DRAINAGE INFORMATION SHEET

PROJECT TITLE: *Emcore Building* ZONE ATLAS/DRNG. FILE #: *M-21* 005E

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

LEGAL DESCRIPTION: *Lot 2, Block 4, Sandia Research Park*

CITY ADDRESS: *SE Corner of Research Rd & Eubank Blvd*

ENGINEERING FIRM: *TIERRA WEST, LLC* CONTACT: *RONALD R. BOHANNAN*

ADDRESS: *4421 McCleod Rd. NE Suite D, 87109* PHONE: *(505) 883-7592*

OWNER: *Reed & Associates* CONTACT: *Mike Reed*

ADDRESS: _____ PHONE: _____

ARCHITECT: *Dekker-Perich & Associates* CONTACT: *Tim Grattan*

ADDRESS: *6801 Jefferson NE Suite 100* PHONE: *(505) 761-9700*

SURVEYOR: *Precision Surveys* CONTACT: *Larry Medrano*

ADDRESS: *2929 Coors Blvd NW Suite 309* PHONE: *(505)839-0569*

CONTRACTOR: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

TYPE OF SUBMITTAL:

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

PRE-DESIGN MEETING:

_____ YES
X NO
_____ COPY PROVIDED

CHECK TYPE OF APPROVAL SOUGHT:

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

RECEIVED
APR 16 1998
HYDROLOGY SECTION

DATE SUBMITTED: 4/14/98

BY: *Ronald R. Bohannan*

DRAINAGE REPORT
FOR

LOT 2 BLOCK 4
SANDIA RESEARCH FACILITY

EMCORE BUILDING

Prepared by:

Tierra West, LLC
4421 McLeod Rd., NE, Suite D
Albuquerque, New Mexico 87109

February, 1998

Revised April, 1998

I certify that this report was prepared under my supervision, and I am a registered professional engineer in the State of New Mexico in good standing.

RONALD RAY BOHANNAN
NEW MEXICO
REGISTERED PROFESSIONAL ENGINEER
7868

Ronald R. Bohannan
PE NO. 7868
4-15-98

Job No. 980005

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HYDROLOGY SECTION

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Runoff Calculations

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SECTION IV - AHYMO FILES
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AHYMO INPUT FILE (100 & 6 hour storm)
AHYMO SUMMARY OUTPUT

MAP POCKET
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APPENDIX
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Section I

Report

Location

Tract 2, Block 4 of the Sandia Research Center is located at the southeast corner of Research Road and Eubank Boulevard in the southeast quadrant of Albuquerque. The site has been highlighted on Zone Atlas page number M-2 for an exact location. The owners of the project are proposing to construct a new research warehouse building on the site to be built in one phase. The site contains 5.211 acres.

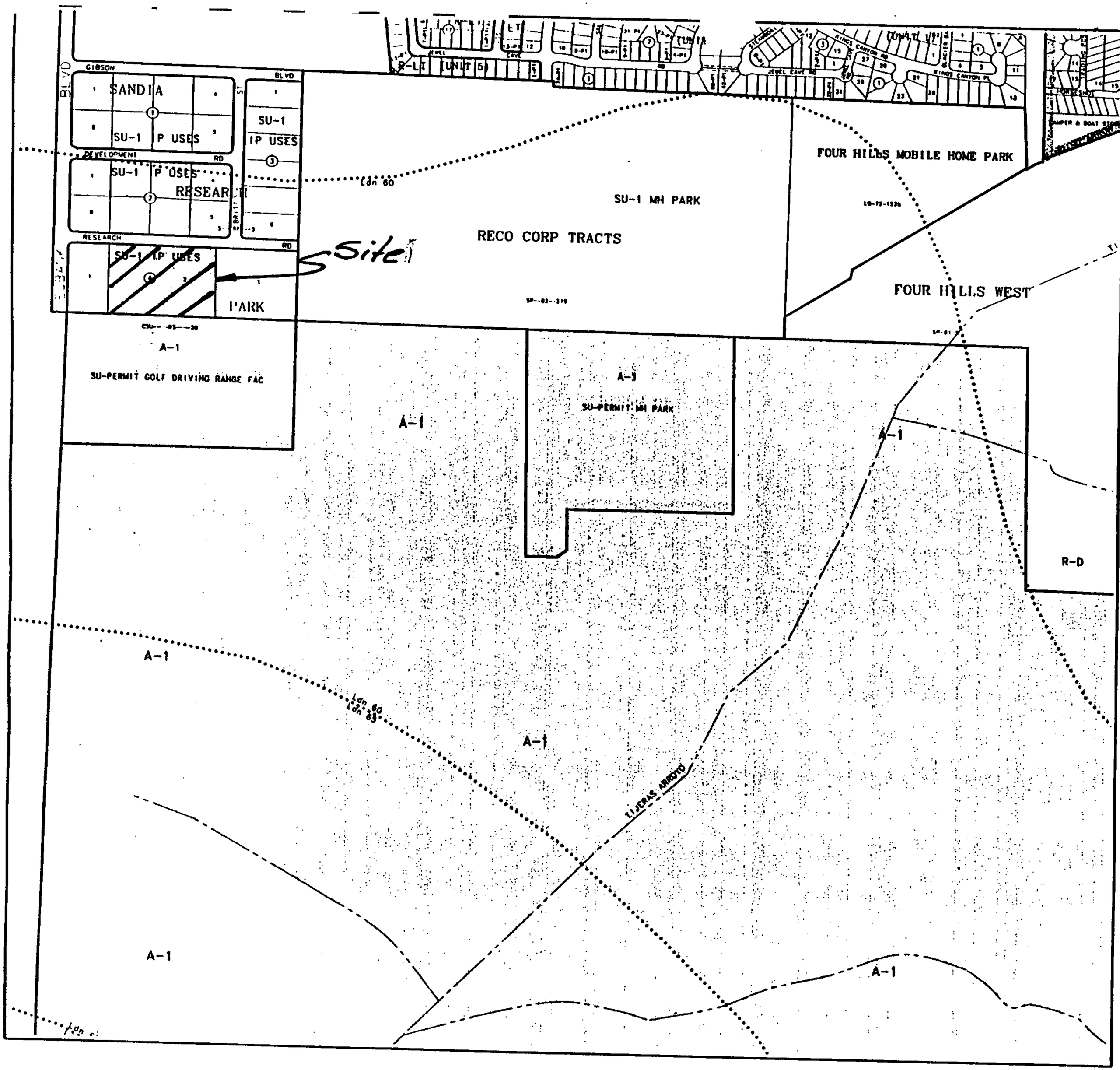
Purpose

The purpose of this drainage report is to amend the approved grading and drainage solution for the proposed building to be built in one phase, versus two phases. We are requesting grading approval, Site Development Plan for Building Permit, and Building Permit at this time.

RECEIVED
APR 16 1998
HYDROLOGY SECTION

Existing Drainage Conditions

The site falls within the approved Sandia Research Park Drainage Report, and it is currently undeveloped. Research Road, and all of the roads, were constructed but the individual parcels (with the exception of Lot 3, Block 4, Lot 8, Block 2) are undeveloped at this time. The existing conditions for the entire site were originally analyzed under the Drainage Report for Sandia Research Park prepared by Andrews, Asbury, & Robert under M-15/D5, a copy of which is attached in the appendix.



GRAPHIC SCALE IN FEET

250 0 500 1000

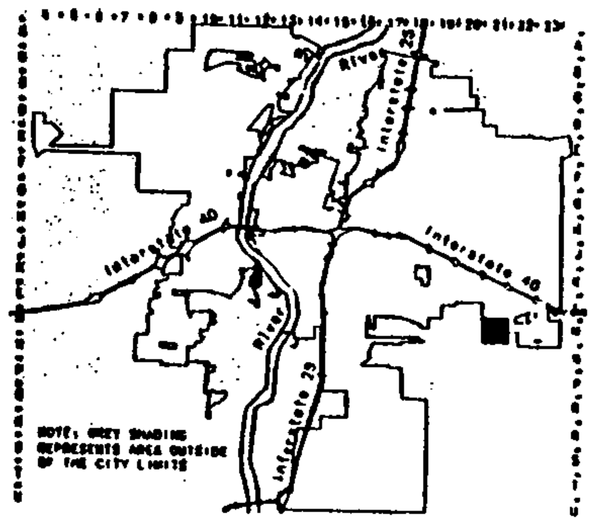
CITY OF Albuquerque

Albuquerque Geographic Information System

PLANNING DEPARTMENT

©Copyright 1997

Map Amended through February 17, 1997



LEGAL DESCRIPTION

T10N

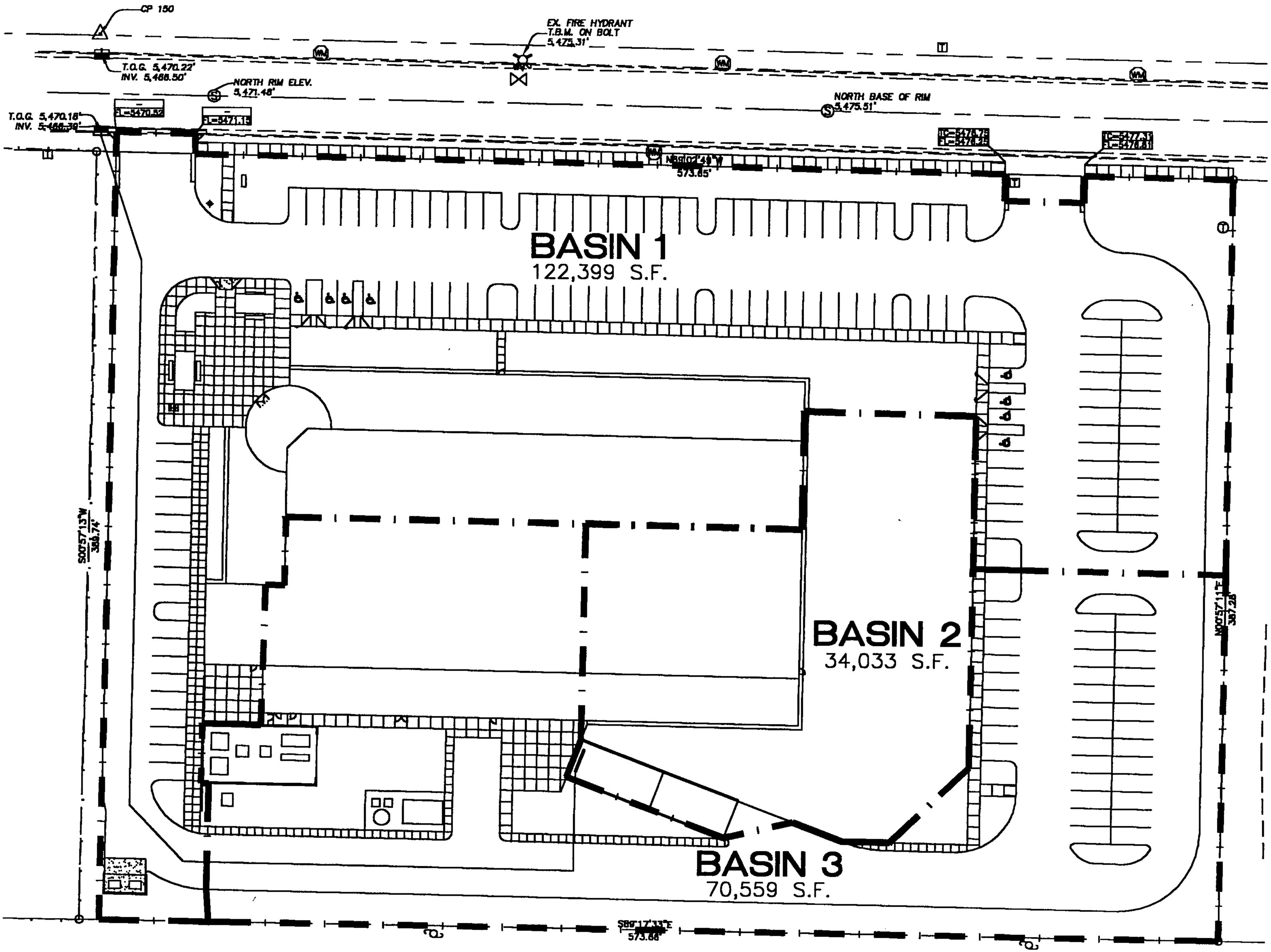
R4E

SEC 33

UNIFORM PROPERTY CODE

1-021-056

M-21-Z


CP 150
EX. FIRE HYDRANT
T.B.M. ON BOLT
5,475.31'
T.O.G. 5,470.22'
INV. 5,466.50'
NORTH RIM ELEV.
5,471.48'
NORTH BASE OF RIM
5,475.51'
T.O.G. 5,470.18'
INV. 5,466.39'
FL=5470.52
FL=5471.15
N89°02'49"W
573.65'
BASIN 1
122,399 S.F.
BASIN 2
34,033 S.F.
BASIN 3
70,559 S.F.
S00°57'13"W
356.74'
N00°57'11"E
387.28'
S89°17'33"E
573.68'

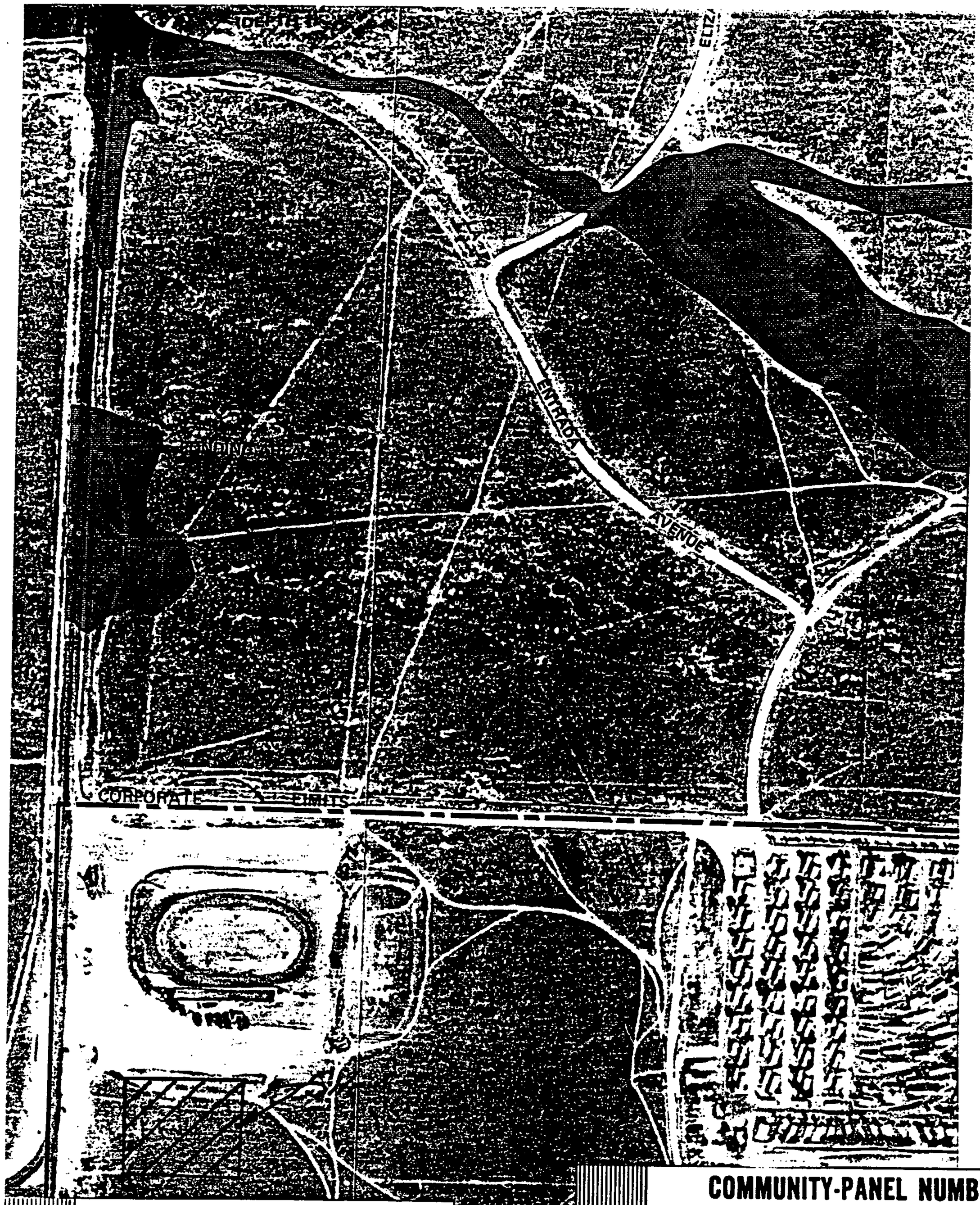
The site does not have any developed flows that impact the project. The proposed project lies within the park and is bounded on the west by the temporary retention pond, on the east by a developed site, and on the north by Research Boulevard. The south is owned by APS and is currently undeveloped. The site falls east to west at around 2%. The property to the east has directed all of the developed runoff to Research Road and the runoff to the property to the south flows west and south away from the project.

The approved drainage plan proposes to direct all the developed flow to the streets within Research Road and Eubank Boulevard. These flows are then collected by an existing storm sewer collection system. This storm sewer system collects the entire flow directing it to a temporary retention pond located on Lot 1, Block 4, due west of the site. The future Eubank storm system will intercept the flows and remove the need for the retention basin on Lot 1, Block 4. The site was analyzed under one basin (Basin 1) for existing flows. The AHYMO run was used to calculate the flows and calculated the 100 year and 10 year flows at 9.76 cfs and 2.90 cfs, respectively.

Flood Plain and Soil Condition

The site is located on FEMA Map No. 350002 panel 37 as shown on the attached excerpt. The map shows that the site does not lie within any 100 year flood plains.

The site contains two soil types: Madurez Wink (MWA) and Tijeras



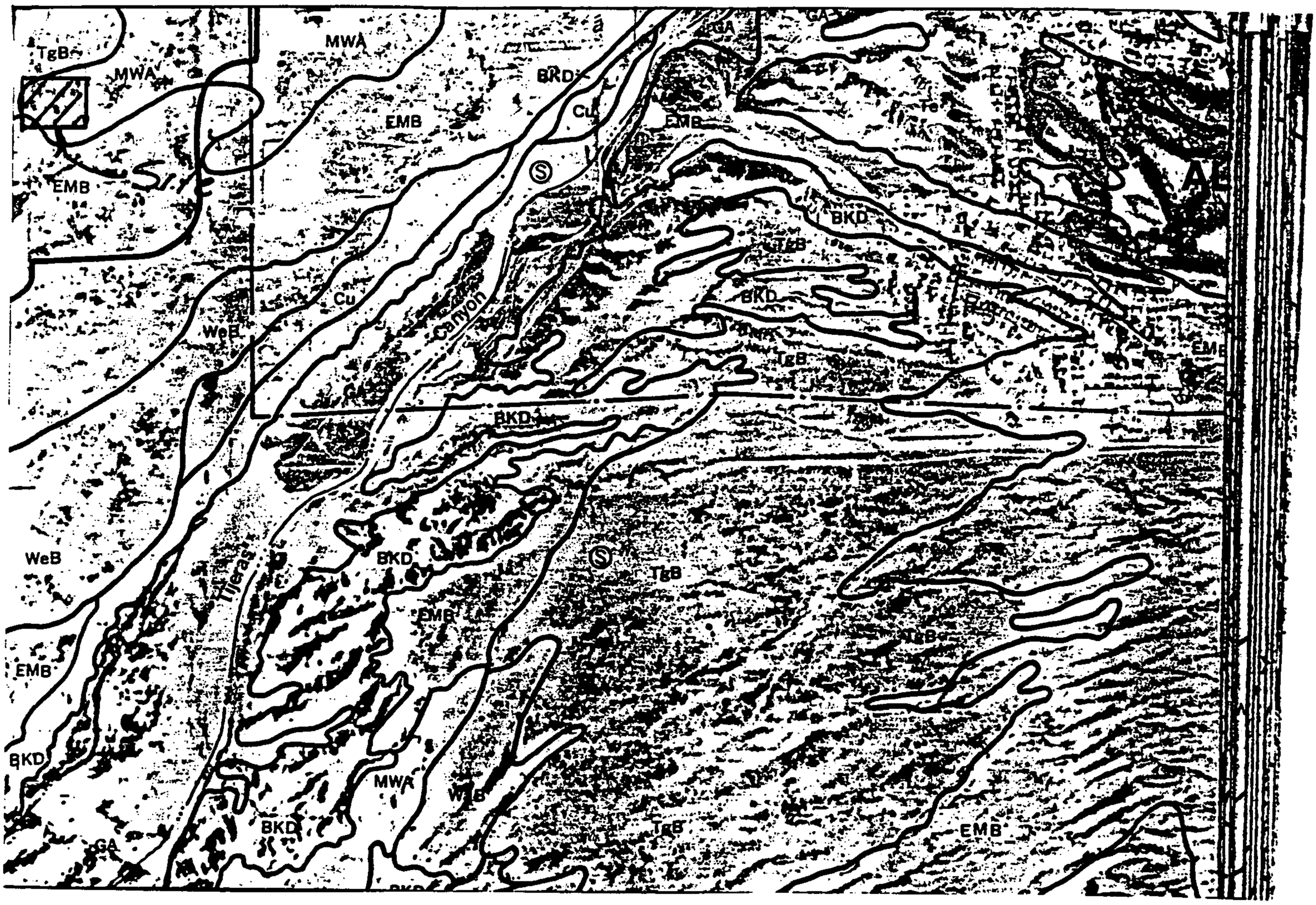
FIRM
FLOOD INSURANCE RATE MAP

COMMUNITY-PANEL NUMBER

350002 0037 C

EFFECTIVE DATE:

OCTOBER 14, 1983



SOIL SURVEY OF

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

Location

Tract 2, Block 4 of the Sandia Research Center is located at the southeast corner of Research Road and Eubank Boulevard in the southeast quadrant of Albuquerque. The site has been highlighted on Zone Atlas page number M-2 for an exact location. The owners of the project are proposing to construct a new research warehouse building on the site to be built in one phase. The site contains 5.211 acres.

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The purpose of this drainage report is to amend the approved grading and drainage solution for the proposed building to be built in one phase, versus two phases. We are requesting grading approval, Site Development Plan for Building Permit, and Building Permit at this time.

Existing Drainage Conditions

The site falls within the approved Sandia Research Park Drainage Report, and it is currently undeveloped. Research Road, and all of the roads, were constructed but the individual parcels (with the exception of Lot 3, Block 4, Lot 8, Block 2) are undeveloped at this time. The existing conditions for the entire site were originally analyzed under the Drainage Report for Sandia Research Park prepared by Andrews, Asbury, & Robert under M-15/D5, a copy of which is attached in the appendix.

The site does not have any developed flows that impact the project. The proposed project lies within the park and is bounded on the west by the temporary retention pond, on the east by a developed site, and on the north by Research Boulevard. The south is owned by APS and is currently undeveloped. The site falls east to west at around 2%. The property to the east has directed all of the developed runoff to Research Road and the runoff to the property to the south flows west and south away from the project.

The approved drainage plan proposes to direct all the developed flow to the streets within Research Road and Eubank Boulevard. These flows are then collected by an existing storm sewer collection system. This storm sewer system collects the entire flow directing it to a temporary retention pond located on Lot 1, Block 4, due west of the site. The future Eubank storm system will intercept the flows and remove the need for the retention basin on Lot 1, Block 4. The site was analyzed under one basin (Basin 1) for existing flows. The AHYMO run was used to calculate the flows and calculated the 100 year and 10 year flows at 9.76 cfs and 2.90 cfs, respectively.

Flood Plain and Soil Condition

The site is located on FEMA Map No. 350002 panel 37 as shown on the attached excerpt. The map shows that the site does not lie within any 100 year flood plains.

The site contains two soil types: Madurez Wink (MWA) and Tijeras

(TgB) as indicated on the Soil Map (sheet #42) from the Soil Conservation Service Survey of Bernalillo County. The Tijeras is gentle sloping old allivate fan material with moderate runoff and soil erosion. The Madurez Wink series is a sandy loam with slow runoff and moderate to severe soil erosion. (See attached soil map for site location).

Proposed Conditions and On-Site Drainage Management Plan

This project will be developed in a single phase that encompasses the entire tract. The enclosed grading plan in the map pocket shows the grades for the entire project and the new basin layout.

The site has been divided into three basins. Basin 1 collects the northern half of the site and directs the flow out the west entrance to Research Road. Basin 2 collects a portion of the roof drainage and the area east of the building and directs the flow to a sump area in the loading dock. Basin 3 collects the balance of the site and directs the flow to a small storm sewer that is located on the site. This storm drain will flow west and then north and tie to the back of an existing drop inlet located at the northwest corner of the site and in Research Road. This storm sewer connection will require an SO19 permit to make the tie.

The entire site runoff will continue to drain per the Sandia Research Park Master Drainage Plan which calls for free discharge from the site to Research Road and the storm drain. The developed discharge rate for the entire site

(containing 5.211 acres) is 24.90 cfs for the 100 year and 16.13 cfs for the 10 year flows. The individual basins discharge at the following rates: Basin 1 is 13.42 cfs for the 100 year and 8.72 cfs for the 10 year flows. Basin 2 is 3.69 cfs for the 100 year and 2.39 for the 10 year, Basin 3 is 7.66 cfs for the 100 year and 4.96 cfs for the 10 year flows.

The Sandia Research Park, as mentioned, was originally analyzed by Andrews, Asbury, & Robert using the rational method for all of the basins. We have included a copy of the report from the file in the appendix. The new flows were analyzed under City of Albuquerque, Development Process Manual, Section 22.2, Hydrology Section, revised January, 1993, was used for runoff calculations. See Sections IV, V, and VI of this report for AHYMO input and output files for runoff and ponding calculations.

Summary

Lot 2, Block 4 proposes to discharge 24.90 cfs and 16.13 cfs from a 5.211 acre site to Research Road per the approved drainage master plan prepared by Andrews, Asbury, and Robert under M-15/D5. The flows enter Research Road via surface drainage and an on site storm drain that drains to an existing storm sewer and conveyed to a retention pond located on Lot 1 Block 4. This pond will be removed when the City and AMAFCA construct the Eubank Storm Drain.

Infrastructure List

All work will be performed under building permit and the storm sewer connection will require an SO19 permit.

Runoff Calculations

Curb Cut

Weir Equation:

$Q=CLH^{3/2}$

Equation 5-10 Handbook of Hydraulics
King and Brater

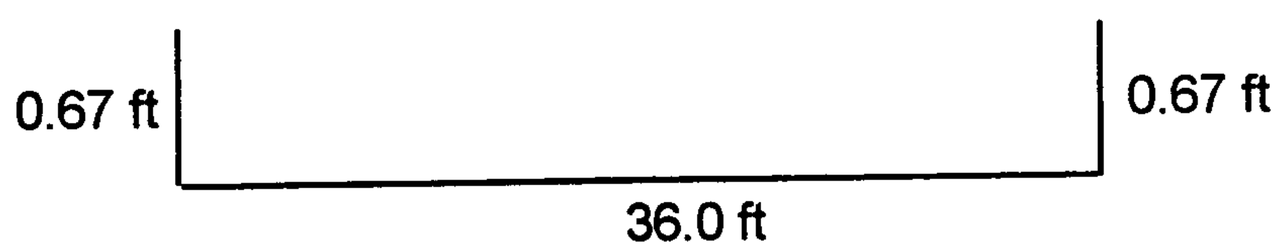
Basin 2:
Q= Flow (cfs)
C = 2.95

H = 0.67 ft
L = 2.0 ft

Where
Q = Flow in cubic feet per second
C = Coefficient for Broad Crested Weirs
Table 5-3 King and Brater
H = Height of the water
L = Width of the weir

$Q=2.95*36.0*0.67^{3/2}$

Q = 58.24 cfs
58.24 cfs > 13.47 cfs



Driveway Opening Capacity

Manning's Equation:

Equation 7-366 Handbook of Hydraulics
Braten and King

$$Q = \frac{1.49}{n} A R^{2/3} S^{1/2}$$

Where
Q = Flow (cfs)
n = 0.017
A = Area
R = Hydraulic Radius
S = Slope

Roughness located page 7-22

$$A = 0.24 + 24 * 0.5 = 12.00$$

$$WP = 2 * 0.5 + 24 = 25$$

$$R = \frac{A}{WP} = \frac{12}{25} = 0.480$$

Manning's Equation:

$$Q = \frac{1.49}{0.017} * 12 * 0.48^{2/3} * 0.028^{1/2}$$

$$Q = 107.89 \ cfs$$

Capacity of curb cut open = 107.87 cfs
Required capacity of street = 13.47 cfs
107.87 cfs > 13.47cfs

RUNOFF CALCULATIONS

The site is @ Zone 3

LAND TREATMENT

Proposed	*Existing*
B = 10%	A = 100%
D = 90%	

DEPTH (INCHES) @ 100-YEAR STORM

P_{60} = 2.14 inches

P_{360} = 2.60 inches

P_{1440} = 3.10 inches

DEPTH (INCHES) @ 10-YEAR STORM

P_{60} = 2.14 x 0.667
= 1.427 inches

P_{360} = 2.60 x 0.667
= 1.734

P_{1440} = 2.068

See the summary output from AHYMO calculations.

