

APPENDIX "A"

**Sunport Park
Original Drainage Report**

Latest Revision August 1990

DRAINAGE REPORT

for

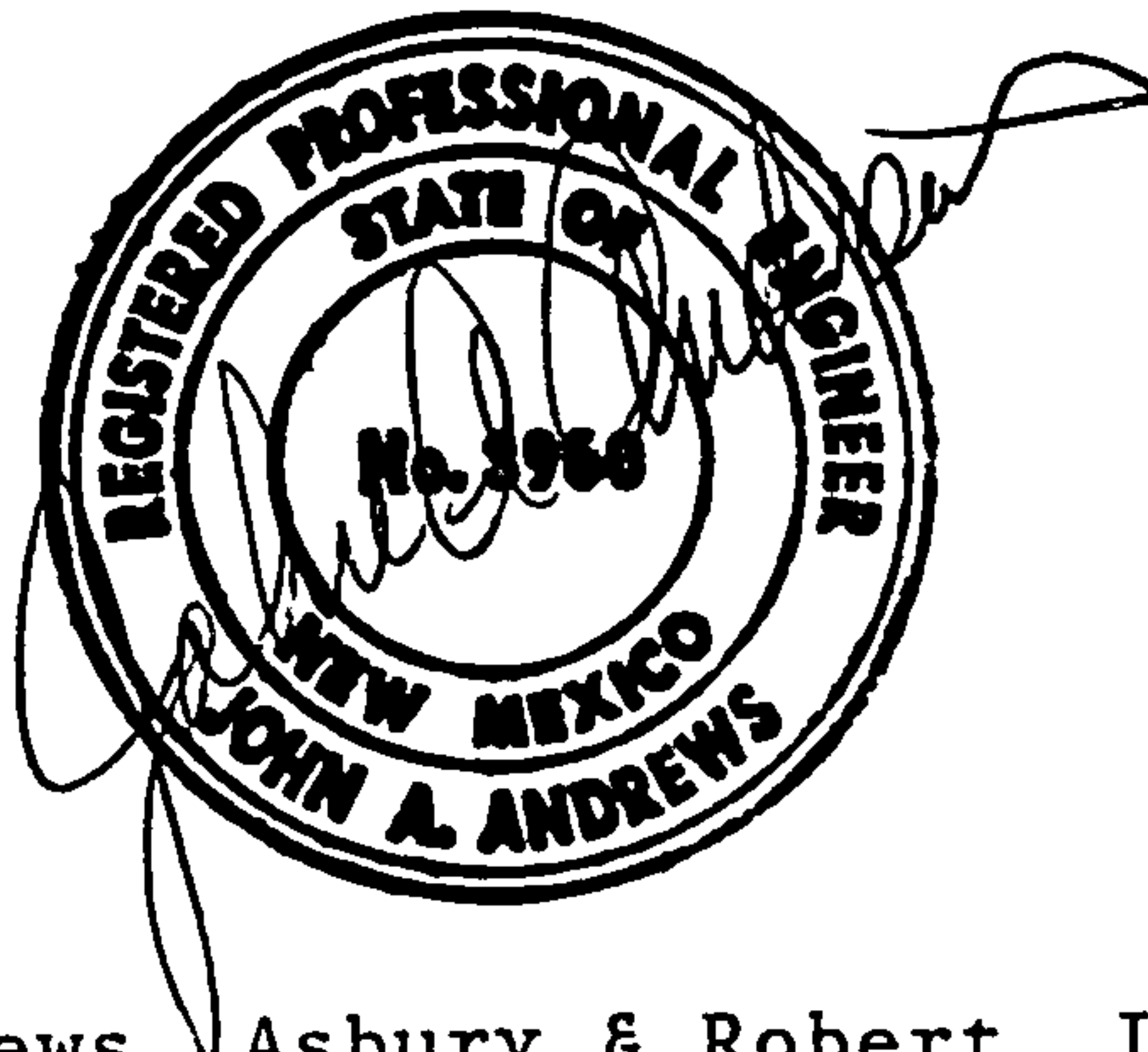
SUNPORT PARK

PHASE I

June, 1987

REVISED JANUARY, 1988

REVISED AUGUST, 1990



Andrews, Asbury & Robert, Inc.

Consulting Engineers

Albuquerque, New Mexico

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I

INTRODUCTION

This report, with the enclosed maps, provides a Drainage Plan for Sunport Park - Phase I. Phase I constitutes approximately the northerly half of the total Sunport Park Area.

The southerly portion of the Sunport Park Area will be addressed under a separate future report as Phase II.

This Sunport Park project is located in the southeast quadrant of the Albuquerque Metropolitan Area, and lies approximately one-half mile west of the Airport. It is bounded on the east by South University Boulevard, on the south by the University of New Mexico South Golf Course, on the north by the Kirtland Addition and on the west by Interstate 25.

See enclosed Location Map (Map No. 1), Zone Atlas Map M-15.

II

EXISTING CONDITIONS

A. GENERAL

The underlying contours shown on the Drainage Plan included herein as Map No. 2, depicts the existing topographic conditions of the site.

The terrain of the site is relatively steep, having slopes of approximately five percent to six percent (5% to 6%) from east to the west.

B. OFFSITE DRAINAGE

The major offsite areas generating storm water runoff towards the site under existing conditions are located along the east boundary of the area. These areas are shown on the Existing Conditions Map (Map No. 3) enclosed.

In addition to the major offsite areas, a small area located along a portion of the north boundary of the property generates some offsite storm water to the site. This small area is shown on Map No. 2 enclosed, as Area B-1.

As stated previously, this report addresses only Phase I of Sunport Park, this phase being the northerly portion of the overall area. The southerly portion of the area will be addressed under a future Phase II report, therefore, any offsite flows affecting this southern portion of the area will be considered at the time the Phase II report is prepared.

C. ONSITE DRAINAGE

The storm water runoff generated onsite from the major portion of the area, combined with the offsite runoff from the east, flows westerly and crosses under Interstate 25 (I-25) through various existing culverts, from 300 feet to 1,000 feet west of I-25, the runoff enters the Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA) South Diversion Channel.

Onsite runoff from the northerly portion of the site flows northwesterly, and enters the AMAFCA South Diversion Channel on the east side of I-25.

III

DEVELOPED CONDITIONS

A. OFFSITE

South University Boulevard located along the easterly boundary of this site is proposed to be graded and paved prior to the overall development of the Phase I portion of Sunport Park with the westerly (south bound) lanes to be constructed initially. Construction work on this South University Boulevard Project has begun. When constructed, South University Boulevard will intercept all offsite runoff from the east that affects the Phase I portion of Sunport Park and diverts a portion of the runoff north and a portion to the south.

The runoff from the small offsite area adjacent to the north boundary will be disposed of along with onsite runoff at the northwesterly corner of the site.

B. ONSITE

This subdivision is to be developed as an Industrial Park, however, it is not known at this time what the actual type, size or location of the buildings will be or the actual type ground cover proposed in the ultimate development. It is

therefore assumed that in the final developed conditions, the subdivision will have a runoff factor "C" of 0.70 and it is proposed to allow for total runoff from the site without detention of storm waters.

The runoff generated from the site will be conveyed in the streets and underground storm drains.

The drainage plan included herein as Map No. 2 shows the proposed drainage areas and systems for developed conditions.

This plan of drainage is to establish the major drainage facilities to be constructed at the time the infrastructure for the project is constructed. Also, this plan is to provide a guide for use in the preparation of future plans on an individual basis, when actual development of the various parcels of land occurs.

A northwesterly portion of the site, Drainage Area B-2, along with offsite Drainage Area B-1, will be collected by an inlet at the far northwest corner of the site and carried by a storm drain to the Kirtland Channel.

The runoff from the remaining onsite drainage area, (Areas A-1 through A-11) will be collected by a combination of streets

and storm drains, as shown on Map No. 2 enclosed. Collected runoff will be carried from the site by a major storm drain to be tunneled under Interstate I-25 in Woodward Road and extended westerly to the AMAFCA South Diversion Channel. A 65' easement has been obtained for the storm drain between the Interstate 25 right-of-way and the existing Woodward Road right-of-way east of the South Diversion Channel.

IV

EROSION CONTROL

The contractor for the project will be responsible for soil migration during the construction phase. This can be accomplished by sedimentation basins and windrows.

After development of the individual tracts, erosion will be controlled by landscaping of all areas not covered by buildings or pavement.

A separate Erosion Control Plan is being submitted to address conditions after construction, but prior to development of the individual tracts.

V

DRAINAGE ANALYSES

Following are the Drainage Analyses (computations) made for the drainage areas affecting subject lands in the proposed developed conditions.

DRAINAGE ANALYSIS

CRITERIA

City of Albuquerque
Development Process Manual
Volume 2 - Section 22

DESIGN PARAMETERS

Peak Runoff Rate -

Rational Formula - $Q = CIA$

Assume Developed Conditions
and allowing total Runoff.

$$"C" = 0.70$$

$$I_{100} = (2.3)(6.84)(t_c)^{-0.51}$$

$$I_{10} = 0.657 \times I_{100}$$

Travel time determined from
Plates 22.2 B-1 & 22.2 B-2

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Project Sunport Park Phase 7 Sheet 2 of 8
Drainage Analysis Job No. 415
By JEM Chk'd _____ Date 8.3.90

Analysis Point	Drainage Area Designation	Area (Acres)	Length of Travel (Ft)	Slope (%)	Velocity (ft/sec)	Travel Time (min)	C	F ₁₀ (in/hr)	I ₁₀₀ (in/hr)	Q ₁₀ (cfs)	Q ₁₀₀ (cfs)
1	A-1 & A-2	12.2	700' Overland	8.3	3.42	3.41 (use 10)	0.7	3.19	4.86	27.23	41.9
	A-3	1.7	450' Overland	4.4	3.25	2.30 (use 10)	0.7	3.19	4.86	3.8	5.8
2	A-1, A-2 & A-3	13.9	700' Overland 200' Street	8.3 6.0	3.42 6.7	3.41 (3.91 use 10) 0.50 (use 10)	0.7	3.19	4.86	31.0	47.3
	A-4	4.6	500' OL 400' ST	4.4 0.75	3.25 2.3	2.30 (5.20 use 10) 2.70 (use 10)	0.7	3.19	4.86	10.3	15.6
3	A-1 thru A-4	18.5	300' ST 500' ST	4.2 0.75	5.45 2.3	0.95 (4.65 use 10) 3.70 (use 10)	0.7	3.19	4.86	41.3	62.9
	A-5	4.7	490' OL	10.9	5.12	1.53 (use 10)	0.7	3.19	4.86	10.5	16.0
4	A-1 thru A-5	23.2	495' Pipe	0.75	10.0	0.83	0.7	3.19	4.86	51.81	78.9
5	A-6	10.3	750' OL	4.93	3.45	3.63 (use 10)	0.7	3.19	4.86	23.0	35.0
6	A-6, A-7 & A-8	17.2	750' OL 750' ST	4.93 6.40	3.45 7.1	3.63 (5.39 use 10) 1.76 (use 10)	0.7	3.19	4.86	38.4	58.5
7	A-6 thru A-9	20.8	750' OL 750' ST 240' Pipe	4.93 6.40 1.64	3.45 7.1 3.8	3.63 (7.09 use 10) 1.76 (use 10) 0.33 (use 10)	0.7	3.19	4.86	46.4	70.8
8	A-1 thru A-9	44.0	390' Pipe 240' Pipe		13.7 12	9.39 (use 10) 0.33 (use 10) 0.33 (use 10)	0.7	3.19	4.86	98.3	149.7
	A-10	9.2	710' OL	4.80	2.60	4.55 (use 10)	0.7	3.19	4.86	20.5	31.3

Project Sunport Park Phase I Sheet 3 of 8
Drainage Analysis Job No. 415
 By EM Chk'd _____ Date 08.15.00

OFF SITE AREAS

DRAINAGE AREA 500

(See enclosed Existing Conditions
map for Location)

Existing Conditions

$$A = 18.6 \text{ Acres}, C = 0.40$$

$$L = 2300'$$

$$S = \frac{5272 - 5150}{2300} = 0.053 \text{ ft/ft.}$$

$$V = 1.15 \text{ fps}$$

$$T_c = 33.3 \text{ minutes}$$

$$I_{100} = 2.63$$

$$Q_{100} = (0.40)(2.63)(18.6) = 19.6 \text{ CFS}$$

Developed Conditions

$$A = 18.6 \text{ Ac.}, C = 0.68, I_{100} = 4.37, I_{10} = 2.87$$

$$T_c = 12.4 \text{ min}$$

$$Q_{100} = (0.68)(4.37)(18.6) = \underline{\underline{55.3 \text{ cfs.}}}$$

$$Q_{10} = (0.68)(2.87)(18.6) = 36.30 \text{ cfs}$$

South University Blvd. Street Capacity

1/2 Street Width

$$A = 10.50 \text{ ft}^2, S = 0.029 \text{ ft/ft.}$$

$$V = \frac{1.486}{0.015} \left(\frac{10.5}{26} \right)^{2/3} (0.029)^{1/2} = (99.1)(0.546)(0.170) \\ = 9.22 \text{ fps}$$

$$Q_{\text{Capacity}} = AV = (10.5)(9.22) = \underline{\underline{96.81 \text{ CFS} - \text{OK}}}$$

at top of curb.

REVISED 3/23/80

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Project Sunport Park Sheet 5 of 8
Phase I Job No. 415
By RSF Chk'd - Date 11/7/85

DRAINAGE AREA 201

(See enclosed Existing Conditions Map for location)

Existing Conditions

$$A = 71 \text{ ac.}, \quad C = 0.40$$

$$L = 3350$$

$$S = \frac{5308 - 5200}{3350} = 0.0322 \text{ ft/ft}$$

$$T_c = 15.2 \text{ mins}$$

$$I_{100} = 3.93 \text{ in/hr}$$

$$Q_{100} = .4 \times 3.93 \times 71 = 111.6 \text{ cfs}$$

Developed Conditions

$$A = 71, \quad C = 0.68, \quad I_{100} = 3.93$$

$$Q_{100} = .68 \times 3.93 \times 71 = 189.7 \text{ cfs}$$

for $H/D = 1.7$ (RCP)
GROOVE END w/ HDW

54" RCP

Check water Depth in Flightway at P 2
 $Q = 47.3$ cfs, width = 40', in vertical curve transitioning from
2.5% to 0.75% & horizontal curve ($R = 300'$)
Compute @ 8.5% w/o allowance for horizontal curve

$$V = 7.9 \text{ fps}, d_c = 0.42'$$

$$A = 47.3 \div 7.9 = 5.98 \text{ ft}^2$$

$$y_h = 5.98 \div 40 = 0.15'$$

$$Fr = V / \sqrt{g y_h} = 7.9 / \sqrt{32.2 \times 0.15} = 3.6$$

Compute Fr @ bottom end of curve (AP #3) $S = 0.75\%$, $Q = 62.9$ cfs

$$V = 3.9 \text{ fps}, d_c = 0.67'$$

$$A = 62.9 \div 3.9 = 16.12$$

$$y_h = 16.12 \div 40 = 0.40'$$

$$Fr = 3.9 / \sqrt{32.2 \times 0.40} = 1.08$$

Since no sudden transition take place it is unlikely that a jump will take place at bottom of curve depth would not be significantly above normal depth in any case ($Fr = 1.08$). Due, however, to velocity reduction sedimentation will take place.

Compute Super-elevation @ upstream end of curve

$$S = V^2 b / g r = 7.9^2 \times 40 / 32.2 \times 300 = 0.26'$$

$$\therefore \text{depth outside curb} = 0.26 + 0.42 = 0.68'$$

Compute @ downstream end of curve

$$S = 3.9^2 \times 40 / 32.2 \times 400 = 0.05' \therefore \text{depth outside curb} = 0.05 + 0.67 = 0.72'$$

Check Wake - Depth in Woodward @ AP #6

$$Q = 58.5 \text{ cfs, width} = 40', S = 3.11\%$$

From DPM Plate 223, D-2

$$\text{Depth} = 0.52', V = 6 \text{ fps}$$

$$Fr = V / \sqrt{g y_n}$$

$$A = 58.5 \div 6 = 9.75 \text{ ft}^2$$

$$y_h = 9.75 \div 40 = 0.243$$

$$Fr = 6 / \sqrt{32.2 \cdot 0.243} = 2.14$$

When turns onto Transport $S = 1.60\%$

$$\text{Depth} = 0.575', V = 4.8 \text{ fps}$$

$$A = 58.5 \div 4.8 = 12.18 \text{ ft}^2$$

$$y_n = 12.18 \div 40 = 0.305'$$

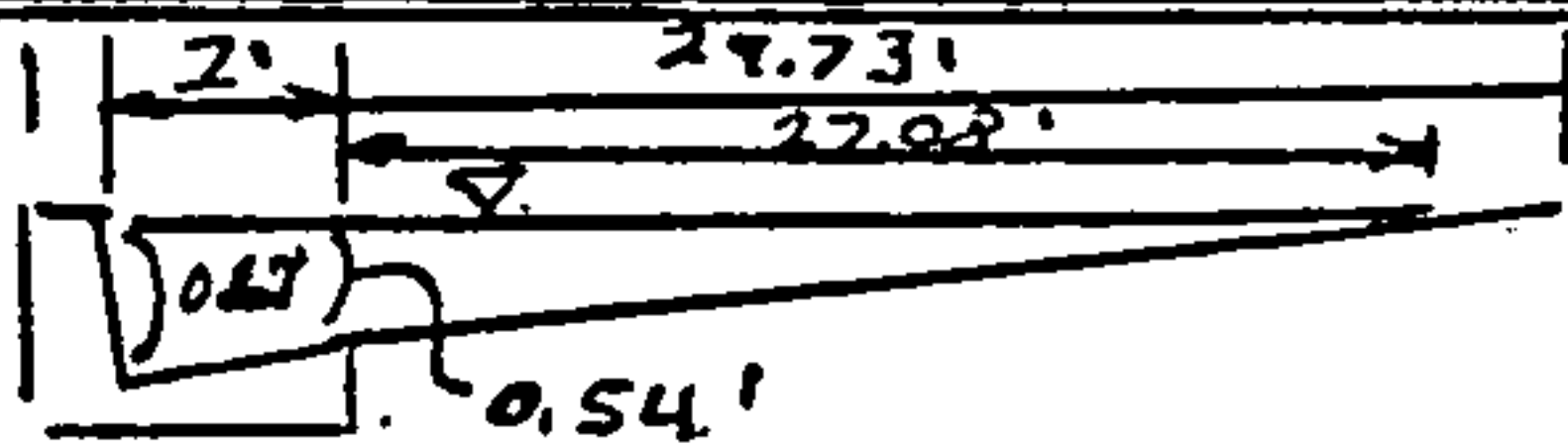
$$Fr = 4.8 / \sqrt{32.2 \cdot 0.305} = 1.53$$

$\therefore$ No sustained Hydraulic Jump takes place (i.e. lack of tailwater)

A short unsustained jump may take place at turn - compute conjugate depths by Trial & Error, use FL gutter as baseline 0.00

	$y_1 = 0.52'$	$V = 6 \text{ fps}$	$h_v = 0.56'$	$\% EG = 1.08 \cdot V / 10 \cdot \text{Energy loss} = 0.97$
try	$y_2 = 0.67'$	$V = 3.75$	$h_v = 0.22$	$\% EG = 0.89$
	$y_2 = 0.80'$	$V = 2.75$	$h_v = 0.12$	$\% EG = 0.92$
	$y_2 = 0.85'$	$V = 2.4$	$h_v = 0.09$	$\% EG = 0.94$ within 0.03'

Extra losses caused by 90° street bend make it unlikely to leave P.O.W., however sediment will drop @ this point whether jump takes place or not because of basic velocity reduction from 6 fps to 4.8 fps. A partial unsustained jump will drop more. Momentum may create some problem if no drive entrance should be allowed straight across from Woodward



Sta 15+50 - Slope = 3.10%
Area of water = $\left[\left(\frac{.67 + .54}{2} \right) \times 2 \right] + \frac{.54 \times 27.08}{2} = 18.52 \text{ ft}^2$

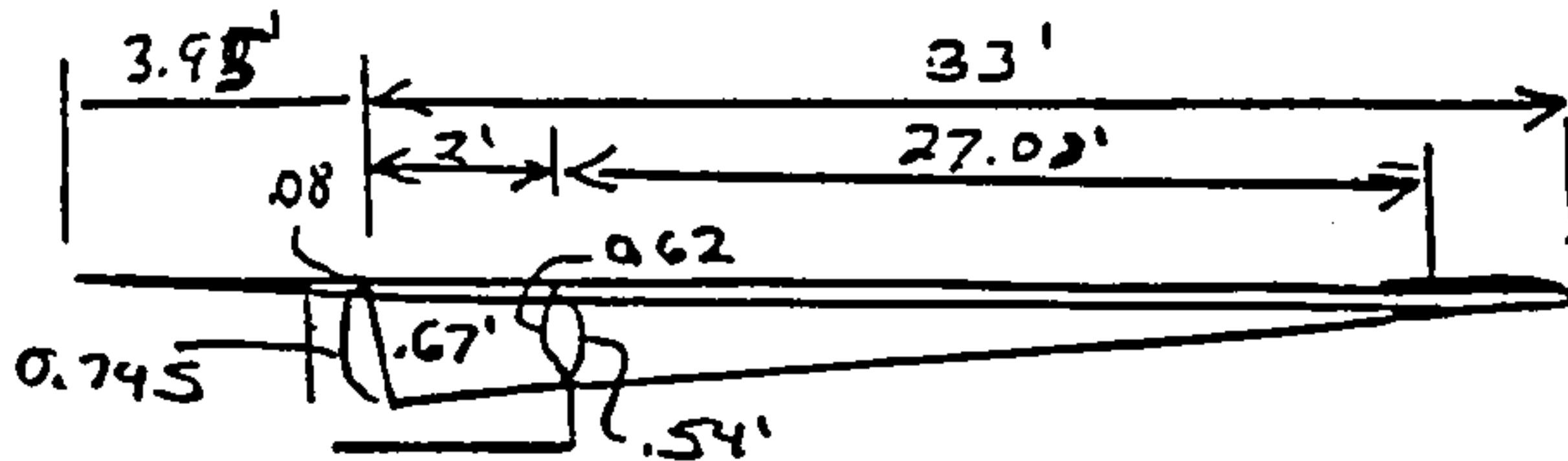
WP = $29.08 + .67 = 29.75'$

$R = 8.52 \div 29.75 = 0.286'$

$V = \frac{1.486}{.017} \times .286^{2/3} \times .0310^{1/2} = 6.69 \text{ fps}$

Cap = $6.69 \times 8.52 = 56.97 \text{ cfs}$

$Q_{po} = 55.3 \text{ cfs}$ (St. 11 leaves .05' FB)



Sta 16+27.26 S = 2.10%
 $A = 8.52 \text{ ft}^2$ $R = 0.286'$ (w/o Topping Curb)

$V = \frac{1.486}{.017} \times .286^{2/3} \times .0210^{1/2} = 5.50 \text{ fps}$

Cap = $5.50 \times 8.52 = 46.85 \text{ cfs}$ (w/o Topping Curb)

w/o Topping & $A = \left(\frac{3.95 \times .08}{2} \right) + \left(\frac{.62 + .745}{2} \right) \times 2 + (.62 \times 31 \div 2) = 11.13 \text{ ft}^2$

WP = $33 + .67 + 3.95 = 37.62 \text{ ft}$

$R = 11.13 \div 37.62 = 0.296$

$V = \frac{1.486}{.017} \times .296^{2/3} \times .0210^{1/2} = 5.62 \text{ fps}$

Cap = 62.59 cfs $Q < 55 \text{ cfs}$

@ Sta 16+65.26, S = 1.61%, section same as 16+27.26

w/o Topping Curb $V = \frac{1.486}{.017} \times .286^{2/3} \times .0161^{1/2} = 4.82 \text{ fps}$

Cap = 41.02 cfs

w/o Topping & crown $V = \frac{1.486}{.017} \times .296^{2/3} \times .0161^{1/2} = 4.93 \text{ fps}$

Cap = 54.83 cfs ($Q < 55 \text{ cfs}$)

∴ If East lanes properly constructed flow will not divert down Flyway

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Project Sonport Park Sheet 1 of 3
Inlet Capacities Job No. 415
By JM Chk'd _____ Date 5.29.87

Inlet Flows are based upon the runoff factors presented in this report.

Street Flow depths are computed based upon The City of Albuquerque Development process manual - Plate 22.3D-2

Catch Basin Gully Capacities are based upon the DPM - Plate 22.3D-5 (Type A) & 22.3D-6 (Type Double C).

Catch Basin Throat capacities are based upon Texas Highway Dept. Tables for Curb opening inlets, 3" depression.

TABLE 16-1. CAPACITIES OF STORM-FLOW INLETS PER FOOT OF LENGTH

Depth of flow in gutter, ft.	Depth of depression, in.	Average capacity per foot of length, cu. ft. per sec.	Depth of flow in gutter, ft.	Depth of depression, in.	Average capacity per foot of length, cu. ft. per sec.
0.05	0		0.3	0	0.115
	1	0.063		1	0.205
	2	0.148		2	0.320
	3	0.250		3	0.450
	4	0.357		4	0.590
0.1	5	0.510	0.4	5	0.758
	0	0.022		0	0.175
	1	0.086		1	0.277
	2	0.180		2	0.400
	3	0.290		3	0.540
0.2	4	0.420	0.5	4	0.682
	5	0.555		5	0.860
	0	0.062		0	0.247
	1	0.141		1	0.362
	2	0.245		2	0.490
	3	0.358		3	0.640
	4	0.500		4	0.796
	5	0.650		5	0.950

At NW Corner of Property (AP-14), $Q = 28.6$ cfs
Use Sedimentation Basin Inlet, 6' dia, weir length = 18.85' c/c 59.50
 $28.6 = 3.0 \times 18.85 \times H^{3/2}$
 $H = 0.63'$ $\therefore$ HGL = 60.13

On Transport street

Inlets @ Approx Sta 15+00 (AP-3) $Q = 62.9$ cfs (31.5 cfs ea side)
Street slope = 0.75 %; $w = 40'$, $D = 0.68'$

Type A catches 9 cfs (grate)

throat $0.64 \times 6.5 = 4.2$ cfs

13.2 cfs $\therefore$ remaining = 18.3 cfs, $d = 0.57'$

- Type Double C catches 8.5 cfs grate

4.2 cfs throat

12.7 cfs $\therefore$ remaining = 5.6 cfs

Use 1 more Double "C" for Complete Capture

Transport Street Approx Sta 7+65 (AP-6) $Q = 58.5$ cfs, Street = 1.60 %
 $1/2$ ea side = 29.25 cfs, depth = 0.58'

Type "A" Cap =

9 cfs (Grate)

4.2 cfs (Throat)

13.2 cfs

remaining = 16.05 cfs, depth = 0.49'

Double "C" caps =

7.5 cfs (Grate)

4.2 cfs (throat)

11.7 cfs

Remaining = 1.5 cfs - catch w/ another Double C on East, let pass on west.

Transport St Sta 9+70± (AP 7) pick up area Aug $Q = 12.2$ cfs (E. side)

$s = 1.60\%$, depth = 0.45'

Type A cap = 7 cfs (Grate)

4.1 cfs (Throat)

11.1 cfs

total - Pick up remainder w/ double C

Transport Sta 11+25 (Low Point) West side 1.5 cfs (1 double C)

E side Area A-S 16 cfs - 1 double C

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Project Sunset Park Phase I Sheet 3 of 3
Inlet Calculations Job No. 415
By JM Chk'd _____ Date 08.24.90

At AP-9 Pick up area A-10 w/ 6' dia Basin Inlet, $Q = 36.3 \text{ cfs}$

$$\text{Weir length} = 6 \times \pi = 18.85'$$

$$36.3 = 3.0 \times 18.85 \times H^{3/2}$$

$$H = 0.67'$$

At AP-10 Pick up area A-11 w/ 6' dia Basin Inlet, $Q = 14.3 \text{ cfs}$

$$14.3 = 3.0 \times 18.85 \times H^{3/2}$$

$$H = 0.40'$$

Project Support B-K Sheet 1 of 3
Phase I Job No. 415
 By JEM Chk'd _____ Date 7.6.90

Summary of Hydraulic Calculations

[illegible]

Summary of Hydraulic Calculations

STAT	STRUC	D	Q	H	V	K	Sf	L	Δ	Junction D	LOSSES						E _G	h _v	H _G
											h _f	h _b	h _i	h _m	h _{ex}	Σ			
22+28.70		48"	80.6	12.57	14.37		.0158	68'	91.57		1.07	1.83				2.90	27.60	4.82	22.78
22+47.14																	30.50	3.21	27.29
25+84.92	MH	48"	80.6	12.57	14.37		.0158	337.61			5.33					5.33	30.50	3.21	27.29
25+84.92	Joint	48"	49.7	12.57	11.91					30			0.67			0.67	35.83	3.21	32.62
26+52.92		48"	149.7	12.57	11.91		.011	68	90.82		0.74	1.25				1.99	36.50	2.20	34.30
			Compute Distance to H _G Break from Curve														38.49	2.20	36.29
			HG = 36.29, Invert = 26.75 :: Curve = 30.75 :: Surcharge = 5.54'																
			S _{prop} = 6.14%																
			S _{prop} = 5.54%																
			Dist = 109.92'																
			(Sta 27+30.20)																
	By MH Sta		29+59.31 Flow will be approximately normal																
			Capacity = 12,566 x $\frac{1.484}{.013} \times \frac{1}{2} \times .0614^{1/2} = 355.92$ cfs																
			Q/Q _F = 149.7 ÷ 355.92 = 0.42 :: D/D _F = 0.45 :: D = 1.80' :: HGL = 46.30																
	By MH Sta		31+81.62 Flow will be in approach Normal																
			Capacity = 12,566 x $\frac{1.484}{.013} \times \frac{1}{2} \times .0614^{1/2} = 355.92$ cfs																
			Q/Q _F = 149.7 ÷ 355.92 = 0.42 :: D/D _F = 0.45 :: D = 1.80' :: HGL = 46.30																
			A/A _F = .595 :: A = 7.48 ft ² :: V = 20.02 fps :: h _v = 6.22' :: EGL = 59.10																
																	59.10	6.22	52.88

Summary of Hydraulic Calculations

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Project Support 73-k

Phase I

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Office

Sheet 6

Job No. 415

Date **7.6.90**

[illegible]

APPENDIX "B"

AHYMO - RUN

**Sunport Park Boulevard
Storm Drain Facilities**

AHYMO PROGRAM (AHYMO194) - AMAFCA Hydrologic Model - January, 1994

RUN DATE (MON/DAY/YR) = 12/19/1996

START TIME (HR:MIN:SEC) = 21:34:07 USER NO.= ANASRONM.I01

INPUT FILE = C:\PROJECTS\752\AHYMO\MLZCRBMD.DAT

*S SUNPORT PARK - PHASE 1, BLOCK 4-A AND 4-B

*S BLOCK 4-B HYDROGRAPH ADDITION TO MOLZEN-CORBIN DRAINAGE MODEL

*

START TIME=0.0 PUNCH CODE=0

RAINFALL TYPE=2 QUARTER=0

ONE=1.87 SIX=2.01

DAY=2.75 DT=0.05 HR

COMPUTED 24-HOUR RAINFALL DISTRIBUTION BASED ON NOAA ATLAS 2 - PEAK AT 1.40 HR.

DT = .050000 HOURS END TIME = 24.000000 HOURS

.0000	.0005	.0009	.0014	.0019	.0024	.0030
.0035	.0041	.0047	.0054	.0061	.0068	.0075
.0083	.0091	.0100	.0110	.0120	.0132	.0144
.0223	.0310	.0562	.1159	.2184	.3770	.6054
.9176	1.1639	1.2752	1.3681	1.4495	1.5222	1.5881
1.6482	1.7034	1.7542	1.8010	1.8443	1.8844	1.8897
1.8946	1.8990	1.9031	1.9070	1.9105	1.9139	1.9170
1.9200	1.9229	1.9256	1.9281	1.9306	1.9330	1.9353
1.9374	1.9396	1.9416	1.9436	1.9455	1.9473	1.9491
1.9508	1.9525	1.9542	1.9558	1.9574	1.9589	1.9604
1.9618	1.9632	1.9646	1.9660	1.9673	1.9686	1.9699
1.9711	1.9723	1.9736	1.9747	1.9759	1.9770	1.9781
1.9792	1.9803	1.9814	1.9824	1.9835	1.9845	1.9855
1.9864	1.9874	1.9884	1.9893	1.9902	1.9911	1.9920
1.9929	1.9938	1.9947	1.9955	1.9964	1.9972	1.9980
1.9988	1.9997	2.0004	2.0012	2.0020	2.0028	2.0035
2.0043	2.0050	2.0058	2.0065	2.0072	2.0079	2.0086
2.0093	2.0100	2.0130	2.0160	2.0190	2.0220	2.0250
2.0280	2.0310	2.0339	2.0369	2.0398	2.0427	2.0457
2.0486	2.0515	2.0544	2.0573	2.0601	2.0630	2.0659
2.0687	2.0715	2.0744	2.0772	2.0800	2.0828	2.0856
2.0884	2.0912	2.0940	2.0968	2.0995	2.1023	2.1050
2.1078	2.1105	2.1132	2.1159	2.1186	2.1213	2.1240
2.1267	2.1294	2.1320	2.1347	2.1374	2.1400	2.1427
2.1453	2.1479	2.1505	2.1531	2.1557	2.1583	2.1609
2.1635	2.1661	2.1687	2.1712	2.1738	2.1763	2.1789
2.1814	2.1840	2.1865	2.1890	2.1915	2.1940	2.1965
2.1990	2.2015	2.2040	2.2065	2.2089	2.2114	2.2139
2.2163	2.2187	2.2212	2.2236	2.2260	2.2285	2.2309
2.2333	2.2357	2.2381	2.2405	2.2429	2.2453	2.2476
2.2500	2.2524	2.2547	2.2571	2.2594	2.2618	2.2641
2.2664	2.2688	2.2711	2.2734	2.2757	2.2780	2.2803
2.2826	2.2849	2.2872	2.2895	2.2917	2.2940	2.2963
2.2985	2.3008	2.3030	2.3053	2.3075	2.3097	2.3120
2.3142	2.3164	2.3186	2.3208	2.3231	2.3253	2.3274
2.3296	2.3318	2.3340	2.3362	2.3384	2.3405	2.3427
2.3449	2.3470	2.3492	2.3513	2.3534	2.3556	2.3577
2.3598	2.3620	2.3641	2.3662	2.3683	2.3704	2.3725
2.3746	2.3767	2.3788	2.3809	2.3830	2.3851	2.3871
2.3892	2.3913	2.3933	2.3954	2.3974	2.3995	2.4015
2.4036	2.4056	2.4076	2.4097	2.4117	2.4137	2.4157
2.4178	2.4198	2.4218	2.4238	2.4258	2.4278	2.4298
2.4317	2.4337	2.4357	2.4377	2.4397	2.4416	2.4436
2.4456	2.4475	2.4495	2.4514	2.4534	2.4553	2.4573

2.4592	2.4611	2.4631	2.4650	2.4669	2.4688	2.4707
2.4727	2.4746	2.4765	2.4784	2.4803	2.4822	2.4841
2.4860	2.4878	2.4897	2.4916	2.4935	2.4954	2.4972
2.4991	2.5010	2.5028	2.5047	2.5065	2.5084	2.5102
2.5121	2.5139	2.5157	2.5176	2.5194	2.5212	2.5231
2.5249	2.5267	2.5285	2.5303	2.5322	2.5340	2.5358
2.5376	2.5394	2.5412	2.5430	2.5447	2.5465	2.5483
2.5501	2.5519	2.5537	2.5554	2.5572	2.5590	2.5607
2.5625	2.5642	2.5660	2.5678	2.5695	2.5713	2.5730
2.5747	2.5765	2.5782	2.5799	2.5817	2.5834	2.5851
2.5869	2.5886	2.5903	2.5920	2.5937	2.5954	2.5971
2.5988	2.6005	2.6022	2.6039	2.6056	2.6073	2.6090
2.6107	2.6124	2.6141	2.6157	2.6174	2.6191	2.6208
2.6224	2.6241	2.6258	2.6274	2.6291	2.6307	2.6324
2.6340	2.6357	2.6373	2.6390	2.6406	2.6423	2.6439
2.6455	2.6472	2.6488	2.6504	2.6520	2.6537	2.6553
2.6569	2.6585	2.6601	2.6617	2.6634	2.6650	2.6666
2.6682	2.6698	2.6714	2.6730	2.6746	2.6761	2.6777
2.6793	2.6809	2.6825	2.6841	2.6856	2.6872	2.6888
2.6904	2.6919	2.6935	2.6951	2.6966	2.6982	2.6997
2.7013	2.7028	2.7044	2.7060	2.7075	2.7090	2.7106
2.7121	2.7137	2.7152	2.7167	2.7183	2.7198	2.7213
2.7229	2.7244	2.7259	2.7274	2.7289	2.7305	2.7320
2.7335	2.7350	2.7365	2.7380	2.7395	2.7410	2.7425
2.7440	2.7455	2.7470	2.7485	2.7500		

*

*S**INPUT HYDROGRAPH FROM MOLEN-CORBIN DRAINAGE MODEL**

*

STORE HYD ID=1 HYD NO=MOLZCORB DT=0.5 DA=.2016
FLOW RATES = 0 2 2 277.2 136.5 83.5 38.9 17.1 8 4.5 3.4 3.2
3.3 3.3 3.3 3.3 3.2 3.2 3.1 3.1 3.1 3 3 3 3 2.9 2.9 2.9 2.9
2.9 2.8 2.8 2.8 2.8 2.8 2.8 2.8 2.7 2.7 2.7 2.7 2.7 2.7 2.7
2.7 2.6 2.6 2.6 2.6 2 2 2 2 2 2 2 2 2 0

*

*S**CALCULATE HYDROGRAPH FROM BLOCK 4-B

*

COMPUTE NM HYD ID=10 HYD NO=4-B
DA=0.01258 SQ MI
PER A=0 PER B=10
PER C=0 PER D=90
TP=0.133 HR MASSRAIN=-1
*

K = .072485HR TP = .133000HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420
UNIT PEAK = 44.801 CFS UNIT VOLUME = .9989 B = 526.28 P60 = 1.8700
AREA = .011322 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .050000

K = .130697HR TP = .133000HR K/TP RATIO = .982685 SHAPE CONSTANT, N = 3.593454
UNIT PEAK = 3.0938 CFS UNIT VOLUME = .9972 B = 327.09 P60 = 1.8700
AREA = .001258 SQ MI IA = .50000 INCHES INF = 1.25000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .050000

PRINT HYD ID=10 CODE=1

HYDROGRAPH FROM AREA 4-B

RUNOFF VOLUME = 2.33360 INCHES = 1.5657 ACRE-FEET
 PEAK DISCHARGE RATE = 32.48 CFS AT 1.500 HOURS BASIN AREA = .0126 SQ. MI.

*
 *
 ***ROUTE RUNOFF TO EXISTING STORM DRAIN**

*
 COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLP=0.0040
 DIA=36 IN N=0.013

RATING CURVE PIPE SECTION 1.0

WATER SURFACE ELEV	FLOW AREA SQ FT	FLOW RATE CFS	MAX WIDTH FT
.00	.00	.00	.00
.16	.14	.22	1.33
.31	.39	.96	1.83
.47	.71	2.23	2.18
.63	1.07	4.02	2.44
.78	1.46	6.27	2.63
.94	1.89	8.95	2.78
1.09	2.33	11.99	2.89
1.25	2.79	15.33	2.96
1.41	3.26	18.89	2.99
1.56	3.72	22.61	3.00
1.72	4.19	26.40	3.00
1.88	4.65	30.16	3.00
2.03	5.10	33.81	3.00
2.19	5.53	37.22	3.00
2.35	5.93	40.27	3.00
2.50	6.30	42.81	3.00
2.66	6.62	44.63	3.00
2.81	6.89	45.38	3.00
3.00	7.07	45.38	3.00

*
 COMPUTE TRAVEL TIME ID=2 REACH=1 VS NO=1 L=180 SLP=0.004

TRAVEL TIME TABLE

REACH= 1.0

WATER DEPTH FEET	AVERAGE AREA SQ.FT.	FLOW RATE CFS	TRAVEL TIME HRS
.156	.140	.22	.0317
.313	.391	.96	.0203
.469	.706	2.23	.0158
.625	1.068	4.02	.0133
.782	1.465	6.27	.0117
.938	1.889	8.95	.0106
1.094	2.332	11.99	.0097
1.251	2.790	15.33	.0091
1.407	3.255	18.89	.0086
1.563	3.724	22.61	.0082
1.720	4.191	26.40	.0079
1.876	4.650	30.16	.0077
2.032	5.097	33.81	.0075
2.189	5.525	37.22	.0074
2.345	5.928	40.27	.0074

2.501	6.297	42.81	.0074
2.658	6.622	44.63	.0074
2.814	6.887	45.38	.0076
3.000	7.069	45.38	.0078

★
ROUTE

ID=2 HYD=4_B RTE INFLOW ID=10 DT=0.05

★

ADD HYD

ID=20 HYD=MC&4_B ID 1=1 II=2

★

PRINT HYD

ID=20 CODE=0

HYDROGRAPH FROM AREA MC&4_B

TIME	FLOW	TIME	FLOW	TIME	FLOW	TIME	FLOW	TIME	FLOW
HRS	CFS	HRS	CFS	HRS	CFS	HRS	CFS	HRS	CFS
.000	.0	5.800	3.3	11.600	3.3	17.400	3.1	23.200	2.8
.050	.2	5.850	3.4	11.650	3.3	17.450	3.1	23.250	2.8
.100	.4	5.900	3.4	11.700	3.3	17.500	3.1	23.300	2.8
.150	.6	5.950	3.4	11.750	3.3	17.550	3.1	23.350	2.8
.200	.8	6.000	3.4	11.800	3.3	17.600	3.1	23.400	2.8
.250	1.0	6.050	3.4	11.850	3.3	17.650	3.1	23.450	2.8
.300	1.2	6.100	3.4	11.900	3.3	17.700	3.1	23.500	2.8
.350	1.4	6.150	3.5	11.950	3.3	17.750	3.1	23.550	2.8
.400	1.6	6.200	3.6	12.000	3.3	17.800	3.1	23.600	2.8
.450	1.8	6.250	3.7	12.050	3.3	17.850	3.1	23.650	2.8
.500	2.0	6.300	3.7	12.100	3.3	17.900	3.1	23.700	2.8
.550	2.0	6.350	3.7	12.150	3.3	17.950	3.1	23.750	2.8
.600	2.0	6.400	3.7	12.200	3.3	18.000	3.1	23.800	2.8
.650	2.0	6.450	3.7	12.250	3.3	18.050	3.1	23.850	2.8
.700	2.0	6.500	3.7	12.300	3.3	18.100	3.0	23.900	2.8
.750	2.0	6.550	3.7	12.350	3.2	18.150	3.0	23.950	2.8
.800	2.0	6.600	3.7	12.400	3.2	18.200	3.0	24.000	2.8
.850	2.0	6.650	3.7	12.450	3.2	18.250	3.0	24.050	2.8
.900	2.0	6.700	3.7	12.500	3.2	18.300	3.0	24.100	2.7
.950	2.0	6.750	3.7	12.550	3.2	18.350	3.0	24.150	2.6
1.000	2.0	6.800	3.7	12.600	3.2	18.400	3.0	24.200	2.4
1.050	29.5	6.850	3.7	12.650	3.2	18.450	3.0	24.250	2.4
1.100	57.0	6.900	3.7	12.700	3.2	18.500	3.0	24.300	2.3
1.150	84.6	6.950	3.7	12.750	3.2	18.550	3.0	24.350	2.2
1.200	112.1	7.000	3.7	12.800	3.2	18.600	3.0	24.400	2.1
1.250	140.2	7.050	3.7	12.850	3.2	18.650	3.0	24.450	2.1
1.300	170.8	7.100	3.7	12.900	3.2	18.700	3.0	24.500	2.0
1.350	205.4	7.150	3.7	12.950	3.2	18.750	3.0	24.550	2.0
1.400	240.7	7.200	3.7	13.000	3.2	18.800	3.0	24.600	2.0
1.450	277.2	7.250	3.7	13.050	3.2	18.850	3.0	24.650	2.0
1.500	309.6	7.300	3.7	13.100	3.2	18.900	3.0	24.700	2.0
1.550	292.4	7.350	3.7	13.150	3.2	18.950	3.0	24.750	2.0
1.600	271.8	7.400	3.7	13.200	3.2	19.000	3.0	24.800	2.0
1.650	252.9	7.450	3.7	13.250	3.2	19.050	3.0	24.850	2.0
1.700	235.8	7.500	3.7	13.300	3.2	19.100	3.0	24.900	2.0
1.750	219.8	7.550	3.7	13.350	3.2	19.150	2.9	24.950	2.0
1.800	204.4	7.600	3.7	13.400	3.2	19.200	2.9	25.000	2.0
1.850	189.2	7.650	3.7	13.450	3.2	19.250	2.9	25.050	2.0
1.900	174.2	7.700	3.7	13.500	3.2	19.300	2.9	25.100	2.0
1.950	159.3	7.750	3.7	13.550	3.2	19.350	2.9	25.150	2.0
2.000	144.5	7.800	3.6	13.600	3.2	19.400	2.9	25.200	2.0
2.050	138.4	7.850	3.6	13.650	3.2	19.450	2.9	25.250	2.0
2.100	131.6	7.900	3.6	13.700	3.2	19.500	2.9	25.300	2.0
2.150	124.4	7.950	3.6	13.750	3.2	19.550	2.9	25.350	2.0
2.200	117.9	8.000	3.6	13.800	3.2	19.600	2.9	25.400	2.0

2.250	111.9	8.050	3.6	13.850	3.2	19.650	2.9	25.450	2.0
2.300	106.2	8.100	3.6	13.900	3.2	19.700	2.9	25.500	2.0
2.350	100.6	8.150	3.6	13.950	3.2	19.750	2.9	25.550	2.0
2.400	95.1	8.200	3.6	14.000	3.2	19.800	2.9	25.600	2.0
2.450	89.6	8.250	3.6	14.050	3.2	19.850	2.9	25.650	2.0
2.500	84.2	8.300	3.6	14.100	3.2	19.900	2.9	25.700	2.0
2.550	79.6	8.350	3.6	14.150	3.2	19.950	2.9	25.750	2.0
2.600	75.1	8.400	3.6	14.200	3.2	20.000	2.9	25.800	2.0
2.650	70.5	8.450	3.6	14.250	3.2	20.050	2.9	25.850	2.0
2.700	66.0	8.500	3.6	14.300	3.2	20.100	2.9	25.900	2.0
2.750	61.5	8.550	3.6	14.350	3.2	20.150	2.9	25.950	2.0
2.800	57.0	8.600	3.6	14.400	3.2	20.200	2.9	26.000	2.0
2.850	52.5	8.650	3.6	14.450	3.2	20.250	2.9	26.050	2.0
2.900	48.0	8.700	3.5	14.500	3.2	20.300	2.9	26.100	2.0
2.950	43.5	8.750	3.5	14.550	3.2	20.350	2.9	26.150	2.0
3.000	39.0	8.800	3.5	14.600	3.2	20.400	2.9	26.200	2.0
3.050	36.8	8.850	3.5	14.650	3.2	20.450	2.9	26.250	2.0
3.100	34.6	8.900	3.5	14.700	3.2	20.500	2.9	26.300	2.0
3.150	32.4	8.950	3.5	14.750	3.1	20.550	2.9	26.350	2.0
3.200	30.2	9.000	3.5	14.800	3.1	20.600	2.9	26.400	2.0
3.250	28.0	9.050	3.5	14.850	3.1	20.650	2.9	26.450	2.0
3.300	25.8	9.100	3.5	14.900	3.1	20.700	2.9	26.500	2.0
3.350	23.7	9.150	3.5	14.950	3.1	20.750	2.9	26.550	2.0
3.400	21.5	9.200	3.5	15.000	3.1	20.800	2.9	26.600	2.0
3.450	19.3	9.250	3.5	15.050	3.1	20.850	2.9	26.650	2.0
3.500	17.1	9.300	3.5	15.100	3.1	20.900	2.9	26.700	2.0
3.550	16.2	9.350	3.5	15.150	3.1	20.950	2.9	26.750	2.0
3.600	15.3	9.400	3.5	15.200	3.1	21.000	2.9	26.800	2.0
3.650	14.4	9.450	3.5	15.250	3.1	21.050	2.9	26.850	2.0
3.700	13.5	9.500	3.5	15.300	3.1	21.100	2.9	26.900	2.0
3.750	12.6	9.550	3.5	15.350	3.1	21.150	2.9	26.950	2.0
3.800	11.6	9.600	3.5	15.400	3.1	21.200	2.9	27.000	2.0
3.850	10.7	9.650	3.5	15.450	3.1	21.250	2.9	27.050	2.0
3.900	9.8	9.700	3.5	15.500	3.1	21.300	2.9	27.100	2.0
3.950	8.9	9.750	3.5	15.550	3.1	21.350	2.9	27.150	2.0
4.000	8.0	9.800	3.5	15.600	3.1	21.400	2.9	27.200	2.0
4.050	7.7	9.850	3.5	15.650	3.1	21.450	2.9	27.250	2.0
4.100	7.3	9.900	3.5	15.700	3.1	21.500	2.9	27.300	2.0
4.150	7.0	9.950	3.5	15.750	3.1	21.550	2.9	27.350	2.0
4.200	6.6	10.000	3.5	15.800	3.1	21.600	2.9	27.400	2.0
4.250	6.3	10.050	3.4	15.850	3.1	21.650	2.9	27.450	2.0
4.300	5.9	10.100	3.4	15.900	3.1	21.700	2.9	27.500	2.0
4.350	5.6	10.150	3.4	15.950	3.1	21.750	2.9	27.550	2.0
4.400	5.2	10.200	3.4	16.000	3.1	21.800	2.9	27.600	2.0
4.450	4.9	10.250	3.4	16.050	3.1	21.850	2.9	27.650	2.0
4.500	4.5	10.300	3.4	16.100	3.1	21.900	2.9	27.700	2.0
4.550	4.4	10.350	3.4	16.150	3.1	21.950	2.9	27.750	2.0
4.600	4.3	10.400	3.4	16.200	3.1	22.000	2.9	27.800	2.0
4.650	4.2	10.450	3.4	16.250	3.1	22.050	2.9	27.850	2.0
4.700	4.1	10.500	3.3	16.300	3.1	22.100	2.9	27.900	2.0
4.750	4.0	10.550	3.3	16.350	3.1	22.150	2.9	27.950	2.0
4.800	3.9	10.600	3.3	16.400	3.1	22.200	2.9	28.000	2.0
4.850	3.7	10.650	3.3	16.450	3.1	22.250	2.9	28.050	2.0
4.900	3.6	10.700	3.3	16.500	3.1	22.300	2.9	28.100	2.0
4.950	3.5	10.750	3.3	16.550	3.1	22.350	2.9	28.150	2.0
5.000	3.4	10.800	3.3	16.600	3.1	22.400	2.8	28.200	2.0
5.050	3.4	10.850	3.3	16.650	3.1	22.450	2.8	28.250	2.0
5.100	3.4	10.900	3.3	16.700	3.1	22.500	2.8	28.300	2.0
5.150	3.4	10.950	3.3	16.750	3.1	22.550	2.8	28.350	2.0
5.200	3.4	11.000	3.3	16.800	3.1	22.600	2.8	28.400	2.0

5.250	3.3	11.050	3.3	16.850	3.1	22.650	2.8	28.450	2.0
5.300	3.3	11.100	3.3	16.900	3.1	22.700	2.8	28.500	2.0
5.350	3.3	11.150	3.3	16.950	3.1	22.750	2.8	28.550	2.0
5.400	3.3	11.200	3.3	17.000	3.1	22.800	2.8	28.600	2.0
5.450	3.3	11.250	3.3	17.050	3.1	22.850	2.8	28.650	2.0
5.500	3.3	11.300	3.3	17.100	3.1	22.900	2.8	28.700	2.0
5.550	3.3	11.350	3.3	17.150	3.1	22.950	2.8	28.750	2.0
5.600	3.3	11.400	3.3	17.200	3.1	23.000	2.8	28.800	2.0
5.650	3.3	11.450	3.3	17.250	3.1	23.050	2.8	28.850	2.0
5.700	3.3	11.500	3.3	17.300	3.1	23.100	2.8	28.900	2.0
5.750	3.3	11.550	3.3	17.350	3.1	23.150	2.8	28.950	2.0

RUNOFF VOLUME = 2.67727 INCHES = 30.5820 ACRE- FEET
 PEAK DISCHARGE RATE = 309.60 CFS AT 1.500 HOURS BASIN AREA = .2142 SQ. MI.

*
 *
 *
 *S**CONTINUE WITH MOLZEN-CORBIN DRAINAGE MODEL**
 *
 *S**CALCULATE BASIN A11
 ** BASIN A11 **
 *
 COMPUTE NM HYD ID=3 HYD NO=111 DA=0.001 SQ MI
 PER A=0 PER B=0 PER C=0 PER D=100
 TP=0.133 RAIN=-1

K = .072485HR TP = .133000HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420
 UNIT PEAK = 3.9570 CFS UNIT VOLUME = .9966 B = 526.28 P60 = 1.8700
 AREA = .001000 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .050000

*
 PRINT HYD ID=3 CODE=6

PARTIAL HYDROGRAPH 111.00

TIME	FLOW	TIME	FLOW	TIME	FLOW	TIME	FLOW	TIME	FLOW
HRS	CFS	HRS	CFS	HRS	CFS	HRS	CFS	HRS	CFS
.000	.0	5.100	.0	10.200	.0	15.300	.0	20.400	.0
.300	.0	5.400	.0	10.500	.0	15.600	.0	20.700	.0
.600	.0	5.700	.0	10.800	.0	15.900	.0	21.000	.0
.900	.0	6.000	.0	11.100	.0	16.200	.0	21.300	.0
1.200	.0	6.300	.0	11.400	.0	16.500	.0	21.600	.0
1.500	2.7	6.600	.0	11.700	.0	16.800	.0	21.900	.0
1.800	1.0	6.900	.0	12.000	.0	17.100	.0	22.200	.0
2.100	.5	7.200	.0	12.300	.0	17.400	.0	22.500	.0
2.400	.1	7.500	.0	12.600	.0	17.700	.0	22.800	.0
2.700	.0	7.800	.0	12.900	.0	18.000	.0	23.100	.0
3.000	.0	8.100	.0	13.200	.0	18.300	.0	23.400	.0
3.300	.0	8.400	.0	13.500	.0	18.600	.0	23.700	.0
3.600	.0	8.700	.0	13.800	.0	18.900	.0	24.000	.0
3.900	.0	9.000	.0	14.100	.0	19.200	.0	24.300	.0
4.200	.0	9.300	.0	14.400	.0	19.500	.0		
4.500	.0	9.600	.0	14.700	.0	19.800	.0		
4.800	.0	9.900	.0	15.000	.0	20.100	.0		

RUNOFF VOLUME = 2.52381 INCHES = .1346 ACRE- FEET

PEAK DISCHARGE RATE = 2.74 CFS AT 1.500 HOURS BASIN AREA = .0010 SQ. MI.

*
*S**ADD BASIN A11 TO TOTAL**

*
ADD HYD ID=4 HYD NO=111.1 I=3 II=20

*
PRINT HYD ID=4 CODE=6

PARTIAL HYDROGRAPH 111.10

TIME	FLOW	TIME	FLOW	TIME	FLOW	TIME	FLOW	TIME	FLOW
HRS	CFS	HRS	CFS	HRS	CFS	HRS	CFS	HRS	CFS
.000	.0	6.000	3.4	12.000	3.4	18.000	3.1	24.000	2.8
.300	1.2	6.300	3.7	12.300	3.3	18.300	3.0	24.300	2.3
.600	2.0	6.600	3.8	12.600	3.2	18.600	3.0	24.600	2.0
.900	2.0	6.900	3.8	12.900	3.2	18.900	3.0	24.900	2.0
1.200	112.1	7.200	3.8	13.200	3.2	19.200	3.0	25.200	2.0
1.500	312.3	7.500	3.7	13.500	3.2	19.500	3.0	25.500	2.0
1.800	205.4	7.800	3.7	13.800	3.2	19.800	3.0	25.800	2.0
2.100	132.1	8.100	3.6	14.100	3.2	20.100	3.0	26.100	2.0
2.400	95.2	8.400	3.6	14.400	3.2	20.400	3.0	26.400	2.0
2.700	66.0	8.700	3.6	14.700	3.2	20.700	3.0	26.700	2.0
3.000	39.0	9.000	3.5	15.000	3.1	21.000	3.0	27.000	2.0
3.300	25.8	9.300	3.5	15.300	3.1	21.300	3.0	27.300	2.0
3.600	15.3	9.600	3.5	15.600	3.1	21.600	3.0	27.600	2.0
3.900	9.8	9.900	3.5	15.900	3.1	21.900	3.0	27.900	2.0
4.200	6.6	10.200	3.4	16.200	3.1	22.200	2.9	28.200	2.0
4.500	4.5	10.500	3.4	16.500	3.1	22.500	2.8	28.500	2.0
4.800	3.9	10.800	3.4	16.800	3.1	22.800	2.8	28.800	2.0
5.100	3.4	11.100	3.4	17.100	3.1	23.100	2.8		
5.400	3.3	11.400	3.4	17.400	3.1	23.400	2.8		
5.700	3.3	11.700	3.4	17.700	3.1	23.700	2.8		

RUNOFF VOLUME = 2.67655 INCHES = 30.7166 ACRE-FEET

PEAK DISCHARGE RATE = 312.34 CFS AT 1.500 HOURS BASIN AREA = .2152 SQ. MI.

*

*S**CALCULATE BASIN A12**

*

COMPUTE NM HYD ID=3 HYD NO=112 DA=0.0059 SQ MI
PER A=0 PER B=95 PER C=0 PER D=5
TP=0.133 RAIN=-1

K = .072485HR TP = .133000HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420
UNIT PEAK = 1.1673 CFS UNIT VOLUME = .9892 B = 526.28 P60 = 1.8700
AREA = .000295 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .050000

K = .130697HR TP = .133000HR K/TP RATIO = .982685 SHAPE CONSTANT, N = 3.593454
UNIT PEAK = 13.784 CFS UNIT VOLUME = 1.000 B = 327.09 P60 = 1.8700
AREA = .005605 SQ MI IA = .50000 INCHES INF = 1.25000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .050000

*

PARTIAL HYDROGRAPH 112.00

TIME	FLOW	TIME	FLOW	TIME	FLOW	TIME	FLOW	TIME	FLOW
HRS	CFS	HRS	CFS	HRS	CFS	HRS	CFS	HRS	CFS
.000	.0	5.100	.0	10.200	.0	15.300	.0	20.400	.0
.300	.0	5.400	.0	10.500	.0	15.600	.0	20.700	.0
.600	.0	5.700	.0	10.800	.0	15.900	.0	21.000	.0
.900	.0	6.000	.0	11.100	.0	16.200	.0	21.300	.0
1.200	.0	6.300	.0	11.400	.0	16.500	.0	21.600	.0
1.500	7.6	6.600	.0	11.700	.0	16.800	.0	21.900	.0
1.800	1.8	6.900	.0	12.000	.0	17.100	.0	22.200	.0
2.100	.6	7.200	.0	12.300	.0	17.400	.0	22.500	.0
2.400	.2	7.500	.0	12.600	.0	17.700	.0	22.800	.0
2.700	.1	7.800	.0	12.900	.0	18.000	.0	23.100	.0
3.000	.0	8.100	.0	13.200	.0	18.300	.0	23.400	.0
3.300	.0	8.400	.0	13.500	.0	18.600	.0	23.700	.0
3.600	.0	8.700	.0	13.800	.0	18.900	.0	24.000	.0
3.900	.0	9.000	.0	14.100	.0	19.200	.0		
4.200	.0	9.300	.0	14.400	.0	19.500	.0		
4.500	.0	9.600	.0	14.700	.0	19.800	.0		
4.800	.0	9.900	.0	15.000	.0	20.100	.0		

RUNOFF VOLUME = .71686 INCHES = .2256 ACRE-Feet
PEAK DISCHARGE RATE = 7.58 CFS AT 1.500 HOURS BASIN AREA = .0059 SQ. MI.

*
*S**ADD BASIN A12 TO TOTAL**
*
ADD HYD ID=5 HYD NO=112.1 I=3 II=4
*
PRINT HYD ID=5 CODE=6

PARTIAL HYDROGRAPH 112.10

TIME	FLOW	TIME	FLOW	TIME	FLOW	TIME	FLOW	TIME	FLOW
HRS	CFS	HRS	CFS	HRS	CFS	HRS	CFS	HRS	CFS
.000	.0	6.000	3.4	12.000	3.4	18.000	3.1	24.000	2.8
.300	1.2	6.300	3.7	12.300	3.3	18.300	3.0	24.300	2.3
.600	2.0	6.600	3.8	12.600	3.3	18.600	3.0	24.600	2.0
.900	2.0	6.900	3.8	12.900	3.2	18.900	3.0	24.900	2.0
1.200	112.1	7.200	3.8	13.200	3.2	19.200	3.0	25.200	2.0
1.500	319.9	7.500	3.8	13.500	3.2	19.500	3.0	25.500	2.0
1.800	207.2	7.800	3.7	13.800	3.2	19.800	3.0	25.800	2.0
2.100	132.7	8.100	3.6	14.100	3.2	20.100	3.0	26.100	2.0
2.400	95.4	8.400	3.6	14.400	3.2	20.400	3.0	26.400	2.0
2.700	66.1	8.700	3.6	14.700	3.2	20.700	3.0	26.700	2.0
3.000	39.0	9.000	3.5	15.000	3.1	21.000	3.0	27.000	2.0
3.300	25.9	9.300	3.5	15.300	3.1	21.300	3.0	27.300	2.0
3.600	15.3	9.600	3.5	15.600	3.1	21.600	3.0	27.600	2.0
3.900	9.8	9.900	3.5	15.900	3.1	21.900	3.0	27.900	2.0
4.200	6.6	10.200	3.5	16.200	3.1	22.200	2.9	28.200	2.0
4.500	4.5	10.500	3.4	16.500	3.1	22.500	2.9	28.500	2.0
4.800	3.9	10.800	3.4	16.800	3.1	22.800	2.9	28.800	2.0
5.100	3.4	11.100	3.4	17.100	3.1	23.100	2.8		
5.400	3.3	11.400	3.4	17.400	3.1	23.400	2.8		
5.700	3.3	11.700	3.4	17.700	3.1	23.700	2.8		

RUNOFF VOLUME = 2.62425 INCHES = 30.9422 ACRE- FEET
PEAK DISCHARGE RATE = 319.92 CFS AT 1.500 HOURS BASIN AREA = .2211 SQ. MI.

