=	1150.
DELTA ELEVATION (FT.)	=	16.
BASIN SLOPE (FT./FT.)	=	.0139
TIME OF CONCENTRATION (MIN.)	=	10.00
TIME TO PEAK (MIN.)	=	10.00
AVERAGE VELOCITY (FPS)	=	2.1
DRAINAGE AREA (ACRES)	=	4.80
DRAINAGE AREA (SQ.MI.)	=	.0075
RATIONAL C FACTOR	=	.82
RAINFALL DEPTH (IN.)	=	1.45
RAINFALL INTENSITY (IPH)	=	3.06
RUNOFF VOLUME (INCHES)	=	1.189
RUNOFF VOLUME (AC.FT.)	=	.476
PEAK DISCHARGE (CFS)	=	12.06

TRIANGULAR RUNOFF HYDROGRAPH

T MIN	Q CFS
0.00	0.00
10.00	12.06
57.24	0.00

25 x 10

0000 0000 0665

DENNEY-TIBLJAS-MCLEAN AND ASSOCIATES, INC.
12 / 21 / 85
RATIONAL METHOD, CHAPTER 22.2
CITY OF ALBUQUERQUE DEVELOPMENT PROCESS MANUAL

PROJECT : GRANT LINE ARROYO CHANNEL
JOB NUMBER : 838.12
LOCATION : AREA #7
EVENT : 100 YEAR

LENGTH OF BASIN (FT.)	=	1150.
DELTA ELEVATION (FT.)	=	16.
BASIN SLOPE (FT./FT.)	=	.0139
TIME OF CONCENTRATION (MIN.)	=	10.00
TIME TO PEAK (MIN.)	=	10.00
AVERAGE VELOCITY (FPS)	=	2.1
DRAINAGE AREA (ACRES)	=	4.80
DRAINAGE AREA (SQ.MI.)	=	.0075
RATIONAL C FACTOR	=	.82
RAINFALL DEPTH (IN.)	=	2.20
RAINFALL INTENSITY (IPH)	=	4.65
RUNOFF VOLUME (INCHES)	=	1.804
RUNOFF VOLUME (AC.FT.)	=	.722
PEAK DISCHARGE (CFS)	=	18.30

TRIANGULAR RUNOFF HYDROGRAPH

T MIN	Q CFS
0.00	0.00
10.00	18.30
57.24	0.00

25×10

0000 0000 0666

BOHNY TIPTON-MCLEAN AND ASSOCIATES, INC.
12 / 21 / 85
MODIFIED SCS HYDROGRAPH, CHAPTER 22.2
CITY OF ALBUQUERQUE DEVELOPMENT PROCESS MANUAL

PROJECT : GRANT LINE ARROYO CHANNEL
JOB NUMBER : 838.12
LOCATION : AREA #1 THRU #7
EVENT : 100 YEAR

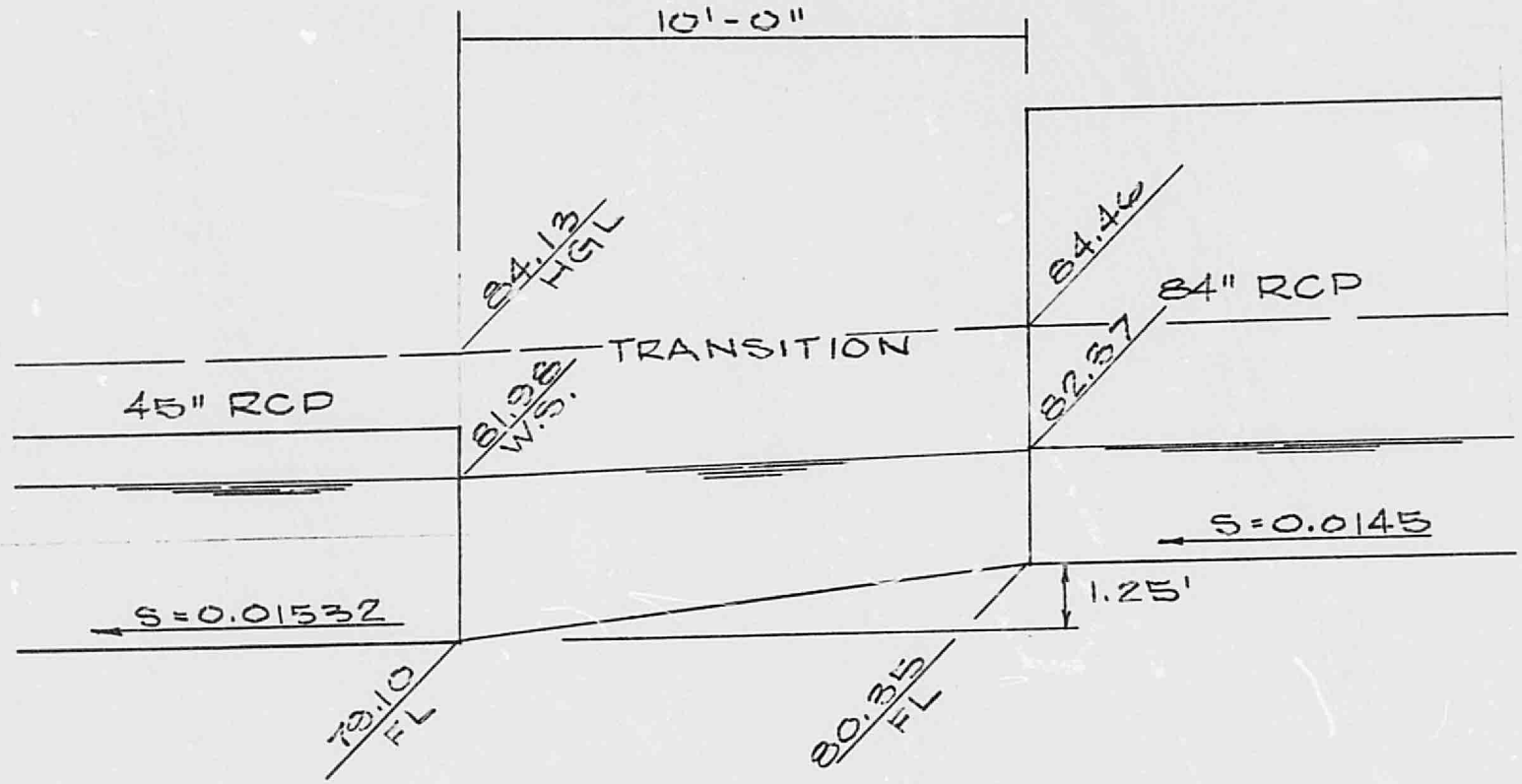
LENGTH OF BASIN (FT.)	=	11200.
DELTA ELEVATION (FT.)	=	215.
BASIN SLOPE (FT./FT.)	=	.0192
TIME OF CONCENTRATION (MIN.)	=	46.88
TIME TO PEAK (MIN.)	=	47.00
AVERAGE VELOCITY (FPS)	=	4.0
DRAINAGE AREA (ACRES)	=	176.60
DRAINAGE AREA (SQ.MI.)	=	.2759
CURVE NUMBER	=	82.0
RAINFALL DEPTH (IN.)	=	2.20
RUNOFF VOLUME (INCHES)	=	.784
RUNOFF VOLUME (AC.FT.)	=	11.536
PEAK DISCHARGE (CFS)	=	133.72