Drainage Basins

BASIN	AREA (SF)	AREA (AC)	AREA (M1^2)
1	122,399.16	2.8099	0.0044
2	34,033.00	0.7813	0.0012
3	70,559.00	1.6198	0.0025
Total	226,991.16	5.211	0.008142

Runoff Calculation Results

BASIN	Q-100 CFS	Q-10 CFS	V-100 AC-FT	V-10 AC-FT
1	13.47	8.72	0.519	0.324
2	3.69	2.39	0.142	0.088
3	7.66	4.96	0.295	0.184

Drainage Facilities Analysis

Pipe Capacity
for pipe flowing full

Q = Flow (cfs)
d = Diameter of pipe (ft)
S = Slope
n = 0.010

$$d = \left(\frac{2.159 * Q * n}{S^{1/2}} \right)^{3/8}$$

Equation 6-26b Page 6-15, Handbook of Hydraulics, Braten & King

$$d = \left(\frac{2.159 * 11.35 * 0.010}{0.007^{1/2}} \right)^{3/8}$$

d = 1.496 ft
= 17.95 inches

Use pipe diameter of 18"

AHYMO
Runoff Input
and
Summary Output
for
Existing Drainage Basins

AHYMO SUMMARY TABLE (AHYMO194) - AMAFCA Hydrologic Model - January, 1994 RUN DATE (MON/DAY/YR) =04/15/1998

INPUT FILE = A:\9805E.DAT USER NO.= R_BOHANN.I01

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	PAGE = 1 NOTATION	
START										TIME=	.00
RAINFALL TYPE= 1										RAIN6=	2.600
COMPUTE NM HYD	100.10	-	1	.00440	5.28	.154	.65514	1.533	1.874	PER IMP=	.00
COMPUTE NM HYD	100.20	-	1	.00120	1.45	.042	.65514	1.533	1.882	PER IMP=	.00
COMPUTE NM HYD	100.30	-	1	.00250	3.00	.087	.65514	1.533	1.876	PER IMP=	.00
START										TIME=	.00
RAINFALL TYPE= 1										RAIN6=	1.730
COMPUTE NM HYD	110.10	-	1	.00440	1.57	.044	.18715	1.533	.557	PER IMP=	.00
COMPUTE NM HYD	110.20	-	1	.00120	.43	.012	.18715	1.533	.560	PER IMP=	.00
COMPUTE NM HYD	110.30	-	1	.00250	.89	.025	.18715	1.533	.558	PER IMP=	.00
START										TIME=	.00
RAINFALL TYPE= 1										RAIN6=	2.600
COMPUTE NM HYD	100.10	-	1	.00440	13.47	.519	2.21185	1.500	4.782	PER IMP=	90.00
COMPUTE NM HYD	100.20	-	1	.00120	3.69	.142	2.21185	1.500	4.801	PER IMP=	90.00
COMPUTE NM HYD	100.30	-	1	.00250	7.66	.295	2.21185	1.500	4.787	PER IMP=	90.00
START										TIME=	.00
RAINFALL TYPE= 1										RAIN6=	1.730
COMPUTE NM HYD	110.10	-	1	.00440	8.72	.324	1.38065	1.500	3.098	PER IMP=	90.00
COMPUTE NM HYD	110.20	-	1	.00120	2.39	.088	1.38065	1.500	3.108	PER IMP=	90.00
COMPUTE NM HYD	110.30	-	1	.00250	4.96	.184	1.38065	1.500	3.101	PER IMP=	90.00
FINISH											

```
*****************************************************************
*          SANDIA RESEARCH FACILITY - EMCORE BUILDING           *
*****************************************************************
*        100-YEAR, 6-HR STORM  (UNDER EXISTING CONDITIONS)       *
*****************************************************************
*
START                   TIME=0.0
*
* BASIN 1
*
RAINFALL                TYPE=1 RAIN QUARTER=0.0 IN
                        RAIN ONE=2.14 IN RAIN SIX=2.60 IN
                        RAIN DAY=3.10 IN DT=0.03333 HR
COMPUTE NM HYD          ID=1 HYD NO=100.1 AREA=0.0044 SQ MI
                        PER A=100.00 PER B=0.00 PER C=0.00 PER D=0.00
                        TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD               ID=1 CODE=1
*
* BASIN 2
*
COMPUTE NM HYD          ID=1 HYD NO=100.2 AREA=0.0012 SQ MI
                        PER A=100.00 PER B=0.00 PER C=0.00 PER D=0.00
                        TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD               ID=1 CODE=1
*
* BASIN 3
*
COMPUTE NM HYD          ID=1 HYD NO=100.3 AREA=0.0025 SQ MI
                        PER A=100.00 PER B=0.00 PER C=0.00 PER D=0.00
                        TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD               ID=1 CODE=1
*
*
*
*****************************************************************
*         10-YEAR, 6-HR STORM  (UNDER EXISTING CONDITIONS)        *
*****************************************************************
*
START                   TIME=0.0
*
* BASIN 1
*
RAINFALL                TYPE=1 RAIN QUARTER=0.0 IN
                        RAIN ONE=1.42 IN RAIN SIX=1.73 IN
                        RAIN DAY=2.07 IN DT=0.03333 HR
COMPUTE NM HYD          ID=1 HYD NO=110.1 AREA=0.0044 SQ MI
                        PER A=100.00 PER B=0.00 PER C=0.00 PER D=0.00
                        TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD               ID=1 CODE=1
*
* BASIN 2
*
COMPUTE NM HYD          ID=1 HYD NO=110.2 AREA=0.0012 SQ MI
                        PER A=100.00 PER B=0.00 PER C=0.00 PER D=0.00
                        TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD               ID=1 CODE=1
*
* BASIN 3
*
COMPUTE NM HYD          ID=1 HYD NO=110.3 AREA=0.0025 SQ MI
```

```
                    PER A=100.00 PER B=0.00 PER C=0.00 PER D=0.00
                    TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD           ID=1 CODE=1
*
*
*****************************************************************
*       100-YEAR, 6-HR STORM  (UNDER DEVELOPED CONDITIONS)      *
*****************************************************************
*
START               TIME=0.0
*
* BASIN 1
*
RAINFALL            TYPE=1 RAIN QUARTER=0.0 IN
                    RAIN ONE=2.14 IN RAIN SIX=2.60 IN
                    RAIN DAY=3.10 IN DT=0.03333 HR
COMPUTE NM HYD      ID=1 HYD NO=100.1 AREA=0.0044 SQ MI
                    PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                    TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD           ID=1 CODE=1
*
* BASIN 2
*
COMPUTE NM HYD      ID=1 HYD NO=100.2 AREA=0.0012 SQ MI
                    PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                    TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD           ID=1 CODE=1
*
* BASIN 3
*
COMPUTE NM HYD      ID=1 HYD NO=100.3 AREA=0.0025 SQ MI
                    PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                    TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD           ID=1 CODE=1
*
*****************************************************************
*       10-YEAR, 6-HR STORM  (UNDER DEVELOPED CONDITIONS)       *
*****************************************************************
*
START               TIME=0.0
*
* BASIN 1
*
RAINFALL            TYPE=1 RAIN QUARTER=0.0 IN
                    RAIN ONE=1.42 IN RAIN SIX=1.73 IN
                    RAIN DAY=2.07 IN DT=0.03333 HR
COMPUTE NM HYD      ID=1 HYD NO=110.1 AREA=0.0044 SQ MI
                    PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                    TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD           ID=1 CODE=1
*
* BASIN 2
*
COMPUTE NM HYD      ID=1 HYD NO=110.2 AREA=0.0012 SQ MI
                    PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                    TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD           ID=1 CODE=1
*
* BASIN 3
*
```

```
COMPUTE NM HYD          ID=1 HYD NO=110.3 AREA=0.0025 SQ MI
                        PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                        TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD               ID=1 CODE=1
*
*
FINISH
```

Appendix I

Drainage Report
For
Sandia Research Park
(M-15/D5)

DRAINAGE REPORT

for

SANDIA RESEARCH PARK
Albuquerque, New Mexico

January, 1988

REGISTERED PROFESSIONAL ENGINEER
STATE OF NEW MEXICO
No. 3960
JOHN A. ANDREWS

1-20-88

Prepared by
Andrews, Asbury & Robert, Inc.
Consulting Engineers
Albuquerque, New Mexico

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Enclosures

Map No. 2 - Existing Conditions

Map No. 3 - Onsite Developed Conditions-
Grading & Drainage Plan

Plat of Sandia Research Park

Storm Drain Plan & Profile Sheet 25 of 34 (Hydraulic Gradient)

TABLE 3 Cont'd.

ON SITE DEVELOPED & OFF SITE UNDEVELOPED Cont'd.

ANALYSIS POINT	DRAINAGE AREA DESIGNATION	AREA (Ac)	LENGTH OF TRAVEL (Ft)	SLOPE (%)	VELOCITY (FPS)	TRAVEL TIME (T_c) (Mins.)	C	I_{10} (IN/Hr)	I_{100} (IN/Hr)	Q_{10} (CFS)	Q_{100} (CFS)
(4)	B OFFSITE	14.5	See existing Conditions			30.14	0.40	1.90	2.89	11.0	16.8
	System AP (4) to	From AP (E)	320' St. 800' St.	1.50 1.25	3.3 3.0	1.62 4.44 } 6.06					
(E)	B & D-1	32.06	--	--	--	30.14 6.06 } 36.20	0.62	1.73	2.63	34.4	52.3

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

Project: Sandia Research Park
Sheet 7 of 16
By: JA
Chk'd: —
Job No. 458
Date: 12-10-86

CONDITIONS- ONSITE DEVELOPED & OFFSITE UNDEVELOPE

Determine if proposed streets will have capacity to carry runoff flows for on site developed conditions & offsite undeveloped conditions

Opportunity Ave. @ A.P. (A)

From Table 3, Q = 36.9 cfs.

Temporary street Section is Std. curb & gutter and 22 ft. of paving. (½ street)

Street Area @ 0.20' above Top of Curb = 13.40 ft

Street Slope = 0.82%, $R = \frac{13.4}{25.8} = 0.53$

$V = (99)(0.53)^{2/3}(.0082)^{1/2} = 5.87$ fps

Street Capacity = Q = AV = (13.40)(5.87) = 78.7 cfs

OK

Eubank Blvd @ A.P. (B)

From Table 3; Q = 38.4 CFS

Temporary street section is Std. Curb & Gutter and 22' of paving adjacent & Connected to existing 48' Wide paved Roadwa

Street Area @ 0.20' above Top of Curb = 15.80

Street Slope = 0.30%, $R = \frac{15.80}{40.80} = 0.39$

$V = (99)(0.39)^{2/3}(.003)^{1/2} = 2.90$ fps

Street Capacity = Q = AV = (15.80)(2.90) = 45.8 cfs

OK

Eubank Blvd @ A.P. (D)

From Table 3, Q = 55.2 cfs

Temporary street Section - Same as at A.P. (B).

street Area @ 0.20' above Top of Curb = 15.80

Street Slope = 0.54%, $R = \frac{15.80}{40.80} = 0.39$

$V = (99)(.39)^{2/3}(.0054)^{1/2} = 3.88$ fps

street Capacity = Q = AV = (15.80)(3.88) = 61.3 cfs

ok

Research Road @ A.P. (E)

From Table 3, Q = 52.3 cfs.

street Section is Std. 40 ft wide street

street Area @ 0.20' above Top of Curb = 24.00 ft²

street Slope = 1.25%, $R = \frac{24.00}{42.58} = 0.56$

$V = (99)(.56)^{2/3}(.0125)^{1/2} = 7.52$ fps

Street Capacity = Q = AV = (24.00)(7.52) = 180.5 cfs

ok

TABLE 4

ON SITE DEVELOPED CONDITIONS + OFF SITE DEVELOPED CONDITIONS (See Map No. 2 & 3)

ANALYSIS POINT	DRAINAGE AREA DESIGNATION	AREA (Ac)	LENGTH OF TRAVEL (Ft)	SLOPE (%)	VELOCITY (FPS)	TRAVEL TIME (T_c) (Mins.)	C	I_{10} (IN/Hr)	I_{100} (IN/Hr)	Q_{10} (CFS)	Q_{100} (CFS)
1	A	21.1	450' Overland 600' Street 750' Street	1.44 0.50 1.23	1.65 1.9 3.0	4.55 5.26 4.17 } 13.98	0.80	2.81	4.28	47.4	72.2
	AP 1 to	AP A				8.11					
A	A & C-1	29.31	--	--	--	13.98 8.11 } 22.09	0.80	2.23	3.39	52.2	79.5
4	B	14.5	450' Overland 300' Street 750' Street	1.44 0.50 1.40	1.65 1.9 3.2	4.55 2.63 3.91 } 11.19	0.80	3.16	4.81	36.7	55.8
	AP 4 to	AP E				6.06					
E	B & D-1	32.06	---	---	---	11.09 6.06 } 17.15	0.80	2.53	3.85	64.8	98.7

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Project: Sandia Research Park
Sheet 10 of 16
By: JA
Chk'd: —
Job No. 458
Date: 12-10-8

CONDITIONS - ONSITE DEVELOPED & FUTURE OFFSITE DEVELOPED

Determine if proposed streets will have capacity to carry runoff flows for on-site developed conditions & "future" off site developed conditions

Opportunity Ave. @ A.P. (A)

From Table 4; Q = 79.5 cfs.

Assume full street section is constructed with Std. 40' street.

Street Area @ 0.20' above Top of Curb = 24.00 ft²

Street Slope = 0.82%, $R = \frac{24}{42.58} = 0.56$

$V = (99)(0.56)^{2/3}(0.0082)^{1/2} = 6.09$ fps

Street Capacity = Q = AV = (24.00)(6.09) = 146.2 cfs

OK

Research Road @ A.P. (E)

From Table 4, Q = 98.7 cfs

Street section is Std. 40' wide street

Street Area @ 0.20' above Top of Curb = 24.00

Street Slope = 1.25%, $R = \frac{24.00}{42.58} = 0.56$

$V = (99)(0.56)^{2/3}(0.0125)^{1/2} = 7.52$ fps

Street Capacity = Q = AV = (24.00)(7.52) = 180.5 cfs

OK

CONDITIONS - ONSITE DEVELOPED & "FUTURE" OFFSITE DEVELOPED - Cont'd.

Only the Street Capacities at Analysis Point (A) on Opportunity Ave and at Analysis Point (E) on Research Road were checked for capacity because:

1. Prior to the time that offsite developed flows will be allowed to flow through the Sandia Reseach Park subdivision the proposed major Storm Drain Line will be installed in the Drainage Easement located east of Eubank Blvd.

2. The installation of this Major Storm Drain will collect the flows on Opportunity Ave and on Research Road East of Eubank Blvd. Therefore, the flows on these streets will not flow onto Eubank Blvd.

VOLUME OF TEMPORARY RETENTION POND REQUIRED

CONDITIONS - ONSITE DEVELOPED & OFFSITE UNDEVELOPED

CRITERIA

1. Develop Inflow hydrograph to Retention Pond for above Conditions
2. Allow offsite flow rates, under existing conditions, to flow through the Retention Pond. - Area "A" = 23.4 + Area "B" = 16.8 = 40.20
3. Determine total Area contributing to volume & runoff rate, & "C" value

Offsite	Area "A"	= 21.1 Acres	C = 0.40
"	Area B	= 14.5 Acres	C = 0.40
Sub-Total		35.6 Acres	@ C = 0.40
Onsite	Area C-1	8.21 Acres	C = 0.80
	C-2	1.27 "	C = 0.80
	C-3	8.54 "	C = 0.80
	C-4	2.54 "	C = 0.80
	D-1	17.56 "	C = 0.80
	E-1	1.92 "	C = 0.40
	F-1	0.40 "	C = 0.80
Subtotal		40.44 "	@ C = 0.78

Total Area = 76.04

Combined "C"

$= (35.6)(0.40)/76.04 + (40.44)(.78)/76.04$

$= 0.60$

4. Use Tc for Analysis Point "D" (51.11 min.), see Table 3, as this is the time required for runoff flows to reach the ponding area from the most remote point of the overall combined drainage areas.

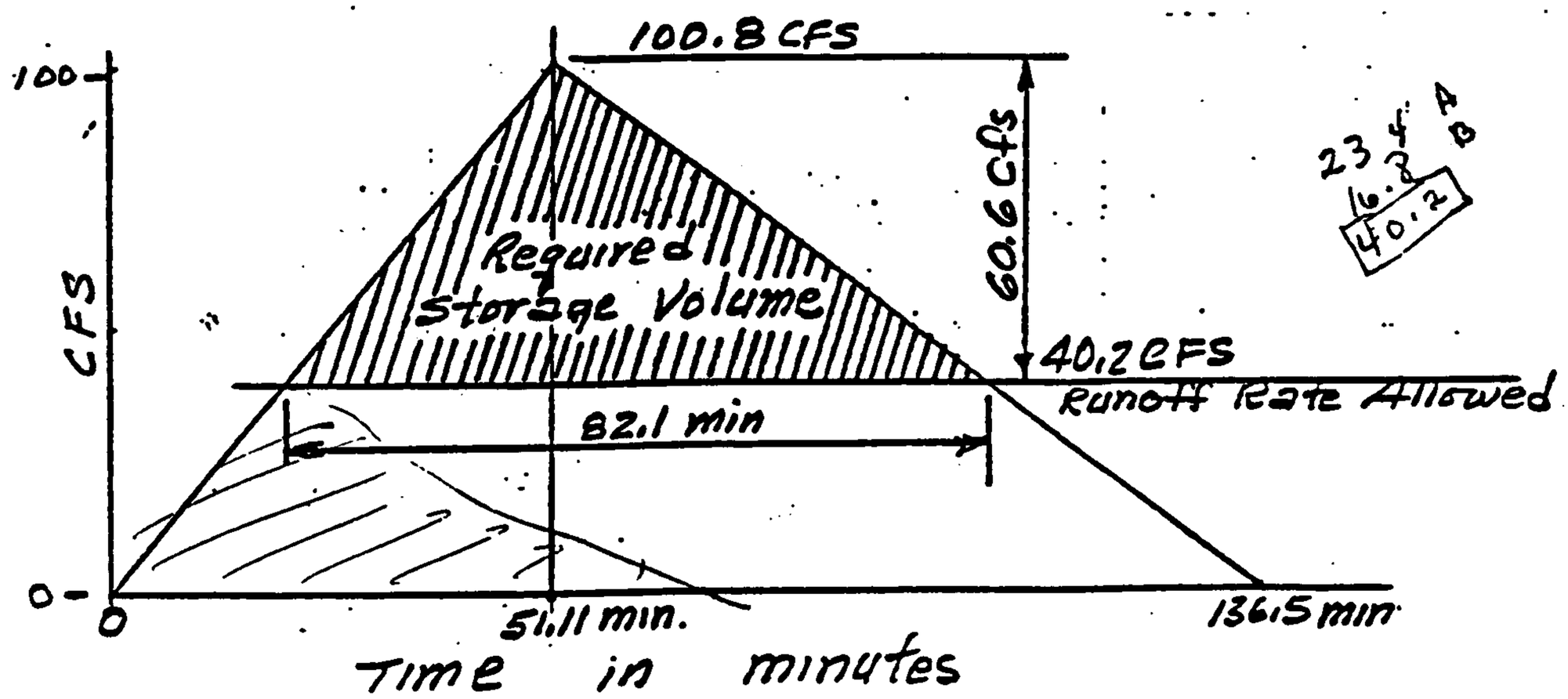
Must use 24 hr storm

Therefore I = 2.21 - See Table 3

$$Q = CIA = (0.60)(2.21)(76.04) = 100.8 \text{ CFS}$$

From USDA - Soil Conservation Service
National Engineering Handbook,
Section 4, Hydrology
Supplemental A, "The Hydrology Guide"

Triangular Hydrograph Base = 2.67 (Tp)
= 2.67 (51.11) = 136.5 min



Volume of Storage Req'd.

= 82.1 min × 60 × 60.6"/2 = 149,258 ft³ = 3.43 AF

Need for Volume calculations

RESEARCH AVENUE - STORM DRAIN

A storm drain with inlets will need to be installed in Research Avenue, East of Eubank Blvd. to Collect the Flows from Drainage Area D-1 and OFFSITE AREA B.

This stormdrain is required to divert the flows on Research Ave. to the Temporary Retention Pond.

From Table 3 - Q = 52.3 cfs.

Use 6 - Curb inlets - Ea. to collect 10cfs±

4 - Inlets upstrem to Collect 40cfs.

Pipe size Req'd = 30" @ 1.2%±; Q = 42cfs OK

From 6-Inlets to Pond -

Pipe Size Req'd = 36" @ 1.0%±; Q=65 CFS OK

SUMMARY OF HYDRAULIC CALCULATIONS

STAT.	STRUC	D	Q	A	V	K	S_f	L	Δ	JUNCTION D	JUNCTION θ	LOSSES h_f	h_b	h_j	h_{MH}	h_T	h_{MS}	Σ	EG	h_v	HG
2+46	Outlet	36"	53.2	6.75	7.88	1.00											0.96	0.96	66.00	0	66.00
2+46	Outlet	36"	53.2	6.25	7.88							0.28						0.28	66.96	0.96	66.00
2+96	45° MH	36"	53.2	5.58	9.53	0.14			45°				0.20					0.20	67.24	1.4	67.31
																			67.44		
			Free Discharge Into MH Yc upstream																		
2+96	MH	30"	40	4.62	8.67			40'				0.34						0.34	67.57	1.17	66.40
3+36	MH	30"	40	4.91	8.15														67.91	1.03	67.02

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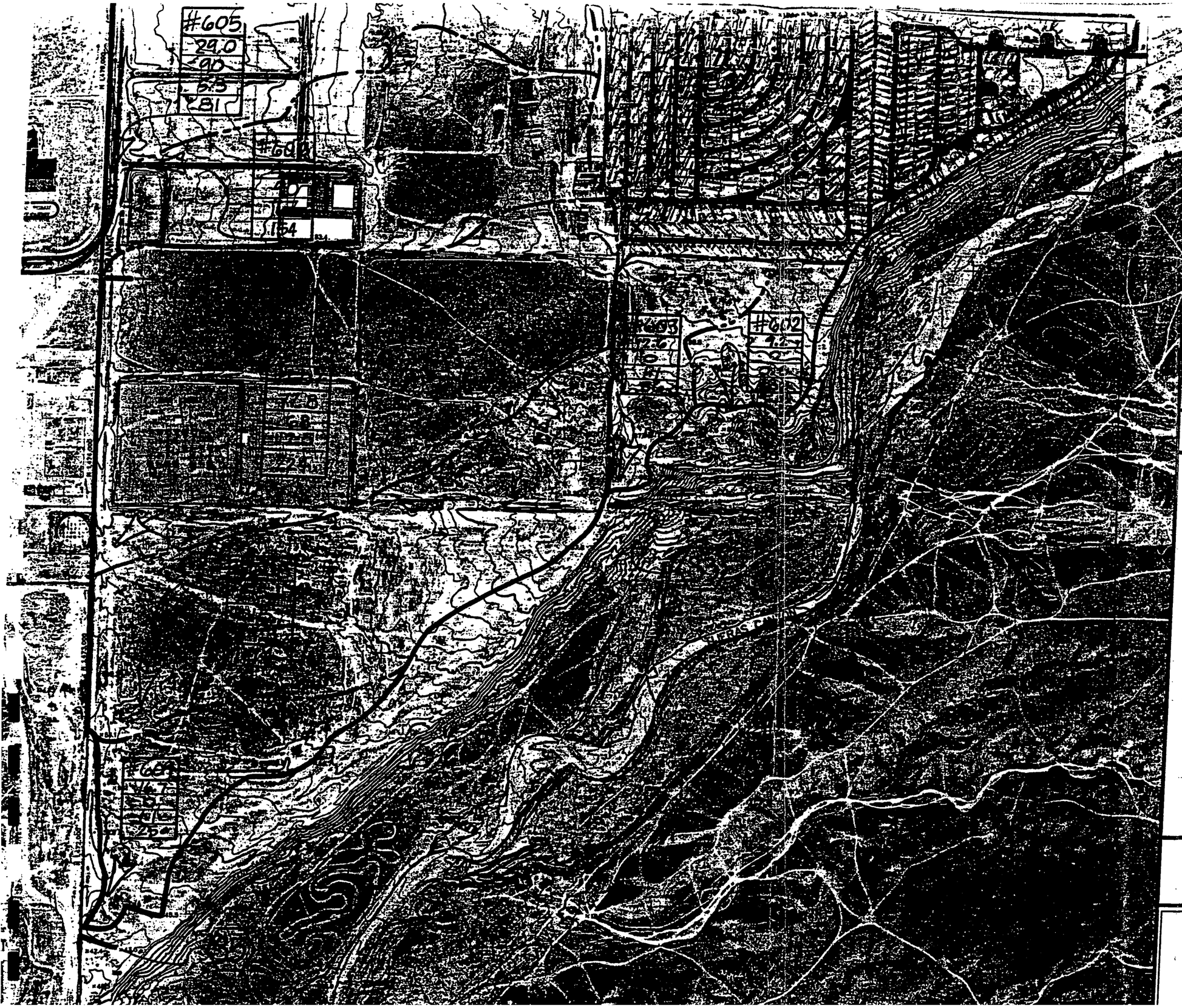
Project Sandia Research Park
By JFN
Chk'd
Date 01.20.88
Sheet 16 of 16
Job No. 4525



NOTES

LEGEND

ANALYSIS POINT NUMBER WITH LOCATION BAR

STUDY BOUNDARY

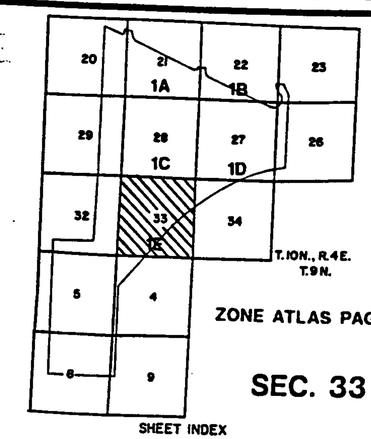
BASIN BOUNDARY

SUB-BASIN BOUNDARY

SUB-BASIN NUMBER
AREA (ACRES)
% IMPERVIOUS
100-YEAR RUNOFF VOLUME (AC-FT)
100-YEAR PEAK RUNOFF FLOW (CFS)

SUB-BASIN DATA

DRAINAGE BASIN MAP



ZONE ATLAS PAGE M-21

SEC. 33

SHEET INDEX

N

1"=50

2' CONT INTERVA

THE AERIAL PHOTOGRAPH ON THIS SHEET HAS BEEN RECTIFIED TO SELECTED PLANIMETRIC DETAIL OBTAINED DURING MAP COMPILATION. CONSEQUENTLY, THE PHOTO IMAGES FALLING OUTSIDE OF THE MAPPING AREA ARE UNCONTROLLED.

500 250 0 500 1000

DATE OF PHOTOGRAPHY: MARCH 2, 1994

SOUTH EUBANK AREA STORM DRAINAGE ANALYSIS

PROJ. # 4790

89-01-08

Smith Engineering Company

A Full Service Engineering Company

6400 Uptown Boulevard N.E.

PADS

EXISTING	PROPOSED	DIFFERENCE
5304	5314.97	−10.97
5305	5324.16	−19.16
5307	5328.88	−21.88
5319	5330.78	−11.78
5330	5330.51	−0.51
5330	5329	1
5325	5329.35	−4.35
5324	5330.56	−6.56
5320	5329.44	−9.44
5315	5319.1	−4.1
5323	5329.45	−6.45
5326	5329.45	−3.45
5327	5327	0
5330	5325.8	4.2
5323	5322.88	0.12
5330	5327.58	2.42
5328	5327.58	0.42
5322	5325	−3
5323.25	5324.75	−1.5
5324	5322.06	1.94
5325	5320.08	4.92
5322.5	5318.84	3.66
5325	5321.81	3.19
5324	5320.9	3.1
5320	5317.94	2.06
5320	5317.95	2.05
5317	5318.18	−1.18
5316.5	5317.41	−0.91
5315	5318.07	−3.07
5315	5317.16	−2.16
5314	5319.74	−5.74
5315	5320.62	−5.62
5315	5315.59	−0.59
5313	5317.62	−4.62
5312	5319.19	−7.19
5311	5320.04	−9.04
5312	5321.4	−9.4
5312	5321.56	−9.56
5315	5321.18	−6.18
		−3.57

STREETS

EXISTING	PROPOSED	DIFFERENCE
5311.5	5318.9	−7.4
5313	5317.62	−4.62
5315	5319.62	−4.62
5315	5320.21	−5.21
5315	5321.03	−6.03
5316	5320.34	−4.34
5316	5317.56	−1.56
5315	5315.4	−0.4
5310	5311	−1
5310.5	5312	−1.5
5312	5313	−1
5314	5314	0
5314.25	5314.38	−0.13
5317	5313.2	3.8
5321	5315.14	5.86
5322	5319.24	2.76
5328	5327.36	0.64
5329	5327.2	1.8
5330	5330	0
5329	5325.46	3.54
5329	5328.63	0.37
5329	5328.7	0.3
5323	5324.2	−1.2
5310	5310	0
5325	5328.14	−3.14
5320	5329.71	−9.71
5312	5319.96	−7.96
		−1.51

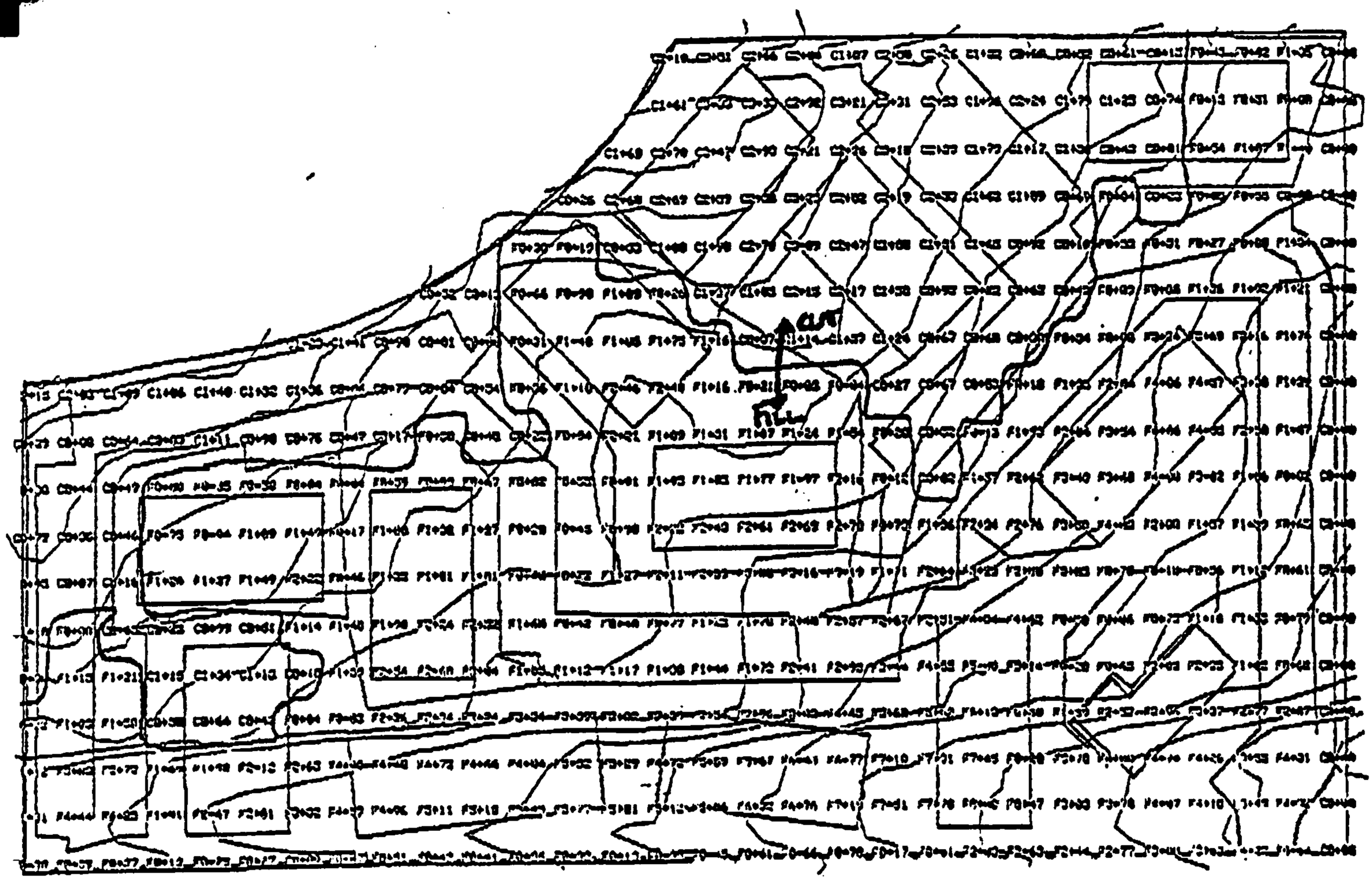
VOLUMES REPORT
JOB NAME : 263.EAS Ladera Apts
PRINTED : 05/31/1995 02:19:35 PM

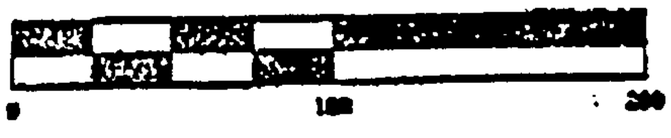
(NO STRIPPING REGIONS SPECIFIED)

REGION	LAYER	MATERIAL	SECT	AREA, SF TOTAL	AREA, SF CUT	AREA, SF FILL	VOLUMES, CY (AFTER STRIPPING) CUT	VOLUMES, CY (AFTER STRIPPING) FILL
Total Site	NAT'L GROUND	SUITABLE	var	267878	80527	187351	4002	16546
JOB TOTAL	NAT'L GROUND	SUITABLE		267878	80527	187351	4002	16546

SITE AREA: 274954
UNSPECIFIED: 7076

These volumes were calculated using the AVERAGE END AREA method.
839 cross sections were computed at an average separation of 0.52 feet.