★
*S**CALCULATE BASIN A13**

** BASIN A13 **

★
COMPUTE NM HYD ID=3 HYD NO=113 DA=0.00092 SQ MI
PER A=0 PER B=0 PER C=0 PER D=100
TP=0.133 RAIN=-1

K = .072485HR TP = .133000HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420
UNIT PEAK = 3.6404 CFS UNIT VOLUME = .9960 B = 526.28 P60 = 1.8700
AREA = .000920 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .050000

★
PRINT HYD ID=3 CODE=6

PARTIAL HYDROGRAPH 113.00

TIME	FLOW	TIME	FLOW	TIME	FLOW	TIME	FLOW	TIME	FLOW
HRS	CFS	HRS	CFS	HRS	CFS	HRS	CFS	HRS	CFS
.000	.0	5.100	.0	10.200	.0	15.300	.0	20.400	.0
.300	.0	5.400	.0	10.500	.0	15.600	.0	20.700	.0
.600	.0	5.700	.0	10.800	.0	15.900	.0	21.000	.0
.900	.0	6.000	.0	11.100	.0	16.200	.0	21.300	.0
1.200	.0	6.300	.0	11.400	.0	16.500	.0	21.600	.0
1.500	2.5	6.600	.0	11.700	.0	16.800	.0	21.900	.0
1.800	.9	6.900	.0	12.000	.0	17.100	.0	22.200	.0
2.100	.4	7.200	.0	12.300	.0	17.400	.0	22.500	.0
2.400	.1	7.500	.0	12.600	.0	17.700	.0	22.800	.0
2.700	.0	7.800	.0	12.900	.0	18.000	.0	23.100	.0
3.000	.0	8.100	.0	13.200	.0	18.300	.0	23.400	.0
3.300	.0	8.400	.0	13.500	.0	18.600	.0	23.700	.0
3.600	.0	8.700	.0	13.800	.0	18.900	.0	24.000	.0
3.900	.0	9.000	.0	14.100	.0	19.200	.0	24.300	.0
4.200	.0	9.300	.0	14.400	.0	19.500	.0		
4.500	.0	9.600	.0	14.700	.0	19.800	.0		
4.800	.0	9.900	.0	15.000	.0	20.100	.0		

RUNOFF VOLUME = 2.52381 INCHES = .1238 ACRE- FEET
PEAK DISCHARGE RATE = 2.52 CFS AT 1.500 HOURS BASIN AREA = .0009 SQ. MI.

★
★
*S**ADD A13 TO TOTAL**

★
ADD HYD ID=6 HYD NO=113.1 I=3 II=5

★
PRINT HYD ID=6 CODE=6

PARTIAL HYDROGRAPH 113.10

TIME	FLOW	TIME	FLOW	TIME	FLOW	TIME	FLOW	TIME	FLOW
------	------	------	------	------	------	------	------	------	------

HRS	CFS	HRS	CFS	HRS	CFS	HRS	CFS	HRS	CFS
.000	.0	6.000	3.4	12.000	3.4	18.000	3.1	24.000	2.9
.300	1.2	6.300	3.8	12.300	3.3	18.300	3.0	24.300	2.3
.600	2.0	6.600	3.8	12.600	3.3	18.600	3.0	24.600	2.0
.900	2.0	6.900	3.8	12.900	3.3	18.900	3.0	24.900	2.0
1.200	112.1	7.200	3.8	13.200	3.3	19.200	3.0	25.200	2.0
1.500	322.4	7.500	3.8	13.500	3.3	19.500	3.0	25.500	2.0
1.800	208.1	7.800	3.7	13.800	3.3	19.800	3.0	25.800	2.0
2.100	133.1	8.100	3.7	14.100	3.3	20.100	3.0	26.100	2.0
2.400	95.5	8.400	3.7	14.400	3.3	20.400	3.0	26.400	2.0
2.700	66.1	8.700	3.6	14.700	3.2	20.700	3.0	26.700	2.0
3.000	39.0	9.000	3.5	15.000	3.1	21.000	3.0	27.000	2.0
3.300	25.9	9.300	3.5	15.300	3.1	21.300	3.0	27.300	2.0
3.600	15.3	9.600	3.5	15.600	3.1	21.600	3.0	27.600	2.0
3.900	9.8	9.900	3.5	15.900	3.1	21.900	3.0	27.900	2.0
4.200	6.6	10.200	3.5	16.200	3.1	22.200	2.9	28.200	2.0
4.500	4.5	10.500	3.4	16.500	3.1	22.500	2.9	28.500	2.0
4.800	3.9	10.800	3.4	16.800	3.1	22.800	2.9	28.800	2.0
5.100	3.4	11.100	3.4	17.100	3.1	23.100	2.9		
5.400	3.3	11.400	3.4	17.400	3.1	23.400	2.9		
5.700	3.3	11.700	3.4	17.700	3.1	23.700	2.9		

RUNOFF VOLUME = 2.62384 INCHES = 31.0660 ACRE- FEET
 PEAK DISCHARGE RATE = 322.44 CFS AT 1.500 HOURS BASIN AREA = .2220 SQ. MI.

*
 *
 ***CALCULATE BASIN A14**
 ** BASIN A14 **
 *

COMPUTE NM HYD ID=3 HYD NO=114 DA=0.0062 SQ MI
 PER A=0 PER B=5 PER C=10 PER D=85
 TP=0.133 RAIN=-1

K = .072485HR TP = .133000HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420
 UNIT PEAK = 20.853 CFS UNIT VOLUME = .9986 B = 526.28 P60 = 1.8700
 AREA = .005270 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .050000

K = .113985HR TP = .133000HR K/TP RATIO = .857028 SHAPE CONSTANT, N = 4.150447
 UNIT PEAK = 2.5528 CFS UNIT VOLUME = .9969 B = 365.08 P60 = 1.8700
 AREA = .000930 SQ MI IA = .40000 INCHES INF = .97000 INCHES PER HOUR
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .050000

*
 PRINT HYD ID=3 CODE=6

PARTIAL HYDROGRAPH 114.00

TIME	FLOW	TIME	FLOW	TIME	FLOW	TIME	FLOW	TIME	FLOW
HRS	CFS	HRS	CFS	HRS	CFS	HRS	CFS	HRS	CFS
.000	.0	5.100	.0	10.200	.2	15.300	.1	20.400	.1
.300	.0	5.400	.0	10.500	.2	15.600	.1	20.700	.1
.600	.0	5.700	.0	10.800	.2	15.900	.1	21.000	.1
.900	.0	6.000	.0	11.100	.2	16.200	.1	21.300	.1
1.200	.0	6.300	.2	11.400	.2	16.500	.1	21.600	.1
1.500	15.9	6.600	.2	11.700	.2	16.800	.1	21.900	.1

1.800	5.6	6.900	.2	12.000	.2	17.100	.1	22.200	.1
2.100	2.5	7.200	.2	12.300	.1	17.400	.1	22.500	.1
2.400	.5	7.500	.2	12.600	.1	17.700	.1	22.800	.1
2.700	.1	7.800	.2	12.900	.1	18.000	.1	23.100	.1
3.000	.0	8.100	.2	13.200	.1	18.300	.1	23.400	.1
3.300	.0	8.400	.2	13.500	.1	18.600	.1	23.700	.1
3.600	.0	8.700	.2	13.800	.1	18.900	.1	24.000	.1
3.900	.0	9.000	.2	14.100	.1	19.200	.1	24.300	.0
4.200	.0	9.300	.2	14.400	.1	19.500	.1	24.600	.0
4.500	.0	9.600	.2	14.700	.1	19.800	.1		
4.800	.0	9.900	.2	15.000	.1	20.100	.1		

RUNOFF VOLUME = 2.26907 INCHES = .7503 ACRE-FEET
 PEAK DISCHARGE RATE = 15.88 CFS AT 1.500 HOURS BASIN AREA = .0062 SQ. MI.

*
 *
 *S**ADD BASIN A14 TO TOTAL**
 *
 ADD HYD ID=7 HYD NO=114.1 I=3 II=6
 *
 PRINT HYD ID=7 CODE=6

PARTIAL HYDROGRAPH 114.10

TIME	FLOW	TIME	FLOW	TIME	FLOW	TIME	FLOW	TIME	FLOW
HRS	CFS	HRS	CFS	HRS	CFS	HRS	CFS	HRS	CFS
.000	.0	6.000	3.5	12.000	3.5	18.000	3.2	24.000	3.0
.300	1.2	6.300	3.9	12.300	3.5	18.300	3.2	24.300	2.3
.600	2.0	6.600	4.0	12.600	3.4	18.600	3.1	24.600	2.0
.900	2.0	6.900	4.0	12.900	3.4	18.900	3.1	24.900	2.0
1.200	112.2	7.200	4.0	13.200	3.4	19.200	3.1	25.200	2.0
1.500	338.3	7.500	4.0	13.500	3.4	19.500	3.1	25.500	2.0
1.800	213.7	7.800	3.9	13.800	3.4	19.800	3.1	25.800	2.0
2.100	135.6	8.100	3.9	14.100	3.4	20.100	3.1	26.100	2.0
2.400	96.0	8.400	3.8	14.400	3.4	20.400	3.1	26.400	2.0
2.700	66.3	8.700	3.8	14.700	3.3	20.700	3.1	26.700	2.0
3.000	39.1	9.000	3.7	15.000	3.3	21.000	3.1	27.000	2.0
3.300	25.9	9.300	3.7	15.300	3.3	21.300	3.1	27.300	2.0
3.600	15.3	9.600	3.7	15.600	3.3	21.600	3.1	27.600	2.0
3.900	9.8	9.900	3.7	15.900	3.3	21.900	3.1	27.900	2.0
4.200	6.6	10.200	3.6	16.200	3.3	22.200	3.0	28.200	2.0
4.500	4.5	10.500	3.6	16.500	3.3	22.500	3.0	28.500	2.0
4.800	3.9	10.800	3.6	16.800	3.2	22.800	3.0	28.800	2.0
5.100	3.4	11.100	3.6	17.100	3.2	23.100	3.0		
5.400	3.3	11.400	3.6	17.400	3.2	23.400	3.0		
5.700	3.4	11.700	3.5	17.700	3.2	23.700	3.0		

RUNOFF VOLUME = 2.61420 INCHES = 31.8163 ACRE-FEET
 PEAK DISCHARGE RATE = 338.32 CFS AT 1.500 HOURS BASIN AREA = .2282 SQ. MI.

*
 *
 *S**ROUTE TOTAL THRU 170' OF 54" DIA RCP**
 *
 COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLP=0.035

DIA=4.5 FT N=0.013

RATING CURVE PIPE SECTION 1.0

WATER SURFACE ELEV	FLOW AREA SQ FT	FLOW RATE CFS	MAX WIDTH FT
.00	.00	.00	.00
.23	.32	1.93	2.00
.47	.88	8.38	2.75
.70	1.59	19.48	3.27
.94	2.40	35.03	3.66
1.17	3.30	54.69	3.95
1.41	4.25	78.03	4.17
1.64	5.25	104.54	4.33
1.88	6.28	133.66	4.44
2.11	7.32	164.77	4.49
2.35	8.38	197.20	4.50
2.58	9.43	230.22	4.50
2.81	10.46	263.05	4.50
3.05	11.47	294.83	4.50
3.28	12.43	324.59	4.50
3.52	13.34	351.22	4.50
3.75	14.17	373.38	4.50
3.99	14.90	389.23	4.50
4.22	15.50	395.75	4.50
4.50	15.90	395.75	4.50

*

COMPUTE TRAVEL TIME ID=8 REACH=1 VS NO=1 L=170 SLP=0.035

TRAVEL TIME TABLE

REACH= 1.0

WATER DEPTH FEET	AVERAGE AREA SQ. FT.	FLOW RATE CFS	TRAVEL TIME HRS
.235	.316	1.93	.0077
.469	.880	8.38	.0050
.704	1.588	19.48	.0039
.938	2.402	35.03	.0032
1.173	3.296	54.69	.0028
1.407	4.249	78.03	.0026
1.641	5.248	104.54	.0024
1.876	6.277	133.66	.0022
2.111	7.325	164.77	.0021
2.345	8.380	197.20	.0020
2.579	9.430	230.22	.0019
2.814	10.463	263.05	.0019
3.049	11.468	294.83	.0018
3.283	12.432	324.59	.0018
3.518	13.338	351.22	.0018
3.752	14.169	373.38	.0018
3.987	14.900	389.23	.0018
4.221	15.495	395.75	.0018
4.500	15.904	395.75	.0019

*

ROUTE

*

PRINT HYD

ID=8 HYD NO=114.1 INFLOW ID=7 DT=0.05

ID=8 CODE=3

TIME	FLOW	TIME	FLOW	TIME	FLOW	TIME	FLOW	TIME	FLOW
HRS	CFS	HRS	CFS	HRS	CFS	HRS	CFS	HRS	CFS
.000	.0	6.000	3.5	12.000	3.5	18.000	3.2	24.000	3.0
.150	.6	6.150	3.7	12.150	3.5	18.150	3.2	24.150	2.6
.300	1.2	6.300	3.9	12.300	3.5	18.300	3.2	24.300	2.3
.450	1.8	6.450	4.0	12.450	3.4	18.450	3.1	24.450	2.1
.600	2.0	6.600	4.0	12.600	3.4	18.600	3.1	24.600	2.0
.750	2.0	6.750	4.0	12.750	3.4	18.750	3.1	24.750	2.0
.900	2.0	6.900	4.0	12.900	3.4	18.900	3.1	24.900	2.0
1.050	24.6	7.050	4.0	13.050	3.4	19.050	3.1	25.050	2.0
1.200	113.6	7.200	4.0	13.200	3.4	19.200	3.1	25.200	2.0
1.350	210.9	7.350	4.0	13.350	3.4	19.350	3.1	25.350	2.0
1.500	338.4	7.500	4.0	13.500	3.4	19.500	3.1	25.500	2.0
1.650	269.8	7.650	3.9	13.650	3.4	19.650	3.1	25.650	2.0
1.800	214.0	7.800	3.9	13.800	3.4	19.800	3.1	25.800	2.0
1.950	166.4	7.950	3.9	13.950	3.4	19.950	3.1	25.950	2.0
2.100	136.1	8.100	3.9	14.100	3.4	20.100	3.1	26.100	2.0
2.250	113.5	8.250	3.8	14.250	3.4	20.250	3.1	26.250	2.0
2.400	96.2	8.400	3.8	14.400	3.4	20.400	3.1	26.400	2.0
2.550	80.2	8.550	3.8	14.550	3.4	20.550	3.1	26.550	2.0
2.700	66.5	8.700	3.8	14.700	3.3	20.700	3.1	26.700	2.0
2.850	52.8	8.850	3.8	14.850	3.3	20.850	3.1	26.850	2.0
3.000	39.3	9.000	3.7	15.000	3.3	21.000	3.1	27.000	2.0
3.150	32.5	9.150	3.7	15.150	3.3	21.150	3.1	27.150	2.0
3.300	26.0	9.300	3.7	15.300	3.3	21.300	3.1	27.300	2.0
3.450	19.4	9.450	3.7	15.450	3.3	21.450	3.1	27.450	2.0
3.600	15.4	9.600	3.7	15.600	3.3	21.600	3.1	27.600	2.0
3.750	12.6	9.750	3.7	15.750	3.3	21.750	3.1	27.750	2.0
3.900	9.9	9.900	3.7	15.900	3.3	21.900	3.1	27.900	2.0
4.050	7.6	10.050	3.7	16.050	3.3	22.050	3.1	28.050	2.0
4.200	6.6	10.200	3.7	16.200	3.3	22.200	3.0	28.200	2.0
4.350	5.6	10.350	3.6	16.350	3.3	22.350	3.0	28.350	2.0
4.500	4.5	10.500	3.6	16.500	3.3	22.500	3.0	28.500	2.0
4.650	4.2	10.650	3.6	16.650	3.3	22.650	3.0	28.650	2.0
4.800	3.9	10.800	3.6	16.800	3.2	22.800	3.0	28.800	2.0
4.950	3.6	10.950	3.6	16.950	3.2	22.950	3.0	28.950	2.0
5.100	3.4	11.100	3.6	17.100	3.2	23.100	3.0	29.100	.1
5.250	3.4	11.250	3.6	17.250	3.2	23.250	3.0	29.250	.0
5.400	3.3	11.400	3.6	17.400	3.2	23.400	3.0	29.400	.0
5.550	3.3	11.550	3.6	17.550	3.2	23.550	3.0	29.550	.0
5.700	3.4	11.700	3.5	17.700	3.2	23.700	3.0	29.700	.0
5.850	3.4	11.850	3.5	17.850	3.2	23.850	3.0	29.850	.0

RUNOFF VOLUME = 2.61422 INCHES = 31.8167 ACRE-Feet
PEAK DISCHARGE RATE = 338.40 CFS AT 1.500 HOURS BASIN AREA = .2282 SQ. MI.

*
*
***ROUTE TOTAL THRU 213' OF 66" DIA RCP**
*

COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLP=0.01
DIA=5.5 FT N=0.013

RATING CURVE PIPE SECTION 1.0

WATER	FLOW	FLOW	MAX
SURFACE	AREA	RATE	WIDTH
ELEV	SQ FT	CFS	FT

.00	.00	.00	.00
.29	.47	1.76	2.44
.57	1.31	7.65	3.36
.86	2.37	17.78	3.99
1.15	3.59	31.97	4.47
1.43	4.92	49.92	4.83
1.72	6.35	71.23	5.10
2.01	7.84	95.43	5.30
2.29	9.38	122.00	5.42
2.58	10.94	150.40	5.49
2.87	12.52	180.00	5.50
3.15	14.09	210.14	5.50
3.44	15.63	240.11	5.50
3.73	17.13	269.11	5.50
4.01	18.57	296.28	5.50
4.30	19.92	320.59	5.50
4.59	21.17	340.81	5.50
4.87	22.26	355.29	5.50
5.16	23.15	361.23	5.50
5.50	23.76	361.23	5.50

★

COMPUTE TRAVEL TIME ID=9 REACH=1 VS NO=1 L=213 SLP=0.01

TRAVEL TIME TABLE
REACH= 1.0

WATER DEPTH FEET	AVERAGE AREA SQ.FT.	FLOW RATE CFS	TRAVEL TIME HRS
.287	.472	1.76	.0159
.573	1.314	7.65	.0102
.860	2.373	17.78	.0079
1.146	3.589	31.97	.0066
1.433	4.923	49.92	.0058
1.720	6.348	71.23	.0053
2.006	7.839	95.43	.0049
2.293	9.377	122.00	.0045
2.579	10.942	150.40	.0043
2.866	12.518	180.00	.0041
3.153	14.086	210.14	.0040
3.439	15.630	240.11	.0039
3.726	17.132	269.11	.0038
4.013	18.571	296.28	.0037
4.299	19.925	320.59	.0037
4.586	21.166	340.81	.0037
4.872	22.258	355.29	.0037
5.159	23.147	361.23	.0038
5.500	23.758	361.23	.0039

★

ROUTE ID=9 HYD NO=114.2 INFLOW ID=8 DT=0.05

★

PRINT HYD ID=9 CODE=3

PARTIAL HYDROGRAPH 114.20

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
.000	.0	6.000	3.4	12.000	3.5	18.000	3.2	24.000	3.0
.150	.5	6.150	3.7	12.150	3.5	18.150	3.2	24.150	2.7
.300	1.1	6.300	3.9	12.300	3.5	18.300	3.2	24.300	2.3

.450	1.7	6.450	4.0	12.450	3.4	18.450	3.1	24.450	2.1
.600	2.0	6.600	4.0	12.600	3.4	18.600	3.1	24.600	2.0
.750	2.0	6.750	4.0	12.750	3.4	18.750	3.1	24.750	2.0
.900	2.0	6.900	4.0	12.900	3.4	18.900	3.1	24.900	2.0
1.050	17.7	7.050	4.0	13.050	3.4	19.050	3.1	25.050	2.0
1.200	110.3	7.200	4.0	13.200	3.4	19.200	3.1	25.200	2.0
1.350	210.1	7.350	4.0	13.350	3.4	19.350	3.1	25.350	2.0
1.500	335.1	7.500	4.0	13.500	3.4	19.500	3.1	25.500	2.0
1.650	272.7	7.650	3.9	13.650	3.4	19.650	3.1	25.650	2.0
1.800	214.5	7.800	3.9	13.800	3.4	19.800	3.1	25.800	2.0
1.950	167.5	7.950	3.9	13.950	3.4	19.950	3.1	25.950	2.0
2.100	137.0	8.100	3.9	14.100	3.4	20.100	3.1	26.100	2.0
2.250	113.9	8.250	3.8	14.250	3.4	20.250	3.1	26.250	2.0
2.400	96.6	8.400	3.8	14.400	3.4	20.400	3.1	26.400	2.0
2.550	80.6	8.550	3.8	14.550	3.4	20.550	3.1	26.550	2.0
2.700	66.8	8.700	3.8	14.700	3.3	20.700	3.1	26.700	2.0
2.850	53.2	8.850	3.8	14.850	3.3	20.850	3.1	26.850	2.0
3.000	39.7	9.000	3.7	15.000	3.3	21.000	3.1	27.000	2.0
3.150	32.7	9.150	3.7	15.150	3.3	21.150	3.1	27.150	2.0
3.300	26.2	9.300	3.7	15.300	3.3	21.300	3.1	27.300	2.0
3.450	19.7	9.450	3.7	15.450	3.3	21.450	3.1	27.450	2.0
3.600	15.5	9.600	3.7	15.600	3.3	21.600	3.1	27.600	2.0
3.750	12.7	9.750	3.7	15.750	3.3	21.750	3.1	27.750	2.0
3.900	10.0	9.900	3.7	15.900	3.3	21.900	3.1	27.900	2.0
4.050	7.6	10.050	3.7	16.050	3.3	22.050	3.1	28.050	2.0
4.200	6.6	10.200	3.7	16.200	3.3	22.200	3.0	28.200	2.0
4.350	5.6	10.350	3.6	16.350	3.3	22.350	3.0	28.350	2.0
4.500	4.6	10.500	3.6	16.500	3.3	22.500	3.0	28.500	2.0
4.650	4.2	10.650	3.6	16.650	3.3	22.650	3.0	28.650	2.0
4.800	3.9	10.800	3.6	16.800	3.2	22.800	3.0	28.800	2.0
4.950	3.6	10.950	3.6	16.950	3.2	22.950	3.0	28.950	2.0
5.100	3.4	11.100	3.6	17.100	3.2	23.100	3.0	29.100	.0
5.250	3.4	11.250	3.6	17.250	3.2	23.250	3.0	29.250	.0
5.400	3.3	11.400	3.6	17.400	3.2	23.400	3.0	29.400	.0
5.550	3.3	11.550	3.6	17.550	3.2	23.550	3.0	29.550	.0
5.700	3.4	11.700	3.5	17.700	3.2	23.700	3.0	29.700	.0
5.850	3.4	11.850	3.5	17.850	3.2	23.850	3.0	29.850	.0

RUNOFF VOLUME = 2.61422 INCHES = 31.8167 ACRE-FEET
PEAK DISCHARGE RATE = 335.11 CFS AT 1.500 HOURS BASIN AREA = .2282 SQ. MI.

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FINISH

NORMAL PROGRAM FINISH END TIME (HR:MIN:SEC) = 21:34:10

M15 / D23

Sunport Joint Venture
Albuquerque, New Mexico

Revised Drainage Report
for

Sunport Park - Phase I
Including Replat of Blocks 4-A and 4-B

December 26, 1996

Prepared by:

Andrews, Asbury & Robert, Inc.
Consulting Engineers
149 Jackson N.E.
Albuquerque, NM 87108

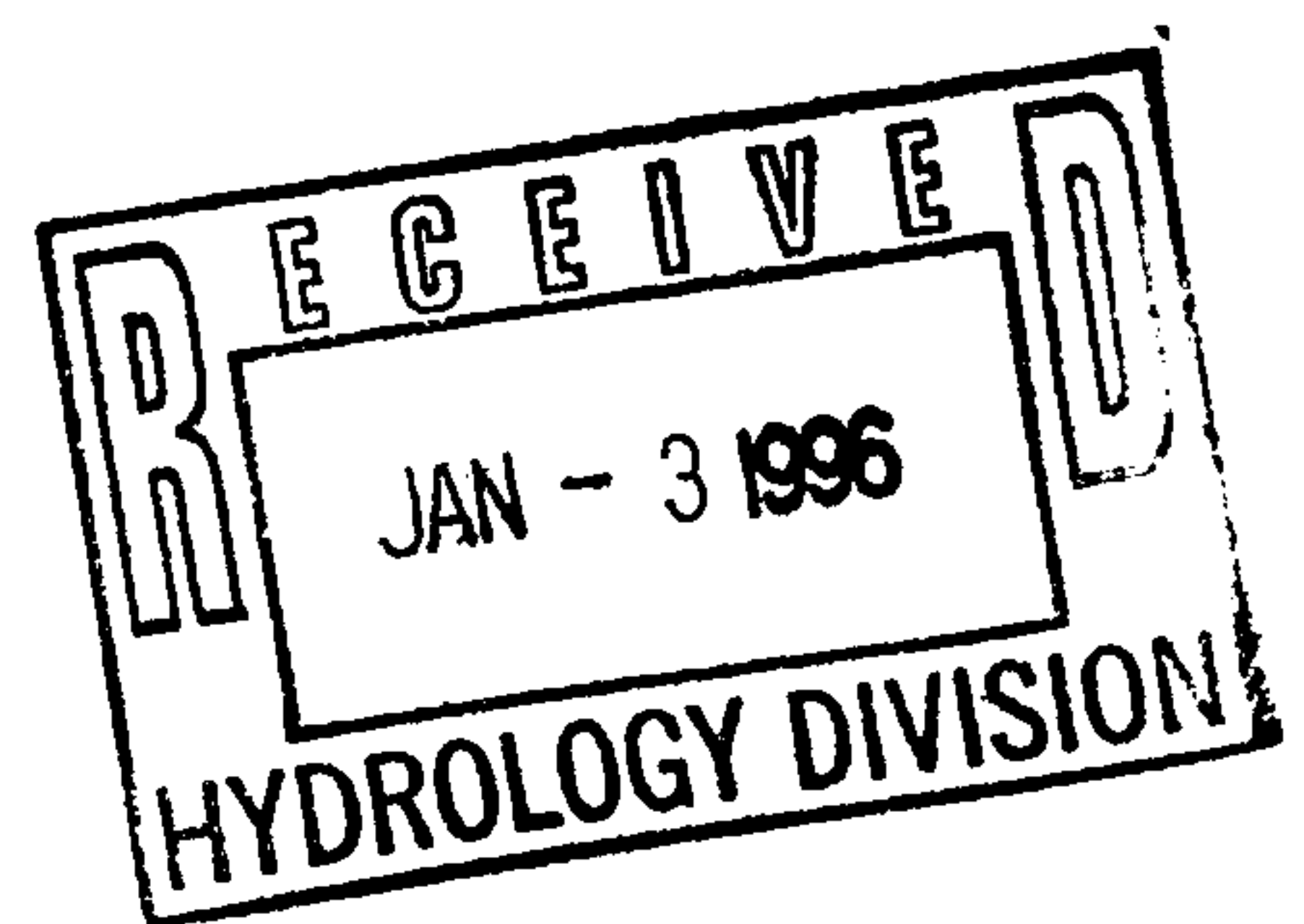


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Plan Sheet	- Sunport Boulevard - Phase I Transport Street Storm Drainage Details
Appendix "A"	- Sunport Park Original Drainage Report, Latest Revision August 1990
Appendix "B"	- AHYMO - Run Sunport Park Boulevard Storm Drain Facilities

**REVISED
DRAINAGE REPORT
for
SUNPORT PARK - PHASE I**

December 26, 1996

I. GENERAL

This report, with the enclosed maps, provides a revised Master Drainage Plan for Sunport Park - Phase I.

The original Drainage Report for Sunport Park - Phase I was prepared in June 1987 and subsequently updated by revision dated January 1988 and revision dated August 1990 and is on file at the City of Albuquerque Hydrology Division.

For reference, this original drainage report with revisions is included herein as Appendix "A" for reference.

Since the original report was prepared, the City of Albuquerque and the New Mexico State Highway and Transportation Department has constructed Sunport Boulevard through the Subdivision. Due to the constructed location of Sunport Boulevard, the southerly drainage basin boundary of the original Phase I area has been extended from 150 feet to 250 feet south to the north right-of-way line of Sunport Boulevard. The westerly boundary of the drainage basin at the new northbound on-ramp to the Interstate from Sunport has also been adjusted to reflect the constructed conditions.

Along with this Master Drainage Report and Drainage Plan for Sunport Park Phase I, this report also addresses the drainage for a proposed replat of the southerly portion of Phase I and is designated herein as Sunport Park, Block 4-A and 4-B.

The drainage basin boundaries, including the above revisions, are shown on (Figure 1) in the packet at the back of this report.

II. EXISTING IMPROVEMENTS

Presently, the following streets in the subdivision are improved with pavement, curb and gutter and utilities:

- Flightway Avenue - from University Blvd. to Transport Street
- Woodward Road - from University Blvd. to Transport Street
- Transport Street - from Flightway Avenue to the south ROW line of Sunport Blvd.
- University Blvd. - Along the east property line from Randolph Road to approximately 1,000 feet south of Sunport Blvd.
- Sunport Blvd. - from Interstate-25 to East of University Blvd.

A. Drainage Improvements

1) Original Facilities

As outlined in the original drainage report, certain major drainage facilities were constructed with the original infrastructure project to convey the storm waters from the original Phase I area. These drainage facilities include the following:

The northwesterly portion of the site, Drainage Area B-2, along with the offsite Drainage Area B-1, is collected by an inlet at the far northwest corner of the site and carried by a storm drain to the Kirtland Channel.

The runoff from on-site drainage areas A-1 through A-11 are collected by a combination of streets and storm drains as shown on Figure 1 enclosed. The collected runoff is carried from the site by a major storm drain that was tunneled under Interstate-25 north of the new Sunport Blvd. alignment and extends westerly to the AMAFCA South Diversion Channel.

2) Sunport Boulevard Facilities

With the construction of Sunport Blvd., a major storm drain was constructed along its southerly right-of-way line. This storm drain system collects and conveys the runoff from the Sunport Blvd. roadway, a portion of the lands within Phase II and also runoff flows from a portion of the Phase I area directly north of Sunport Blvd. and east of Transport Street. The Phase I area served by this storm drain is designated on Figure 1 as drainage areas C-1 and C-2 and is connected to the major storm drain by a 36-inch pipe in Transport Street under Sunport Blvd.

The runoff from Area A-12 is collected and carried under Interstate-25 by a 36-inch culvert that was extended each side of I-25 with the Sunport Blvd. Interstate-25 interchange project.

III. MASTER DRAINAGE PLAN

The revised Master Drainage Plan showing Drainage Areas and Sub-basins enclosed herewith as Figure 1 in the back of this report.

Runoff for Drainage Basins A-1 through A-5, A-10 and A-11, and B-1 and B-2 remain as presented in the original revised report (See Appendix "A").

Drainage Basin A-6-A is presently developed; therefore, the runoff established by the developed site drainage plan of 8.3 cfs was maintained.

Due to reconfiguration of the drainage basins within the area bounded by Woodward Road, Transport Street, University Blvd. and Sunport Blvd. And along with construction of the storm drain with the Sunport Blvd. project, the runoff from Drainage Basins A-6-B, A-8-A, A-7 and A-9 was allowed to be increased from the original runoff rates.

Drainage Basins C-1 and C-2 are basically new areas created when Sunport Blvd. was constructed, and the drainage facilities constructed with this project have provided for drainage of these basins.

The developed runoff from Drainage Basins A-6-B, A-8-A, C-1 and C-2 which constitutes the area to be replatted is based on current hydrology methods established by the City DPM, Section 22.2, January 1993. Runoff from these basins is based on having 10 percent Land Treatment "B" - Landscaping, and 90 percent Land Treatment "D" - Impervious, which provides for a runoff of 4.46 cfs per acre.

To establish and verify capacity of the Sunport Boulevard Drainage Facilities to convey the runoff from Drainage Areas C-1 and C-2, a hydrologic and hydraulic analysis of the runoff from the area proposed to be replatted and Sunport Boulevard was performed to establish and verify sufficient capacity within the existing storm drain to convey the additional runoff from these areas to be replatted.

The AHYMO hydrologic model was used to determine the effect of peak discharge from the southerly portion of the replatted area (Areas C-1 and C-2) would have on the existing storm drain system south of Sunport Boulevard. The AYHMO model, developed for the Sunport Boulevard Project by Molzen/Corbin Engineers, was used with some modifications for as-built conditions (See Appendix B). The 24-hour duration, 100-year return event was modeled as in the model mentioned previously. The addition of runoff from the replatted area increases the peak flow within the storm drain system approximately 35 cubic feet per second. The new peak flows within the system were checked against the maximum capacity of the storm drain pipes flowing at 94 percent full. This system was verified to have the capacity to convey the additional runoff.

The following Sunport Park Runoff Analysis, Master Drainage Plan, Revised December 12, 1996, establishes the runoff rates (Q_{100}) for the Developed Drainage Basins.

Capacity of the Existing Drainage Facilities relative to runoff is shown in the table on the Master Drainage Plan, Figure 1.

ANDREWS, ASBURY & ROBERT, INC.
CONSULTING ENGINEERS

149 Jackson, NE., Albuquerque, N.M. 87108
 Telephone (505) 265-6631 • FAX (505) 266-8112

Project Sunport Park Sheet 1 of 3
 Job No. 752A
 By JA Chk'd _____ Date 12-26-96

SUNPORT PARK
RUNOFF ANALYSIS
MASTER DRAINAGE PLAN
REVISED- 12-26-96

Analysis Point	Drainage Area Designation	Area (Acres)	Q ₁₀₀ (CFS)	Remarks
1	A-1 & A-2	12.2	41.5	From Orig. Report.
2	A-1, A-2 & A-3	13.9	47.3	From Orig. Report.
3	A-1 thru A-4	18.5	62.9	" "
4	A-1 thru A-5	23.2	78.9	" "
	A-6-A	2.3	8.3	From Site Specific Drainage Plan. (Developed Area)
	A-6-B (Revised)	6.76	30.1	Revised Area & Portion of Replat.
	A-7	1.1	4.4	
5 (Revised)	A-6-A, A-6-B & A-7	-	42.8	

ANDREWS, ASBURY & ROBERT, INC.
CONSULTING ENGINEERS

149 Jackson, NE., Albuquerque, N.M. 87108
Telephone (505) 265-6631 • FAX (505) 266-8112

Project Sunport Park- Sheet 2 of 3
Job No. 752A
By JA Chk'd _____ Date 12-26-96

SUNPORT PARK- RUNOFF ANALYSIS
MASTER DRAINAGE PLAN, REVISED 12-26-96

Analysis Point	Drainage Area Designation	Area (Acres)	Allow Runoff	Q ¹⁰⁰ (CFS)	REMARKS
	A-8-A (Revised)	3.16	Allow 4.46 cfs/Acre Runoff	14.1	Revised Area & Portion of Replat.
6	A-6-A, A-6-B, A-7 & A-8-A	-		56.9	From Original Report Flow = 58.5 :: OK
	A-9	3.6	Allow 3.85 cfs/Acre	13.9	Runoff determined by AP-7-Design Flow
7	A-6-A, A-6-B, A-7, A-8-A & A-9-	-		70.8	From Original Report Flow = 70.8 :: OK
8	A-1 thru A-9	-	$\frac{AP-4 + AP-7}{78.9 + 70.8} =$	149.7	Flow is Same as design flow in Original Report.
9	A-1 thru A-10	-	-	180.6	From Original Report.
10	A-11			14.3	" " "
11	A-1 thru A-11	-	-	190.5	" " "
12	"			179.6	" " "
14 & 15	B-1 & B-2			28.6	" " "

ANDREWS, ASBURY & ROBERT, INC.
CONSULTING ENGINEERS
149 Jackson, NE., Albuquerque, N.M. 87108
Telephone (505) 265-6631 • FAX (505) 266-8112

Project Sumport Park Sheet 3 of 3
Job No. 752A
By JA Chk'd _____ Date 12-26-96

SUMPORT PARK- RUNOFF ANALYSIS
MASTER DRAINAGE PLAN; REVISED 12-26-96

Analysis Point	Drainage Area Designation	Area (Acres)	Allow 4.46 cfs/Acre Runoff	Q ₁₀₀ (cfs)	REMARKS
13	B-1	3.7		12.6	From Original Report
14 & 15	B-1 & B-2	8.4		28.6	" "
C1	C-1	7.6	Allow 4.46 cfs/Acre Runoff	33.9	Revised & Additional Area. & Portion of Replat.
C2	C-1 & C-2	8.0	" "	35.7	Design Capacity is 37.0 CFS-OK.

IV. REPLAT - SUNPORT PARK, BLOCK 4-A & 4-B

To provide for development of the portion of property within Phase I bounded by Woodward Road, Sunport Blvd., Transport Street and University Blvd., a replat of this area is proposed.

This replat is designated as Sunport Park, Block 4-A and 4-B and a copy of this plat is included herein in the packet at the back of this report.

As shown on the plat, a new street (Sunport Place) is created and therefore, improvements to this street are to be provided, including pavement, curb and gutter and applicable utilities.

The drainage plan for developed conditions of this replat is shown on the enclosed Figure 2 Titled: Sunport Park, Block 4-A and 4-B, Drainage Plan.

This replat lies within Drainage Basins A-6-B, A-8-A, C-1 and C-2 of the Master Drainage Plan.

A. Existing Conditions

The drainage basins addressed in this portion of this report are those comprising Blocks 4-A and 4-B. These areas lie between Woodward Road and Sunport Boulevard, north to south, and University Boulevard and Transport Street, east to west. These areas are shown on Figure 2.

Existing topographic conditions are also shown on Figure 2. Generally, Blocks 4-A and 4-B have a slope of five to seven percent from east to west. All runoff is generated on-site as surrounding improved streets divert runoff from the area to existing storm drain systems. Currently, runoff from these blocks is carried away from the site through two existing separate storm drain systems north and south of the site. (See Master Drainage Plan.)

B. Developed Conditions

Guidelines for the hydrologic analysis for this replat are based on methods as defined in Section 22.2, Hydrology of the Development Process Manual (DPM), Volume 2, Design Criteria for the City of Albuquerque, New Mexico, January 1993.

Sunport Park is within Precipitation Zone 2 as defined in Section 22.2 of the DPM. The 6-hour, 100-year return event storm was used to calculate peak runoff under developed conditions. Land treatments were based on "Design Guidelines for Sunport Park," developed by the Site Plan as well as the recommended values in Table A-5 of DPM, Section 22.2.

Runoff from the individual lots in Blocks 4-A and 4-B are based on having 10 percent Land Treatment "B" - Landscaping, and 90 percent Land Treatment "D" - Impervious. Section 22.2 of the DPM lists peak discharges for various land treatments in Table A-9. Adjacent streets including Transport Street, Woodward Road and Sunport Place were also assumed to be 10 percent "B" and 90 percent "D".

Therefore, runoff per acre is determined as follows:

From Table A-9 in DPM Section 22.2:

Type "B" = 2.28 cfs/Acre

Type "D" = 4.70 cfs/Acre

Runoff = $10\% \times 2.28 + 90\% \times 4.70 = 4.46$ cfs/Acre

1) Runoff Analysis

The runoff analysis for Blocks 4-A and 4-B for Developed Conditions is shown on the following tabulation titled: Sunport Park Block 4-A and 4-B, Runoff Analysis.

Sunport Park Block 4A and 4B Runoff Analysis

Analysis Point	DrainageArea Designation	Area (Acres)	q100 (cfs/acre)	Qp100 (cfs)	Cummulative Qp100 (cfs)
	1-B	0.8136	4.46	3.63	
	MRD-1	0.2183	4.46	0.97	
AP-A					4.60
	2-B	1.0700	4.46	4.77	
	MRD-2	0.1329	4.46	0.59	
AP-B					9.97
	3-B	2.1664	4.46	9.66	
	MRD-3	0.2422	4.46	1.08	
AP-C					20.71
	4-B	2.6837	4.46	11.97	
	MRD-4	0.2907	4.46	1.30	
AP-D					33.98
	TSB	0.4008	4.46	1.79	
AP-E					35.76
	1-A	1.5244	4.46	6.80	
	2-A	0.1416	4.46	0.63	
	3-A	0.2336	4.46	1.04	
	SPL	0.9704	4.46	4.33	
AP-F					12.80
	1-4A	1.0365	4.46	4.62	
	2-4A	1.0852	4.46	4.84	
					22.26
	A-6-A			8.30	
	A-7	1.10	4.00	4.40	
					34.96
	WRD-1	1.7697	4.46	7.89	
AP-F					42.86
	4-A	2.2210	4.46	9.91	
	WRD-2	0.5023	4.46	2.24	
	TSA	0.4339	4.46	1.94	
AP-G					56.94

C. Maintenance Road Drainage Ditch

As a portion of the Sunport Boulevard project, a cement-treated base-course lined ditch was constructed along the north side of the north maintenance road to receive and convey the runoff flows from the adjacent drainage basins to the north.

A plan sheet from the construction plans (which was added by change order) is included in the packet at the back of this report showing the construction details. This sheet is titled: Sunport Boulevard - Phase I, Transport Street Storm Drainage Details.

Following are computations showing capacity of this drainage ditch and associated inlet.

NORTH MAINTENANCE ROAD DRAINAGE DITCH

Trapezoidal Channel Analysis & Design

Open Channel - Uniform flow

Worksheet Name: Hydraulic Capacity

Comment: Ditch Section 1

Solve For Discharge

Given Input Data:

Bottom Width.....	8.00 ft
Left Side Slope..	3.00:1 (H:V)
Right Side Slope.	3.00:1 (H:V)
Manning's n.....	0.017
Channel Slope....	0.0195 ft/ft
Depth.....	1.50 ft

Computed Results:

Discharge.....	239.76 cfs
Velocity.....	12.79 fps
Flow Area.....	18.75 sf
Flow Top Width...	17.00 ft
Wetted Perimeter.	17.49 ft
Critical Depth...	2.28 ft
Critical Slope...	0.0038 ft/ft
Froude Number....	2.15 (flow is Supercritical)

SEE SHEET 2 OF 2, SUNPORT BOULEVARD - PHASE I ,
TRANSPORT STREET STORM DRAINAGE DETAILS

Open Channel Flow Module, Version 3.42 (c) 1991

Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct 06708

NORTH MAINTENANCE ROAD DRAINAGE DITCH

Trapezoidal Channel Analysis & Design

Open Channel - Uniform flow

Worksheet Name: Hydraulic Capacity

Comment: Ditch Section Transport St to STA 5+60

Solve For Discharge

Given Input Data:

Bottom Width.....	0.00 ft
Left Side Slope..	3.00:1 (H:V)
Right Side Slope.	3.00:1 (H:V)
Manning's n.....	0.017
Channel Slope....	0.0195 ft/ft
Depth.....	1.50 ft

Computed Results:

Discharge.....	65.67 cfs
Velocity.....	9.73 fps
Flow Area.....	6.75 sf
Flow Top Width...	9.00 ft
Wetted Perimeter.	9.49 ft
Critical Depth...	1.97 ft
Critical Slope...	0.0045 ft/ft
Froude Number....	1.98 (flow is Supercritical)

SEE SHEET 2 OF 2, SUNPORT BOULEVARD - PHASE I,
TRANSPORT STREET STORM DRAINAGE DETAILS

Open Channel Flow Module, Version 3.42 (c) 1991

Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct 06708

NORTH MAINTENANCE ROAD DRAINAGE DITCH

Trapezoidal Channel Analysis & Design

Open Channel - Uniform flow

Worksheet Name: Hydraulic Capacity

Comment: Ditch Section STA 5+75 and East

Solve For Discharge

Given Input Data:

Bottom Width.....	0.00 ft
Left Side Slope..	3.00:1 (H:V)
Right Side Slope.	3.00:1 (H:V)
Manning's n.....	0.017
Channel Slope....	0.0727 ft/ft
Depth.....	1.00 ft

Computed Results:

Discharge.....	43.01 cfs
Velocity.....	14.34 fps
Flow Area.....	3.00 sf
Flow Top Width...	6.00 ft
Wetted Perimeter.	6.32 ft
Critical Depth...	1.66 ft
Critical Slope...	0.0048 ft/ft
Froude Number....	3.57 (flow is Supercritical)

SEE SHEET 2 OF 2 , SUNPORT BOULEVARD -PHASE I ,
TRANSPORT STREET STORM DRAINAGE DETAILS

Open Channel Flow Module, Version 3.42 (c) 1991

Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct 06708

NORTH MAINTENANCE ROAD DRAINAGE DITCH

ANDREWS, ASBURY & ROBERT, INC.
CONSULTING ENGINEERS

149 Jackson, NE., Albuquerque, N.M. 87108
 Telephone (505) 265-6631 • FAX (505) 266-8112

Project SUNPORT PARK

Sheet _____ of _____

AREA INLET CAPACITY

Job No. 752A

By PG Chk'd _____

Date DEC. 31, 1996

AREA INLET AT ANALYSIS POINT D

PERIMETER LENGTH OF 6' Ø MANHOLE

$$P = \pi d = \pi (6') = 18.85 \text{ FT}$$

ASSUME 30% CLOGGED W/ DEBRIS

$$P_c = (1 - 0.30) (18.85) = 13.20 \text{ FT}$$

WEIR EQUATION

$$Q = CLH^{1.5}$$

C = 3.0 RING & BRATTLE

Q = 35.8 CFS

SOLVE FOR H, REQUIRED HEAD

L = P_c = 13.20

$$H = (Q / CL)^{2/3}$$

$$H = \left(\frac{35.8}{3.0 (13.20)} \right)^{2/3}$$

$$H = 0.93 \text{ FT}$$

0.93 FT REQUIRED < 1.0 FT AVAILABLE

✓ OK

SEE SHEET 2 OF 2, SUNPORT BOULEVARD - PHASE I,

TRANSPORT STREET STORM DRAINAGE DETAILS

MIS/D23

TYPE OF SUBMITTAL:

DRAINAGE REPORT

SKETCH PLAT APPROVAL

DRAINAGE PLAN

PRELIMINARY PLAT APPROVAL

CONCEPTUAL GRADING & DRAINAGE PLAN

S. DEV. PLAN FOR SUB'D. APPROVAL

GRADING PLAN

S. DEV. PLAN FOR BLDG. PERMIT APPROVAL

EROSION CONTROL PLAN

SECTOR PLAN APPROVAL

ENGINEER'S CERTIFICATION

_____ FINAL PLAT APPROVAL

 X OTHER

FOUNDATION PERMIT APPROVAL

BUILDING PERMIT APPROVAL

PRE-DESIGN MEETING:

CERTIFICATE OF OCCUPANCY APPROVAL

YES

GRADING PERMIT APPROVAL

 X NO

PAVING PERMIT APPROVAL

COPY PROVIDED

S.A.D. DRAINAGE REPORT

DRAINAGE REQUIREMENTS

X OTHER L.O.M.R. (SPECIFY)
(Letter of Map Revision)

DATE SUBMITTED:

BY:

RECEIVED
MAR 18 1992
HYDROLOGY DIVISION

January 17, 1992

RECEIVED
MAR 14 1991
HYDROLOGY DIVISION



City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

February 27, 1992

Thomas L. Holtman, P.E.
Andrews, Asbury & Robert, Inc.
149 Jackson, NE
Albuquerque, New Mexico 87108

RE: LETTER OF MAP REVISION REQUEST FOR SUNPORT PARK
PHASE 1 RECEIVED JANUARY 17, 1992 (M-15/D23)

Dear Mr. Holtman:

Based on the information provided, I feel you need to include the following information prior to submittal to FEMA for the request:

1. Include the topographic mapping of the new berm constructed on the western side of Transport Street.
2. Submit certification requirements by a registered Professional Engineer that the fill was compacted per Section 65.5.6.i of the National Flood Insurance Program and Related Regulations.
3. Please review other requirements that may be applicable in Section 65.5.6.
4. I have also attached FEMA's letter dated September 10, 1991, regarding this berm. Please submit a letter stating that you have complied with their comments.

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

Cordially,

Gilbert Aldaz, P.E. & P.S.
City/County Floodplain Administrator

GA
(WP+283)

PUBLIC WORKS DEPARTMENT



City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

February 19, 1992

Thomas L. Holtman, P.E.
Andrews, Asbury & Robert, Inc.
149 Jackson, NE
Albuquerque, New Mexico 87108

RE: LETTER OF MAP REVISION REQUEST FOR SUNPORT PARK,
PHASE 1 RECEIVED JANUARY 17, 1992 (M-15/D23)

Dear Mr. Holtman:

Based on the information provided, I feel you need to include the following information prior to Hydrology submitting to FEMA for the request:

1. Include the topographic mapping of the new berm constructed on the western side of Transport Street.
2. Submit certification requirements by a registered Professional Engineer that the fill was compacted per Section 65.5.6.i of the National Flood Insurance Program and Related Regulations.
3. Please review other requirements that may be applicable in Section 65.5.6.
4. I have also attached FEMA's letter dated September 10, 1991, regarding this berm. Please submit a letter stating that you have complied with their comments.

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

Cordially,

Gilbert Aldaz, P.E. & P.S.
City/County Floodplain Administrator

GA
(WP+283)

PUBLIC WORKS DEPARTMENT

Walter H. Nickerson, Jr., P.E.
Assistant Director Public Works

ENGINEERING GROUP

Telephone (505) 768-2500

AN EQUAL OPPORTUNITY EMPLOYER

SEP 13

Case.No.: 6-91-127

Community: City of Albuquerque,
Bernalillo County,
New Mexico

Community No.: 350002

ADDITIONAL DATA REQUIRED TO SUPPORT A REVISION TO THE
FLOOD INSURANCE STUDY AND NATIONAL FLOOD INSURANCE PROGRAM MAP

Requestor: Mr. Thomas L. Holtman, P.E. Date: SEP 10 1991

The issues listed below must be addressed in order to process this revision request:

In order to remove the Zone-AO delineation from the area west of the intersection of Transport Street and Woodward Road, we must first receive topographic mapping (certified by a registered professional engineer or licensed land surveyor) which shows that the berm on the western side of Transport Street is at its highest point across the entire width of the intersection, and ties into natural high ground.

DRAINAGE INFORMATION SHEET

M15/D23

PROJECT TITLE: Sunport Park L.O.M.R. ZONE ATLAS/DRNG. FILE #: M-14, 15
DRB #: 90-301 EPC #: _____ WORK ORDER #: _____
LEGAL DESCRIPTION: Sunport Park as shown on the plat thereof filed Jan. 27, 1989 in Plat
CITY ADDRESS: University Blvd., SE/Flightway Ave., SE Book C38, Folio 102
ENGINEERING FIRM: Andrews, Asbury & Robert, Inc. CONTACT: Tom Holtman
ADDRESS: 149 Jackson St., NE, Albuquerque PHONE: 265-6631
OWNER: Sunport Park Joint Venture CONTACT: Howard Mock
c/o Jaynes Corporation PHONE: 345-8591
ADDRESS: P.O. Box 26841, Albuq., NM 87125
ARCHITECT: _____ CONTACT: _____
ADDRESS: _____ PHONE: _____
SURVEYOR: _____ CONTACT: _____
ADDRESS: _____ PHONE: _____
CONTRACTOR: _____ CONTACT: _____
ADDRESS: _____ PHONE: _____

TYPE OF SUBMITTAL:

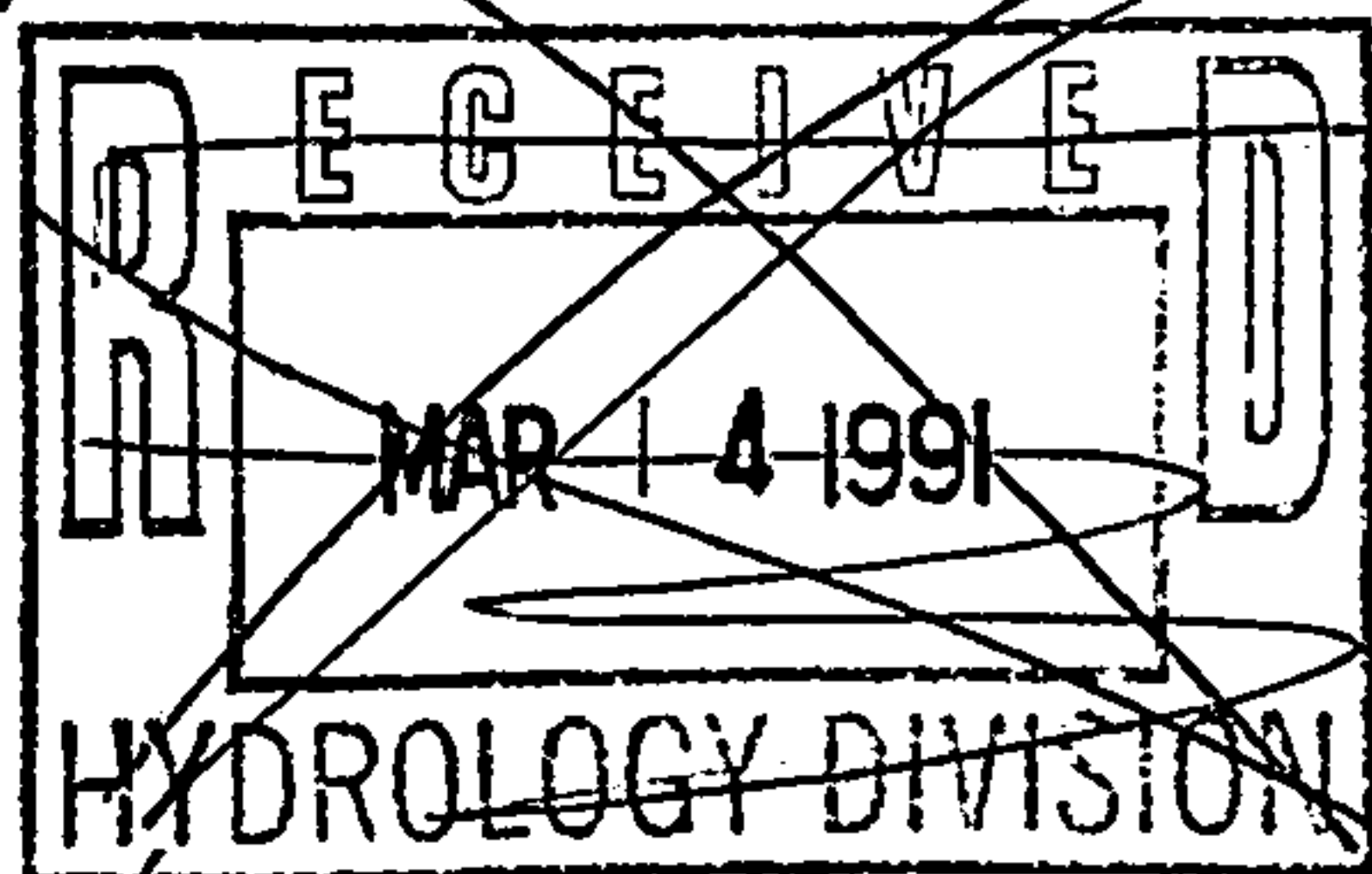
- ☐ DRAINAGE REPORT
☐ DRAINAGE PLAN
☐ CONCEPTUAL GRADING & DRAINAGE PLAN
☐ GRADING PLAN
☐ EROSION CONTROL PLAN
☐ ENGINEER'S CERTIFICATION
☒ OTHER

PRE-DESIGN MEETING:

- ☐ YES
☒ NO
☐ COPY PROVIDED

CHECK TYPE OF APPROVAL SOUGHT:

- ☐ SKETCH PLAT APPROVAL
☐ PRELIMINARY PLAT APPROVAL
☐ S. DEV. PLAN FOR SUB'D. APPROVAL
☐ S. DEV. PLAN FOR BLDG. PERMIT APPROVAL
☐ SECTOR PLAN APPROVAL
☐ FINAL PLAT APPROVAL
☐ FOUNDATION PERMIT APPROVAL
☐ BUILDING PERMIT APPROVAL
☐ CERTIFICATE OF OCCUPANCY APPROVAL
☐ GRADING PERMIT APPROVAL
☐ PAVING PERMIT APPROVAL
☐ S.A.D. DRAINAGE REPORT
☐ DRAINAGE REQUIREMENTS
☒ OTHER L.O.M.R. (SPECIFY)
(Letter of Map Revision)



DATE SUBMITTED: _____

BY: Gilbert Aldaz



ANDREWS, ASBURY & ROBERT, INC.
Consulting Engineers

149 Jackson, NE, Albuquerque, New Mexico 87108
(505) 265-6631

John A. Andrews, P.E.
Charles T. Asbury, P.E.
John B. Robert, P.E. & L.S. (1915-1984)
James E. Millington, P.E. - V.P.
Gayle D. Jewell, L.S. - V.P.

January 17, 1992

Mr. Gilbert Aldez
Flood Plain Administrator
City of Albuquerque
P.O. Box 1293
Albuquerque, NM 87103

RE: L.O.M.R.; Sunport Park Phase I; Map Panel 350002 0035 C;
Unnamed area of shallow flooding (Zone AO) in the vicinity
of University Boulevard SE and Woodward Road, Albuquerque NM.

Dear Gilbert:

I am transmitting 2 blueline prints and 2 copies of survey notes showing recent earthwork performed along Transport Street at the referenced site.

In the review of our last submittal, Dewberry and Davis expressed concern over the height of the earthen embankment along the west side of Transport Street. Some sections of the roadway cut were approximately 2 feet above the curb and they felt this could not meet the minimum requirements for diverting the Woodward Avenue flows north to the inlets on Transport Street. After telephone discussion with Mark Bryer of Dewberry and Davis, I instructed the owner to raise the embankment height to a minimum of 3 feet above the top of the roadway curb on the west side of Transport Street. This work has been performed and our surveyors have verified the height.

The survey notes are enclosed and we have plotted this new survey information (dated 12-23-91) on the drawing which had been submitted previously (dated 7-22-91). The new survey shows that there is now over 3 feet of earthen embankment along the area of concern on Transport Avenue.

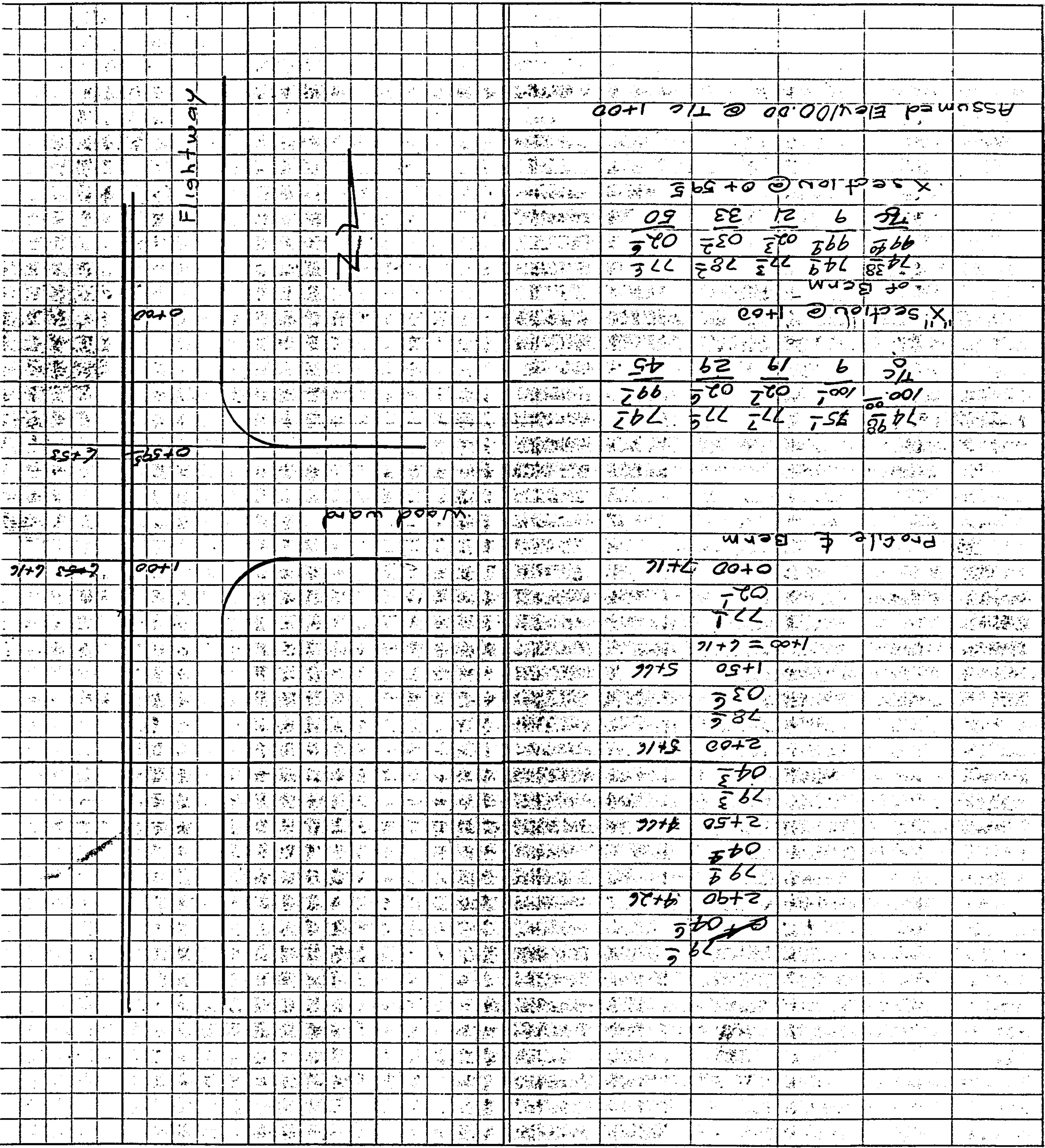
I assume you will forward one copy of the enclosed information to FEMA and keep one for your files. If you have any questions or comments regarding this information, please feel free to call.

Very truly yours,



Thomas L. Holtman P.E.

TLH/tac-415E



Date: 12-23-91
Survey Crew: JRE, JR
Instrument:
Weather:
149 Jackson, N.E., Albuquerque, N.M. 87108
Telephone (505) 265-6631
Subj. Support
Sheet
No. 415E
Loc. Highway & Woodward
CONSULTING ENGINEERS
ANDREWS, ASBURY & ROBERT, INC.



Federal Emergency Management Agency

Washington, D.C. 20472

APR 26 1991

IN REPLY REFER TO:
(65-DR1-100)

Case No.: 6-91-127

Community: City of Albuquerque,
Bernalillo County,
New Mexico

Community No.: 350002

The Honorable Louis Saavedra
Mayor of the City of Albuquerque
P.O. Box 1293
Albuquerque, New Mexico 87103

Dear Mayor Saavedra:

This is in reference to a request for a revision to the National Flood Insurance Program maps for your community. A copy of the incoming request is enclosed; information pertinent to the revision request is listed below:

Requestor: Mr. Thomas L. Holtman, P.E., Andrews, Asbury & Robert, Inc.