RUNOFF HYDROGRAPH

NUMBER	t/Tp	t Min.	Y	Q CFS
1	0.0	0.0	0.000	0.00
2	.1	4.7	.030	4.01
3	.2	9.4	.100	13.37
4	.3	14.1	.190	25.41
5	.4	18.8	.310	41.45
6	.5	23.5	.470	62.85
7	.6	28.2	.660	88.25
8	.7	32.9	.820	109.65
9	.8	37.6	.930	124.36
10	.9	42.3	.990	132.38
11	1.0	47.0	1.000	133.72
12	1.1	51.7	.990	132.38
13	1.2	56.4	.930	124.36
14	1.3	61.1	.860	115.00
15	1.4	65.8	.780	104.30
16	1.5	70.5	.680	90.93
17	1.6	75.2	.560	74.88
18	1.7	79.9	.460	61.51
19	1.8	84.6	.390	52.15
20	1.9	89.3	.330	44.13
21	2.0	94.0	.280	37.44
22	2.2	103.4	.207	27.68
23	2.4	112.8	.147	19.66
24	2.6	122.2	.107	14.31
25	2.8	131.6	.077	10.30
26	3.0	141.0	.055	7.35
27	3.2	150.4	.040	5.35
28	3.4	159.8	.029	3.88
29	3.6	169.2	.021	2.81
30	3.8	178.6	.015	2.01
31	4.0	188.0	.011	1.47
32	4.5	211.5	.005	.67
33	5.0	235.0	0.000	0.00

25×10

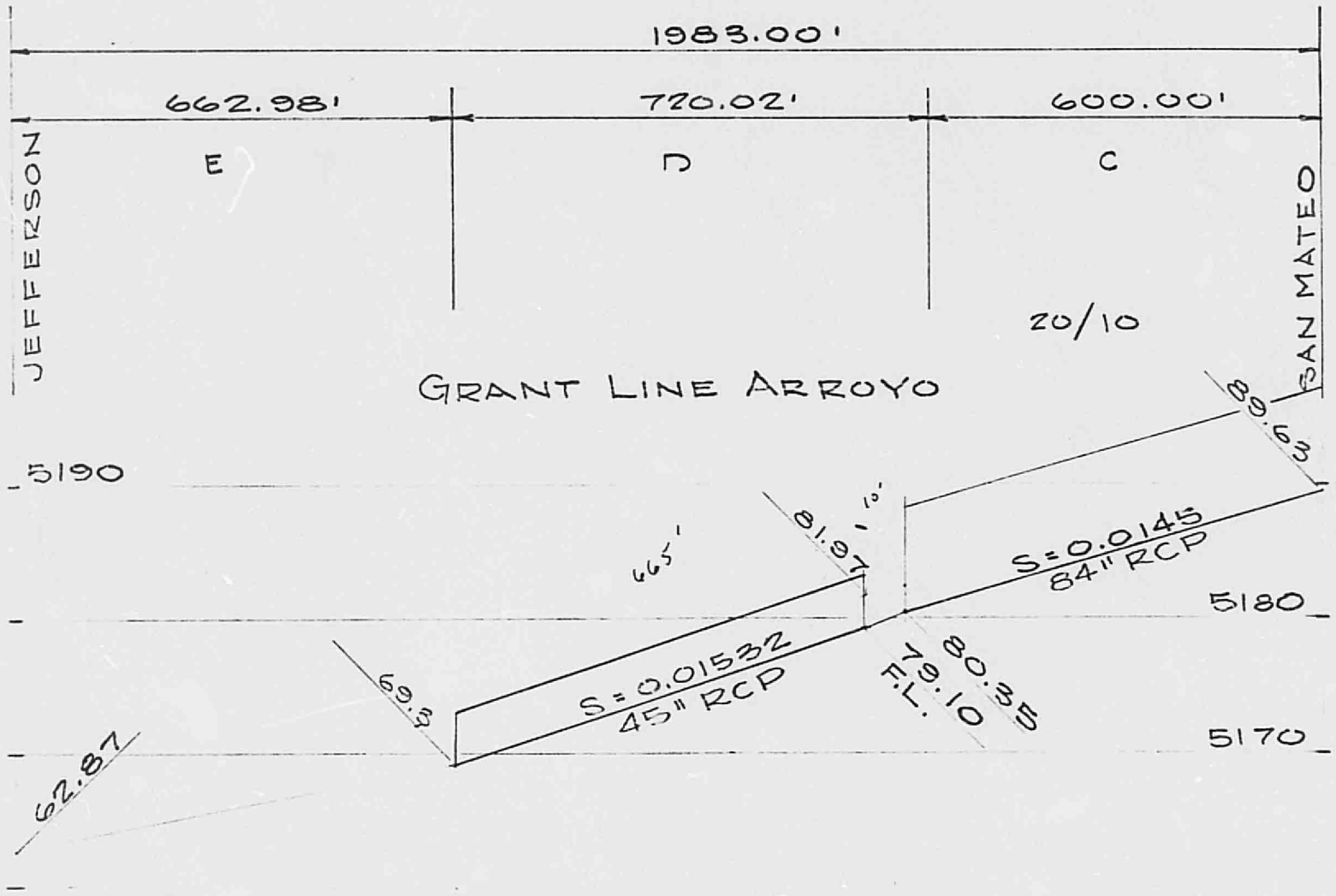
WATER SURFACE PROFILE



SKETCH "A"

25×

SKETCH "B"


1983.00'
662.98'
720.02'
600.00'
E
D
C
JEFFERSON
SAN MATEO
20/10
GRANT LINE ARROYO
5190
5180
5170
89.63
81.97
1.0'
665'
S=0.0145
84" RCP
S=0.01532
45" RCP
69.3
62.87
80.35
79.10
F.L.