- 3.4,415.1)
3.4,-85.9) C=(418.6,-85.9)

Name:Ladera Apts

I

INTRODUCTION

A. GENERAL

This report, with the enclosed maps, provides a Drainage Plan for the Sandia Research Park Subdivision. The project is located in the Southeast Quadrant of the Albuquerque Metropolitan Area. The subdivision consists of approximately 40 acres that lies approximately one mile south of Central Avenue and directly east of Eubank Boulevard SE. (See enclosed Location Map, Map No. 1, Zone Atlas Map M-21.)

Kirtland Air Force Base is located west of the subdivision. An Industrial Park type of development is proposed for this tract and it is the intent of this report to provide a drainage plan for the development of the 40 acre site.

Guidelines for the analysis included herein are based on the City of Albuquerque's Development Process Manual, Volume 2, Design Criteria, Section 22.

II

EXISTING CONDITIONS

A. GENERAL

The subject property is presently undeveloped with a general slope from northeast to southwest of slightly more than one percent (1%).

The site has previously been utilized as a dirt race track for racing cars and was known as Speedway Park. However, all improvements were removed several years ago.

The tract is bounded on the west by Eubank Boulevard SE which has been improved with a four lane paved roadway without curb and gutter and is one of the main accesses to Kirtland Air Force Base.

Along the north side of the site a bladed dirt road exists and was formerly known as Gibson Boulevard; however, with the platting of the property for this development, the street has been named Opportunity Avenue.

Adjacent property to the northeast and south is presently undeveloped.

B. OFFSITE AND ONSITE DRAINAGE

Presently the adjacent offsite areas to the east of subject property flow across the east boundary of the property as generally sheet flow. (See Map No. 2 enclosed and Table No. 1 of the Drainage Analysis.)

The storm water runoff from Area A offsite and Area E-1 and E-2 onsite flows to the westerly boundary of the property and the east side of Eubank Boulevard where it is directed southerly to the southwest corner of the site and away from the site.

Storm water runoff from Area B offsite and Area E-3 onsite flows to the southerly boundary of the site then continues southwesterly away from the site.

III

DEVELOPED CONDITIONS

A. OFFSITE

Flows from offsite Area A will be directed northerly by raising the grade along the east boundary of the subdivision slightly. This water will be received by Opportunity Avenue which will be paved and curbed and guttered on the southerly half of the street.

Flows from offsite Area B will be directed to Research Road again by raising the grade along the easterly boundary of the subdivision slightly. Research Road will be paved and curb and gutter installed.

See Map No. 3 enclosed.

B. ONSITE

This subdivision is to be developed as an Industrial Park; however, it is not known at the time of the writing of this report what the actual type, size or location of the buildings will be or the actual type ground cover proposed in the ultimate development. It was therefore assumed that in the final developed conditions the subdivision will have a coefficient of runoff of 0.80 and it is proposed to allow for total runoff from the developed lots without detention of waters on individual lots.

The runoff generated from the site will be conveyed in the streets to a site retention pond located at the southwest corner of the subdivision. (See Map No. 3 enclosed.)

The initial phase of development will consist of improvements to the streets and public drainage easements only. Street improvements will include the construction of curb and gutter and pavement and the installation of water and sewer lines. Drainage improvements include the construction of a retention pond on Lot 1, Block 4; the installation of a storm drain system on Research Road to collect and direct the flows on Research Road to the retention pond; and a concrete rundown near the south end of Eubank Boulevard to direct the flows on Eubank to the retention pond. This concrete rundown will also act as an overflow from the retention pond when the pond becomes full.

The drainage plan as provided herein provides for conveyance of storm waters from all developed lots except for the lot to be used as a retention pond, and is to be used as a basis for drainage plans of individual sites as the area develops.

As site development occurs, drainage plans for each specific development site will be required.

IV

FUTURE STORM DRAIN CONSTRUCTION

As shown on Map No. 3, a future major storm drain is proposed to be constructed by the City, located east and parallel to Eubank Boulevard. It is proposed that at the time this storm drain is constructed, catch basins and piping will be installed in Opportunity Avenue and Development Road to collect and carry the flows from these streets to the proposed storm drain. The outlet from the storm drain system installed under this development in Research Road can be redirected to this proposed storm drain.

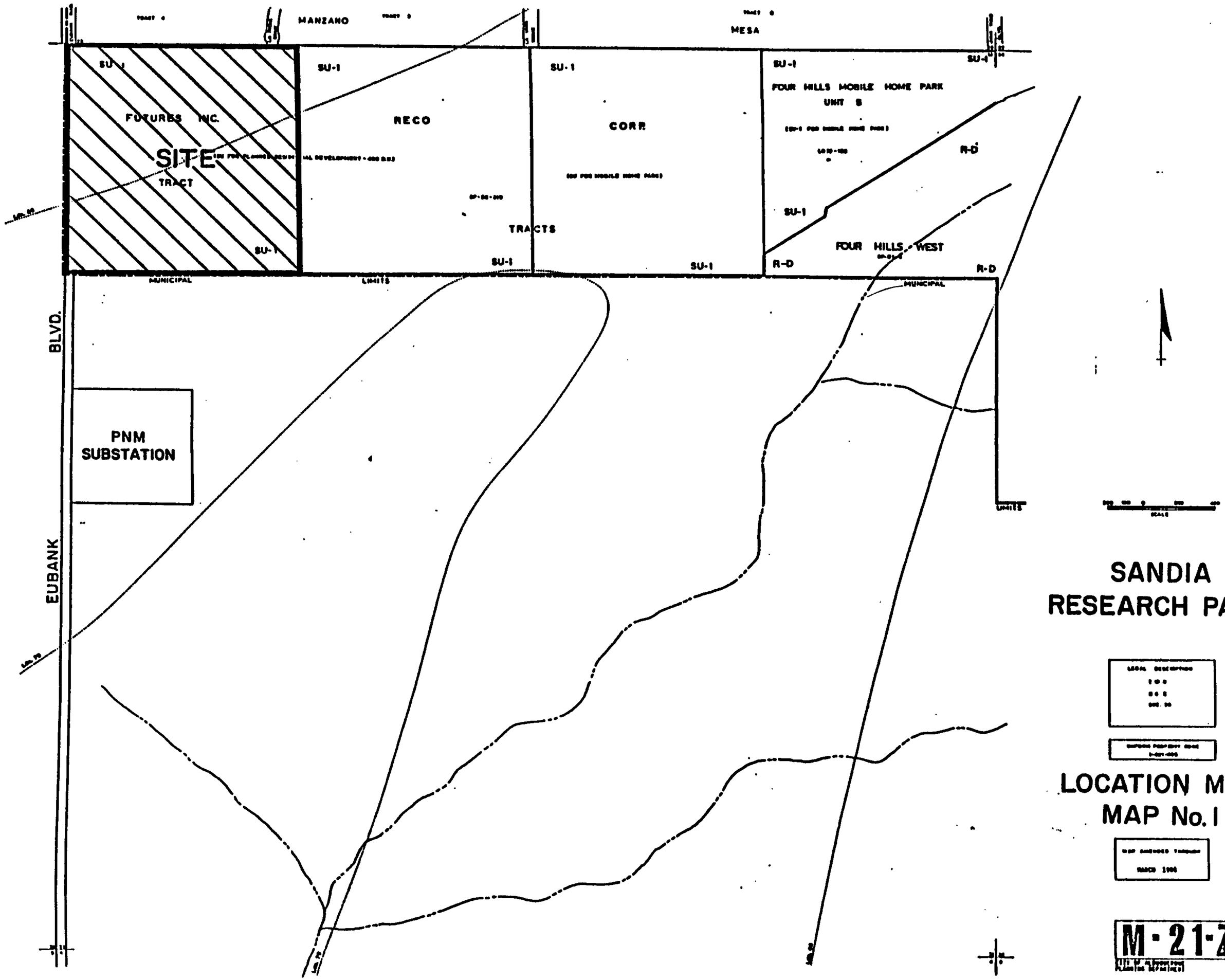
Upon completion of construction of this future storm drain by the City the retention pond can be eliminated by filling, and the lot on which the retention pond is located will be developed.

V

EROSION CONTROL

The contractor for the project will be responsible for soil migration during the construction phase. This can be accomplished by the grading of windrows in a north-south direction.

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


MANZANO
MESA
SU-1
FUTURES INC.
SITE
TRACT
RECO
CORR
TRACTS
FOUR HILLS MOBILE HOME PARK
UNIT 8
R-D
FOUR HILLS WEST
MUNICIPAL
LIMITS
BLVD.
EUBANK
PNM
SUBSTATION
SANDIA
RESEARCH PARK
LOCATION MAP
MAP No. I
M-21-Z

VI

DRAINAGE ANALYSIS

Following is the Drainage Analysis (computations) for the subject property.

Table 1 - Existing Conditions	Sheets 2 & 3
Table 2 - Onsite Developed Conditions	Sheets 4 & 5
Table 3 - Onsite Developed Conditions and Offsite Undeveloped	Sheets 6 & 7
Table 4 - Onsite Developed Conditions and Offsite Developed Conditions	Sheet 10
Hydraulic Gradient	Sheet 16

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" = 0.80

For Existing Conditions -
"C" = 0.40

$I_{100} = (2.4)(6.84)(t_c)^{-0.51}$

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

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

TABLE 1

EXISTING CONDITIONS - See MAP No. 2

ANALYSIS POINT	DRAINAGE AREA DESIGNATION	AREA (Ac)	LENGTH OF TRAVEL (Ft)	SLOPE (%)	VELOCITY (FPS)	TRAVEL TIME (T_c) (Mins.)	C	I_{10} (IN/Hr)	I_{100} (IN/Hr)	Q_{10} (CFS)	Q_{100} (CFS)
1	A OFFSITE	21.1	1300	1.31	0.66 overland	32.83	0.40	1.82	2.77	15.4	23.4
	E-1 ON SITE	18.4 0.9-offsite	1350	1.15	0.62 overland	36.29	0.40	1.73	2.63	12.7	19.4
	From A.P. 1 to A.P. 2		1250' - channel, 350' - Ditch	1.12 045	3.5 2.5	5.95 2.33 } 8.28					
2	A & E-1	39.5	—	—	—	32.83+8.28 = 41.11	0.40	1.62	2.47	25.6	39.0
	E-2 ON-SITE	15.8	1500	1.53	0.73 Overland	34.25	0.40	1.78	2.71	11.2	17.1
	From A.P. 2 to A.P 3		1000' Ditch.	0.45	2.5	6.67					
3	A, E-1 & E-2	55.3	—	—	—	41.11+6.67 47.78	0.40	1.50	2.28	33.1	50.4

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Project Sandia Research Park
By JA Chk'd Date 12-7-86
Job No. 458
Sheet 2 of 16

TABLE 1- Cont'd.

EXISTING CONDITIONS - Cont'd.

ANALYSIS POINT	DRAINAGE AREA DESIGNATION	AREA (Ac)	LENGTH OF TRAVEL (Ft)	SLOPE (%)	VELOCITY (FPS)	TRAVEL TIME (T_c) (Mins.)	C	I_{10} (IN/Hr)	I_{100} (IN/Hr)	Q_{10} (CFS)	Q_{100} (CFS)
4	B OFFSITE	14.5	1230	1.38	0.68 Overland	30.14	0.40	1.90	2.89	11.0	16.8
	E-3 ON SITE	7.2	750	1.27	0.65 Overland	19.23	0.40	2.38	3.63	6.9	10.5
5	B & E-3	21.7	—	—	—	30.14+19.23 49.37	0.40	1.48	2.25	12.8	19.5

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Project Sandia Park Search Sheet 3 of 16
By JA Chk'd Date 12-2-86 Job No. 458

TABLE 2

ONSITE - DEVELOPED CONDITIONS - See Map No. 3

ANALYSIS POINT	DRAINAGE AREA DESIGNATION	AREA (Ac)	LENGTH OF TRAVEL (Ft)	SLOPE (%)	VELOCITY (FPS)	TRAVEL TIME (T_c) (Mins.)	C	I_{10} (IN/Hr)	I_{100} (IN/Hr)	Q_{10} (CFS)	Q_{100} (CFS)
(A)	C-1	8.21	310' Overland 450' st. 940' st.	1.61 0.50 0.82	1.75 1.90 2.45	2.95 3.95 6.39 } 13.29	0.80	2.88	4.39	18.9	28.8
	C-2	1.27	250' Overland 120' st.	1.68 0.30	1.77 1.50	2.35 1.33 } use 10	0.80	3.33	5.07	3.4	5.2
	System AP (A) to AP (B)		330' st.	0.30	1.50	3.67					
(B)	C-1 & C-2	9.48	--	--	--	13.29 3.67 } 16.96	0.80	2.54	3.87	19.3	29.4
	C-3	8.54	380 Overland 80 st. 600 st.	0.85 1.60 1.10	0.55 3.30 2.80	11.51 0.40 3.57 } 15.48	0.80	2.67	4.06	18.2	27.7
	system AP (B) to AP (C)		150' st.	0.54	2.0	1.25					
(C)	C-1 thru C-3	18.02	--	--	--	16.96 1.25 } 18.46	0.80	2.44	3.71	35.1	53.5

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

Project: Sandia Research Park
Sheet 4 of 16
Job No. 458
By: JA
Ch'd:
Date: 12-8-86

TABLE 2 Cont'd.

ONSITE - DEVELOPED CONDITIONS - Cont'd.

ANALYSIS POINT	DRAINAGE AREA DESIGNATION	AREA (Ac)	LENGTH OF TRAVEL (Ft)	SLOPE (%)	VELOCITY (FPS)	TRAVEL TIME (T_c) (Mins.)	C	I_{10} (IN/Hr)	I_{100} (IN/Hr)	Q_{10} (CFS)	Q_{100} (CFS)
	C-4	2.54	240' Overland 440' St.	2.30 0.54	2.0 2.0	2.00 3.67 } Use 10	0.80	3.33	5.07	6.8	10.3
	System-to AP-	AP (C) (D)	630' St.	0.54	2.0	5.25					
(D)	C-1 thru C-4	20.56	— —	— —	— —	18.46 5.25 } 23.71	0.80	2.15	3.27	35.3	53.8
(E)	D-1	17.56	430' Overland 400' Overland 670' St.	- 1.38 - 0.67 - 1.25	1.60 1.15 3.00	4.48 5.80 3.72 } 14.0	0.80	2.80	4.27	39.4	60.0
		38.12									

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

Project Sandia Research Park Sheet 5 of 16
By JA Chk'd Date 12-8-86 Job No. 458

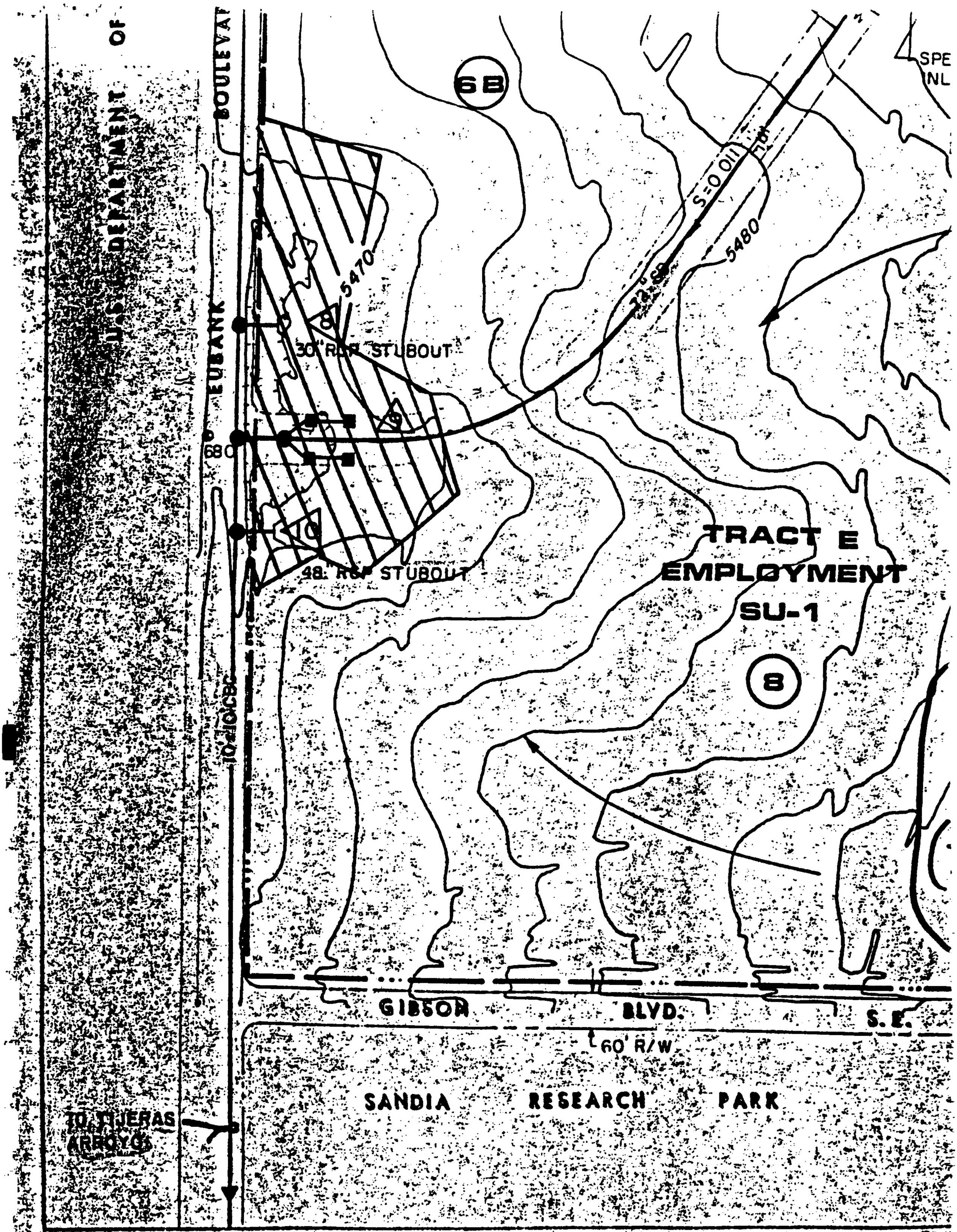
TABLE 3

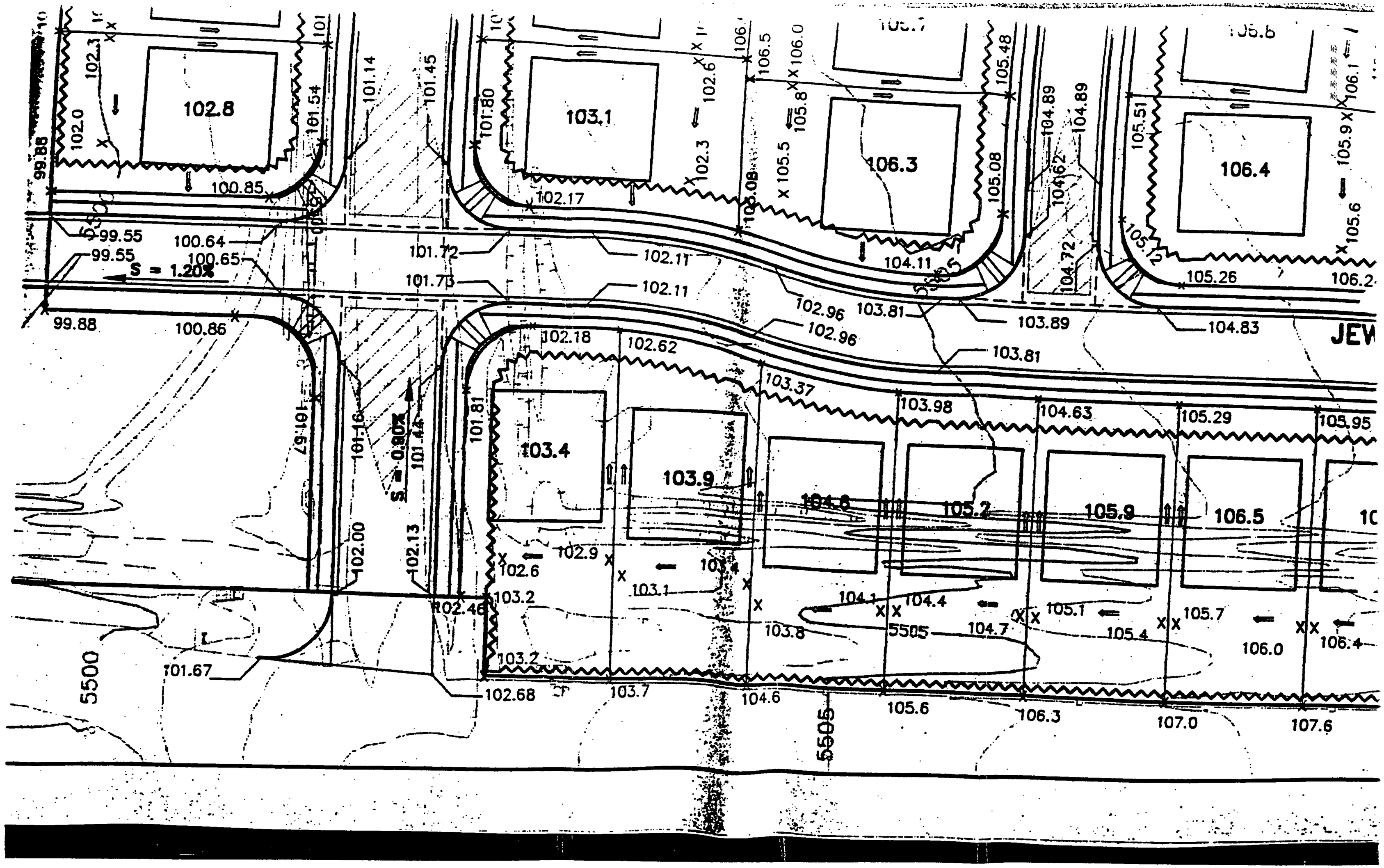
ON-SITE - DEVELOPED & OFFSITE UNDEVELOPED - See Map No. 2 & 3

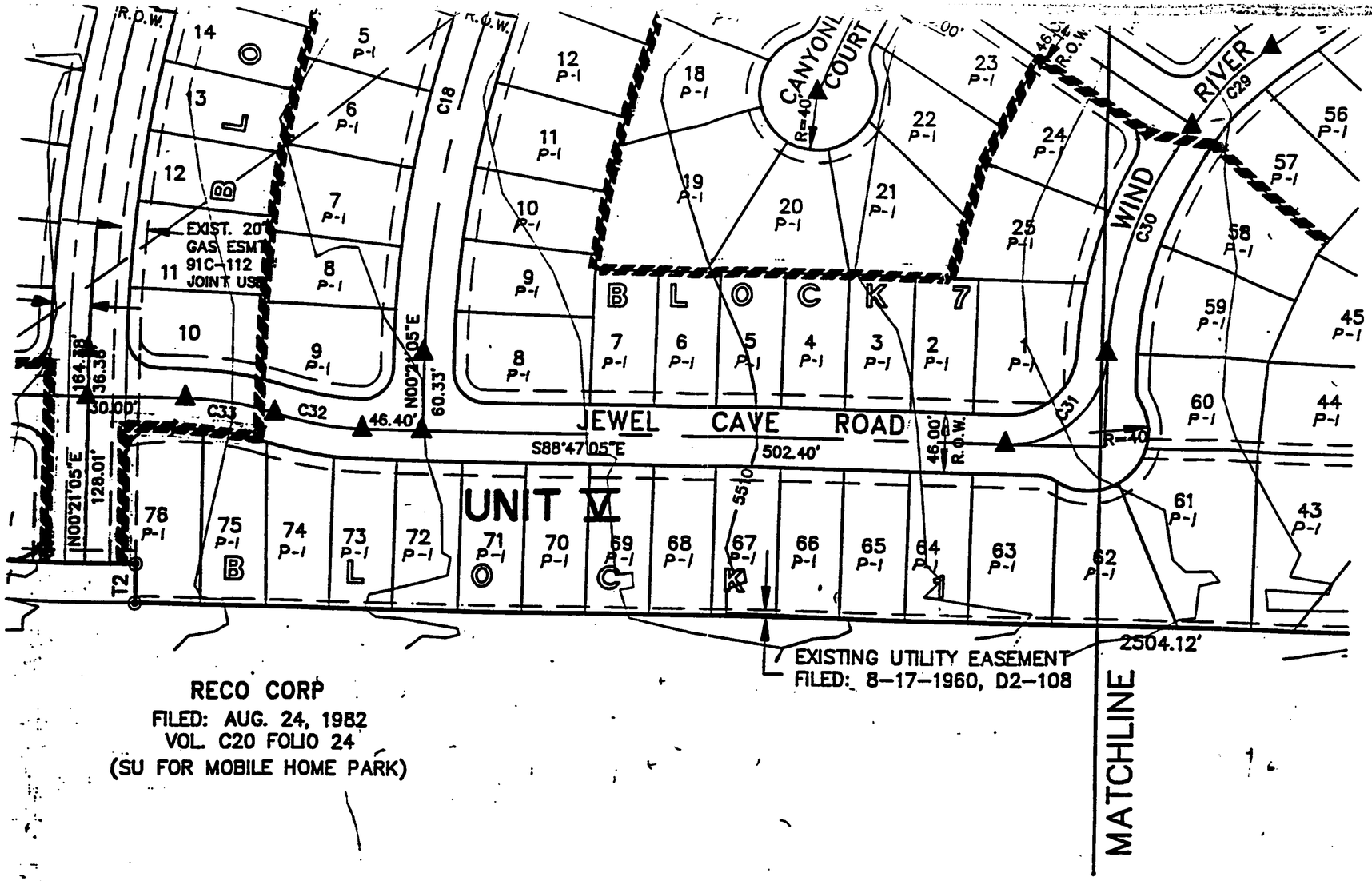
ANALYSIS POINT	DRAINAGE AREA DESIGNATION	AREA (Ac)	LENGTH OF TRAVEL (FT)	SLOPE (%)	VELOCITY (FPS)	TRAVEL TIME (T_c) (Mins.)	C	I_{10} (IN/Hr)	I_{100} (IN/Hr)	Q_{10} (CFS)	Q_{100} (CFS)
1	A OFFSITE	21.1	See Existing Conditions			32.83	0.40	1.82	2.77	15.4	23.4
	System from A.P. 1 to	A.P. A	320' st. 940' st.	-1.8 0.82	-3.1 2.45	1.72 6.39 } 8.11					
A	A & C-1	29.31	—	—	—	32.83 8.11 } 40.94	0.51	1.62	2.47	24.2	36.9
	System AP A to	AP B	See On-Site Developed Conditions			3.67					
B	A, C-1 & C-2	30.58				40.94 3.67 } 44.61	0.53	1.56	2.37	25.2	38.4
	System AP B to	AP C				1.25					
C	A & C-1 thru C-3	39.12				44.61 1.25 } 45.86	0.58	1.53	2.33	34.8	52.9
	System AP C to	AP D				5.25					
D	A & C-1 thru C-4	41.66				45.86 5.25 } 51.11	0.60	1.45	2.21	36.3	55.2

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

Project Sandia Research Park
By JA Ch'd
Date 12-10-86
Job No. 458
Sheet 6 of 16


U.S. DEPARTMENT OF
EUBANK BOULEVAR
6B
5470
8
30" RGP STUBOUT
9
680
10
48" RGP STUBOUT
S=0 011
5480
SPE
NL
TRACT E
EMPLOYMENT
SU-1
8
TO ALBQ CBC
GIBSON BLVD. S.E.
60' R/W
SANDIA RESEARCH PARK
TO TIJERAS ARROYO