Flooding source(s): Unnamed area of shallow flooding (Zone AO) in the vicinity of University Boulevard, S.E., and Woodward Road

Project name or area of revision: Sunport Park, Phase 1

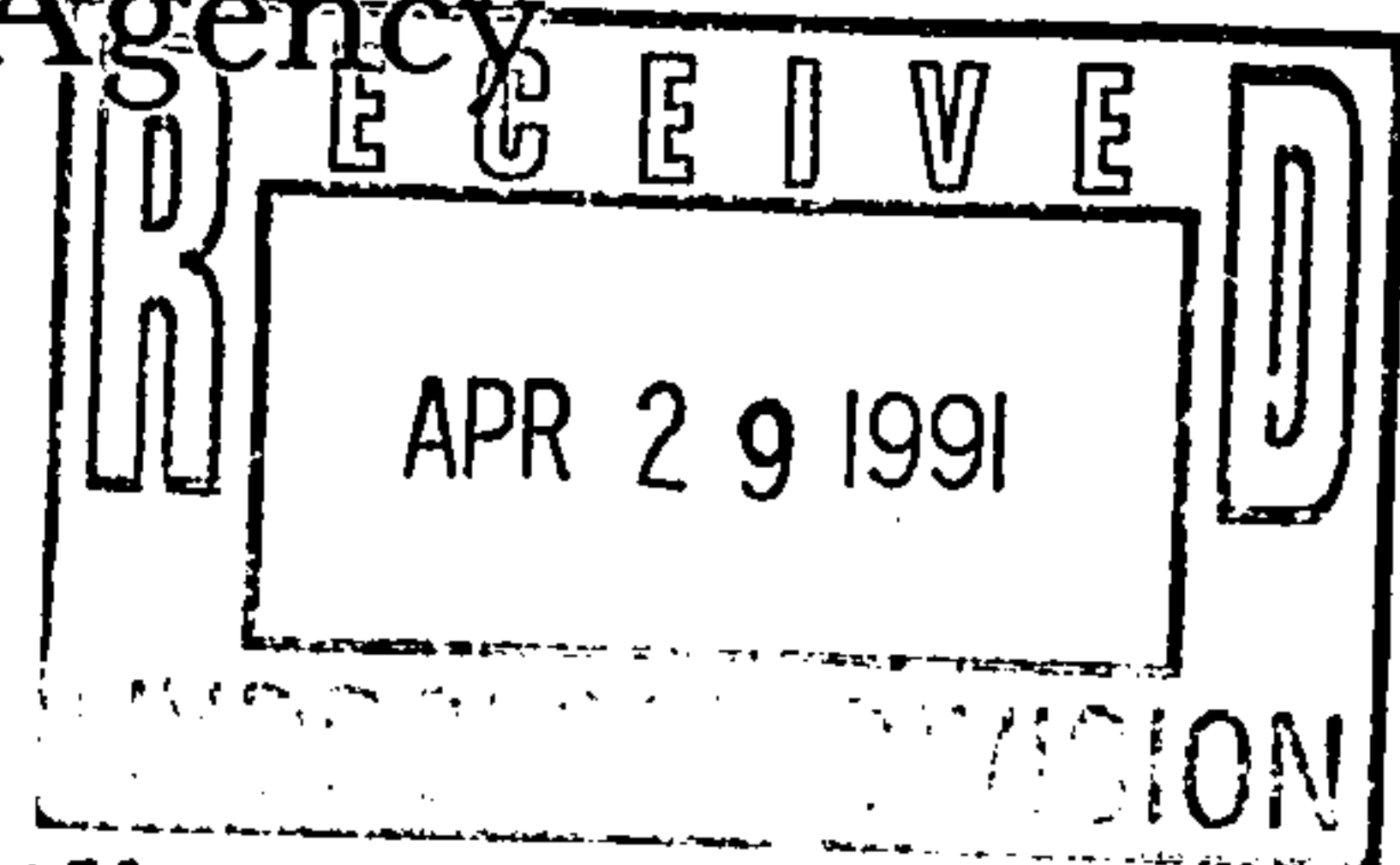
Map Panel(s) affected: 350002 0035 C

We have determined that additional data are required to adequately evaluate the request. The additional data required are specified on the enclosed checklist. To provide assistance in preparing the required data, we have enclosed a copy of Part 65 of the National Flood Insurance Program and Related Regulations and a document entitled Guide for the Submittal of Requests to Revise National Flood Insurance Program Maps. The procedures and guidelines outlined in these documents should be followed.

The specified information on the enclosed checklist should be provided by the requestor within 30 days of the date of this letter to the following address:

Dewberry & Davis
8401 Arlington Boulevard
Fairfax, Virginia 22031

ATTENTION Ms. Patricia W. McDermott, P.E.
Management Engineering and
Technical Services Division
(703) 849-0245



The case number referenced above should be included on any further correspondence regarding this request. Further action on this request has been suspended pending receipt of the specified additional data. After receiving the required data as indicated on the enclosed checklist, we will continue our evaluation of the request. If additional information is required to complete our evaluation, we will inform you.

Should you have any questions or if additional time is required to provide the requested information, please contact Matthew B. Miller of my staff at (202) 646-3461.

Sincerely,



William R. Locke
Chief, Risk Studies Division
Federal Insurance Administration

Enclosures

cc: Mr. Gilbert Aldaz, P.E., L.S., Floodplain Administrator for the City
of Albuquerque ✓
Mr. Thomas L. Holtman, P.E.



Federal Emergency Management Agency

Washington, D.C. 20472

Case No.: 6-91-127
Community: City of Albuquerque,
Bernalillo County,
New Mexico

DATA REQUEST CHECKLIST FOR REVISIONS TO NATIONAL FLOOD INSURANCE PROGRAM MAPS

Requestor: Mr. Thomas L. Holtman, P.E.

Date: APR 26 1991

The items checked below in Column 1 are required to process the request for a revision to the National Flood Insurance Program (NFIP) maps. Items checked in Column 2 have been received and should not be resubmitted unless specifically requested.

(1) Required	(2) Received	
_____	<u> X </u>	1. A description of the nature and extent of the revision request.
_____	<u> X </u>	2. Community approval of the revision request.
_____	<u> X </u>	3. A brief statement describing the methodology used to determine the hydrologic and/or hydraulic parameters.
_____	<u> X </u>	4. Hydrologic computations for the 100-year flood reflecting the completed project.
		5. Hydraulic computations for the 100-year flood for the following:
<u> -- </u>	<u> -- </u>	a. Floodplain conditions prior to construction of the project
_____	<u> X </u>	b. Floodplain conditions after construction of the project
<u> -- </u>	<u> -- </u>	6. Map of the community's current corporate limits.
_____	<u> X </u>	7. Topographic mapping of the entire area covered by the post-construction conditions computations, indicating the locations of all cross sections used in the hydraulic computations and delineating the 100-year floodplain boundary.
_____	<u> X </u>	8. Annotated NFIP maps delineating the 100-year floodplain boundary, stream alignment, roads and road names, and corporate limits.
_____	<u> X </u>	9. "As-built" plans of the project, certified by a registered professional engineer.

(1) Required	(2) Received
-----------------	-----------------

--

--

10. Certification by a registered professional engineer or soils engineer that fill placed meets the requirements for 95% compaction.

--

--

11. Certification from a Federal agency or registered professional engineer indicating structural flood protection measures are adequately designed and will be maintained to withstand a 100-year flood event.

--

--

12. An operation and maintenance plan for any structural flood protection measures.

--

--

13. Written statement from the community indicating that they will accept ultimate responsibility for maintenance of a structural flood protection system.

--

--

14. Study that addresses interior drainage for any area protected by a levee or dike system.

X

15. Other: Please provide technical analyses determining the volume of sediment contributed by the watershed during the 100-year flood and its impact on the storm drain system. Also, please provide "as-built" plans of the sedimentation basin constructed near Interstate 25, certified by a registered professional engineer.



Federal Emergency Management Agency

Washington, D.C. 20472

SEP 10 1991

SEP 13 1991

IN REPLY REFER TO:

(65-DR2)

Case No.: 6-91-127

Community: City of Albuquerque,
Bernalillo County,
New Mexico

Community No.: 350002

The Honorable Louis Saavedra
Mayor of the City of Albuquerque
P.O. Box 1293
Albuquerque, New Mexico 87103

Dear Mayor Saavedra:

This is in reference to a request for a revision to the Flood Insurance Study and National Flood Insurance Program maps for your community. Information pertinent to this revision request is listed below:

Requestor: Mr. Thomas L. Holtman, P.E., Andrews, Asbury & Robert, Inc.

Flooding source(s): Unnamed area of shallow flooding (Zone AO) in the vicinity of University Boulevard, S.E., and Woodward Road

Project name or area of revision: Sunport Park, Phase 1

Map Panel(s) affected: Flood Insurance Rate Map number 350002, panel 0035 C

Our previous letter to you indicated that additional information might be required to complete our evaluation of the request. We have reviewed the data submitted and have determined that additional and/or revised data are required to complete our evaluation. The enclosed list outlines the information required.

The information specified on the enclosed list should be provided by the requestor to the following address:

Federal Emergency Management Agency
Federal Insurance Administration
~~and~~ Office of Risk Assessment
500 C Street, S.W., Room 422
Washington, DC 20472

Attention: Mr. William R. Locke
Chief, Risk Studies Division

2

The case number referenced above should be included on any further correspondence regarding this request. Our review cannot proceed until the required additional data are received. After receiving the data, we will continue our evaluation of the request. If additional information is required to complete our evaluation, we will inform you.

Should you have any questions or if additional time is required to provide the required data, please contact Matthew B. Miller of my staff at (202) 646-3461.

Sincerely,



William R. Locke
Chief, Risk Studies Division
Federal Insurance Administration

Enclosure

cc: Mr. Gilbert Aldaz, P.E., L.S., Floodplain Administrator for the
City of Albuquerque ✓
Mr. Thomas L. Holtman, P.E.

SEP 13

Case No.: 6-91-127

Community: City of Albuquerque,
Bernalillo County,
New Mexico

Community No.: 350002

ADDITIONAL DATA REQUIRED TO SUPPORT A REVISION TO THE
FLOOD INSURANCE STUDY AND NATIONAL FLOOD INSURANCE PROGRAM MAP

Requestor: Mr. Thomas L. Holtman, P.E. Date: SEP 10 1991

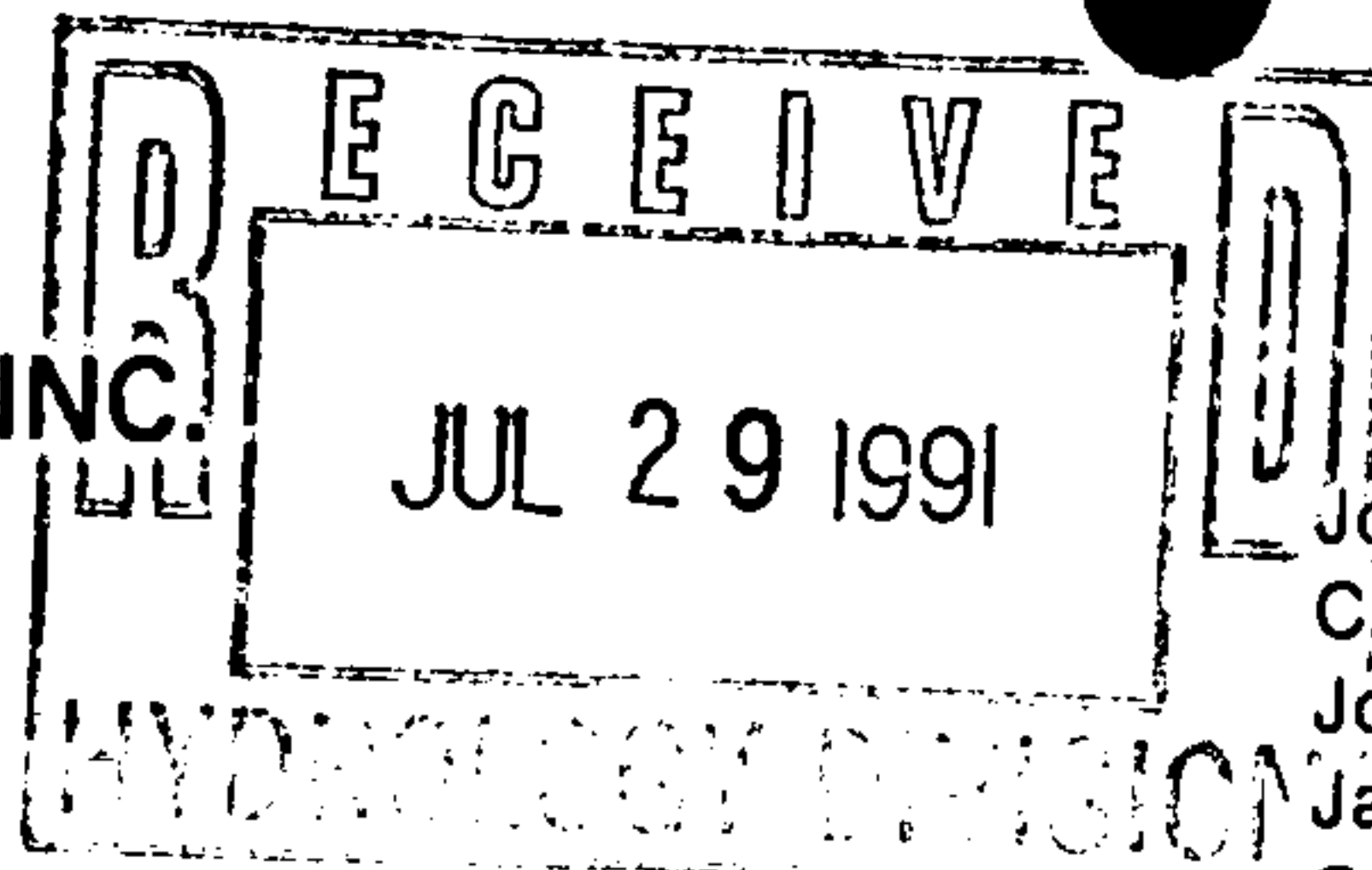
The issues listed below must be addressed in order to process this revision request:

In order to remove the Zone AO delineation from the area west of the intersection of Transport Street and Woodward Road, we must first receive topographic mapping (certified by a registered professional engineer or licensed land surveyor) which shows that the berm on the western side of Transport Street is at its highest point across the entire width of the intersection, and ties into natural high ground.



ANDREWS, ASBURY & ROBERT, INC.
Consulting Engineers

149 Jackson, NE, Albuquerque, New Mexico 87108
(505) 265-6631



John A. Andrews, P.E.
Charles T. Asbury, P.E.
John B. Robert, P.E. & L.S. (1915-1984)
James E. Millington, P.E. - V.P.
Gayle D. Jewell, L.S. - V.P.

July 25, 1991

Mr. Mark Bryer
Dewberry & Davis
8401 Arlington Boulevard
Fairfax, Virginia 22031

SUBJECT: LETTER OF MAP REVISION
SUNPORT PARK, ALBUQUERQUE, NEW MEXICO

Dear Mark:

Please find the following enclosed materials:

1. Bluelines of cross-section and profile plots along Transport Street from surveys performed July 22, 1991.
2. A copy of the survey notes for Item 1.
3. A blueline of a topographic map of the site dated 1989 showing the locations of the sections and profile.

I am sending this material in reference to our recent phone conversation when you expressed concern over the potential for Woodward Road westbound flows to cross the intersection at Transport Road, overtop the curb, and then travel west.

The Erosion Control Plan originally submitted was somewhat misleading in this area as it called for construction of a berm on the west side of Transport with a minimum height of 1.4' from flowline gutter. I believe the enclosed surveyed sections will show what actually exists today on the site. There was never a berm or levee constructed. Rather, Transport Road was in a cut situation and this produced the embankment on the west side of the road which ranges in height from 2 to 5 feet above the flowline of Transport.

If flows do jump the curb on Transport, it will be on the northern portion of the intersection due to the down slope of the Transport roadway. In this area, the west embankment contains well over 3 feet of freeboard. Furthermore, the embankment is not a berm or levee, but more like an elevated building site. The embankment width is well over 100 feet as can be seen from the sections. This will allow a generous amount of sacrificial scouring of the embankment should flows overtop the curb.

Page 2
Mr. Mark Bryer
July 25, 1991

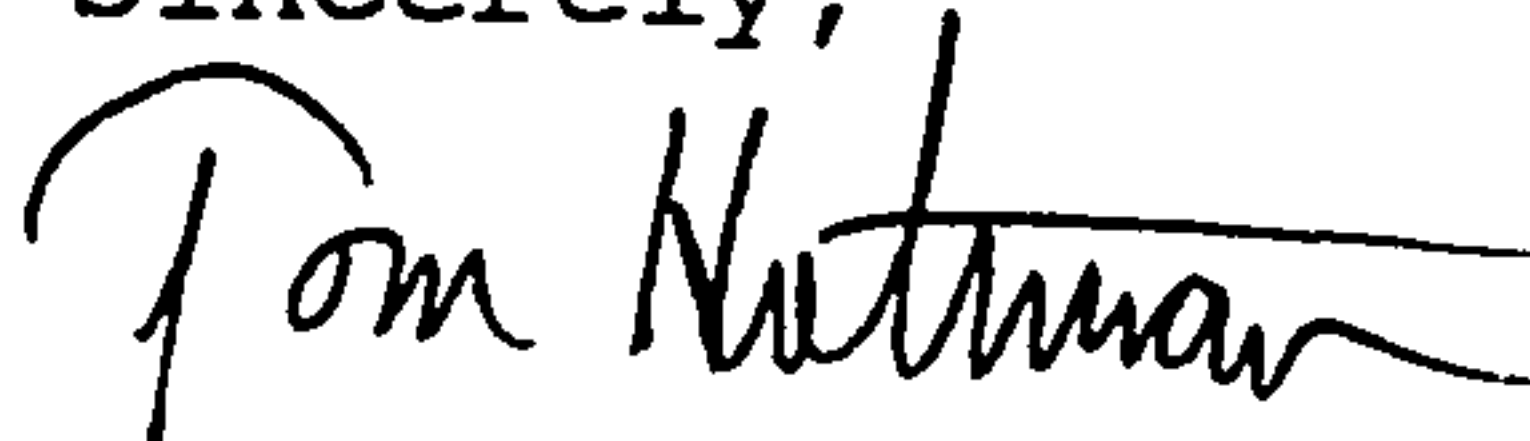
It is my opinion that the regulations you sent me (65.10 - mapping of areas protected by levee systems) are not totally applicable in this circumstance. As stated in Section 1.i. of the Regulations, the analyses criteria is directed toward riverine levees. I interpret riverine levees as a manmade structure with some uniform width and height above existing ground. This is not the case along the west side of Transport Avenue. Instead, what exists in this case is a roadway cut into existing ground where the embankment cut forms one side of the so-called levee. On the dry side of the levee, there is no drop back down to existing ground, rather, existing ground is at the top of the levee.

Although I have no problem with the 3' minimum freeboard requirement, such as would be applied in a typical study of existing conditions along any riverine flood retarding structure, I do not feel a foundation stability or internal seepage analysis, such as 65.10, is justified in this case. If the regulations were strictly interpreted in this fashion, I believe most of the existing riverbanks in the country could be shown to be inadequate as a "levee".

In conclusion, I feel FEMA's 3' freeboard criteria is met on the west side of Transport Road and 100 year flows will be directed north from the intersection towards the constructed storm drain system.

Please feel free to contact me with any further questions or comments.

Sincerely,



Tom Holtman P.E.

Enclosures

cc: Gilbert Aldaz, City of Albuquerque w/enclosures
Matthew B. Miller, FEMA Washington DC w/o enclosures

TLH/tac-415

Date: 7-22-91

Survey Crew: RE, JR

Instrument: _____

Weather: _____

ANDREWS, ASBURY & ROBERT, INC.
CONSULTING ENGINEERS

149 Jackson, N.E., Albuquerque, N.M. 87108
Telephone (505) 265-6631

Loc. SUNport

Job No. _____

Proj. SUNport

Sheet _____

Subj. _____

Of _____

JUL 29 1991

Z

1+44.8
SOUTH
0+20
0+0

2 @ B/C

W. 500 P.W. R.R.

Intersect
0+50
0

2+00
0 P.C.C.R.

0+50 & Survey

6+34 &

Const Transport

TRANSPORT

35

Profile

6+43	6+59	8+76 ³	7+34
6+38	7+27 ²	6+77 ⁵	7+09
6+22	8+75 ⁸	6+78 ²	6+84
6+04	8+76 ³	6+78 ³	6+57
5+84	8+76 ³	5+79 ²	6+52

15° 75° 76° 73° Prof. 35' west of west B/C Same Sta. as E
94 85 79 109 1127 1193 1146 1209 1126 109 73 45
130° 100° 70° 51° T/C H E E H 1+44.8 70 23° 44°
41.3 C.B. E 7+29

76°	77°	78°	79°	74°	74°	73°	74°	73°	74°
75	69	61	53	98	1004	1071	1026	1071	947
130°	105°	90°	78°	49°	41.3	H	E	H Valley Gutt.	30°
					T/C			0+68°	6+53

74°	74°	74°	76°	75°	74°	74°	74°	74°	75°
104	99	95	83	93	947	1011	970	1008	90
130°	100°	82°	64°	51°	41.3	H	E	H Valley Gutt.	30°
					T/C			0+32°	6+16

73°	74°	76°	75°	75°	74°	75°	74°	75°	76°	79°	81°
109	95	81	90	895	961	922	949	887	75	45	28
130°	100°	72°	52°	41.3	H	E	H	0+00	24°	50°	75°
				T/C				E			

+2.24 = H.I. 84.45

T.B.M. 400. in P.P. N.E. Quad
Flightway & Woodward Elev. 82.21



City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

May 24, 1991

Gayle Jewel
Andrews, Asbury & Roberts
149 Jackson, NE
Albuquerque, New Mexico 87108

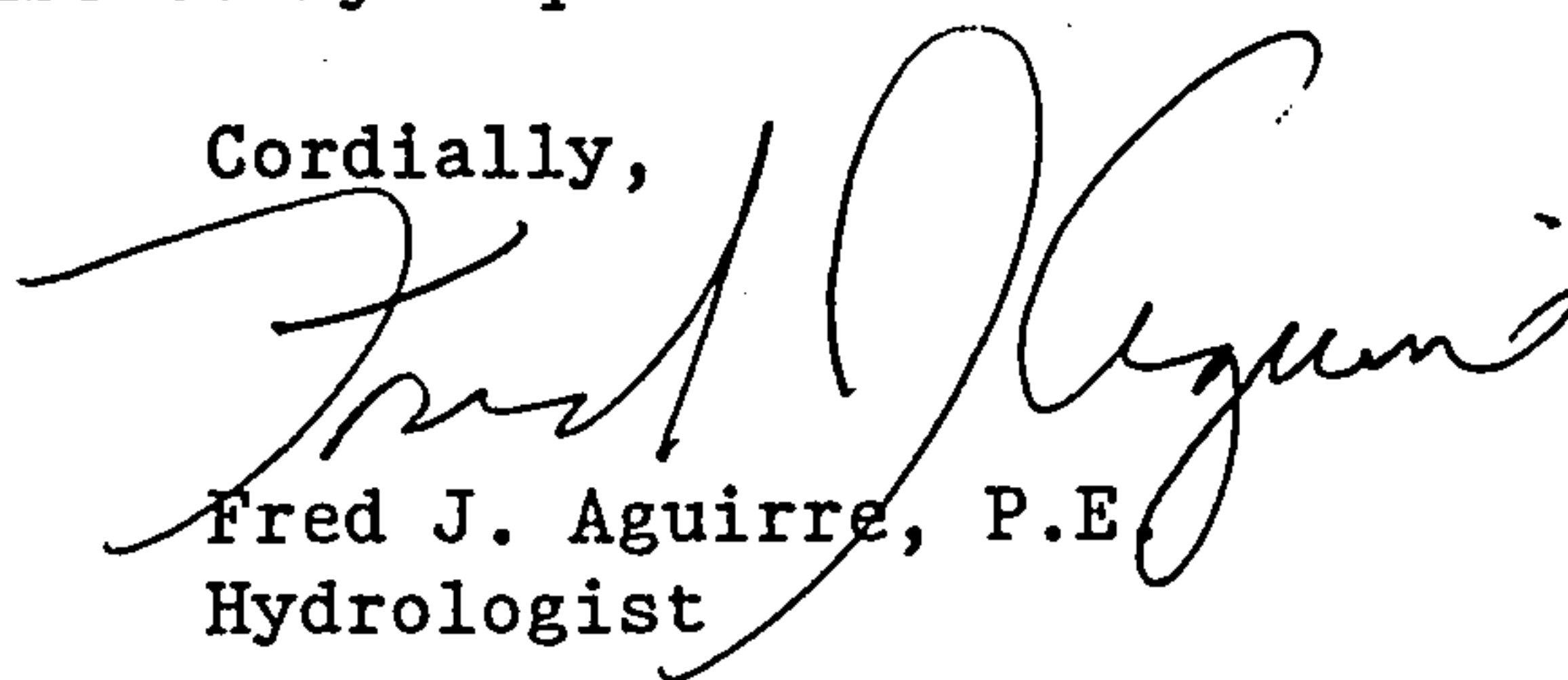
RE: DRAINAGE PLAN FOR SUNPORT PARK
REVISION DATED MAY 7, 1991 (M-15/D23)

Dear Mr. Jewel:

The referenced drainage submittal updating the master plan to reflect the subdivision of Parcel 1 into Parcel 1-A and 1-B is approved for the Sunport Park.

Thank you for your prompt response to my request.

Cordially,


Fred J. Aguirre, P.E.
Hydrologist

FJA/bsj
(WP+283)

PUBLIC WORKS DEPARTMENT

Walter H. Nickerson, Jr., P.E.
Assistant Director Public Works

ENGINEERING GROUP

Telephone (505) 768-2500

AN EQUAL OPPORTUNITY EMPLOYER

MEMO TO FILE: (M-15/D23)

SUNPORT PARK

FROM: GILBERT A.

DATE: 5/21/91

RE: SUBMITTAL RECEIVED MAY 10, 1991

ANDREWS, ASBURY FORWARDED ATTACHED

SUBMITTAL TO FEMA PER THEIR REQUEST

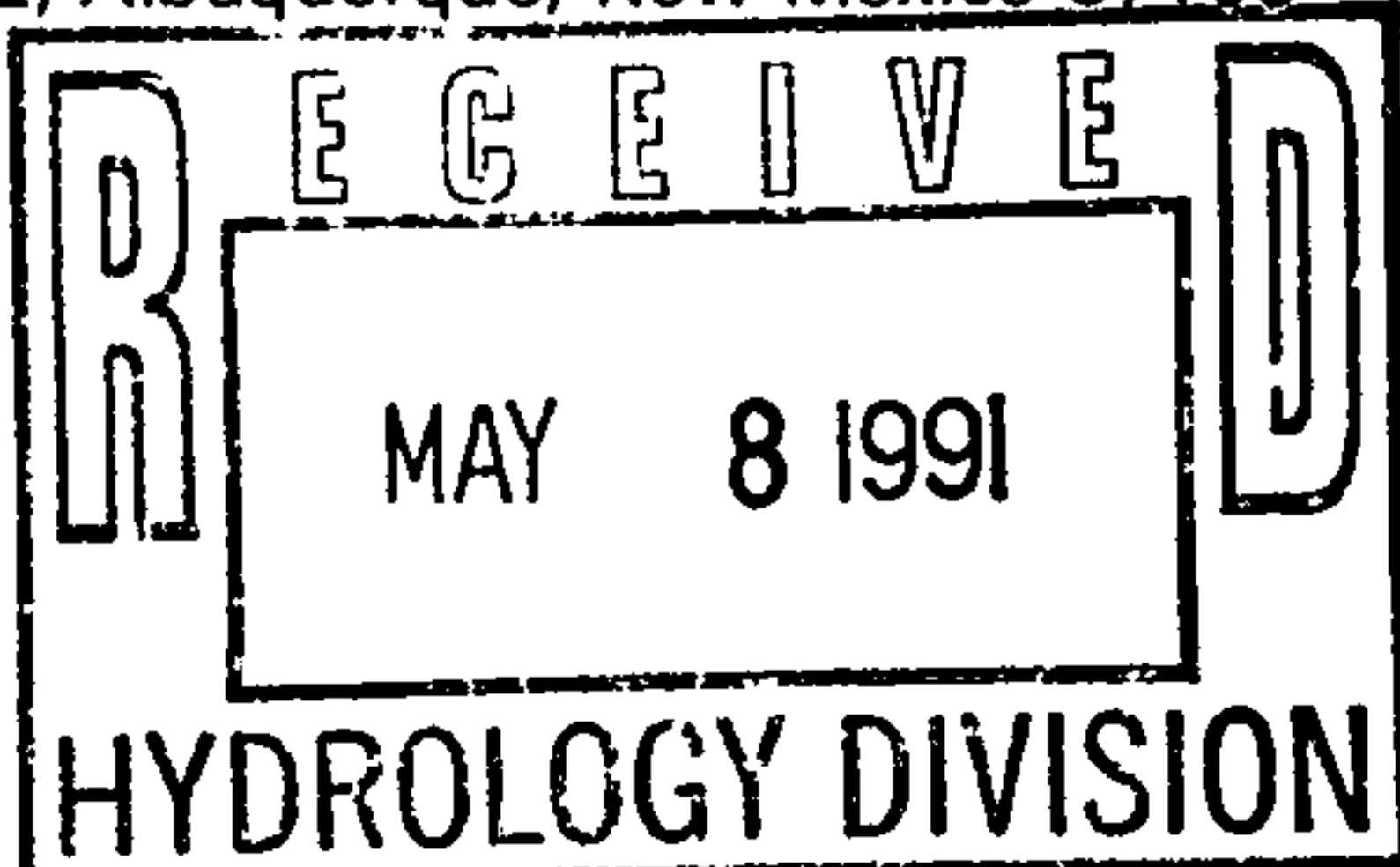
ON 4/26/91. THIS SUBMITTAL IS FOR

DUR INFO. ONLY



ANDREWS, ASBURY & ROBERT, INC.
Consulting Engineers

149 Jackson, NE, Albuquerque, New Mexico 87108
(505) 265-6631



May 8, 1991

John A. Andrews, P.E.
Charles T. Asbury, P.E.
John B. Robert, P.E. & L.S. (1915-1984)
James E. Millington, P.E. - V.P.
Gayle D. Jewell, L.S. - V.P.

Mr. Fred Aguirre
Engineering Group
Hydrology Section
Public Works Department
City of Albuquerque
P.O. Box 1293
Albuquerque, NM 87103

SUBJECT: SUNPORT PARK, PHASE I
DRB CASE NO: DRB-91-131

Dear Fred:

Pursuant to your DRB comments and requirements, we are submitting the following:

1. Drainage Information Sheet
2. Revised Drainage Plan

We thank you for your attention to this matter.

Very truly yours,

GAYLE D. JEWELL, P.S.

Enclosures

cc: Howard Mock

GDJ/tac-609

DRAINAGE INFORMATION SHEET

PROJECT TITLE: Sunport Park ZONE ATLAS/DRNG. FILE #: M15/D23
 DRB #: 91-131 EPC #: N/A WORK ORDER #: N/A
 LEGAL DESCRIPTION: Sunport Park Subdivision - Phase I
 CITY ADDRESS: N/A
 ENGINEERING FIRM: Andrews, Asbury & Robert CONTACT: John Andrews or
149 Jackson NE, Albuquerque PHONE: 265-6631
 OWNER: Sunport Joint Venture CONTACT: Howard Mock
P.O. Box 26841, Albuquerque PHONE: 345-8591
 ARCHITECT: N/A CONTACT: _____
 ADDRESS: _____ PHONE: _____
 SURVEYOR: Andrews, Asbury & Robert CONTACT: Gayle Jewell
149 Jackson NE, Albuquerque PHONE: 265-6631
 CONTRACTOR: N/A CONTACT: _____
 ADDRESS: _____ PHONE: _____

TYPE OF SUBMITTAL:

☐ DRAINAGE REPORT
☒ DRAINAGE PLAN (Revised May 7, 1991)
☐ CONCEPTUAL GRADING & DRAINAGE PLAN
☐ GRADING PLAN
☐ EROSION CONTROL PLAN
☐ ENGINEER'S CERTIFICATION
☐ OTHER

PRE-DESIGN MEETING:

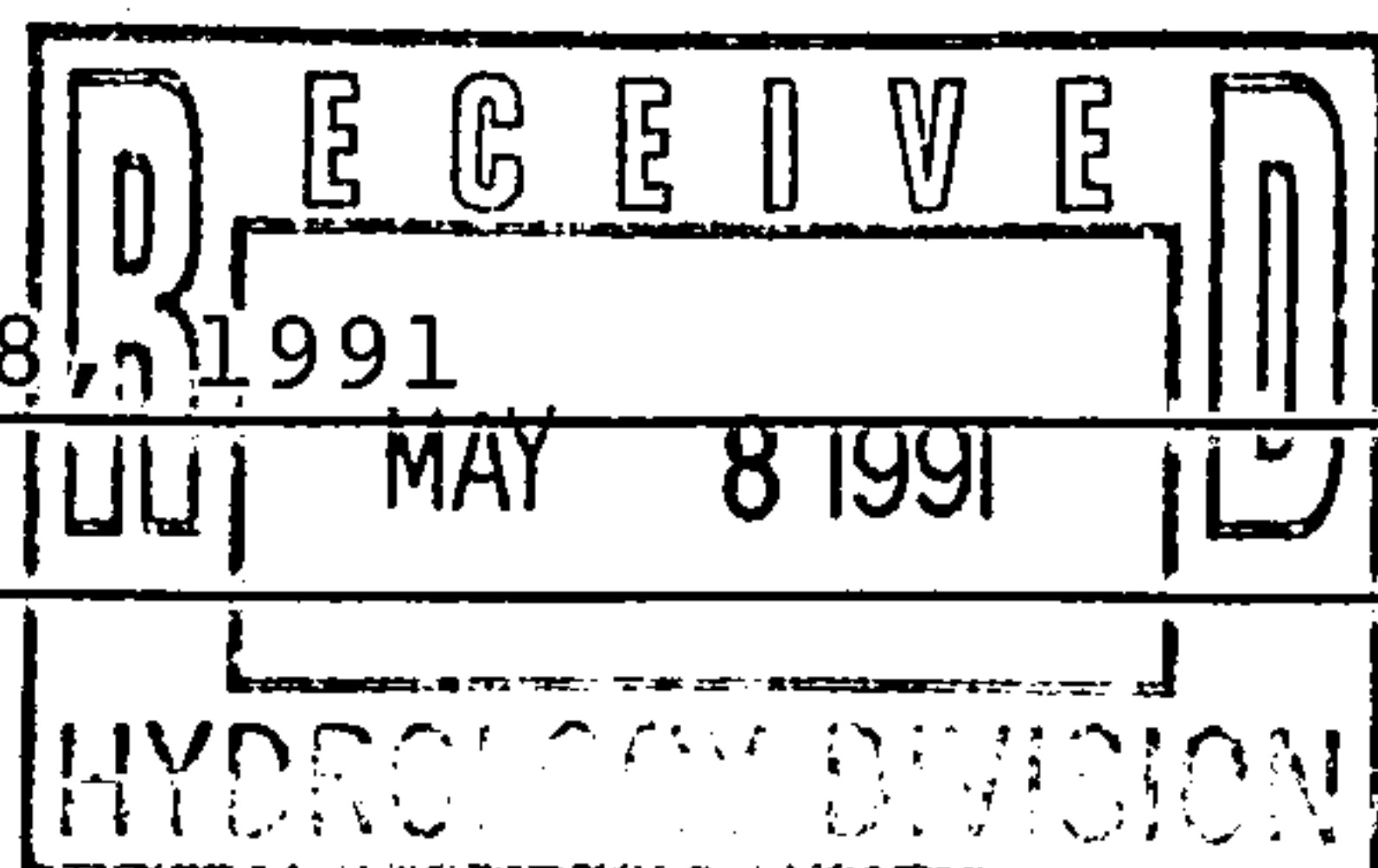
☐ YES
☐ NO
☐ COPY PROVIDED

CHECK TYPE OF APPROVAL SOUGHT:

☐ SKETCH PLAT APPROVAL
☐ PRELIMINARY PLAT APPROVAL
☐ S. DEV. PLAN FOR SUB'D. APPROVAL
☐ S. DEV. PLAN FOR BLDG. PERMIT APPROVAL
☐ SECTOR PLAN APPROVAL
☒ FINAL PLAT APPROVAL
☐ FOUNDATION PERMIT APPROVAL
☐ BUILDING PERMIT APPROVAL
☐ CERTIFICATE OF OCCUPANCY APPROVAL
☐ GRADING PERMIT APPROVAL
☐ PAVING PERMIT APPROVAL
☐ S.A.D. DRAINAGE REPORT
☐ DRAINAGE REQUIREMENTS
☐ OTHER _____ (SPECIFY)

DATE SUBMITTED: May 8, 1991

BY: _____



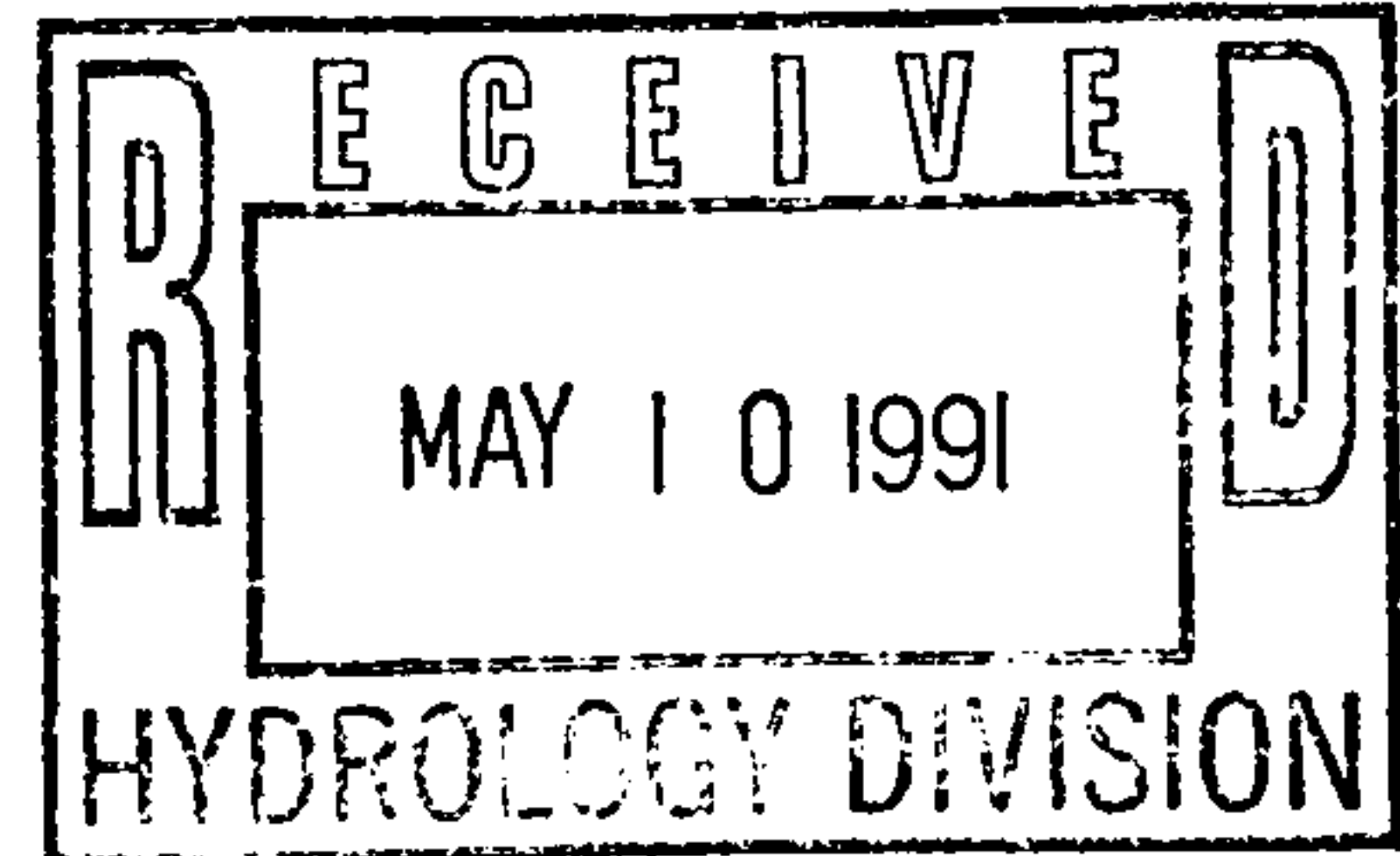


ANDREWS, ASBURY & ROBERT, INC.
Consulting Engineers

149 Jackson, NE, Albuquerque, New Mexico 87108
(505) 265-6631

John A. Andrews, P.E.
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James E. Millington, P.E. - V.P.
Gayle D. Jewell, L.S. - V.P.

May 2, 1991



Ms. Patricia W. McDermott, P.E.
Management Engr. and Tech. Services
Dewberry & Davis
8401 Arlington Boulevard
Fairfax, Virginia 22031

RE: L.O.M.R.; Sunport Park Phase I; Map Panel 350002 0035 C;
Unnamed area of shallow flooding (Zone AO) in the vicinity
of University Blvd., SE and Woodward Road, Albuquerque NM.

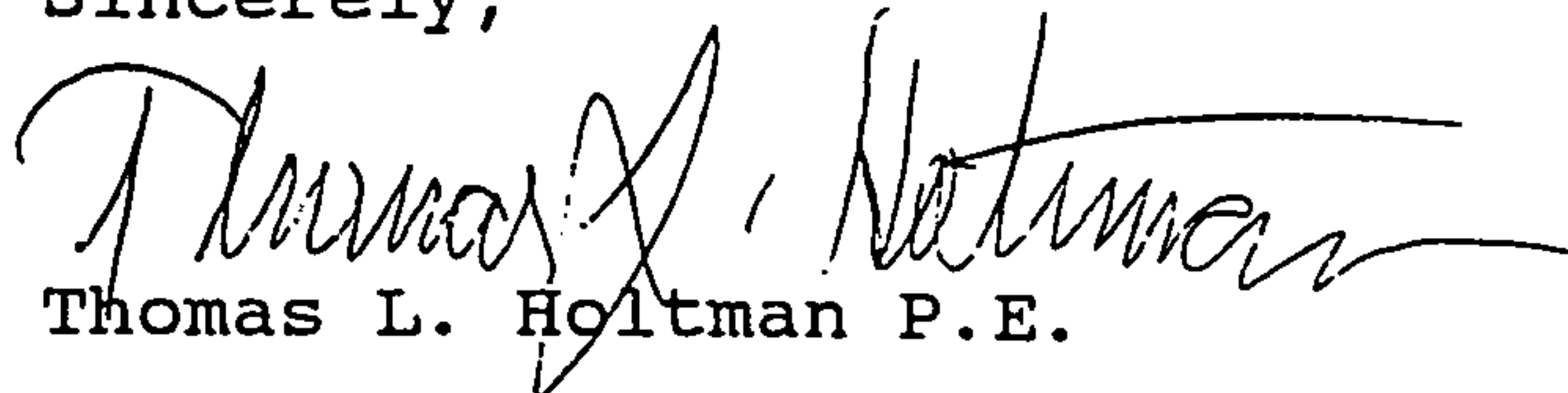
Dear Ms. McDermott:

Please find enclosed the additional information requested by FEMA
in their letter of April 26, 1991 regarding the referenced L.O.M.R.

As discussed on the phone with Mark Bryer, I am sending Sheet 26 of
the plans. Furthermore, I have estimated the 100 year event
sediment production in accordance with the guidelines in the Corps
of Engineers EM 1110-2-4000 using the Modified Uniform Soil Loss
Equation. The enclosed calculation shows the sediment yield to be
approximately 780 cubic yards which is 8% of the total runoff
volume. In the calculation previously submitted (dated 3-6-91), I
showed that the pipe outfall has 15% additional capacity available
under existing conditions for sediment bulking. In combination
with the site sedimentation basins and the geometry of the site (as
described in the calculation), I feel that the required capacity of
the storm drain outfall with sediment load is maintained (with
adequate maintenance).

Please feel free to call with any additional questions.

Sincerely,


Thomas L. Holtman P.E.

Enclosures

cc Gilbert Aldez (City of Albuquerque Flood Plain Admin.)
William R. Locke (FEMA, Washington DC)

TLH/tac-415

DRAINAGE INFORMATION SHEET

PROJECT TITLE: SUNPORT PARK ZONE ATLAS/DRNG. FILE #: M15/D23

DRB #: _____ EPC #: _____ WORK ORDER #: _____

LEGAL DESCRIPTION: _____

CITY ADDRESS: VICINITY OF UNIVERSITY BLVD. SE & WOODWARD RD.

ENGINEERING FIRM: ANDREWS, ASBURY & ROBERT CONTACT: TOM HOLTMAN

ADDRESS: 149 JACKSON N.E. PHONE: 265-6631

OWNER: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

ARCHITECT: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

SURVEYOR: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

CONTRACTOR: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

TYPE OF SUBMITTAL:

- ☐ DRAINAGE REPORT
- ☐ DRAINAGE PLAN
- ☐ CONCEPTUAL GRADING & DRAINAGE PLAN
- ☐ GRADING PLAN
- ☐ EROSION CONTROL PLAN
- ☐ ENGINEER'S CERTIFICATION
- ☒ OTHER

CHECK TYPE OF APPROVAL SOUGHT:

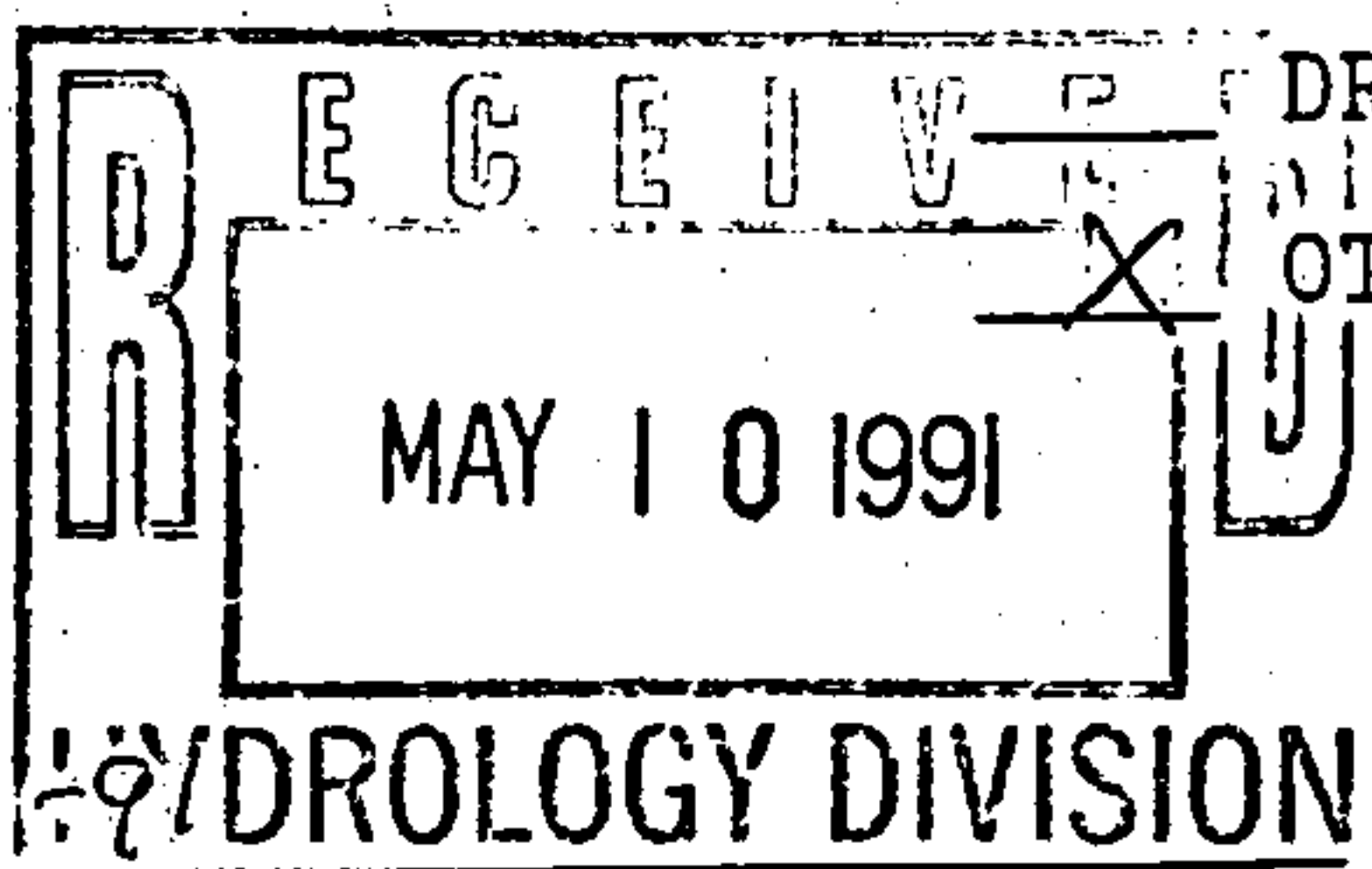
- ☐ SKETCH PLAT APPROVAL
- ☐ PRELIMINARY PLAT APPROVAL
- ☐ S. DEV. PLAN FOR SUB'D. APPROVAL
- ☐ S. DEV. PLAN FOR BLDG. PERMIT APPROVAL
- ☐ SECTOR PLAN APPROVAL
- ☐ FINAL PLAT APPROVAL
- ☐ FOUNDATION PERMIT APPROVAL
- ☐ BUILDING PERMIT APPROVAL
- ☐ CERTIFICATE OF OCCUPANCY APPROVAL
- ☐ GRADING PERMIT APPROVAL
- ☐ PAVING PERMIT APPROVAL
- ☐ S.A.D. DRAINAGE REPORT

PRE-DESIGN MEETING:

- ☐ YES
- ☐ NO
- ☐ COPY PROVIDED

DRAINAGE REQUIREMENTS

☒ OTHER L.O.M.R. (SPECIFY)



DATE SUBMITTED: 5-10-91

BY: _____

ANDREWS ASBURY & ROBERTS, INC.
149 Jackson N.E.
ALBUQUERQUE, NEW MEXICO 87108

LETTER OF TRANSMITTAL

(505) 265-6631

TO

GILBERT ALDEZ
City Of Albuq.
Hydrology/Flood Plan Admin
3rd floor

DATE	5-9-91	JOB NO.	415
ATTENTION			
RE:			
Support Phase I			
L.O.M.R.			
RECEIVED			
MAY 10 1991			

WE ARE SENDING YOU ☒ Attached ☐ Under separate cover via

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

HYDROLOGY DIVISION

COPIES	DATE	NO.	DESCRIPTION
1			Sedimentation Calc
1			Blue line Sheet 26 of 26

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

Gilbert,
Let me know if you need anything
else or have questions or comments

COPY TO

SIGNED:

P. Natman



NTH

Federal Emergency Management Agency

Region VI, Federal Center, 800 North Loop 288
Denton, Texas 76201-3698

APR 16 1991

April 10, 1991

Mr. Gilbert Aldaz, P. E. & L. S.
City/County Floodplain Administrator
P. O. Box 1293
Albuquerque, New Mexico 87103

RE: Request for Letter of Map Revision for Sunport Park Phase I,
Work Order No. 2950

Dear Mr. Aldaz:

This is in response to your recent request for a Letter of Map
Revision for the above mentioned area.

The initial review of the request and support data has been
completed and the request has, as of the date of this letter,
been forward to the appropriate staff for a technical review. If
additional information is required, you will be notified. Should
there be a fee associated with this service, you will be
informed.

If I may provide additional assistance with this or other
floodplain management matters, please contact me at the above
address or call (817) 898-5136.

Sincerely,

A handwritten signature in cursive script, reading "Diane Leatherwood", is written over the typed name.

Diane Leatherwood
Natural Hazards
Program Specialist

FILE
(M15/D23)
JG



City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

March 25, 1991

Diane Leatherwood
Emergency Management Specialist
Region VI, Federal Center
800 North Loop 288
Denton, Texas 76201-3698

RE: REQUEST FOR LETTER OF MAP REVISION FOR SUNPORT PARK PHASE I,
WORK ORDER NO. 2950

Dear Ms. Leatherwood:

The purpose of this letter is to request a L.O.M.R. for the referenced site. The request is a Private Developer funded project, with as-built drawings prepared on February 8, 1989. The developer would like to remove the 100 year floodplain as shown on the attached Floodway Panel 350002-0035, due to an existing storm drain system. Enclosed with this letter is the following information:

1. A copy of the existing Floodway Maps marked up to show the floodplain revision being proposed.
2. A copy of the Drainage Report for Sunport Park Phase I revised August 1990.
3. A copy of the storm drain construction within Sunport Park which now conveys the discharges which originally produced the floodplain.
4. A copy of University Boulevard construction which intercepts off-site drainage and reroutes offsite flows to the north.
5. A copy of an orthophoto map of the site taken in 1987.
6. A copy of the constructed Erosion Control Plan for the site.

PUBLIC WORKS DEPARTMENT

Walter H. Nickerson, Jr., P.E.
Assistant Director Public Works

ENGINEERING GROUP

Telephone (505) 768-2500

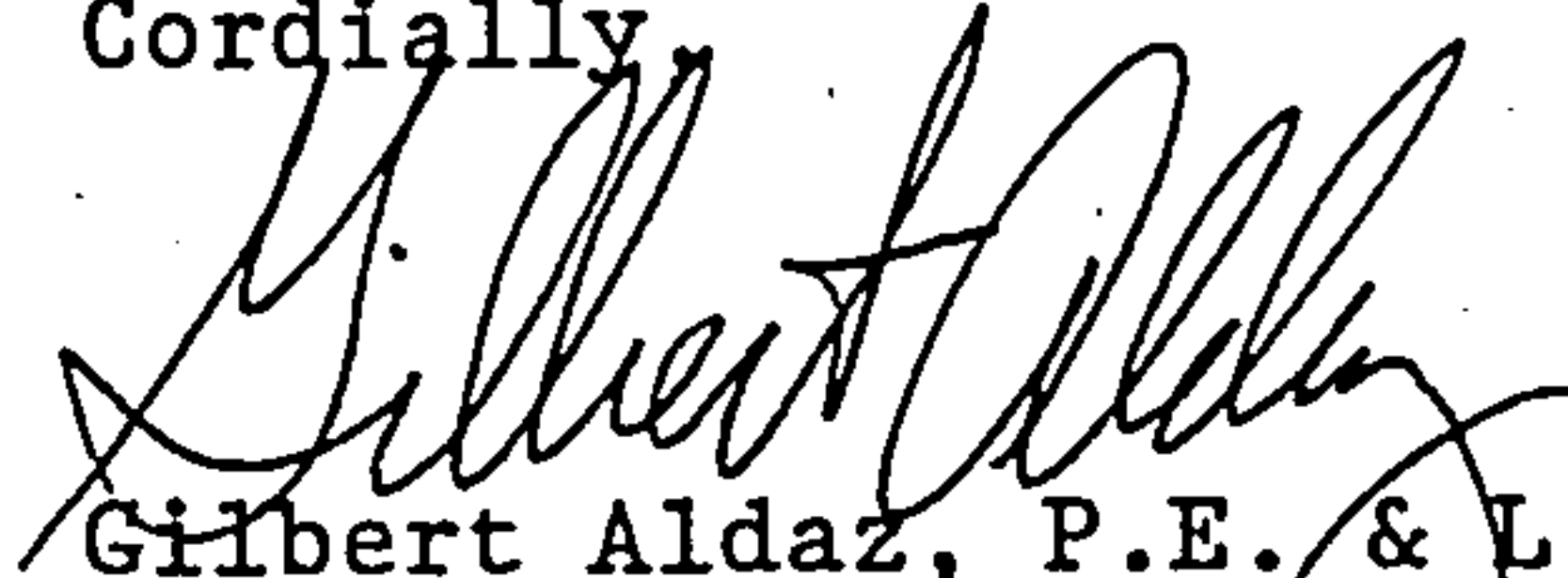
AN EQUAL OPPORTUNITY EMPLOYER

Diane Leatherwood
March 25, 1991
Page 2

7. A Copy of a brief report with calculations justifying removal of the floodplain.

If you should have any questions concerning this submittal, please do not hesitate to call me at (505) 768-2650.

Cordially,



Gilbert Aldaz, P.E. & L.S.
City/County Floodplain Administrator

xc: Thomas L. Holtman, P.E.
Andrews, Asbury & Robert
149 Jackson Street, NE
Albuquerque, New Mexico 87108
(WP+1596)

DRAINAGE INFORMATION SHEET

M15/D23

PROJECT TITLE: Sunport Park L.O.M.R. ZONE ATLAS/DRNG. FILE #: M-14, 15

DRB #: 90-301 EPC #: _____ WORK ORDER #: _____

LEGAL DESCRIPTION: Sunport Park as shown on the plat thereof filed Jan. 27, 1989 in Plat

CITY ADDRESS: University Blvd., SE/Flightway Ave., SE Book C38, Folio 102

ENGINEERING FIRM: Andrews, Asbury & Robert, Inc. CONTACT: Tom Holtman

ADDRESS: 149 Jackson St., NE, Albuquerque PHONE: 265-6631

OWNER: Sunport Park Joint Venture CONTACT: Howard Mock
c/o Jaynes Corporation

ADDRESS: P.O. Box 26841, Albuquerque, NM 87125 PHONE: 345-8591

ARCHITECT: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

SURVEYOR: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

CONTRACTOR: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

TYPE OF SUBMITTAL:

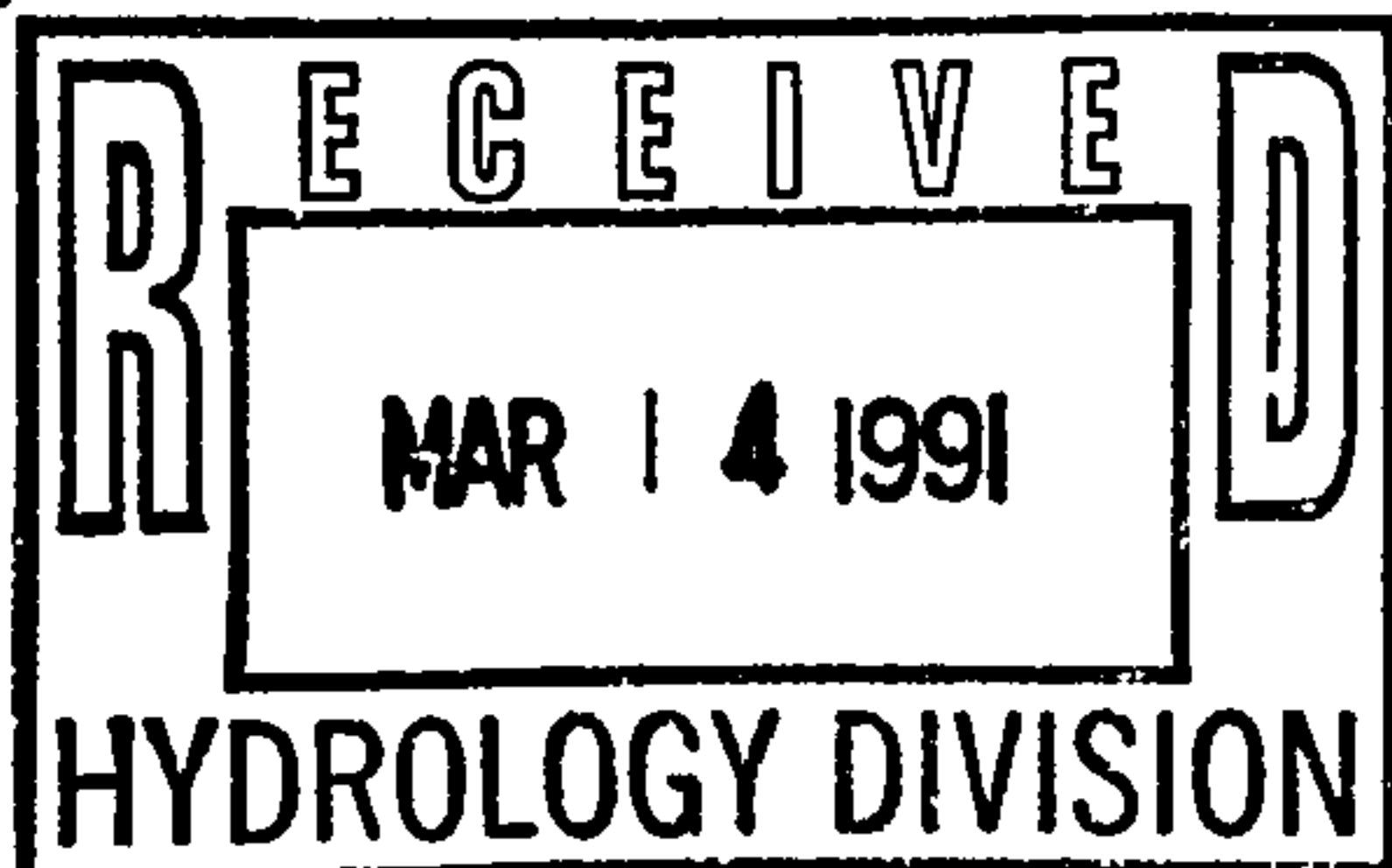
- ☐ DRAINAGE REPORT
- ☐ DRAINAGE PLAN
- ☐ CONCEPTUAL GRADING & DRAINAGE PLAN
- ☐ GRADING PLAN
- ☐ EROSION CONTROL PLAN
- ☐ ENGINEER'S CERTIFICATION
- ☒ OTHER

PRE-DESIGN MEETING:

- ☐ YES
- ☒ NO
- ☐ COPY PROVIDED

CHECK TYPE OF APPROVAL SOUGHT:

- ☐ SKETCH PLAT APPROVAL
- ☐ PRELIMINARY PLAT APPROVAL
- ☐ S. DEV. PLAN FOR SUB'D. APPROVAL
- ☐ S. DEV. PLAN FOR BLDG. PERMIT APPROVAL
- ☐ SECTOR PLAN APPROVAL
- ☐ FINAL PLAT APPROVAL
- ☐ FOUNDATION PERMIT APPROVAL
- ☐ BUILDING PERMIT APPROVAL
- ☐ CERTIFICATE OF OCCUPANCY APPROVAL
- ☐ GRADING PERMIT APPROVAL
- ☐ PAVING PERMIT APPROVAL
- ☐ S.A.D. DRAINAGE REPORT
- ☐ DRAINAGE REQUIREMENTS
- ☒ OTHER L.O.M.R. (SPECIFY)
(Letter of Map Revision)



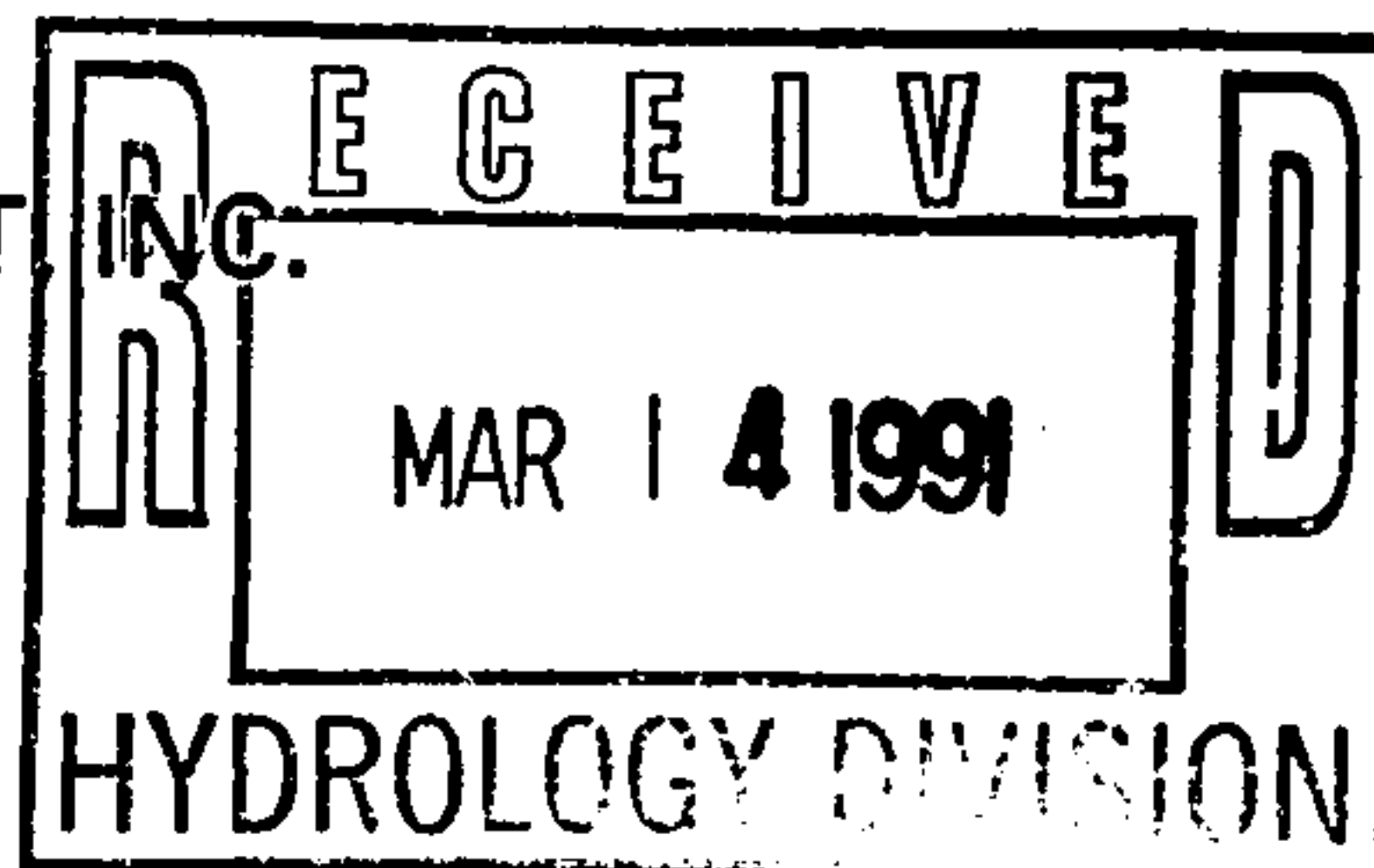
DATE SUBMITTED: _____

BY: _____



ANDREWS, ASBURY & ROBERT, INC.
Consulting Engineers

149 Jackson, NE, Albuquerque, New Mexico 87108
(505) 265-6631



John A. Andrews, P.E.
Charles T. Asbury, P.E.
John B. Robert, P.E. & L.S. (1915-1984)
James E. Millington, P.E. - V.P.
Gayle D. Jewell, L.S. - V.P.