25X

0000 0000 0669

HYDRAULIC CALCULATIONS

25×10

0000 0000 0670

GRANT LINE ARROYO PROJECT
MONTGOMERY SQUARE DEVELOPMENT

Existing 84-Inch RCP Storm Drain
From Albuquerque Drainage Study, Volume III
Page 3E1 - Grant Line @ San Mateo Boulevard
84" RCP (AP 1902)

Existing Pipe Size	d	84	Inch
100-Year Peak Discharge	Q_{100}	107	Cfs
Flow Depth	D	1.29	Feet
Velocity	V	11.63	Fps
Total Pipe Capacity	Qt	591	Cfs
Cross Section Area	A	38.48	Sq.Ft.
	d 8/3	179.3	
	d 5/2	129.6	
Find Minimum Pipe Slope	So	0.0145	
Depth of Flow	D	Full	
	D/d	1.0	
	K'	0.463	
Qn/K'd 8/3	S 1/2	0.02191	
Minimum Slope of Invert	So	0.00048	

25×10

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GRANT LINE ARROYO PROJECT
MONTGOMERY SQUARE DEVELOPMENT

Existing 84-Inch RCP Storm Drain
Design Criteria

100-Year Peak Discharge	Q_{100}	107	Cfs
Pipe Type		RCP	
Pipe Size	d	84	Inch
Pipe Slope	So	0.0145	Fps
	$S^{1/2}$	0.12042	
Manning	n	0.017	
Eight-Thirds Power (7')	$d^{8/3}$	179.3	
Five-Halves Power (7')	$d^{5/2}$	129.6	
$Qn/d^{8/3} S^{1/2}$	K'	0.08425	
	D/d	0.289	
Normal Depth of Flow	Dn	2.023	Feet
Cross Section Area C=0.1881	A	9.217	Sq.Ft.
Velocity	V	11.61	Fps
Head Velocity	Hv	2.09	Feet
Head Energy	He	4.11	Feet
$Q/d^{5/2}$	K'c	0.8256	
	Dc/d	0.380	
Critical Depth	Dc	2.66	Feet
Flow Area C=0.2739	A	13.421	Sq.Ft.
Velocity	V	7.97	Fps
Head Velocity	Hv	0.987	Feet
Head Energy	He	3.647	Feet

25×10

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GRANT LINE ARROYO PROJECT
MONTGOMERY SQUARE DEVELOPMENT

Existing 84-Inch RCP Storm Drain
Total Capacity

Pipe Type		RCP	
Pipe Size - Diameter	d	84	Inch
Pipe Slope	So	0.0145	
	$S^{1/2}$	0.12042	
Manning	n	0.017	
Eight-Thirds Power (7')	$d^{8/3}$	179.31	
Five-Halves	$d^{5/2}$	129.6	
Full	K'	0.463	
Capacity Flowing Full			
$Q=(K'/n)\ d^{8/3}\ S^{1/2}$	Q	588	Cfs
Water Area	A	38.485	Sq.Ft.
Velocity	V	15.279	Fps
Head Velocity	Hv	3.624	Feet
Head Energy	He	10.624	

25×10

0000 0000 0673

GRANT LINE ARROYO PROJECT
MONTGOMERY SQUARE DEVELOPMENT

Proposed 45-Inch RCP Storm Drain
Design Criteria

100-Year Peak Discharge	Q100	107	Cfs
Pipe Type		RCP	
Pipe Size	d	45	Inch
Pipe Slope	S	0.01532	
	$S^{1/2}$	0.12378	
Manning	n	0.017	
Eight-Thirds Power (3.75)	$d^{8/3}$	33.90	
Five-Halves Power (3.75)	$d^{5/2}$	27.23	
$Qn/d^{8/3} S^{1/2}$	K'	0.04335	
	D/d	0.7675	
Normal Depth of Flow	Dn	2.878	Feet
Flow Area C=0.647	A	9.098	Sq.Ft.
Velocity	V	11.76	Fps
Head Velocity	Hv	2.148	Feet
Head Energy	He	5.026	Feet
$Q/d^{5/2}$	K'c	0.929	
	Dc/d	0.841	
Critical Depth	Dc	3.154	Feet
Flow Area C=0.705	A	9.914	Sq.Ft.
Velocity	V	10.793	Fps
Head Velocity	Hv	1.81	Feet
Head Energy	He	4.963	Feet

25×10

0000 0000 0674

GRANT LINE ARROYO PROJECT
MONTGOMERY SQUARE DEVELOPMENT

Drop Through Transition Between 84" and 45"
Discharge From 84" RCP at Normal Depth

D_2 84" RCP	Dn	2.023	Feet
Water Area		RCP	
Pipe Size	A	9.217	Fps
Velocity	V	11.61	Fps
Head Velocity	Hv	2.09	Feet
Head Energy	He	4.11	Feet
Enter Into 45" RCP at Normal Depth			
D_1 45" RCP	Dn	2.878	Feet
	A	9.098	Sq.Ft.
	V	11.76	Fps
	Hv	2.148	Feet
	He	5.026	Feet
$H_L = 0.10(H_{V1} + H_{V2}/2)$	H_L	0.212	Feet
$H_{E1} + H_L = H_{E2} + SoL$			
$SoL = H_{E1} + H_L - H_{E2}$			
$SoL = 5.026 + 0.21 - 4.11$	SoL	1.126	Feet
Minimum SoL		0.10	Feet
Use SoL	SoL	1.25	Feet
Check:			
$H_{E1} + H_L \quad H_{E2} + SoL$			
$5.03 + 0.21 \quad 4.11 + 1.13$			
$5.24 = 5.24$		ok	