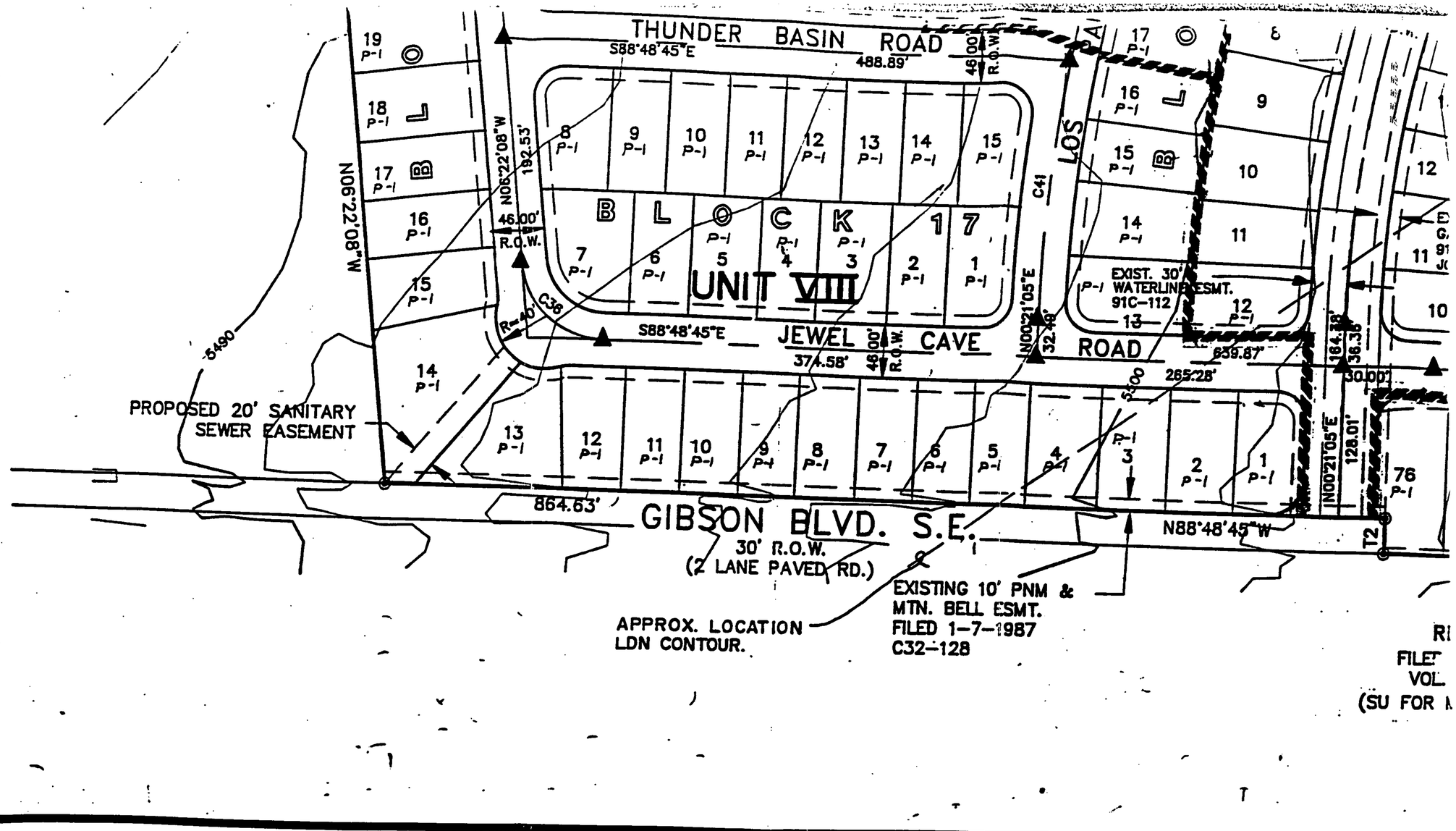

102.8
103.1
106.3
106.4
S = 1.20%
S = 0.80%
103.4
103.9
105.2
105.9
106.5
5500
5505
JEW

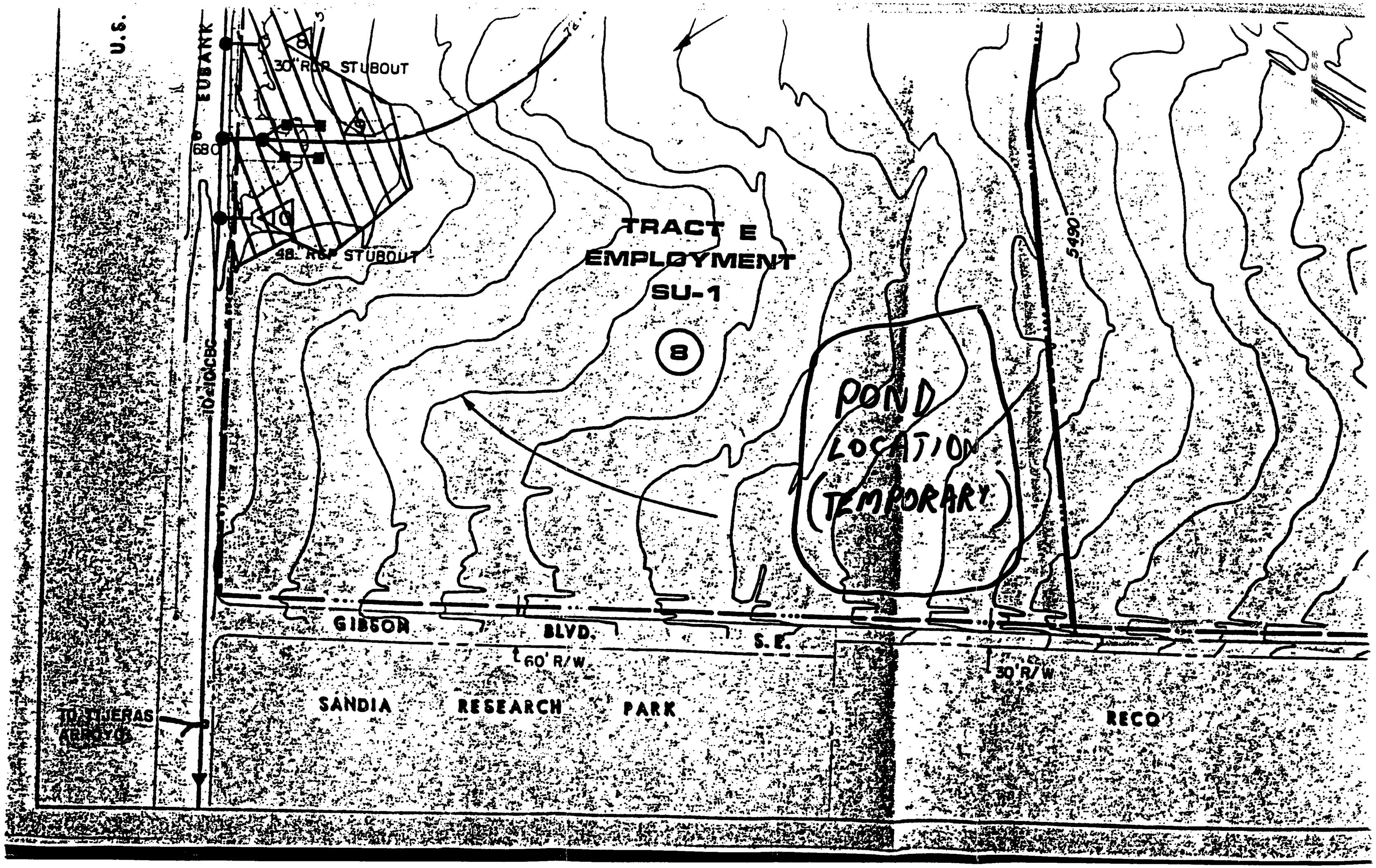


RECO CORP
FILED: AUG. 24, 1982
VOL. C20 FOLIO 24
(SU FOR MOBILE HOME PARK)

APPROVED FOR

CITY SURVEYOR


THUNDER BASIN ROAD
S88°48'45"E
488.89'
46.00' R.O.W.
LOS
BLOCK 17
UNIT VIII
JEWEL CAVE ROAD
S88°48'45"E
374.58'
46.00' R.O.W.
N00°21'05"E
32.49'
639.87'
265.28'
EXIST. 30' WATERLINE ESMT. 91C-112
N06°22'08"W
192.53'
46.00' R.O.W.
R=40'
C38
C41
N06°22'08"W
5490
PROPOSED 20' SANITARY SEWER EASEMENT
864.63'
GIBSON BLVD. S.E.
30' R.O.W.
(2 LANE PAVED RD.)
N88°48'45"W
N00°21'05"E
128.01'
164.38'
36.38'
30.00'
EXISTING 10' PNM & MTN. BELL ESMT. FILED 1-7-1987 C32-128
APPROX. LOCATION LDN CONTOUR.


U.S.
EUBANK
30" RGP STUBOUT
680
48" RGP STUBOUT
10"-10"CBC
TRACT E
EMPLOYMENT
SU-1
8
POND
LOCATION
(TEMPORARY)
5490
GIBSON
BLVD.
S.E.
60' R/W
30' R/W
SANDIA
RESEARCH
PARK
RECO
TO TIJERAS
ARROYO

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

MAYOR
KEN SCHULTZ

CHIEF ADMINISTRATIVE OFFICER
GENE ROMO

DEPUTY CAO DEVELOPMENT & ENTERPRISE SERVICES
LARRY LARRANAGA

DEPUTY CAO PUBLIC SERVICES
DAN WEAKS

FILE COPY

July 6, 1988

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

RE: SANDIA RESEARCH PARK RETENTION POND SIZING CALCULATIONS (M-21/D5) (CITY PROJECT NO. 3325)

Dear Mr. Andrews:

It has recently come to my attention that the Drainage Report for Sandia Research Park, dated January 1988, uses an improper method to determine the minimum volume of storage required for the retention pond.

Sheet 14 of 16 of the above referenced report uses a SCS triangular hydrograph and routing techniques to determine the required storage volume. The flaw with this is that it assumes an outflow simultaneous with inflow with a maximum outflow being allowed. This application is correct when there is a detention pond with a riser type or staged weir outlet, which is not the case with this project. The other problem is that a volume of runoff greater than the off-site volume is allowed to pass by the retention pond. Normally with a retention pond condition, we must provide storage volume equal to the runoff from the entire project site.

Please reanalyze the retention pond design requirements and make any recommendations as to the adequacy of the current design or required changes.

I apologize for not recognizing this discrepancy earlier, and please contact me to further discuss this.

Cordially,

Roger A. Green, P.E.

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

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.

February 9, 1988

RECEIVED
FEB 09 1988
HYDROLOGY SECTION

Mr. Roger Green
Hydrology Section
Public Works Department
Engineering Group
City of Albuquerque
Post Office Box 1293
Albuquerque, New Mexico 87103

HAND DELIVERED

SUBJECT: SANDIA RESEARCH PARK
CITY PROJECT NO. 3325

Dear Mr. Green:

Transmitted herewith are the pond volume calculations for the subject project.

Very truly yours,

ROBERT S. FOGLESONG, P.E. & L.S.

kat/458
Enclosure

No written response required.
RGreen 2/24/88

PROJECT TITLE: Sandia Research Park ZONE ATLAS/DRNG. FILE #: M-21 / U5

LEGAL DESCRIPTION: Sandia Research Park

CITY ADDRESS:

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

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

OWNER: Opportunity Research Park Partnership CONTACT:

ADDRESS PHONE:

ARCHITECT: CONTACT:

ADDRESS: PHONE:

SURVEYOR: CONTACT:

ADDRESS: PHONE:

CONTRACTOR: CONTACT:

ADDRESS: PHONE:

PRE-DESIGN MEETING:

RECEIVED FEB 09 1988 HYDROLOGY SECTION

X YES DRB NO. 86-284

NO EPC NO.

COPY OF CONFERENCE RECAP SHEET PROVIDED PROJECT NO. 3325

TYPE OF SUBMITTAL:

DRAINAGE REPORT

DRAINAGE PLAN

CONCEPTUAL GRADING & DRAIN. PLAN

X 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

X ROUGH GRADING PERMIT APPROVAL

GRADING/PAVING PERMIT APPROVAL

OTHER (SPECIFY)

DATE SUBMITTED: February 9, 1988

BY:

Rev. 11/84

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.

RECEIVED
FEB 08 1988
HYDROLOGY SECTION

February 8, 1988

Mr. Rodger Green
Hydrology Section
Public Works Department
Engineering Group
City of Albuquerque
Post Office Box 1293
Albuquerque, New Mexico 87103

SUBJECT: SANDIA RESEARCH PARK
CITY PROJECT NO. 3325

Dear Mr. Green:

Research in the NOAA Atlas indicates that the precipitation for a 24 hour - 100 year storm is 2.8 inches for the subject project. The precipitation for a 6 hour - 100 year storm is 2.4 inches. The volume of runoff during a 24 hr. precipitation vs. a 6 hr. precipitation would be approximately 16.6 percent larger.

The volume of runoff for a 6 hr. - 100 year storm for the subject project is 3.43 acre feet, from the drainage report. The volume of runoff for a 24 hour precipitation is approximately 4.00 acre feet. The retention pond will be enlarged to accommodate 4.00 acre feet.

Very truly yours,

ROBERT S. FOGLESONG, P.E. & L.S.

kat/458

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 2, 1988

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

RE: DRAINAGE REPORT SUBMITTAL OF SANDIA RESEARCH PARK RECEIVED JANUARY 20, 1988 FOR ROUGH GRADING PERMIT AND FINAL PLAT APPROVAL (M-21/D5) (W.O.#3325)

Dear Mr. Andrews:

I have the following comments in regard to the above referenced submittal revised on January 29, 1988.

1. The Drainage Ordinance requires that all detention ponds not drained within 6 hours be sized to hold the runoff from the 24 hour duration storm, not the 6 hour. This requirement was overlooked in my previous review and approval. An alternative to calculating the volume of runoff by a hydrograph, is to determine a composite runoff curve number (RCN) for the site and calculate the direct runoff value with the SCS formula or Plate 22.2 C-4 of the DPM.

2. The site can be approved for rough grading with the addition of construction notes referencing earthwork specifications, and the requirement that the contractor obtain a "Topsoil Disturbance Permit". Bring in the grading plan mylars for approval signature with the above notes added.

3. Final Plat may be signed off by the City Engineer after execution of a Subdivision Improvements Agreement, and Drainage Covenant for the retention pond.

Specific design details and street grades will be reviewed and commented on by the DRC.

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

Cordially,

Roger A. Green, PE

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

RAG/bsj

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.

RECEIVED
JAN 20 1988
HYDROLOGY SECTION

January 19, 1988

Mr. Roger Green
Public Works Department
City of Albuquerque
Post Office Box 1293
Albuquerque, New Mexico 87103

SUBJECT: SANDIA RESEARCH PARK

Dear Mr. Green:

Attached is a revised Drainage Report for Sandia Research Park for your review and approval.

If you need any further information, please contact me.

Very truly yours,

JAMES E. MILLINGTON, P.E.

kat/458
Enclosure
cc: Don Morgan

PROJECT TITLE: Sandia Research Park ZONE ATLAS/DRNG. FILE #: M-21 / D5

LEGAL DESCRIPTION: Sandia Research Park

CITY ADDRESS:

ENGINEERING FIRM: Andrews, Asbury & Robert, In CONTACT: John A. Andrews

ADDRESS: 149 Jackson NE PHONE: 265-6631

OWNER: Opportunity Research Park Partnership CONTACT:

ADDRESS PHONE:

ARCHITECT: CONTACT:

ADDRESS: PHONE:

SURVEYOR: CONTACT:

ADDRESS: PHONE:

CONTRACTOR: CONTACT:

ADDRESS: PHONE:

PRE-DESIGN MEETING:

RECEIVED
JAN 20 1988
HYDROLOGY SECTION

X YES DRB NO. 86-284

NO EPC NO.

COPY OF CONFERENCE RECAP SHEET PROVIDED PROJECT NO. 3325

TYPE OF SUBMITTAL:

X 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

X FINAL PLAT APPROVAL

BUILDING PERMIT APPROVAL

FOUNDATION PERMIT APPROVAL

CERTIFICATE OF OCCUPANCY APPROVAL

X ROUGH GRADING PERMIT APPROVAL

X GRADING/PAVING PERMIT APPROVAL

OTHER (SPECIFY)

DATE SUBMITTED: January 20, 1988

BY:

FILE COPY

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

Ken Schultz
Mayor

UTILITY DEVELOPMENT DIVISION
HYDROLOGY SECTION
(505) 768-2650

April 28, 1987

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

RE: DRAINAGE REPORT SUBMITTAL OF SANDIA RESEARCH PARK RECEIVED APRIL 13, 1987 FOR FINAL PLAT AND ROUGH GRADING PERMIT APPROVAL (M-21/D5)

Dear John:

The above referenced submittal dated April 13, 1987, is approved for Final Plat purposes. Prior to Final Plat sign-off by the City Engineer, an executed Subdivision Improvements agreement is required.

A Grading Permit can be issued by this office after submittal, review, and approval of a detailed Grading Plan in accordance with the DPM outline. Earthwork specifications and note to contractor requiring a Topsoil Disturbance Permit should be included.

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: M.B. Ford, Theatre Joint Venture

RAG/bsj

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.

RECEIVED
APR 13 1987

April 10, 1987

Mr. Fred Aguirre
Utility Development Division
Hydrology Section
Public Works Department
City of Albuquerque
P.O. Box 1293
Albuquerque, New Mexico 87103

ATTN: ROGER GREEN

SUBJECT: SANDIA RESEARCH PARK
DRAINAGE REPORT

Dear Mr. Aguirre:

Transmitted herewith is a drainage report for subject project for review.

The initial review of drainage for this project was made with Billy Goolsby; however, I have had detailed discussions with Roger Green relative to the drainage requirements for the development of this subdivision.

Your early review of this report will be appreciated.

Very truly yours,

JOHN A. ANDREWS, P.E.

caf-458
Enclosure
cc: Mr. M. B. "Pete" Ford

PROJECT TITLE: Sandia Research Park ZONE ATLAS/DRNG. FILE #: M-21

LEGAL DESCRIPTION: Sandia Research Park Subdivision

CITY ADDRESS: Eubank Boulevard, SE

ENGINEERING FIRM: Andrews, Asbury ~~& Robert, Inc.~~ CONTACT: John Andrews

ADDRESS: 149 Jackson NE ~~Albuquerque, NM 87108~~ PHONE: (505) 265-6631

OWNER: Theatre Joint Venture CONTACT: M. B. "Pete" Ford

ADDRESS 707 Broadway NE, Suite 303 Albuquerque, NM 87102 PHONE: (505) 242-5241

ARCHITECT: N/A CONTACT:

ADDRESS: PHONE:

SURVEYOR: Andrews, Asbury & Robert, Inc. CONTACT: Gayle Jewell

ADDRESS: 149 Jackson NE Albuquerque, NM 87108 PHONE: (505) 265-6631

CONTRACTOR: New Concepts Inc. & Interwest Ltd. A Joint Venture CONTACT: Tom Lakeman

ADDRESS: P.O. Box 6128 Albuquerque, NM 87197 PHONE: (505) 821-9504

PRE-DESIGN MEETING:

X YES w/ Billy Goolsby and Roger Green DRB NO. 86-284

___ NO EPC NO.

___ COPY OF CONFERENCE RECAP SHEET PROVIDED PROJECT NO.

TYPE OF SUBMITTAL:

X 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

X FINAL PLAT APPROVAL

___ BUILDING PERMIT APPROVAL

___ FOUNDATION PERMIT APPROVAL

___ CERTIFICATE OF OCCUPANCY APPROVAL

X ROUGH GRADING PERMIT APPROVAL

___ GRADING/PAVING PERMIT APPROVAL

OTHER ___ (SPECIFY)

DATE SUBMITTED: April 10, 1987

BY:

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

HYDROLOGY SECTION
123 Central NW, Albuquerque, NM 87102
(505) 766-7644

November 19, 1986

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

RE: CONCEPTUAL GRADING & DRAINAGE PLAN SUBMITTAL OF SANDIA RESEARCH PARK RECEIVED NOVEMBER 10, 1986 FOR PRELIMINARY PLAT APPROVAL (M-21/D5)

Dear Ted:

I have reviewed the above referenced submittal dated July 1986 and have the following comments to be addressed before review can continue:

1. Provide a complete watershed map to verify the off-site watershed drainage areas.

2. Off-site flows from the intersection of Eubank and Gibson must be accounted for in the existing and future conditions.

3. No reference is made to the proposed AMDS drainage channel within the existing 40' wide drainage easement. After discussions with Dwayne Sheppard, it appears that the City may propose a storm drain in this easement in lieu of an open channel. This item should be further coordinated with Dwayne Sheppard in Special Projects Hydrology Section of PWD Planning Division, with your plans reflecting some type of future facilities.

4. Your Grading Plan implies that in the developed condition the project site may discharge 89.9 cfs.

4. (cont'd.)

   This is incorrect since the Drainage Ordinance allows no discharge with developed conditions unless downstream drainage facilities exist and capacity is available, which is not the case for this site. 100% of the runoff must be retained until downstream facilities are in place.

5. This office does not recognize calculating volumes of runoff using the Rational Method. I recommend that DPM plates 22.2 C-2, C-3 and C-4 be used to calculate the volume of direct runoff for ponding requirement. You will find that the method you are using is very conservative and requires much greater pond volumes.

6. Offsite drainage basins must also have runoff calculations for the developed condition with the onsite facilities, such as the streets, analyzed for capacity with developed offsite flows. This would not apply if, under developed conditions, the offsite flows would be diverted away from your project site, but your Grading Plan does not imply this.

7. Provide the following information on the Grading and Drainage Plan as required by the DPM submittal check list to increase clarity:

   A. Legal description.
   B. Flood Hazard map or reference.
   C. Date with the Engineer's stamp.

A Conceptual Grading and Drainage Plan is not usually of enough detail to determine all the infrastructure requirements for an Infrastructure Listing for sign-off by the DRB. Your Grading and Drainage Plan must have adequate Hydrologic and Hydraulic calculations to demonstrate that all required infrastructures are identified and sized adequately. The only information not needed is design details which are reviewed at DRC for Work Order purposes.

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

Cordially,

Roger A. Green, PE

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

Standard Form Letter to:

Pete Ford, Theatre Joint Venture

RAG/bsj

RECEIVED
NOV 10 1986
HYDROLOGY SECTION

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.

October 23, 1986

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

SUBJECT: PRELIMINARY DRAINAGE PLAN

Dear Mr. Aguirre:

Recently, you and I informally discussed the general requirements for hydrology sign-off for Preliminary Plat approval.

I am enclosing a copy of the conceptual grading and drainage plan which depicts onsite, offsite, undeveloped and developed conditions, which I hope is suitable for your concurrence for preliminary plat approval.

If additional information is required, please contact me.

Very truly yours,

Ted

CHARLES TED ASBURY

jtg-458
Enclosure: Sheet 3

DRAINAGE INFORMATION SHEET

M21/D5

PROJECT TITLE: SANDIA RESEARCH PARK ZONE ATLAS/DRNG. FILE #: DRB 86-284

LEGAL DESCRIPTION: _____

CITY ADDRESS: SOUTH EUBANK BLVD.

ENGINEERING FIRM: ANDREWS ASBURY & ROBERT JAC CONTACT: TED ASBURY

ADDRESS: 149 JACKSON NE PHONE: 265-6631

OWNER: THEATRE JOINT VENTURE CONTACT: PETE FORD

ADDRESS: 707 BROADWAY N.W. PHONE: 242-5241

ARCHITECT: N/A. CONTACT: _____

ADDRESS: _____ PHONE: _____

SURVEYOR: AA&R CONTACT: _____

ADDRESS: _____ PHONE: _____

CONTRACTOR: N/A. CONTACT: _____

ADDRESS: _____ PHONE: _____

RECEIVED
NOV 10 1986
HYDROLOGY SECTION

PRE-DESIGN MEETING:

____ YES

____ NO

____ COPY OF CONFERENCE RECAP SHEET PROVIDED

DRB NO. 86-284 - 7/29/86

EPC NO. _____

PROJ. NO. _____

TYPE OF SUBMITTAL:

____ DRAINAGE REPORT

____ DRAINAGE PLAN

X CONCEPTUAL GRADING & DRAINAGE PLAN

____ GRADING PLAN

____ EROSION CONTROL PLAN

____ ENGINEER'S CERTIFICATION

CHECK TYPE OF APPROVAL SOUGHT:

____ SKETCH PLAT APPROVAL

X PRELIMINARY PLAT APPROVAL

____ SITE DEVELOPMENT PLAN APPROVAL

____ FINAL PLAT APPROVAL

____ BUILDING PERMIT APPROVAL

____ FOUNDATION PERMIT APPROVAL

____ CERTIFICATE OF OCCUPANCY APPROVAL

____ ROUGH GRADING PERMIT APPROVAL

____ GRADING/PAVING PERMIT APPROVAL

____ OTHER _____ (SPECIFY)

DATE SUBMITTED: NOV 10, 1986

BY: CHAS. T. Ashby

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

CONFERENCE RECAP

DRAINAGE FILE/ZONE ATLAS PAGE NO.: M-21 DATE: 5/8/90 @ 10:00 a.m.

PLANNING DIVISION NOS: EPC: _____ DRB: 90-254

SUBJECT: Sandia Research Park

STREET ADDRESS (IF KNOWN): NW [illegible] of NW ¼ Sec 15 T 10 N R 4 E

SUBDIVISION NAME: [illegible]

APPROVAL REQUESTED:

X	PRELIMINARY PLAT		FINAL PLAT
X	SITE DEVELOPMENT PLAN		BUILDING PERMIT
	OTHER		ROUGH GRADING

ATTENDANCE:	WHO	REPRESENTING
	Jim Millington	Andrew Asbury & Assoc.
	Bill Coulson	Hydrology Section
	Ted Ashburn	L.P.S.

FINDINGS:

- Interim solution will need to be presented to address the ultimate drainage scheme and show how the runoff will be controlled until the ultimate outfall becomes available.

- Individual Tract Drainage Plans will be required for approval at the building permits.

- Initial or small temporary stockpiles will be allowed pending the approved drainage scheme. It will be enforced with appropriate requirements for maintenance responsibility.

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: [illegible] SIGNED: [illegible]

TITLE: [illegible] TITLE: [illegible]

DATE: [illegible] DATE: _____

BRASHER ENGINEERING INC.

January 23, 1991

Mr. Fred Aguirre, P.E.
City Hydrologist
Public Works Department
PO Box 1293
Albuquerque, New Mexico

SUBJECT: SHAW MOBILE HOME PARK OUTFALL
BEI JOB 91-002

Dear Fred:

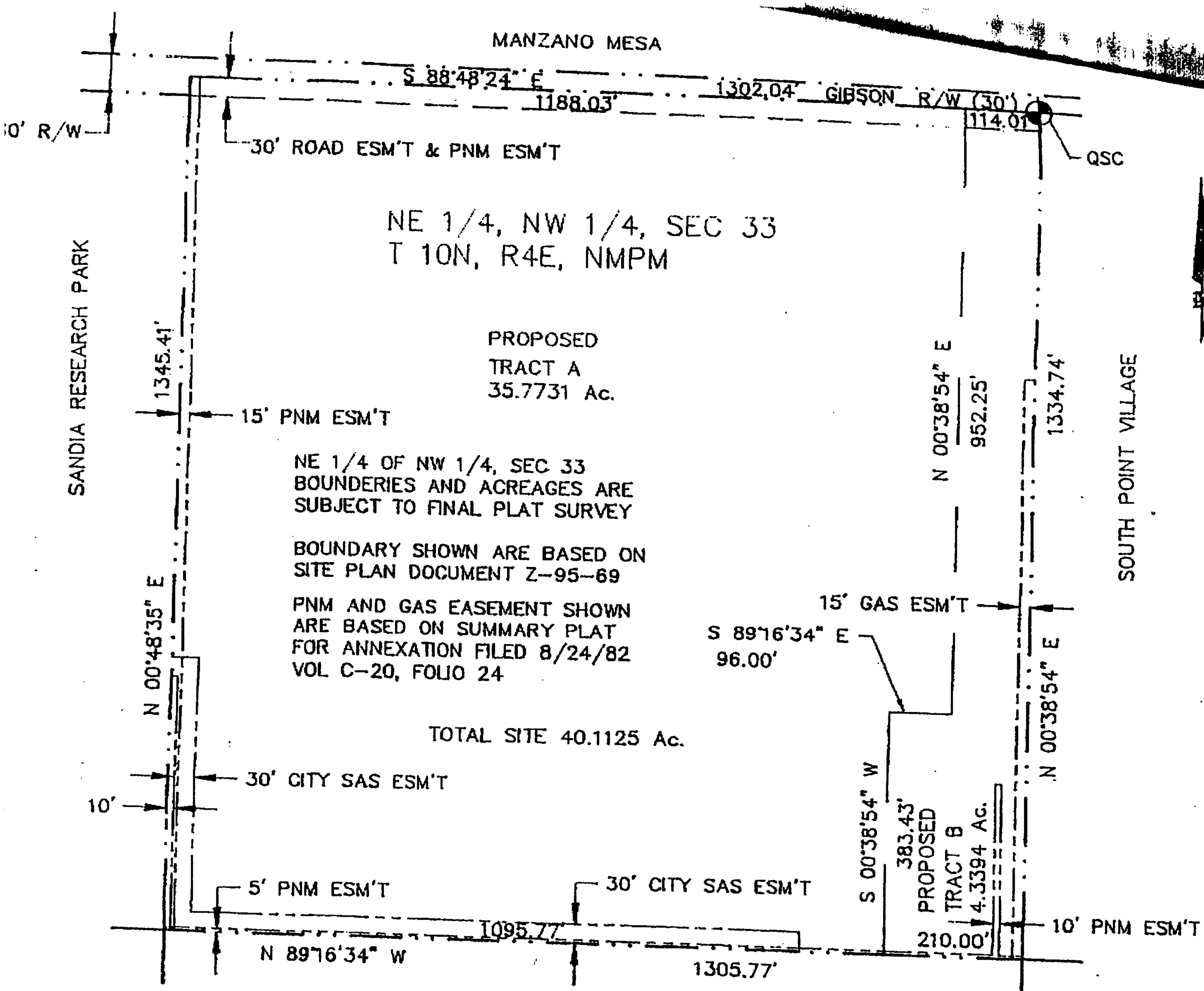
Submitted herewith for Discussion is one copy of the conceptual drainage plan for Shaw Mobile Home Park. As we discussed on January 21, 1992, our original plan to discharge directly to the Tijeras Arroyo has been vetoed by downstream property owners. We therefore are pursuing connection to the future Eubank Storm Drainage System. Before we develop our plans any further we need to know the implications of utilizing the Eubank system. Specifically, what is the project schedule and will Shaw Mobile Home Park be required to participate financially?

Please plan a meeting with the appropriate City personnel to discuss the pertinent issues. If you have any questions and if I can help, please call.

Sincerely,

Dennis A. Lorenz, P.E.