March 11, 1991

Mr. Gilbert Aldaz
Hydrology Division
Public Works Department
City of Albuquerque
P.O. Box 1293
Albuquerque, NM 87103

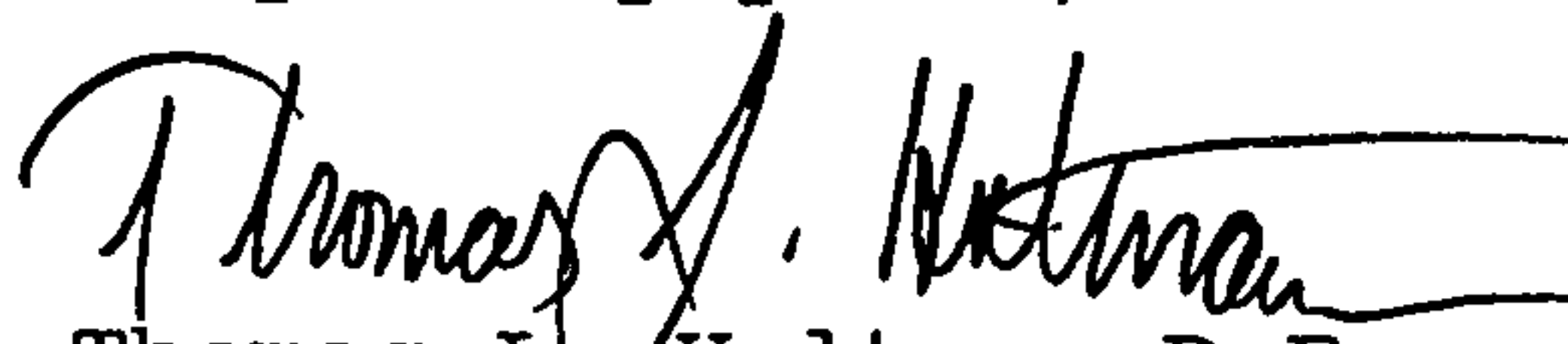
Dear Gilbert,

Please instigate the appropriate procedures to obtain a Letter of Map Revision for the tract of land known as Sunport Park Phase I near Woodward Road, S.E. and South University Boulevard, S.E. Transmitted herewith is the following material for submittal to FEMA:

1. Two copies of the existing FIRM Map marked up to show the floodplain revision we are requesting.
2. Two copies of the Drainage Report for Sunport Park Phase I revised August 1990.
3. Two sets of bluelines of the storm drain construction within Sunport Park which now conveys the discharges which originally produced the floodplain in the FIS.
4. Two sets of bluelines of University Boulevard construction which intercepts off-site drainage.
5. Two bluelines of an orthophoto map of the site taken in 1987.
6. Two bluelines of the constructed Erosion Control Plan for the site.
7. Two copies of a brief report with calculations justifying removal of the floodplain.

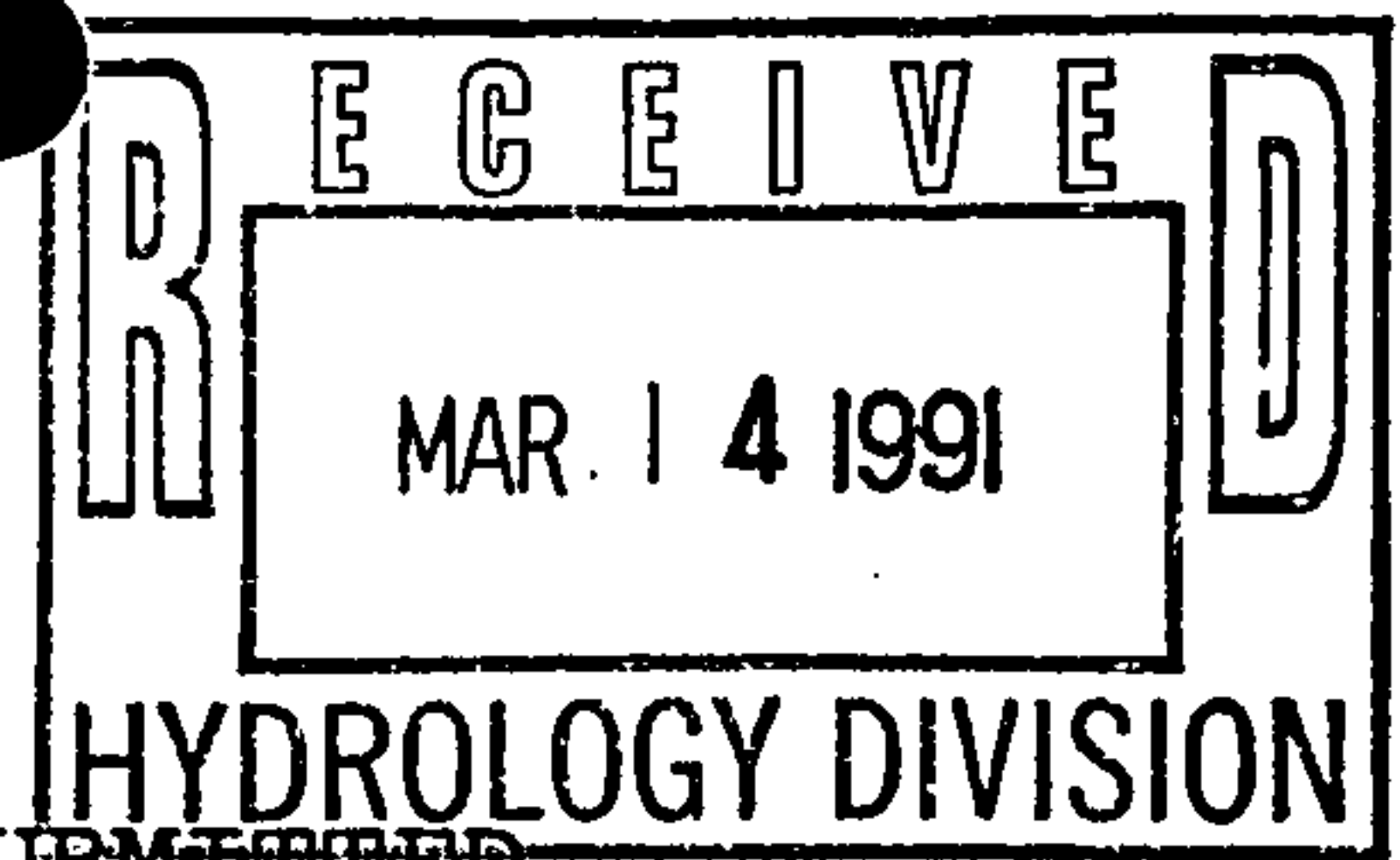
Hopefully, this information is all FEMA will need, if not, please advise. Feel free to call with any questions or comments.

Very truly yours,


Thomas L. Holtman P.E.

cc: Howard Mock w/o enclosures

TLH/tac-415



SUMMARY OF DRAINAGE INFORMATION SUBMITTED
FOR SUNPORT PARK, PHASE I
LETTER OF MAP REVISION

In 1989, a storm drain system was constructed on the tract of land in Albuquerque, New Mexico known as Sunport Park Phase I. This land is located near Woodward Road and South University Boulevard, S.E. Construction of a street system and a 48" RCP outfall on the site has eliminated the floodplain shown on Panel 35 of the City of Albuquerque F.I.S. (see F.I.R.M. markups).

Accompanying this submittal is the Drainage Report for the Sunport Park development. The Drainage Report was originally produced in 1987 and last revised in August of 1990. Since the August revision of the Sunport Park Drainage Report, the "Developmental Procedures Manual" (DPM) Chapter 22.2 for the City of Albuquerque has been revised. The revision to the DPM has generally increased the 100 year peak flows originally calculated for the site. The calculation in Appendix A investigates the site hydrology following the procedures presented in the January 1991, revision to the DPM. The calculations in Appendix A and the site Drainage Report show that the 48" RCP outfall from the site has an existing maximum capacity of approximately 220 cfs. This capacity is based upon the high water surface elevation in the South Diversion channel in the event of the standard project flood at the 48" RCP outlet and the hydraulics of the pipe itself. In short, the 48" outfall has the capacity to convey the existing flows which develop on the site. Therefore, it is requested that the floodplain shown on the FIRM Map for the small arroyo which crossed the site at one time be eliminated. The constructed 48" RCP now conveys these existing flows while the magnitude of the existing discharge has been reduced by upstream construction. When the site is developed further in the future, on-site ponding may be required to control developed condition flows beyond the capacity of the 48" outfall due to the increased runoff flows resulting from the recent revisions in the hydrologic methods in the DPM.

A second construction project has diverted the upstream basins which at one time contributed to the floodplain shown on the F.I.R.M Map of the site. This project included the construction of South University Boulevard located along the east frontage of the Sunport Park site (Drawing Sheets 6, 7, and 8 of 14). As discussed in the site Drainage Report, the basins east of University Boulevard are now intercepted in the channel which parallels University Boulevard on the east side of the roadway. The flows which enter the roadway channel now travel either north or south of the site.

An erosion control system (shown on the Erosion Control Plan, Sheet 1 of 1) has been constructed on the site to help stabilize the existing conditions sediment production on the site. The calculation in the appendix shows that a 15% bulking factor is available under existing conditions in the 48" outfall line. In addition, a sedimen-

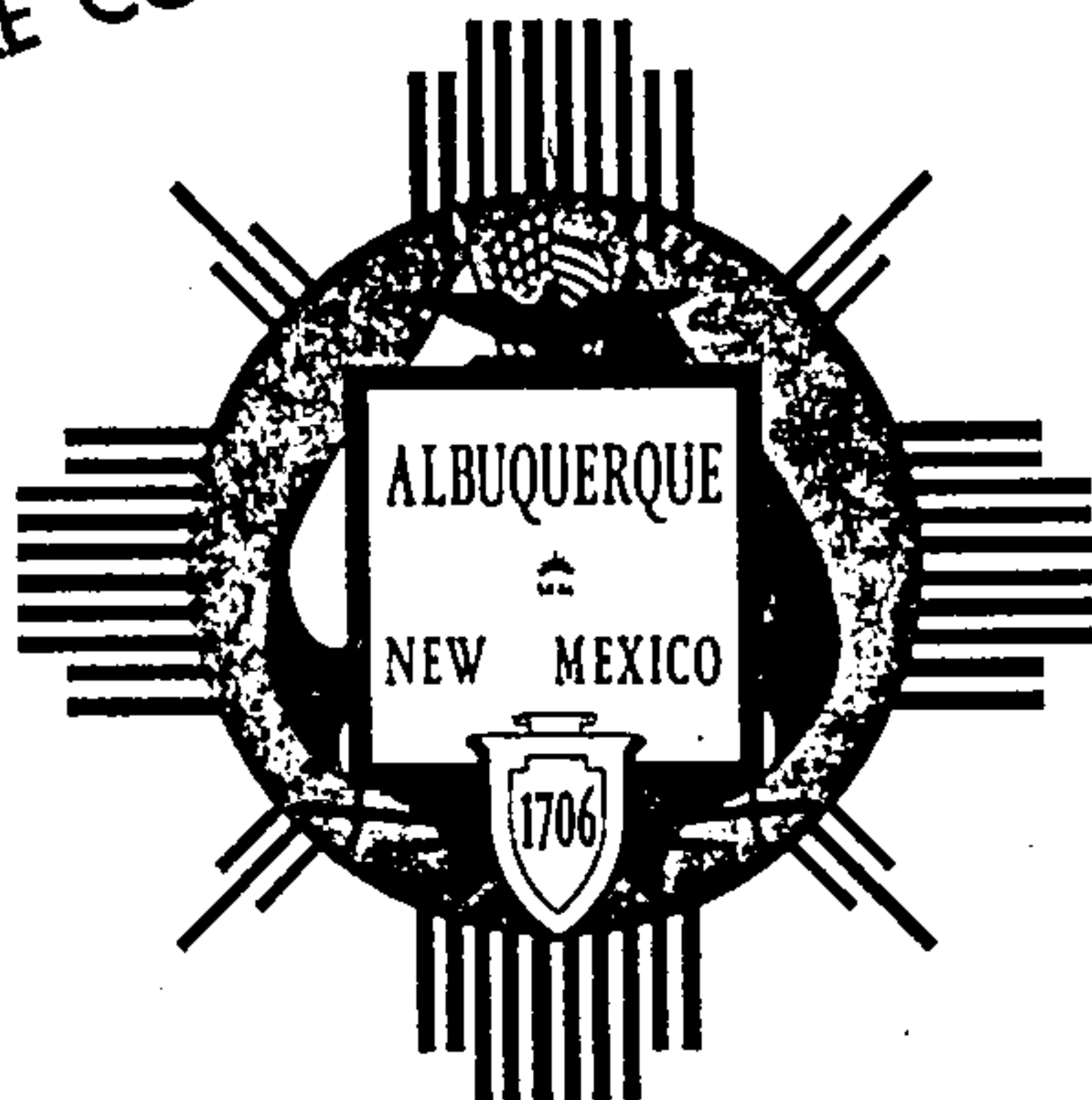
Page 2

Summary of Drainage Information
Sunport Park Phase I

tation basin has been constructed near Interstate 25 which reduces the sediment load to the 48" outfall. For informational purposes, an orthophoto of the site taken in 1987 (prior to roadway paving) has been included with this submittal. The existing limits of disturbance to the natural vegetation on the site can be seen in the photo. This information is also shown on the Erosion Control Plan. Furthermore, the photo was taken prior to the paving of University Boulevard. Finally, the lots shown as sold on the photo have been developed and are now mostly paved, landscaped, and/or buildings constructed to the extent represented in the appendix calculation.

In summary, the 48" outfall has the capacity to convey the existing flows on-site with a sufficient buffer for sediment load. Therefore, the floodplain shown on the current FIS FIRM Map should be removed. As the site develops in the future, additional ponding will need to be constructed for developed condition flows beyond the maximum capacity of the 48" outfall or the ground surface raised at the critical points of the hydraulic grade line of the storm drain.

FILE COPY



City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

September 6, 1990

James E. Millington, P.E.
Andrews, Asbury & Robert, Inc.
149 Jackson, NE
Albuquerque, New Mexico 87108

RE: REVISED DRAINAGE REPORT FOR SUNPORT PARK, PHASE I,
(M-15/D23) (PROJECT NO. 2950), ENGINEER'S STAMP DATED
SEPTEMBER 5, 1990

Dear James:

Based on the information provided on the referenced submittal received September 5, 1990, the updated drainage requirements for the masterplanned area is approved.

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

Cordially,

Gilbert Aldaz, P.E. & L.S.
Civil Engineer/Hydrology

xc: Bernie Montoya
Larry Caudell

GA
(WP+283)

PUBLIC WORKS DEPARTMENT

Walter H. Nickerson, Jr., P.E.
Assistant Director Public Works

ENGINEERING GROUP

Telephone (505) 768-2500

AN EQUAL OPPORTUNITY EMPLOYER

149 Jackson N.E.
ALBUQUERQUE, NEW MEXICO 87108

TO

City of Albuquerque
Public Works Dept
Hydrology

[illegible]

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

[illegible]

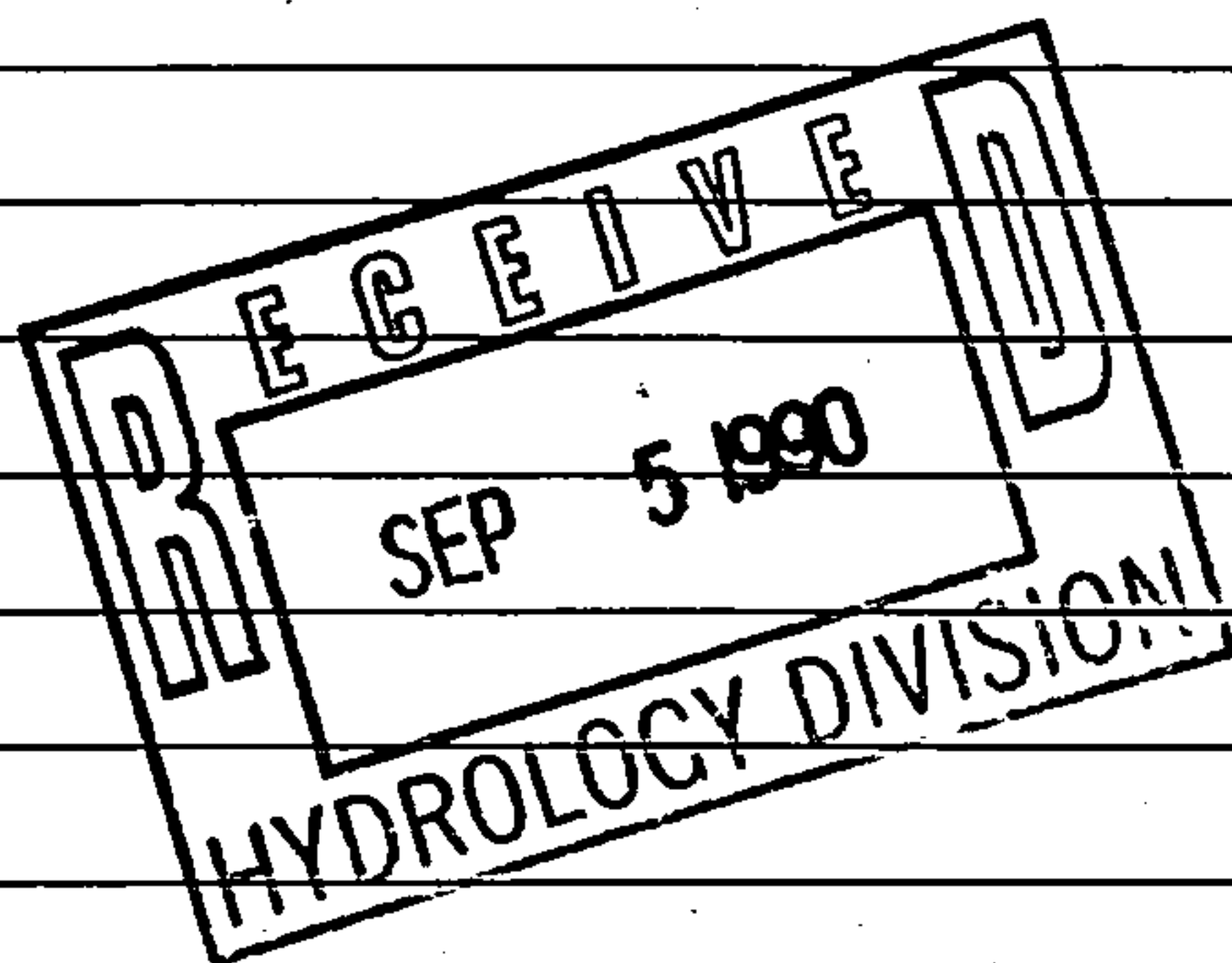
☐ For approval
☒ For your use
☒ As requested
☐ For review and comment
☐ FOR BIDS DUE _____ 19____

☐ Approved as submitted
☐ Approved as noted
☐ Returned for corrections
☐ _____

☐ Resubmit _____ copies for approval
☐ Submit _____ copies for distribution
☐ Return _____ corrected prints

☐ PRINTS RETURNED AFTER LOAN TO US

REMARKS



COPY TO:

SIGNED:

DRAINAGE INFORMATION SHEET

PROJECT TITLE: Sunport Park ZONE ATLAS/DRNG. FILE #: M15/D23
 DRB #: N/A EPC #: N/A WORK ORDER #: N/A
 LEGAL DESCRIPTION: Sunport Park Subdivision - Phase I
 CITY ADDRESS: N/A
 ENGINEERING FIRM: Andrews, Asbury & Robert, Inc. CONTACT: John Andrews or
149 Jackson, NE, Albuquerque PHONE: Jim Millington
265-6631
 OWNER: Sunport Joint Venture CONTACT: Howard Mock
 ADDRESS: P.O. Box 26841, Albuquerque PHONE: 345-8591
 ARCHITECT: N/A CONTACT: _____
 ADDRESS: _____ PHONE: _____
 SURVEYOR: Andrews, Asbury & Robert, Inc. CONTACT: Gayle Jewell
 ADDRESS: 149 Jackson, NE, Albuquerque PHONE: 265-6631
 CONTRACTOR: N/A CONTACT: _____
 ADDRESS: _____ PHONE: _____

TYPE OF SUBMITTAL:

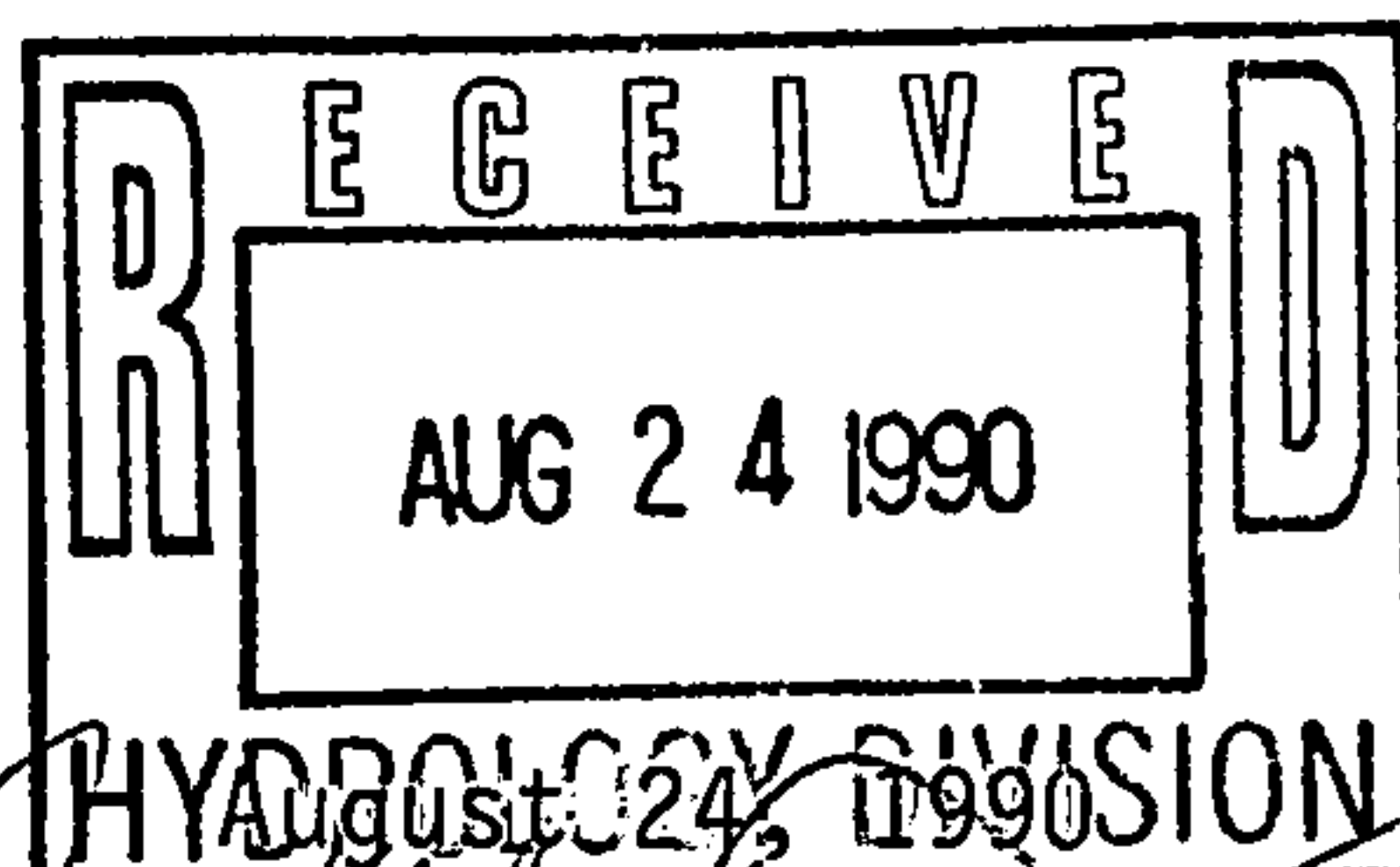
☒ DRAINAGE REPORT (REVISED AUGUST 23, 1990)
☐ DRAINAGE PLAN
☐ CONCEPTUAL GRADING & DRAINAGE PLAN
☐ GRADING PLAN
☒ EROSION CONTROL PLAN
☐ ENGINEER'S CERTIFICATION
☐ OTHER

PRE-DESIGN MEETING:

☐ YES
☐ NO
☐ COPY PROVIDED

CHECK TYPE OF APPROVAL SOUGHT:

☐ SKETCH PLAT APPROVAL
☐ PRELIMINARY PLAT APPROVAL
☐ S. DEV. PLAN FOR SUB'D. APPROVAL
☐ S. DEV. PLAN FOR BLDG. PERMIT APPROVAL
☐ SECTOR PLAN APPROVAL
☐ FINAL PLAT APPROVAL
☐ FOUNDATION PERMIT APPROVAL
☐ BUILDING PERMIT APPROVAL
☐ CERTIFICATE OF OCCUPANCY APPROVAL
☐ GRADING PERMIT APPROVAL
☐ PAVING PERMIT APPROVAL
☐ S.A.D. DRAINAGE REPORT
☐ DRAINAGE REQUIREMENTS
☒ OTHER MASTER PLAN OF (SPECIFY)
DRAINAGE



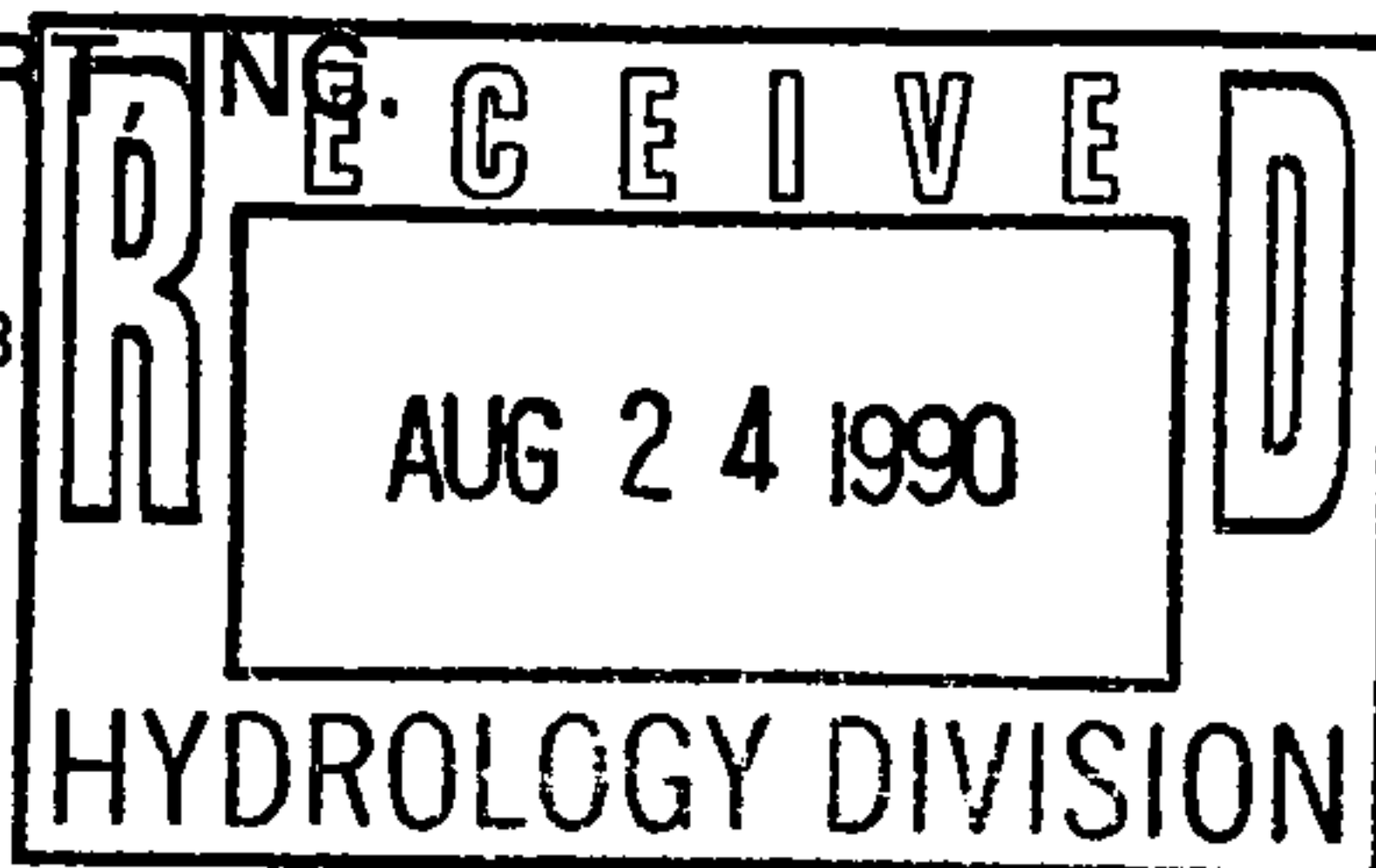
DATE SUBMITTED: August 24, 1990

BY: [Signature]



ANDREWS, ASBURY & ROBERT
Consulting Engineers

149 Jackson, NE, Albuquerque, New Mexico 87108
(505) 265-6631



August 24, 1990

John A. Andrews, P.E.
Charles T. Asbury, P.E.
John B. Robert, P.E. & L.S. (1915-1984)
James E. Millington, P.E. - V.P.
Gayle D. Jewell, L.S. - V.P.

Mr. Gilbert Aldaz, P.E. & L.S.
Civil Engineer/Hydrology
Public Works Department
City of Albuquerque
P.O. Box 1293
Albuquerque, NM 87103

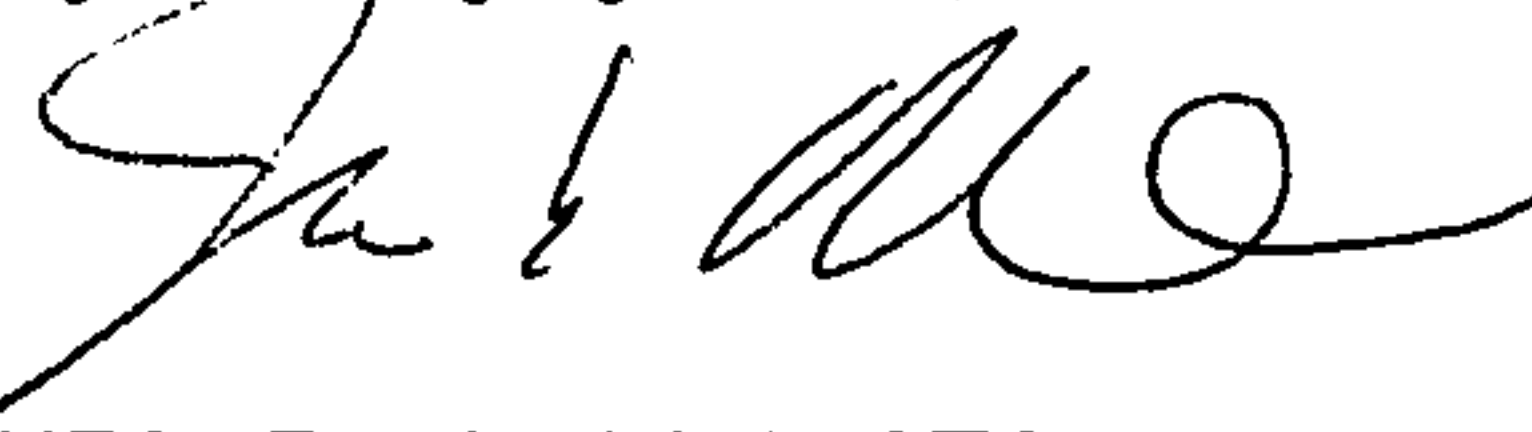
SUBJECT: REVISED DRAINAGE REPORT FOR SUNPORT PARK, PHASE I

Dear Mr. Aldaz:

Attached is one copy of the revised and consolidated Drainage Report for Sunport Park, Phase I which will supersede all previous reports and Addendum.

If satisfactory, please utilize this report as the Master Plan of Drainage for the FEMA Release of Floodplain.

Very truly yours,



JAMES E. MILLINGTON

Attachments

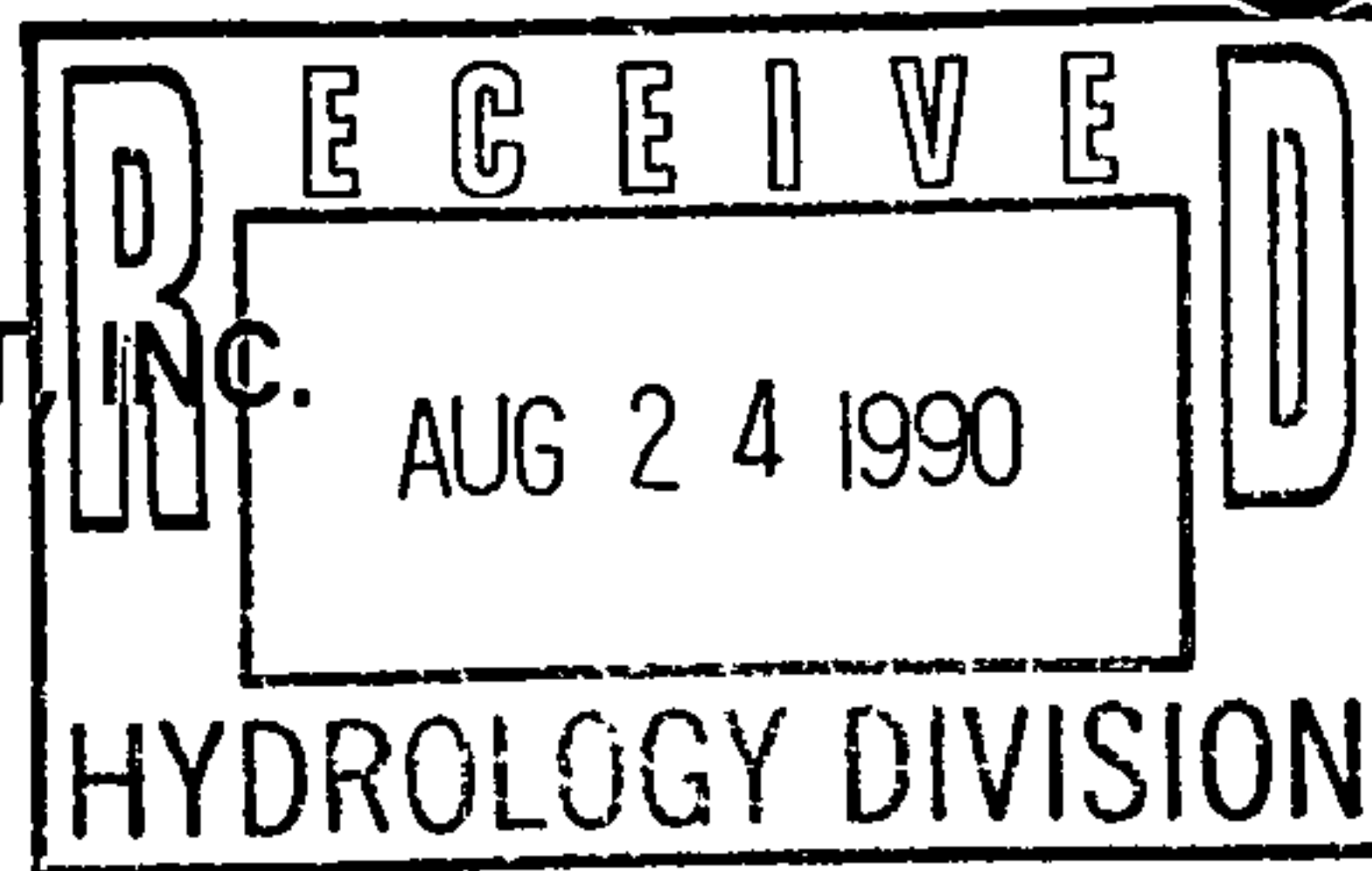
cc: Howard Mock w/attachments

JEM/tac-415



ANDREWS, ASBURY & ROBERT, INC.
Consulting Engineers

149 Jackson, NE, Albuquerque, New Mexico 87108
(505) 265-6631



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Gayle D. Jewell, L.S. - V.P.

August 23, 1990

Mr. Gilbert Aldaz, P.E. & L.S.
Civil Engineer/Hydrology
Public Works Department
City of Albuquerque
P.O. Box 1293
Albuquerque, New Mexico 87103

SUBJECT: REVISED DRAINAGE REPORT FOR SUNPORT PARK, PHASE I
(M-15/D23) PROJECT NO. 2950

Dear Mr. Aldaz:

Attached is an Erosion Control Plan for Sunport Park as requested in your letter of July 24, 1990.

We also included the following responses to your specific questions:

Questions 1 and 2

On August 3, 1990, we made a detailed field investigation of the storm drain lines to determine the amount of sediment in the lines. All of the main lines were sediment free except at the outlet of the 48" storm drain into the South Diversion Channel. At this point, due to backwater from the channel after the peak had passed the 48" outlet, there was 6"-8" of sediment in the 48". This would be readily retransported during the next storm occurrence over Sunport. The 30" line from the sedimentation basin inlet at Station 25+84.92 had 3"-4" of sediment which should also be retransported. The 30" line from the sedimentation basin inlet at Station 21+60.79 was approximately two-thirds filled with sediment. Due to 15' of head being available to keep this line flowing, we are confident that this is an essentially stable condition and any additional sediment entering the basin will be flushed from the system. Until significant development of the Phase I properties occur, the owner will clear the paved streets of sediment whenever accumulation is significant enough to interfere with drainage.

Observation of other sites in the area which have been seeded for erosion control (i.e. the slopes on University Boulevard and Clark Carr Boulevard) make it apparent that grass will not grow on the native soil without continuous maintenance and watering. There is no way to seed, at this point, without disturbing the presently armored surface and causing additional erosion, therefore, we do not recommend it at this time.

Question 3

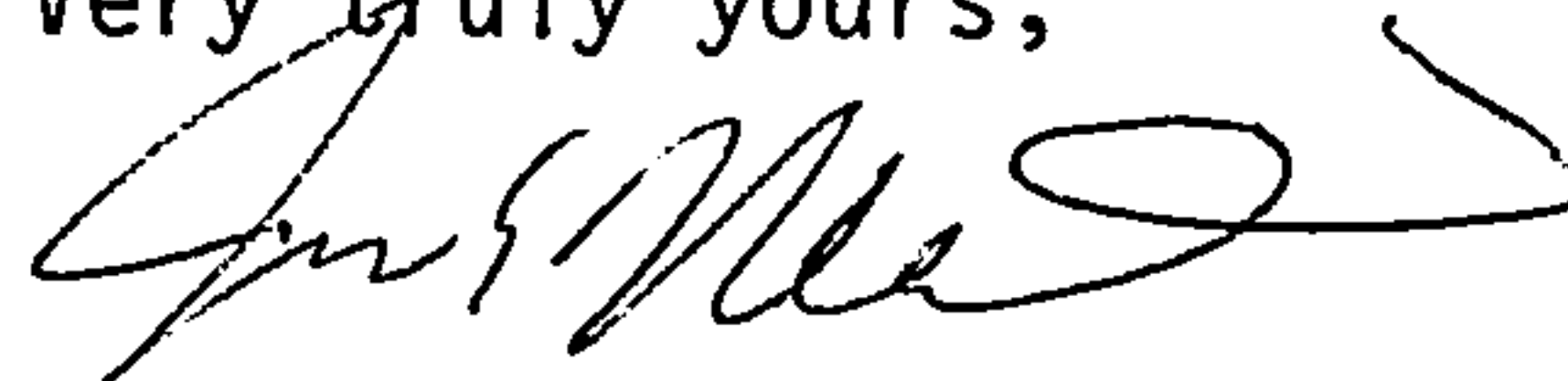
- A. Calculations for the 300' radius on Flightway are attached. No hydraulic jump should take place and even allowing for the radius of curvature the street should carry projected flows.

Page 2
Mr. Gilbert Aldaz
August 23, 1990

- B. Calculations are submitted for Woodward at Transport. Backwater conditions will not sustain a hydraulic jump, however, an unsustainable partial jump will probably occur which can be contained in the street.
- C. We are uncertain where you measured the street crown or slope so this question is difficult to address precisely, but it must have been on the upstream (south) side of the intersection. According to the Plans, this intersection is in the middle of a vertical curve and the slope of the street will vary depending upon where measured. In any case, the east half of the street (which must contain the flows) has not been constructed. Due to the slope of the land, almost all flows will enter University from Drainage Area 500 at its northwest corner of this drainage area near University Boulevard, Station 15+50. Attached are calculations for one-half street capacity at several locations (indicated on the Plans) with slope at that point. Capacity is adequate to prevent overtopping down Transport if street is constructed in accordance with Plans.

We hope that this answers all of your questions, if not, please call.

Very truly yours,



JAMES E. MILLINGTON, P.E.

Attachments

cc: Howard Mock w/attachments

JEM/tac-415

CITY OF ALBUQUERQUE
MUNICIPAL DEVELOPMENT DEPARTMENT
ENGINEERING DIVISION/DESIGN HYDROLOGY SECTION

HYDROLOGY SECTION PROJECT NO.:

M 15

DATE:

6/5/85

PLANNING DIVISION NOS. EPC:

DRB:

CONFERENCE RECAP

SUBJECT:

SUNPORT PARK (WEST OF UNIVERSITY, East of I-25,
SOUTH OF KIRTLAND AVE, North of UNIVERSITY GOLF COURSE)

APPROVAL REQUESTED:

PRELIMINARY PLAT

FINAL PLAT

SITE DEVELOPMENT PLAN

BUILDING PERMIT

☒ CONCEPTUAL APPROVAL
OF DRAINAGE SCHEME
WHO

ROUGH GRADING

REPRESENTING

ATTENDANCE:

TED ASBURY

FRED J. AGUIRRE

ANDREW ASBURY + Roberts

CITY ENGINEER

FINDINGS:

1. A CONCEPTUAL GRADING & DRAINAGE PLAN PER
THE DPM APPROPRIATE FOR THE SUBJECT REQUEST.

2. ITEMS OF PARTICULAR INTEREST THAT SHOULD
BE ADDRESSED IN DRAINAGE SUBMITTAL ARE:

A. OWNERSHIP OF DOWNSTREAM LAND (E.G. WEST OF
FWY BETWEEN THE I-25 & SOUTH DIVERSION CHANNELS.

B. FUTURE STREET DESIGN OF UNIVERSITY DR WITH
RESPECT TO DRAINAGE BASINS.

C. CHECK DRAINAGE FILES FOR PREVIOUS STUDIES PREPARED
FOR THE AIRPORT.

The undersigned agrees that the above findings are summarized accurately and are only subject to change if further investigation reveals that they are not reasonable or that they are based on inaccurate information.

SIGNED:

TITLE:

DATE:

Fred Aguirre

6/5/85

SIGNED:

TITLE:

DATE:

Andrew Asbury + Robert Inc.

Agent for Owner
6/5/85

****NOTE** PLEASE PROVIDE A COPY OF THIS RECAP WITH THE DRAINAGE SUBMITTAL**

Sunport Phase I typical Roadway @ 0.75%

STA(ft)	ELEV(ft)	MANNINGS n (to Next #)
0	.67	.019
.1	0	.019
20	.4	.019
40	0	.019
40.1	.67	.019

Channel Slope = .0075 ft./ft.

RATING CURVE

WSE(ft)	D(ft)	AREA-sf	WT.P-ft	Q-(cfs)	V-fps	Fr.#	TW(ft)
0	0	0	0	0	0	0	0
.1	.1	.5	10.1	.4	.9	.718	10
.2	.2	2	20.3	2.8	1.4	.806	20
.3	.3	4.5	30.5	8.5	1.8	.862	30
.4	.4	8	40.7	18.3	2.2	.904	40
.5	.5	12	40.9	36	2.9	.965	40
.6	.6	16	41.1	57.9	3.6	1	40
.6	.6	0	0	0	3.6	1	0

26 + 26

Sunport Phase I typical roadway @ 7.5% slope

STA(ft)	ELEV(ft)	MANNINGS n (to Next #)
0	.67	.019
.1	0	.019
20	.4	.019
40	0	.019
40.1	.67	.019

Channel Slope = .075 ft./ft.

RATING CURVE

WSE(ft)	D(ft)	AREA-sf	WT.P-ft	Q-(cfs)	V-fps	Fr.#	TW(ft)
0	0	0	0	0	0	0	0
.1	.1	.5	10.1	1.4	2.8	2.27	10
.2	.2	2	20.3	9.1	4.5	2.54	20
.3	.3	4.5	30.5	26.9	5.9	2.72	30
.4	.4	8	40.7	58.1	7.2	2.86	40
.5	.5	12	40.9	113.8	9.4	3.05	40
.6	.6	16	41.1	183.4	11.4	3.19	40
.6	.6	0	0	0	11.4	3.19	0

Sunport Phase I typical roadway @ 1.6%

STA(ft)	ELEV(ft)	MANNINGS n (to Next #)
0	.67	.019
.1	0	.019
20	.4	.019
40	0	.019
40.1	.67	.019

Channel Slope = .016 ft./ft.

RATING CURVE

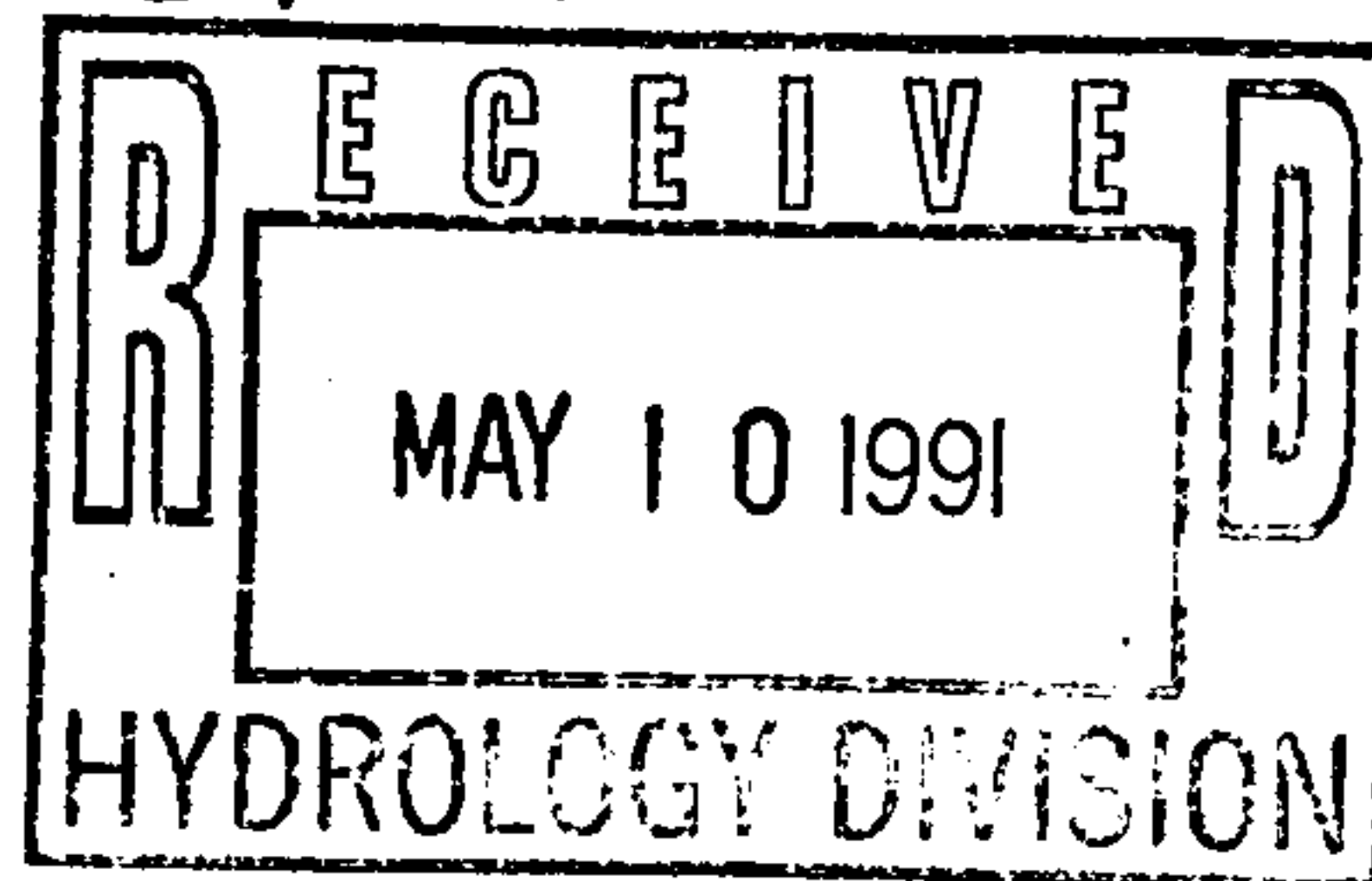
WSE(ft)	D(ft)	AREA-sf	WT.P-ft	Q-(cfs)	V-fps	Fr.#	TW(ft)
0	0	0	0	0	0	0	0
.1	.1	.5	10.1	.6	1.3	1.04	10
.2	.2	2	20.3	4.2	2.1	1.17	20
.3	.3	4.5	30.5	12.4	2.7	1.25	30
.4	.4	8	40.7	26.8	3.3	1.32	40
.5	.5	12	40.9	52.5	4.3	1.4	40
.6	.6	16	41.1	84.7	5.2	1.47	40
.6	.6	0	0	0	5.2	1.47	0

ANDREWS, ASBURY & ROBERT, INC.
CONSULTING ENGINEERS
149 Jackson, N.E., Albuquerque, N.M. 87108
Telephone (505) 265-6631

Project SUNPORT LOMR Sheet 1 of 26
Calc #2 Job No. 415E
By JH Chk'd _____ Date 4-29-91

PURPOSE: Estimate sediment yield
per 100 yr event + predict
effects on outfall hydraulics

Methods: Modified Universal Soil
Loss Equation as listed in
Ref 1.



References

1. "Sedimentation Investigations
of Rivers and Reservoirs"
Corps of Engr EM 1110-Z-4000
Dec, 1989.
2. "National Symposium on Urban Hydrology,
Hydraulics, + Sediment Control"
Univ of Kentucky, 1976
3. "Soil Survey of Bernalillo County ..."
SCS, June 1927
4. "Section 22.2, Hydrology of the Development Process
Manual, VOL 2", City of Abq. NM Jan 1991
5. "Engineering Hydrology, Principles + Practices"
Victor Miguel Ponce, 1989

CALC

The site can be divided into
4 basins as shown on attached
EROSION CONTROL PLAN - Aug, 1990

Under existing conditions the four
basins have the following properties:

<u>Basin</u>	<u>Approx. Area (acres)</u>	<u>Land Treatment %</u>			
		A	B	C	D
S-1	19	0	50	20	30
S-2	12	0	60	20	20
S-3	16	0	10	60	30
S-4	11	0	10	80	10

USE DPM Table 9 (ref 4)
for peak flows, zone 2 (qr)

$$\begin{aligned}
 S-1 & 19 [2.17(0.5) + 3.02(0.2) + 4.7(0.3)] = 59 cfs \\
 S-2 & 12 [2.17(0.6) + 3.02(0.2) + 4.7(0.2)] = 34 cfs \\
 S-3 & 16 [2.17(0.1) + 3.02(0.6) + 4.7(0.3)] = 55 cfs \\
 S-4 & 11 [2.17(0.1) + 3.02(0.8) + 4.7(0.1)] = 34 \\
 & \underline{182}
 \end{aligned}$$

USE DPM Table B (ref 4)
for 6 hr Volumes

$$\begin{aligned} S-1 & \quad \frac{1}{12} (19) [0.72(0.5) + 1.07(0.2) + 2.08(0.3)] = 1.9 \text{ ac ft} \\ S-2 & \quad \frac{1}{12} (12) [0.72(0.6) + 1.07(0.2) + 2.08(0.2)] = 1.1 \\ S-3 & \quad \frac{1}{12} (16) [0.72(0.1) + 1.07(0.6) + 2.08(0.3)] = 1.8 \\ S-4 & \quad \frac{1}{12} (11) [0.72(0.1) + 1.07(0.8) + 2.08(0.1)] = 1.1 \end{aligned}$$

5.9

Now convert to 24 hr (Q)

$$S-1 \quad 1.9 + \left[\frac{0.3(19)(2.7-2.3)}{12} \right] = 2.1$$

$$S-2 \quad 1.1 + \frac{0.2(12)(2.0)}{12} = 1.2$$

$$S-3 \quad = 1.9$$

$$S-4 \quad = 1.2$$

6.1 ac ft

Now use the modified uniform
Soil equation as given in Ref 1 pg 3-21
to guess the 100 event sediment
production =

$$Y = 95 [(Q)(q_p)]^{0.56} (K)(C)(P)(L)(S)$$

(L~~S~~) - Length / Slope factor
Average site slope = $\frac{5160-5070}{1200} = 7.5\%$
average small basin length = 600'

$\Rightarrow \underline{LS = 2.3}$ Ref 5 Fig 15-3
(back of calc)

C - Cropping Management factor
Site has 20% veg. cover
with ~ 30-40% asphalt +
some areas Landscaped Grass

$\Rightarrow \underline{C = 0.5}$

P - Erosion Practice Factor
Assume None (conservative)
 $\underline{P = 1.0}$

Y - Sed yield

S-1 $Y = 95 [2.1(59)]^{0.56} (0.2)(0.5)(2.3) = 320 \text{ tons/100yr event}$

S-2 $[1.2(34)]^{0.56} (21.8) = 170$

S-3 $[1.9(55)]^{0.56} (21.8) = 290$

S-4 $[1.2(34)]^{0.56} (21.8) = 170$

Convert to CY, Assume Sediment Unit Weight = $90 \frac{\text{lb}}{\text{ft}^3}$
(Ref 5 Table 15-2, back)

$$S-1 \quad 320 \text{ tons} \left(2000 \frac{\text{lb}}{\text{ton}} \right) \left(\frac{1 \text{ ft}^3}{90 \text{ lbs}} \right) \frac{1 \text{ yd}}{27 \text{ ft}^3} = 260 \text{ CY}$$

$$S-2 \quad 170 \quad (0.82) \quad = \quad 140$$

$$S-3 \quad 290 \quad (0.82) \quad = \quad 240$$

$$S-4 \quad 170 \quad (0.82) \quad = \quad 140$$

780 CY

0.48 ac-feet

$$\frac{0.48}{6.4} = 8\% \text{ of total runoff}$$

which is about right
for Abq (10 → 20%
w/no development)

- The roadways on the site have been built and convey the majority of the runoff, therefore, bank and gully erosion is near zero

Sediment Transport

- Flightway + Woodward Road have Slopes over 8%, then flows turn onto Transport with Slopes from 1-2%. Velocities are cut in half and a hydraulic jump most likely occurs at the inlets in Transport Street.

⇒ Bed Load from basins

S-1, S-2, + S-3 drops in transport street. Suspended load passes into Inlets + Storm drain. Assume bed load is $\frac{1}{2}$ of total sediment from S-1, 2, 3

$$\frac{1}{2} (260 + 140 + 240) = 320 \text{ CY}$$

@ 0.3' deep, 40' wide

$$\frac{320(27)}{0.3(40)} = 720' \text{ long deposit}$$

⇒ Transport street fills w/ sediment

however, the inlets should remain open.

One can quickly see that the two sediment basins near I-25 have approx

$$\frac{100(100)}{43560} = 0.23 \text{ ac ft of}$$

storage @ 1' deep. Since S-4 produces

$$\frac{140(27)}{43560} = 0.09 \text{ ac feet total}$$

there is lots of sediment capacity.

The calc previously submitted to FEMA by JH 3-6-91 shows a 15% bulking factor available in storm drain system hydraulics. Pg 5 of this calc shows Total Sed. is 8% of runoff.

∴ 15% sediment capacity is sufficient.



US Army Corps
of Engineers

EM 1110-2-4000
15 December 1989

ENGINEERING AND DESIGN

Sedimentation Investigations of Rivers and Reservoirs

ENGINEER MANUAL

*Ref 1
8 of 26*

over several cross sections which describe a reach of the river and provides a continuity equation for sediment movement. Consequently, it will produce a more reliable result than comes from applying a sediment transport function at a single point.

3-13. Universal Soil Loss Equation (USLE). Soil loss equations, evolving since 1940, have been developed for use in small, rural upland watersheds. The USLE is one of the most recent and most widely used of these equations. It was developed to predict the long-term average soil loss from agricultural land. Rainfall simulators were used to create the erosive energy. Tests were conducted on plots which were 72 feet long on uniform slopes. Surface erosion occurred in the form of rills; the quantity of eroded soil was measured at the outflow point and expressed as tons per acre per year. Consequently, the uses of the USLE are quite limited for Corps projects. Reconnaissance studies could find the USLE with a sediment delivery ratio appropriate for a preliminary estimate of sediment storage for a small reservoir where sediment is expected to come from the watershed and is not expected to be a significant problem. The pertinent parameters were assembled into the following regression equation by Wischmeier and Smith [68].

$$A = R * K * L * S * C * P \quad (3-6)$$

where

- A - Soil loss per unit area per time period, tons per acre per year
- R - Rainfall erosion index
- K - Soil erodibility factor
- L - Slope-length factor
- S - Slope-steepness factor
- C - Cover and management factor
- P - Support practice factor

a. Calculations. A value is estimated for each of these variables using information gained through a field reconnaissance of the watershed to enter tables and nomographs provided in reference [68]. SCS personnel should be consulted to ensure that appropriate values have been selected. Guidance on adapting the equation to incorporate the effects of thaw, snowmelt, and irrigation on the area, on estimating erosion from construction sites; and on modification of the R-value to estimate sediment yield on a frequency basis through the 20-year recurrence interval event for individual hypothetical storms is presented in reference [68].

b. Points of Caution When Using the USLE. The following points are made to stress proper use of the USLE.

(1) Channel Projects. The USLE gives no information on gradation of the eroded sediment. Consequently, the equations would be of limited value in analyzing the effects of a channel project where sands and gravels are of primary interest.

(2) Construction Sites. The significance of selecting coefficients can be illustrated by looking at the soil erodibility factor, K. Published coefficients for crop land imply regular tillage of the soil, and that disturbs the natural armor layer which forms during rain events. The significance of this, the soil erodibility factor, K, for a construction site is not the same as published for crop land in the USLE manual. Soil in a construction area would be expected to exhibit similar erosion to agricultural land during the first rain event after the ground was disturbed, but successive rainfall events would erode that soil at a reduced rate because the construction site is not plowed regularly.

(3) Erosion Mechanisms. The channelization of surface water runoff due to construction may increase gully and channel erosion significantly, and the USLE would miss that altogether because it is formulated for sheet and rill erosion.

(4) Sediment Transport. There is no transport function in the USLE, and a watershed sediment delivery ratio must be applied to account for overland deposition. However, the validity of results is questionable when the USLE is applied to subareas in excess of a few square miles.

3-14. Sediment Delivery Ratio. With the addition of a sediment delivery ratio (SDR), the USLE can be extended to areas of several square miles. The SDR is a factor, ranging from 0 to 1, to multiply times the annual soil loss to obtain the annual sediment yield for the watershed. Sediment delivery ratios have been calculated for specific areas, but no generalized equations or techniques are yet available to universally determine a sediment delivery ratio. The SDR is proportional to drainage area, and the available data indicates the ratio may vary with the 0.2 power, in the form of:

$$(SDR2 / SDR1) = (A1 / A2)^{0.2} \quad (3-7)$$

where:

- A1 - reference drainage area, square miles
- A2 - desired drainage area, square miles
- SDR1 - sediment delivery ratio for reference drainage area
- SDR2 - desired sediment delivery ratio

Vanoni item [2] suggests using a reference drainage area of .001 and a SDR1 of 1.0 in this equation. Figure 3-4 illustrates sediment delivery ratio-drainage area relationships for different regions in the United States, and Figure 3-5 shows a generalized relationship drawn through a mass of data points from various regions. Any arbitrary sediment delivery ratio selected solely on the basis of drainage area could be in considerable error; other factors (soil moisture, channel density, land use, conservation treatment, soil type, rainfall intensity, topographic relief, and so forth) must also affect the SDR in some manner.