25×10

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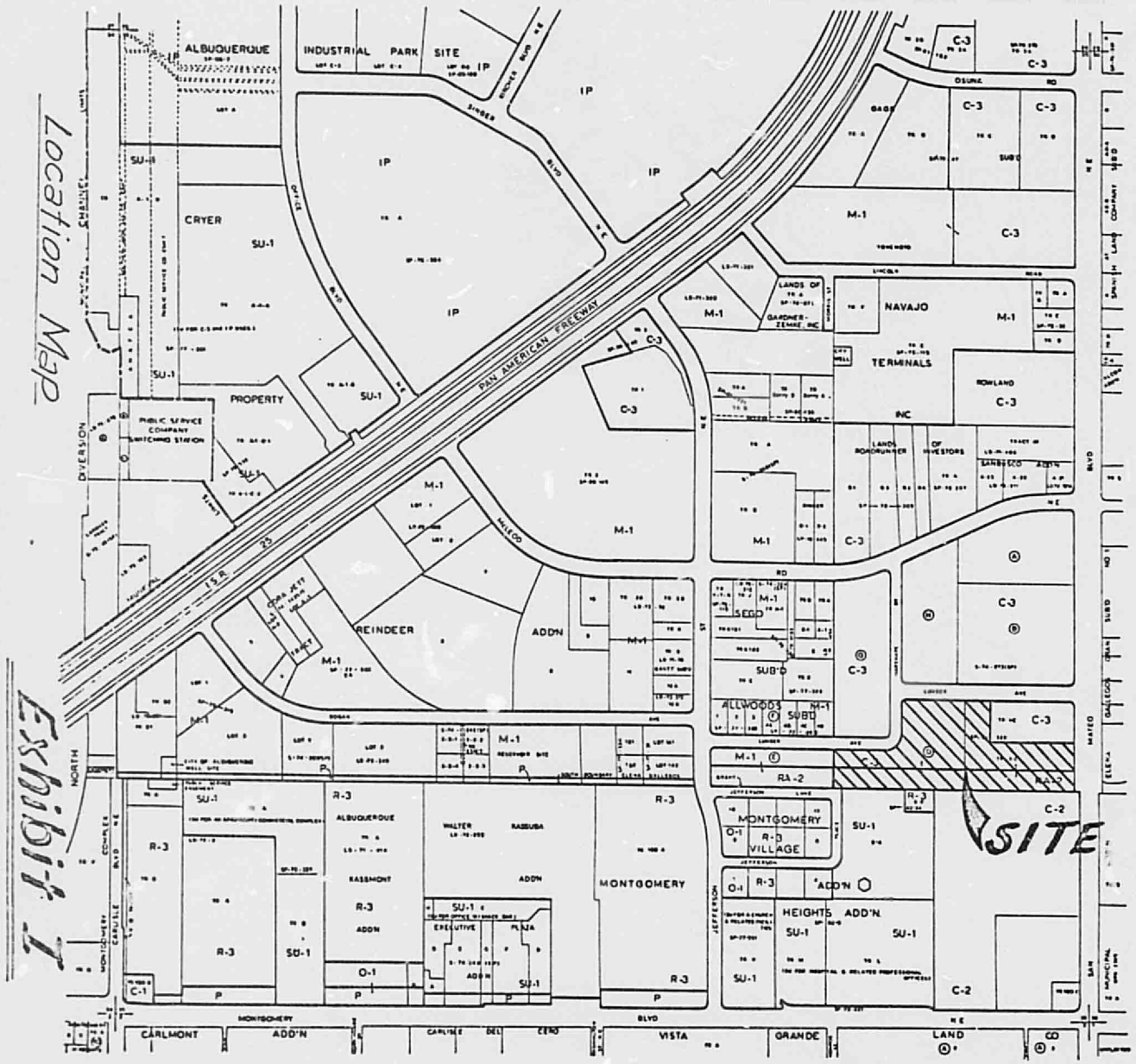
GRANT LINE ARROYO PROJECT
MONTGOMERY SQUARE DEVELOPMENT

Right-of-Way and Easements
Required Easement Width Storm Drain

Minimum Width Easement	W	20	Feet
Depth to Invert from Finished G	Di	10	Feet
Inside Diameter of Pipe	ID	3.75	Feet
Wall Thickness	t	3.5	Inch
Outside Diameter	OD	4.08	Feet
Required Width of Easement			
W = 2 x Di + ID + 4'			
W = (2 x 10) + 3.75 + 4.0	W	27.75	Feet
Existing Easement Width	Wex	30.0	Feet
27.75 < 30.0		ok	

25×10



25 X 10

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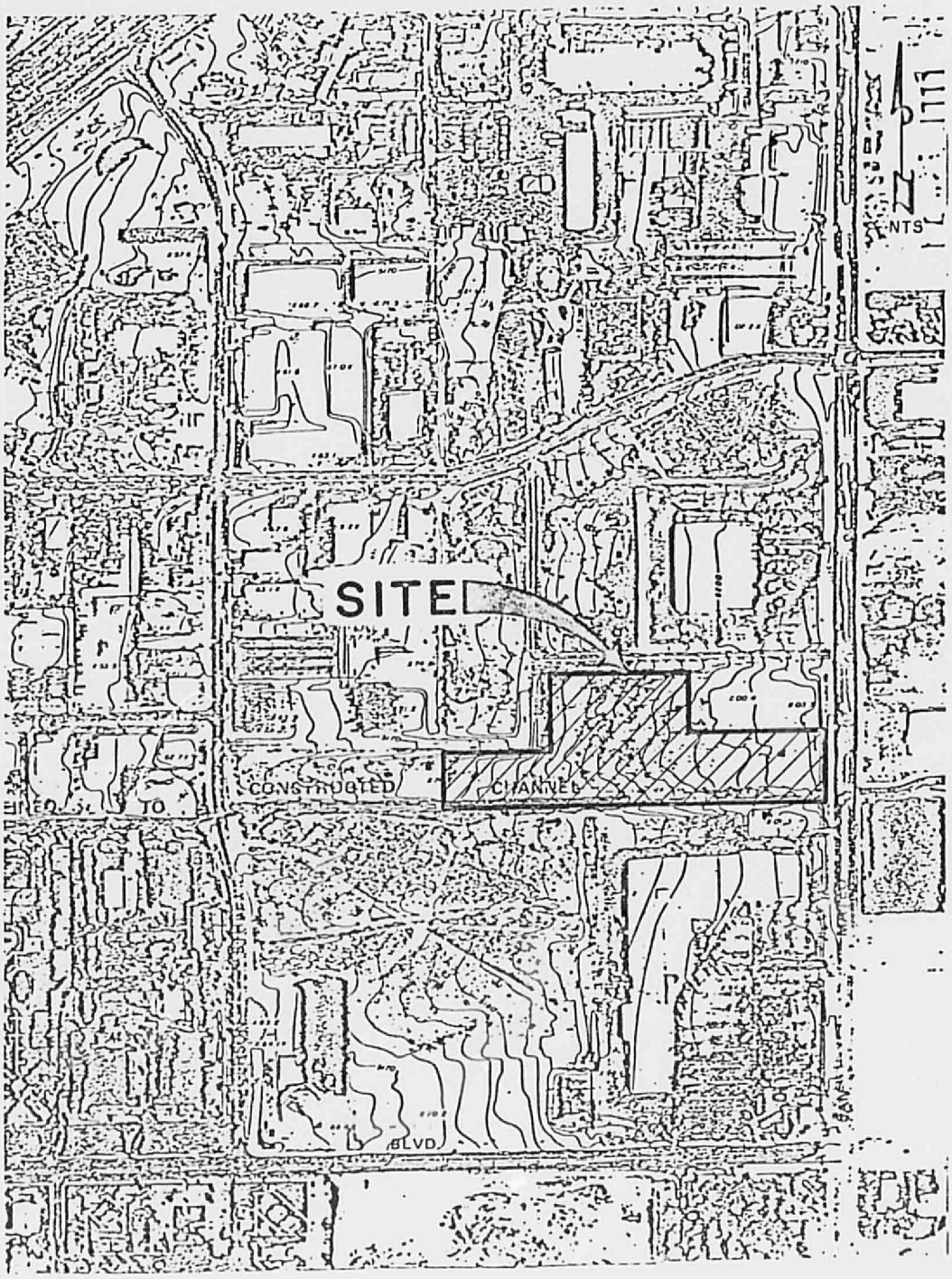
0000 0000 0677