11930 MENAUL NE. SUITE 111 ALBUQUERQUE. NEW MEXICO 87112 (505) 296-0422 (505) 296-0466 FAX


MANZANO MESA
S 88°48'24" E
1188.03'
1302.04'
GIBSON R/W (30')
114.01'
QSC
30' R/W
30' ROAD ESM'T & PNM ESM'T
NE 1/4, NW 1/4, SEC 33
T 10N, R4E, NMPM
SANDIA RESEARCH PARK
1345.41'
15' PNM ESM'T
PROPOSED
TRACT A
35.7731 Ac.
NE 1/4 OF NW 1/4, SEC 33
BOUNDERIES AND ACREAGES ARE
SUBJECT TO FINAL PLAT SURVEY
BOUNDARY SHOWN ARE BASED ON
SITE PLAN DOCUMENT Z-95-69
PNM AND GAS EASEMENT SHOWN
ARE BASED ON SUMMARY PLAT
FOR ANNEXATION FILED 8/24/82
VOL C-20, FOLIO 24
TOTAL SITE 40.1125 Ac.
N 00°38'54" E
952.25'
1334.74'
SOUTH POINT VILLAGE
15' GAS ESM'T
S 89°16'34" E
96.00'
N 00°48'35" E
N 00°38'54" E
30' CITY SAS ESM'T
10'
S 00°38'54" W
383.43'
PROPOSED
TRACT B
4.3394 Ac.
5' PNM ESM'T
30' CITY SAS ESM'T
1095.77'
N 89°16'34" W
1305.77'
210.00'
10' PNM ESM'T

DRAINAGE INFORMATION SHEET

PROJECT TITLE: SHAW MHP ZONE ATLAS/DRNG. FILE #: M21-D6

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

LEGAL DESCRIPTION: RECO CORP

CITY ADDRESS: 11100 GIBSON SE

ENGINEERING FIRM: BRASHER ENGR CONTACT: D. LORENZ

ADDRESS: 11930 MENAUL NE PHONE: 296 0422

OWNER: G. MITCHELL CONTACT: SAME

ADDRESS: 11100 GIBSON SE PHONE: _____

ARCHITECT: NA CONTACT: _____

ADDRESS: _____ PHONE: _____

SURVEYOR: NA CONTACT: _____

ADDRESS: _____ PHONE: _____

CONTRACTOR: NA CONTACT: _____

ADDRESS: _____ PHONE: _____

TYPE OF SUBMITTAL:

____ DRAINAGE REPORT

____ DRAINAGE PLAN

____ CONCEPTUAL GRADING & DRAINAGE PLAN

____ GRADING PLAN

____ EROSION CONTROL PLAN

____ ENGINEER'S CERTIFICATION

X OTHER TOPIC FOR DISCUSSION

PRE-DESIGN MEETING:

X 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

X OTHER SET UP (SPECIFY)

MEETING WITH HYDROLOGY STAFF. NO APPROVAL OR ACTION REQUESTED.

DATE SUBMITTED: 1-24-92

BY: D. LORENZ

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

MAYOR
KEN SCHULTZ

CHIEF ADMINISTRATIVE OFFICER
GENE ROMO

DEPUTY CAO DEVELOPMENT & ENTERPRISE SERVICES
LARRY LARRANAGA

DEPUTY CAO PUBLIC SERVICES
DAN WEAKS

FILE COPY

July 6, 1988

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

RE: SANDIA RESEARCH PARK RETENTION POND SIZING CALCULATIONS (M-21/D5) (CITY PROJECT NO. 3325)

Dear Mr. Andrews:

It has recently come to my attention that the Drainage Report for Sandia Research Park, dated January 1988, uses an improper method to determine the minimum volume of storage required for the retention pond.

Sheet 14 of 16 of the above referenced report uses a SCS triangular hydrograph and routing techniques to determine the required storage volume. The flaw with this is that it assumes an outflow simultaneous with inflow with a maximum outflow being allowed. This application is correct when there is a detention pond with a riser type or staged weir outlet, which is not the case with this project. The other problem is that a volume of runoff greater than the off-site volume is allowed to pass by the retention pond. Normally with a retention pond condition, we must provide storage volume equal to the runoff from the entire project site.

Please reanalyze the retention pond design requirements and make any recommendations as to the adequacy of the current design or required changes.

I apologize for not recognizing this discrepancy earlier, and please contact me to further discuss this.

Cordially,

Roger A. Green, PE

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

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.

February 9, 1988

RECEIVED
FEB 09 1988
HYDROLOGY SECTION

Mr. Roger Green
Hydrology Section
Public Works Department
Engineering Group
City of Albuquerque
Post Office Box 1293
Albuquerque, New Mexico 87103

HAND DELIVERED

SUBJECT: SANDIA RESEARCH PARK
CITY PROJECT NO. 3325

Dear Mr. Green:

Transmitted herewith are the pond volume calculations for the subject project.

Very truly yours,

ROBERT S. FOGLESONG, P.E. & L.S.

kat/458
Enclosure

No written response required.
RGreen 2/24/88

PROJECT TITLE: Sandia Research Park ZONE ATLAS/DRNG. FILE #: M-21 / D5

LEGAL DESCRIPTION: Sandia Research Park

CITY ADDRESS:

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

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

OWNER: Opportunity Research Park Partnership CONTACT:

ADDRESS PHONE:

ARCHITECT: CONTACT:

ADDRESS: PHONE:

SURVEYOR: CONTACT:

ADDRESS: PHONE:

CONTRACTOR: CONTACT:

ADDRESS: PHONE:

PRE-DESIGN MEETING:

RECEIVED FEB 09 1988 HYDROLOGY SECTION

X YES DRB NO. 86-284

___ NO EPC NO.

___ COPY OF CONFERENCE RECAP SHEET PROVIDED PROJECT NO. 3325

TYPE OF SUBMITTAL:

___ DRAINAGE REPORT

___ DRAINAGE PLAN

___ CONCEPTUAL GRADING & DRAIN. PLAN

X 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

X ROUGH GRADING PERMIT APPROVAL

___ GRADING/PAVING PERMIT APPROVAL

OTHER ___ (SPECIFY)

DATE SUBMITTED: February 9, 1988

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.

RECEIVED
FEB 08 1988
HYDROLOGY SECTION

February 8, 1988

Mr. Rodger Green
Hydrology Section
Public Works Department
Engineering Group
City of Albuquerque
Post Office Box 1293
Albuquerque, New Mexico 87103

SUBJECT: SANDIA RESEARCH PARK
CITY PROJECT NO. 3325

Dear Mr. Green:

Research in the NOAA Atlas indicates that the precipitation for a 24 hour - 100 year storm is 2.8 inches for the subject project. The precipitation for a 6 hour - 100 year storm is 2.4 inches. The volume of runoff during a 24 hr. precipitation vs. a 6 hr. precipitation would be approximately 16.6 percent larger.

The volume of runoff for a 6 hr. - 100 year storm for the subject project is 3.43 acre feet, from the drainage report. The volume of runoff for a 24 hour precipitation is approximately 4.00 acre feet. The retention pond will be enlarged to accommodate 4.00 acre feet.

Very truly yours,

ROBERT S. FOGLESONG, P.E. & L.S.

kat/458

FILE CO

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 2, 1988

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

RE: DRAINAGE REPORT SUBMITTAL OF SANDIA RESEARCH PARK RECEIVED JANUARY 20, 1988 FOR ROUGH GRADING PERMIT AND FINAL PLAT APPROVAL (M-21/D5) (W.O.#3325)

Dear Mr. Andrews:

I have the following comments in regard to the above referenced submittal revised on January 29, 1988.

1. The Drainage Ordinance requires that all detention ponds not drained within 6 hours be sized to hold the runoff from the 24 hour duration storm, not the 6 hour. This requirement was overlooked in my previous review and approval. An alternative to calculating the volume of runoff by a hydrograph, is to determine a composite runoff curve number (RCN) for the site and calculate the direct runoff value with the SCS formula or Plate 22.2 C-4 of the DPM.

2. The site can be approved for rough grading with the addition of construction notes referencing earthwork specifications, and the requirement that the contractor obtain a "Topsoil Disturbance Permit". Bring in the grading plan mylars for approval signature with the above notes added.

3. Final Plat may be signed off by the City Engineer after execution of a Subdivision Improvements Agreement, and Drainage Covenant for the retention pond.

Specific design details and street grades will be reviewed and commented on by the DRC.

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

Cordially,

Roger A. Green, PE

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

RAG/bsj

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.

RECEIVED
JAN 20 1988
HYDROLOGY SECTION

January 19, 1988

Mr. Roger Green
Public Works Department
City of Albuquerque
Post Office Box 1293
Albuquerque, New Mexico 87103

SUBJECT: SANDIA RESEARCH PARK

Dear Mr. Green:

Attached is a revised Drainage Report for Sandia Research Park for your review and approval.

If you need any further information, please contact me.

Very truly yours,

JAMES E. MILLINGTON, P.E.

kat/458
Enclosure
cc: Don Morgan

PROJECT TITLE: Sandia Research Park ZONE ATLAS/DRNG. FILE #: M-21 / D5

LEGAL DESCRIPTION: Sandia Research Park

CITY ADDRESS:

ENGINEERING FIRM: Andrews, Asbury & Robert, In CONTACT: John A. Andrews

ADDRESS: 149 Jackson NE PHONE: 265-6631

OWNER: Opportunity Research Park Partnership CONTACT:

ADDRESS PHONE:

ARCHITECT: CONTACT:

ADDRESS: PHONE:

SURVEYOR: CONTACT:

ADDRESS: PHONE:

CONTRACTOR: CONTACT:

ADDRESS: PHONE:

PRE-DESIGN MEETING:

RECEIVED
JAN 20 1988
HYDROLOGY SECTION

X YES

___ NO

___ COPY OF CONFERENCE RECAP SHEET PROVIDED

DRB NO. 86-284

EPC NO.

PROJECT NO. 3325

TYPE OF SUBMITTAL:

X 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

X FINAL PLAT APPROVAL

___ BUILDING PERMIT APPROVAL

___ FOUNDATION PERMIT APPROVAL

___ CERTIFICATE OF OCCUPANCY APPROVAL

X ROUGH GRADING PERMIT APPROVAL

X GRADING/PAVING PERMIT APPROVAL

OTHER _____ (SPECIFY)

DATE SUBMITTED: January 20, 1988

BY:

FILE COPY

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

Ken Schultz
Mayor

UTILITY DEVELOPMENT DIVISION
HYDROLOGY SECTION
(505) 768-2650

April 28, 1987

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

RE: DRAINAGE REPORT SUBMITTAL OF SANDIA RESEARCH PARK RECEIVED APRIL 13, 1987 FOR FINAL PLAT AND ROUGH GRADING PERMIT APPROVAL (M-21/D5)

Dear John:

The above referenced submittal dated April 13, 1987, is approved for Final Plat purposes. Prior to Final Plat sign-off by the City Engineer, an executed Subdivision Improvements agreement is required.

A Grading Permit can be issued by this office after submittal, review, and approval of a detailed Grading Plan in accordance with the DPM outline. Earthwork specifications and note to contractor requiring a Topsoil Disturbance Permit should be included.

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: M.B. Ford, Theatre Joint Venture

RAG/bsj

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.

RECEIVED
APR 13 1987

April 10, 1987

Mr. Fred Aguirre
Utility Development Division
Hydrology Section
Public Works Department
City of Albuquerque
P.O. Box 1293
Albuquerque, New Mexico 87103

ATTN: ROGER GREEN

SUBJECT: SANDIA RESEARCH PARK
DRAINAGE REPORT

Dear Mr. Aguirre:

Transmitted herewith is a drainage report for subject project for review.

The initial review of drainage for this project was made with Billy Goolsby; however, I have had detailed discussions with Roger Green relative to the drainage requirements for the development of this subdivision.

Your early review of this report will be appreciated.

Very truly yours,

JOHN A. ANDREWS, P.E.

caf-458
Enclosure
cc: Mr. M. B. "Pete" Ford

PROJECT TITLE: Sandia Research Park ZONE ATLAS/DRG. FILE #: M-21

LEGAL DESCRIPTION: Sandia Research Park Subdivision

CITY ADDRESS: Eubank Boulevard, SE

ENGINEERING FIRM: Andrews, Asbury ~~& Robert, Inc.~~ CONTACT: John Andrews

ADDRESS: 149 Jackson NE Albuquerque, NM 87108 PHONE: (505) 265-6631

OWNER: Theatre Joint Venture CONTACT: M. B. "Pete" Ford

ADDRESS 707 Broadway NE, Suite 303 Albuquerque, NM 87102 PHONE: (505) 242-5241

ARCHITECT: N/A CONTACT:

ADDRESS: PHONE:

SURVEYOR: Andrews, Asbury & Robert, Inc. CONTACT: Gayle Jewell

ADDRESS: 149 Jackson NE Albuquerque, NM 87108 PHONE: (505) 265-6631

CONTRACTOR: New Concepts Inc. & Interwest Ltd. A Joint Venture CONTACT: Tom Lakeman

ADDRESS: P.O. Box 6128 Albuquerque, NM 87197 PHONE: (505) 821-9504

PRE-DESIGN MEETING:

X YES w/ Billy Goolsby and Roger Green DRB NO. 86-284

___ NO EPC NO.

___ COPY OF CONFERENCE RECAP SHEET PROVIDED PROJECT NO.

TYPE OF SUBMITTAL:

X 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

X FINAL PLAT APPROVAL

___ BUILDING PERMIT APPROVAL

___ FOUNDATION PERMIT APPROVAL

___ CERTIFICATE OF OCCUPANCY APPROVAL

X ROUGH GRADING PERMIT APPROVAL

___ GRADING/PAVING PERMIT APPROVAL

OTHER _____ (SPECIFY)

DATE SUBMITTED: April 10, 1987

BY:

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

HYDROLOGY SECTION
123 Central NW, Albuquerque, NM 87102
(505) 766-7644

November 19, 1986

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

RE: CONCEPTUAL GRADING & DRAINAGE PLAN SUBMITTAL OF SANDIA RESEARCH PARK RECEIVED NOVEMBER 10, 1986 FOR PRELIMINARY PLAT APPROVAL (M-21/D5)

Dear Ted:

I have reviewed the above referenced submittal dated July 1986 and have the following comments to be addressed before review can continue:

1. Provide a complete watershed map to verify the off-site watershed drainage areas.

2. Off-site flows from the intersection of Eubank and Gibson must be accounted for in the existing and future conditions.

3. No reference is made to the proposed AMDS drainage channel within the existing 40' wide drainage easement. After discussions with Dwayne Sheppard, it appears that the City may propose a storm drain in this easement in lieu of an open channel. This item should be further coordinated with Dwayne Sheppard in Special Projects Hydrology Section of PWD Planning Division, with your plans reflecting some type of future facilities.

4. Your Grading Plan implies that in the developed condition the project site may discharge 89.9 cfs.

4. (cont'd.)

   This is incorrect since the Drainage Ordinance allows no discharge with developed conditions unless downstream drainage facilities exist and capacity is available, which is not the case for this site. 100% of the runoff must be retained until downstream facilities are in place.

5. This office does not recognize calculating volumes of runoff using the Rational Method. I recommend that DPM plates 22.2 C-2, C-3 and C-4 be used to calculate the volume of direct runoff for ponding requirement. You will find that the method you are using is very conservative and requires much greater pond volumes.

6. Offsite drainage basins must also have runoff calculations for the developed condition with the onsite facilities, such as the streets, analyzed for capacity with developed offsite flows. This would not apply if, under developed conditions, the offsite flows would be diverted away from your project site, but your Grading Plan does not imply this.

7. Provide the following information on the Grading and Drainage Plan as required by the DPM submittal check list to increase clarity:

   A. Legal description.
   B. Flood Hazard map or reference.
   C. Date with the Engineer's stamp.

A Conceptual Grading and Drainage Plan is not usually of enough detail to determine all the infrastructure requirements for an Infrastructure Listing for sign-off by the DRB. Your Grading and Drainage Plan must have adequate Hydrologic and Hydraulic calculations to demonstrate that all required infrastructures are identified and sized adequately. The only information not needed is design details which are reviewed at DRC for Work Order purposes.

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

Cordially,

Roger A. Green, PE

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

Standard Form Letter to:

Pete Ford, Theatre Joint Venture

RAG/bsj

RECEIVED
NOV 10 1986
HYDROLOGY SECTION

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.

October 23, 1986

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

SUBJECT: PRELIMINARY DRAINAGE PLAN

Dear Mr. Aguirre:

Recently, you and I informally discussed the general requirements for hydrology sign-off for Preliminary Plat approval.

I am enclosing a copy of the conceptual grading and drainage plan which depicts onsite, offsite, undeveloped and developed conditions, which I hope is suitable for your concurrence for preliminary plat approval.

If additional information is required, please contact me.

Very truly yours,

Ted

CHARLES TED ASBURY

jtg-458
Enclosure: Sheet 3

DRAINAGE INFORMATION SHEET

M21/D6

PROJECT TITLE: SANDIA RESEARCH PARK ZONE ATLAS/DRNG. FILE #: DRB 86-28

LEGAL DESCRIPTION:

CITY ADDRESS: SOUTH EUBANK BLVD.

ENGINEERING FIRM: ANDREWS ASBURY & ROBERT JACONTACT: TED ASBURY

ADDRESS: 149 JACKSON NE PHONE: 265-6631

OWNER: THEATRE JOINT VENTURE CONTACT: PETE FORD

ADDRESS: 707 BROADWAY N.W. PHONE: 242-5241

ARCHITECT: N/A. CONTACT:

ADDRESS: PHONE:

SURVEYOR: AA&R CONTACT:

ADDRESS: PHONE:

CONTRACTOR: N/A. CONTACT:

ADDRESS: PHONE:

RECEIVED
NOV 10 1986
HYDROLOGY SECTION

PRE-DESIGN MEETING:

____ YES

____ NO

____ COPY OF CONFERENCE RECAP SHEET PROVIDED

DRB NO. 86-284 - 7/29/86

EPC NO.

PROJ. NO.

TYPE OF SUBMITTAL:

____ DRAINAGE REPORT

____ DRAINAGE PLAN

X CONCEPTUAL GRADING & DRAINAGE PLAN

____ GRADING PLAN

____ EROSION CONTROL PLAN

____ ENGINEER'S CERTIFICATION

CHECK TYPE OF APPROVAL SOUGHT:

____ SKETCH PLAT APPROVAL

X PRELIMINARY PLAT APPROVAL

____ SITE DEVELOPMENT PLAN APPROVAL

____ FINAL PLAT APPROVAL

____ BUILDING PERMIT APPROVAL

____ FOUNDATION PERMIT APPROVAL

____ CERTIFICATE OF OCCUPANCY APPROVAL

____ ROUGH GRADING PERMIT APPROVAL

____ GRADING/PAVING PERMIT APPROVAL

____ OTHER _____ (SPECIFY)

DATE SUBMITTED: NOV 10, 1986

BY: Thos. T Asbury

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

CONFERENCE RECAP

DRAINAGE FILE/ZONE ATLAS PAGE NO.: M-21 DATE: 5/8/90 @ 10:00 a.m.

PLANNING DIVISION NOS: EPC: _____ DRB: 86-254

SUBJECT: Sandia Research Park

STREET ADDRESS (IF KNOWN): NW ¼ NW ¼ Sec 15 T 10 N R 4 E

SUBDIVISION NAME: _____

APPROVAL REQUESTED:

X	PRELIMINARY PLAT		FINAL PLAT
X	SITE DEVELOPMENT PLAN		BUILDING PERMIT
	OTHER		ROUGH GRADING

ATTENDANCE:

WHO	REPRESENTING
Jim Millington	Andrew Asbury & Assoc.
Bill Coulson	Hydrology Section
Ted Asbury	L.P.C.

FINDINGS:

- Interim solution will need to be presented to address the ultimate drainage scheme and show how the runoff will be controlled until the ultimate outfall becomes available.

- Individual Tract Drainage Plans will be required for approval at time building permits.

- Partial or small treatment storm on site with interceptor ponding is the desired drainage scheme. It will be enforced with accomodations towards the maintenance responsibility.

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: _____ SIGNED: _____

TITLE: _____ TITLE: _____

DATE: _____ DATE: _____

BRASHER ENGINEERING INC.

January 23, 1991

Mr. Fred Aguirre, P.E.
City Hydrologist
Public Works Department
PO Box 1293
Albuquerque, New Mexico

SUBJECT: SHAW MOBILE HOME PARK OUTFALL
BEI JOB 91-002

Dear Fred:

Submitted herewith for Discussion is one copy of the conceptual drainage plan for Shaw Mobile Home Park. As we discussed on January 21, 1992, our original plan to discharge directly to the Tijeras Arroyo has been vetoed by downstream property owners. We therefore are pursuing connection to the future Eubank Storm Drainage System. Before we develop our plans any further we need to know the implications of utilizing the Eubank system. Specifically, what is the project schedule and will Shaw Mobile Home Park be required to participate financially?

Please plan a meeting with the appropriate City personnel to discuss the pertinent issues. If you have any questions and if I can help, please call.

Sincerely,

Dennis A. Lorenz, P.E.

```
ROWN0212              RIGHT OF WAY SYSTEM - UPDATE PERMIT DATA            ROWNM212
LOC. FRMT: 1 (1,2,3,4) W.O.: ________________   PRMT NBR: 2042849     03/12/2001
 1 = SPECIFIC ADR: HOUSE NUMBER: 10400 STREET: RESEARCH_____________.RD.SE
 2 = AT   AN INTR: ______________________ __ __   ______________________ __ __
 3 = FROM AN INTR: ______________________ __ __   ______________________ __ __
                      FEET: ______ HDG: __ OF     ______________________
 4 = BETWEEN INTR: NAME OF COMMON INTR STREET     ______________________ __ __
MAP ZONE: ____    ______________________ __ __    ______________________ __ __
CONTRACTOR: FRANKLIN'S EARTHMV._                 FEES:  EXCAVATION: 42.00______
   ADDRESS: P.O. BOX 30275_________________                SIDEWALK: 25.00______
            ALBUQUERQUE, NM  87176-1275___                 DRIVEPAD: 0.00_______
            884-6947_______________________              CURB/GUTTER: 0.00_______
PERMIT EXPIRES: 03222001  INS. EXPIRES: 07012001           BARRICADE: 0.00_______
BOND EXP: 12312001        COMPLT DATE:  03222001         RESTORATION: 0.00_______
PAVING BY: CON  STATE LICENSE: GF09__  BLUE STK: ______        TOTAL: 67.00
WORK CODE: O (E,M,O) ACTIVITY: IEDP BARRICADE CO: ___ BARR USED: _ AREA PRMT: _
DETOUR PLAN: N (Y,N) _________________    EMERGENCY-PLANNED CODE: P (E,P)
DATE: 03122001 TODATE: 03222001  EXTENDED DATE: ________ BAR REMOVED: 03282001
SO#19 FOR EMCORE EXPANSION_____________  ____________________________________
_____________________________________  ____________________________________
 INSPECTED BY MATT KLINE_____________________________________________________
PF1=UPD&PRNT PF3=UPD PF7=PRNT&KEEP PF8=UPD&KEEP ENTER=VALID PF10=MENU PF12=MAIN
```

M-21/DSE

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

February 8, 2001

Kim Kemper, PE
Kemper – Vaughan Construction Engineers
3700 Coors NW
Albuquerque, NM 87120

Re: Emcore Expansion Grading Plan
Engineer's Stamp dated 1-30-01, (M21/D5E)

Dear Mr. Kemper,

Based upon the information provided in your submittal dated 1-30-01, the above referenced plan is approved for Building Permit and SO#19 Permit.

Please attach a copy of this approved plan to the construction sets prior to sign-off by Hydrology.

A separate permit is required for construction within City R/W. A copy of this approval letter must be on hand when applying for the excavation permit.

Also, prior to Certificate of Occupancy release, Engineer Certification per the DPM checklist will be required.

If I can be of further assistance, please contact me at 924-3986

Sincerely,

Bradley L. Bingham

Bradley L. Bingham, PE
Sr. Engineer, Hydrology

C: Pam Lujan, CoA
file

M21|DSE

Front

CITY OF ALBUQUERQUE
PERMIT FOR EXCAVATION, CONSTRUCTION AND BARRICADING

CONTRACTOR	FRANKLIN'S EARTHMV.
LICENSE	GF09
ADDRESS	P.O. BOX 90275 ALBUQUERQUE, NM 87176-1875
PERMIT NUMBER	2042849
PROJECT NUMBER	
PERMIT ISSUE DATE	05/18/2001
BARRICADED BY	
BLUE STAKE	
PAVING BY	CON
EXCAVATION 443008-5810000	42.00 SA
SIDEWALK 443012-5810000	25.00 SW
DRIVEPAD 443011-5810000	0.00 DP
CURB/GUTTER 443010-5810000	0.00 CU
BARRICADING 443009-5810000	0.00 BA
RESTORATION 443017-5810000	0.00 RS
TOTAL FEE	67.00

10400 RESEARCH RD SE

PERMIT AND DETOUR PLAN COMMENTS

SD#19 FOR EMCORE EXPANSION

START DATE	COMPLETION DATE	PERMIT EXPIRES	INSURANCE EXPIRES	BOND EXPIRES	ZONE ATLAS
5/12/2001	05/22/2001	05/22/2001	07/01/2001	12/31/2001	

APPLICANT

ISSUED BY

VOID UNTIL VALIDATED BY CITY TREASURER

PERMITTEE AGREES TO ASSUME ALL LIABILITY, INCLUDING IDEMNIFYING, 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 768-2551 FOR ADDITIONAL INFORMATION.

CAUTION: PROTECT UNDERGROUND UTILITIES CALL 260-1990, 48 HOURS IN ADVANCE FOR LINE STAKING

PWD 003 REV 07/98

Back

DATE EXCAVATION STARTED _____

Backfill: Started _____ Completed 3/28/01 Accepted CoA [illegible] SDM.

Paved Cleared _____ Site Cleared _____ Warranty Exp _____

Restoration Fee Refund Authorized Yes _____ NO _____ BY: _____

Cash Disbursement Prepared for Refund Dated _____

Emcont ET.
5019

CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT
DEVELOPMENT AND BUILDING SERVICES
ONE STOP SHOP/PLAZA DEL SOL BUILDING

FRED J. AGUIRRE, P.E.

CITY ENGINEER

ROUTING AND TRANSMITTAL FORM

M21/D5E

DATE: 12-29-00

☐	Larry Blair	☐	Action
☐	Felicia Giron	☐	Please discuss w/me
☐	John Castillo	☐	Process
☐	Kevin Broderick	☐	Review & Comment
☐	Richard Dourte	☐	For Your Info
☐	Roger Green	☐	File
☐	Loren Meinz	☐	Fax to:_____
☐	Gloria Saavedra	☐	Copies to:_____
☑	TERRI MARTIN	☐	Prepare response for signature:
☐	_____	☐	Coordinate response w/_____

COMMENTS:
C.O. REQUIREMENTS FOR ENCORE SITE

REQUIRED BY:

ORIGINAL

EXHIBIT A (CITY 8/24/99)
TO SUBDIVISION IMPROVEMENT AGREEMENT
DEVELOPMENT REVIEW BOARD
REQUIRED INFRASTRUCTURE LISTING

STATE LAND OFFICE 20 ACRES
(20-ACRE MASTER DEVELOPMENT PLAN)
PHASE I – EMCORE SITE

#1000554
DRB Case No.: 00450...01483
DRC Project No.:
Prelim. Plat Approved: —
Prelim. Plat Expires: —
Site Plan Approved: 12-13-00

Date Submitted: 12/13/00

Following is a summary of PUBLIC/PRIVATE Infrastructure required to be constructed or financially guaranteed for the above development. This summary is not necessarily a complete listing. During CPC, BCC, the design process and/or in the preparation of the construction drawings, if the City, County, and/or AMAFCA determines that appurtenant items have not been included in the summary, those items will be included in the listing and related financial guarantee, if the items normally are the Subdivider's responsibility. In addition, any unforeseen Subdivider's responsibilities are the responsibility of the Subdivider and will be included in the financial guarantee provided to the City, County, and/or AMAFCA.

PHASE I

IMPROVEMENT	LOCATION	SIZE	FROM	TO
* Water	Eubank	16"	NW Corner Tract	675' South
	Public Easement	10"	Eubank	615' East
* Sewer	Public Easement	8"	Eubank	615' East
* Storm Sewer	Public Easement	48"	Eubank	615' East
* Detention Pond	SW Corner Phase I	Per grading plan		
	SW Corner Phase II	Per grading plan		
** Arterial Paving	Eubank	30' wide (F-F)	NW Corner Tract	675' South
** Paving	Public Easement	36' wide (F-F)	Eubank	615' East
** Curb and Gutter	East side Eubank	Standard	NW Corner Tract	675' South
	Each side of Public Easement paving	Standard	Eubank	615' East
** Trail	East side Eubank	9' wide asphalt	NW Corner Tract	455' South
	East side Eubank	10' wide asphalt	110' N. of Pub. Esmt	Public Easement
	North side of Public Easement	10' wide asphalt	Eubank	580' east
*** Intersection Improvements	To be determined			

NON-DEFERRED INFRASTRUCTURE (no financial guarantees required)

* Water, sewer, and storm sewer improvements (including pond) shall be designed and constructed for Phase I (EMCORE SITE). These items will not be financially guaranteed; however Certificate of Occupancy of any building(s) on Phase I shall be withheld pending satisfactory completion **and acceptance** of this infrastructure by the **City Engineer**.

DEFERRED INFRASTRUCTURE (financial guarantees required)

** Paving shown on this infrastructure listing for Phase I shall be designed and financially guaranteed for Phase I (EMCORE SITE). Construction of these paving improvements is deferred.

*** The off-site traffic mitigation cost to be financially guaranteed per the Traffic Impact Study is $ 52,420.81. This dollar amount does not include engineering fees such as design, design review, staking, testing, contingencies, and taxes, which are the responsibility of the developer. Release of this financial guarantee will be contingent on satisfactory design, construction, and acceptance by the City Engineer and/or the Traffic Engineer for these off-site improvements.

Certificate of Occupancy for Phase I (EMCORE SITE) building improvements will require prior certification by the Engineer as to substantial compliance with the approved Grading and Drainage Plan for Phase I (EMCORE SITE).

By signing below, I, Bob McCabe, Director of the Planning Department for the City of Albuquerque, understand that my Department will withhold the issuance of all Certificates of Occupancy until the required non-deferred infrastructure improvements listed above have been constructed and accepted by the City Engineer.

Signed By: _____

Print Name: BOB McCABE

Concur: David L. Steele

By signing below, I Thomas M. Brennan as VP for EMCORE, Inc., recognize that it is my responsibility to construct the above-listed improvements for Phase I (EMCORE site). Furthermore, Certificate of Occupancy for any building(s) constructed on the Phase I (EMCORE site) shall be withheld pending satisfactory completion and acceptance of the non-deferred infrastructure listed above by the City Engineer.

Signed By: Tom Brennan

Print Name: Tom Brennan

Firm: EMCORE

By signing below, I J. KYLE BODHAINE as VICE PRESIDENT for REID & ASSOCIATES, INC, Contractor for the construction of improvements for Phase I (EMCORE site), recognize that Certificate of Occupancy for any building(s) constructed on the Phase I (EMCORE site) shall be withheld pending satisfactory completion and acceptance of the non-deferred infrastructure listed above as required for Phase I by the City Engineer.

Signed By: _____

Print Name: J. KYLE BODHAINE

Firm: REID & ASSOCIATES.

INFRASTRUCTURE LISTING PREPARED BY:

12.5.00

Paul Brasher
BRASHER & LORENZ, INC.