3-15. Modified Universal Soil Loss Equation (MUSLE). The Universal Soil Loss Equation was modified by Williams [69] with the resulting equation termed the Modified USLE (MUSLE). The MUSLE allows the estimation of soil losses for each precipitation event throughout the year, thereby becoming an event model

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rather than an average annual runoff model. As an event model, the MUSLE and similar techniques have more application to Corps analyses. The full equation defining the MUSLE is:

$$Y = 95 * ([Q * qp]**0.56) * K * C * P * L * S \quad (3-8)$$

where

- Y - Sediment yield from an individual storm through sheet and rill erosion only, tons
- Q - Storm runoff volume in ac-ft
- qp - Peak runoff rate in cubic feet per second
- L*S - Slope length and gradient factor
- K, C, P - as defined previously for the USLE

The MUSLE is simply the USLE with the rainfall erosion index replaced by the runoff rate term. Since erosion is computed for each event, a SDR is not necessary. The "Q" and "qp" terms would be obtained from the runoff hydrograph with "Q" used in estimating the amount of soil detachment and "qp" used in determining the volume of soil transported. The sediment yield for each event is summed to obtain each year's total with average annual sediment yield being the average of all the yearly values. Long-term simulation is normally required to obtain a representative estimate. While much additional information is gained from the use of the MUSLE and the necessity of determining an appropriate sediment delivery ratio is eliminated, this technique requires considerable data gathering and calibration effort to apply correctly. Reference [23] includes this method in the evaluation of potential deposition problems in a proposed flood control channel. The points of caution given for USLE apply to MUSLE also.

a. Runoff. A separate rainfall runoff model is needed to calculate flood volume and flood peak runoff rate. Calibration is usually against measured water volume, with at least 3 years of data normally needed.

b. Confirmation. Comparison and confirmation of sediment yield calculated with MUSLE should be made against that from other techniques. A report by Dyhouse item [18] describes a study in which sediment yield, which had been calculated by a method similar to the MUSLE, was calibrated using a flow-duration sediment transport integration.

3-16. Gully and Stream Bank Erosion. When the drainage basin exhibits extensive stream bank erosion and gullying, either on the primary stream or on tributaries to it, sediment yield determined by the following methods should be added to the sheet and rill erosion predicted by the soil loss equations.

a. Stream Bank Erosion. Soil losses through stream bank erosion and bank caving contribute significant quantities of the total sediment yield for most natural rivers. Estimates as high as 1,700 tons/year/mile of bank have been made at some locations. The causes are many and varied, and the prediction of future losses at specific locations is difficult. No generalized analytical procedures have yet been developed to formally calculate sediment yield or specific bank line losses from stream bank erosion. The most successful methods are based on aerial photography in which successive overflights can be

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MINI-COURSE 1
PREDICTION AND CONTROL OF URBAN EROSION AND SEDIMENTATION

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Abstract. Since soil erosion and sedimentation by water are complex processes, a better understanding of them provides a sound basis for developing improved prediction and control methods for urban areas. The Universal Soil Loss Equation is an important technique for evaluating urban erosion rates, and various conservation practices are effective for controlling urban erosion and sedimentation. Design of control plans requires the selection of appropriate control practices. These topics are discussed and illustrated as they relate to solving urban problems in erosion and sedimentation.

Introduction

Soil erosion and sedimentation have become major problems in many urban areas because they often occur at tremendous rates and cause severe consequences in densely populated urban environments. Several million acres in the United States are denuded and topographically reshaped each year for nonagricultural purposes. Our growing population and high standard of living require more houses, shopping centers, highways, waterways, and other facilities that involve massive soil movement. Proper land use and site planning can greatly decrease the erosion potential from urban construction during periods of serious erosion hazard before the land is stabilized by permanent structures and vegetation. Most technology for erosion prediction and control on such land has been adapted from knowledge obtained by agricultural research; much has also been developed from field experience. The available technology for erosion prediction and erosion control is described in this paper.

Construction-site erosion may cause relatively little harm to the sites themselves as compared with the serious harm caused by erosion to cropland, yet the resulting sediment frequently causes major problems downstream. It may muddy streams and lakes, clog ditches and rivers, cover roads and bottomland, and fill water-supply reservoirs and harbors. Thus, eroded soil may cause triple damage: first, to the land where it originates; second, to the water that transports it; and third, to the site where it is deposited. Sediment, a common term for eroded soil, is the most massive pollutant of surface waters. Several billion tons of soil are eroded annually from the uplands into our Nation's lakes and streams, and about 20 billion tons of sediment are transported to the oceans of the world each year. This often results in a serious degradation of our soil, water, and land resources.

The Soil Erosion-Sedimentation Process

The companion processes of soil erosion and sedimentation involve many factors that influence the detachment, transportation, and deposition of soil particles by wind or water. Since water is generally the major erosive agent in urban areas, its effects will be emphasized in the remainder of this material.

Soil erosion and sedimentation by water include detachment from the soil mass, transport downslope, and subsequent deposition. Soil is detached by raindrop impact and runoff shear forces, but man's activities that loosen and pulverize soil often promote additional erosion. Downslope transportation of eroding soil particles is primarily by channelized runoff, although raindrop splash causes some net downslope movement and increases the transport capacity of overland flow. No runoff occurs unless the rainfall intensity is greater than the soil's infiltration rate and the surface storage capacity of the land has been satisfied. Once runoff begins, the quantity and size of material transported is a function of runoff velocity and turbulence, and these increase as the slope steepens and the flow increases. The larger the eroding material, the greater must be the flow velocity and turbulence to transport it. When velocity or turbulence decreases, some of the eroded sediment may deposit. Deposition or sedimentation is a selective process with the largest and densest particles settling first and the finer particles carried farther downslope or downstream. Therefore, the size distribution of eroded material is important in determining the portion of the sediment load that is deposited and the composition of the material remaining in the runoff.

Soil eroded from upland areas comes from gullies (large eroded channels that cannot be readily

Ref 2
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SUNPORT
PARK

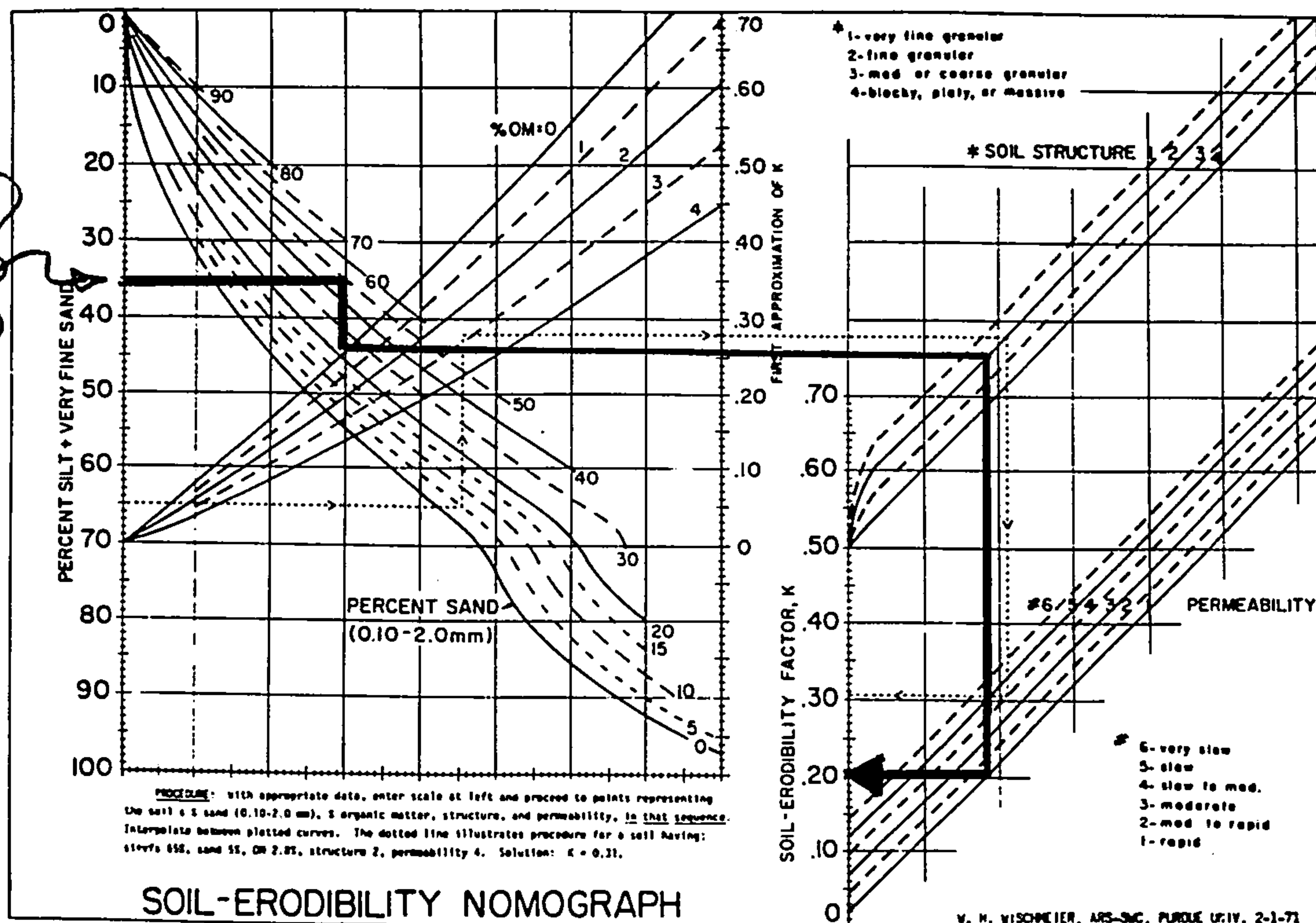


Figure 3. Soil erodibility nomograph for determining K-factor values (from Ref. 6).

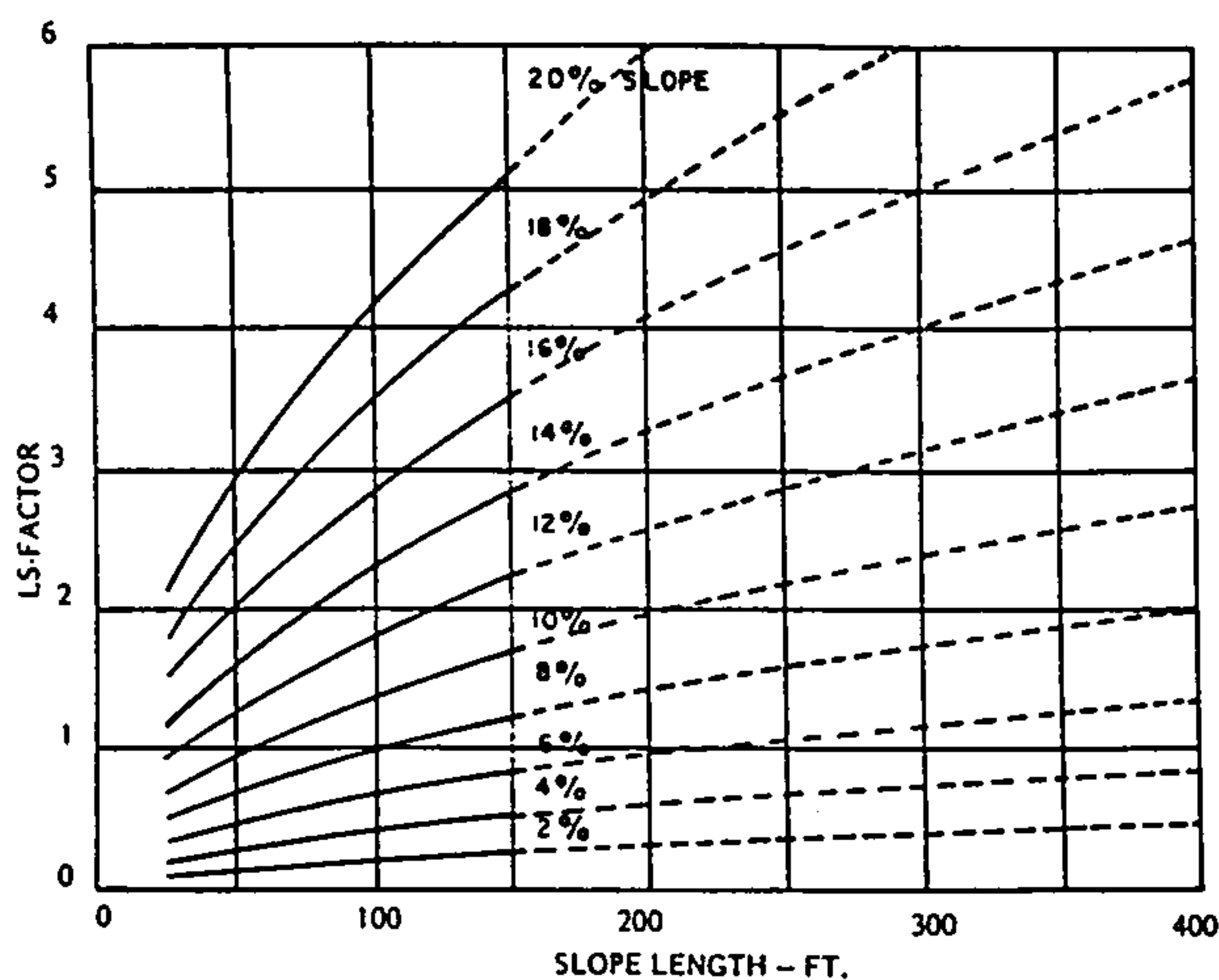


Figure 4. Topographic effect graph used to determine LS-factor values for different combinations of slope steepness and slope length (from Ref. 3).

natural slopes tend to flatten along their lower portions which encourages deposition and heavy vegetation often traps sediment below the upland slopes. However, urban erosion sources often lack locations where deposition is likely to occur, and in such cases, the delivery ratio will approach 1. A sediment delivery ratio is largely a characteristic of a watershed itself, so precise estimation of delivery ratios is quite difficult.

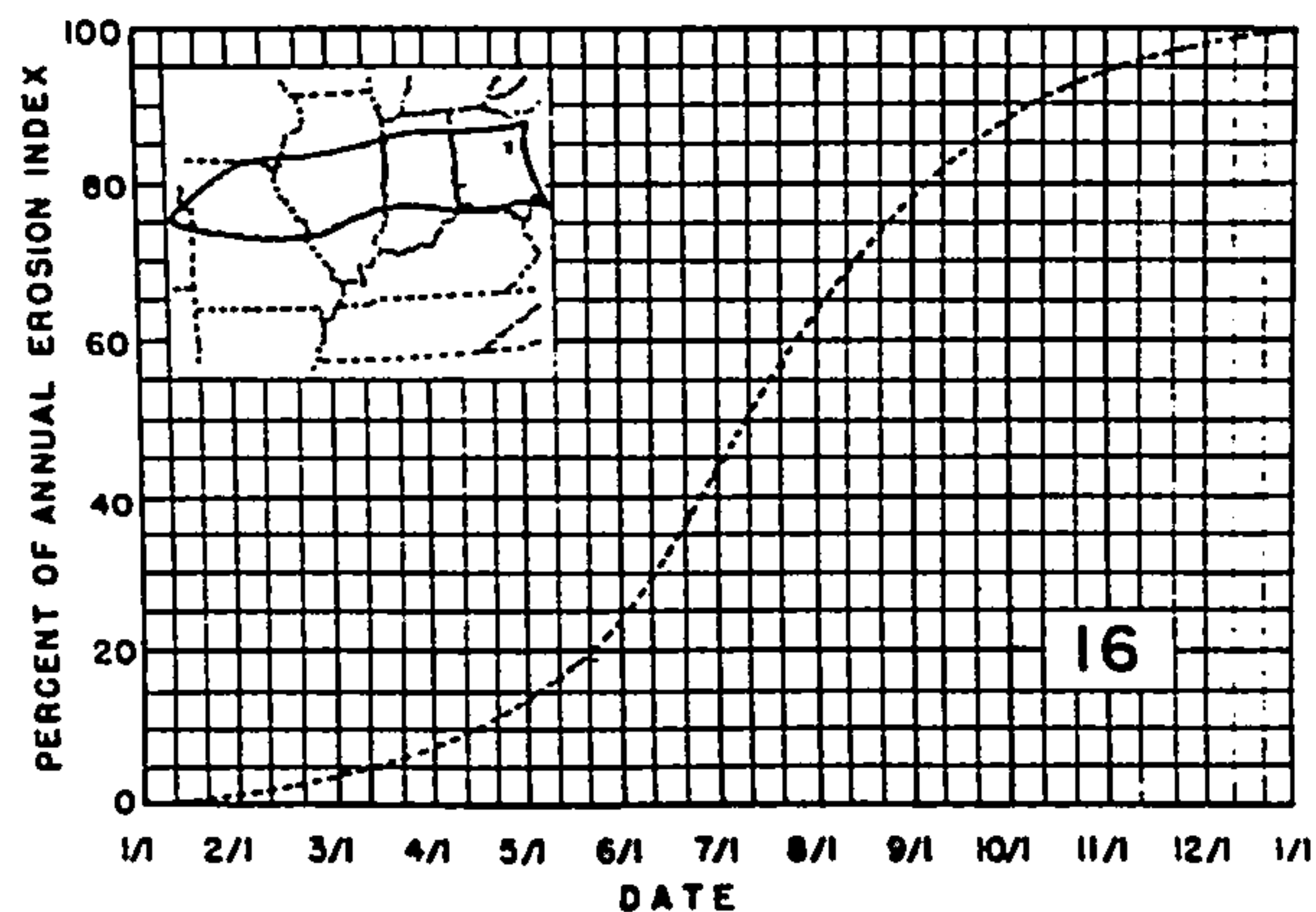


Figure 5. Average annual distribution of the rainfall erosion potential, R, for the shaded portion of the United States (from Ref. 3).

Using the Universal Soil Loss Equation

To illustrate the procedure for predicting upland soil losses for specific site conditions, assume that a watershed undergoing development has the following characteristics:

Location: Cincinnati, Ohio

Soil and Topography (see Figure 6):

2 ac of Cincy sandy loam consisting of 60% sand (including 10% very fine sand), 25%

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Principles and Practices

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TABLE 15-2 CONSTANTS FOR ESTIMATING SPECIFIC WEIGHT OF RESERVOIR SEDIMENT DEPOSITS, EQ. 15-5 (lb/ft³) [28]

Mode of Reservoir Operation	Sand		Silt		Clay	
	W_1	B	W_1	B	W_1	B
Sediment always submerged or nearly submerged	93	0	65	5.7	30	16.0
Normally a moderate reservoir drawdown	93	0	74	2.7	46	10.7
Normally considerable reservoir drawdown	93	0	79	1.0	60	6.0
Reservoir normally empty	93	0	82	0.0	78	0.0

Note: 1 lb/ft³ = 157.1 N/m³.

TABLE 15-3 RANGE IN SPECIFIC WEIGHT OF SEDIMENT DEPOSITS (lbs/ft³) [18]

Soil Description	Permanently Submerged	Aerated
Clay	40-60	60-80
Silt	55-75	75-85
Clay-silt mixture	40-65	65-85
Sand-silt mixture	75-95	95-110
Clay-silt-sand mixture	50-80	80-100
Sand	85-100	85-100
Gravel	85-125	85-125
Poorly-sorted sand and gravel	95-130	95-130

Note: 1 lb/ft³ = 157.1 N/m³.

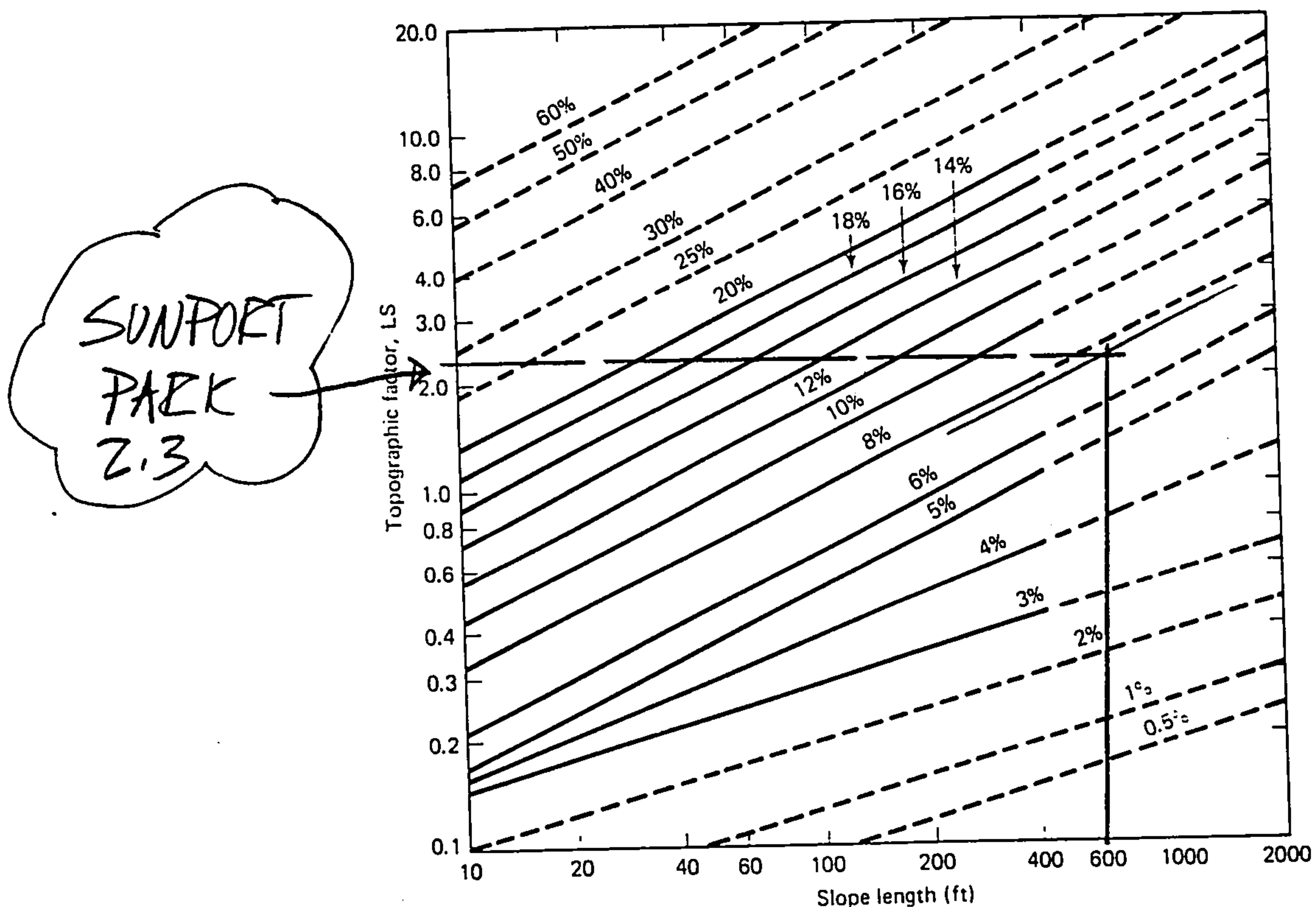
SUNPORT
PARK
USE
90 lb/ft³

15.2 SEDIMENT PRODUCTION

The presence of sediment in streams and rivers has its origin in soil erosion. Erosion encompasses a series of complex and interrelated natural processes that have the effect of loosening and moving away soil and rock materials under the action of water, wind, and other geologic factors. In the long term, the effect of erosion is the denudation of the land surface, i.e., the removal of soil and rock particles from exposed surfaces, their transport to lower elevations, and eventual deposition.

The rate of landscape denudation can be quantified from a geological perspective. For instance, the number of centimeters of denudation per 1000 y can be used as a measure of the erosive activity of a region. Geologic measures of landscape denudation appear insignificant when compared to the typical timespan of human activity, say 25 to 100 y. However, the quantities of sediment moved may be important when considering the impact that sediment loads have on the operation and design life of reservoirs and hydraulic structures.

At the outset of the study of sediment production, a distinction should be made between the amount of sediment eroded at the source(s) and the amount of sediment



*The dashed lines represent estimates for slope dimensions beyond the range of lengths and steepnesses for which data are available.

Figure 15-3 Topographic factor LS in the universal soil loss equation [41].

Streambank erosion and streambed degradation can be significant in certain cases. Changes in channel alignment and/or removal of natural vegetation from stream banks may cause increased bank erosion. Streambed degradation, typically downstream of reservoirs, can also constitute an additional source of sediment.

Methods for determining soil loss due to the various types of channel erosion include the following: (1) comparing aerial photographs taken at different times to assess the growth rate of channels, (2) performing river cross-sectional surveys to determine changes in cross-sectional area, (3) assembling historical data to determine the average age and growth rate of channels, and (4) performing field studies to evaluate the annual growth rate of channels.

Field surveys can often provide sufficient data to estimate streambank erosion as follows [41]:

$$S = HLR \quad (15-7)$$

in which S = annual volume of streambank erosion; H = average height of bank; L = length of eroded bank, each side of channel if both sides are eroding; and R = annual rate of bank recession (net rate if one side is eroding while the other is depositing).

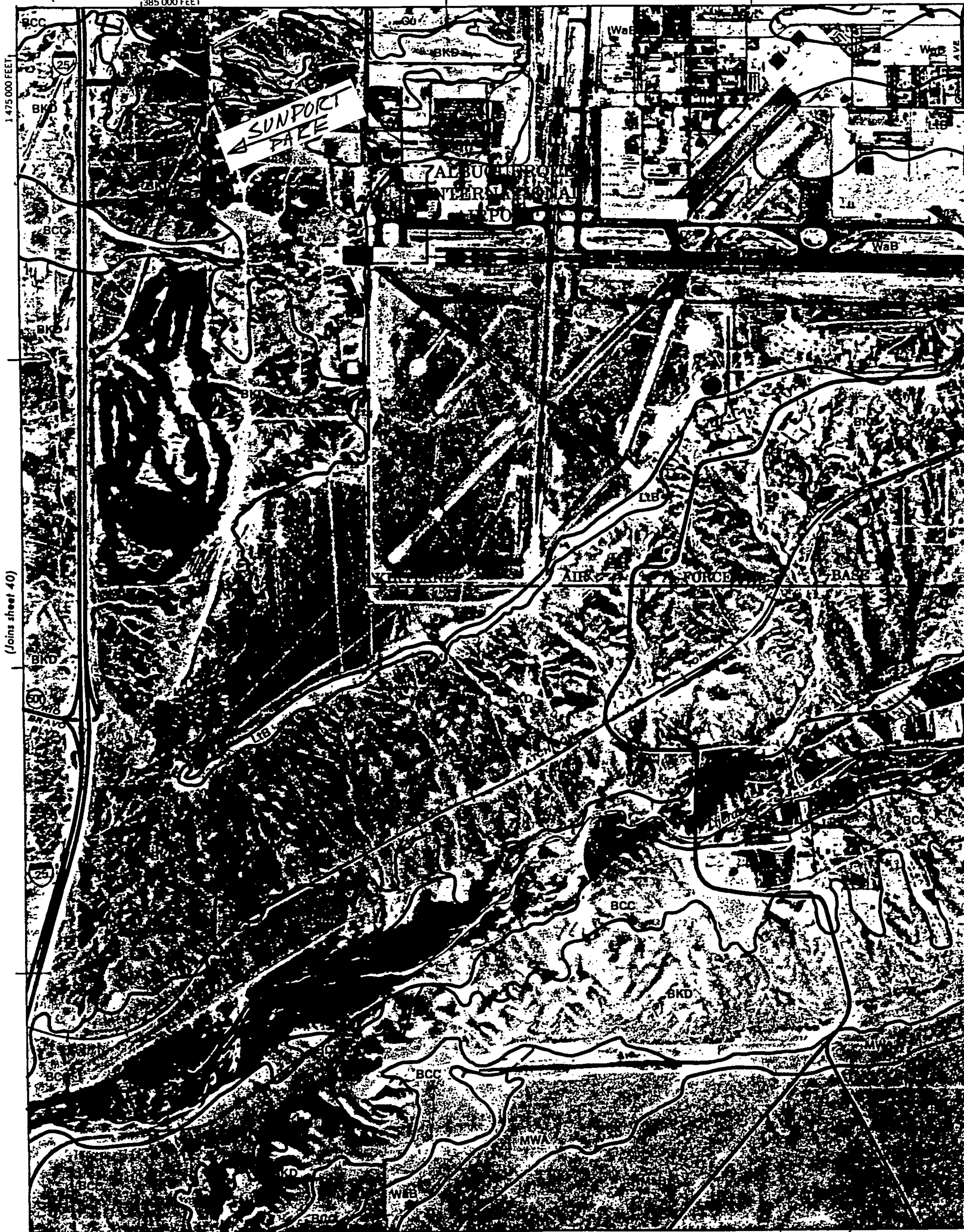
SOIL SURVEY OF

Bernalillo County and Parts of Sandoval and Valencia Counties, New Mexico



United States Department of Agriculture
Soil Conservation Service and Forest Service
and
United States Department of the Interior
Bureau of Indian Affairs and Bureau of Land Management
in cooperation with
New Mexico Agricultural Experiment Station

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West of the Rio Puerco, Badland consists of weathered soft shale and weakly consolidated sandstone, siltstone, and conglomerate. Included in mapping are mainly areas of Shingle and Kim soils.

In the foothills, Badland is mainly weathered soft shale, but commonly has a thin mantle of limestone, sandstone, granite, gneiss, or schist. Included in mapping is mainly Borolls-Rock outcrop association, very steep.

Permeability is variable, runoff is rapid to very rapid, and the hazard of water erosion is severe. Active geologic erosion is prevalent.

Badland is used for watershed and has limited use for wildlife habitat. Dryland capability subclass VIIIE.

Bluepoint Series

The Bluepoint series consists of deep, somewhat excessively drained soils that formed in sandy alluvial and eolian sediments on alluvial fans and terraces. Slopes are 1 to 15 percent. The native vegetation is principally mesa dropseed and Indian ricegrass and some giant dropseed and black grama. Elevations range from 4,850 to 6,000 feet. The mean annual precipitation is 7 to 10 inches, the mean annual air temperature is 58° to 60° F, and the frost-free season is 165 to 195 days. Bluepoint soils are associated with Kokan, Latene, Madurez, and Wink soils.

In a representative profile, the surface layer is pale brown loamy fine sand about 8 inches thick. The underlying material to a depth of 60 inches or more is pale brown and light yellowish brown loamy sand. The soil is slightly calcareous and mildly alkaline or moderately alkaline.

Permeability is rapid. Available water capacity is 4 to 5.5 inches. Effective rooting depth is 60 inches or more.

Bluepoint soils are used for range, irrigated crops, watershed, wildlife habitat, and community development.

Representative profile of Bluepoint loamy fine sand, 1 to 9 percent slopes, 30 feet west of the El Paso Natural Gas Pipeline Road, northeast corner of sec. 5, T. 11 N., R. 2 E.

A1—0 to 8 inches, pale brown (10YR 6/3) loamy fine sand, brown (10YR 5/3) moist; single grained; loose; many fine and very fine roots and interstitial pores; slightly calcareous; mildly alkaline; clear, wavy boundary.

C1—8 to 20 inches, pale brown (10YR 6/3) loamy sand, brown (10YR 5/3) moist; massive; slightly hard, very friable; few very fine and fine roots; many very fine interstitial pores; slightly calcareous; moderately alkaline; clear, wavy boundary.

C2—20 to 60 inches, light yellowish brown (10YR 6/4) loamy sand, dark yellowish brown (10YR 4/4) moist; massive; slightly hard, very friable; few fine and very fine roots; many very fine interstitial pores; slightly calcareous in spots; mildly alkaline.

The A horizon has value of 5 to 7 dry and 4 to 6 moist and chroma of 2 to 4. It is sand, loamy fine sand, and loamy sand. The C horizon has hue of 5YR to 10YR, value of 5 or 6 dry and 4 or 5 moist, and chroma of 3 or 4. It is loamy sand or loamy fine sand. Gravel content ranges from 0 to 15 percent throughout the profile.

Where mapping units BCC and Bd3 occur west of the Rio Puerco, the mean annual temperature is a few degrees cooler than is defined as the range for the series. This difference, however, does not alter use and management.

Bb—Bluepoint fine sand, hummocky. This gently rolling to rolling soil is on the piedmont east of the Rio Puerco and in areas near basalt flows. It occurs as low

dunes 8 to 50 feet high of reworked sand. The windward side is generally a blowout, and the leeward side is low dunes. Areas generally are 15 to 100 acres in size. Vegetation is sparse. Slopes are 5 to 15 percent.

This soil has a profile similar to that described as representative of the series, but the surface layer differs in texture.

Runoff is slow. The hazard of soil blowing is severe.

This soil is used for range, watershed, wildlife habitat, and recreation. Dryland capability subclass VIIe; native plant community 2.

BcA—Bluepoint loamy fine sand, 1 to 3 percent slopes. This nearly level soil is along the margin of the irrigated Rio Grande Valley. It has a profile similar to that described as representative of the series, but on about 10 percent of the acreage the surface layer is fine sand. Included in mapping are areas of Pajarito and Vinton soils, which make up about 10 percent of the unit.

Runoff is slow, and the hazard of soil blowing is severe.

This soil is used for irrigated alfalfa, row crops, and pasture. It is also used for wildlife habitat and community development. Irrigated capability unit IIIe-11.

BCC—Bluepoint loamy fine sand, 1 to 9 percent slopes. This soil is nearly level to moderately sloping. It has the profile described as representative of the series, but on about 10 percent of the acreage the surface layer is sand. Included in mapping are areas of Madurez, Pajarito, and Wink soils, which make up about 15 percent of the unit.

Runoff is slow, and the hazard of soil blowing is severe.

This soil is used for range, watershed, wildlife habitat, recreation, and community development. Dryland capability subclass VIIe; native plant community 2.

Bd3—Bluepoint-Wink, severely eroded complex. This mapping unit is about 45 percent a Bluepoint loamy fine sand that has 3 to 15 percent slopes and 35 percent a severely eroded Wink sandy loam that has 5 to 15 percent slopes (fig. 3).

The Bluepoint soil is in low swales and drainageways where runoff is slow but the hazard of soil blowing is severe. The Wink soil occurs as eroded remnants of narrow ridges where runoff is rapid and the hazard of water erosion is severe. It has a profile similar to that described as representative of the Wink series, but the surface layer is sandy loam and the soil is severely eroded.

Included in this unit in mapping are areas of Vinton, Penistaja, and Kokan soils, which make up about 15 percent of the unit. Also included are areas where the upper 30 inches of the soil is 10 to 15 percent gravel.

This mapping unit is used for watershed, wildlife habitat, and range. Dryland capability subclass VIIe; native plant community 2 for Bluepoint soil and 6 for Wink soil.

BKD—Bluepoint-Kokan association, hilly. This mapping unit is about 50 percent a Bluepoint loamy fine sand that has 5 to 15 percent slopes and 40 percent a Kokan gravelly sand that has 15 to 40 percent slopes. The gently rolling to rolling Bluepoint soil is on fans between gravelly ridges of the hilly to steep Kokan soil.

The Kokan soil has the profile described as representative of the Kokan series. On about 10 percent of the acreage, however, it has a high lime layer in the substratum.



Figure 3.—An area of Bluepoint-Wink, severely eroded complex.

On both soils, runoff is slow and the hazard of water erosion is moderate or severe.

This mapping unit is used for range, watershed, wildlife habitat, recreation, and community development. In Bernalillo County it is also a major source of sand and gravel. Dryland capability subclass VIIe; native plant community 2 for Bluepoint soil and 3 for Kokan soil.

Bond Series

The Bond series consists of shallow, well drained soils that formed in residuum weathered from sandstone bedrock on uplands. Slopes are 5 to 15 percent. The native vegetation is principally blue grama, side-oats grama, pinyon pine, and juniper. Elevations range from 6,000 to 8,000 feet. The mean annual precipitation is 12 to 16 inches, the mean annual air temperature is about 50° to 54° F, and the frost-free season is 110 to 150 days. Bond soils are associated with Laporte, Penistaja, and Travesilla soils.

In a representative profile, the surface layer is brown fine sandy loam about 3 inches thick. The subsoil is brown and strong brown sandy clay loam about 15 inches thick. Hard, brown sandstone bedrock is at a depth of about 18 inches. The soil is moderately alkaline throughout.

Permeability is moderately slow. Available water capacity is 1 inch to 3 inches. Effective rooting depth is 12 to 20 inches.

Bond soils are used for range, watershed, and wildlife habitat.

In this survey area, Bond soils are mapped only with Penistaja soils and Rock outcrop.

Representative profile of Bond fine sandy loam, from an area of Penistaja-Bond association in SW¼NE¼NE¼ sec. 27, T. 11 N., R. 3 W.

- A1—0 to 3 inches, brown (7.5YR 5/4) fine sandy loam, dark brown (7.5YR 4/4) moist; single grained; loose; many roots of all sizes; many fine interstitial pores; moderately alkaline; abrupt, smooth boundary.
- B2t—3 to 12 inches, brown (7.5YR 5/4) sandy clay loam, dark brown (7.5YR 4/4) moist; moderate, medium, subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many roots of all sizes; many fine interstitial pores; moderately alkaline; clear, smooth boundary.
- B3—12 to 18 inches, strong brown (7.5YR 5/6) sandy clay loam, strong brown (7.5YR 4/6) moist; weak, fine, subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common roots of all sizes; common interstitial pores; moderately alkaline; abrupt, smooth boundary.
- R—18 inches, brown (7.5YR 5/4) hard sandstone.

The A horizon has hue of 7.5 or 10YR and value of 4 or 5 dry and 3 or 4 moist. It is stony heavy sandy loam to fine sandy loam. The B horizon has value of 5 to 7 dry and 4 to 6 moist and chroma of 4 to 6 dry and moist. It is sandy clay loam or clay loam that is 0 to 20 percent rock fragments. Depth to bedrock is 12 to 20 inches.

Borolls

Borolls are shallow to deep, well drained soils that formed mostly in residuum weathered from limestone, sandstone, granite, gneiss, and schist on the sides of canyons and mountains in a cool climate. Slopes are 50 to 80 percent. The native vegetation is variable, but is principally ponderosa pine, Douglas-fir, Gambel oak, mountainmahogany, bottlebrush squirreltail, and junegrass. Elevations range from 8,000 to 9,500 feet. The mean annual precipitation is 16 to 25 inches, the mean annual air temperature is 40° to 45° F, and the frost-free season is 70 to 100 days. Borolls soils are mainly associated with Rock outcrop.

Borolls are variable, but they have some features in common. The surface layer is brown, dark brown, or dark grayish brown stony loam, cobbly loam, or very stony loam. The subsoil is stony sandy clay loam to very stony clay. Bedrock is at a depth of 10 to more than 60 inches. The soils are mainly noncalcareous and neutral to mildly alkaline.

Permeability is moderate to slow. Available water capacity is 1 inch to 6 inches. Effective rooting depth is 10 to 60 inches.

Borolls are used for wildlife habitat, watershed, recreation, timber, and range.

BOF—Borolls-Rock outcrop association, very steep. This mapping unit is about 70 percent Borolls, 20 percent Rock outcrop, and 10 percent a very shallow soil and Orthids. It is on the west face of the Sandia, Manzanita, and Manzano Mountains at elevations higher than 8,000 feet.

Borolls are shallow to deep and stony, cobbly, or very stony soils on very steep canyon and mountain walls between the outcrops of bedrock. Runoff is medium, and the hazard of water erosion is moderate. Rock outcrop occurs where resistant limestone, schist, gneiss, sandstone, or granite has been exposed through faulting, uplifting, or geologic erosion. Runoff is very rapid, and the hazard of water erosion is moderate. There is little or no vegetation. About 20 percent of the surface area of this mapping unit is covered with boulders 3 to 15 feet in diameter.

Permeability is moderately rapid. Available water capacity is 5.5 to 8 inches. Effective rooting depth is 60 inches or more.

Wink soils are used for range, watershed, wildlife habitat, and community development.

Representative profile of Wink fine sandy loam, 0 to 5 percent slopes, 0.8 of a mile north of power lines and 150 feet east of road, in SW¼ sec. 23, T. 10 N., R. 1 E.

A11—0 to 6 inches, brown (7.5YR 5/3) fine sandy loam, dark brown (7.5YR 4/3) moist; weak, medium, subangular blocky structure; soft, very friable, slightly sticky; common fine roots; many fine interstitial pores; slightly calcareous; moderately alkaline; clear, smooth boundary.

A12—6 to 11 inches, brown (7.5YR 5/3) sandy loam, dark brown (7.5YR 4/3) moist; weak, medium, subangular blocky structure; soft, very friable, slightly sticky; common fine roots; many fine interstitial pores; slightly calcareous; moderately alkaline; clear, smooth boundary.

B2—11 to 19 inches, light brown (7.5YR 6/4) sandy loam, brown (7.5YR 5/3) moist; weak, medium, subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine roots and tubular pores; strongly calcareous; moderately alkaline, clear, smooth boundary.

B3ca—19 to 27 inches, light brown (7.5YR 6/4) sandy loam, brown (7.5YR 5/4) moist; moderate, medium, subangular blocky structure; hard, friable, slightly sticky and slightly plastic; many fine roots and tubular pores; many fine, hard and soft lime masses; strongly calcareous; moderately alkaline, clear, smooth boundary.

C1ca—27 to 35 inches, pinkish gray (7.5YR 7/2) sandy loam, brown (7.5YR 5/2) moist; weak, medium, subangular blocky structure; hard, friable, slightly sticky and slightly plastic; many fine roots; many fine tubular and interstitial pores; many fine, hard and soft, white masses of lime; strongly calcareous; moderately alkaline; abrupt, smooth boundary.

C2ca—35 to 60 inches, pinkish white (7.5YR 8/2) sandy loam, pinkish gray (7.5YR 7/2) moist; massive; very hard, firm, slightly sticky; few fine tubular pores; weakly cemented; strongly calcareous; moderately alkaline.

The A horizon has value of 4 to 6 dry and 4 or 5 moist and chroma of 3 or 4. It is sandy loam, fine sandy loam, or loamy fine sand. The B horizon has hue of 7.5YR or 10YR, value of 5 or 6 dry and moist, and chroma of 3 or 4. It is loam or sandy loam. The Cca horizon has hue of 7.5YR or 10YR, value of 6 to 8 dry and 4 to 7 moist, and chroma of 2 to 4. It is clay loam below a depth of 40 inches in places.

WaB—Wink fine sandy loam, 0 to 5 percent slopes. This level to gently sloping soil is on the East and West Mesas. It has the profile described as representative of the series.

Included with this soil in mapping are areas of a Wink soil that has a thin surface layer of loamy sand. This included soil makes up about 10 percent of the unit. Also included are Latene soils, which make up 5 percent.

Runoff is medium. The hazard of water erosion is slight to moderate and the hazard of soil blowing is moderate.

This soil is used for range, watershed, wildlife habitat, and community development. Dryland capability subclass VIIe; native plant community 4.

WeB—Wink-Embudo complex, 0 to 5 percent slopes. This mapping unit is about 65 percent a Wink fine sandy loam that has 1 to 5 percent slopes and 25 percent Embudo gravelly fine sandy loam, 0 to 5 percent slopes.

The Wink soil is on slight rises and ridges. It has a profile similar to that described as representative of the

series, but it is alkaline and has a pale brown fine sandy loam surface layer about 4 inches thick and a strongly alkaline clay loam substratum below a depth of 40 inches. On about 70 percent of the acreage of Wink soil, the content of exchangeable sodium is more than 15 percent. The Embudo soil is in shallow depressions. It has a profile similar to that described as representative of the Embudo series, but the surface layer is yellowish brown gravelly fine sandy loam about 8 inches thick. On both soils, runoff is medium and the hazard of water erosion is moderate.

Included in this unit in mapping are areas of Madurez, Tijeras, and Kokan soils, which make up about 10 percent of the unit.

This mapping unit is used for community development, watershed, and wildlife habitat. Flooding and poor compaction are potential problems where this mapping unit is used for community development. Dryland capability subclass VIIe; native plant community 4.

WM—Wink-Madurez association. This mapping unit is about 65 percent a Wink fine sandy loam that has 1 to 7 percent slopes and 20 percent a Madurez fine sandy loam that has 1 to 5 percent slopes.

The nearly level to moderately sloping Wink soil is in slightly convex areas where runoff is medium and the hazard of soil blowing is severe. It has a profile similar to that described as representative of the Wink series, but the surface layer is winnowed and about 6 inches thick. The nearly level or gently sloping Madurez soil is mainly in slightly concave areas where runoff is medium and the hazard of soil blowing is moderate. It has a profile similar to that described as representative of the Madurez series, but the surface layer is winnowed and about 5 inches thick.

Included in this unit in mapping are areas of Bluepoint, Pajarito, and Latene soils, which make up about 15 percent of the unit.

This mapping unit is used for range, watershed, and wildlife habitat. Dryland capability subclass VIIe; native plant community 4.

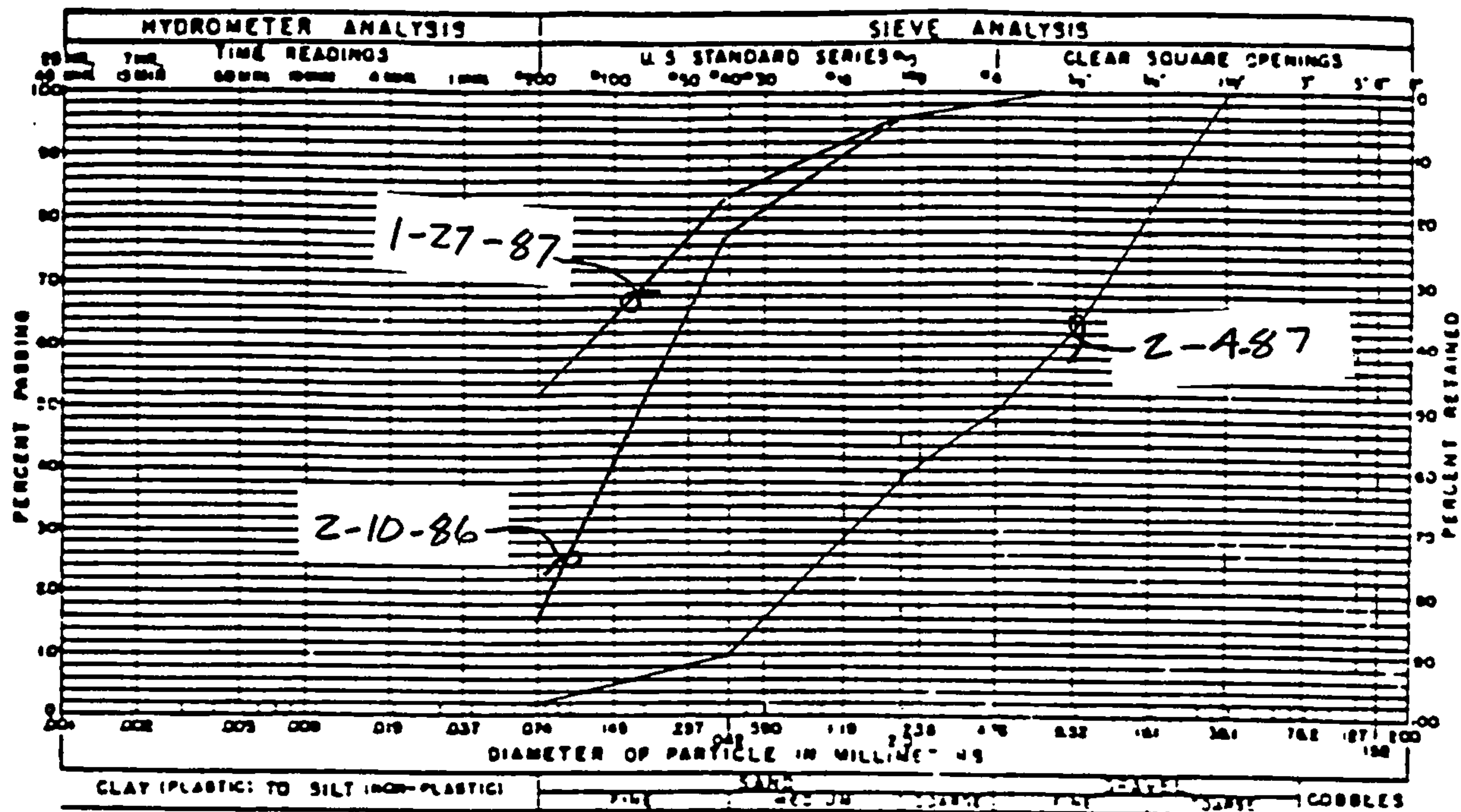
Witt Series

The Witt series consists of deep, well drained soils that formed in sediment derived from mixed rocks on uplands. Slopes are 2 to 9 percent. The native vegetation is principally blue grama, ring muhly, western wheatgrass, pinyon pine, and oneseed juniper. Elevations range from 6,500 to 7,500 feet. The mean annual precipitation is 10 to 14 inches, the mean annual air temperature is about 52° to 55° F, and the frost-free season is 120 to 155 days. Witt soils are associated with Silver, Manzano, and Laporte soils.

In a representative profile, the surface layer is dark yellowish brown very fine sandy loam about 4 inches thick. The subsoil is reddish brown silty clay loam about 24 inches thick. The substratum to a depth of 60 inches or more is pinkish white light silty clay loam. The soil is mildly alkaline or moderately alkaline.

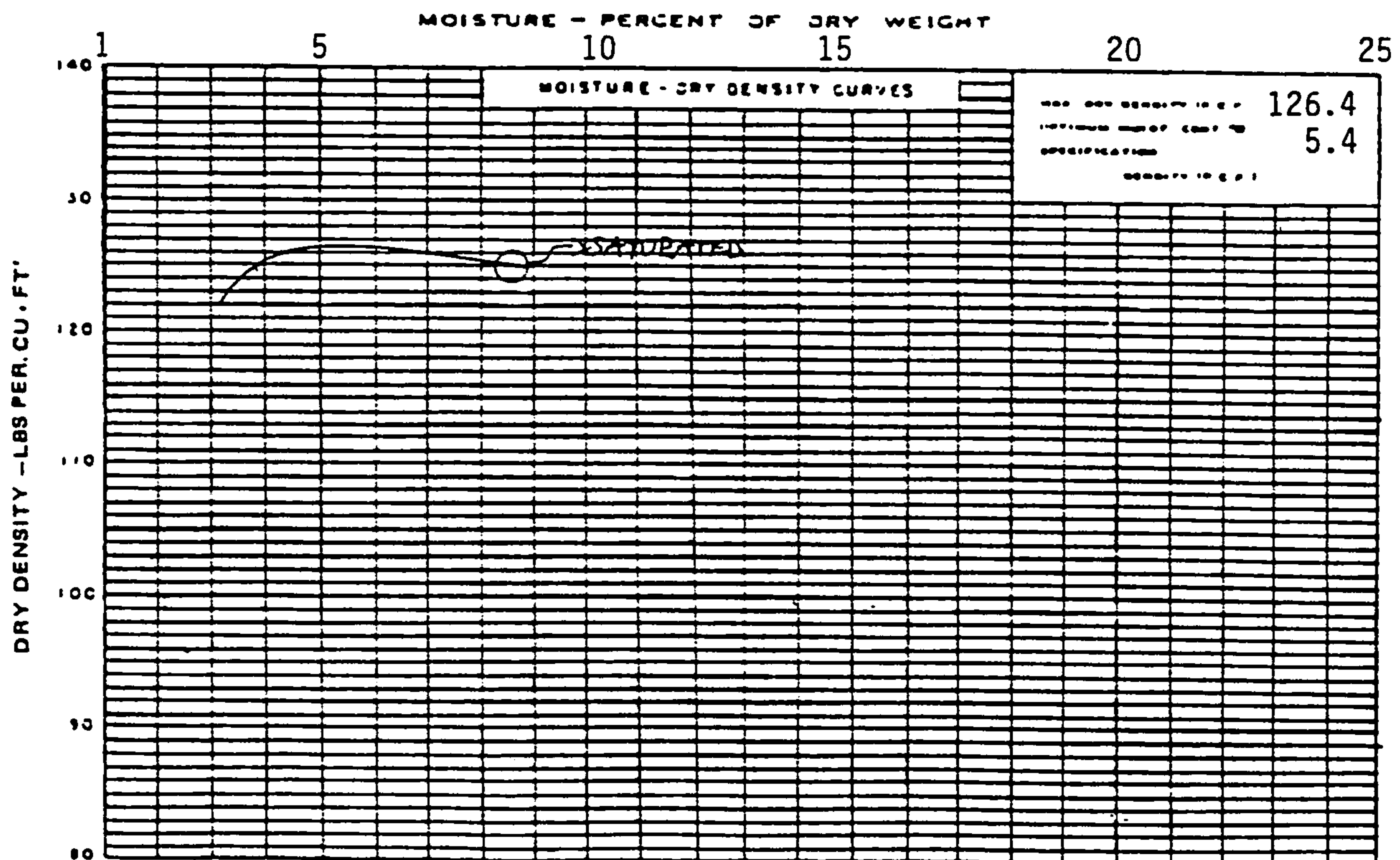
Permeability is moderately slow. Available water capacity is 11 to 12 inches. Effective rooting depth is 60 inches or more.

21 of 26



GRADATION TEST RESULTS

GRAVEL 51 % SAND 47 % SILT AND CLAY 2 %
LIQUID LIMIT NV % PLASTICITY INDEX NP %



COMPACTION TEST RESULTS

COMPACTION TEST PROCEDURE ASTM D-1557, Method D

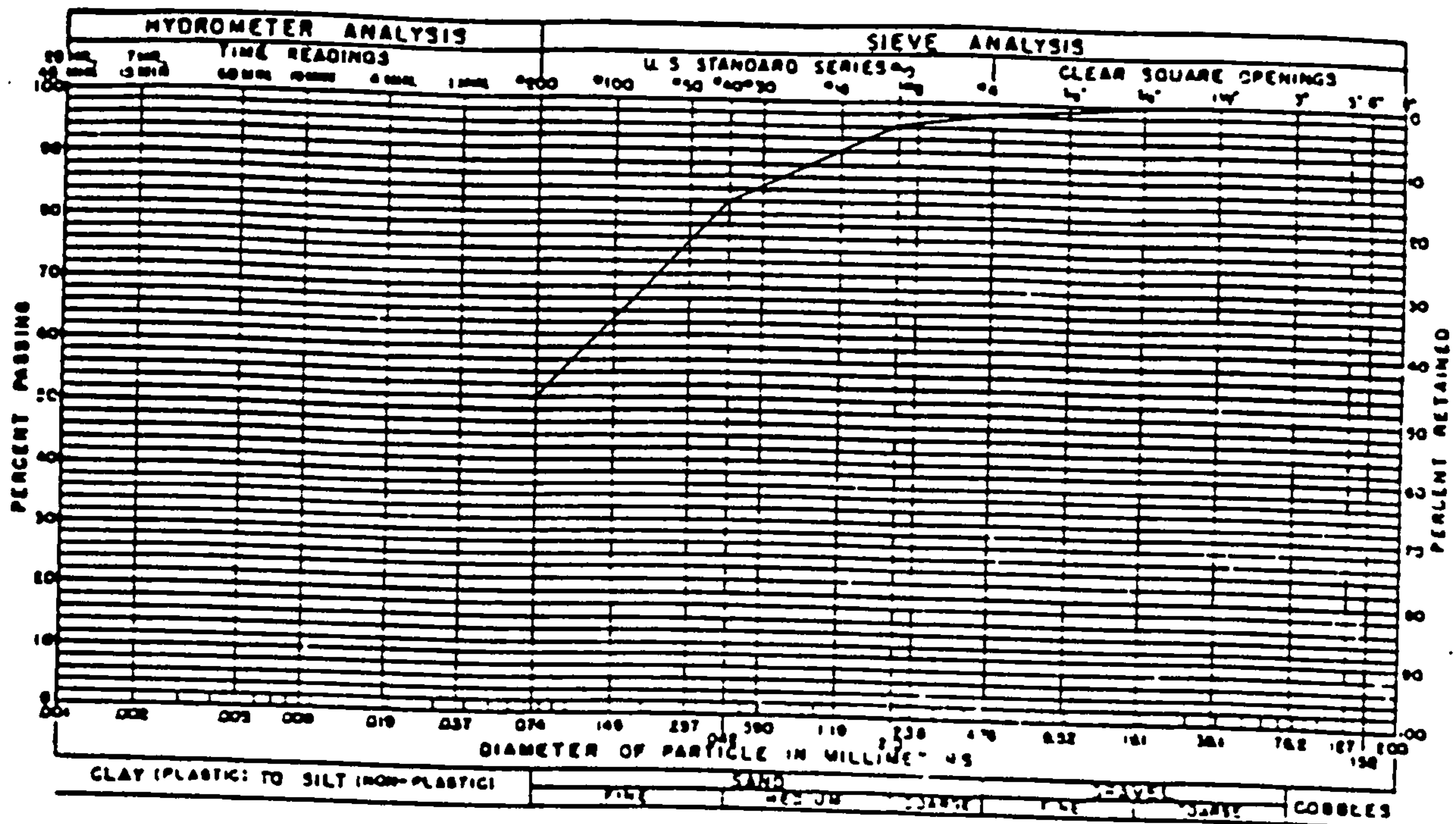
SAMPLE OF GRAVEL, very sandy, trace gravel, brown (GP-GM)
FROM Station 13+00 on Woodward

Date Sampled: 02/04/87

22 of 26

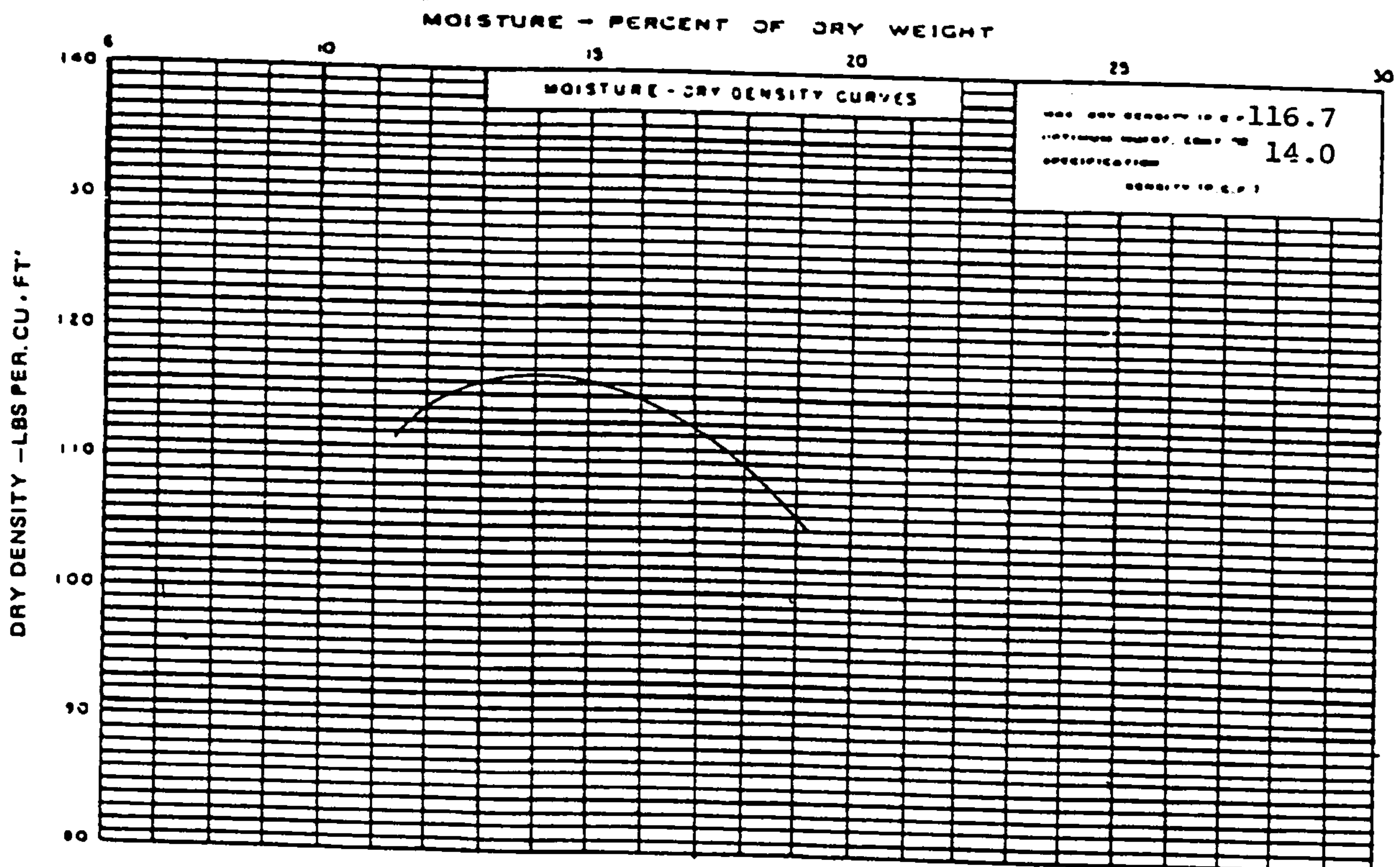
F.M. FOX & ASSOCIATES, INC. Consulting Engineers and Geologists

F.M. FOX & ASSOCIATES, INC.
3412 BRYN MAWR DRIVE, N.E.
ALBUQUERQUE, NEW MEXICO 87107
(505) 884-0900



GRADATION TEST RESULTS

GRAVEL 2 % SAND 46 % SILT AND CLAY 42 %
LIQUID LIMIT 29 % PLASTICITY INDEX 4 %



COMPACTION TEST RESULTS

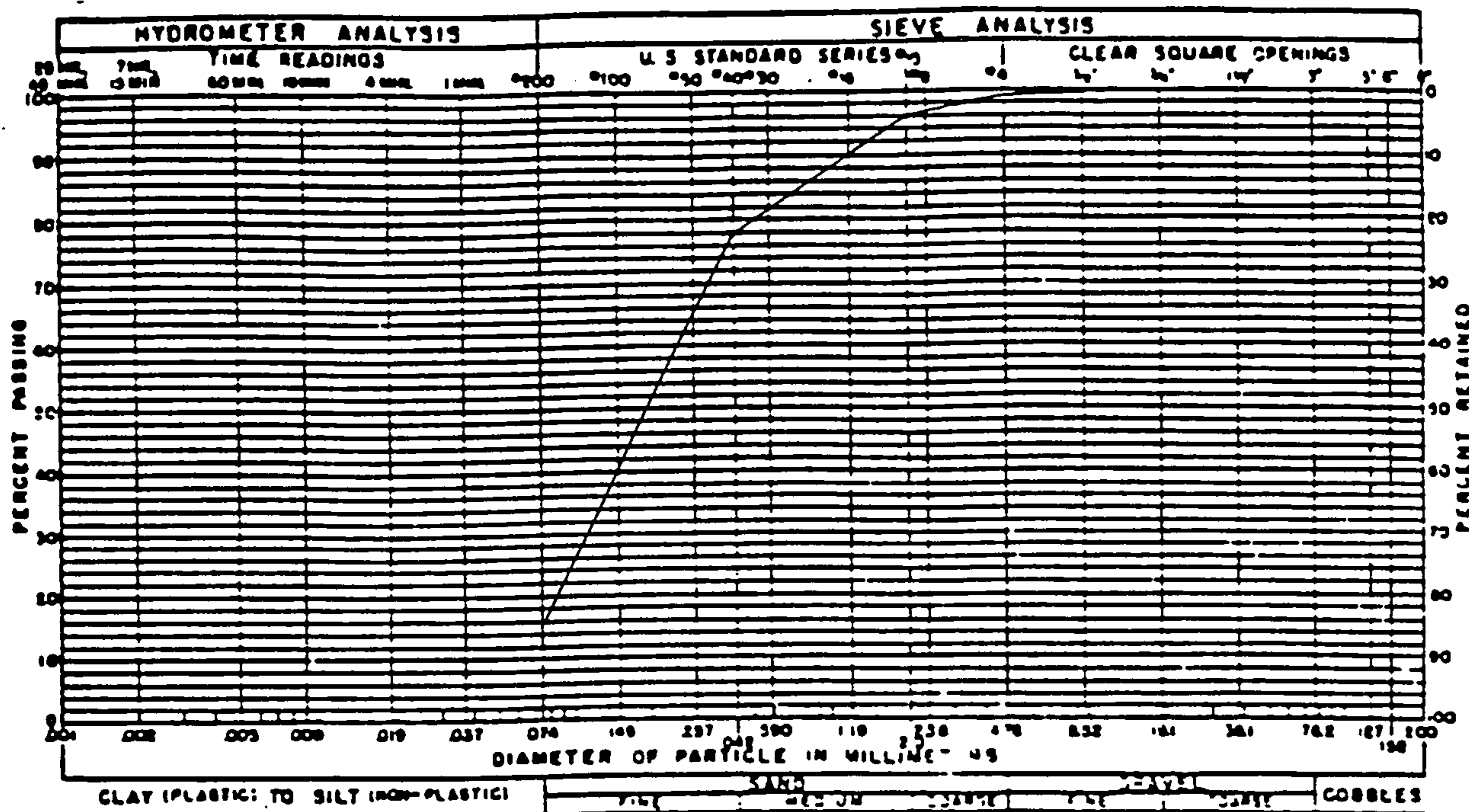
COMPACTION TEST PROCEDURE ASTM D 1557 - A

SAMPLE OF SILT & CLAY, very sandy, trace gravel, brown (ML-CL)
FROM 150' right of Woodward, station 22+00, Date Sampled: 1/27/87

23 of 26

W. FOX & ASSOCIATES, INC.
Consulting Engineers and Geologists

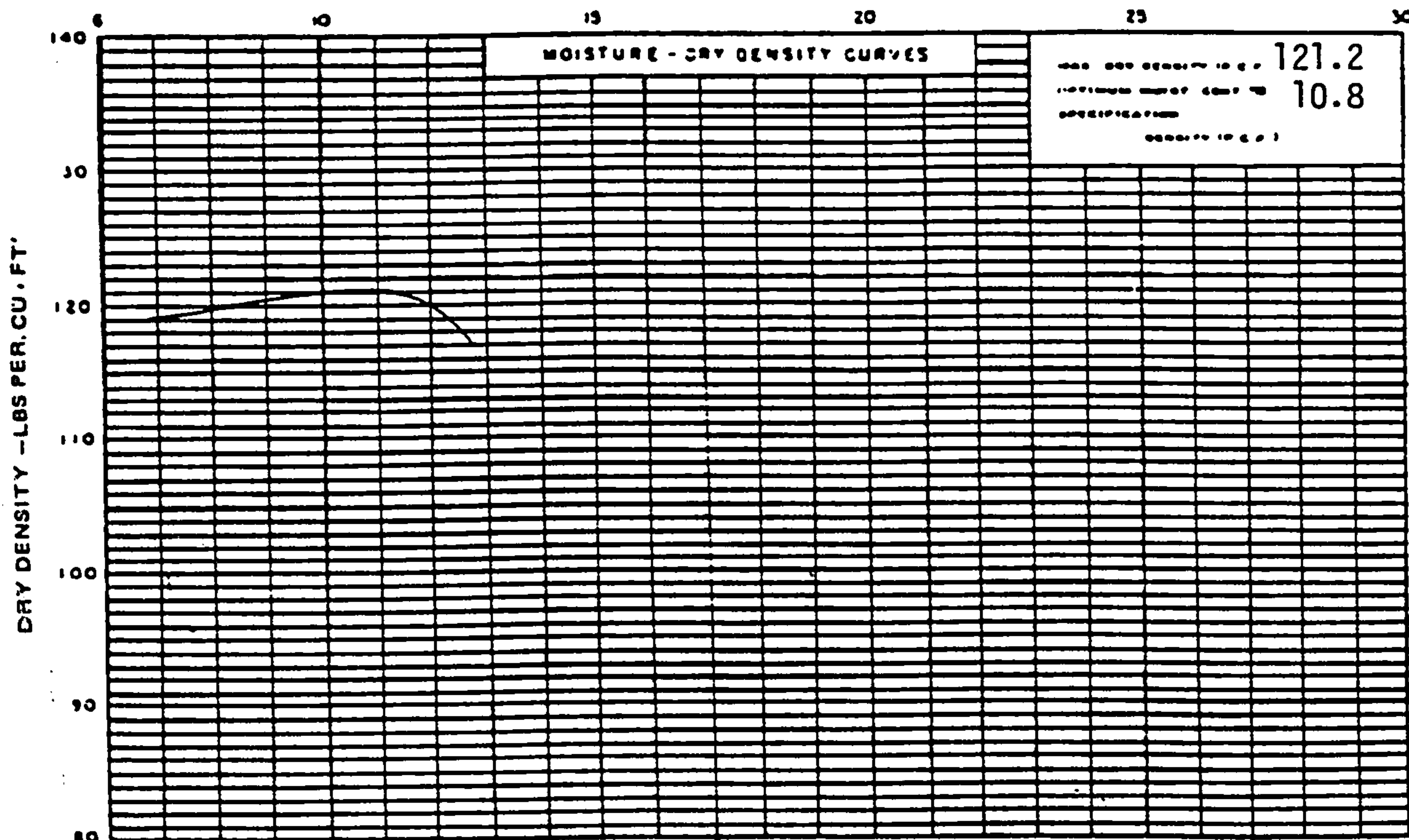
F.M. FOX & ASSOCIATES, INC.
3412 BRYN MAWR DRIVE, N.E.
ALBUQUERQUE, NEW MEXICO 87107
(505) 884-0900



GRADATION TEST RESULTS

GRAVEL	1	%	SAND	84	%	SILT AND CLAY	15	%
LIQUID LIMIT	NV	%	PLASTICITY INDEX	NP	%			

MOISTURE - PERCENT OF DRY WEIGHT



COMPACTION TEST RESULTS

COMPACTION TEST PROCEDURE ASTM D 1557-A

SAMPLE OF SAND, silty, trace gravel, brown (SM)
FROM Station 11+25 north & 150' west of transport

Date Sampled: 12/10/86

FIG.