FLOOD MAP

Exhibit II

25×10

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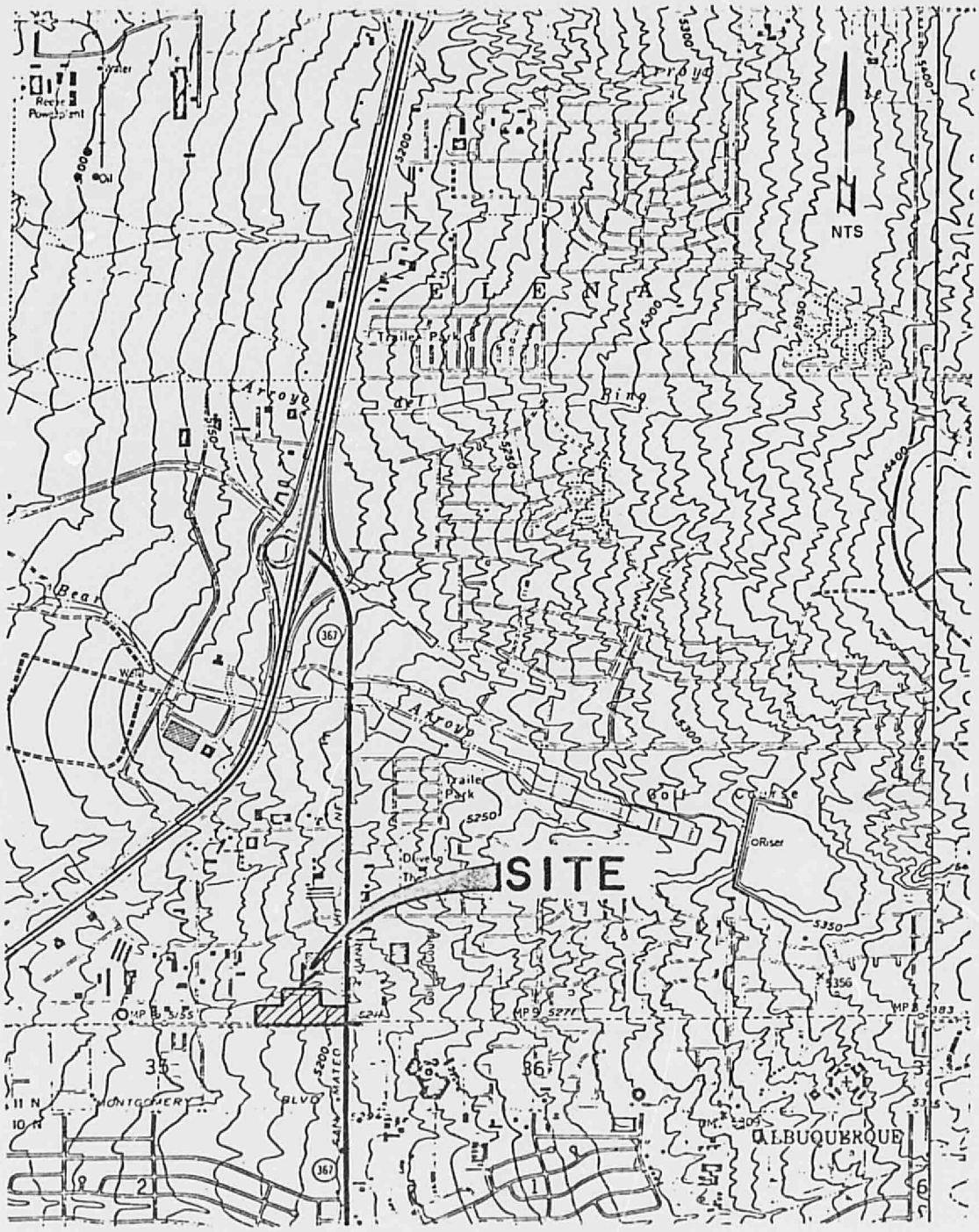
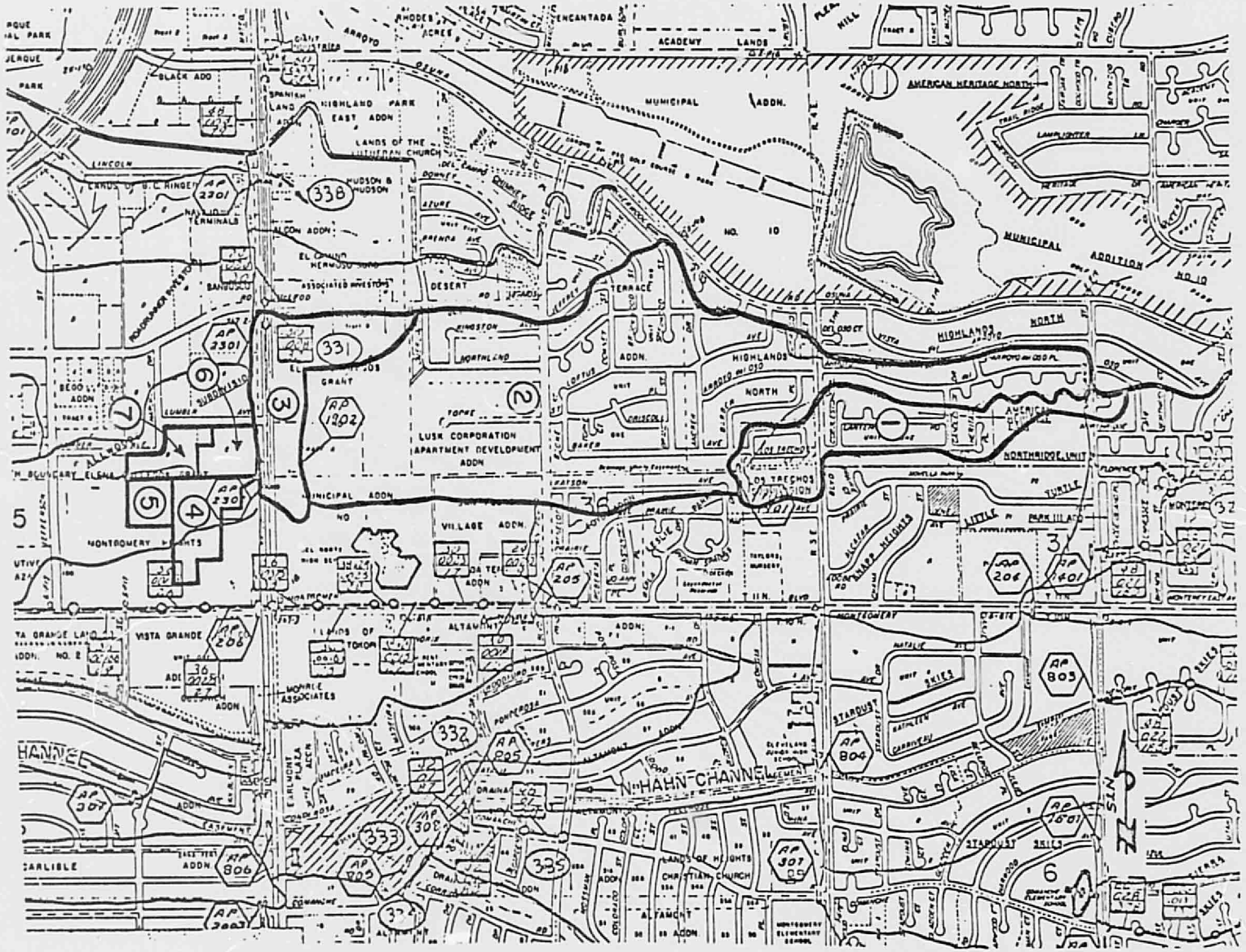