STATE LAND OFFICE 20-AC MASTER PLAN INFRASTRUCTURE LISTING – PHASE 1 (EMCORE SITE)

DEVELOPMENT REVIEW BOARD MEMBER APPROVALS

Traffic	12-13-00 Date	Utility Dev.	12/13/00 Date	Parks & Recreation	12/13 Date
City Engineer	12-6-00 Date	AMAFCA	12/13/00 Date	DRB Chair	12/13/00 Date

DRB Infrastructure Listing – STATE LAND OFFICE 20-AC TRACT MASTER PLAN – PHASE 1 (EMCORE SITE)
DRB CASE # 00450-00000-01483
PROJECT # 1000554

Fred J. Aguirre

01/02/01 05:11 PM

To: Erik C. Pfeiffer/MAYOR/CABQ@COA, Larry Blair/PWD/CABQ@COA

cc: Kevin P. Broderick/PWD/CABQ@COA, Loren D. Meinz/PWD/CABQ@COA, Felicia M. Giron/PWD/CABQ@COA, (bcc: Teresa A. Martin/PWD/CABQ)

Subject: EMCORE

In an effort to expedite the EMCORE project we inadvertently signed off on the Master Plan without obtaining the required financial guarantees agreed to by EMCORE. To remedy this situation, I have the following choices :

1) Withhold the building permit until the SIA and financial guarantees are provided or

2) Withhold the issuance of the Certificate of Occupancy until the SIA and financial guarantees are provided or

3) Withhold the issuance of a Work Order for the water and sewer and storm drain work until the SIA and financial guarantees are provided.

I would recommend that we withhold the issuance of a building permit and the Work Order until the SIA and financial guarantees are submitted to this office. Given the urgency of this project I would like your input regarding my choices, please call me to discuss.

Fred.

FILE

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

January 24, 2001

? ~~M10/DOOTA~~

M21/DSF

Paul Brasher, P.E.
Brasher – Lorenz Engineers
2201 San Pedro NE, Bldg 1, Suite 210
Albuquerque, NM 87110

Re: Emcore III, Site Plan Approval and Financial Guarantees

Dear Mr. Brasher,

Regarding the referenced project, the site plan and infrastructure list was approved by the Development Review Board on December 13, 2000. In order to expedite the project, building permits were issued for "foundation only", pending the completion of the subdivision improvement agreement (SIA) and posting financial guarantees.

To date, the SIA has not been completed, and the City is withholding issuance of final Building Permit until completion of the agreement and financial guarantees. Attached is a copy of the approved infrastructure list and requirements for the financial guarantees.

In order to prevent delays in issuance of the final Building Permit, please advise the project owners that the above documents must be filed as soon as possible. If you have any questions, and if I can assist in expediting these documents, contact me at 924-3980.

Sincerely,

Loren D. Meinz, P.E.
Public Works/Development and Building Services

Attachments

c. Larry Blair, P.E., Public Works Director
Fabrizio Bertoletti, Deputy CAO
Erik Pfeiffer, Economic Development Director
Fred Aguirre, City Engineer, Public Works
Thomas Volek, Reid & Associates

Reid & Associates inc.
Design Builders
332-4400 Field Office
Thomas Volek
Project Manager
333 Rio Rancho Blvd. NE
Suite 301
Rio Rancho, NM 87124
Bus. 891-2528
Fax 892-1489
Mobile 453-7502
email: tvolek@reidandassociates.com

THE CITY OF ALBUQUERQUE IS AN EQUAL OPPORTUNITY/REASONABLE ACCOMMODATION EMPLOYER

ORIGINAL

EXHIBIT A (CITY 8/24/99)
TO SUBDIVISION IMPROVEMENT AGREEMENT
DEVELOPMENT REVIEW BOARD
REQUIRED INFRASTRUCTURE LISTING

STATE LAND OFFICE 20 ACRES
(20-ACRE MASTER DEVELOPMENT PLAN)
PHASE I – EMCORE SITE

#1080554

DRB Case No.: 00450...01483
DRC Project No.:
Prelim. Plat Approved: —
Prelim. Plat Expires: —
Site Plan Approved: 12-13-00

Date Submitted: 12/13/00

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PHASE I

IMPROVEMENT	LOCATION	SIZE	FROM	TO
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* Sewer	Public Easement	8"	Eubank	615' East
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** Trail	East side Eubank	9' wide asphalt	NW Corner Tract	455' South
	East side Eubank	10' wide asphalt	110' N. of Pub. Esmt	Public Easement
	North side of Public Easement	10' wide asphalt	Eubank	580' east
*** Intersection Improvements	To be determined			

NON-DEFERRED INFRASTRUCTURE (no financial guarantees required)

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DEFERRED INFRASTRUCTURE (financial guarantees required)

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*** The off-site traffic mitigation cost to be financially guaranteed per the Traffic Impact Study is $ 52,420.81. This dollar amount does not include engineering fees such as design, design review, staking, testing, contingencies, and taxes, which are the responsibility of the developer. Release of this financial guarantee will be contingent on satisfactory design, construction, and acceptance by the City Engineer and/or the Traffic Engineer for these off-site improvements.

Certificate of Occupancy for Phase I (EMCORE SITE) building improvements will require prior certification by the Engineer as to substantial compliance with the approved Grading and Drainage Plan for Phase I (EMCORE SITE).

By signing below, I, Bob McCabe, Director of the Planning Department for the City of Albuquerque, understand that my Department will withhold the issuance of all Certificates of Occupancy until the required non-deferred infrastructure improvements listed above have been constructed and accepted by the City Engineer.

Signed By: _____

Print Name: Bob McCabe

Concur: David L. Steele

By signing below, I Thomas M. Brennan as VP for EMCORE, Inc., recognize that it is my responsibility to construct the above-listed improvements for Phase I (EMCORE site). Furthermore, Certificate of Occupancy for any building(s) constructed on the Phase I (EMCORE site) shall be withheld pending satisfactory completion and acceptance of the non-deferred infrastructure listed above by the City Engineer.

Signed By: _____

Print Name: Tom Brennan

Firm: EMCORE

By signing below, I J. KYLE BODHAINE as VICE PRESIDENT for REID & ASSOCIATES, INC, Contractor for the construction of improvements for Phase I (EMCORE site), recognize that Certificate of Occupancy for any building(s) constructed on the Phase I (EMCORE site) shall be withheld pending satisfactory completion and acceptance of the non-deferred infrastructure listed above as required for Phase I by the City Engineer.

Signed By: _____

Print Name: J. KYLE BODHAINE

Firm: REID & ASSOCIATES.

INFRASTRUCTURE LISTING PREPARED BY:

_____ 12.5.00

Paul Brasher
BRASHER & LORENZ, INC.

STATE LAND OFFICE 20-AC MASTER PLAN INFRASTRUCTURE LISTING – PHASE 1 (EMCORE SITE)

DEVELOPMENT REVIEW BOARD MEMBER APPROVALS

Traffic	12-13-00 Date	Utility Dev.	12/13/00 Date	Parks & ~~G.S.~~ Recreation	12/13/ Date
City Engineer	12-6-00 Date	AMAFCA	12/13/00 Date	DRB Chair	12/13/00 Date

DRB Infrastructure Listing – STATE LAND OFFICE 20-AC TRACT MASTER PLAN – PHASE 1 (EMCORE SITE)
DRB CASE # 00450-00000-01483
PROJECT # 1000554

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

March 29, 2001

Kim Kemper, P.E.
Kemper-Vaughn Construction Engineers
3700 Coors NW
Albuquerque, New Mexico 87120

RE: **Grading and Drainage Certification**
Emcore Expansion (Phase 2) - (Research Rd SE) (M21/D5E)
Engineer's Stamp dated 1/30/2001
Engineers Certification dated 1/30/2001

Dear Mr. Kemper:

Based upon the information provided in your Engineers Certification submittal dated 1/30/2001, the above referenced site is approved for Permanent Certificate of Occupancy.

If I can be of further assistance, please contact me at 924-3986.

Sincerely,

Bradley L. Bingham

Bradley L. Bingham, PE
Senior Civil Engineer
Hydrology Section, PWD

C: Vickie Chavez, COA
Teresa Martin,COA
file

THE CITY OF ALBUQUERQUE IS AN EQUAL OPPORTUNITY/REASONABLE ACCOMMODATION EMPLOYER

DRAINAGE INFORMATION SHEET

PROJECT TITLE: EMCORE EXPANSION. ZONE ATLAS/DRNG. FILE #: M-21/D005E

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

LEGAL DESCRIPTION: LOTS 1 & 2, BLOCK 4 SANDIA RESEARCH PARK.

CITY ADDRESS: 10420 RESEARCH ROAD.

ENGINEERING FIRM: KEMPER-VAUGHAN CONS. ENGRS. CONTACT: KIM R. KEMPER.

ADDRESS: 5610 SAN FRANCISCO NE PHONE: 338-2352.

OWNER: EMCORE CORP. CONTACT: Mr. DAVE AIGNER.

ADDRESS: 10420 RESEARCH RD. PHONE: 332-5002.

ARCHITECT: DEKKER PERICH SABATINI CONTACT MARGARET FISHBURN.

ADDRESS: 6801 JEFFERSON. PHONE: 761-9700.

SURVEYOR: RIO GRANDE SURVEYING CO., INC. CONTACT: REX VOLGER.

ADDRESS: 3700 COORS RD NW SUITE C PHONE: 265-8940.

CONTRACTOR: REID & ASSOCIATES CONTACT: THOM VOLEK.

ADDRESS: 333 RIO RANCHO BLVD. PHONE: 891-2528.

TYPE OF SUBMITTAL:

_____DRAINAGE REPORT

_____DRAINAGE PLAN

_____CONCEPTUAL GRADING & DRAINAGE PLAN

_____GRADING PLAN

_____EROSION CONTROL PLAN

__X__ENGINEER'S CERTIFICATION

_____OTHER_____

_____PRE-DESIGN MEETING

_____YES

__X__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

BLB → __X__BUILDING PERMIT APPROVAL

TAM → __X__CERTIFICATE OF OCCUPANCY APPROVAL

_____GRADING PERMIT APPROVAL

_____PAVING PERMIT APPROVAL

_____S.A.D. DRAINAGE REPORT

_____DRAINAGE REQUIREMENTS

BCB → __X__OTHER SO-19 (SPECIFY)

RECEIVED
JAN 30 2001
HYDROLOGY SECTION

DATE SUMITTED: 01-30-01.

BY: [signature]

Edward E. Elwell

01/26/01 01:57 PM

To: Loren D. Meinz/PWD/CABQ@COA

cc:

Subject: SO--19 RMCO RR - EXPANSION

Loren the plate over the culvert needs to be repainted. Also the bolts need to be tack welded so that they won't back off.

Other than that it seems to be all right.

If you have any further questions give me a call.

CORRECTIONS MADE + ACCEPTED BY
ST. DRAIN MAINTENCE INSPECTOR (MATTHEW)
DATE 3/28/2001 PER PHONE MESSAGE.

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

February 8, 2001

Kim Kemper, PE
Kemper – Vaughan Construction Engineers
3700 Coors NW
Albuquerque, NM 87120

Re: Emcore Expansion Grading Plan
Engineer's Stamp dated 1-30-01, (M21/D5E)

Dear Mr. Kemper,

Based upon the information provided in your submittal dated 1-30-01, the above referenced plan is approved for Building Permit and SO#19 Permit.

Please attach a copy of this approved plan to the construction sets prior to sign-off by Hydrology.

A separate permit is required for construction within City R/W. A copy of this approval letter must be on hand when applying for the excavation permit.

Also, prior to Certificate of Occupancy release, Engineer Certification per the DPM checklist will be required.

If I can be of further assistance, please contact me at 924-3986

Sincerely,

Bradley L. Bingham

Bradley L. Bingham, PE
Sr. Engineer, Hydrology

C: Pam Lujan, CoA
file

THE CITY OF ALBUQUERQUE IS AN EQUAL OPPORTUNITY/REASONABLE ACCOMMODATION EMPLOYER

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

January 24, 2001

Kim Kemper, P.E.
Kemper/Vaughn Consult. Engineers
5610 San Francisco NE
Albuquerque, NM 87109

RE: **Grading and Drainage Certification – Emcore Expansion (M-21/D005E) (Eubank & Research Rd SE)**
Engineer's Stamp dated 6/13/2000
Engineering Certification dated 1/22/2001

Dear Mr. Kemper:

Based upon the information provided in your submittal dated January 23, 2001, the Engineering Certification for Certificate of Occupancy for the project referred to above *can not* be issued at this time.

In reviewing your Engineers Certification submitted to our office, for the above project, there was a major change in the grading and drainage plan, after Hydrology had approved the building plans, which should have been submitted to our office for review and approval prior to construction and request for Certificate of Occupancy. Any major change has a definite impact on drainage off-site flows. Another drainage concern is the removal of the sidewalk culvert on Eubank and placing a sidewalk culvert on Research Rd.

Also, any SO#19 Sidewalk Culvert constructed within City Right-Of-Way, requires the City's street maintenance inspector's signature on the Engineers Certification prior to approval of a permanent Certificate of Occupancy.

Please contact me, so we can discuss the issues to the changes in the plans.

Thank you for your attention to this matter. If you have any questions, please call me at 924-3986.

Sincerely,

Bradley L. Bingham

Bradley Bingham, P.E.
Hydrology Division

xc: Teresa Martin, COA
File

DRAINAGE INFORMATION SHEET

PROJECT TITLE: EMCORE EXPANSION. ZONE ATLAS/DRNG. FILE #: M-21/ D005E

DRB#: EPC #: WORK ORDER #:

LEGAL DESCRIPTION: LOTS 1 & 2, BLOCK 4 SANDIA RESEARCH PARK.

CITY ADDRESS: 10420 RESEARCH ROAD.

ENGINEERING FIRM: KEMPER-VAUGHAN CONS. ENGRS. CONTACT: KIM R. KEMPER.

ADDRESS: 5610 SAN FRANCISCO NE PHONE: 338-2352.

OWNER: EMCORE CORP. CONTACT: Mr. DAVE AIGNER.

ADDRESS: 10420 RESEARCH RD. PHONE: 332-5002.

ARCHITECT: DEKKER PERICH SABATINI CONTACT MARGARET FISHBURN.

ADDRESS: 6801 JEFFERSON. PHONE: 761-9700.

SURVEYOR: RIO GRANDE SURVEYING CO., INC. CONTACT: REX VOLGER.

ADDRESS: 3700 COORS RD NW SUITE C PHONE: 265-8940.

CONTRACTOR: REID & ASSOCIATES CONTACT: THOM VOLEK.

ADDRESS: 333 RIO RANCHO BLVD. PHONE: 891-2528.

TYPE OF SUBMITTAL:

_____DRAINAGE REPORT

_____DRAINAGE PLAN

_____CONCEPTUAL GRADING & DRAINAGE PLAN

_____GRADING PLAN

_____EROSION CONTROL PLAN

__X__ENGINEER'S CERTIFICATION

_____OTHER_____

_____PRE-DESIGN MEETING

_____YES

__X__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

__X__CERTIFICATE OF OCCUPANCY APPROVAL

_____GRADING PERMIT APPROVAL

_____PAVING PERMIT APPROVAL

_____S.A.D. DRAINAGE REPORT

_____DRAINAGE REQUIREMENTS

_____OTHER_____(SPECIFY)

DATE SUMITTED: 01-22-01.

BY: _____

RECEIVED
JAN 22 2001
HYDROLOGY SECTION

EMCORE EXPANSION

GRADING PLAN & DRAINAGE PLAN

(REVISED FILE M21/D5E)

November 30, 2000

Prepared for:

Reid & Associates, Inc

333 Rio Rancho Blvd. NE

Rio Rancho, New Mexico 87124

RECEIVED
JAN 30 2001
HYDROLOGY SECTION

KIM R. KEMPER
NEW MEXICO
10542
REGISTERED PROFESSIONAL ENGINEER
11-30-00

Prepared by:

KEMPER-VAUGHAN CONSULTING ENGINEERS

3700 Coors Road NW

Albuquerque, New Mexico 87120

PROJECT OVERVIEW

This project is a planned expansion of a facility that was constructed in 1998. The existing facility was certified in October of 1998, City file M21/D5E. This project includes the addition of a 36,000-sf facility and the associated parking. This is a revised plan to a plan for this expansion prepared and approved is June, 2000. This revised plan is required due to the reconfiguration of the proposed west parking area.

The site is located on south Eubank in the Sandia Research Park. The master drainage plan for the Sandia Research Park was prepared by Andrews, Asbury & Roberts and can be found in City file M21/D5. (this plan can also be found in file M21/D5E) This plan allowed for the free discharge of flows from this site and incorporated the use of a detention pond to accommodate the flows from the park. The City's recent project, South Eubank Storm Sewer, eliminated the detention pond with the construction of a 90-inch storm sewer through the western edge of the subject site. The detention pond was the area west of the existing facility (Lot 1) where the new parking is located. The City, with the Eubank project, took this pond out of service.

DRAINAGE PLAN

The existing approved drainage plan (for the initial construction) for this site identified three separate internal basins. Those basins are identified on the attached Figure 1 as basins 1, 2, & 3. The proposed plan does not affect basins 1 and 3. Due to the proposed access it will slightly increase the area of basin 2 (0.04 ac.). The entire new facility is located in basin 1. A small delivery driveway and a small area of drive isle is located in basin 2. Basin 3, which is a dock area with a sump pump, will not be affected by this project. The attached calculations provide for each basin individually. With the inclusion of the area to the west (old detention pond) we have identified an additional two basins shown on Figure 1 as basins 4 & 5. Basin 4 is the new parking area and basin 5 is the balance of the site.

The hydrology of the site can be summarized as follows: (all figures are the 100-yr, 6-hour event)

Basin 1: will continue to drain to the existing three inlets on Research Rd via sidewalk culverts as provided in the original plan. This project will increase the peak rate of discharge 1.98 cfs and the volumetric runoff 4,287 cf.

Basin 2: will continue to drain to the existing three inlets on Research Rd and through the western drive as provided in the original plan. This project will increase the peak rate of discharge 0.11 cfs and the volumetric runoff 260 cf.

Basin 3: this project will not affect the existing basin 3.

Basin 4: storm waters from the new parking area will be conveyed to an existing inlet(s) in Research Rd. via a new concrete rundown and sidewalk culvert. Calculations demonstrating the capacity of the new concrete rundown are attached. This existing inlet was recently constructed as part of the City's South Eubank project. This project will increase the peak rate of discharge 0.63 cfs and the volumetric runoff 1,615 cf.

Basin 5: will "sheet-flow" to Eubank as it does in its current condition. This project will not increase the peak rate of discharge or volumetric from this area.

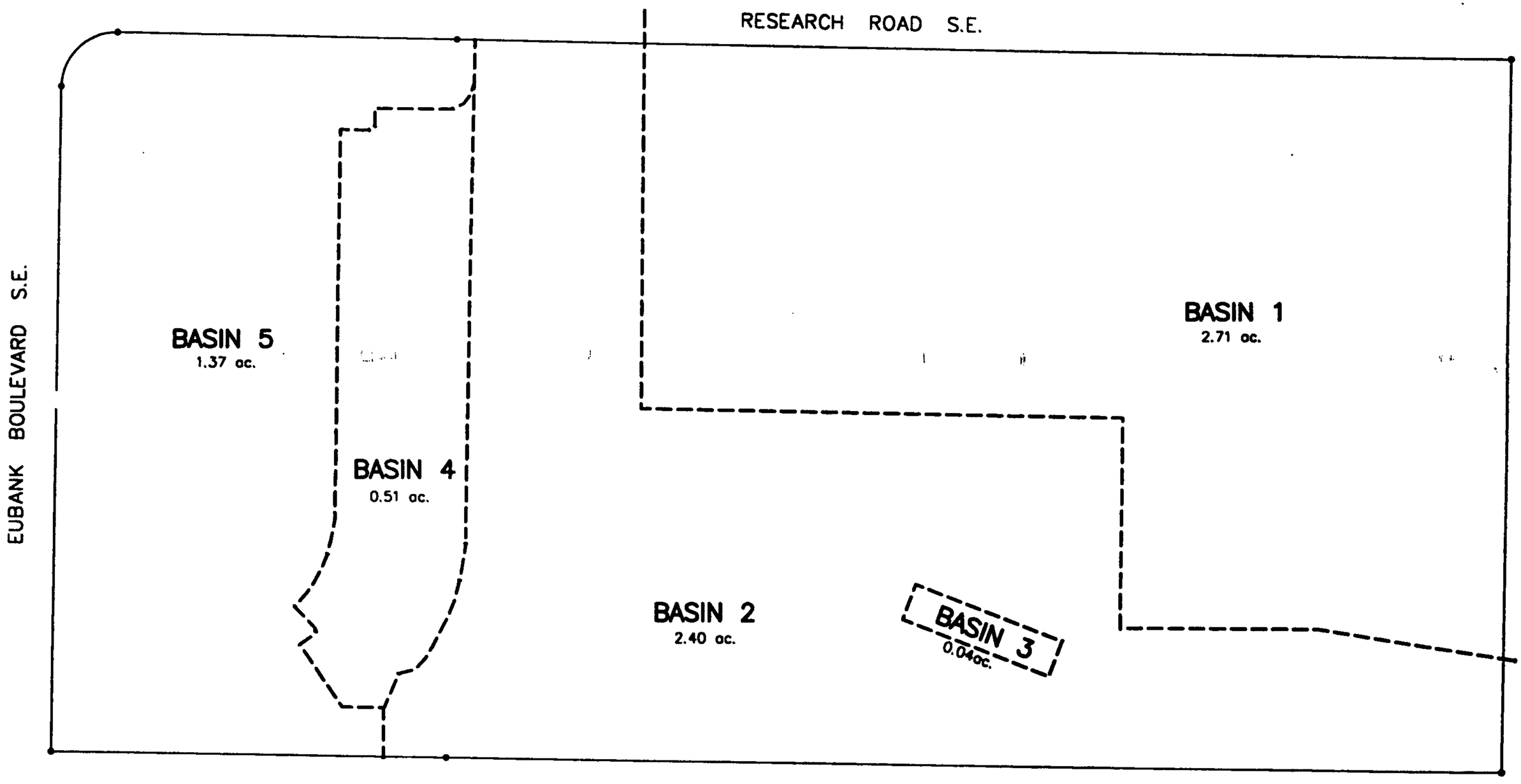
RESEARCH ROAD S.E.
EUBANK BOULEVARD S.E.
BASIN 1
2.71 ac.
BASIN 5
1.37 ac.
BASIN 4
0.51 ac.
BASIN 2
2.40 ac.
BASIN 3
0.04ac.

FIGURE 1

BASIN 1 AREA = 2.71 ac.

DRAINAGE ZONE 3

PRECIPITATION:		
	360 =	2.60 in.
	1140 =	3.10 in.
	10day =	4.90 in.

	EXCESS PRECIPITATION:	PEAK DISCHARGE:	
TREATMENT A	0.66 in.	1.87	cfs/ac.
TREATMENT B	0.92 in.	2.60	cfs/ac.
TREATMENT C	1.29 in.	3.45	cfs/ac.
TREATMENT D	2.36 in.	5.02	cfs/ac.

EXISTING CONDITIONS:		PROPOSED CONDITIONS:
	AREA	AREA
TREATMENT A	0.00 ac.	0.00 ac.
TREATMENT B	1.16 ac.	0.34 ac.
TREATMENT C	0.00 ac.	0.00 ac.
TREATMENT D	1.55 ac.	2.37 ac.

EXISTING EXCESS PRECIPITATION:

Weighted E = (0.66)x(0.00)+(0.92)x(1.16)+(1.29)x(0.00)+(2.36)x(1.55)/ 2.71 ac.
= 1.74 in.

V100-360 = (1.74)x(2.71)/ 12 = 0.393767 ac-ft = 17152 cf

EXISTING PEAK DISCHARGE:

Q100 = (1.87)x(0.00)+(2.60)x(1.16)+(3.45)x(0.00)+(5.02)x(1.55)= 10.80 cfs

PROPOSED EXCESS PRECIPITATION:

Weighted E = (0.66)x(0.00)+(0.92)x(0.34)+(1.29)x(0.00)+(2.36)x(2.37)/ 2.71 ac.
= 2.18 in.

V100-360 = (2.18)x(2.71)/ 12.0 = 0.492167 ac-ft = 21439 cf

V100-1440 = (0.49)+(2.37)x(3.10 - 2.60)/ 12 = 0.590917 ac-ft = 25740 cf

V100-10day = (0.49)+(2.37)x(4.90 - 2.60)/ 12 = 0.946417 ac-ft = 41226 cf

PROPOSED PEAK DISCHARGE:

Q100 = (1.87)x(0.00)+(2.60)x(0.34)+(3.45)x(0.00)+(5.02)x(2.37)= 12.78 cfs

BASIN 2 AREA = 2.40 ac.

DRAINAGE ZONE 3
PRECIPITATION:

360 =	2.60 in.
1140 =	3.10 in.
10day =	4.90 in.

	EXCESS PRECIPITATION:	PEAK DISCHARGE:	
TREATMENT A	0.66 in.	1.87	cfs/ac.
TREATMENT B	0.92 in.	2.60	cfs/ac.
TREATMENT C	1.29 in.	3.45	cfs/ac.
TREATMENT D	2.36 in.	5.02	cfs/ac.

EXISTING CONDITIONS:		PROPOSED CONDITIONS:
	AREA	AREA
TREATMENT A	0.00 ac.	0.00 ac.
TREATMENT B	0.25 ac.	0.23 ac.
TREATMENT C	0.04 ac.	0.00 ac.
TREATMENT D	2.11 ac.	2.17 ac.

EXISTING EXCESS PRECIPITATION:

Weighted E = (0.66)x(0.00)+(0.92)x(0.25)+(1.29)x(0.04)+(2.36)x(2.11)/ 2.40 ac.
= 2.19 in.
V100-360 = (2.19)x(2.40)/ 12 = 0.438433 ac-ft = 19098 cf

EXISTING PEAK DISCHARGE:

Q100 = (1.87)x(0.00)+(2.60)x(0.25)+(3.45)x(0.04)+(5.02)x(2.11)= 11.38 cfs

PROPOSED EXCESS PRECIPITATION:

Weighted E = (0.66)x(0.00)+(0.92)x(0.23)+(1.29)x(0.00)+(2.36)x(2.17)/ 2.40 ac.
= 2.22 in.
V100-360 = (2.22)x(2.40)/ 12.0 = 0.444400 ac-ft = 19358 cf

V100-1440 = (0.44)+(2.17)x(3.10 - 2.60)/ 12 = 0.534817 ac-ft = 23297 cf

V100-10day = (0.44)+(2.17)x(4.90 - 2.60)/ 12 = 0.860317 ac-ft = 37475 cf

PROPOSED PEAK DISCHARGE:

Q100 = (1.87)x(0.00)+(2.60)x(0.23)+(3.45)x(0.00)+(5.02)x(2.17)= 11.49 cfs

BASIN 3 AREA = 0.04 ac.

DRAINAGE ZONE 3
PRECIPITATION:

360 =	2.60 in.
1140 =	3.10 in.
10day =	4.90 in.

	EXCESS PRECIPITATION:	PEAK DISCHARGE:	
TREATMENT A	0.66 in.	1.87	cfs/ac.
TREATMENT B	0.92 in.	2.60	cfs/ac.
TREATMENT C	1.29 in.	3.45	cfs/ac.
TREATMENT D	2.36 in.	5.02	cfs/ac.

	EXISTING CONDITIONS: AREA	PROPOSED CONDITIONS: AREA
TREATMENT A	0.00 ac.	0.00 ac.
TREATMENT B	0.00 ac.	0.00 ac.
TREATMENT C	0.00 ac.	0.00 ac.
TREATMENT D	0.04 ac.	0.04 ac.

EXISTING EXCESS PRECIPITATION:

Weighted E = (0.66)x(0.00)+(0.92)x(0.00)+(1.29)x(0.00)+(2.36)x(0.04)/ 0.04 ac.
= 2.36 in.
V100-360 = (2.36)x(0.04)/ 12 = 0.007867 ac-ft = 343 cf

EXISTING PEAK DISCHARGE:

Q100 = (1.87)x(0.00)+(2.60)x(0.00)+(3.45)x(0.00)+(5.02)x(0.04)= 0.20 cfs

PROPOSED EXCESS PRECIPITATION:

Weighted E = (0.66)x(0.00)+(0.92)x(0.00)+(1.29)x(0.00)+(2.36)x(0.04)/ 0.04 ac.
= 2.36 in.
V100-360 = (2.36)x(0.04)/ 12.0 = 0.007867 ac-ft = 343 cf

V100-1440 = (0.01)+(0.04)x(3.10 - 2.60)/ 12 = 0.009533 ac-ft = 415 cf

V100-10day = (0.01)+(0.04)x(4.90 - 2.60)/ 12 = 0.015533 ac-ft = 677 cf

PROPOSED PEAK DISCHARGE:

Q100 = (1.87)x(0.00)+(2.60)x(0.00)+(3.45)x(0.00)+(5.02)x(0.04)= 0.20 cfs

BASIN 4 AREA = 0.51 ac.

DRAINAGE ZONE 3
PRECIPITATION:

360 =	2.60 in.
1140 =	3.10 in.
10day =	4.90 in.

	EXCESS PRECIPITATION:	PEAK DISCHARGE:	
TREATMENT A	0.66 in.	1.87	cfs/ac.
TREATMENT B	0.92 in.	2.60	cfs/ac.
TREATMENT C	1.29 in.	3.45	cfs/ac.
TREATMENT D	2.36 in.	5.02	cfs/ac.

EXISTING CONDITIONS:	AREA	PROPOSED CONDITIONS: AREA
TREATMENT A	0.00 ac.	0.00 ac.
TREATMENT B	0.00 ac.	0.07 ac.
TREATMENT C	0.51 ac.	0.00 ac.
TREATMENT D	0.00 ac.	0.44 ac.

EXISTING EXCESS PRECIPITATION:

Weighted E = (0.66)x(0.00)+(0.92)x(0.00)+(1.29)x(0.51)+(2.36)x(0.00)/ 0.51 ac.
= 1.29 in.
V100-360 = (1.29)x(0.51)/ 12 = 0.054825 ac-ft = 2388 cf

EXISTING PEAK DISCHARGE:

Q100 = (1.87)x(0.00)+(2.60)x(0.00)+(3.45)x(0.51)+(5.02)x(0.00)= 1.76 cfs

PROPOSED EXCESS PRECIPITATION:

Weighted E = (0.66)x(0.00)+(0.92)x(0.07)+(1.29)x(0.00)+(2.36)x(0.44)/ 0.51 ac.
= 2.16 in.
V100-360 = (2.16)x(0.51)/ 12.0 = 0.091900 ac-ft = 4003 cf

V100-1440 = (0.09)+(0.44)x(3.10 - 2.60)/ 12 = 0.110233 ac-ft = 4802 cf

V100-10day = (0.09)+(0.44)x(4.90 - 2.60)/ 12 = 0.176233 ac-ft = 7677 cf

PROPOSED PEAK DISCHARGE:

Q100 = (1.87)x(0.00)+(2.60)x(0.07)+(3.45)x(0.00)+(5.02)x(0.44)= 2.39 cfs

BASIN 5 AREA = 1.37 ac.

DRAINAGE ZONE 3
PRECIPITATION:

360 =	2.60	in.
1140 =	3.10	in.
10day =	4.90	in.