24 of 26



ANDREWS, ASBURY & ROBERT, INC.
Consulting Engineers

149 Jackson, NE, Albuquerque, New Mexico 87108
(505) 265-6631

John A. Andrews, P.E.
Charles T. Asbury, P.E.
John B. Robert, P.E. & L.S. (1915-1984)
James E. Millington, P.E. - V.P.
Gayle D. Jewell, L.S. - V.P.

March 12, 1992

Mr. Gilbert Aldaz
Flood Plain Administrator
City of Albuquerque
P.O. Box 1293
Albuquerque, New Mexico 87103

RE: L.O.M.R. Request for Sunport Park, Phase I
(FEMA Case 6-91-127).

Dear Gilbert,

In response to your letter of February 19, 1992, I am submitting the following materials:

1. Topographic mapping of the additional fill placed along the west side of Transport Street in December 1991. This map shows that there is now over three (3) feet of earthen embankment on the west side of Transport from approximately one hundred (100) feet north of the intersection with Woodward Ave. to approximately four hundred (400) feet south of the intersection. The new fill increased the height of the embankment approximately six (6) inches to one (1) foot adjacent to the Woodward Road intersection (beyond that shown in the July 22, 1991 survey originally submitted with this revision). In addition to raising the embankment, the new fill provides considerable additional width at FEMA's point of concern (south of Woodward Road).
2. Results of compaction tests performed on the new fill mentioned in Item 1. The compaction test uses the modified proctor density methods based upon maximum density testing performed in May of 1988 when the project was originally constructed (also enclosed). Using the modified densities, the new fill shows a compaction of 90% with ASTM D 1557 method C. This is for all practical purposes equivalent to a compaction of 95% based upon Standard Proctor methods (ASTM D-698).

I believe this information (along with the 12-23-91 survey data submitted to you previously) complies with FEMA's request for additional information (letter of September 10, 1991) and shows that "the berm is at its highest point across the entire width of

Page 2.
Mr. Gilbert Aldaz
March 12, 1992

the intersection" which I have interpreted to mean that a minimum of three (3) feet of freeboard is needed where flows turn from Woodward Road and then travel north to the constructed inlets on Transport.

Please feel free to contact me with any questions or comments.

Sincerely,



Thomas L. Holtman P.E.

Vinyard & Associates, Inc.

4415-D Hawkins, NE
Albuquerque, New Mexico 87109
(505) 345-1937

Geotechnical Engineering • Materials Testing • Environmental Engineering

February 26, 1992

Andrews, Asbury and Robert, Inc.
149 Jackson St. NE
Albuquerque, NM 87109
Attn: Mr. Thomas L. Holtman, P.E.

Subject: Sunport Business Park
V & A Job No. 92-2-53

Dear Sir:

RECEIVED	
ANDREWS, ASBURY & ROBERT, INC.	
CONSULTING ENGINEERS	
DATE MAR 11 1992	ANDREWS
JOB 415-E	ASBURY CJA
COMMENTS	J.E.M.
FILE ☐	TH TH

Attached are copies of the earthwork Compaction Test Results for the subject project.

Should you have any questions regarding this data, please do not hesitate to call.

Sincerely,

John V. Gardner

John Gardner



Vinyard & Associates, Inc

Martin D. Vinyard

Martin D. Vinyard, P.E.

Attachment: Report No. 1

cc: Addressee (1)

V
&
A

COMPACTION TEST RESULTS

PROJECT: Sunport Business ParkCLIENT: Andrews, Asbury and Robert, Inc.TECHNICIAN: John GardnerPROJECT NO.: 92-2-53REPORT NO.: 1DATE: 02/17/92

Test No.	Location	Elevation	Proctor Number	Field Moisture (%)	Field Dry Density (pcf)	Relative Compaction (%)	Specified Compaction (%)
1	Drainage Berm, W. side of transport St. at intersection of Woodward. 30' S. of N. end	FSG	1	7.8	115.7	90	90
2	Drainage Berm, W. side of transport St. at intersection of Woodward, 75' S. of N. end	FSG	1	7.3	115.5	90	90

Proctor Tests Utilized

Proctor No.	Soil Description	Optimum Moisture Content (%)	Maximum Dry Density (pcf)	Remarks
1	SAND, very silty, sli. gravelly, brown	8.5	128.4	Provided by client

WEATHER: Partly cloudyEQUIPMENT: -REMARKS: See attached Daily Diary

Vinyard & Associates, Inc.

A

DAILY DIARY

Project: Sunport Business Park

Client: Andrews, Asbury and Robert Inc.

Date: 02/17/92

Project No.: 92-2-53

Time: _____

Contractor : _____

Technician: John Gardner

Moisture density tests were performed on material placed for earthen berm construction. Test results were presented to Tom Holtman, P.E. with Andrews, Asbury and Robert, Inc.' Proctor weight used for testing was provided by said person with client.

FOX

FOX & ASSOCIATES OF NEW MEXICO, INC.

CONSULTING ENGINEERS AND GEOLOGISTS

ALBUQUERQUE OFFICE 3412 BRYN MAWR DRIVE, NE
ALBUQUERQUE, NEW MEXICO 87107
(505) 884-0900

May 13, 1988

Andrews, Asbury & Robert, Inc.
149 Jackson Street, NE
Albuquerque, NM 87108

Job No. 3-4544-6074-00

Attention: Jim Millington

Subject: Laboratory Determinations
Moisture-Density Relations of Soils,
Atterberg Limits Test & Sieve Analysis
Sunport Parking, Phase I
Infrastructure Improvements

Gentlemen:

Transmitted herein is the detailed test data for the subject
project.

FOX & ASSOCIATES OF NEW MEXICO, INC.


Hector M. Martinez
Staff Materials Engineer

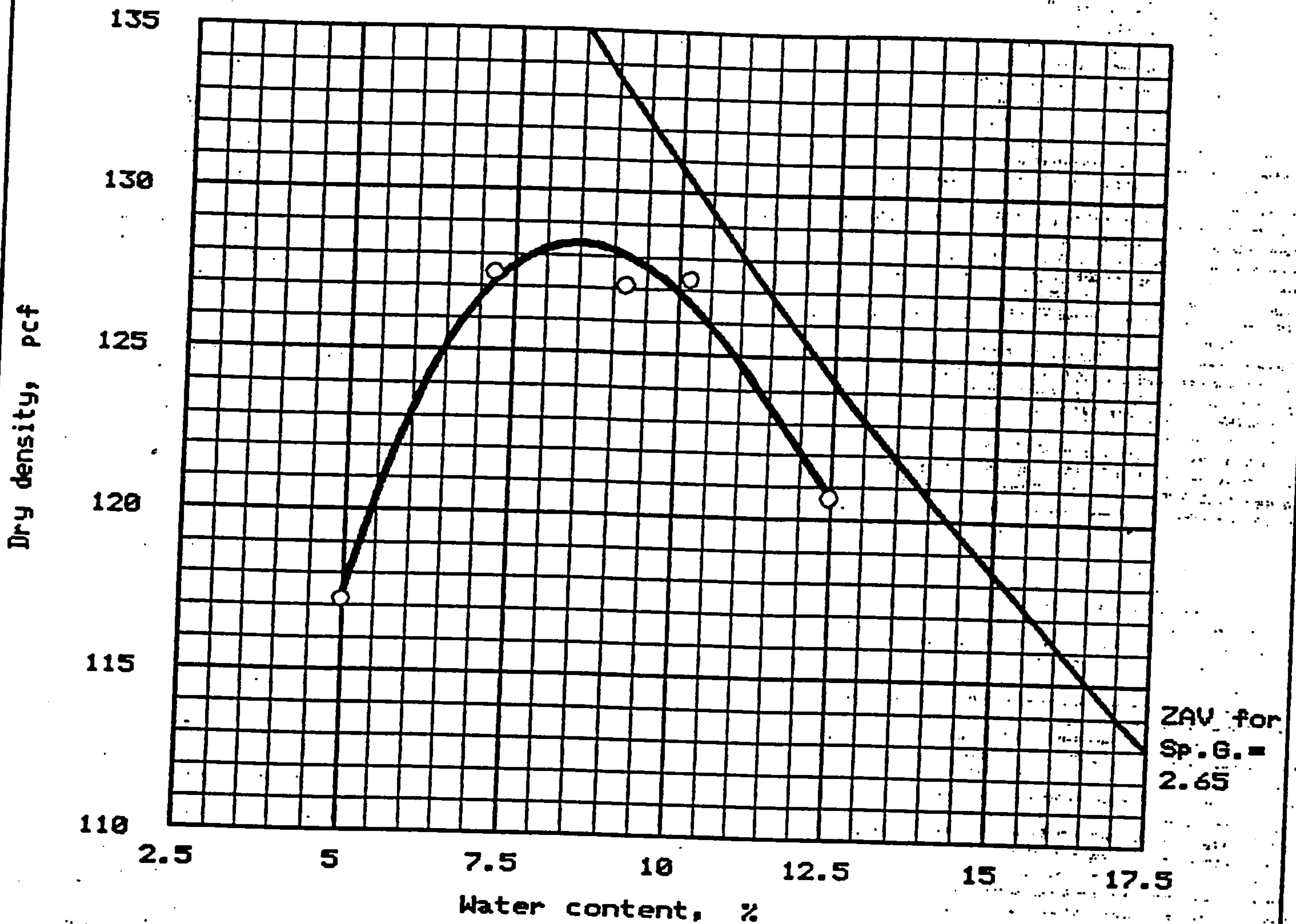
Copies: Addressee (2)
New Concepts, Attn: Mr. Tom Lakeman
City of Albuquerque, Public Works Dept.
Attn: Mr. Brian Dolan
J. R. Hale, Attn: Mr. Kurt Wagener

Attached: Data Sheet

js

RECEIVED ANDREWS, ASBURY & ROBERT, INC. CONSULTING ENGINEERS	
DATE	ANDREWS
JOB 412D	ASBURY
COMMENTS	J.E.M.
FILE ☐	

PROCTOR TEST REPORT



"Modified" Proctor, ASTM D 1557, Method C

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No. 4	% < No. 200
	USCS	AASHTO						
-7.0'	SM	-		2.65	20.7	NP	9.2 %	26.2 %

TEST RESULTS

Optimum moisture = 8.5 %
Maximum dry density = 128.4 pcf

MATERIAL DESCRIPTION

SAND, very silty, sli.
gravelly, brown

Remarks:

Project No.: 6074
Project: Sunport Parking
Location: Transport and Woodward

Date: 5-05-1988

FOX

PROCTOR TEST REPORT
Consulting Engineers and Geologists

Figure No. 1

ANDREWS, ASBURY & ROBERT, INC.
CONSULTING ENGINEERS
149 Jackson, N.E., Albuquerque, N.M. 87108
Telephone (505) 265-6631

Project Sunport Park Phase I Sheet 1 of 3
Job No. 415
By JEM Chk'd _____ Date 08.06.90

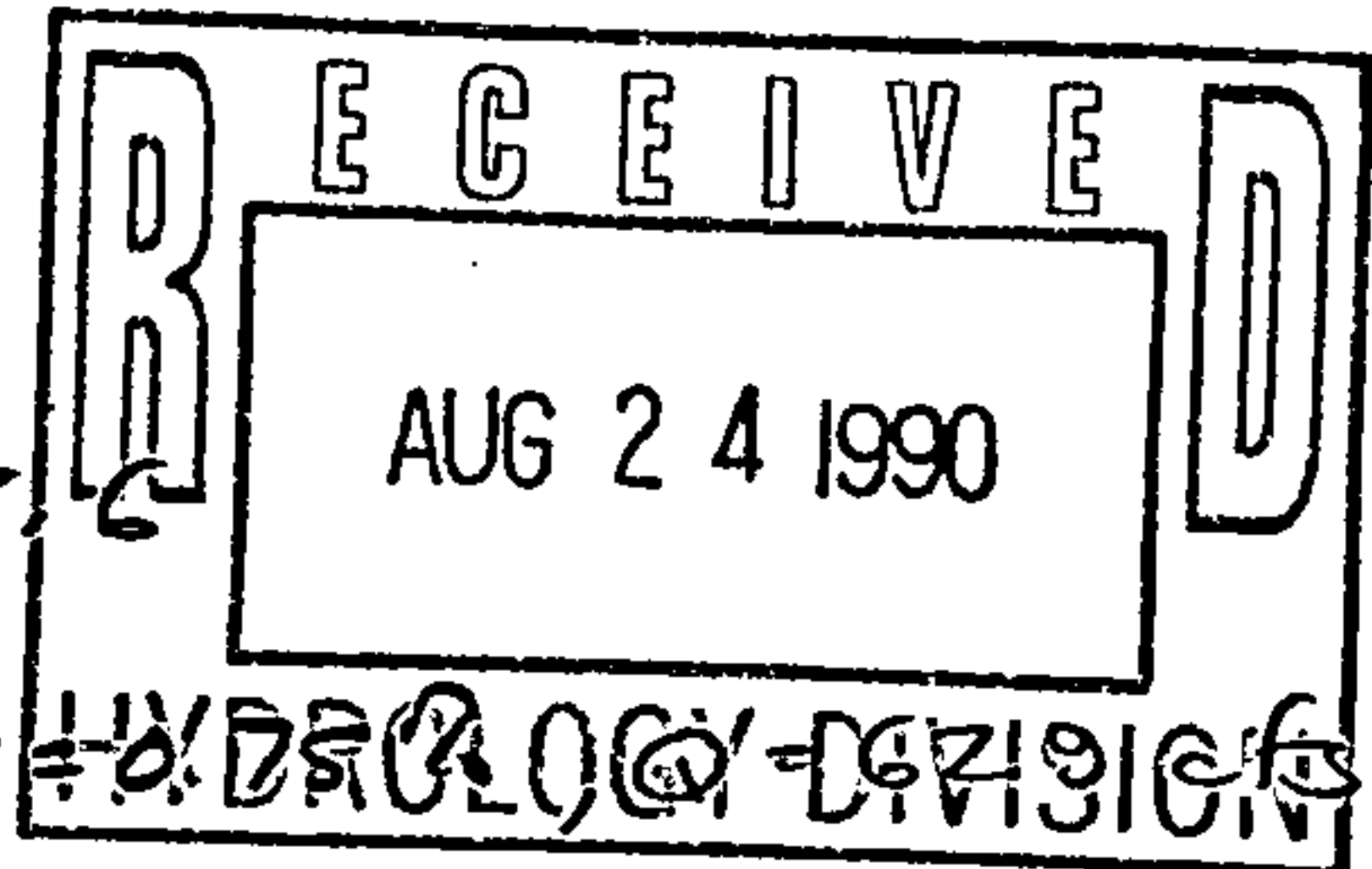
Check water Depth in Flightway at P 2.
 $Q = 47.3$ cfs, width = 40', intercal Curve transitioning from
2.5% to 0.75% & horizontal Curve ($R = 300'$)
Compute @ 8.5% w/o allowance for horizontal curve

$$V = 7.9 \text{ fps}, d_c = 0.42'$$

$$A = 47.3 \div 7.9 = 5.99 \text{ ft}^2$$

$$y_h = 5.99 \div 40 = 0.15'$$

$$Fr = V / \sqrt{g y_h} = 7.9 / \sqrt{32.2 \times 0.15} = 3.6$$



Compute Fr @ bottom end of curve (AP #3) $S = 0.75\%$

$$V = 3.9 \text{ fps}, d = 0.67'$$

$$A = 62.9 \div 3.9 = 16.12$$

$$y_h = 16.12 \div 40 = 0.40'$$

$$Fr = 3.9 / \sqrt{32.2 \times 0.40} = 1.08$$

Since no sudden transition take place it is unlikely that a jump will take place at bottom of curve depth would not be significantly above normal depth in any case ($Fr = 1.08$). Due, however, to velocity reduction sedimentation will take place.

Compute Superelevation @ upstream end of curve

$$S = V^2 b / g R = 7.9^2 \times 40 / 32.2 \times 300 = 0.26'$$

$$\therefore \text{depth outside curb} = 0.26 + 0.42 = 0.68'$$

Compute @ downstream end of curve

$$S = 3.9^2 \times 40 / 32.2 \times 400 = 0.05' \therefore \text{depth outside curb} = 0.05 + 0.67 = 0.72'$$

BASINS A1 - A2 $Q_{100} = 41.5$ cfs

BASINS A1 - A3 $Q_{100} = 63$ cfs

exceeds 8"
how do we control
flows from entering
basin B-2, Need
Criteria on Master
Plan

Check Wake - Depth in Woodward C 7P HLB
 $Q = 58.5 \text{ cfs}$, width = 40', $S = 3.11\%$
From DPM Plate 22.3, D-2
Depth = 0.52', $V = 6 \text{ fps}$
 $Fr = V / \sqrt{g y_n}$

$$A = 58.5 \div 6 = 9.75 \text{ ft}^2$$

$$y_h = 9.75 \div 40 = 0.243$$

$$Fr = 6 / \sqrt{32.2 \cdot 0.243} = 2.14$$

When turns onto Transport $S = 1.60\%$
Depth = 0.575', $V = 4.8 \text{ fps}$
 $A = 58.5 \div 4.8 = 12.18 \text{ ft}^2$
 $y_n = 12.18 \div 40 = 0.305$
 $Fr = 4.8 / \sqrt{32.2 \cdot 0.305} = 1.53$

DID NOT
CONSIDER LOSSES
@ 90° BEND

$\therefore$ No sustained Hydraulic Jump takes Place (i.e. lack of tailwater -)
A short unsustained jump may take place at turn - compute
conjugate depths by Trial & Error - use RL gutter as baseline 0.00

$y_1 = 0.52'$	$V = 6 \text{ fps}$	$h_v = 0.56'$	$\% EG = 1.08$	$V/10 \text{ ft/s} = 0.97$
$y_2 = 0.67'$	$V = 3.75$	$h_v = 0.22$	$\% EG = 0.89$	
$y_2 = 0.80'$	$V = 2.75$	$h_v = 0.12$	$\% EG = 0.92$	
$y_2 = 0.85'$	$V = 2.4$	$h_v = 0.09$	$\% EG = 0.94$	within 0.03'

Extra losses caused by 90° street bend make it unlikely
to leave P.O.W., however sediment will drop @ this point
whether jump takes place or not because of basic velocity
reduction from 6 fps to 4.8 fps. A partial unsustained
jump will drop more. Momentum may create some problem if
no drive entrance should be allowed straight across from Woodward

SOLVE FOR CONJUGATE DEPTH

$$d_1 = \frac{1}{2} d_2 + \sqrt{\frac{2 V_2^2 d_2}{g} + \frac{d_2^2}{4}}$$

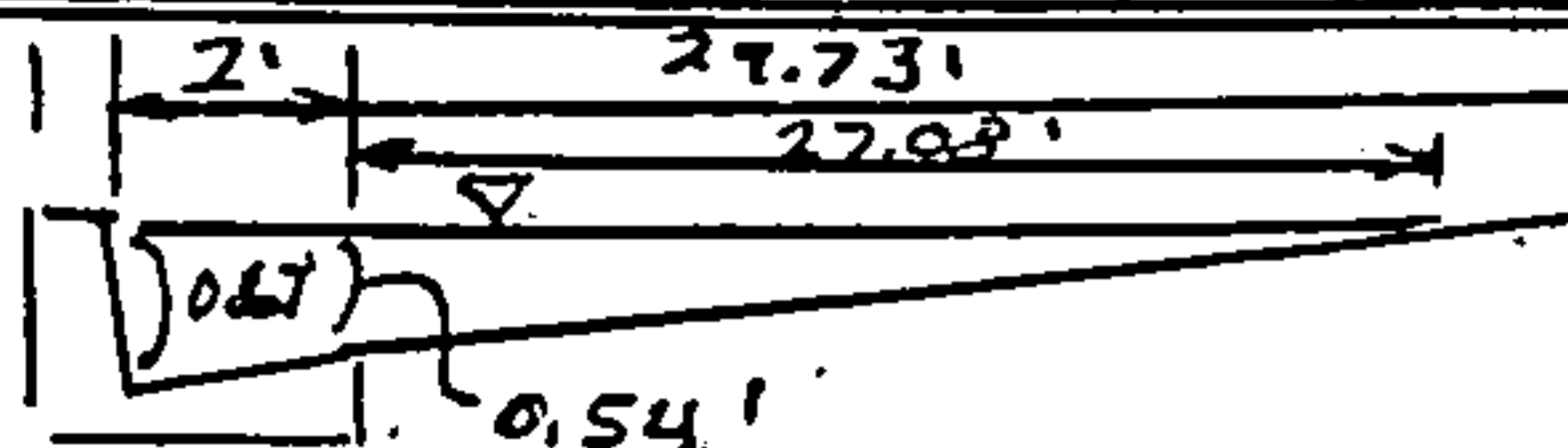
$$d_2 = 0.52$$

$$V_2 = 6 \text{ fps}$$

$$d_1 = \frac{1}{2} (0.52) + \sqrt{\frac{2(6)^2 0.52}{32.2} + \frac{0.52^2}{4}} = \underline{\underline{1.40'}}$$

ANDREWS, ASBURY & ROBERT, INC.
CONSULTING ENGINEERS
149 Jackson, N.E., Albuquerque, N.M. 87108
Telephone (505) 265-6631

Project Sunport Park Phase I Sheet 3 of 3
University Blvd Capacity Job No. 415
By JEM Chk'd _____ Date 08.06.90



Sta 15+50 - Slope = 3.10% ← 1.4% FIELD MEASURED

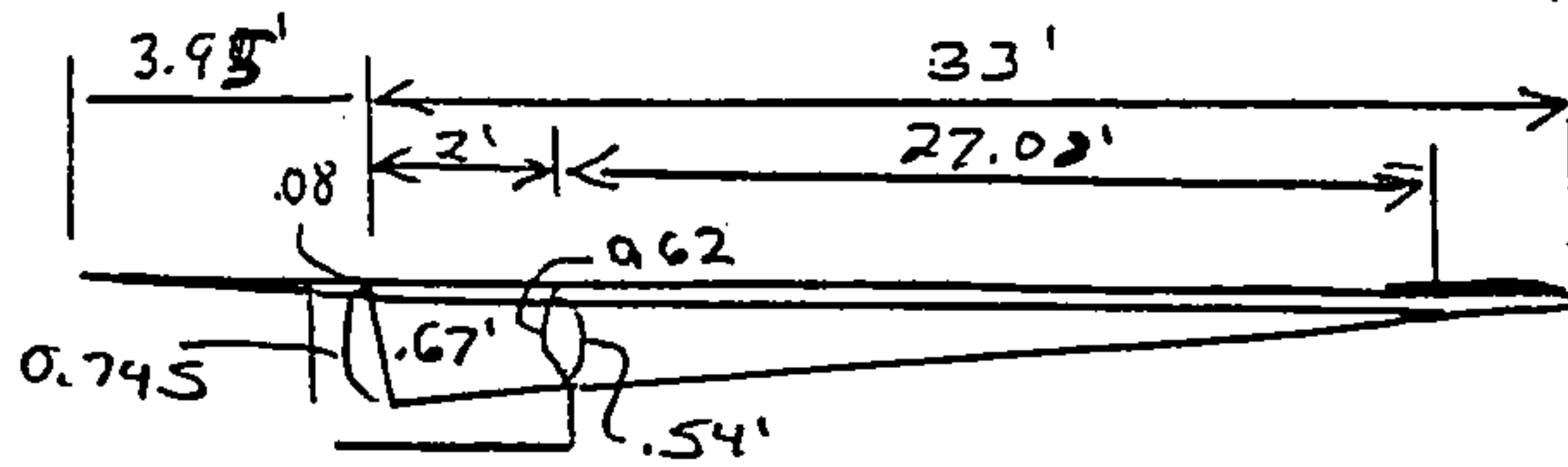
$$\text{Area of water} = \left[\left(\frac{.67 + .54}{2} \right) \times 2 \right] + \frac{.54 \times 27.08}{2} = 8.52 \text{ ft}^2$$

$$\text{WP} = 29.08 + .67 = 29.75'$$

$$R = 8.52 \div 29.75 = 0.286'$$

$$V = \frac{1.486}{.017} \times .286^{2/3} \times .0310^{1/2} = 6.69 \text{ fps}$$

$$\text{Cap} = 6.69 \times 8.52 = 56.97 \text{ cfs} \quad Q_{100} = 55.3 \text{ cfs (Still leaves .05' FB)}$$



Sta 16+27.26 S = 2.10%
A = 8.52 ft² R = 0.286' (w/o Topping Curb)

$$V = \frac{1.486}{.017} \times .286^{2/3} \times .0210^{1/2} = 5.50 \text{ fps}$$

$$\text{Cap} = 5.50 \times 8.52 = 46.85 \text{ cfs (w/o Topping Curb)}$$

$$\text{w/o Topping } A = \left(\frac{3.95 \times .08}{2} \right) + \left(\frac{.62 + .745}{2} \right) \times 2 + (.62 \times 31 \div 2) = 11.13 \text{ ft}^2$$

$$\text{WP} = 33 + .67 + 3.95 = 37.62 \text{ ft}$$

$$R = 11.13 \div 37.62 = 0.296$$

$$V = \frac{1.486}{.017} \times .296^{2/3} \times .0210^{1/2} = 5.62 \text{ fps}$$

$$\text{Cap} = 62.59 \text{ cfs} \quad Q < 55 \text{ cfs}$$

@ Sta 16+65.26, S = 1.61%, section same as 16+27.26

$$\text{w/o Topping Curb } V = \frac{1.486}{.017} \times .286^{2/3} \times .0161^{1/2} = 4.82 \text{ fps}$$

$$\text{Cap} = 41.02 \text{ cfs}$$

$$\text{w/o Topping } \& \text{ crown } V = \frac{1.486}{.017} \times .296^{2/3} \times .0161^{1/2} = 4.93 \text{ fps}$$

$$\text{Cap} = 54.83 \text{ cfs} \quad (Q < 55 \text{ cfs})$$

∴ If East lanes properly constructed flow will not dive down Flt, Hwy



City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

July 24, 1990

James E. Millington, P.E.
Andrews, Asbury & Robert, Inc.
149 Jackson, NE
Albuquerque, New Mexico 87108

RE: REVISED DRAINAGE REPORT FOR SUNPORT PARK, PHASE I,
RECEIVED JUNE 11, 1990 FOR DRAINAGE REQUIREMENTS APPROVAL
(M-15/D23) (PROJECT NO. 2950)

Dear James:

Based on the information provided on the above referenced submittal and the erosion damage sustained on-site by the storm of July 14, 1990, I have the following comments and concerns prior to issuance of a Building Permit at Sunport Park:

1. Attached is a copy of a letter dated December 20, 1988 sent to you from this office requesting an erosion control plan. To date, a plan has not been received. If an erosion control plan would have been implemented as requested, maybe this site would not have sustained sediment deposit along Transport Street and throughout the storm drain system because of the above referenced storm. Please submit a erosion control plan with the requirements per the attached December 20, 1988 letter.
2. Due to the existing sediment runoff contained in the street and storm drain system, the owner must clean all sediment runoff prior to approval. An Engineer's Certification that states all sediment has been cleaned on the streets and throughout the storm drain system will be required.
3. As for the revised drainage report, my concerns are with the street capacity and possible hydraulic jumps which may have caused the sediment runoff. Could you please submit calculations demonstrating sufficient capacity at the following locations:
 - A. Along the 300 foot radius on Flightway Avenue, the capacity should account for curvature and the difference in slope at station 21+50. Could a hydraulic jump be experienced at this change in slope?

PUBLIC WORKS DEPARTMENT

Walter H. Nickerson, Jr., P.E.
Assistant Director Public Works

ENGINEERING GROUP

Telephone (505) 768-2500

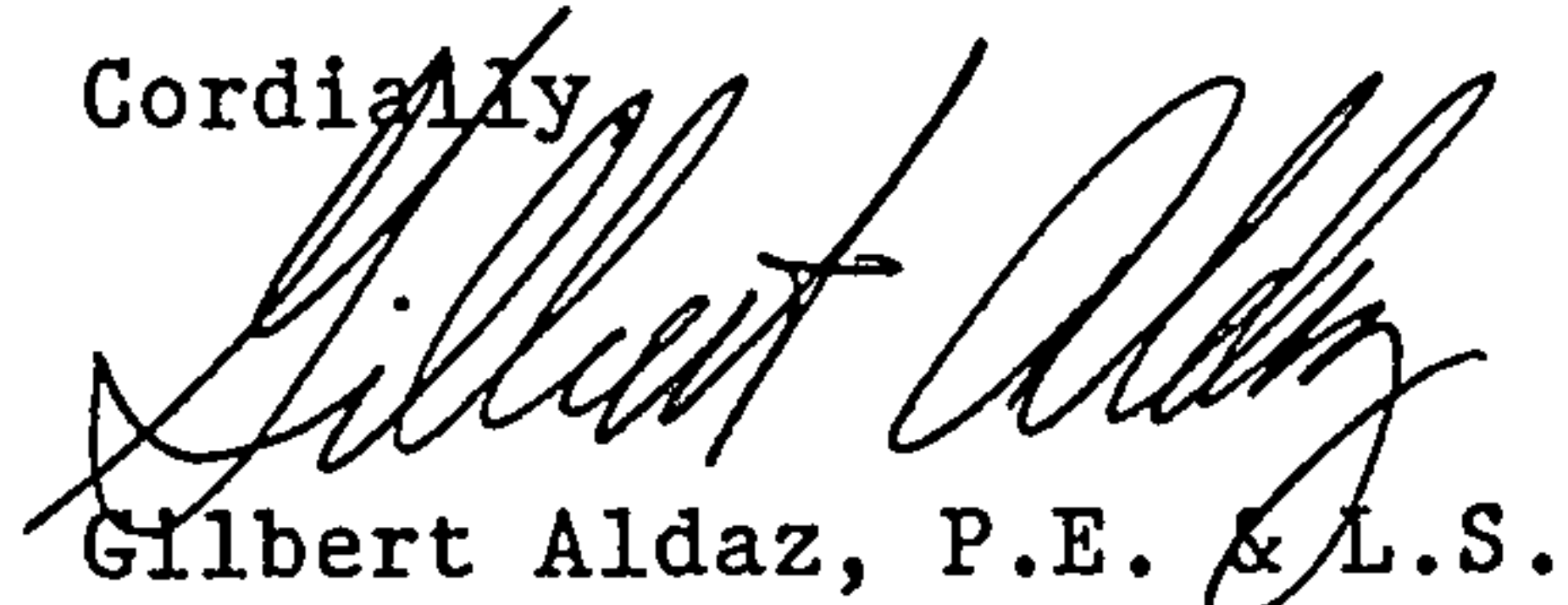
AN EQUAL OPPORTUNITY EMPLOYER

James E. Millington, P.E.
July 24, 1990
Page 2

- B. Flows are required to turn 90 degrees at Transport Street and Woodward Road Intersection, what is the hydraulic jump depth at this location?
- C. We performed some survey elevations at the intersection of University Boulevard and Flightway Avenue. We determined a difference in elevation of 0.4 feet from the gutter to the normal crown and a 1.4% slope on University Boulevard. Please demonstrate that when off-site basin 500 develops, that 0.4 feet of water depth will be contained on the north bound lanes of University Boulevard and that these flows will not overtop the normal crown and be diverted down Flightway Avenue.

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

Cordially



Gilbert Aldaz, P.E. & L.S.
Civil Engineer/Hydrology

xc: Bernie Montoya
Larry Caudell

GA
(WP+283)



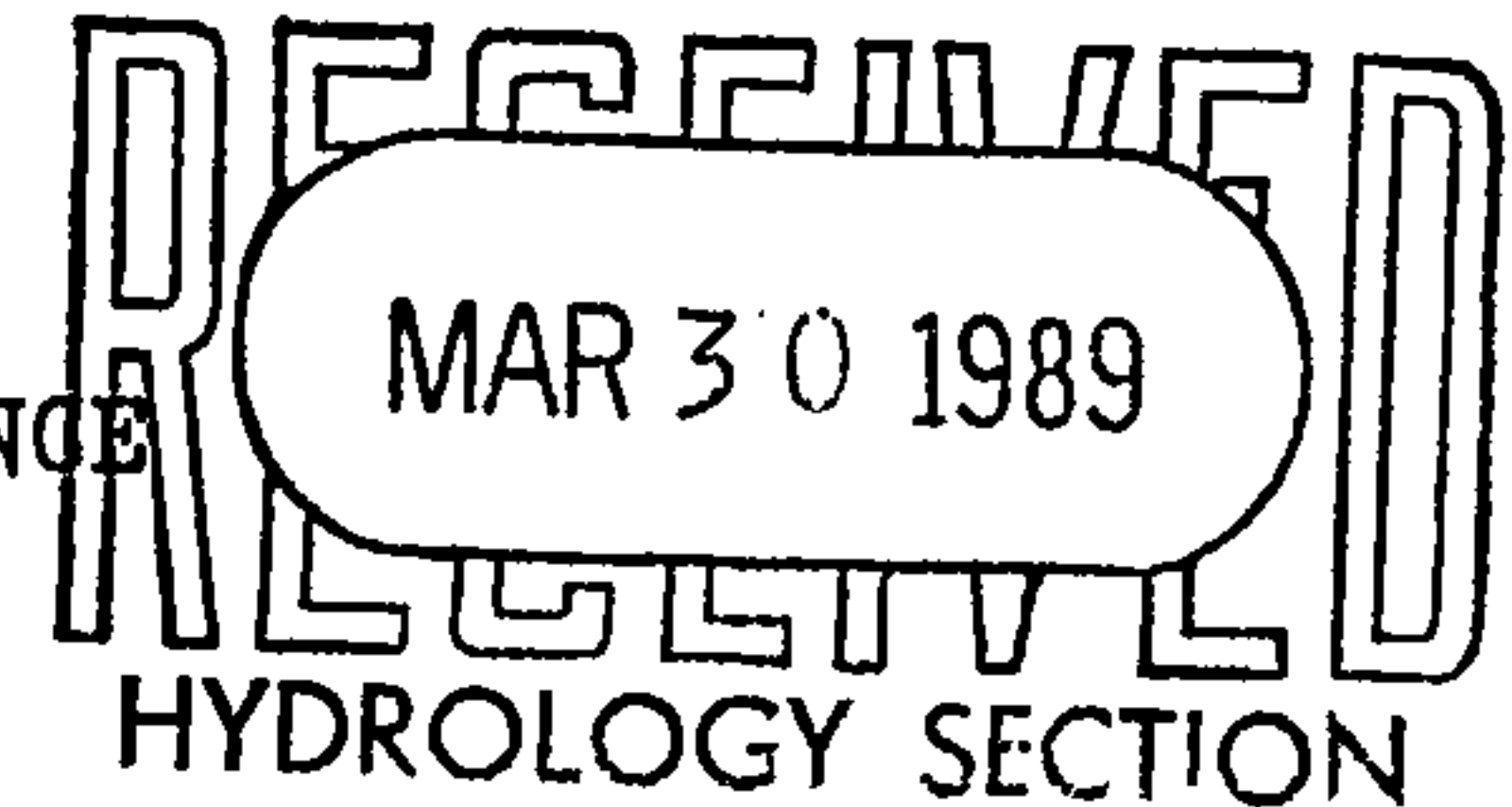
KEN SCHULTZ
MAYOR

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

March 29, 1989

CERTIFICATE OF COMPLETION AND ACCEPTANCE



Mr. J. Howard Mock
Sunport Joint Venture
P.O. Box 26841
Albuquerque, NM 87125

RE: PROJECT NO. 2950, ~~SUNPORT PARK~~, (MAP NO. ~~M-15~~/023)

Dear Mr. Mock:

This is to certify that the City of Albuquerque accepts Project No. 2950 as being completed according to approved plans and construction specifications. If all required right-of-ways and/or easements have been dedicated, the City of Albuquerque will accept for continuous maintenance all public infrastructure improvements constructed as part of Project No. 2950. If the required right-of-ways and/or easements have not been dedicated, the City of Albuquerque cannot accept the project for continuous maintenance and said maintenance will be the responsibility of the developer. When a final plat has been filed it will be the developer's responsibility to provide the Construction Management Division with a copy, at which time the City will fully accept Project No. 2950.

The project is described as follows:

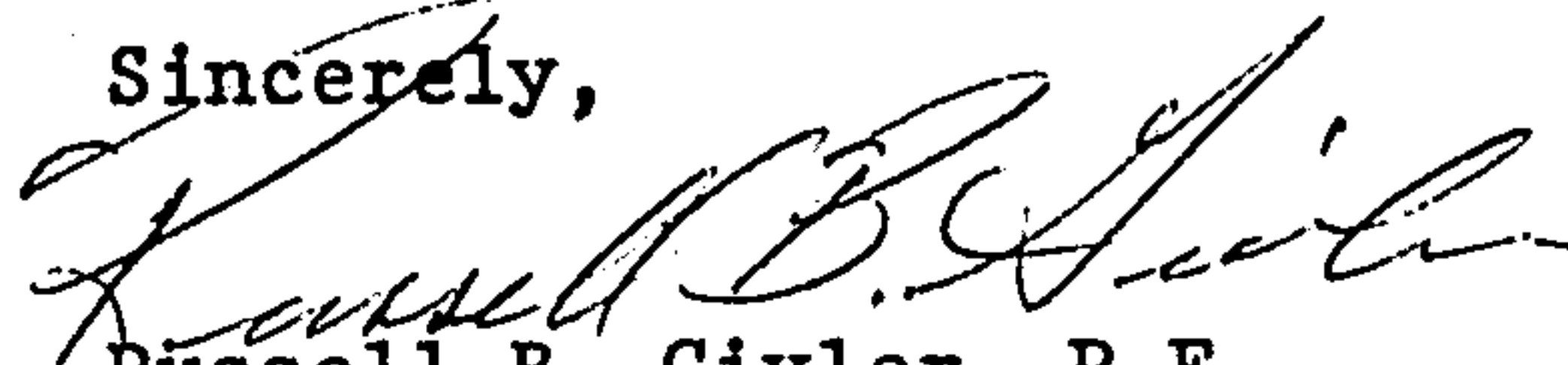
- Pavement and curb & gutter on Flightway Avenue from University Blvd., to Transport St.; on Woodward Rd., from University Blvd., to Transport St.; on Transport St., from Flightway Ave., to a point 250 feet south of Woodward Road.
- A ten inch (10") waterline, valves, fire hydrants, and other appurtenances on Flightway from University Blvd., to Transport St., and then south on Transport St., to a cap located 250 feet south of Woodward Rd. An eight inch (8") waterline, valves, fire hydrants, and other appurtenances on Woodward Rd., from University Blvd., to Transport Rd.

March 29, 1989

Page Two (2)

- An eight inch (8") sanitary sewer main, manholes, services and appurtenances on Flightway Ave., from Transport St., to a thirty foot (30') public utility easement running west to I-25 then south to an underground crossing whence the line becomes a ten inch (10") diameter to the west side of I-25 and runs west on Woodward Road to the existing seventy-two inch (72") sanitary sewer outfall. An eight inch (8") sewer main, manholes, services and appurtenances on Woodward Rd., from University to Transport St., to the thirty foot (30') public utility easement previously mentioned. An eight inch (8") main on Transport St., from Woodward Ave., to a point 250' south.
- A thirty inch (30") and forty-two inch (42") diameter storm sewer system on Transport St., from five (5) catch basins north of Woodward to six (6) catch basins at Flightway Ave., including four (4) intermediate catch basins, and manholes to a forty-eight inch (48") outfall line in a thirty foot (30') public utility easement to I-25, then running south to the crossing at I-25 and Woodward and outfalling to the AMAFCA South Diversion Channel.
- The contractor's warranty begins the date of this letter and will be effective for a period of one (1) year.

Sincerely,



Russell B. Givler, P.E.
Chief Construction Engineer
Construction Mgmt. Division
Engineering Group
Public Works Department

RBG:tp/INP137341

xc: Andrews, Asbury & Robert, Inc.
New Concepts
Inter-West, Ltd.
John Kelly, AMAFCA
Walter H. Nickerson, Jr., Engineering Group, PWD
Dennis Wilcox, Engineering Group, PWD
Fred Aguirre, Engineering Group, PWD
Andre Houle, Engineering Group, PWD
Ray Pang, Engineering Group, PWD
Terri Martin, Engineering Group, PWD
Jeanette Barrett, Special Assessments
Jim Olsen, Operations Group, PWD
Sam Cummins, Operations Group, PWD
Jim Fink, Operations Group, PWD
Ray Chavez, Operations Group, PWD
Jon Ertsgaard, Engineering Group, PWD
Dave Parks, Engineering Group, PWD
Tom Kennerly, Operations Group, PWD
Josie Gutierrez, New Meter Sales, Finance Group, PWD
Claudia Gallegos, Standby Clerk, Finance Group, PWD
Della Gallegos, Engineering Group, PWD
Fred Gomez, Engineering Group, PWD
Judy Aguilar, Engineering Group, PWD
f/Project 2950:Warranty:Readers

D.R.B. NO. 87-366
Date Submitted June 11, 1987

EXHIBIT "D"
to Subdivision Improvements Agreement

D.R.B. REQUIRED INFRASTRUCTURE LISTING for Sunport Park

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

[illegible]

Prepared By:

Print Name James E. Millington

Firm: Andrews, Asbury & Robert, Inc.

Page 1 of 1

Development Review Board Member Approvals

Robert A. Farnell 6-16-87
Traffic Date

W. W. Watson 6-16-87
MRD Date

15 Jane J. Jones 6-16-87
Parks & Rec. Date

Jack Cleveland 6-16-87
DRB Chairman Date

WRD Date
Paul J. Quinn 6/2/87
 City Engineer/AMAFCA

EXHIBIT "D"
to Subdivision Improvements Agreement

D.R.B. REQUIRED INFRASTRUCTURE LISTING
for SUNPORT PARK

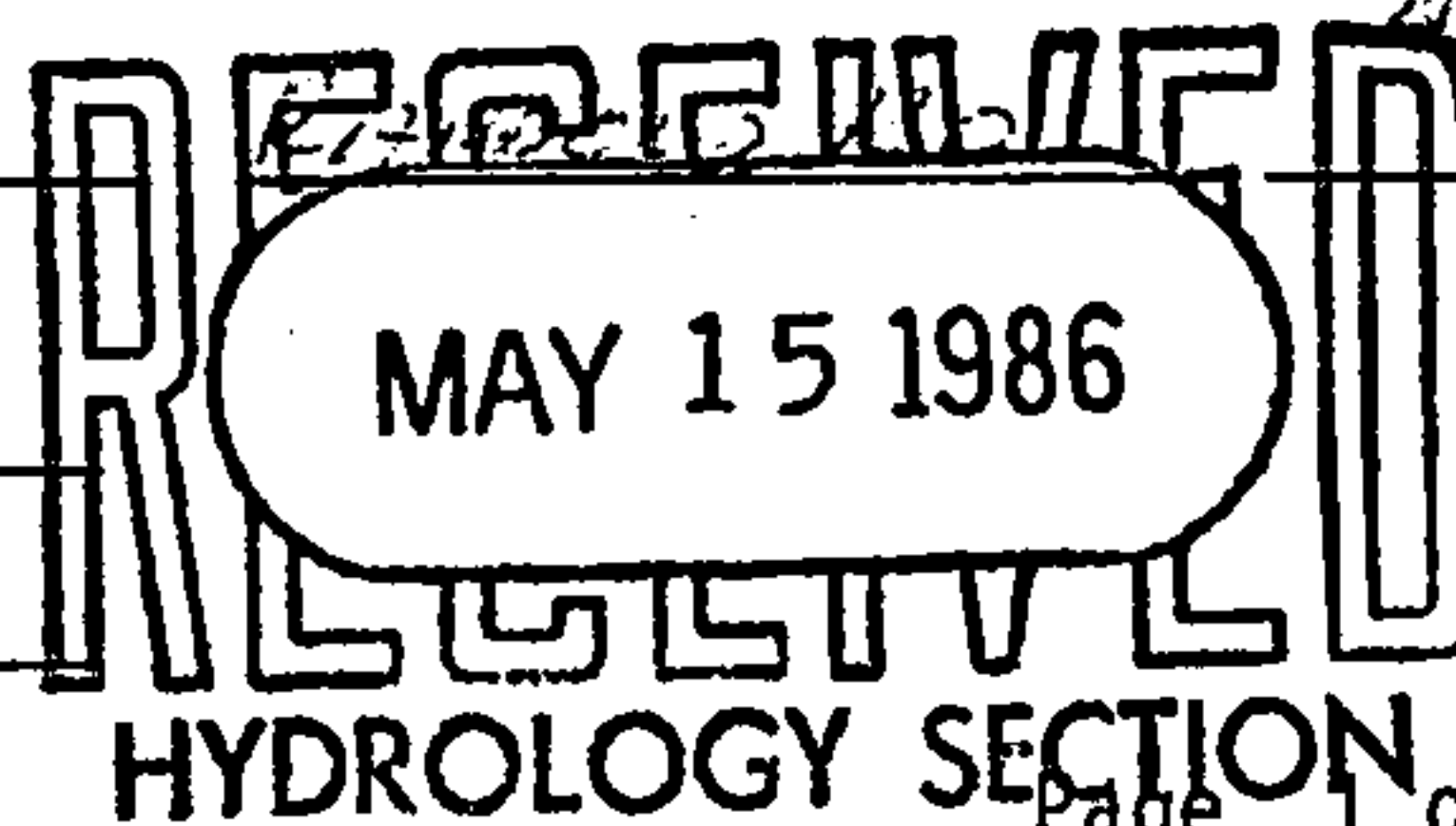
Following is a summary of Public/Private Infrastructure required to be constructed or financially guaranteed to be constructed for the above development for which a waiver is requested for Bulk Land Transfer.

Size	*Type Improvement	Location	From	To
12"	Waterline	University Blvd.	Flightway St.	Loop "B"
10"	Waterline	Flightway St.	University Blvd.	Loop "B"
10"	Waterline	Loop "B"	Flightway St.	University Blvd.
8"	Waterline	25' Access & Utility Esmt.	Flightway St.	Mulberry St.
8"	Waterline	Woodward Blvd.	I-25	University Blvd.
8"	Waterline	Loop "B"	Flightway St.	University Blvd.
8"	Sanitary Sewer	Flightway St.	University Blvd.	Woodward Blvd.
8"	Sanitary Sewer	Woodward Blvd.	University Blvd.	I-25
8"	Sanitary Sewer	Loop "B"	Flightway St.	University Blvd.
8"	Sanitary Sewer	I-25 R/W	Transport St.	I-25 Crossing
Pavement	36' (Local)	Flightway St.	University Blvd.	Transport St.
6'	Sidewalk w/Std C & G	Flightway St.	University Blvd.	Transport St.
86' (Phased)	Arterial Pavement	Woodward Blvd.	University Blvd.	I-25
8"	Std. Curb & Gutter	Woodward Blvd.	University Blvd.	I-25
✓ 24"	Storm Sewer	West Sunport	Flightway St.	I-25
✓ 54"	Storm Sewer	Southwest Sunport	University Blvd.	I-25
✓ 66"	Storm Sewer	Transport St.	University Blvd.	I-25
✓ 48"	Storm Sewer	South Sunport	University Blvd.	I-25
24"	ARTERIAL PAVEMENT	UNIVERSITY	RANDOLPH RD	APPROX 500' Section
6'	SIDWALK & STD C & G	UNIVERSITY	RANDOLPH RD	APPROX 500' Section

Prepared By Charles T. Asbury

Print Name CHARLES "TED" ASBURY

Firm: ANDREWS, ASBURY & ROBERT, INC.



Page 1 of 1

Development Review Board Member Approvals

Robert A. Fausch 5-13-86
Traffic Date

Phoneda S. Fausch
WRD 5/13/86 Date

Parks & Rec. Date

Paul J. Higin 5/13/86
City Engineer/AMAFCA

Richard D. Meen 5/13/86
DRB Chairman Date

DRAINAGE INFORMATION SHEET

PROJECT TITLE: Sunport Park Infrastructure Improvements, Phase I ZONE ATLAS/DRNG. FILE #: M-15/D23

DRB #: 88-63 EPC #: _____ WORK ORDER #: 2950

LEGAL DESCRIPTION: Replat of Sunport Park

CITY ADDRESS: _____

ENGINEERING FIRM: Andrews, Asbury & Robert, Inc. CONTACT: Jim Millington

ADDRESS: 149 Jackson, NE, Albuq., NM 87108 PHONE: 265-6631

OWNER: Sunport Joint Venture CONTACT: Howard Mock

ADDRESS: P.O. Box 26841, Albuq., NM 87107 PHONE: 345-8591

ARCHITECT: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

SURVEYOR: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

CONTRACTOR: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

TYPE OF SUBMITTAL:

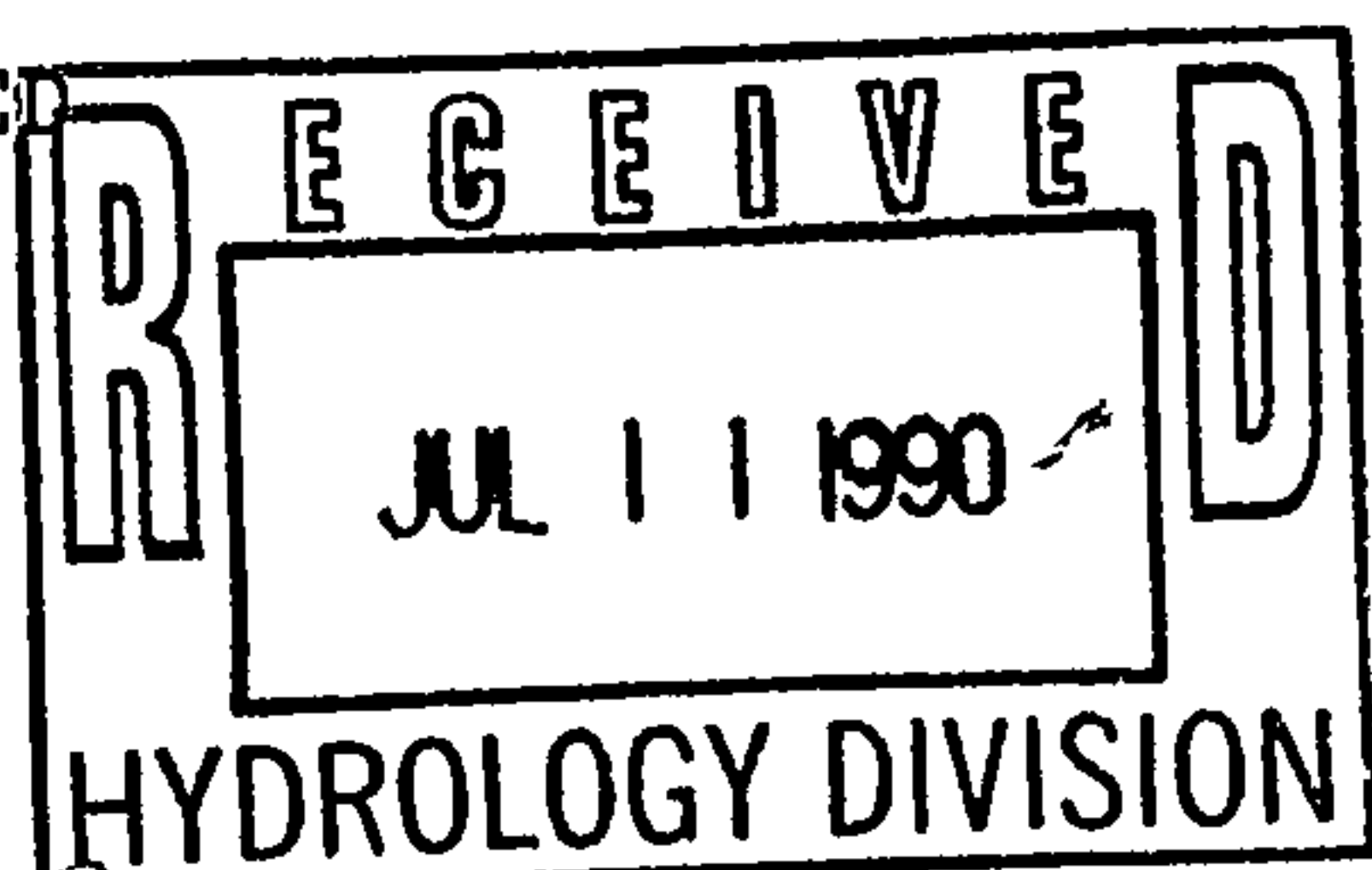
- ☒ DRAINAGE REPORT (ADDENDUM)
- ☐ DRAINAGE PLAN
- ☐ CONCEPTUAL GRADING & DRAINAGE PLAN
- ☐ GRADING PLAN
- ☐ EROSION CONTROL PLAN
- ☐ ENGINEER'S CERTIFICATION
- ☐ OTHER

PRE-DESIGN MEETING:

- ☐ YES
- ☐ NO
- ☐ COPY PROVIDED

CHECK TYPE OF APPROVAL SOUGHT:

- ☐ SKETCH PLAT APPROVAL
- ☐ PRELIMINARY PLAT APPROVAL
- ☐ S. DEV. PLAN FOR SUB'D. APPROVAL
- ☐ S. DEV. PLAN FOR BLDG. PERMIT APPROVAL
- ☐ SECTOR PLAN APPROVAL
- ☐ FINAL PLAT APPROVAL
- ☐ FOUNDATION PERMIT APPROVAL
- ☐ BUILDING PERMIT APPROVAL
- ☐ CERTIFICATE OF OCCUPANCY APPROVAL
- ☐ GRADING PERMIT APPROVAL
- ☐ PAVING PERMIT APPROVAL
- ☐ S.A.D. DRAINAGE REPORT
- ☒ DRAINAGE REQUIREMENTS
- ☐ OTHER _____ (SPECIFY)



DATE SUBMITTED: July 11, 1990

BY: [Signature]

FILE COPY



City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

KEN SCHULTZ
MAYOR

December 20, 1988

James E. Millington, P.E.
Andrews, Asbury & Robert, Inc.
149 Jackson, NE
Albuquerque, New Mexico 87108

RE: REVISED GRADING PLAN SUBMITTAL OF SUNPORT PARK, PHASE I,
RECEIVED DECEMBER 13, 1988 FOR GRADING PERMIT APPROVAL
(M-15/D23) (Project No. 2950)

Dear James:

The above referenced submittal revised 12-13-88, is not approved since it does not require the contractor to either blade contour windrows, build sediment ponds, or provide erosion control berms adjacent to the public Right-of-Way until the vegetation is established. Even though this revised Plan requires seeding and mulch, it is still the land owner's responsibility to ensure that sediment is kept out of the public streets until the ground cover is established. This applies only to the area east of Transport Street.

As of December 9, 1988, the graded areas had not been seeded or mulched, when I made a field trip to the site. Since this site has steep slopes it is critical that the seeding and mulch is in place as soon as possible.

Cordially;

Roger A. Green, P.E.