Topographic Map

Exhibit III

25×10



Drainage Area Map

Exhibit IV

25×10

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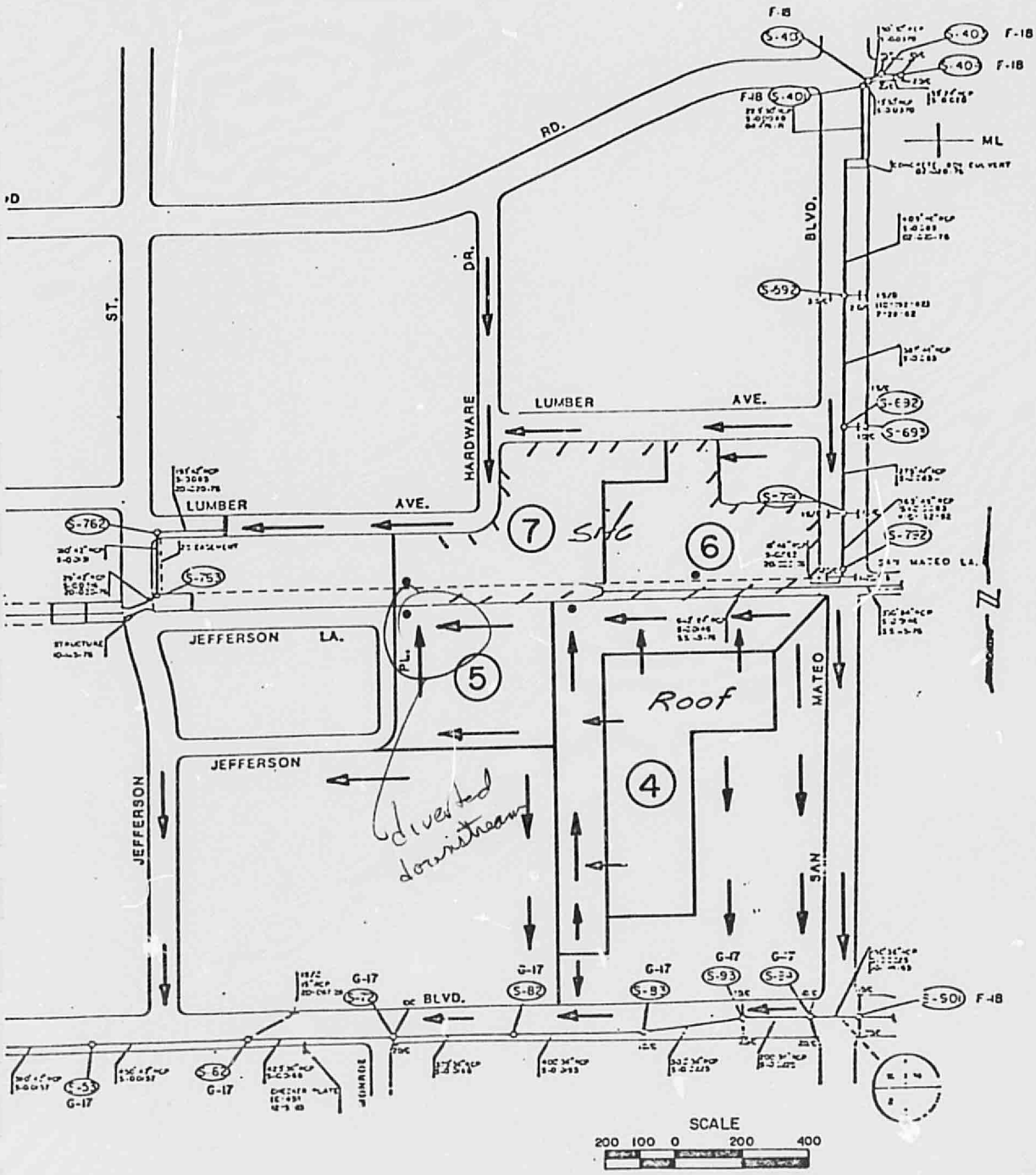
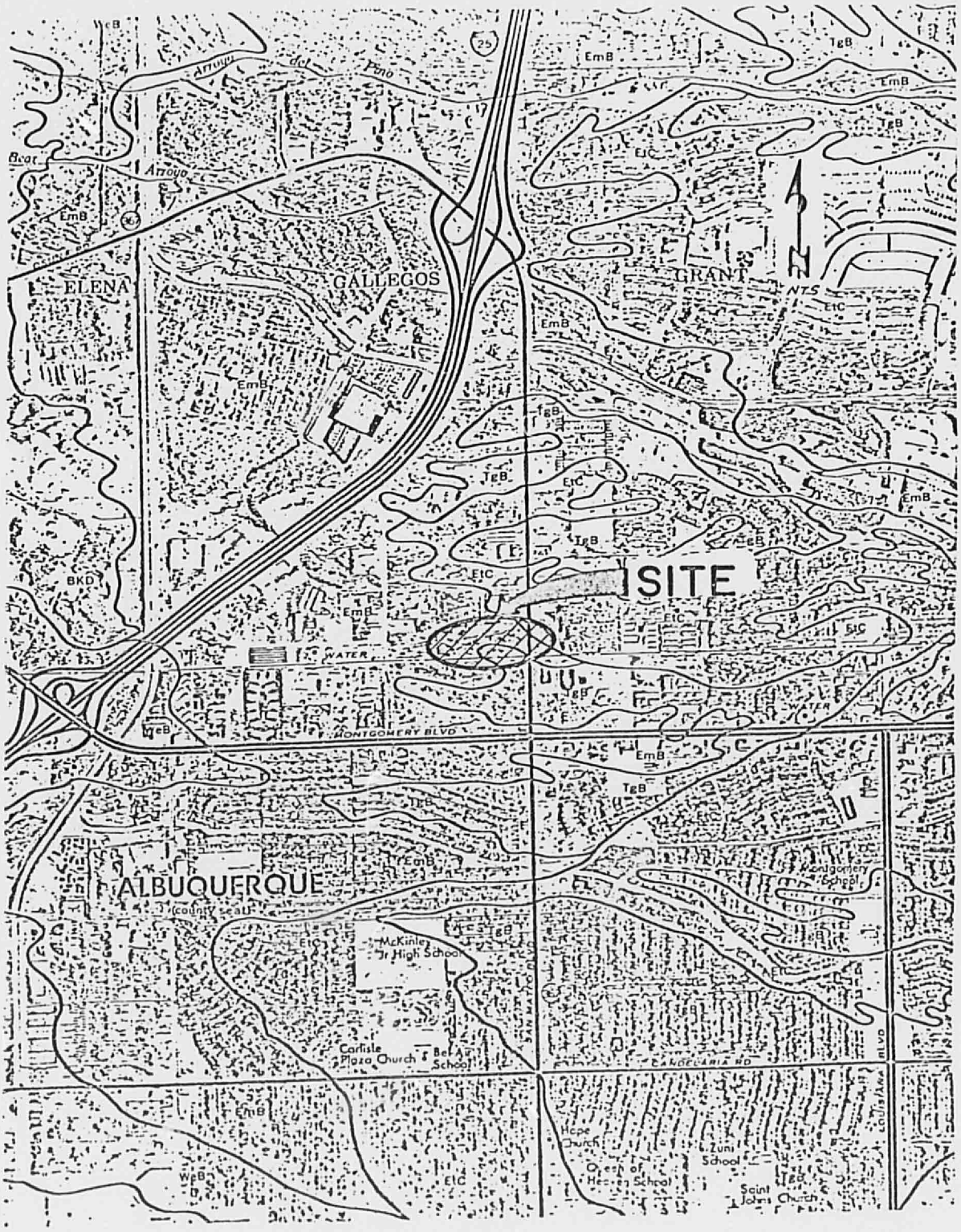
0000 0000 0680