	EXCESS PRECIPITATION:	PEAK DISCHARGE:	
TREATMENT A	0.66 in.	1.87	cfs/ac.
TREATMENT B	0.92 in.	2.60	cfs/ac.
TREATMENT C	1.29 in.	3.45	cfs/ac.
TREATMENT D	2.36 in.	5.02	cfs/ac.

EXISTING CONDITIONS:		PROPOSED CONDITIONS:
	AREA	AREA
TREATMENT A	0.00 ac.	0.00 ac.
TREATMENT B	0.00 ac.	0.00 ac.
TREATMENT C	1.37 ac.	1.37 ac.
TREATMENT D	0.00 ac.	0.00 ac.

EXISTING EXCESS PRECIPITATION:

Weighted E = (0.66)x(0.00)+(0.92)x(0.00)+(1.29)x(1.37)+(2.36)x(0.00)/ 1.37 ac.
= 1.29 in.
V100-360 = (1.29)x(1.37)/ 12 = 0.147275 ac-ft = 6415 cf

EXISTING PEAK DISCHARGE:

Q100 = (1.87)x(0.00)+(2.60)x(0.00)+(3.45)x(1.37)+(5.02)x(0.00)= 4.73 cfs

PROPOSED EXCESS PRECIPITATION:

Weighted E = (0.66)x(0.00)+(0.92)x(0.00)+(1.29)x(1.37)+(2.36)x(0.00)/ 1.37 ac.
= 1.29 in.
V100-360 = (1.29)x(1.37)/ 12.0 = 0.147275 ac-ft = 6415 cf

V100-1440 = (0.15)+(0.00)x(3.10 - 2.60)/ 12 = 0.147275 ac-ft = 6415 cf

V100-10day = (0.15)+(0.00)x(4.90 - 2.60)/ 12 = 0.147275 ac-ft = 6415 cf

PROPOSED PEAK DISCHARGE:

Q100 = (1.87)x(0.00)+(2.60)x(0.00)+(3.45)x(1.37)+(5.02)x(0.00)= 4.73 cfs

TRAPEZOIDAL CHANNEL ANALYSIS
RATING CURVE COMPUTATION

EMCORE EXPANSION
CONC. RUNDOWN FROM
BASIN 4 TO RESEARCH

==========

PROGRAM INPUT DATA:

DESCRIPTION	VALUE
Channel Bottom Slope (feet per foot).....	0.0100
Manning`s Roughness Coefficient (n-value).....	0.0150
Channel Side Slope - Left Side (horizontal/vertical)....	0.01
Channel Side Slope - Right Side (horizontal/vertical)...	0.01
Channel Bottom Width (feet).....	2.0

==========

PROGRAM RESULTS:

Depth (ft)	Flow Rate (cfs)	Velocity (fps)	Froude Number	Velocity Head(ft)	Energy Head(ft)	Flow Area (sq ft)	Top Width (ft)
0.1	0.4	2.00	1.117	0.062	0.162	0.2	2.0
0.2	1.2	3.00	1.184	0.140	0.340	0.4	2.0
0.3	2.2	3.73	1.201	0.216	0.516	0.6	2.0
0.4	3.4	4.30	1.200	0.288	0.688	0.8	2.0
0.5	4.8	4.77	1.190	0.353	0.853	1.0	2.0

==========

TRAPEZOIDAL CHANNEL ANALYSIS COMPUTER PROGRAM, Version 1.3 (c) 1986
Dodson & Associates, Inc., 7015 W. Tidwell, #107, Houston, TX 77092
(713) 895-8322. A manual with equations & flow chart is available.

EMCORE EXPANSION

GRADING PLAN & DRAINAGE PLAN
(REVISED FILE M21/D5E)
November 30, 2000

Prepared for:

Reid & Associates, Inc

333 Rio Rancho Blvd. NE

Rio Rancho, New Mexico 87124

RECEIVED
JAN 30 2001
HYDROLOGY SECTION

KIM R. KEMPER
NEW MEXICO
10542
REGISTERED PROFESSIONAL ENGINEER
11-30-00

Prepared by:

KEMPER-VAUGHAN CONSULTING ENGINEERS

3700 Coors Road NW

Albuquerque, New Mexico 87120

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DRAINAGE PLAN

The existing approved drainage plan (for the initial construction) for this site identified three separate internal basins. Those basins are identified on the attached Figure 1 as basins 1, 2, & 3. The proposed plan does not affect basins 1 and 3. Due to the proposed access it will slightly increase the area of basin 2 (0.04 ac.). The entire new facility is located in basin 1. A small delivery driveway and a small area of drive isle is located in basin 2. Basin 3, which is a dock area with a sump pump, will not be affected by this project. The attached calculations provide for each basin individually. With the inclusion of the area to the west (old detention pond) we have identified an additional two basins shown on Figure 1 as basins 4 & 5. Basin 4 is the new parking area and basin 5 is the balance of the site.

The hydrology of the site can be summarized as follows: (all figures are the 100-yr, 6-hour event)

Basin 1: will continue to drain to the existing three inlets on Research Rd via sidewalk culverts as provided in the original plan. This project will increase the peak rate of discharge 1.98 cfs and the volumetric runoff 4,287 cf.

Basin 2: will continue to drain to the existing three inlets on Research Rd and through the western drive as provided in the original plan. This project will increase the peak rate of discharge 0.11 cfs and the volumetric runoff 260 cf.

Basin 3: this project will not affect the existing basin 3.

Basin 4: storm waters from the new parking area will be conveyed to an existing inlet(s) in Research Rd. via a new concrete rundown and sidewalk culvert. Calculations demonstrating the capacity of the new concrete rundown are attached. This existing inlet was recently constructed as part of the City's South Eubank project. This project will increase the peak rate of discharge 0.63 cfs and the volumetric runoff 1,615 cf.

Basin 5: will "sheet-flow" to Eubank as it does in its current condition. This project will not increase the peak rate of discharge or volumetric from this area.

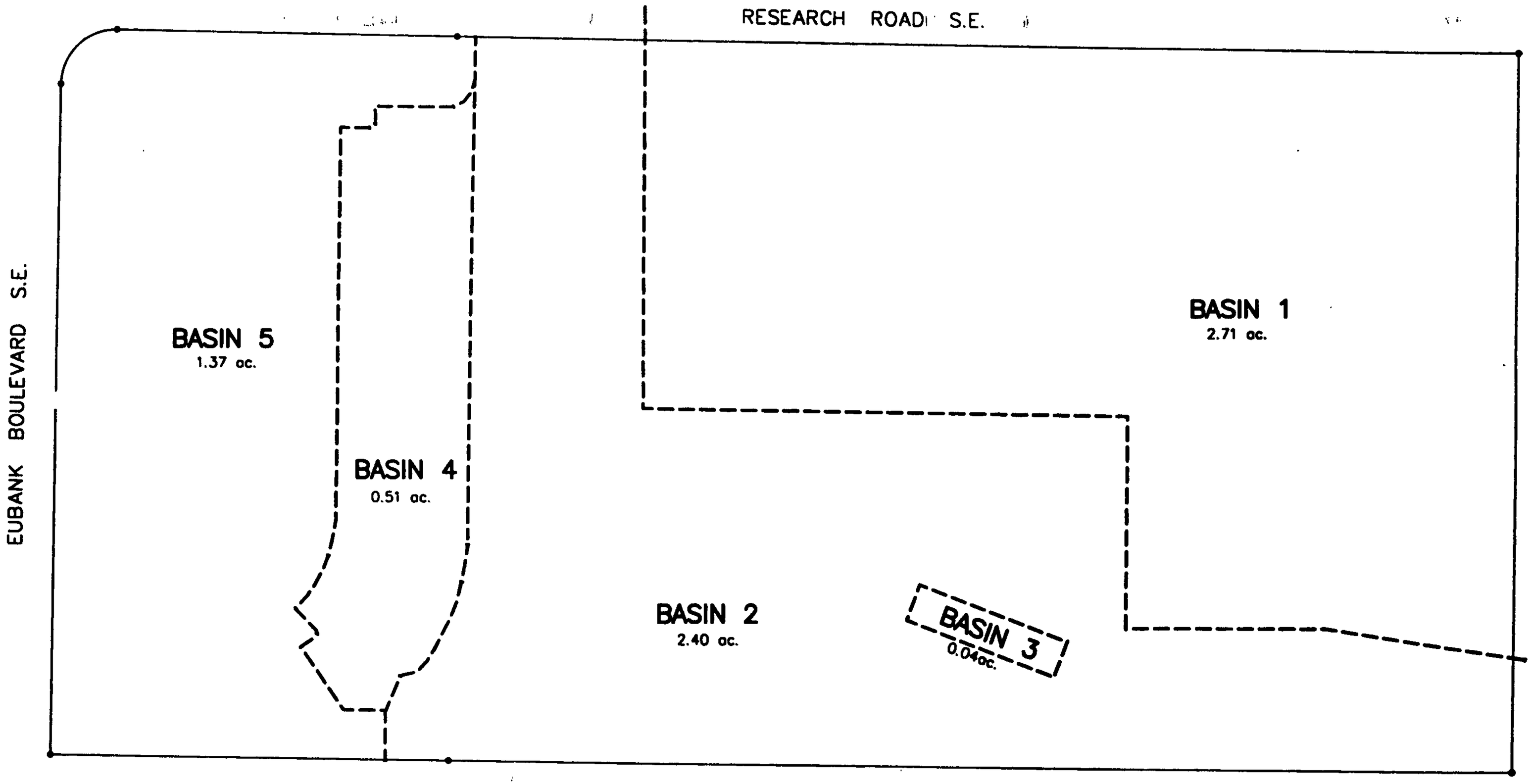
RESEARCH ROAD S.E.
EUBANK BOULEVARD S.E.
BASIN 5
1.37 ac.
BASIN 4
0.51 ac.
BASIN 2
2.40 ac.
BASIN 3
0.04ac.
BASIN 1
2.71 ac.

FIGURE 1

BASIN 1 AREA = 2.71 ac.

DRAINAGE ZONE 3

PRECIPITATION:		
	360 =	2.60 in.
	1140 =	3.10 in.
	10day =	4.90 in.

	EXCESS PRECIPITATION:	PEAK DISCHARGE:	
TREATMENT A	0.66 in.	1.87	cfs/ac.
TREATMENT B	0.92 in.	2.60	cfs/ac.
TREATMENT C	1.29 in.	3.45	cfs/ac.
TREATMENT D	2.36 in.	5.02	cfs/ac.

EXISTING CONDITIONS:	AREA	PROPOSED CONDITIONS: AREA
TREATMENT A	0.00 ac.	0.00 ac.
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TREATMENT C	0.00 ac.	0.00 ac.
TREATMENT D	1.55 ac.	2.37 ac.

EXISTING EXCESS PRECIPITATION:

Weighted E = (0.66)x(0.00)+(0.92)x(1.16)+(1.29)x(0.00)+(2.36)x(1.55)/ 2.71 ac.
= 1.74 in.

V100-360 = (1.74)x(2.71)/ 12 = 0.393767 ac-ft = 17152 cf

EXISTING PEAK DISCHARGE:

Q100 = (1.87)x(0.00)+(2.60)x(1.16)+(3.45)x(0.00)+(5.02)x(1.55)= 10.80 cfs

PROPOSED EXCESS PRECIPITATION:

Weighted E = (0.66)x(0.00)+(0.92)x(0.34)+(1.29)x(0.00)+(2.36)x(2.37)/ 2.71 ac.
= 2.18 in.

V100-360 = (2.18)x(2.71)/ 12.0 = 0.492167 ac-ft = 21439 cf

V100-1440 = (0.49)+(2.37)x(3.10 - 2.60)/ 12 = 0.590917 ac-ft = 25740 cf

V100-10day = (0.49)+(2.37)x(4.90 - 2.60)/ 12 = 0.946417 ac-ft = 41226 cf

PROPOSED PEAK DISCHARGE:

Q100 = (1.87)x(0.00)+(2.60)x(0.34)+(3.45)x(0.00)+(5.02)x(2.37)= 12.78 cfs

BASIN 2 AREA = 2.40 ac.

DRAINAGE ZONE 3
PRECIPITATION:

360 =	2.60	in.
1140 =	3.10	in.
10day =	4.90	in.

	EXCESS PRECIPITATION:	PEAK DISCHARGE:	
TREATMENT A	0.66 in.	1.87	cfs/ac.
TREATMENT B	0.92 in.	2.60	cfs/ac.
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TREATMENT D	2.36 in.	5.02	cfs/ac.

	EXISTING CONDITIONS: AREA	PROPOSED CONDITIONS: AREA
TREATMENT A	0.00 ac.	0.00 ac.
TREATMENT B	0.25 ac.	0.23 ac.
TREATMENT C	0.04 ac.	0.00 ac.
TREATMENT D	2.11 ac.	2.17 ac.

EXISTING EXCESS PRECIPITATION:

Weighted E = (0.66)x(0.00)+(0.92)x(0.25)+(1.29)x(0.04)+(2.36)x(2.11)/ 2.40 ac.
= 2.19 in.
V100-360 = (2.19)x(2.40)/ 12 = 0.438433 ac-ft = 19098 cf

EXISTING PEAK DISCHARGE:

Q100 = (1.87)x(0.00)+(2.60)x(0.25)+(3.45)x(0.04)+(5.02)x(2.11)= 11.38 cfs

PROPOSED EXCESS PRECIPITATION:

Weighted E = (0.66)x(0.00)+(0.92)x(0.23)+(1.29)x(0.00)+(2.36)x(2.17)/ 2.40 ac.
= 2.22 in.
V100-360 = (2.22)x(2.40)/ 12.0 = 0.444400 ac-ft = 19358 cf

V100-1440 = (0.44)+(2.17)x(3.10 - 2.60)/ 12 = 0.534817 ac-ft = 23297 cf

V100-10day = (0.44)+(2.17)x(4.90 - 2.60)/ 12 = 0.860317 ac-ft = 37475 cf

PROPOSED PEAK DISCHARGE:

Q100 = (1.87)x(0.00)+(2.60)x(0.23)+(3.45)x(0.00)+(5.02)x(2.17)= 11.49 cfs

BASIN 3 AREA = 0.04 ac.

DRAINAGE ZONE 3
PRECIPITATION:

360 =	2.60	in.
1140 =	3.10	in.
10day =	4.90	in.

	EXCESS PRECIPITATION:	PEAK DISCHARGE:	
TREATMENT A	0.66 in.	1.87	cfs/ac.
TREATMENT B	0.92 in.	2.60	cfs/ac.
TREATMENT C	1.29 in.	3.45	cfs/ac.
TREATMENT D	2.36 in.	5.02	cfs/ac.

EXISTING CONDITIONS:	AREA	PROPOSED CONDITIONS: AREA
TREATMENT A	0.00 ac.	0.00 ac.
TREATMENT B	0.00 ac.	0.00 ac.
TREATMENT C	0.00 ac.	0.00 ac.
TREATMENT D	0.04 ac.	0.04 ac.

EXISTING EXCESS PRECIPITATION:

Weighted E = (0.66)x(0.00)+(0.92)x(0.00)+(1.29)x(0.00)+(2.36)x(0.04)/ 0.04 ac.
= 2.36 in.
V100-360 = (2.36)x(0.04)/ 12 = 0.007867 ac-ft = 343 cf

EXISTING PEAK DISCHARGE:

Q100 = (1.87)x(0.00)+(2.60)x(0.00)+(3.45)x(0.00)+(5.02)x(0.04)= 0.20 cfs

PROPOSED EXCESS PRECIPITATION:

Weighted E = (0.66)x(0.00)+(0.92)x(0.00)+(1.29)x(0.00)+(2.36)x(0.04)/ 0.04 ac.
= 2.36 in.
V100-360 = (2.36)x(0.04)/ 12.0 = 0.007867 ac-ft = 343 cf

V100-1440 = (0.01)+(0.04)x(3.10 - 2.60)/ 12 = 0.009533 ac-ft = 415 cf

V100-10day = (0.01)+(0.04)x(4.90 - 2.60)/ 12 = 0.015533 ac-ft = 677 cf

PROPOSED PEAK DISCHARGE:

Q100 = (1.87)x(0.00)+(2.60)x(0.00)+(3.45)x(0.00)+(5.02)x(0.04)= 0.20 cfs

BASIN 4 AREA = 0.51 ac.

DRAINAGE ZONE 3
PRECIPITATION:

360 =	2.60	in.
1140 =	3.10	in.
10day =	4.90	in.

	EXCESS PRECIPITATION:	PEAK DISCHARGE:	
TREATMENT A	0.66 in.	1.87	cfs/ac.
TREATMENT B	0.92 in.	2.60	cfs/ac.
TREATMENT C	1.29 in.	3.45	cfs/ac.
TREATMENT D	2.36 in.	5.02	cfs/ac.

EXISTING CONDITIONS:		PROPOSED CONDITIONS:	
	AREA	AREA	
TREATMENT A	0.00	0.00	ac.
TREATMENT B	0.00	0.07	ac.
TREATMENT C	0.51	0.00	ac.
TREATMENT D	0.00	0.44	ac.

EXISTING EXCESS PRECIPITATION:

Weighted E = (0.66)x(0.00)+(0.92)x(0.00)+(1.29)x(0.51)+(2.36)x(0.00)/ 0.51 ac.
= 1.29 in.
V100-360 = (1.29)x(0.51)/ 12 = 0.054825 ac-ft = 2388 cf

EXISTING PEAK DISCHARGE:

Q100 = (1.87)x(0.00)+(2.60)x(0.00)+(3.45)x(0.51)+(5.02)x(0.00)= 1.76 cfs

PROPOSED EXCESS PRECIPITATION:

Weighted E = (0.66)x(0.00)+(0.92)x(0.07)+(1.29)x(0.00)+(2.36)x(0.44)/ 0.51 ac.
= 2.16 in.
V100-360 = (2.16)x(0.51)/ 12.0 = 0.091900 ac-ft = 4003 cf

V100-1440 = (0.09)+(0.44)x(3.10 - 2.60)/ 12 = 0.110233 ac-ft = 4802 cf

V100-10day = (0.09)+(0.44)x(4.90 - 2.60)/ 12 = 0.176233 ac-ft = 7677 cf

PROPOSED PEAK DISCHARGE:

Q100 = (1.87)x(0.00)+(2.60)x(0.07)+(3.45)x(0.00)+(5.02)x(0.44)= 2.39 cfs

BASIN 5 AREA = 1.37 ac.

DRAINAGE ZONE 3
PRECIPITATION: 360 = 2.60 in.
1140 = 3.10 in.
10day = 4.90 in.

	EXCESS PRECIPITATION:	PEAK DISCHARGE:	
TREATMENT A	0.66 in.	1.87	cfs/ac.
TREATMENT B	0.92 in.	2.60	cfs/ac.
TREATMENT C	1.29 in.	3.45	cfs/ac.
TREATMENT D	2.36 in.	5.02	cfs/ac.

EXISTING CONDITIONS:		PROPOSED CONDITIONS:
	AREA	AREA
TREATMENT A	0.00 ac.	0.00 ac.
TREATMENT B	0.00 ac.	0.00 ac.
TREATMENT C	1.37 ac.	1.37 ac.
TREATMENT D	0.00 ac.	0.00 ac.

EXISTING EXCESS PRECIPITATION:

Weighted E = (0.66)x(0.00)+(0.92)x(0.00)+(1.29)x(1.37)+(2.36)x(0.00)/ 1.37 ac.
= 1.29 in.
V100-360 = (1.29)x(1.37)/ 12 = 0.147275 ac-ft = 6415 cf

EXISTING PEAK DISCHARGE:

Q100 = (1.87)x(0.00)+(2.60)x(0.00)+(3.45)x(1.37)+(5.02)x(0.00)= 4.73 cfs

PROPOSED EXCESS PRECIPITATION:

Weighted E = (0.66)x(0.00)+(0.92)x(0.00)+(1.29)x(1.37)+(2.36)x(0.00)/ 1.37 ac.
= 1.29 in.
V100-360 = (1.29)x(1.37)/ 12.0 = 0.147275 ac-ft = 6415 cf

V100-1440 = (0.15)+(0.00)x(3.10 - 2.60)/ 12 = 0.147275 ac-ft = 6415 cf

V100-10day = (0.15)+(0.00)x(4.90 - 2.60)/ 12 = 0.147275 ac-ft = 6415 cf

PROPOSED PEAK DISCHARGE:

Q100 = (1.87)x(0.00)+(2.60)x(0.00)+(3.45)x(1.37)+(5.02)x(0.00)= 4.73 cfs

TRAPEZOIDAL CHANNEL ANALYSIS
RATING CURVE COMPUTATION

EMCORE EXPANSION
CONC. RUNDOWN FROM
BASIN 4 TO RESEARCH

==========

PROGRAM INPUT DATA:

DESCRIPTION	VALUE
Channel Bottom Slope (feet per foot).....	0.0100
Manning`s Roughness Coefficient (n-value).....	0.0150
Channel Side Slope - Left Side (horizontal/vertical)....	0.01
Channel Side Slope - Right Side (horizontal/vertical)...	0.01
Channel Bottom Width (feet).....	2.0

==========

PROGRAM RESULTS:

Depth (ft)	Flow Rate (cfs)	Velocity (fps)	Froude Number	Velocity Head(ft)	Energy Head(ft)	Flow Area (sq ft)	Top Width (ft)
0.1	0.4	2.00	1.117	0.062	0.162	0.2	2.0
0.2	1.2	3.00	1.184	0.140	0.340	0.4	2.0
0.3	2.2	3.73	1.201	0.216	0.516	0.6	2.0
0.4	3.4	4.30	1.200	0.288	0.688	0.8	2.0
0.5	4.8	4.77	1.190	0.353	0.853	1.0	2.0

==========

TRAPEZOIDAL CHANNEL ANALYSIS COMPUTER PROGRAM, Version 1.3 (c) 1986
Dodson & Associates, Inc., 7015 W. Tidwell, #107, Houston, TX 77092
(713) 895-8322. A manual with equations & flow chart is available.

DRAINAGE INFORMATION SHEET

PROJECT TITLE: EMCORE EXPANSION. ZONE ATLAS/DRNG. FILE #: M-21 / D5E

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

LEGAL DESCRIPTION: LOTS 1 & 2, BLOCK 4 SANDIA RESEARCH PARK.

CITY ADDRESS: 10420 RESEARCH ROAD.

ENGINEERING FIRM: KEMPER-VAUGHAN CONS. ENGRS. CONTACT: KIM R. KEMPER.

ADDRESS: 3700 COORS RD, NW SUITE C PHONE: 831-4520.

OWNER: EMCORE CORP. CONTACT: Mr. DAVE AIGNER.

ADDRESS: 10420 RESEARCH RD. PHONE: 332-5002.

ARCHITECT: DEKKER PERICH SABATINI CONTACT MARGARET FISHBURN.

ADDRESS: 6801 JEFFERSON. PHONE: 761-9700.

SURVEYOR: RIO GRANDE SURVEYING CO., INC. CONTACT: REX VOLGER.

ADDRESS: 3700 COORS RD NW SUITE C PHONE: 841-4511.

CONTRACTOR: REID & ASSOCIATES CONTACT: THOM VOLEK.

ADDRESS: 333 RIO RANCHO BLVD. PHONE: 891-2528.

TYPE OF SUBMITTAL:

____DRAINAGE REPORT

__X__DRAINAGE PLAN

____CONCEPTUAL GRADING & DRAINAGE PLAN

__X__GRADING PLAN

____EROSION CONTROL PLAN

____ENGINEER'S CERTIFICATION

____OTHER_____

____PRE-DESIGN MEETING

____YES

__X__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

__X__BUILDING PERMIT APPROVAL

____CERTIFICATE OF OCCUPANCY APPROVAL

____GRADING PERMIT APPROVAL

____PAVING PERMIT APPROVAL

____S.A.D. DRAINAGE REPORT

____DRAINAGE REQUIREMENTS

____OTHER SO#19 (SPECIFY)

DATE SUMITTED: 6-13-00.

BY: _____.

RECEIVED
JUN 15 2000
HYDROLOGY SECTION

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

June 15, 2000

Kim R. Kemper, P.E.
Kemper-Vaughan Consulting Engineers
3600 Coors Road, NW, Suite C
Albuquerque, NM 87120

RE: GRADING & DRAINAGE PLAN FOR EMCORE EXPANSION (M-21/D005E)
ENGINEERS STAMP DATED JUNE 13, 2000 SUBMITTED FOR BUILDING PERMIT APPROVAL AND SO 19

Dear Mr. Kemper,

Based upon the information provided in your June 15, 2000, submittal, the project, referred to above, is approved for Building Permit. Please attach a copy of this approved plan to the construction sets prior to sign-off by Hydrology.

A separate permit is required for construction within the city right-of-way. A copy of this approval letter must be on hand when applying for the excavation permit.

Prior to release of the Certificate of Occupancy, an Engineer Certification, per the DPM checklist, will be required.

If you have any questions, please call me at 924-3988.

Sincerely,

Stuart Reeder, P.E.

Stuart Reeder, P.E.
Hydrology Division

xc: Pam Lujan, Permits w/attachment
Whitney Reierson
File

DRAINAGE INFORMATION SHEET

PROJECT TITLE: EMCORE EXPANSION. ZONE ATLAS/DRNG. FILE #: M-21 / D5

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

LEGAL DESCRIPTION: LOTS 1 & 2, BLOCK 4 SANDIA RESEARCH PARK.

CITY ADDRESS: 10420 RESEARCH ROAD.

ENGINEERING FIRM: KEMPER-VAUGHAN CONS. ENGRS. CONTACT: KIM R. KEMPER.

ADDRESS: 3700 COORS RD, NW SUITE C PHONE: 831-4520.

OWNER: EMCORE CORP. CONTACT: Mr. DAVE AIGNER.

ADDRESS: 10420 RESEARCH RD. PHONE: 332-5002.

ARCHITECT: DEKKER PERICH SABATINI CONTACT MARGARET FISHBURN.

ADDRESS: 6801 JEFFERSON. PHONE: 761-9700.

SURVEYOR: RIO GRANDE SURVEYING CO., INC. CONTACT: REX VOLGER.

ADDRESS: 3700 COORS RD NW SUITE C PHONE: 841-4511.

CONTRACTOR: REID & ASSOCIATES CONTACT: THOM VOLEK.

ADDRESS: 333 RIO RANCHO BLVD. PHONE: 891-2528.

TYPE OF SUBMITTAL:

____DRAINAGE REPORT

__X_DRAINAGE PLAN

____CONCEPTUAL GRADING & DRAINAGE PLAN

__X_GRADING PLAN

____EROSION CONTROL PLAN

____ENGINEER'S CERTIFICATION

____OTHER_____

____PRE-DESIGN MEETING

____YES

__X__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

__X__BUILDING PERMIT APPROVAL

____CERTIFICATE OF OCCUPANCY APPROVAL

____GRADING PERMIT APPROVAL

____PAVING PERMIT APPROVAL

____S.A.D. DRAINAGE REPORT

____DRAINAGE REQUIREMENTS

____OTHER_____(SPECIFY)

DATE SUMITTED: 5-30-00

BY: _____

RECEIVED
MAY 30 2000
HYDROLOGY SECTION

EMCORE EXPANSION

GRADING PLAN & DRAINAGE PLAN

May 26, 2000

Prepared for:

Reid & Associates, Inc

333 Rio Rancho Blvd. NE

Rio Rancho, New Mexico 87124

Prepared by:

KEMPER-VAUGHAN CONSULTING ENGINEERS

3700 Coors Road NW

Albuquerque, New Mexico 87120

RECEIVED
MAY 3 0 2000
HYDROLOGY SECTION

KIM R. KEMPER
NEW MEXICO
10542
REGISTERED PROFESSIONAL ENGINEER
5-26-00

PROJECT OVERVIEW

This project is a planned expansion of a facility that was constructed in 1998. The existing facility was certified in October of 1998, City file M21/D5E. This project includes the addition of a 36,000-sf facility and the associated parking. Also, adjacent to the new parking are two gas storage tank pads. This gas used in the facility process is in a gaseous state, not liquid. There are no requirements for site containment.

The site is located on south Eubank in the Sandia Research Park. The master drainage plan for the Sandia Research Park was prepared by Andrews, Asbury & Roberts and can be found in City file M21/D5. (the plan can also be found in file M21/D5E) This plan allowed for the free discharge of flows from this site and incorporated the use of a detention pond to accommodate the flows from the park. The City's recent project, South Eubank Storm Sewer, eliminated the detention pond with the constructed of a 90-inch storm sewer through the western edge of the subject site. The detention pond was the area west of the existing facility (Lot 1) where the new parking is located. The City, with the Eubank project, took it out of service.

DRAINAGE PLAN

The existing approved drainage plan for this site identified three separate internal basins. Those basins are identified on the attached Figure 1 as basins 1, 2, & 3. The proposed plan does not affect those basin boundaries. The entire new facility is located in basin 1. A small delivery driveway is located in basin 2. Basin 3, which is a dock area with a sump pump, will not be affected by this project. The attached calculations provide for each basin individually. With the inclusion of the area to the west (old detention pond) we have identified an addition two basins shown in Figure 1 as basins 4 & 5. Basin 4 is the new parking area and basin 5 is the balance of the site.

The hydrology of the site can be summarized as follows: (all figures are the 100-yr, 6-hour event)

Basin 1: will continue to drain to the existing three inlets on Research Rd via sidewalk culverts as provided in the original plan. This project will increase the peak rate of discharge 1.98 cfs and the volumetric runoff 4,287 cf.

Basin 2: will continue to drain to the existing three inlets on Research Rd through the western drive as provided in the original plan. This project will increase the peak rate of discharge 0.05 cfs and the volumetric runoff 104 cf.

Basin 3: this project will not affect the existing basin 3.

Basin 4: storm waters from the new parking area will be conveyed to an existing inlet in Eubank via a new concrete rundown and sidewalk culvert. Calculations demonstrating the capacity of the new concrete rundown are attached. This existing inlet was recently constructed as part of the City's South Eubank project. This project will increase the peak rate of discharge 0.75 cfs and the volumetric runoff 1,864 cf.

Basin 5: will continue to "sheet-flow" to Eubank as it does in its current condition. This project will increase the peak rate of discharge 0.06 cfs and the volumetric runoff 155 cf.