Roger A. Green, P.E.
C.E./ Hydrology Section

cc: Howard Mock, Sunport Joint Venture
Brian Dolan, COA, Construction
David Salcido, COA, Storm Drain Maintenance

Sunport Park Infrastructure

PROJECT TITLE: Improvements, Phase I ZONE ATLAS/DRAIN. FILE #: M-15/D-23LEGAL DESCRIPTION: Replat of Sunport Park

CITY ADDRESS: _____

ENGINEERING FIRM: Andrews, Asbury & Robert, Inc. CONTACT: Jim MillingtonADDRESS: 149 Jackson, NE, Albuq., NM 87108 PHONE: 265-6631OWNER: Sunport Joint Venture CONTACT: Howard MockADDRESS P. O. Box 26841, Albuq., NM 87107 PHONE: 345-8591

ARCHITECT: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

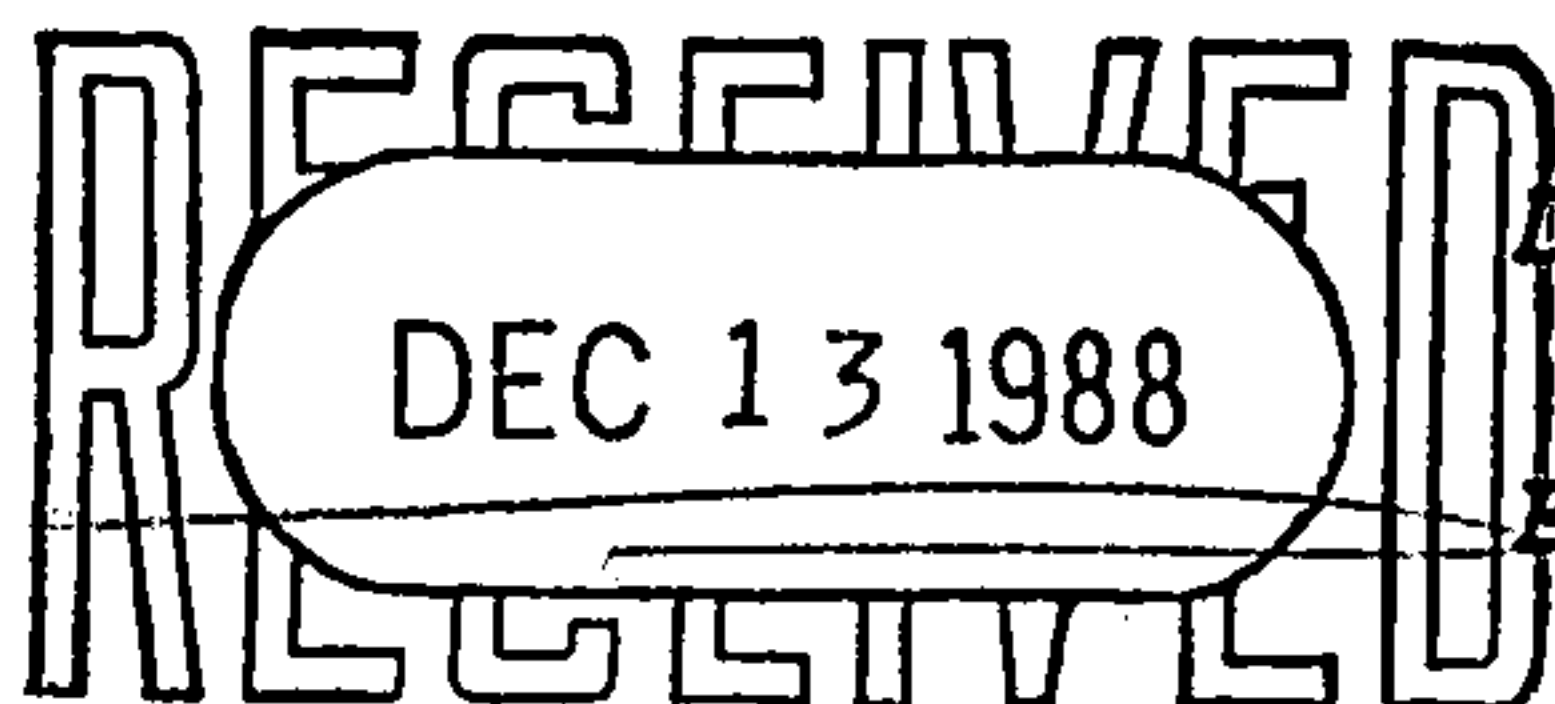
SURVEYOR: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

CONTRACTOR: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

PRE-DESIGN MEETING:

☒ YES☐ NODRB NO. 87-366

EPC NO. _____

COPY OF CONFERENCE RECORD SHEET PROVIDED ☐ SECTION PROJECT NO. _____

TYPE OF SUBMITTAL:

☐ DRAINAGE REPORT☐ DRAINAGE PLAN☐ CONCEPTUAL GRADING & DRAIN. 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

OTHER _____ (SPECIFY)

DATE SUBMITTED: 12-13-88BY: Jim Millington

FILE COPY



City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

MAYOR
KEN SCHULTZ

CHIEF
ADMINISTRATIVE OFFICER

GENE ROMO

DEPUTY CAO
PUBLIC SERVICES

FRANK MARTINEZ

DEPUTY CAO
PLANNING/DEVELOPMENT

BILL MUELLER

February 5, 1988

John Andrews, P.E.
Andrews, Asbury & Robert, Inc.
149 Jackson, NE
Albuquerque, New Mexico 87108

RE: REVISED DRAINAGE REPORT FOR SUNPORT PARK - PHASE I RECEIVED
JANUARY 20, 1988 FOR FINAL PLAT APPROVAL (M-15/D23) (W.O. #2950)

Dear Mr. Andrews:

The above referenced submittal dated January 20, 1988, is approved. The Final Plat can be signed off by the City Engineer after execution of a Subdivision Improvements Agreement and the infrastructures are either built or financially guaranteed.

Site Development or further subdivision will require site specific detailed Grading and Drainage plans.

If you have any further questions, call me at 768-2650.

Cordially,

Roger A. Green, P.E.
C.E./Hydrology Section

xc: Pete Ford

RAG/bsj

SUNPORT PARK INFRASTRUCTURE

PROJECT TITLE: IMPROVEMENTS, PHASE I ZONE ATLAS RING. FILE #: M-15/D-23LEGAL DESCRIPTION: Replat of Sunport Park

CITY ADDRESS: _____

ENGINEERING FIRM: Andrews, Asbury & Robert, Inc CONTACT: James E. MillingtonADDRESS: 149 Jackson St., NE, Alb. NM 87108 PHONE: 265-6631OWNER: Sunport Joint Venture CONTACT: Howard MockADDRESS 707 Broadway NE, Suite 303, Alb. PHONE: 242-5241

ARCHITECT: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

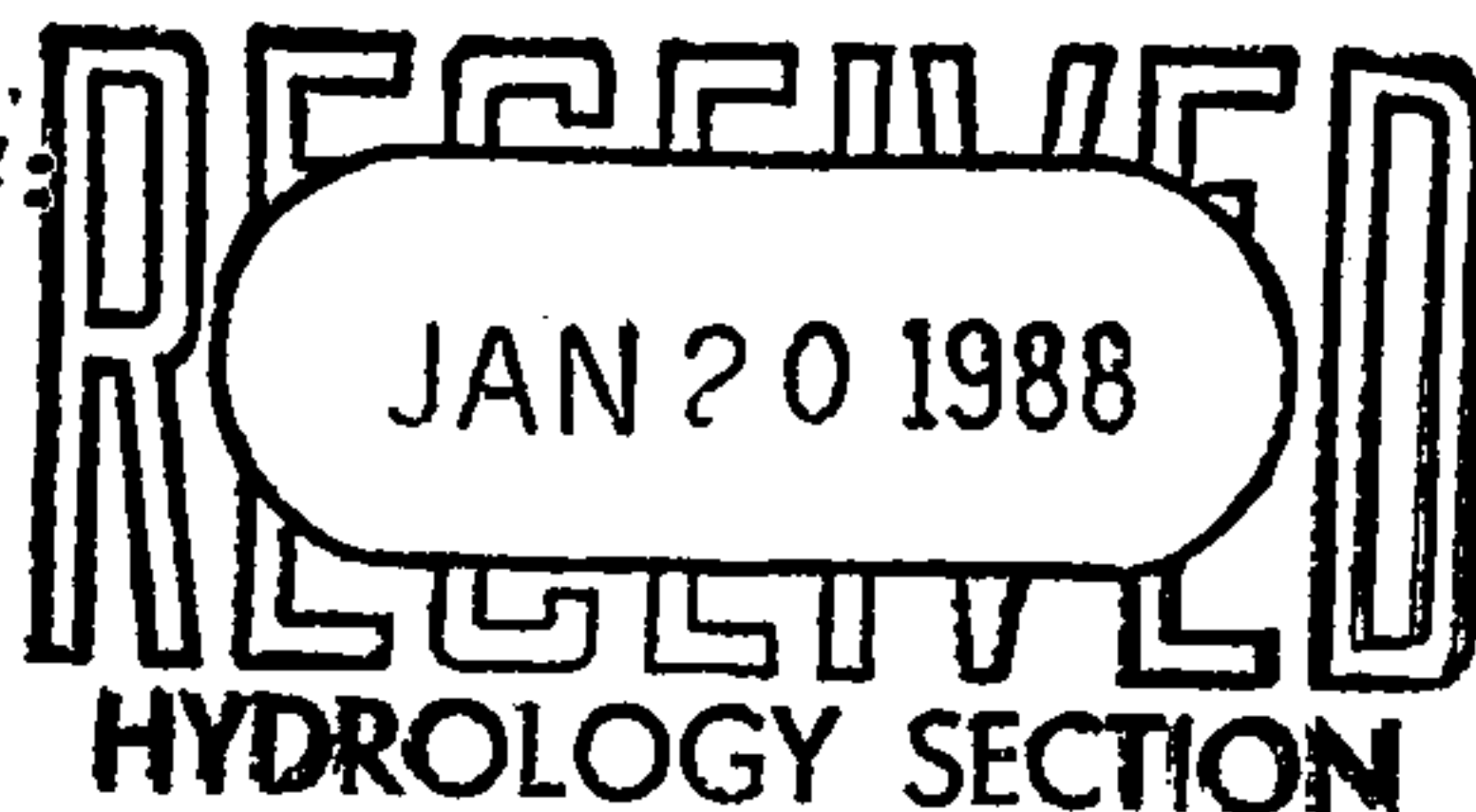
SURVEYOR: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

CONTRACTOR: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

PRE-DESIGN MEETING:

☒ YES☐ NO☐ COPY OF CONFERENCE RECAP
SHEET PROVIDEDDRB NO. 87-366

EPC NO. _____

PROJECT NO. 2950

TYPE OF SUBMITTAL:

☒ REVISED
DRAINAGE REPORT☐ DRAINAGE PLAN☐ CONCEPTUAL GRADING & DRAIN. 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

OTHER _____ (SPECIFY)

DATE SUBMITTED: 1-18-88BY: [Signature]

FILE COPY



City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

Ken Schultz
Mayor

UTILITY DEVELOPMENT DIVISION
HYDROLOGY SECTION
(505) 768-2650

July 16, 1987

James E. Millington, P.E.
Andrews, Asbury & Robert, Inc.
149 Jackson, NE
Albuquerque, New Mexico 87108

RE: DRAINAGE REPORT SUBMITTAL OF SUNPORT PARK, PHASE I RECEIVED
JUNE 15, 1987 FOR FINAL PLAT APPROVAL (M-15/D23)

Dear James:

The above referenced submittal dated June 1987, is approved for Final Plat purposes. Prior to Final Plat sign-off by the City Engineer, an executed Subdivision Improvements Agreement is required.

Site Development or further subdivision will require site specific detailed Grading and Drainage Plan approvals.

If you have any further questions, call me at 768-2650.

Cordially,

Roger A. Green, P.E.
C.E./Hydrology Section

cc: Pete Ford, Owner

RAG/bsj

PUBLIC WORKS DEPARTMENT

Walter Nickerson, P.E., City Engineer

ENGINEERING GROUP

Telephone (505) 768-2500

AN EQUAL OPPORTUNITY EMPLOYER

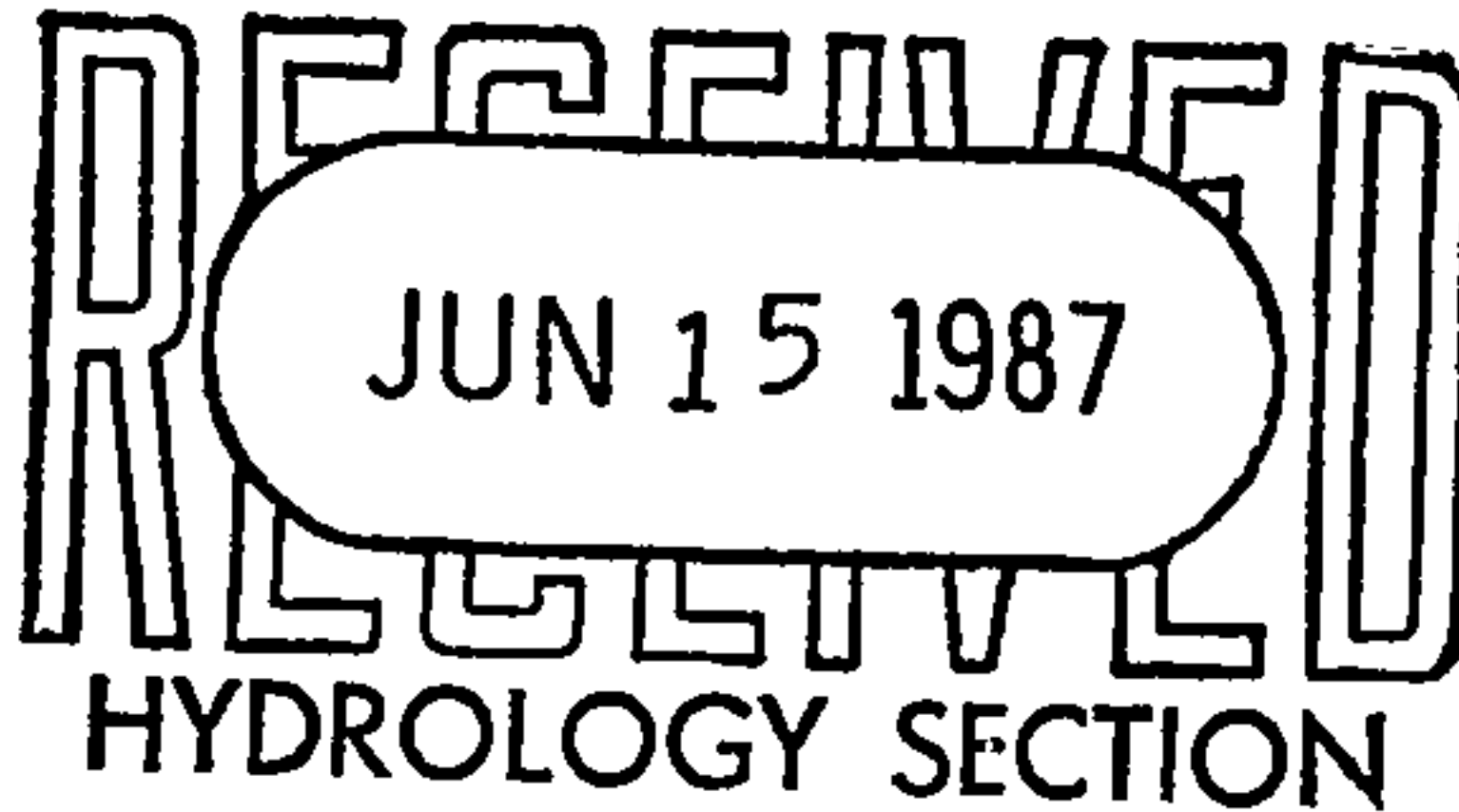


ANDREWS, ASBURY & ROBERT, INC.
Consulting Engineers

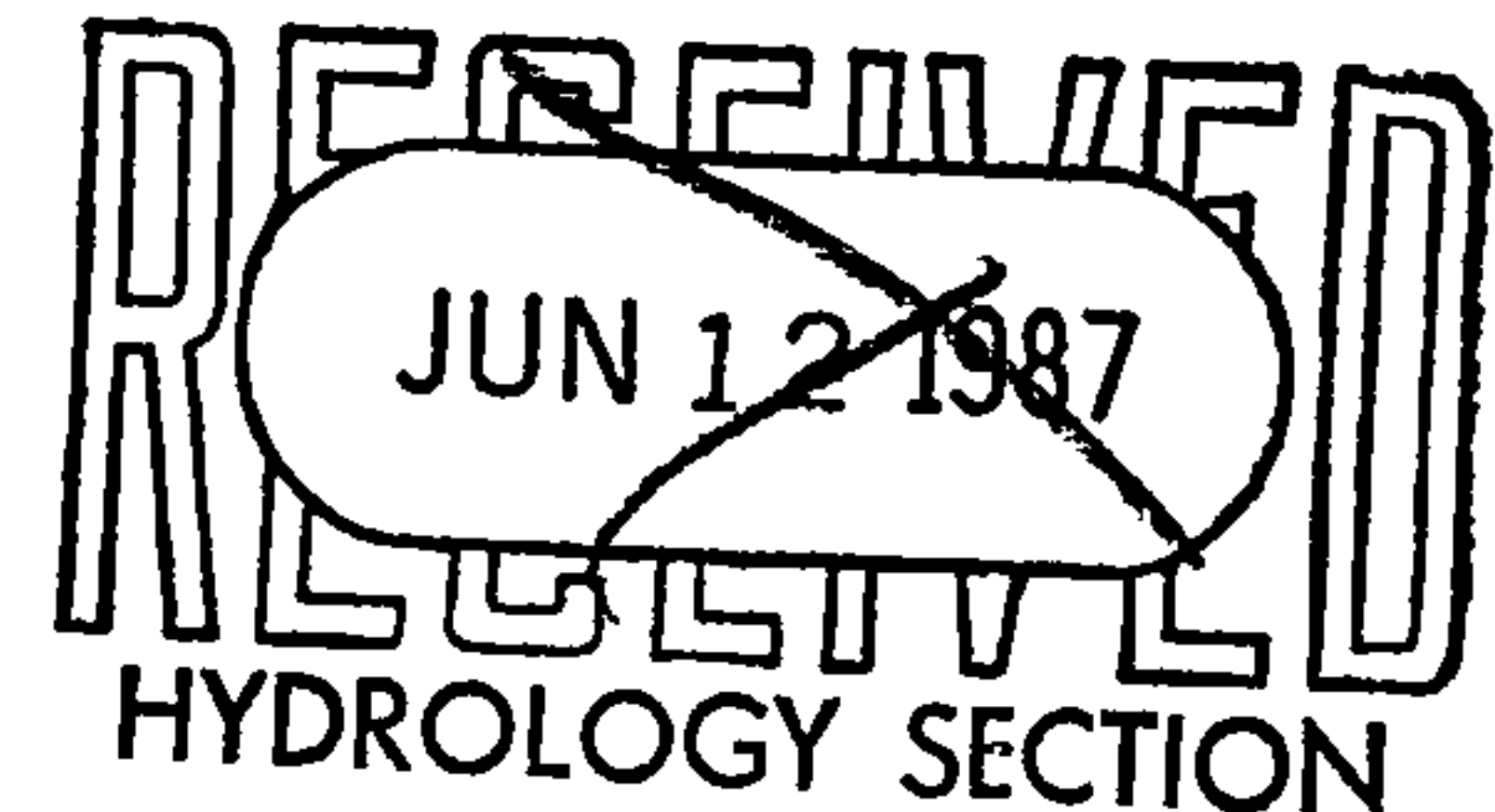
149 Jackson, NE, Albuquerque, New Mexico 87108
(505) 265-6631

June 15, 1987

Mr. Roger Green, P.E.
City of Albuquerque
Public Works Department
Hydrology Section
P.O. Box 1293
Albuquerque, New Mexico 87103



John A. Andrews, P.E.
Charles T. Asbury, P.E.
John B. Robert, P.E. & L.S. (1915 - 1984)
James E. Millington, P.E. - V.P.



SUBJECT: SUNPORT PARK PHASE I
M-15/D23

Dear Mr Green:

Attached is a Drainage Report for Sunport Park Phase I. I believe this answers all concerns that you expressed in your letter of November 24, 1986 as follows:

1. Page 6 of the report addresses the easement requirement now. We are attaching a copy of the easement.
2. The calculations have been revised to check Q_{10} criteria against the one free lane requirement. Under developed conditions the street can handle Q_{100} flow but Q_{10} requirements cannot be met without some onsite detention or the construction of a storm drain.
3. The new platting for Sunport Park included a drainage and utility easement for the area downstream of AP # 10.
4. Hydraulic calculations for HGL etc., are included in the report for revised conditions.
5. A Grading Plan is attached. This report constitutes the detailed drainage plan.

In addition, this addresses the comments of Fred Aguirre's letter of May 12, 1986.

If you have any further questions please call me.

Very truly yours,

JAMES E. MILLINGTON, P.E.

shj-415
Attachments

SUNPORT PARK INFRASTRUCTURE

PROJECT TITLE: IMPROVEMENTS PHASE I ZONE ATLAS/DRNG. FILE #: M-15/D26

LEGAL DESCRIPTION: Replat of Sunport Park

CITY ADDRESS: _____

ENGINEERING FIRM: Andrews, Asbury & Robert, Inc. CONTACT: James E. Millington

ADDRESS: 149 Jackson St. NE, Alb. 87108 PHONE: 265-6631

OWNER: Sunport Joint Venture CONTACT: M. B. "Pete" Ford

ADDRESS 707 Broadway NE, Suite 303, Alb PHONE: 242-5241

ARCHITECT: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

SURVEYOR: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

CONTRACTOR: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

PRE-DESIGN MEETING:

☒ YES☐ NO☐ COPY OF CONFERENCE RECAP
SHEET PROVIDEDRECEIVED
JUN 15 1987
HYDROLOGY SECTION

DRB NO. 87-366

EPC NO. _____

PROJECT NO. 2950

RECEIVED
JUN 12 1987
HYDROLOGY SECTION

TYPE OF SUBMITTAL:

☒ DRAINAGE REPORT☐ DRAINAGE PLAN☐ CONCEPTUAL GRADING & DRAIN. 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

OTHER _____ (SPECIFY)

RECEIVED
JUN 15 1987
HYDROLOGY SECTION

DATE SUBMITTED: June 15, 1987

BY: _____

FIVE COPY



City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

HYDROLOGY SECTION
123 Central NW, Albuquerque, NM 87102
(505) 766-7644

November 24, 1986

John A. Andrews, P.E.
Andrews, Asbury & Robert, Inc.
149 Jackson, NE
Albuquerque, New Mexico 87108

RE: DRAINAGE REPORT AND GRADING PLAN SUBMITTAL OF SUNPORT PARK,
PHASE I, RECEIVED NOVEMBER 13, 1986 FOR ROUGH GRADING PERMIT
APPROVAL (M-15/D23)

Dear John:

Rough Grading Permit is approved for the above referenced submittal dated November 12, 1986, provided that the following items are added to the original drawings prior to Hydrology's approval signature:

1. Add note that a Topsoil Disturbance permit is required by contractor prior to grading.
2. Add note providing or referencing grading specifications to be followed.
3. Add a Bench Mark and TBM description and elevation to be used for this site.
4. On Sheet 1 of 2, identify that a slope easement is required prior to grading along the north west portion of Transport Street.
5. Clarify grading limits along the I-25 Right-of-Way north of Woodward Road.

I have the following comments in regards to the Drainage Report which must be approved prior to further platting or construction drawing submittals to the DRB and DRC.:

1. Page 6 of the report text does not address the status of the required Drainage Easements between I-25 and the diversion channel.

PUBLIC WORKS DEPARTMENT

Walter Nickerson, P.E., City Engineer

ENGINEERING GROUP

Telephone (505) 768-2500

AN EQUAL OPPORTUNITY EMPLOYER

John A. Andrews, P.E.
November 24, 1986
Page 2

2. Sheet 6 of 7 of calculations, the capacity of University Boulevard should also be checked against the Q10 criteria that one free driving lane exist since it is a minor arterial street.
3. On Map No. 2, the storm drain immediately downstream of A.P. #10 is shown outside of the established public drainage easement.
4. The drainage basins have been revised for the developed conditions since the Conceptual Drainage report was approved, therefore, revised design hydraulic calculations are required for the storm drains. The infrastructure listings previously approved by the DRB (Case No. 84-333) will need to be revised accordingly. This may also require a change order to Work Order #2950.
5. A detailed Drainage and Grading Plan will be required with enough detail to determine infrastructure requirements prior to further platting or Site Development Plan approvals.

If you have any questions, call me at 768-2650.

Cordially,

Roger A. Green, PE

Roger A. Green, P.E.
C.E./Hydrology Section

cc: Andre Houle, DRC

RAG/bsj

DRAINAGE INFORMATION SHEET

PROJECT TITLE: Sunport Park-Phase I ZONE ATLAS/DRNG. FILE #: M-15/D23LEGAL DESCRIPTION: Sunport Park SubdivisionCITY ADDRESS: N/AENGINEERING FIRM: Andrews, Asbury & Robert, Inc. CONTACT: John A. AndrewsADDRESS: 149 Jackson, NE, Albuquerque, NM 87108 PHONE: (505) 265-6631OWNER: Sunport Joint Venture CONTACT: Pete FordADDRESS 707 Broadway, NE, Suite 303 PHONE: (505) 242-5241
Albuquerque, NM 87102ARCHITECT: N/A

CONTACT: _____

ADDRESS: N/A

PHONE: _____

SURVEYOR: Andrews, Asbury & Robert, Inc. CONTACT: Gayle JewellADDRESS: 149 Jackson, NE, Albuquerque, NM 87108 PHONE: (505) 265-6631
Albuquerque, NM 87108CONTRACTOR: New Concepts & Interwest, Ltd., CONTACT: Lee Smith
a Joint VentureADDRESS: 3841 Midway Place, NE PHONE: (505) 345-8123
Albuquerque, NM 87109

PRE-DESIGN MEETING:

____ YES NOTE:
Conceptual Drainage Plan
____ NO previously approved.
M15/D23

DRB NO. 84-333

EPC NO. _____

____ COPY OF CONFERENCE RECAP
SHEET PROVIDED

PROJECT NO. N/A

TYPE OF SUBMITTAL:

____ DRAINAGE REPORT

____ DRAINAGE PLAN-HYDROLOGY SECTION

____ CONCEPTUAL GRADING & DRAIN. PLAN

X GRADING PLAN (Revised 11-24-86)

____ 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

X ROUGH GRADING PERMIT APPROVALDATE SUBMITTED: November 25, 1986

____ GRADING/PAVING PERMIT APPROVAL

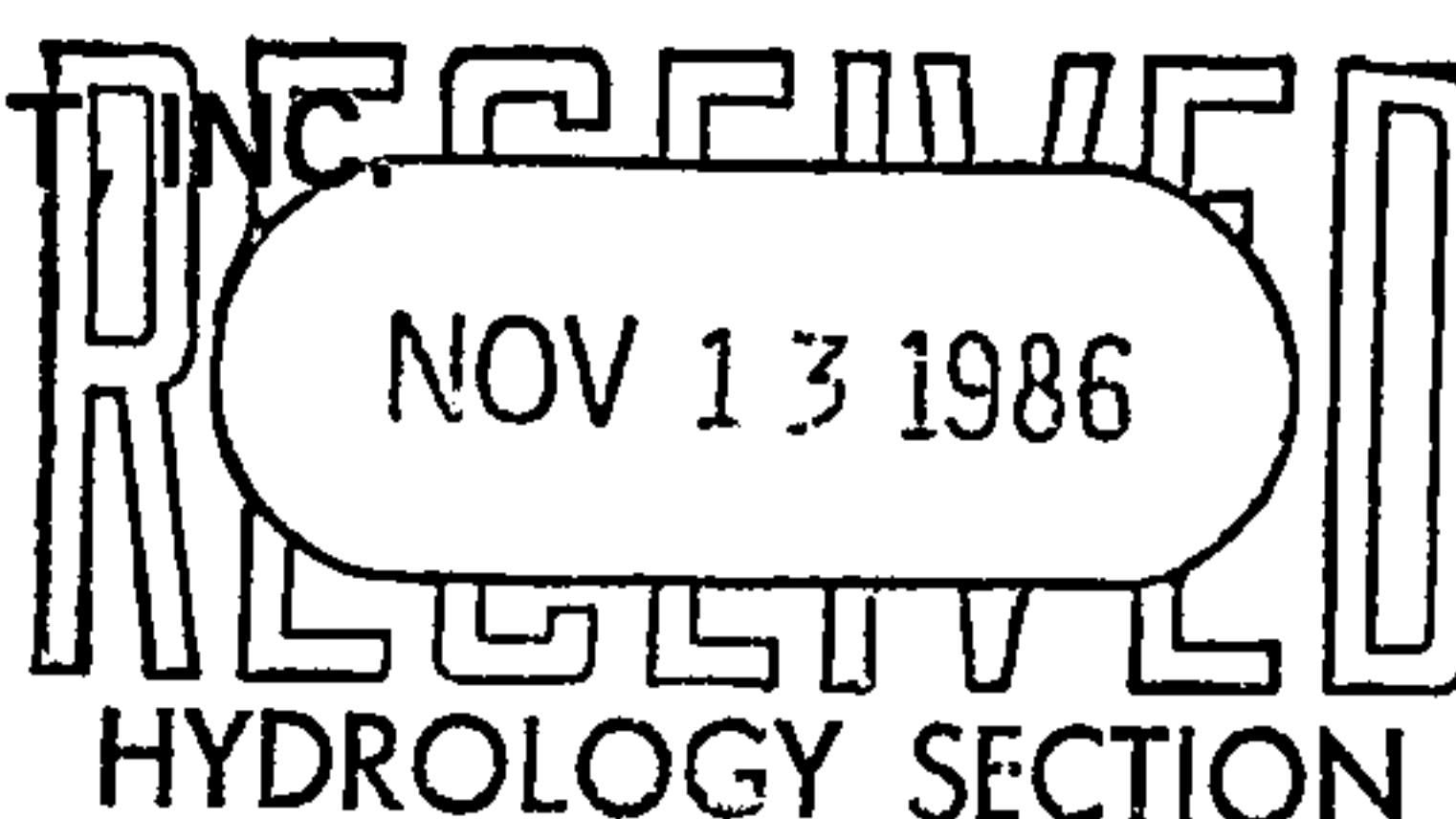
BY: John A. Andrews

OTHER _____ (SPECIFY)



ANDREWS, ASBURY & ROBERT, INC.
Consulting Engineers

149 Jackson, NE, Albuquerque, New Mexico 87108
(505) 265-6631



John A. Andrews, P.E.
Charles T. Asbury, P.E.
John B. Robert, P.E. & L.S. (1915 - 1984)
James E. Millington, P.E. - V.P.

November 12, 1986

Mr. Fred Aguirre
Public Works Department
Engineering Group
Utility Development Division
Hydrology Section
City of Albuquerque
P. O. Box 1293
Albuquerque, New Mexico 87103

SUBJECT: SUNPORT PARK - PHASE I

Dear Mr. Aguirre:

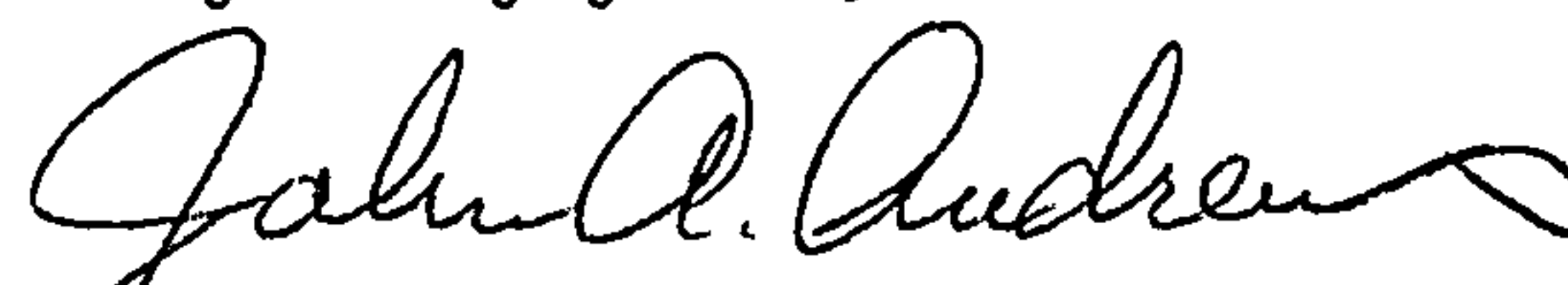
Transmitted herewith for subject project is one copy each of the following:

- Drainage Information Sheet
- Preliminary Drainage Report
- Grading Plan - Sheets 1 of 2 and 2 of 2

As indicated on the Drainage Information Sheet, this submittal is made to obtain approval to perform the rough grading for Phase I of this Project.

Your early review and approval is requested.

Very truly yours,


JOHN A. ANDREWS, P.E.

jtg:415
Enclosures
cc:(w/encl.): Mr. M. B. "Pete" Ford

PROJECT TITLE: Sunport Park-Phase I ZONE ATLAS DRNG. FILE #: M-15/D23LEGAL DESCRIPTION: Sunport Park SubdivisionCITY ADDRESS: N/AENGINEERING FIRM: Andrews, Asbury & Robert, Inc CONTACT: John A. AndrewsADDRESS: 149 Jackson, NE, Albuq., NM PHONE: (505) 265-6631
87108OWNER: Sunport Joint Venture CONTACT: Pete FordADDRESS 707 Broadway, NE, Suite 303, PHONE: (505) 242-5241
Albuq., NM 87102ARCHITECT: N/A

CONTACT: _____

ADDRESS: N/A

PHONE: _____

SURVEYOR: Andrews, Asbury & Robert, Inc. CONTACT: Gayle JewellADDRESS: 149 Jackson, NE., Albuq., NM PHONE: (505) 265-6631
87108CONTRACTOR: New Concepts & Interwest, Ltd., CONTACT: Lee Smith
a Joint VentureADDRESS: 3841 Midway Place, NE PHONE: (505) 345-8123
Albuq., NM 87109

PRE-DESIGN MEETING:

☐ YES NOTE:
Conceptual Drainage Plan
☐ NO previously approved.
M15/D23DRB NO. 84-333

EPC NO. _____

☐ COPY OF CONFERENCE RECAP
SHEET PROVIDEDPROJECT NO. N/A

TYPE OF SUBMITTAL:

☒ DRAINAGE REPORT☐ DRAINAGE PLAN HYDROLOGY SECTION☐ CONCEPTUAL GRADING & DRAIN. 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

OTHER _____ (SPECIFY)

DATE SUBMITTED: November 12, 1986BY: John A. Andrews

Jack Clifford & Company

9861 0 8 N00 12 01 03 08 RECEIVED JUN 30 1986

42266
Cc Tom Penland
James Topmiller

June 9, 1986

Mr. Dan Hogan
Assistant Utilities Engineer
Design Division
Engineering Group
Public Works Department
City of Albuquerque
P.O. Box 1293
Albuquerque, New Mexico 87103

RE: FLOWAGE EASEMENT - CLIFFORD (SCHWARTZMAN'S) PROPERTY, VICINITY
OF SOUTH UNIVERSITY GOLF COURSE

Dear Dan:

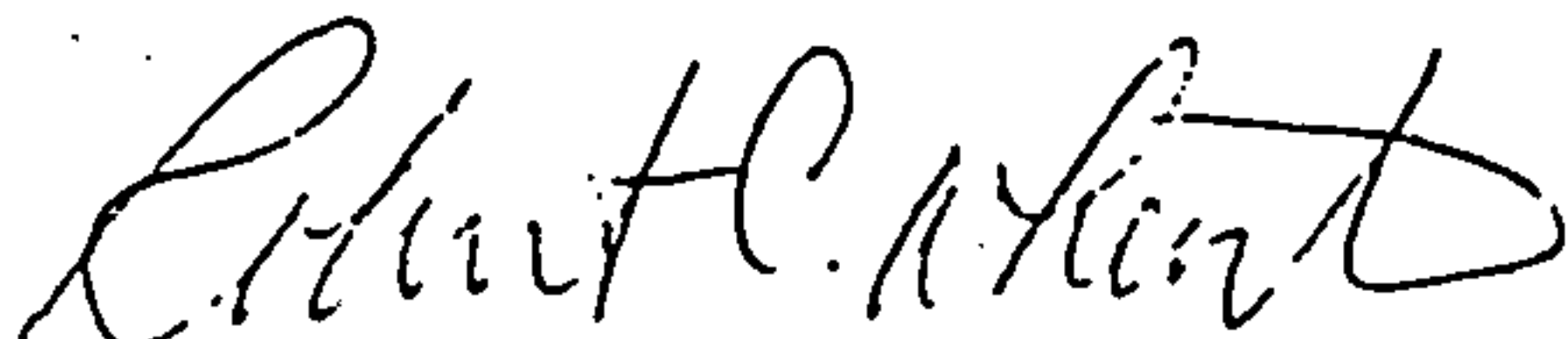
This letter is to confirm our discussion of June 4, 1986. Jack Clifford & Company agrees to grant to the City of Albuquerque a flowage easement across Tract 4 from the culvert under I-25 to the inlet on the AMAFCA south Diversion Channel. The terms and conditions, along with a physical description of the easement, will be forthcoming. The basics are as follows:

1. The City agrees to maintain the easement in such a manner as to not harm Jack Clifford & Company's property.
2. Jack Clifford & Company will not incur any expenses, now or in the future, due to the City's diversion of flows into the easement or its failure to perform proper maintenance.
3. If the channel is treated in some way in the future, Jack Clifford & Company will, at its option, be able to cost share. Jack Clifford & Company's share would be based upon benefits accrued to Jack Clifford & Company.

We will commence work immediately to develop the easement description and conveyance.

If I can be of further assistance, please do not hesitate to contact this office.

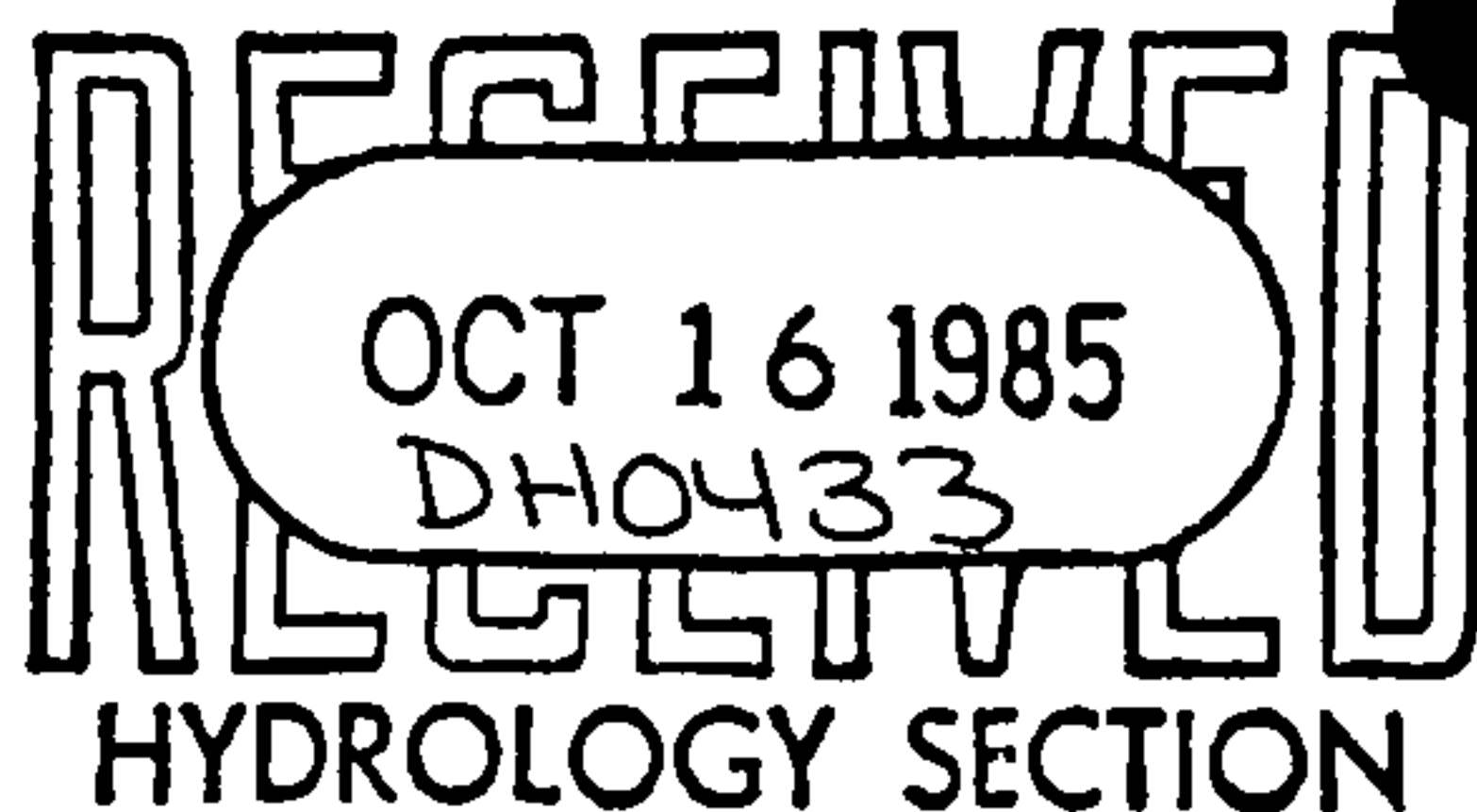
Sincerely,



Robert C. Wharton
Senior Vice-President
Land Development Division

Talk to Dan
about.

- Airport
• extension
• master plan
- Connection from



October 14, 1985

RECEIVED

OCT 16 1985

CITY ENGINEER

Mr. Tom Reinhardt
3317 Linda Vista S.E.
Albuquerque, NM 87106

Re: Meeting Summary - 60" RCP in Vicinity of UNM South Golf Course

Dear Tom:

This letter summarizes the meeting on October 9, 1985 regarding the construction of the 60" RCP across the UNM South Golf Course. Those in attendance included:

Tom Reinhardt
Brian Burnett
Alan Prickett
Gil Berry
Gary Tibljas
Dwayne Sheppard
Greg Olson
Jim Fink
Fred Aguirre
Steve Bowman

Property Owner - Airport Technical Center
Bohannon-Huston, Inc.
UNM Real Estate Coordinator
UNM Landscape Architect
Denney, Tibljas, McLean Associates
City Engineer
Assistant City Engineer - Design
Planning and Programming Hydrologist
Design Hydrologist
City Attorney

Following is a summary of issues discussed at the meeting:

Easements -

I explained the need to obtain a surface drainage easement across the Clifford Property west of I-25 and east of the South Diversion Channel. The group concurred that it was in the best interest of both the City and private property owners in the upstream watershed to attempt acquisition of the easement. The City's interest is centered around plans to improve Clark Boulevard in the near future and University Boulevard at some later date. The ultimate outfall for storm runoff generated by these systems is the 60" RCP system, which eventually drains into the freeway system and then across Clifford property to the South Diversion Channel. Dwayne Sheppard pointed out that three options exist for acquisition of the easement:

- a) the private sector pursues acquisition immediately
- b) the City sector pursues acquisition immediately

PRINCIPALS

JERRY R. BOHANNAN, P.E. & L.S.
LARRY W. HUSTON
MICHAEL M. EMERY, P.E.

Mr. Tom Reinhardt
October 14, 1985
Page 2

c) no roadway improvements or development takes place until an easement is obtained, probably occurring as a part of replatting on the Clifford property.

Due to the anticipated timeframes for the road construction, it was agreed that an attempt should be made to obtain the easement at this time. Tom Reinhardt agreed to authorize Bohannon-Huston, Inc. to pursue this with Clifford and Company. Fred Aguirre agreed to assist in formulating appropriate easement language, if necessary.

Dwayne Sheppard stated that the City would pursue appropriate easements from Tom Reinhardt for runoff discharged from Clark Boulevard east of University Boulevard.

Extension of 60" RCP Across Airport Technical Center Property, East of University Boulevard -

It was stated that Tom Reinhardt has agreed to financially support the extension of the 60" RCP from east edge of the UNM South Golf Course to a point directly west of existing University Boulevard. Tom Reinhardt would also be financially responsible for any additional engineering work required to modify the plans prepared for the University.

I stated that the pipe could be extended and a drop inlet (manhole) be constructed to allow 250 cfs to flow through the pipe. The flow rate value was used for the original design and was obtained from earlier studies prepared for the City and University. I indicated that the Manning's flow condition in the pipe at a slope of 4.85% is approximately 590 cfs. For the interim condition, approximately 7' of head must be generated to permit the 250 cfs design flowrate to discharge through the system.

Greg Olson pointed out that the design should be sensitive to the possible future extension of the sanitary sewer which will be constructed across the golf course at the same time the RCP is installed. I stated that the design of the pipe extension would address this situation. Greg Olson also stated that it made sense to require a west to east construction phasing.

Dwayne Sheppard suggested that the contractor selected be qualified to do work in the City rights-of-way.

Mr. Tom Reinhardt
October 14, 1985
Page 3

Time Schedules and Plan Processing -

Alan Prickett stated that December 1, 1985 is the target date for beginning construction and that the University has a 2-3 month "window" to construct the two facilities. Gary Tibljas indicated that the contract had originally been set up for a 60 day construction period. Gil Berry stated that it takes approximately 3 weeks to obtain bids and award the contract. Therefore, the group concurred that an accelerated review process would be required. The following conditions were agreed to:

1. Bohannon-Huston, Inc. would prepare a design report and details for extending the 60" RCP from the edge of the golf course to west of University Boulevard. This report would be reviewed administratively by both Fred Aguirre and Jim Fink.
2. Once Fred Aguirre and Jim Fink have concurred with the details of the pipe extension, the plans for the entire system would be submitted by Gary Tibljas to the DRC for comment. Brian Burnett would assist in this effort. Details would be worked out at this meeting.
3. Once the DRC has approved the design, the University will proceed with bidding the project.

Maintenance Responsibilities, Warranty Period, Agreements and Project Certification -

Alan Prickett offered to grant a public easement for the 60" RCP if the pipe was extended to University Boulevard and the concrete inlet structure originally designed was not constructed. Once the easement was granted, the City would be responsible for maintenance of the system. Jim Fink agreed that this was acceptable in that the pipe was designed to specific City Standards, primarily those dealing with the installation of manholes at 450' intervals. Gary Tibljas saw no problem with amending the plans to meet this requirement.

The group then discussed the warranty period for construction. It was pointed out that the City warranty period is 3 years. Gil Berry thought that the University contract could be amended to reflect such a period.

It was agreed that Denney, Tibljas, McLean could serve as project inspector for the purpose of certifying construction of the system. As-built drawings would also be supplied to the City at the conclusion of the project.

Mr. Tom Reinhardt
October 14, 1985
Page 4

Responsibilities -

At the conclusion of the meeting the following responsibilities for the various individuals and agencies represented

A. Bohannon-Huston, Inc:

1. ~~Provide easement description and coordination with~~ Clifford and Company for reach west of I-25 and east of the South Diversion Channel.

2. Prepare design report and details for extension of 60" RCP across Airport Technical Center property.

3. Coordinate with Jim Fink and Fred Aguirre to review design report.

4. Coordinate with Gary Tibljas for inclusion of details in University plans and processing plans through DRC.

Note: It will be attempted to complete Items 2-4 by the end of October, 1985.

B. Denney-Tibljas-McLean Associates:

1. Coordinate with Bohannon-Huston, Inc. for changes to plans.

2. Process revised plans through DRC.

3. Coordinate with Gil Berry to amend contract documents and bidding material.

4. Supply Tom Reinhardt with an estimate for fee for additional design work and processing of plans through DRC.

C. Steve Bowman/Alan Prickett/Gil Berry:

Steve, Alan and Gil agreed to work together to amend the original agreement for the pipe construction. Details of agreement should address City maintenance responsibilities, dedication of the public easement, warranty periods and acceptance procedures.

Mr. Tom Reinhardt
October 14, 1985
Page 5

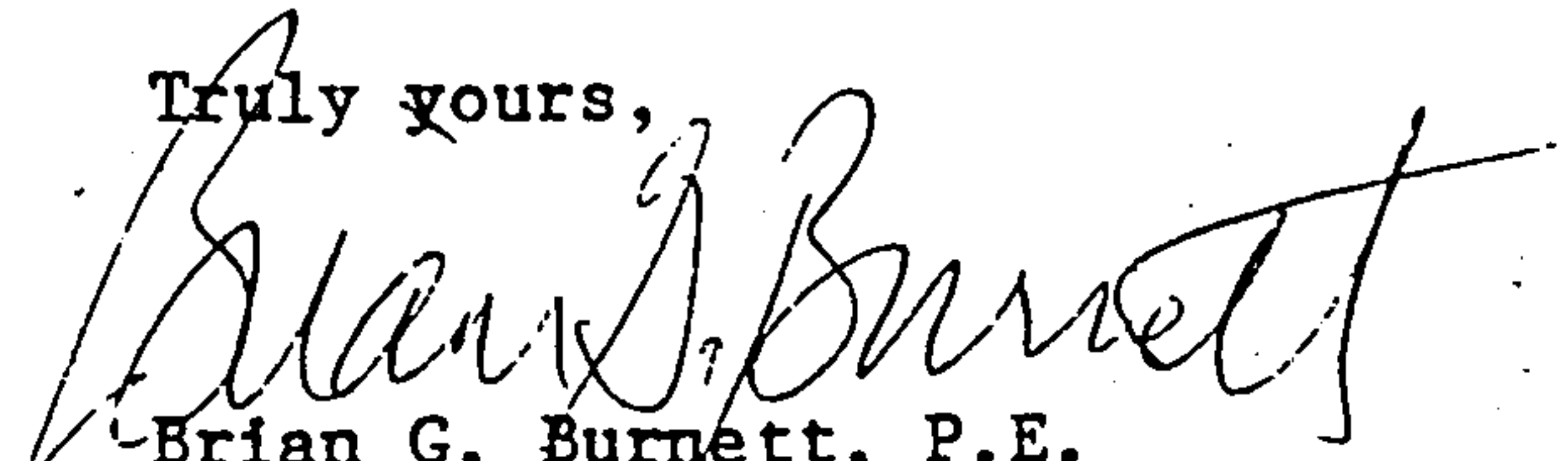
D. UNM Architect's Office

1. Proceed with bidding on project and act as lead agency for construction of the system.

In closing, I would like to extend a big thank you to the participants at the meeting for their input and support of the project. I believe the program outlined above serves the best interest of all parties involved and points to what can be accomplished through a cooperative effort.

If any party has questions or wishes to amend any items listed above, please do not hesitate to call.

Truly yours,

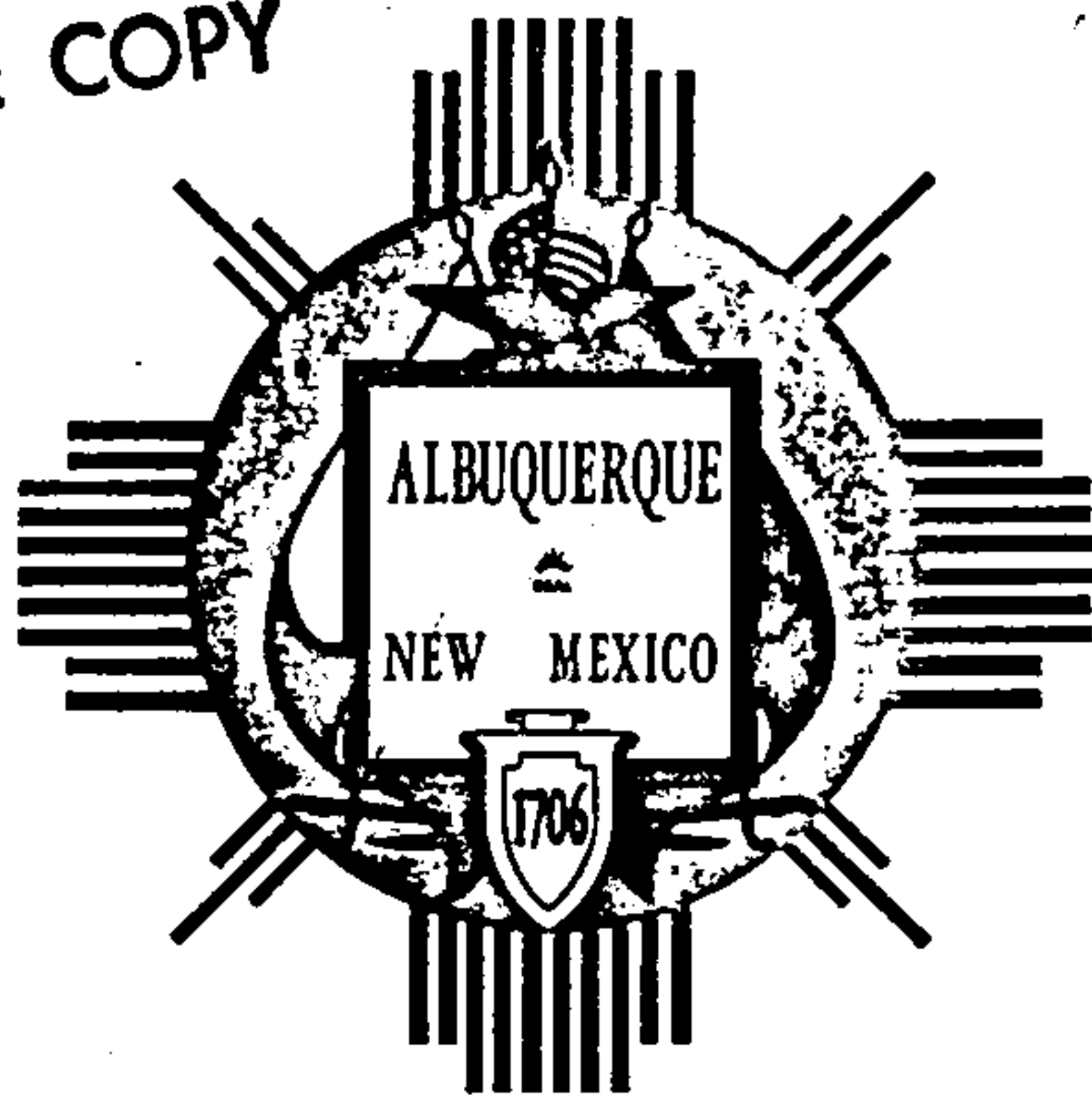


Brian G. Burnett, P.E.
Vice President

cc: Mr. Tom Reinhardt
Mr. Alan Prickett
Mr. Gil Berry
Mr. Steve Bowman
Mr. Gary Tibljas
Mr. Dwayne Sheppard
Mr. Jim Fink
Mr. Fred Aguirre
Mr. Greg Olson

BGB/mls
Job No. 4 228 6

FILE COPY



City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

DESIGN HYDROLOGY SECTION
123 Central NW, Albuquerque, NM 87102
(505) 766-7644
May 12, 1986

Ted Asbury, P.E.
Andrews, Asbury & Robert, Inc.
149 Jackson Street, NE
Albuquerque, New Mexico 87108

RE: BULK LAND PLAT REQUEST FOR SUNPORT PARK (M-15/D23)

Dear Ted:

In recap of our meeting on Friday, May 9, in regards to the proposed Bulk Land Plat of Sunport Park, following is a summary of that meeting.

Since no detailed Drainage Report for area south of Woodward Road has been submitted or approved identifying complete storm drain systems and drainage easements secured to the South Diversion Channel, this area must be left intact as one tract. Proposed streets in this Tract should be shown as easements. Any subdivision south of Woodward would require bonded infrastructures and Drainage Easements West of I-25.

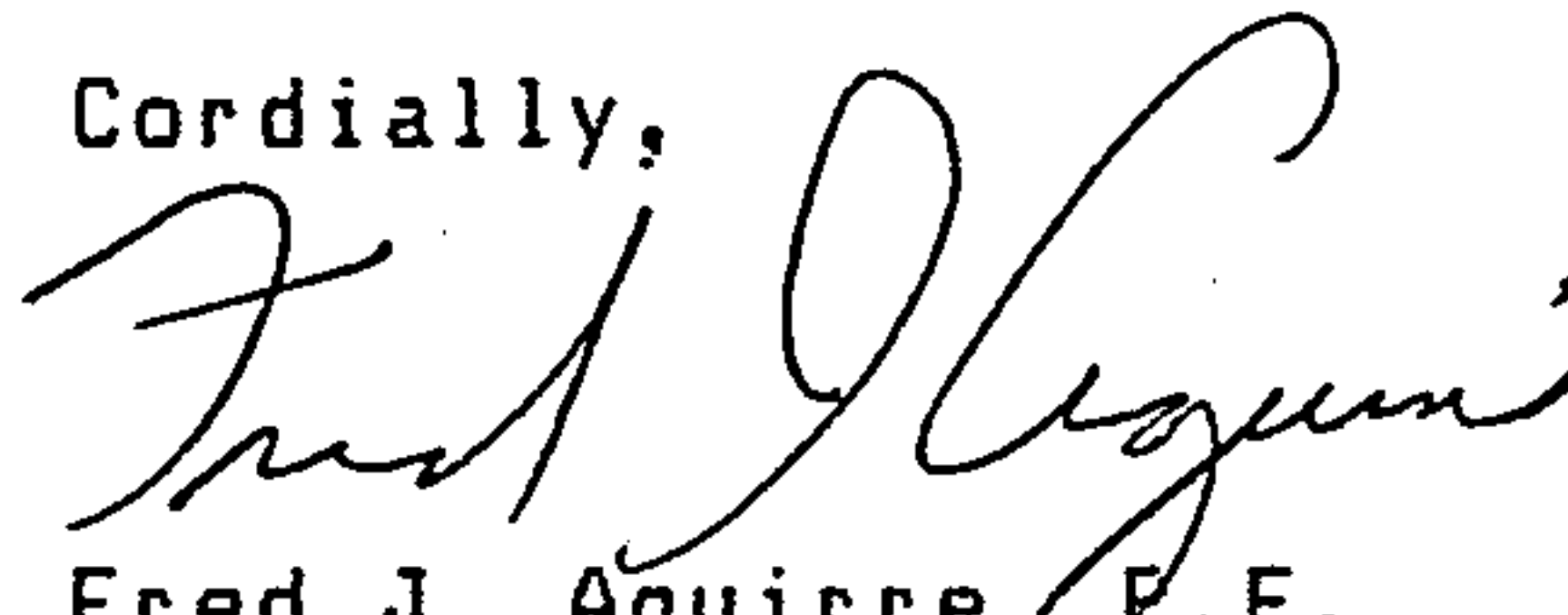
For the area north of Woodward, portions not draining north to Mulberry Street would require drainage easement and storm drain system bonded or built at time of further Subdivision or Site Development Plan approval.

Construction of Woodward Road would generate the need for a drainage easement and storm drain to the channel west of I-25.

The storm drain system for Tracts 1 and 2, draining north along Mulberry Street, will be bonded with this Bulk Land Plat.

If you have any further questions, call me at 766-7644.

Cordially,


Fred J. Aguirre, P.E.
Hydrologist

cc: Pete Ford
Sunport Joint Venture

RAG:FJA/bsj

MUNICIPAL DEVELOPMENT DEPARTMENT

ALBUQUERQUE, NEW MEXICO

ENGINEERING DIVISION

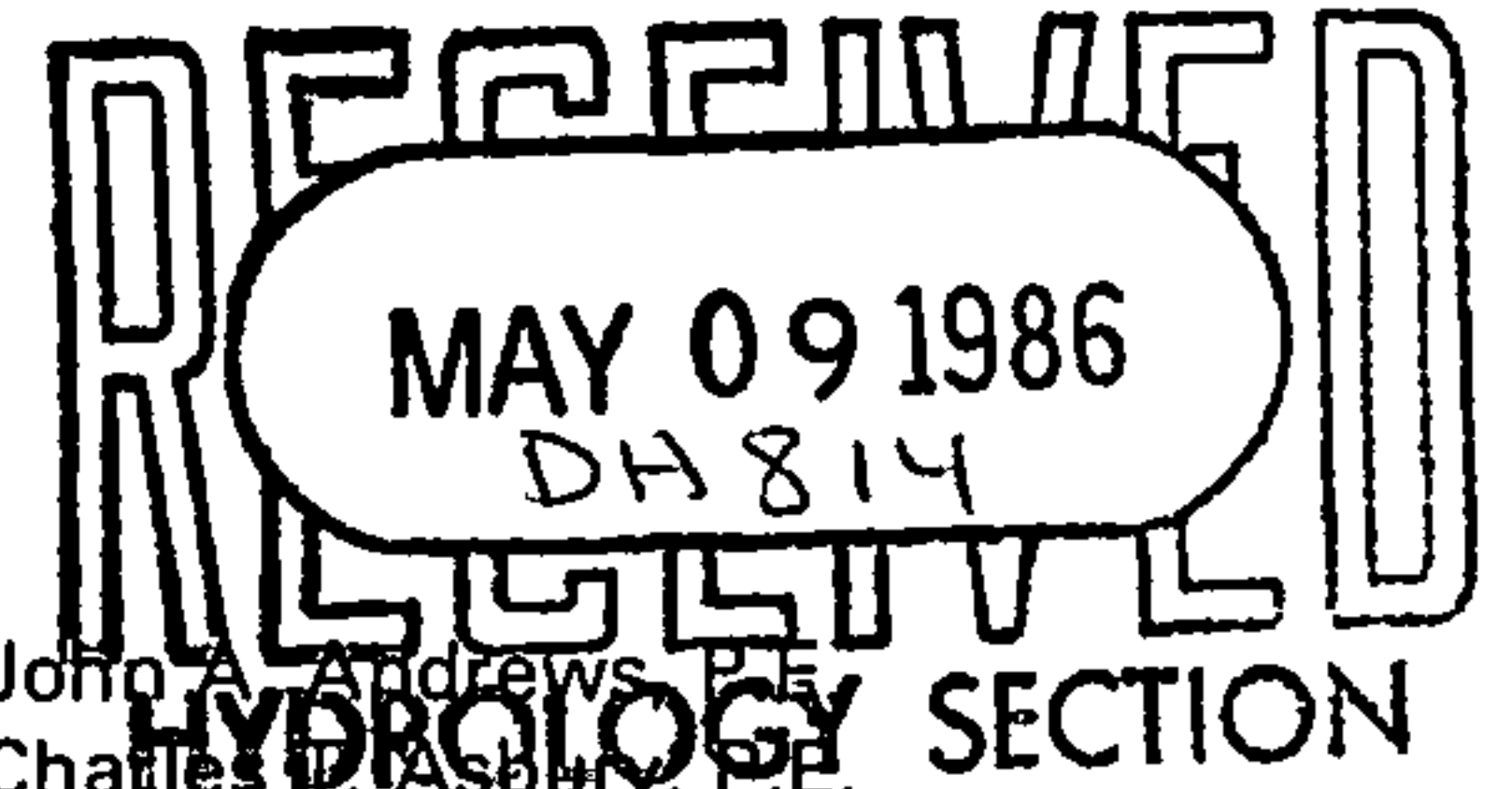
Telephone (505) 766-7467

AN EQUAL OPPORTUNITY EMPLOYER



ANDREWS, ASBURY & ROBERT, INC.
Consulting Engineers

149 Jackson, NE, Albuquerque, New Mexico 87108
(505) 265-6631



John A. Andrews, P.E.
Charles D. Asbury, P.E.
John B. Robert, P.E. & L.S. (1915 - 1984)
James E. Millington, P.E. - V.P.

May 9, 1986

M15/D23

Mr. Rodger Green
Public Works Department, Hydrology
123 Central Avenue, S.E.
Albuquerque, New Mexico 87102

SUBJECT: CONCEPTUAL GRADING AND DRAINAGE PLAN

REFERENCE: YOUR LETTER OF FEBRUARY 24, 1986

Dear Mr. Green:

In anticipation of addressing the final issues prior to preliminary plat approval I would like to address each point to provide a record of correspondence.

As you know on March 31, 1986 we submitted a revised drainage plan and supporting narrative.