Local Drainage Area Map

Exhibit V

25×10



Area Soil Map

Exhibit VI

25×10

0000 0000 0682

DRAINAGE REPORT

FOR THE

SOUTHWEST SKATEBOARD

PARK

Goldberg · Mann & Associates
Engineers-Planners
911 Pennsylvania N.E. Albuquerque, New Mexico 87110

25×10

0000 0000 0683

Goldberg · Mann & Associates
Engineers·Planners
911 Pennsylvania St. Albuquerque, New Mexico 87110 (505) 265-3521

March 27, 1978

Mr. Scott Price
3939 San Pedro N.E.
Albuquerque, NM 87110

Re: Southwest Skateboard Park Drainage Report

We are herewith submitting three (3) copies of the drainage report for your project.

The drainage plan is in accordance with the requirements of the City of Albuquerque and the Albuquerque Metropolitan Arroyo Flood Control Authority.

We have enjoyed working with you on this project and look forward to future opportunities to assist you.

Yours sincerely,

Thomas T. Mann, Jr., P.E.
President

djv

Enclosure

25×10

F17/D20

0000 0000 0684

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CALCULATIONS

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FIGURE 2. EXISTING TOPOGRAPHY AND GRADING PLAN

25×10

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PURPOSE AND SCOPE

The purpose of this drainage plan is to establish the criteria for controlling surface runoff from a particular development in a manner that is acceptable to the City of Albuquerque and to the Albuquerque Metropolitan Arroyo Flood Control Authority.

This plan will determine the runoff resulting from a 100-year frequency storm falling on the site under existing and developed conditions.

The scope of this plan is to insure that the proposed project will be protected from storm runoff and that the potential of the adjacent properties.

LOCATION AND DESCRIPTION OF PROJECT

The project is located within the corporate limits of the City of Albuquerque in the northeast quadrant. The project is bordered on the south by McLeod Road N.E. and undeveloped lands to the north, east and west. The parcel is located in Section 35, Township 11 North, Range 3 East as shown in Figure 1.

This parcel is approximately 2.0 acres in size and will be developed as a skateboard park. The natural topography of the area slopes from east to west at approximately 4 percent.

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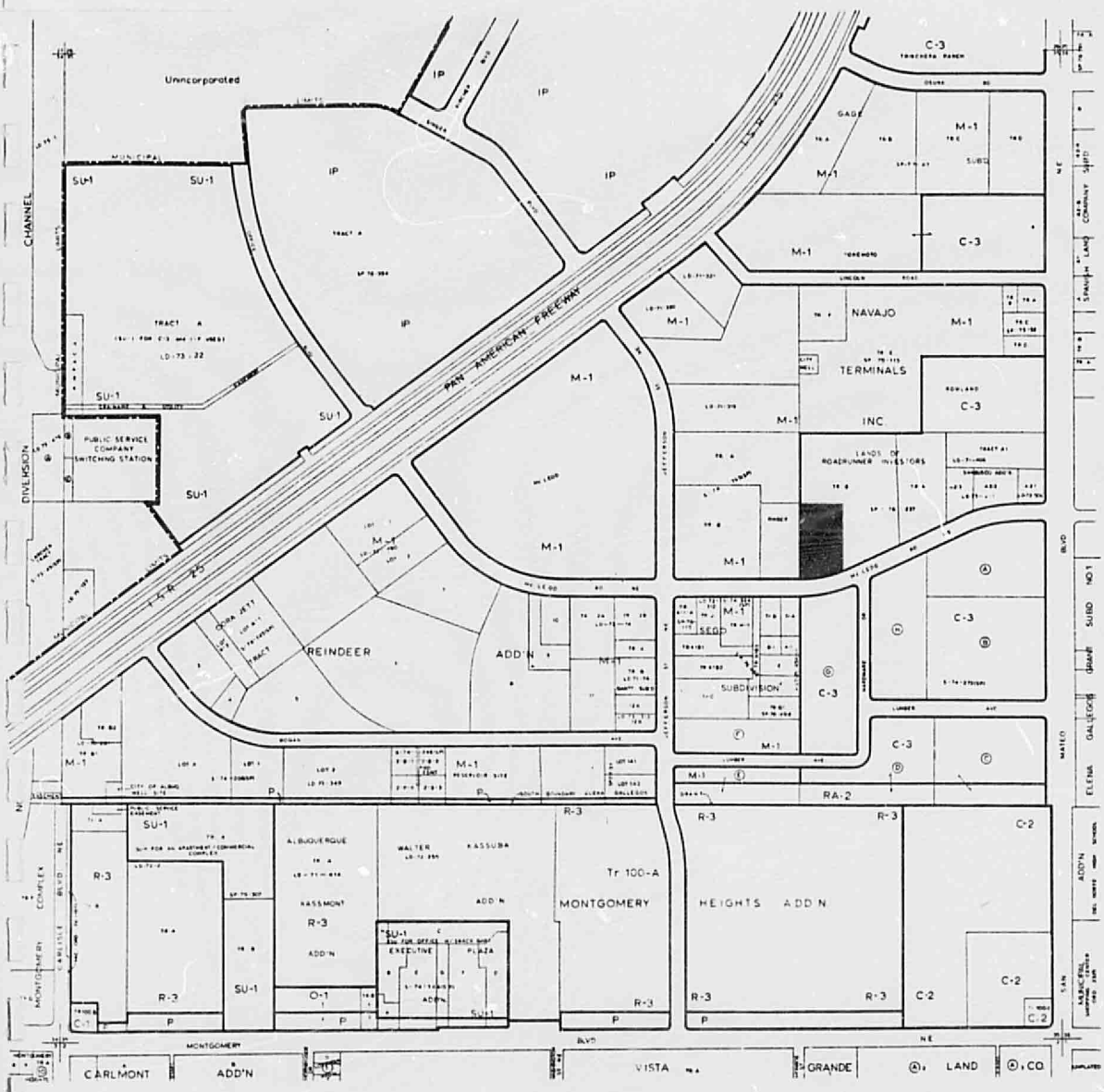
FIGURE 1.
LOCATION MAP

DATE
RECEIVED_____



APPLICANT

NAME: Scott Price
ADDRESS: 3939 San Pedro N.E.
Albuquerque, NM
PHONE: 883-3633
SIGNATURE: Scott Price

LOCATION OF PARCEL

LOT NO: Tract B BLOCK NO: N/A
SUBDIVISION: Lands of Roadrunner Inv.
STREET ADDRESS: McLeod Road N.E.
Albuquerque, NM

CURRENT ZONING: C-3

F-17

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EXISTING DRAINAGE CONDITIONS

The existing contours are shown in Figure 2. The development of the land to the north and east has greatly reduced the amount of off-site flows that will affect the project site. Approximately four (4) acres of land due east of the site will contribute runoff to the site. Land to the north and east will not contribute any runoff to the site. McLeod Road to the south is lower than the site and therefore will not contribute any runoff.

PROPOSED DRAINAGE CONDITIONS

The skateboard runs are essentially irregular swimming pools. Areas immediately adjacent to runs will drain into the runs. As shown in Figure 2, the low point in each run will contain a drain and all drains will be connected by drain pipe. The pipe will connect to a sump which contains a sump pump. The sump pump will transfer the stormwater from the sump into a leach field located along the west property line.

The leach field will be sized to store approximately 3,000 cubic feet of water and operate at a percolation rate of 2.0 inches per hour. The skateboard runs will retain the runoff until the water can be transfered to the leach field. The water level in the runs will reach an approximate elevation of 5,169 feet during the 100-year frequency storm. The pump will be sized to deliver 82 gpm to the leach field. This rate is equivalent to the rate of percolation in the leach field required to percolate 50% of

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the runoff from a 100-year frequency storm. Runoff in excess of 50% will overflow the leach field and flow into McLeod Road. The runoff from the parking lot will be conveyed through drop inlets directly into the leach field.

An earth ditch will be constructed along the east property line to divert off-site flows into the parking lot.

CONCLUSIONS

1. Direct all flows possible into the skateboard runs.
2. Direct all flows from the parking area into drop inlets.
3. Utilize the skateboard runs as temporary storage.
4. Construct a leach field type percoalation system along the west property line. The system should be capable of percolating 8850 cubic feet of runoff at the rate of two (2) inches per hour.
5. Flows from the inlets can enter the leach field by gravity.
6. Flows from the runs must be pumped into the leach field. The maximum pumping rate shall not exceed 82 gpm.
7. Construct an earth ditch along the east property line to direct off-site flows into the parking lot.

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CALCULATIONS

Area of Project	442.5 x 200 = 88,500 square feet
Area of Parking and Road	30,280 square feet (34%)
Remaining Area	58,220 square feet (66%)
Required Pond Volume	88,500 x 0.1 = 8,850 cubic feet

Volume of Runs at Elevation 5169

Pond C	=	10,395 cubic feet
Pond D	=	570 cubic feet
Pond E	=	1,710 cubic feet
Pond F	=	2,955 cubic feet
TOTAL		15,630 cubic feet

Volume of Runs at Elevation 5167.5

Pond C	=	6,846 cubic feet
Pond D	=	145 cubic feet
Pond E	=	606 cubic feet
Pond F	=	1,520 cubic feet
TOTAL		9,117 cubic feet

Volume of Water from Parking and Road

8850 x 0.34 = 3,009 cubic feet

Volume of Water from Runs

8850 x 0.66 = 5,841 cubic feet

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PLANS/PLATS ON FILE

FILE DESC: F17/D20

PLANS/PLATS 3

25×10

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