This report addressed each point raised in your letter with the exception of items No. 2 & No. 3. More specifically:

Point No. 1 - the existing railroad easement has been vacated, however, it was identified on the revised map titled "Existing Conditions Map, Offsite and Onsite".

Point No. 2 - the stability and maintenance constraints were addressed during a field visit to the site.

Point No. 3 - Drainage easement issues were addressed during a field visit to the site.

Point No. 4 - the ultimate outlet of the 36 inch drain from AP - # 2A was addressed in the revised drainage plan and was shown to be the east-west channel discharging from Kirtland into the South Diversion Channel.

Point No. 5 - the drainage basins and revised drawing addressed this point.

Point No. 6 - the revised narrative and drawings addressed this question.

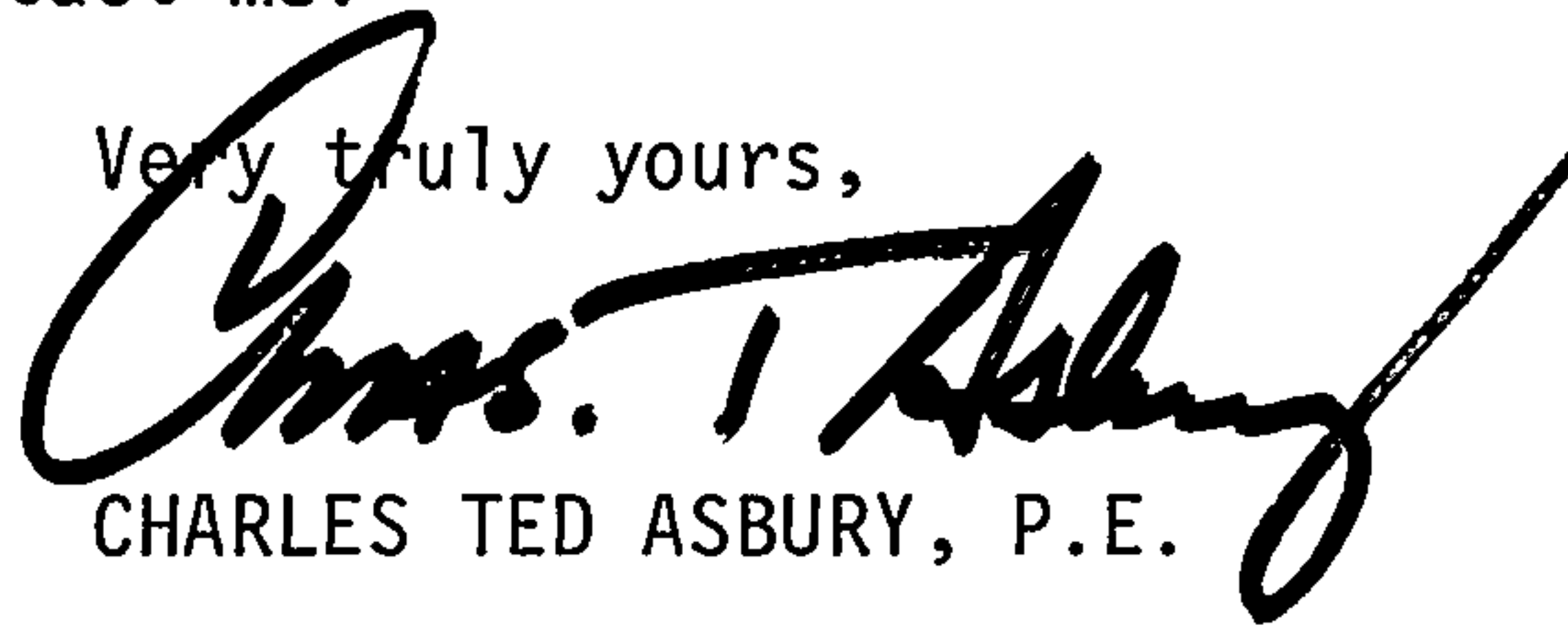
Point was made that no flows are allowed after any development takes place unless easements are obtained and arroyo stability addressed in drainage report.

Mr. Rodger Green
Public Works Department/Hydrology
May 9, 1986
Page 2

Point No. 7 - the revised drainage plan addressed developed and undeveloped conditions.

I trust this is satisfactory, however, should additional questions arise, please don't hesitate to contact me.

Very truly yours,

A handwritten signature in black ink, appearing to read "Charles T. Asbury", written over the typed name.

CHARLES TED ASBURY, P.E.

shj-415
cc: Sunport Joint Venture



City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

DESIGN HYDROLOGY SECTION
123 Central NW, Albuquerque, NM 87102
(505) 766-7644

April 2, 1986

Ted Asbury, P.E.
Andrews, Asbury & Robert, Inc.
149 Jackson Street, NE
Albuquerque, New Mexico 87108

RE: CONCEPTUAL GRADING & DRAINAGE PLAN SUBMITTAL OF SUNPORT
PARK RECEIVED APRIL 1, 1986 FOR SITE DEVELOPMENT PLAN
APPROVAL (M-15/D23)

Dear Ted:

The above referenced submittal with revised drawing dated March 31, 1986, is approved for Site Development Plan.

At time of Platting request, a more detailed Drainage Report will be required for Platting approval. The historical downstream drainage channels that you have identified as the outfall systems for A.P. #2B, 1C, & 12C must be established as public Drainage Easements before any platting approval can be granted. The Drainage Report should establish the required easement widths and treatments required to discharge developed runoff into these existing channels. Any Drainage Easements needed for the proposed storm drain from A.P. #2A will also be a condition of Platting approval.

If you have any questions, call me at 766-7644.

Cordially,

Roger A. Green, PE

Roger A. Green, P.E.
C.E./Hydrology Section

cc: Sunport Joint Venture
P.O. Box 26841 87125

RAG/bsj

MUNICIPAL DEVELOPMENT DEPARTMENT

C. Dwayne Sheppard, P.E., City Engineer

ENGINEERING DIVISION

Telephone (505) 766-7467

AN EQUAL OPPORTUNITY EMPLOYER

PROJECT TITLE: SUNPORT PARKZONE ATLAS/DWG. FILE #: M-15/023LEGAL DESCRIPTION: West of University; East of I-25, North of UNM Golf Course,
South of Kirtland AdditionCITY ADDRESS: P.O. Box 26841, Albuquerque, New Mexico 87125ENGINEERING FIRM: ANDREWS, ASBURY & ROBERT, INC. CONTACT: TED ASBURYADDRESS: 149 Jackson St., N.E., Albuq. NM 87108 PHONE: 265-6631OWNER: SUNPORT JOINT VENTURE CONTACT: PETE FORDADDRESS: P.O. Box 26841, Alb. N.M. 87125 PHONE: 345-8591

ARCHITECT: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

SURVEYOR: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

CONTRACTOR: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

PRE-DESIGN MEETING:

☒ YESDRB NO. 85-542☐ NOEPC NO. Z-85-98☒ COPY OF CONFERENCE RECAP
SHEET PROVIDEDPROJECT NO. N/A

TYPE OF SUBMITTAL:

☐ DRAINAGE REPORT☐ DRAINAGE PLAN☒ CONCEPTUAL GRADING & DRAIN. PLAN
(Revision to 12/20/85 Submittal)☐ 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

OTHER _____ (SPECIFY)

DATE SUBMITTED: 3/31/86BY: ANDREWS, ASBURY & ROBERT, INC.



City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

DESIGN HYDROLOGY SECTION
123 Central NW, Albuquerque, NM 87102
(505) 766-7644

February 24, 1986

Ted Asbury, P.E.
Andrews, Asbury, & Robert, Inc.
149 Jackson Street, NE
Albuquerque, New Mexcio 87108

RE: CONCEPTUAL GRADING & DRAINAGE PLAN SUBMITTAL OF SUNPORT PARK
RECEIVED FEBRUARY 13, 1986, FOR SITE DEVELOPMENT PLAN APPROVAL
(M-15/D23)

Dear Ted:

I have reviewed the above referenced submittal and have the following comments.

The drainage scheme is approved in concept, but the following items need to be addressed before further review and approval of the conceptual grading and drainage plan, for site plan sign-off.

1. Existing railroad easement should be identified.
2. The stability and maintenance constraints of the drainage-ways between I-25 and diversion channel need to be addressed.
3. Drainage easement issues will need to be addressed for drainage-ways between I-25 and diversion channel.
4. Ultimate outlet of the 36" storm drain north from A.P. #2A needs to be identified and shown in plan view.
5. The drainage plan text lists four drainage areas on Sheet 1 of the calculations. Are these off-site drainage basins? The drawings show only two off-site basins, which are not consistant with any of the four listed in text.
6. Drainage areas 101 and 201 as listed in text on pages 2 and 3 of the calculations are shown as areas 100 and 200 on the drawings. In accordance with the Drainage Ordinance, these off-site drainage areas must be analyzed in the "developed" condition for on-site infrastructure design.

MUNICIPAL DEVELOPMENT DEPARTMENT

C. Dwayne Sheppard, P.E., City Engineer

ENGINEERING DIVISION

Telephone (505) 766-7467

AN EQUAL OPPORTUNITY EMPLOYER

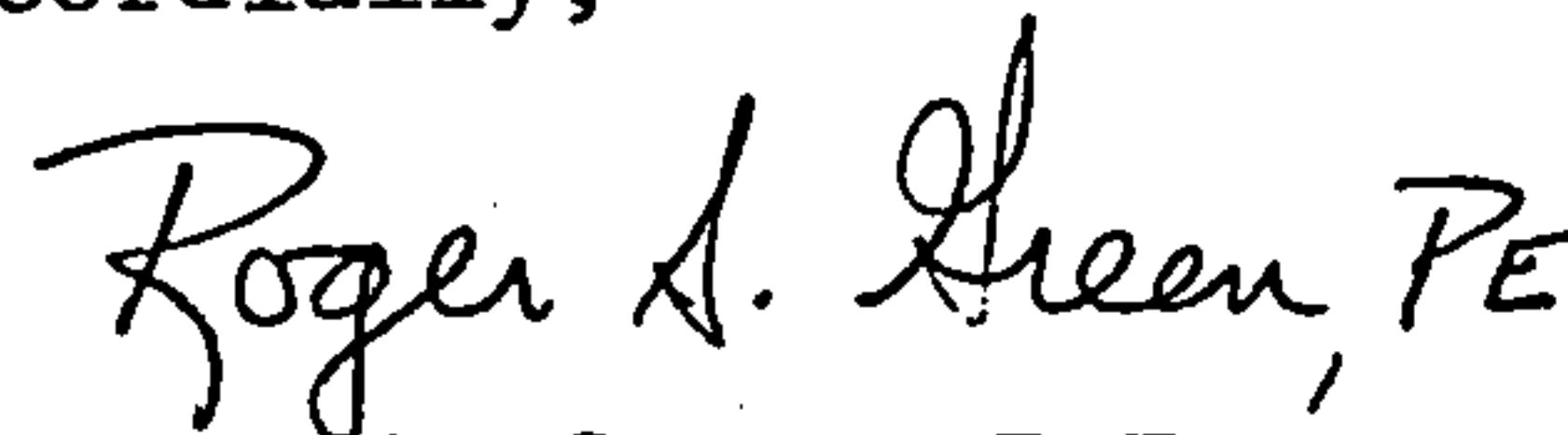
Ted Asbury
February 24, 1986
Page Two of Two

Table 2 - Design Flows of the text must use off-site flows for the developed condition, not the undeveloped "for A.P.#2.C. and 7.C.

7. Provide a plan view topo map outlining off-site drainage areas. Off-site developed flow rates need to be consistent with drainage areas identified in the Albuquerque International Airport Master Plan Improvements, Conceptual Drainage Plan, being prepared by Greiner Engineering.

If you have any questions regarding this project, call me at 766-7644.

Cordially,



Roger A. Green, P.E.
C.E./Design Hydrology

cc: Standard Letter to:

Sunport Joint Venture
P.O. Box 26841 87125

RAG/bsj

DRAINAGE INFORMATION SHEET

PROJECT TITLE: SUNPORT PARK ZONE ATLAS/DRAINAGE FILE # M-15 1023LEGAL DESCRIPTION: West of University; East of I-25, North of UNM Golf Course,
South of Kirtland AdditionCITY ADDRESS: P.O. Box 26841, Albuquerque, New Mexico 87125ENGINEERING FIRM: ANDREWS, ASBURY & ROBERT, INC. CONTACT: TED ASBURYADDRESS: 149 Jackson St., N.E., Albuquerque, NM 87108 PHONE: 265-6631OWNER: SUNPORT JOINT VENTURE CONTACT: PETE FORDADDRESS: P.O. Box 26841, Albuquerque, NM 87125 PHONE: 345-8591

ARCHITECT: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

SURVEYOR: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

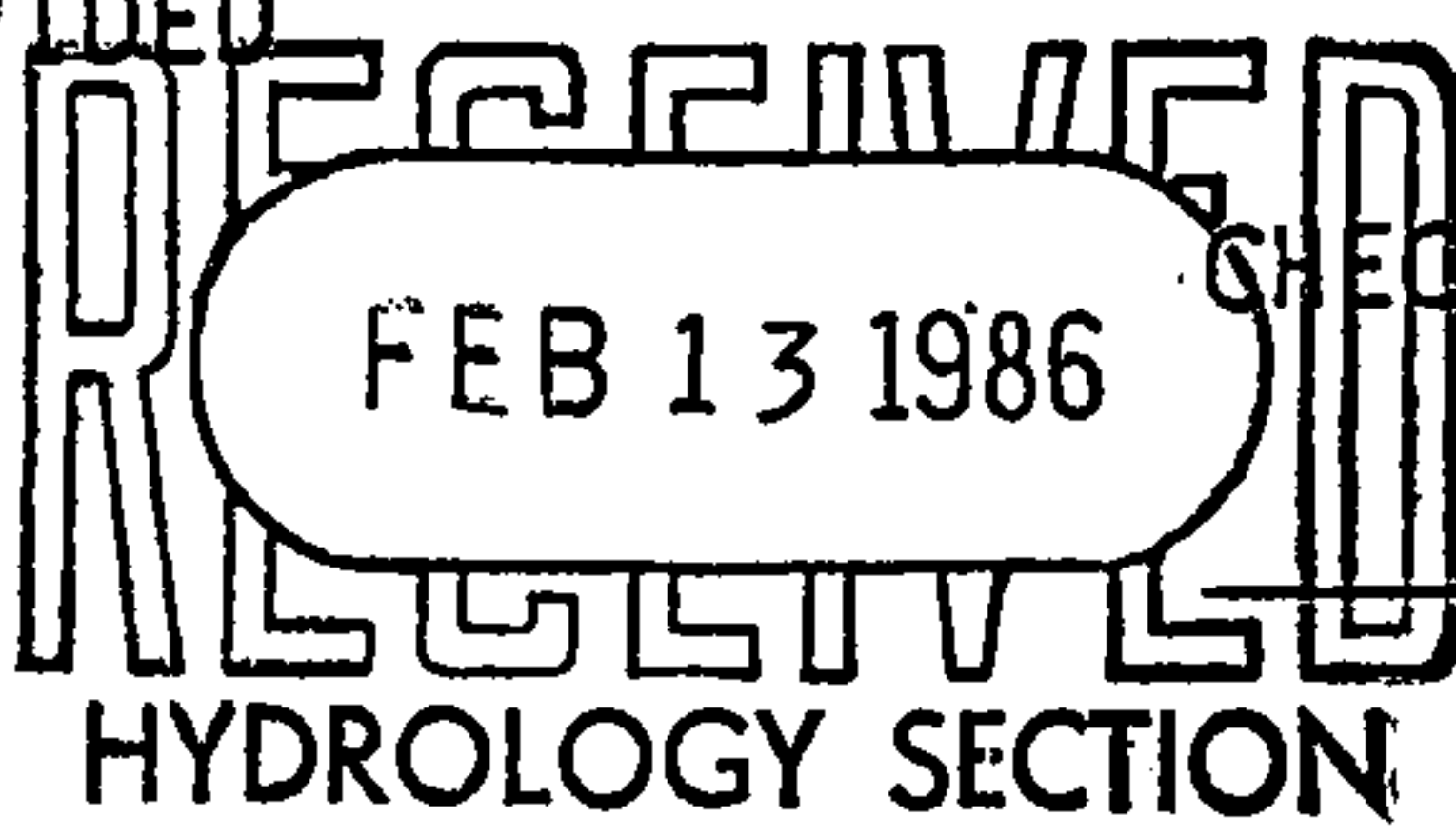
CONTRACTOR: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

PRE-DESIGN MEETING:

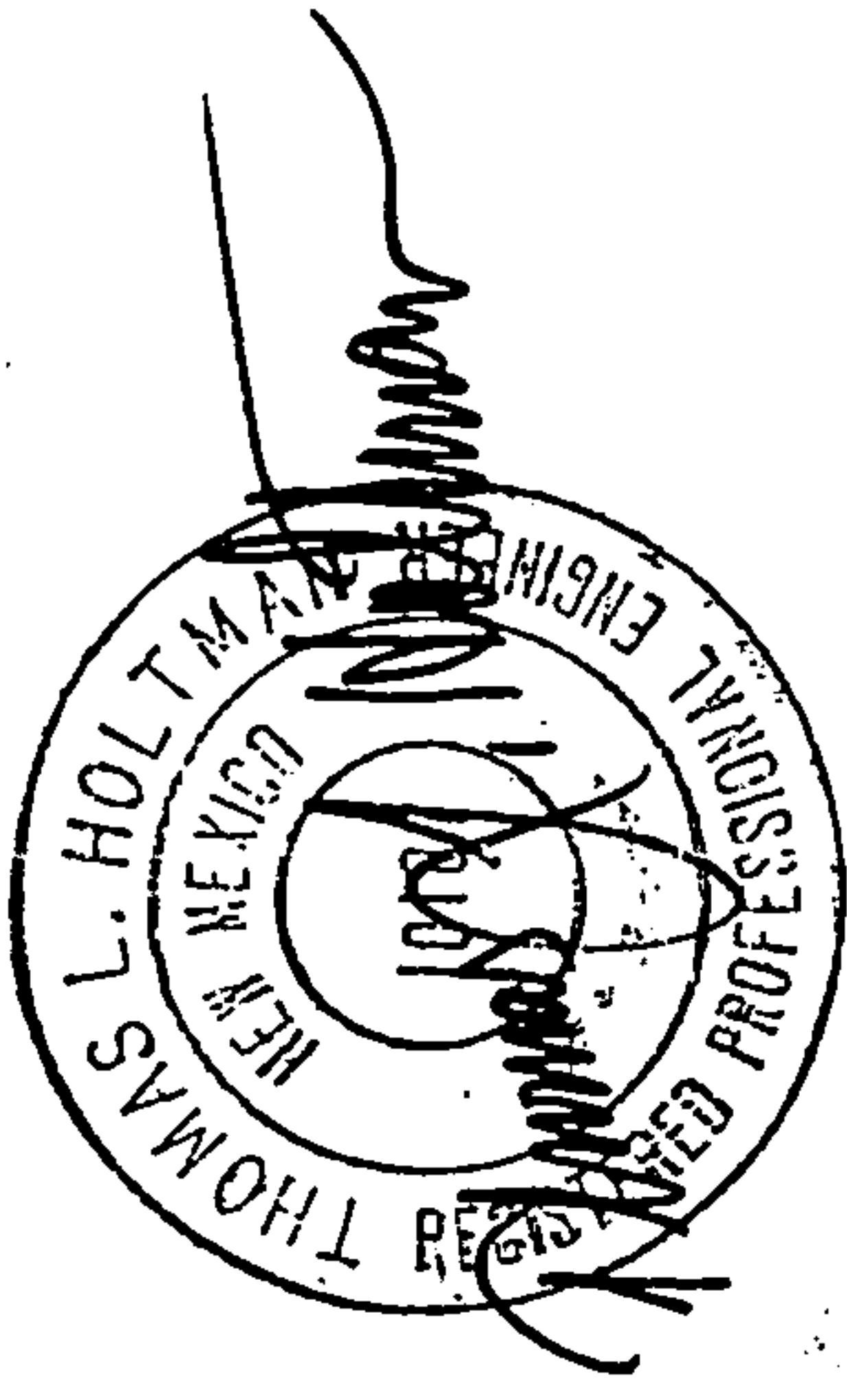
☒ YES☐ NO☒ COPY OF CONFERENCE
RECAP SHEET PROVIDEDDRB NO. 85-542/V. 85.67 1/7/86EPC NO. Z-85-98-1 9/19/85PROJECT NO. N/A

TYPE OF SUBMITTAL:

☐ DRAINAGE REPORT☐ DRAINAGE PLAN☒ CONCEPTUAL GRADING & DRAIN PLAN☐ GRADING PLAN☐ EROSION CONTROL PLAN☐ ENGINEER'S CERTIFICATION

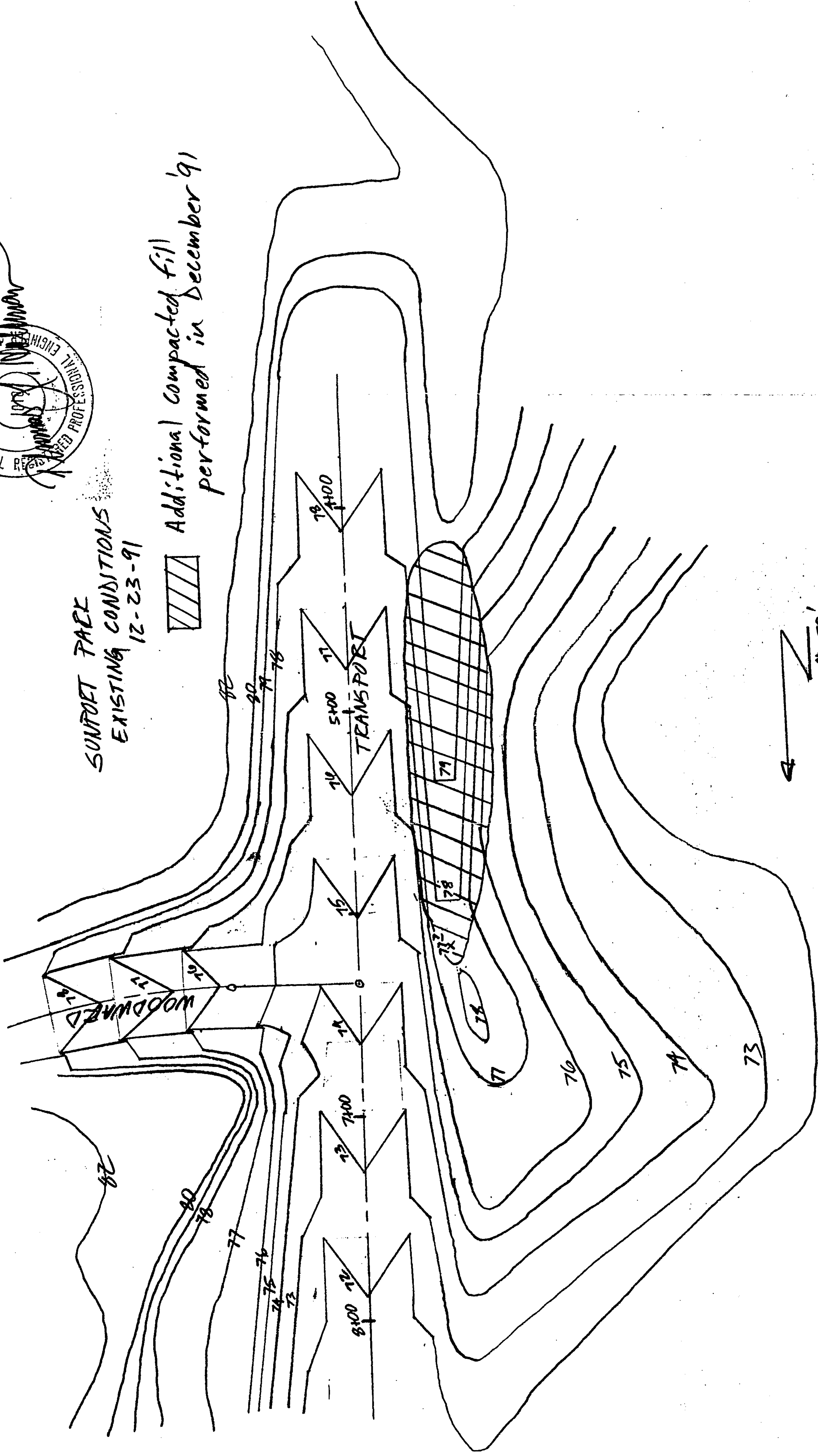
CHECK TYPE OF APPROVAL SOUGHT:

☐ SECTOR PLAN APPROVAL☐ 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 APPROVALDATE SUBMITTED: 12/20/85BY: ANDREWS, ASBURY & ROBERT, INC. OTHER _____ (SPECIFY)



SUNFOET PARK
EXISTING CONDITIONS
12-23-91

Additional compacted fill
performed in December '91



SCALE 1"=50'

M-15/D23

CITY OF ALBUQUERQUE

PERMIT FOR EXCAVATION, CONSTRUCTION AND BARRICADING

11-16-04
[Signature]

CONTRACTOR LICENSE ADDRESS	JAYNES CORPORATION GA98 2906 BROADWAY BD N.E. ALBUQUERQUE, NM 87107 345-8591	PERMIT NUMBER PROJECT NUMBER PERMIT ISSUE DATE BARRICADED BY BLUE STAKE PAVING BY	2089024 10/20/2004 CON
S I T E	1381 FLIGHTWAY AV SE	EXCAVATION 443008-5810000 SIDEWALK 443012-5810000 DRIVEPAD 443011-5810000 CURB/GUTTER 443010-5810000 BARRICADING 443009-5810000 RESTORATION 443017-5810000 TOTAL FEE	42.00 EX 0.00 SW 0.00 DP 0.00 CG 25.00 BR 0.00 RS 67.00
PERMIT AND DETOUR PLAN COMMENTS SO#19 LETTER ON FILE DATED 8/27/04 SUNPORT PARK BLDG. SHELL			

START DATE	COMPLETION DATE	PERMIT EXPIRES	INSURANCE EXPIRES	BOND EXPIRES	ZONE ATLAS
10/20/2004	10/30/2004	10/30/2004	06/01/2005	12/31/2004	

[Signature]
 APPLICANT

ISSUED BY

VOID UNTIL VALIDATED BY CITY TREASURER

PERMITTEE AGREES TO ASSUME ALL LIABILITY, INCLUDING INDEMNIFYING, DEFENDING AND HOLDING THE CITY HARMLESS FOR ALL DAMAGES OR INJURY TO PERSONS OR PROPERTY RESULTING FROM PERMITTEE'S EXCAVATION AND/OR BARRICADE WORK. THIS PERMIT IS GRANTED IN CONSIDERATION OF PERMITTEE'S ASSUMING SAID LIABILITY AND IS APPROVED FOR THE WORK DESCRIBED ABOVE. IN ACCORDANCE WITH SECTION 6-5-2-1 ET SEQ. R.O. (1994), PERMITTEE AGREES TO COMPLY WITH ALL APPLICABLE CITY RULES, REGULATIONS AND ORDINANCES, AND WHEN EXCAVATING, TO PATCH OR PLATE PRIOR TO OPENING TO TRAFFIC IN ACCORDANCE WITH APPLICABLE RULES, REGULATIONS AND ORDINANCES. PLEASE CALL 924-3400 FOR ADDITIONAL INFORMATION.

CAUTION: PROTECT UNDERGROUND UTILITIES CALL 260-1990, 48 HOURS IN ADVANCE FOR LINE STAKING

PWD 003 REV 04/03

DATE EXCAVATION STARTED _____

Backfill: Started _____ Completed _____ Accepted _____

Paved Cleared _____ Site Cleared _____ Warranty Exp _____

Restoration Fee Refund Authorized Yes _____ NO _____ BY: _____

Cash Disbursement Prepared for Refund Dated _____

CITY OF ALBUQUERQUE



Making History

Jaynes Corp.

2089024

10/20/04

August 27, 2004

John Arthur Blessen, P.E.
Claudio Vigil Architects
1801 Rio Grande Blvd. NW
Albuquerque, NM 87104

**Re: Sunport Park Building Shell, 1381 Flightway Ave SE, Grading and
Drainage Plan
Engineer's Stamp dated 8-26-04 (M15-D23)**

Dear Mr. Blessen,

Based upon the information provided in your submittal received 8-26-04, the above referenced plan is approved for Building Permit. Please attach a copy of this approved plan to the construction sets prior to sign-off by Hydrology.

P.O. Box 1293

Albuquerque

A separate permit (SO#19) is required for construction within City Right of Way. A copy of this approval letter must be on hand when applying for the excavation permit. Prior to Certificate of Occupancy release, Engineer Certification per the DPM checklist will be required.

New Mexico 87103

This project requires a National Pollutant Discharge Elimination System (NPDES) permit. If you have any questions regarding this permit please feel free to call the DMD Storm Drainage Design section at 768-3654 (Charles Caruso).

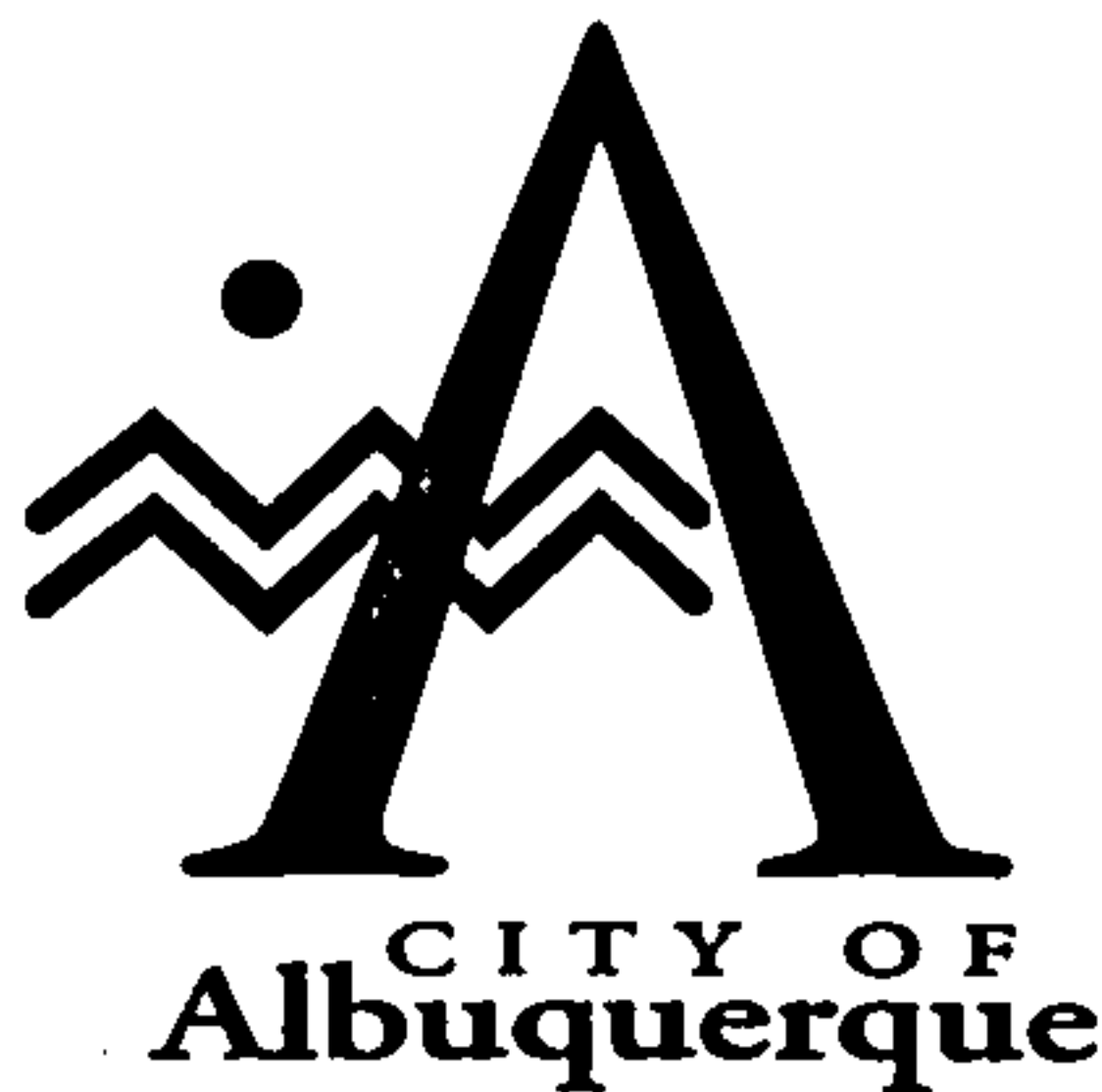
www.cabq.gov

If you have any questions, you can contact me at 924-3981.

Sincerely,

Kristal D. Metro
Engineering Associate, Planning Dept.
Development and Building Services

C: Matt Cline, Arroyo Maintenance
~~Pam Lujan, Excavation Permits~~
Charles Caruso, DMD Storm Drainage Design
File



December 5, 1996

Martin J. Chávez, Mayor

John Andrews
Andrews, Asbury & Robert, Inc
149 Jackson Street NE
Albuquerque, NM 87108

**RE: SUNPORT PARK (M15-D23). CONCEPTUAL GRADING AND DRAINAGE PLAN
FOR PRELIMINARY PLAT APPROVAL AND SITE DEVELOPMENT FOR BUILDING
PERMIT APPROVAL. ENGINEER'S STAMP DATED 11-22-96.**

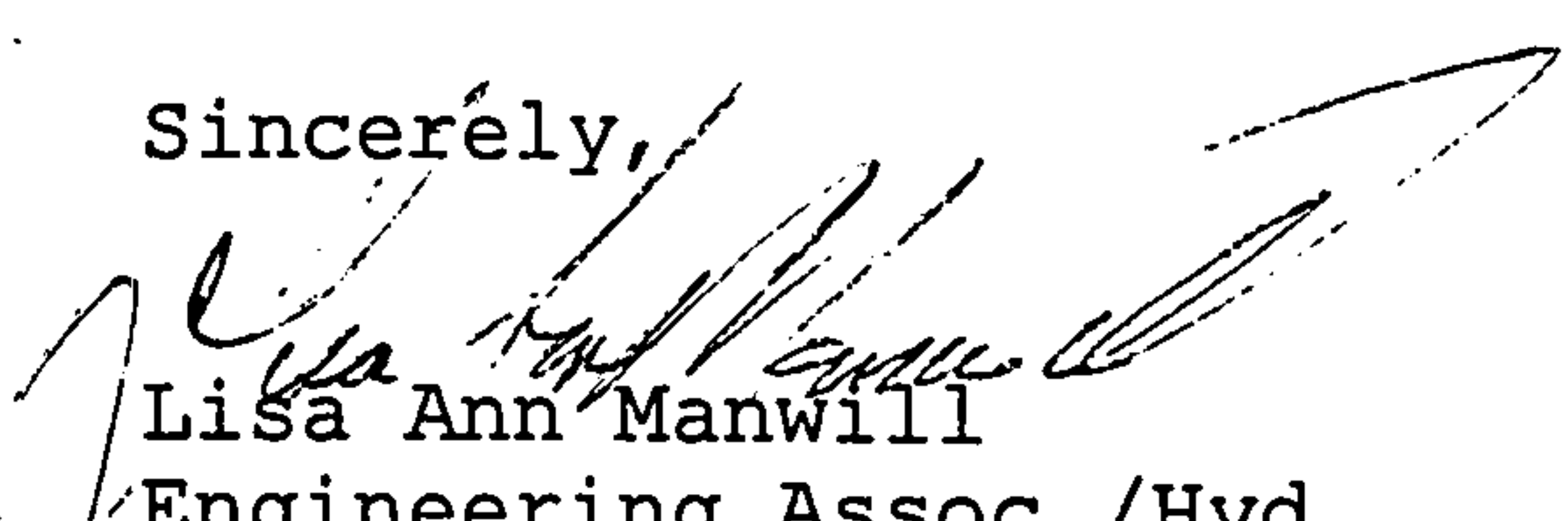
Dear Mr. Andrews:

Based on the information provided on your November 25, 1996
submittal, City Hydrology has the following comments:

1. A conceptual submittal is not sufficient for the type of approval you are seeking. A detailed grading and drainage plan with narrative will be required.
2. Are you free discharging? Please discuss downstream capacity.

If I can be of further assistance, please feel free to contact me at 768-3622.

Sincerely,



Lisa Ann Manwill

Engineering Assoc./Hyd.

c: Andrew Garcia
File

Good for You, Albuquerque!





CITY OF
Albuquerque

Public Works Department

January 15, 1997

Martin J. Chávez, Mayor

Robert E. Gurulé, Director

John Andrews
Andrews, Asbury & Robert, Inc
149 Jackson Street NE
Albuquerque, NM 87108

RE: SUNPORT PARK (M15-D23). DRAINAGE REPORT FOR PRELIMINARY PLAT
APPROVAL AND SITE DEVELOPMENT PLAN FOR SUBDIVISION APPROVAL.
ENGINEER'S STAMP DATED 12-26-96.

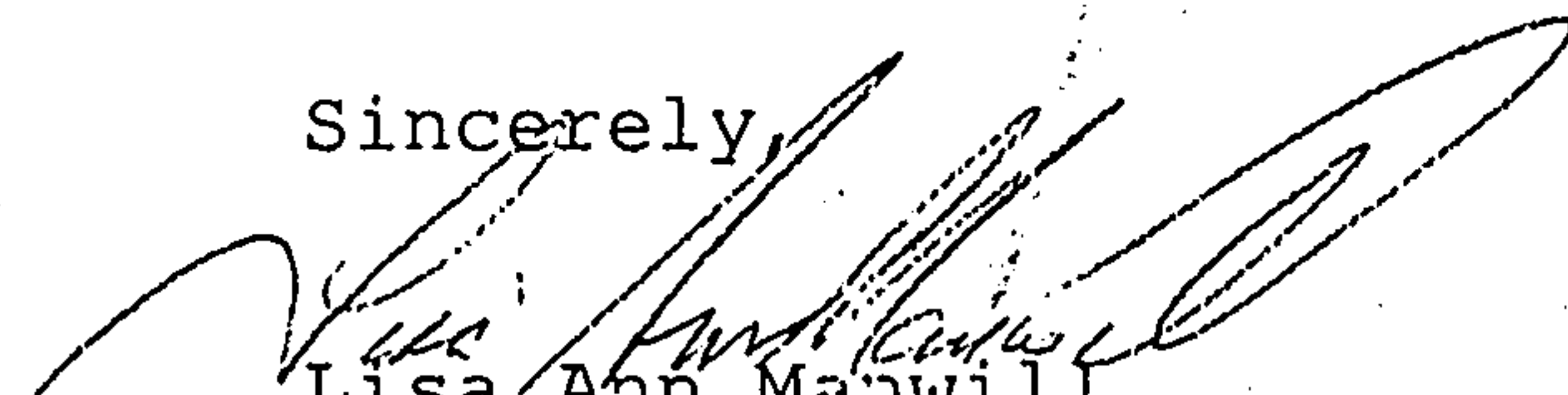
Dear Mr. Andrews:

Based on the information provided on your January 3, 1997 submittal,
the above referenced project is approved for Preliminary Plat and
Side Development Plan for Subdivision.

Please include an infrastructure list with your next submittal.

If I can be of further assistance, please feel free to contact me at
768-3622.

Sincerely,



Lisa Ann Mahwill
Engineering Assoc./Hyd.

c: Jonh Alexander - Bohannan Huston
Andrew Garcia - COA
File

Good for You, Albuquerque!

P.O. Box 1293, Albuquerque, New Mexico 87103



MOLZEN-CORBIN & Associates

ENGINEERS/ARCHITECTS/PLANNERS

2701 Miles Road Southeast
Albuquerque, New Mexico 87106
Telephone 505-242-5700
Fax 505-242-0673



April 21, 1997

Mr. Fred Aguirre
Public Works Department, Hydrology
City of Albuquerque
P.O. Box 1293
Albuquerque, New Mexico 87103

**RE: Sunport Park Drainage
DRB Case 97-68**

ABQ41-11.C03

Dear Mr. Aguirre:

We have received and reviewed for the Aviation Department, the Drainage Masterplan for Sunport Park, Parcel 2A as submitted by Brasher & Lorenz, dated April 3, 1997. We offer the following comments on behalf of the Aviation Department:

1. It appears that the proposed office location is directly in the flow path of the emergency spillway of the existing Sunport Detention Pond. Will the spillway path be impeded?
2. The design flowrate used at the east property line is 256 cfs, which corresponds to an existing flow rate from the West End Basin off of the Airport. The future developed flow rate of 408 cfs should be used in planning the downstream improvements.
3. Easements must be gained from the City for the improvements located on City property.
4. Will a structure be required to connect the discharge from the 2-60 inch culverts under University Boulevard to the proposed 48 inch storm drain to the proposed detention pond?
5. Have calculations been made on the hydraulics for turning the discharge from the new detention pond and the flow from the small detention pond to the west? Will a junction box be required at this point in lieu of the manhole shown?

Mr. Fred Aguirre
April 21, 1997
Page 2

Please accept these comments on behalf of the Aviation Department. If you have any questions concerning these comments, please contact Mr. Dennis Parker, Assistant Director of Aviation at 842-4366 or me at 242-5700.

Sincerely,

MOLZEN-CORBIN & ASSOCIATES

A handwritten signature in black ink, appearing to read "Mike Provine". The signature is fluid and cursive, with the first name "Mike" and last name "Provine" clearly distinguishable.

Mike Provine, P.E.

MP:cvh

cc: Mr. Dennis Parker, AAE, Assistant Director of Aviation

R&B LLC
2121 Yale SE
Albuquerque, New Mexico 87106
505.299.0115

August 19, 1997

Honorable Mayor Martin Chavez
P.O. Box 1293
Albuquerque, New Mexico 87103

Honorable Mayor Chavez:

R&B LLC, owner of the 50 acre parcel located on the south east corner of Sunport Blvd. and I-25, proposes the following to the City of Albuquerque:

-This acreage will be used to provide a full service facility for all rent-a-car companies presently located on airport premises. My father and I recently paid a visit to Sacramento, California where we saw what is believed to be the best rent-a-car facility designed to date. Every rent-a-car company we have talked with agree unanimously that this site plan works beautifully. We intend to use those plans to develop this particular facility.

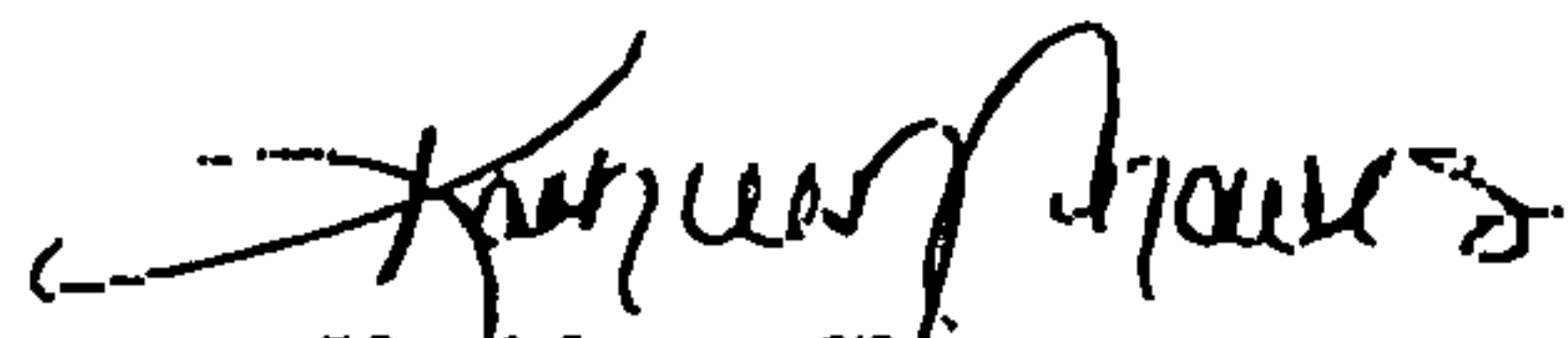
-R&B LLC will enter into negotiations with each individual rent-a-car company.

-R&B LLC will pay to the City of Albuquerque an annual access fee of Two Million Dollars.

My father and I look forward to discussing this proposal with you further today at our 2:00pm meeting.

Sincerely,

R&B LLC


Kathleen Chavez

R&B LLC
2121 Yale SE
Albuquerque, New Mexico 87106
505.299.0115

August 19, 1997

Honorable Mayor Martin Chavez
P.O. Box 1293
Albuquerque, New Mexico 87103

Honorable Mayor Chavez:

R&B LLC owns a 50 acre parcel located on the south east corner of Sunport Blvd and I-25. There is a holding pond adjacent to the north east corner of this property. This pond poses the following problems:

- It is an eyesore for both the property itself and the city's recent construction of the new "Gateway to Albuquerque".
- It does not adequately accomodate the hydrological requirements for the existing Aircraft Blvd. run off.
- It does not adequately accomodate the runoff received from the airport's east-west runway.

We propose the following solution:

- We will take three out of five acres on the south side of Aircraft Blvd. which is currently owned by the Albuquerque Airport and build a three acre pond that will accomodate water received from the Aircraft Blvd. runoff and the runoff from the airport's east-west runway.

-We will replace the three of the five acres used for ponding on the south side of Aircraft Blvd. by giving the City of Albuquerque three acres owned by R&B LLC that are contiguous to the five acre parcel. This will give the Albuquerque Airport a complete five acre parcel.

-This pond will be built to be asthetically pleasing to the eye.

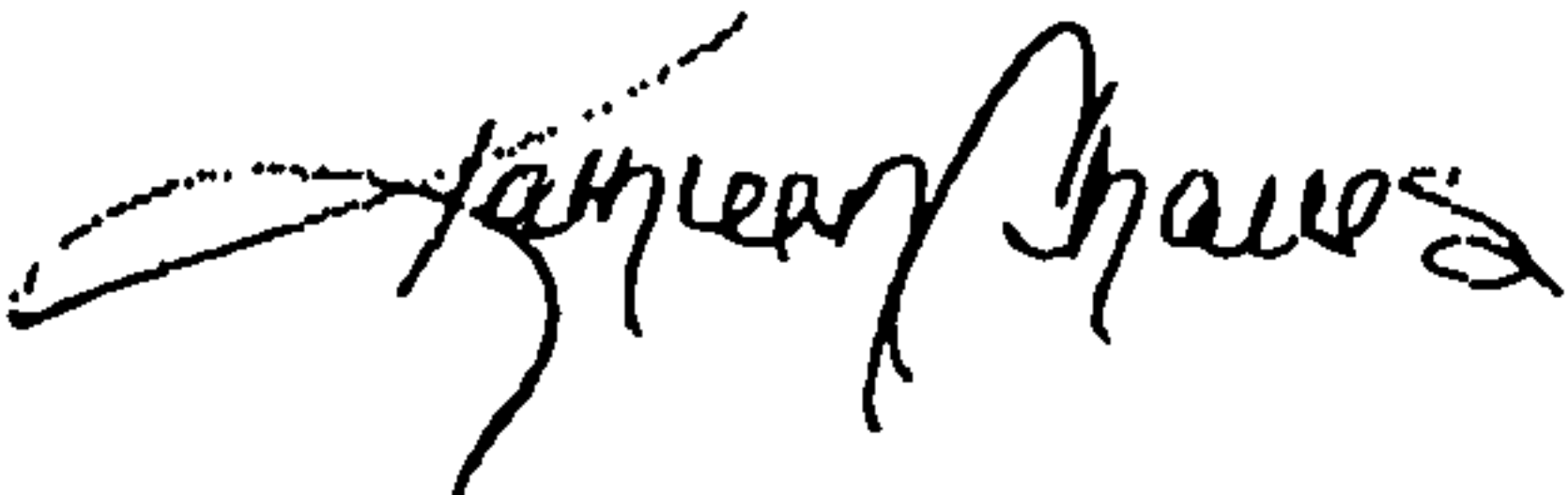
R&B LLC will pay for any and all costs pertaining to the construction and maintenance of this hydrological solution. In consideration for this, we are asking the City of Albuquerque for aquisition of the current two acre pond which will then no longer be as such.

Thank you for your time and considration regarding this matter.

I look forward to your reply.

Sincerely,

R&B LLC

A handwritten signature in cursive script, appearing to read 'Kathleen Chaves', with a long, sweeping horizontal line extending to the left.

Kathleen Chaves

MOLZEN-CORBIN**& Associates**

ENGINEERS/ARCHITECTS/PLANNERS

2701 Miles Road Southeast
Albuquerque, New Mexico 87106
Telephone 505-242-5700
Fax 505-242-0673



April 21, 1997

Mr. Fred Aguirre
Public Works Department, Hydrology
City of Albuquerque
P.O. Box 1293
Albuquerque, New Mexico 87103

**RE: Sunport Park Drainage
DRB Case 97-68**

ABQ41-11.C03

Dear Mr. Aguirre:

We have received and reviewed for the Aviation Department, the Drainage Masterplan for Sunport Park, Parcel 2A as submitted by Brasher & Lorenz, dated April 3, 1997. We offer the following comments on behalf of the Aviation Department:

1. It appears that the proposed office location is directly in the flow path of the emergency spillway of the existing Sunport Detention Pond. Will the spillway path be impeded?
2. The design flowrate used at the east property line is 256 cfs, which corresponds to an existing flow rate from the West End Basin off of the Airport. The future developed flow rate of 408 cfs should be used in planning the downstream improvements.
3. Easements must be gained from the City for the improvements located on City property.
4. Will a structure be required to connect the discharge from the 2-60 inch culverts under University Boulevard to the proposed 48 inch storm drain to the proposed detention pond?
5. Have calculations been made on the hydraulics for turning the discharge from the new detention pond and the flow from the small detention pond to the west? Will a junction box be required at this point in lieu of the manhole shown?

Mr. Fred Aguirre
April 21, 1997
Page 2

Please accept these comments on behalf of the Aviation Department. If you have any questions concerning these comments, please contact Mr. Dennis Parker, Assistant Director of Aviation at 842-4366 or me at 242-5700.

Sincerely,

MOLZEN-CORBIN & ASSOCIATES



Mike Provine, P.E.

MP:cvh

cc: Mr. Dennis Parker, AAE, Assistant Director of Aviation

MOLZEN-CORBIN



& Associates

ENGINEERS/ARCHITECTS/PLANNERS

2701 Miles Road Southeast
Albuquerque, New Mexico 87106
Telephone 505-242-5700
Fax 505-242-0673

March 28, 1997

Mr. Fred Aguirre, P.E.
City of Albuquerque
Public Works Department
P.O. Box 1293
Albuquerque, New Mexico 87103

**RE: Sunport Park Drainage
DRB Case 97-119**

ABQ41-11.C01

Dear Mr. Aguirre:

We have been requested by the Aviation Department to review and comment on the Sunport Park Drainage MasterPlan submitted to the City for review. We have reviewed sheet C-2 of the masterplan dated February 25, 1997, and offer the following comments on behalf of the Aviation Department:

1. The drainage boundaries illustrated on the Phase I portion of the proposed development do not agree with the masterplan prepared by Andrews, Asbury and Robert (AAR). The land treatment shown indicates a 100 percent impervious surface. The Sunport system was designed to accept the basin as shown on that masterplan. The AAR masterplan indicated a land treatment consistent with commercial development with a maximum of 90 percent impervious surface. Undetained flow from the system, shown on the current drawing, may exceed the system capacity.
2. The capacity and structural integrity of the 3-36" RCP crossing at I-25 are of concern due to age and condition. Calculations performed during the preparation of the Sunport Boulevard Drainage Report indicate that the capacity of this structure is approximately 300 cfs. This capacity should not be exceeded in order to protect the improvements constructed in the Sunport Boulevard projects.
3. There is not an easement identified for the 42" outfall pipe from the detention pond.
4. A public detention pond is proposed. Who will be responsible for maintenance?

Mr. Fred Aguire, P.E.

March 28, 1997

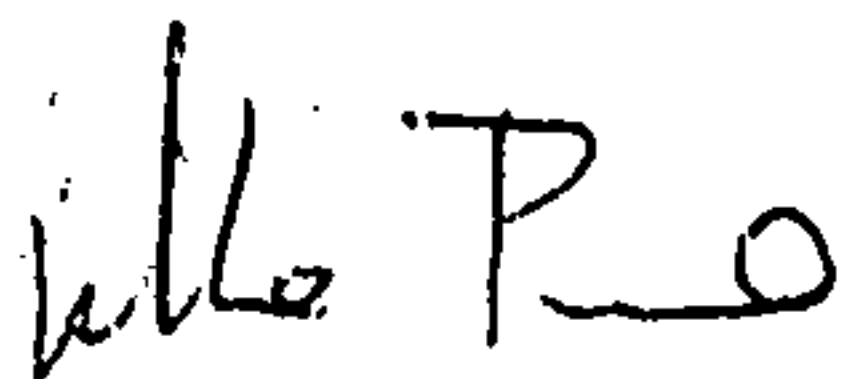
Page 2

5. Drop inlets are indicated on the north boundary of Phase I. We assume these are intended to catch surface flows. The finished grading shown indicates a slope of approximately 5% with a cross slope. Will the drop inlets be effective in collecting the surface water prior to reaching the western boundary of the development with the cross slope indicated?
6. Will the proposed public detention pond require permitting through the State Engineer's Office?
7. What provisions will be made for an emergency spillway for the proposed pond?

Please accept these comments and questions for the hearing scheduled for Tuesday, April 1, 1997. If you have any questions concerning these comments, please contact the Mr. Dennis Parker, Assistant Director of Aviation, at 842-4366 or me at 242-5700.

Sincerely,

MOLZEN-CORBIN & ASSOCIATES



Mike Provine, P.E.

MP:cvh

cc: Mr. Dennis Parker, AAE, Assistant Director of Aviation



Federal Emergency Management Agency

Washington, D.C. 20472



CERTIFIED MAIL
RETURN RECEIPT REQUESTED

IN REPLY REFER TO:
102A

The Honorable Louis Saavedra
Mayor, City of Albuquerque
P.O. Box 1293
Albuquerque, New Mexico 87103

Case No.: 92-06-098P
Community: City of Albuquerque,
New Mexico

FIRM Panel Number: 350002 0035 C

Effective Date

of This Revision: **JUL 31 1992**

Dear Mayor Saavedra:

This is in response to a letter dated June 25, 1992, from Mr. Gilbert Aldaz, P.E., Floodplain Administrator, City of Albuquerque, regarding the effective Flood Insurance Rate Map (FIRM) for the City of Albuquerque, New Mexico. In his letter, Mr. Aldaz requested that we revise the effective FIRM to show the effects of construction of a storm drain system for Sunport Park Phase I, and the addition of fill on the west side of Transport Street from approximately 100 feet north of the intersection with Woodward Avenue, to approximately 400 feet south of the intersection along an unnamed area of shallow flooding (Zone AO) in the vicinity of University Boulevard, SE., and Woodward Road. Mr. Aldaz submitted all of the data necessary to review this request with his letters dated March 25, 1991, and June 25, 1992; and with letters from Mr. Thomas L. Holtman, P.E., Andrews, Asbury & Robert, Inc., dated March 11 and July 25, 1991, and March 12, 1992.

We have completed our review of the submitted data with regard to the data used to produce the effective FIRM, and have revised the FIRM to modify the floodplain boundary delineations and zone designations of a flood having a 1-percent probability of being equaled or exceeded in any given year (base flood) along an unnamed area of shallow flooding (Zone AO) in the vicinity of University Boulevard, SE., and Woodward Road. As a result of construction of a storm drain system and the addition of fill, the 100-year floodplain has been removed from the FIRM. The 100-year flood is contained in the storm drain system.

The modification is shown on the enclosed annotated copy of FIRM Panel 350002 0035 C. This Letter of Map Revision (LOMR) hereby revises this panel of the effective FIRM dated October 14, 1983.

Because of current funding constraints, we must limit the number of physical map revisions. Consequently, we will not publish a revised FIRM for the City of Albuquerque to reflect modifications at this time. However, if in the future we revise and republish the FIRM panel affected by this LOMR, we will incorporate the previously described modifications at that time.

Because this revision does not involve any floodway changes, we are not enclosing an annotated Flood Boundary and Floodway Map (FBFM). Unless a

subsequent physical map revision involves floodway changes for FBFM Panel 350002 0035, we will not revise it to show the changes made by this LOMR.

This modification has been made pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (P.L. 93-234) and are in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, P.L. 90-448), 42 U.S.C. 4001-4128, and 44 CFR, Part 65. As required by the legislation, a community must adopt and enforce floodplain management measures to ensure continued eligibility to participate in the National Flood Insurance Program (NFIP). Therefore, your community must enforce these regulations using, at a minimum, the base (100-year) flood elevations, zone designations, and floodways in the Special Flood Hazard Areas shown on the FIRM for your community, including the previously described modification.

This response to your request is based on minimum floodplain management criteria established under the NFIP. Your community is responsible for approving all proposed floodplain developments, including this request, and for ensuring that necessary permits required by Federal or State law have been received. With knowledge of local conditions and in the interest of safety, State and community officials may set higher standards for construction, or may limit development in floodplain areas. If the State of New Mexico or the City of Albuquerque has adopted more restrictive or comprehensive floodplain management criteria, these criteria take precedence over the minimum NFIP requirements.

The community number and suffix code listed above will be used for all flood insurance policies and renewals issued for your community on and after the effective date listed above.

The modifications described herein are effective as of the date of this letter. However, a review of the modifications and any requests for changes should be made within 30 days. Any request for reconsideration must be based on scientific or technical data.

This LOMR will not be printed and distributed to primary map users such as local insurance agents and mortgage lenders; therefore, the community will serve as a repository for these new data. We encourage you to disseminate the information reflected by this LOMR widely throughout the community in order that interested persons such as property owners, insurance agents, and mortgage lenders may benefit from this information. We also encourage you to consider preparing an article for publication in the community's local newspaper that would describe the changes that have been made and the assistance the community will provide in serving as a clearinghouse for these data and interpreting NFIP maps.

Please note that the Federal Emergency Management Agency (FEMA) is currently developing detailed application and certification forms for use in requesting revisions or amendments to NFIP maps. Forms will be available this summer and will be used for requests received by FEMA on or after October 1, 1992. These forms will highlight technical considerations in a fashion that facilitates an efficient review; therefore, use of these forms prior to October 1 is strongly recommended. Application forms should be available

after July 1 for Letter of Map Amendment and LOMR Based on Fill requests, and after September 1 for the more common types of revision requests.

If you have any questions regarding the modifications described herein, please call the Chief, Natural and Technological Hazards Division, FEMA, in Denton, Texas, at (817) 898-5162, or Mr. Alan Johnson of my staff in Washington, D.C., at (202) 646-3403.

Sincerely,



William R. Locke
Chief, Risk Studies Division
Federal Insurance Administration

Enclosures

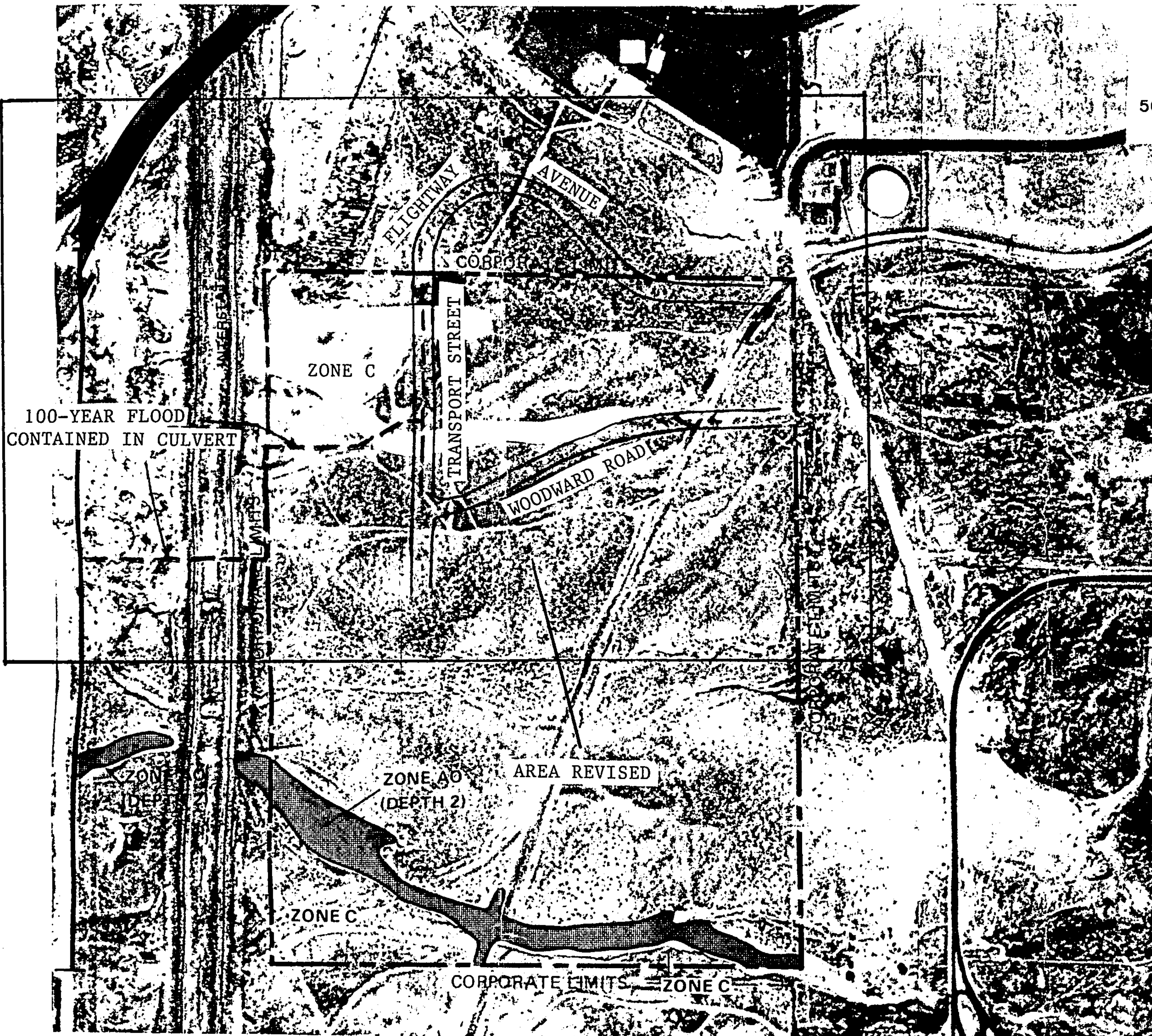
cc: Mr. Gilbert Aldaz, P.E.
Floodplain Administrator
City of Albuquerque

Mr. Thomas L. Holtman, P.E.
Andrews, Asbury, & Robert, Inc.



SCALE: 1"=500'

500 0 500



NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

CITY OF
ALBUQUERQUE,
NEW MEXICO
BERNALILLO COUNTY

PANEL 35 OF 50

REVISED TO
REFLECT LOMR
DATED **JUL 31 1992**

COMMUNITY-PANEL NUMBER

350002 0035 C

EFFECTIVE DATE:

OCTOBER 14, 1983



Federal Emergency Management Agency