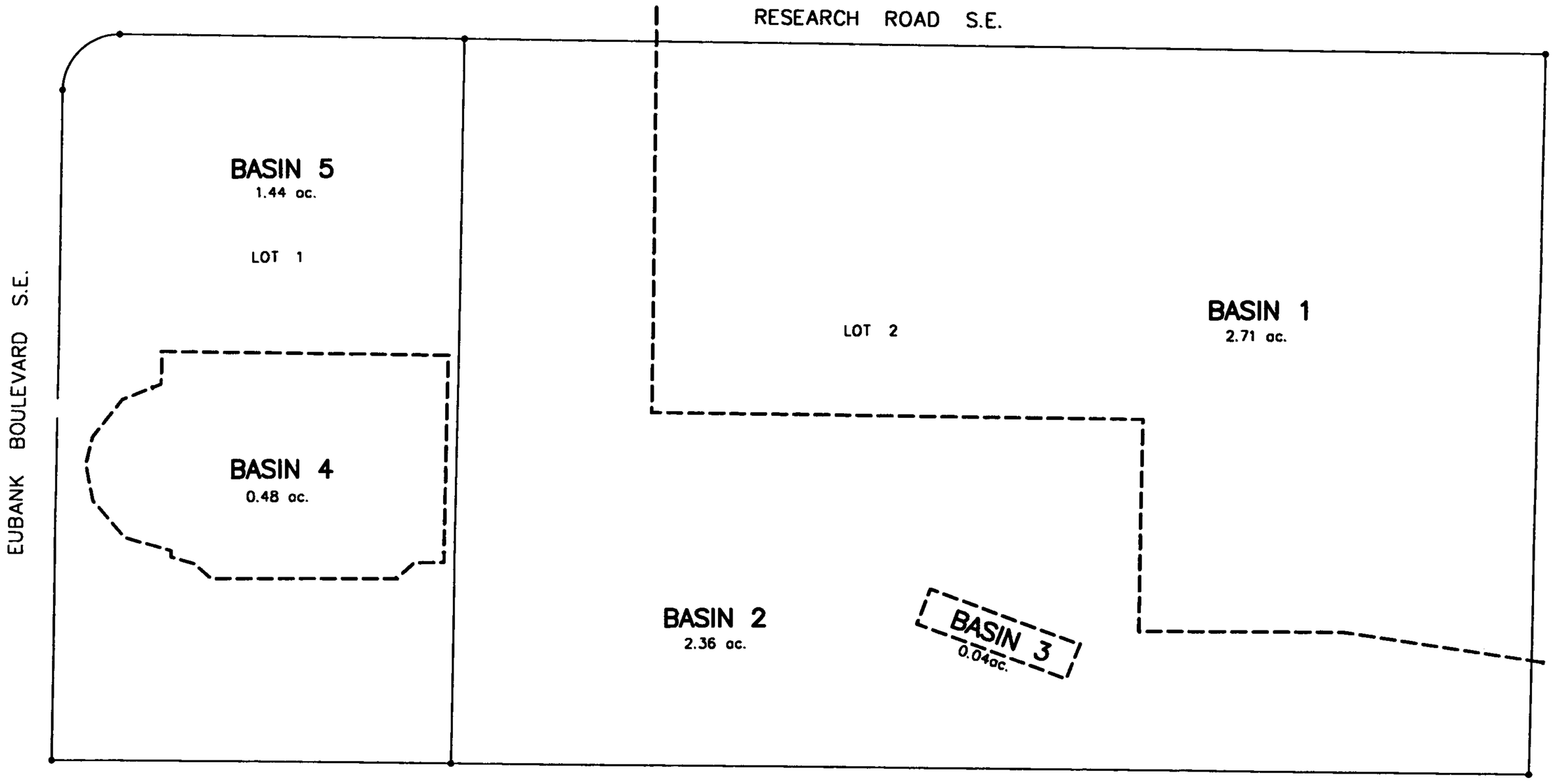
RESEARCH ROAD S.E.
EUBANK BOULEVARD S.E.
BASIN 5
1.44 ac.
LOT 1
BASIN 4
0.48 ac.
LOT 2
BASIN 1
2.71 ac.
BASIN 2
2.36 ac.
BASIN 3
0.04ac.

FIGURE 1

BASIN 1 AREA = 2.71 ac.

DRAINAGE ZONE 3
PRECIPITATION:

360 =	2.60	in.
1140 =	3.10	in.
10day =	4.90	in.

	EXCESS PRECIPITATION:	PEAK DISCHARGE:	
TREATMENT A	0.66 in.	1.87	cfs/ac.
TREATMENT B	0.92 in.	2.60	cfs/ac.
TREATMENT C	1.29 in.	3.45	cfs/ac.
TREATMENT D	2.36 in.	5.02	cfs/ac.

EXISTING CONDITIONS:		PROPOSED CONDITIONS:
	AREA	AREA
TREATMENT A	0.00 ac.	0.00 ac.
TREATMENT B	1.16 ac.	0.34 ac.
TREATMENT C	0.00 ac.	0.00 ac.
TREATMENT D	1.55 ac.	2.37 ac.

EXISTING EXCESS PRECIPITATION:

Weighted E = (0.66)x(0.00)+(0.92)x(1.16)+(1.29)x(0.00)+(2.36)x(1.55)/ 2.71 ac.
= 1.74 in.
V100-360 = (1.74)x(2.71)/ 12 = 0.393767 ac-ft = 17152 cf

EXISTING PEAK DISCHARGE:

Q100 = (1.87)x(0.00)+(2.60)x(1.16)+(3.45)x(0.00)+(5.02)x(1.55)= 10.80 cfs

PROPOSED EXCESS PRECIPITATION:

Weighted E = (0.66)x(0.00)+(0.92)x(0.34)+(1.29)x(0.00)+(2.36)x(2.37)/ 2.71 ac.
= 2.18 in.
V100-360 = (2.18)x(2.71)/ 12.0 = 0.492167 ac-ft = 21439 cf

V100-1440 = (0.49)+(2.37)x(3.10 - 2.60)/ 12 = 0.590917 ac-ft = 25740 cf

V100-10day = (0.49)+(2.37)x(4.90 - 2.60)/ 12 = 0.946417 ac-ft = 41226 cf

PROPOSED PEAK DISCHARGE:

Q100 = (1.87)x(0.00)+(2.60)x(0.34)+(3.45)x(0.00)+(5.02)x(2.37)= 12.78 cfs

BASIN 2 AREA = 2.36 ac.

DRAINAGE ZONE 3
PRECIPITATION:

360 =	2.60	in.
1140 =	3.10	in.
10day =	4.90	in.

	EXCESS PRECIPITATION:	PEAK DISCHARGE:	
TREATMENT A	0.66 in.	1.87	cfs/ac.
TREATMENT B	0.92 in.	2.60	cfs/ac.
TREATMENT C	1.29 in.	3.45	cfs/ac.
TREATMENT D	2.36 in.	5.02	cfs/ac.

EXISTING CONDITIONS:	AREA	PROPOSED CONDITIONS: AREA
TREATMENT A	0.00 ac.	0.00 ac.
TREATMENT B	0.25 ac.	0.23 ac.
TREATMENT C	0.00 ac.	0.00 ac.
TREATMENT D	2.11 ac.	2.13 ac.

EXISTING EXCESS PRECIPITATION:

Weighted E = (0.66)x(0.00)+(0.92)x(0.25)+(1.29)x(0.00)+(2.36)x(2.11)/ 2.36 ac.
= 2.21 in.
V100-360 = (2.21)x(2.36)/ 12 = 0.434133 ac-ft = 18911 cf

EXISTING PEAK DISCHARGE:

Q100 = (1.87)x(0.00)+(2.60)x(0.25)+(3.45)x(0.00)+(5.02)x(2.11)= 11.24 cfs

PROPOSED EXCESS PRECIPITATION:

Weighted E = (0.66)x(0.00)+(0.92)x(0.23)+(1.29)x(0.00)+(2.36)x(2.13)/ 2.36 ac.
= 2.22 in.
V100-360 = (2.22)x(2.36)/ 12.0 = 0.436533 ac-ft = 19015 cf

V100-1440 = (0.44)+(2.13)x(3.10 - 2.60)/ 12 = 0.525283 ac-ft = 22881 cf

V100-10day = (0.44)+(2.13)x(4.90 - 2.60)/ 12 = 0.844783 ac-ft = 36799 cf

PROPOSED PEAK DISCHARGE:

Q100 = (1.87)x(0.00)+(2.60)x(0.23)+(3.45)x(0.00)+(5.02)x(2.13)= 11.29 cfs

BASIN 3 AREA = 0.04 ac.

DRAINAGE ZONE 3
PRECIPITATION:

360 =	2.60 in.
1140 =	3.10 in.
10day =	4.90 in.

	EXCESS PRECIPITATION:	PEAK DISCHARGE:	
TREATMENT A	0.66 in.	1.87	cfs/ac.
TREATMENT B	0.92 in.	2.60	cfs/ac.
TREATMENT C	1.29 in.	3.45	cfs/ac.
TREATMENT D	2.36 in.	5.02	cfs/ac.

	EXISTING CONDITIONS: AREA	PROPOSED CONDITIONS: AREA
TREATMENT A	0.00 ac.	0.00 ac.
TREATMENT B	0.00 ac.	0.00 ac.
TREATMENT C	0.00 ac.	0.00 ac.
TREATMENT D	0.04 ac.	0.04 ac.

EXISTING EXCESS PRECIPITATION:

Weighted E = (0.66)x(0.00)+(0.92)x(0.00)+(1.29)x(0.00)+(2.36)x(0.04)/ 0.04 ac.
= 2.36 in.
V100-360 = (2.36)x(0.04)/ 12 = 0.007867 ac-ft = 343 cf

EXISTING PEAK DISCHARGE:

Q100 = (1.87)x(0.00)+(2.60)x(0.00)+(3.45)x(0.00)+(5.02)x(0.04)= 0.20 cfs

PROPOSED EXCESS PRECIPITATION:

Weighted E = (0.66)x(0.00)+(0.92)x(0.00)+(1.29)x(0.00)+(2.36)x(0.04)/ 0.04 ac.
= 2.36 in.
V100-360 = (2.36)x(0.04)/ 12.0 = 0.007867 ac-ft = 343 cf

V100-1440 = (0.01)+(0.04)x(3.10 - 2.60)/ 12 = 0.009533 ac-ft = 415 cf

V100-10day = (0.01)+(0.04)x(4.90 - 2.60)/ 12 = 0.015533 ac-ft = 677 cf

PROPOSED PEAK DISCHARGE:

Q100 = (1.87)x(0.00)+(2.60)x(0.00)+(3.45)x(0.00)+(5.02)x(0.04)= 0.20 cfs

BASIN 4 AREA = 0.48 ac.

DRAINAGE ZONE 3
PRECIPITATION:

360 =	2.60 in.
1140 =	3.10 in.
10day =	4.90 in.

	EXCESS PRECIPITATION:	PEAK DISCHARGE:	
TREATMENT A	0.66 in.	1.87	cfs/ac.
TREATMENT B	0.92 in.	2.60	cfs/ac.
TREATMENT C	1.29 in.	3.45	cfs/ac.
TREATMENT D	2.36 in.	5.02	cfs/ac.

EXISTING CONDITIONS:		PROPOSED CONDITIONS:
	AREA	AREA
TREATMENT A	0.00 ac.	0.00 ac.
TREATMENT B	0.00 ac.	0.00 ac.
TREATMENT C	0.48 ac.	0.00 ac.
TREATMENT D	0.00 ac.	0.48 ac.

<u>EXISTING EXCESS PRECIPITATION:</u>

Weighted E = (0.66)x(0.00)+(0.92)x(0.00)+(1.29)x(0.48)+(2.36)x(0.00)/ 0.48 ac.
= 1.29 in.
V100-360 = (1.29)x(0.48)/ 12 = 0.051600 ac-ft = 2248 cf

<u>EXISTING PEAK DISCHARGE:</u>

Q100 = (1.87)x(0.00)+(2.60)x(0.00)+(3.45)x(0.48)+(5.02)x(0.00)= 1.66 cfs

<u>PROPOSED EXCESS PRECIPITATION:</u>

Weighted E = (0.66)x(0.00)+(0.92)x(0.00)+(1.29)x(0.00)+(2.36)x(0.48)/ 0.48 ac.
= 2.36 in.
V100-360 = (2.36)x(0.48)/ 12.0 = 0.094400 ac-ft = 4112 cf

V100-1440 = (0.09)+(0.48)x(3.10 - 2.60)/ 12 = 0.114400 ac-ft = 4983 cf

V100-10day = (0.09)+(0.48)x(4.90 - 2.60)/ 12 = 0.186400 ac-ft = 8120 cf

<u>PROPOSED PEAK DISCHARGE:</u>

Q100 = (1.87)x(0.00)+(2.60)x(0.00)+(3.45)x(0.00)+(5.02)x(0.48)= 2.41 cfs

BASIN 5 AREA = 1.44 ac.

DRAINAGE ZONE 3
PRECIPITATION:

360 =	2.60	in.
1140 =	3.10	in.
10day =	4.90	in.

	EXCESS PRECIPITATION:	PEAK DISCHARGE:	
TREATMENT A	0.66 in.	1.87	cfs/ac.
TREATMENT B	0.92 in.	2.60	cfs/ac.
TREATMENT C	1.29 in.	3.45	cfs/ac.
TREATMENT D	2.36 in.	5.02	cfs/ac.

EXISTING CONDITIONS:	AREA	PROPOSED CONDITIONS: AREA
TREATMENT A	0.00 ac.	0.00 ac.
TREATMENT B	0.00 ac.	0.00 ac.
TREATMENT C	1.44 ac.	1.40 ac.
TREATMENT D	0.00 ac.	0.04 ac.

<u>EXISTING EXCESS PRECIPITATION:</u>

Weighted E = (0.66)x(0.00)+(0.92)x(0.00)+(1.29)x(1.44)+(2.36)x(0.00)/ 1.44 ac.
= 1.29 in.
V100-360 = (1.29)x(1.44)/ 12 = 0.154800 ac-ft = 6743 cf

<u>EXISTING PEAK DISCHARGE:</u>

Q100 = (1.87)x(0.00)+(2.60)x(0.00)+(3.45)x(1.44)+(5.02)x(0.00)= 4.97 cfs

<u>PROPOSED EXCESS PRECIPITATION:</u>

Weighted E = (0.66)x(0.00)+(0.92)x(0.00)+(1.29)x(1.40)+(2.36)x(0.04)/ 1.44 ac.
= 1.32 in.
V100-360 = (1.32)x(1.44)/ 12.0 = 0.158367 ac-ft = 6898 cf

V100-1440 = (0.16)+(0.04)x(3.10 - 2.60)/ 12 = 0.160033 ac-ft = 6971 cf

V100-10day = (0.16)+(0.04)x(4.90 - 2.60)/ 12 = 0.166033 ac-ft = 7232 cf

<u>PROPOSED PEAK DISCHARGE:</u>

Q100 = (1.87)x(0.00)+(2.60)x(0.00)+(3.45)x(1.40)+(5.02)x(0.04)= 5.03 cfs

TRAPEZOIDAL CHANNEL ANALYSIS
RATING CURVE COMPUTATION

May 26, 2000
EMCORE EXPANSION
NEW CONC. RUNDOWN FROM
BASIN 4 TO EUBANK

==========

PROGRAM INPUT DATA:

DESCRIPTION	VALUE
Channel Bottom Slope (feet per foot).....	0.0311
Manning`s Roughness Coefficient (n-value).....	0.0150
Channel Side Slope - Left Side (horizontal/vertical)....	0.01
Channel Side Slope - Right Side (horizontal/vertical)...	0.01
Channel Bottom Width (feet).....	2.0

==========

PROGRAM RESULTS:

Depth (ft)	Flow Rate (cfs)	Velocity (fps)	Froude Number	Velocity Head(ft)	Energy Head(ft)	Flow Area (sq ft)	Top Width (ft)
0.1	0.7	3.53	1.970	0.194	0.294	0.2	2.0
0.2	2.1	5.29	2.087	0.435	0.635	0.4	2.0
0.3	4.0	6.58	2.118	0.672	0.972	0.6	2.0
0.4	6.1	7.59	2.117	0.894	1.294	0.8	2.0
0.5	8.4	8.41	2.099	1.099	1.599	1.0	2.0

==========

TRAPEZOIDAL CHANNEL ANALYSIS COMPUTER PROGRAM, Version 1.3 (c) 1986
Dodson & Associates, Inc., 7015 W. Tidwell, #107, Houston, TX 77092
(713) 895-8322. A manual with equations & flow chart is available.

Tierra West, LLC

October 2, 1998

Mr. Bernie Montoya, PE
Albuquerque Public Works Department
PO Box 1293
Albuquerque, NM 87103

RE: Final Certification of Drainage and Release of Financial Guarantees
M-21/D5E
Lot 2, Block 4, Sandia Research Park

Dear Bernie:

The Emcore Building project is now complete. The on-site paving and the landscaping are being installed. Reid & Associates, Inc. is the contractor of record and has completed all of the required improvements in substantial compliance with the approved Grading and Drainage Plan. Installation of the required utilities has also been completed. Aldrich Land Surveying Inc. has provided the as-built grades, and the outfall is in place and is functional.

Please find the enclosed as-built Grading and Drainage Plan which provides the Drainage Certification. We are requesting final Drainage Certification and release of the Financial Guarantees.

Should you have any questions, please do not hesitate to contact our office.

Sincerely,

Ronald R. Bohannan, PE

RRB/js
Enclosures

cc: Bill Smith
Tim Gratten

JN: 980005

RECEIVED
OCT 02 1998
HYDROLOGY SECTION

980005:jm100298

4421 McLeod Rd. NE, Suite D • Albuquerque, NM 87109 • (505) 883-7592
fax (505) 883-7034 • e-mail: twdms@aol

DRAINAGE INFORMATION SHEET

PROJECT TITLE: *Emcore Building* ZONE ATLAS/DRNG. FILE #: *M-21 - D005E*

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

LEGAL DESCRIPTION: *Lot 2, Block 4, Sandia Research Park*

CITY ADDRESS: *SE Corner of Research Rd & Eubank Blvd*

ENGINEERING FIRM: *TIERRA WEST, LLC* CONTACT: *RONALD R. BOHANNAN*

ADDRESS: *4421 McCleod Rd. NE Suite D, 87109* PHONE: *(505) 883-7592*

OWNER: *Reed & Associates* CONTACT: *Mike Reed*

ADDRESS: _____ PHONE: _____

ARCHITECT: *Dekker-Perich & Associates* CONTACT: *Tim Grattan*

ADDRESS: *6801 Jefferson NE Suite 100* PHONE: *(505) 761-9700*

SURVEYOR: *Precision Surveys* CONTACT: *Larry Medrano*

ADDRESS: *2929 Coors Blvd NW Suite 309* PHONE: *(505)839-0569*

CONTRACTOR: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

TYPE OF SUBMITTAL:

_____ DRAINAGE REPORT

_____ DRAINAGE PLAN

_____ CONCEPTUAL GRADING & DRAINAGE PLAN

_____ GRADING PLAN

_____ EROSION CONTROL PLAN

X ENGINEER'S CERTIFICATION

_____ OTHER

PRE-DESIGN MEETING:

_____ YES

X NO

_____ COPY PROVIDED

CHECK TYPE OF APPROVAL SOUGHT:

_____ SKETCH PLAN 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

X CERTIFICATE OF OCCUPANCY APPROVAL

_____ GRADING PERMIT APPROVAL

_____ PAVING PERMIT APPROVAL

_____ S. A. D. DRAINAGE REPORT

_____ DRAINAGE REQUIREMENTS

_____ *OTHER*

RECEIVED
OCT 02 1998
HYDROLOGY SECTION

DATE SUBMITTED: *10/01/98*

BY: *Ronald R. Bohannan*

CITY OF
Albuquerque

March 4,1998

Ronald R. Bohannan
Tierra West LLC
4421 McLeod Rd. NE Suite D
Albuquerque, New Mexico 87109

RE: DRAINAGE PLAN FOR EMCORE BUILDING (M21-D005E) ENGINEER'S STAMP DATED 1/29/98

Dear Mr. Bohannan:

Based on the information provided on your February 12,1998 submittal, the above referenced site is approved for Site Development for Building Permit, prior to Building Permit release the following concerns that will need to addressed prior to final approval:

1. Page 14 of the report shows that 3.24 cfs is greater than 24.90 cfs. If you are checking the capacity of the curb cut, why are you using only a 2.0' foot width?

2. One foot water block at the east drivepad is required.

3. You will need to include the SO19 format on your plan drawing for the tie in from your proposed 12" pipe into the existing inlet.

4. Show the metes and bounds information on the plan drawing.

5. Why are you including pipe capacity calculation if you are only indicating on e basin?

If I can be of further assistance, please feel free to contact me at 924-3986.

C: Andrew Garcia
File

Sincerely

Bernie J. Montoya

Bernie J. Montoya CE
Associate Engineer

CITY OF
Albuquerque

May 20,1998

Ronald R. Bohannan
Tierra West, LLC
4421 McLeod Rd. NE Suite D
Albuquerque New Mexico 87109

RE: REVISED DRAINAGE PLAN FOR EMCORE BUILDING (M21-D005E) REVISION DATED 5/13/98

Dear Mr. Bohannan:

Based on the information provided on your May 18,1998 resubmittal, listed are some concerns that will need to addressed prior to final approval:

1. Basin 3 is not allowed to be drained into the sanitary sewer system (see attachment).

2. Sidewalk culvert analysis indicates that you need 4-2' sidewalk culverts to release the 11.27 cfs , your plan drawing shows a 2' sidewalk culvert. Please change on the drawing.

If I can be of further assistance, please feel free to contact me at 924-3986.

C: Andrew Garcia
File

Sincerely

Bernie J. Montoya CE
Associate Engineer

Tierra West, LLC

May 21, 1998

Mr. Bernie Montoya
Associate Engineer
P.O. Box 1293
Albuquerque, New Mexico 87103

Re: Revised Drainage Plan for Emcore Building (M21-D005E)

Dear Mr. Montoya:

Enclosed please find two copies of the above referenced drainage report that has addressed your comments of May 20, 1998. The changes include calling out four sidewalk culverts on the grading plan and changing Basin 3. Basin 3 is the loading dock that will contain a small sump pump and discharge to Basin 2. I hope that these changes will allow the approval of the plan to proceed.

If you have any questions concerning this re submittal or any other matter pertaining to the project please do not hesitate to contact me.

Sincerely,

Ronald R. Bohannan, P.E.

Enclosure

cc: Tim Grattan

JN 980005
RRB/kc

980005:bm52198.wpd

4421 McLeod Rd. NE, Suite D • Albuquerque, NM 87109 • (505) 883-7592
fax (505) 883-7034 • e-mail: twdms@aol

DRAINAGE INFORMATION SHEET

PROJECT TITLE: *Emcore Building* ZONE ATLAS/DRNG. FILE #: *M-21*

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

LEGAL DESCRIPTION: *Lot 2, Block 4, Sandia Research Park*

CITY ADDRESS: *SE Corner of Research Rd & Eubank Blvd*

ENGINEERING FIRM: *TIERRA WEST, LLC* CONTACT: *RONALD R. BOHANNAN*

ADDRESS: *4421 McCleod Rd. NE Suite D, 87109* PHONE: *(505) 883-7592*

OWNER: *Reed & Associates* CONTACT: *Mike Reed*

ADDRESS: _____ PHONE: _____

ARCHITECT: *Dekker-Perich & Associates* CONTACT: *Tim Grattan*

ADDRESS: *6801 Jefferson NE Suite 100* PHONE: *(505) 761-9700*

SURVEYOR: *Precision Surveys* CONTACT: *Larry Medrano*

ADDRESS: *2929 Coors Blvd NW Suite 309* PHONE: *(505)839-0569*

CONTRACTOR: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

TYPE OF SUBMITTAL:

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

PRE-DESIGN MEETING:

_____ YES
X NO
_____ COPY PROVIDED

CHECK TYPE OF APPROVAL SOUGHT:

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

RECEIVED
MAY 21 1998
HYDROLOGY SECTION

DATE SUBMITTED: 5/21/98

BY: *Ronald R. Bohannan*

CITY OF
Albuquerque

May 20,1998

Ronald R. Bohannan
Tierra West, LLC
4421 McLeod Rd. NE Suite D
Albuquerque New Mexico 87109

RE: REVISED DRAINAGE PLAN FOR EMCORE BUILDING (M21-D005E) REVISION DATED 5/13/98

Dear Mr. Bohannan:

Based on the information provided on your May 18,1998 resubmittal, listed are some concerns that will need to addressed prior to final approval:

1. Basin 3 is not allowed to be drained into the sanitary sewer system (see attachment).

2. Sidewalk culvert analysis indicates that you need 4-2' sidewalk culverts to release the 11.27 cfs , your plan drawing shows a 2' sidewalk culvert. Please change on the drawing.

If I can be of further assistance, please feel free to contact me at 924-3986.

C: Andrew Garcia
File

Sincerely

Bernie J Montoya

Bernie J. Montoya CE
Associate Engineer

CITY OF
Albuquerque

May 26,1998

Ronald R. Bohannan
Tierra West, LLC
4421 McLeod Rd. NE Suite D
Albuquerque, New Mexico 87109

RE: REVISED DRAINAGE PLAN FOR EMCORE BUILDING (M21-D005E) REVISION DATED 5/21/98

Dear Mr. Bohannan:

Based on the information provided on your May 21,1998 resubmittal, the above referenced site is approved for Building Permit.

Please attach a copy of this approved plan to the construction sets prior to sign-off by Hydrology.

Also, a separate permit is required for construction within City R/W. A copy of this approved 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.

If I can be of further assistance, please feel free to contact me at 924-3986.

C: Andrew Garcia
Arlene Portillo
File

Sincerely

Bernie J. Montoya

Bernie J. Montoya CE
Associate Engineer

CITY OF
Albuquerque

March 11,1998

Ronald R. Bohannan
Tierra West LLC
4421 McLeod Rd. NE Site D
Albuquerque, New Mexico 87109

RE: REVISED DRAINAGE PLAN FOR EMCORE BUILDING (M21-D005E) REVISION DATED 3/6/98

Dear Mr. Bohannan:

Based on the information provided on your March 6,1998 resubmittal, the above referenced site is approved for Grading and Building Permit.

Please attach a copy of this approved plan to the construction sets prior to sign-off by Hydrology.

Also, prior to Certificate of Occupancy release, Engineer Certification per the DPM checklist will be required.

If I can be of further assistance, please feel free to contact me at 924-3986.

C: Andrew Garcia
File

Sincerely

Bernie J. Montoya

Bernie J. Montoya CE
Associate Engineer

Appendix I

Drainage Report
For
Sandia Research Park
(M-15/D5)

DRAINAGE REPORT

for

SANDIA RESEARCH PARK
Albuquerque, New Mexico

January, 1988

REGISTERED PROFESSIONAL ENGINEER
STATE OF NEW MEXICO
No. 3960
JOHN A. ANDREWS

1-20-88

Prepared by
Andrews, Asbury & Robert, Inc.
Consulting Engineers
Albuquerque, New Mexico

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I	Introduction	1
	A. General	
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IV	Future Storm Drain Construction	6
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	Map No. 1 - Location Map	8
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	Calculations	

Enclosures

Map No. 2 - Existing Conditions

Map No. 3 - Onsite Developed Conditions-
Grading & Drainage Plan

Plat of Sandia Research Park

Storm Drain Plan & Profile Sheet 25 of 34 (Hydraulic Gradient)

I

INTRODUCTION

A. GENERAL

This report, with the enclosed maps, provides a Drainage Plan for the Sandia Research Park Subdivision. The project is located in the Southeast Quadrant of the Albuquerque Metropolitan Area. The subdivision consists of approximately 40 acres that lies approximately one mile south of Central Avenue and directly east of Eubank Boulevard SE. (See enclosed Location Map, Map No. 1, Zone Atlas Map M-21.)

Kirtland Air Force Base is located west of the subdivision. An Industrial Park type of development is proposed for this tract and it is the intent of this report to provide a drainage plan for the development of the 40 acre site.

Guidelines for the analysis included herein are based on the City of Albuquerque's Development Process Manual, Volume 2, Design Criteria, Section 22.

II

EXISTING CONDITIONS

A. GENERAL

The subject property is presently undeveloped with a general slope from northeast to southwest of slightly more than one percent (1%).

The site has previously been utilized as a dirt race track for racing cars and was known as Speedway Park. However, all improvements were removed several years ago.

The tract is bounded on the west by Eubank Boulevard SE which has been improved with a four lane paved roadway without curb and gutter and is one of the main accesses to Kirtland Air Force Base.

Along the north side of the site a bladed dirt road exists and was formerly known as Gibson Boulevard; however, with the platting of the property for this development, the street has been named Opportunity Avenue.

Adjacent property to the northeast and south is presently undeveloped.

B. OFFSITE AND ONSITE DRAINAGE

Presently the adjacent offsite areas to the east of subject property flow across the east boundary of the property as generally sheet flow. (See Map No. 2 enclosed and Table No. 1 of the Drainage Analysis.)

The storm water runoff from Area A offsite and Area E-1 and E-2 onsite flows to the westerly boundary of the property and the east side of Eubank Boulevard where it is directed southerly to the southwest corner of the site and away from the site.

Storm water runoff from Area B offsite and Area E-3 onsite flows to the southerly boundary of the site then continues southwesterly away from the site.

III

DEVELOPED CONDITIONS

A. OFFSITE

Flows from offsite Area A will be directed northerly by raising the grade along the east boundary of the subdivision slightly. This water will be received by Opportunity Avenue which will be paved and curbed and guttered on the southerly half of the street.

Flows from offsite Area B will be directed to Research Road again by raising the grade along the easterly boundary of the subdivision slightly. Research Road will be paved and curb and gutter installed.

See Map No. 3 enclosed.

B. ONSITE

This subdivision is to be developed as an Industrial Park; however, it is not known at the time of the writing of this report what the actual type, size or location of the buildings will be or the actual type ground cover proposed in the ultimate development. It was therefore assumed that in the final developed conditions the subdivision will have a coefficient of runoff of 0.80 and it is proposed to allow for total runoff from the developed lots without detention of waters on individual lots.

The runoff generated from the site will be conveyed in the streets to a site retention pond located at the southwest corner of the subdivision. (See Map No. 3 enclosed.)

The initial phase of development will consist of improvements to the streets and public drainage easements only. Street improvements will include the construction of curb and gutter and pavement and the installation of water and sewer lines. Drainage improvements include the construction of a retention pond on Lot 1, Block 4; the installation of a storm drain system on Research Road to collect and direct the flows on Research Road to the retention pond; and a concrete rundown near the south end of Eubank Boulevard to direct the flows on Eubank to the retention pond. This concrete rundown will also act as an overflow from the retention pond when the pond becomes full.

The drainage plan as provided herein provides for conveyance of storm waters from all developed lots except for the lot to be used as a retention pond, and is to be used as a basis for drainage plans of individual sites as the area develops.

As site development occurs, drainage plans for each specific development site will be required.

IV

FUTURE STORM DRAIN CONSTRUCTION

As shown on Map No. 3, a future major storm drain is proposed to be constructed by the City, located east and parallel to Eubank Boulevard. It is proposed that at the time this storm drain is constructed, catch basins and piping will be installed in Opportunity Avenue and Development Road to collect and carry the flows from these streets to the proposed storm drain. The outlet from the storm drain system installed under this development in Research Road can be redirected to this proposed storm drain.

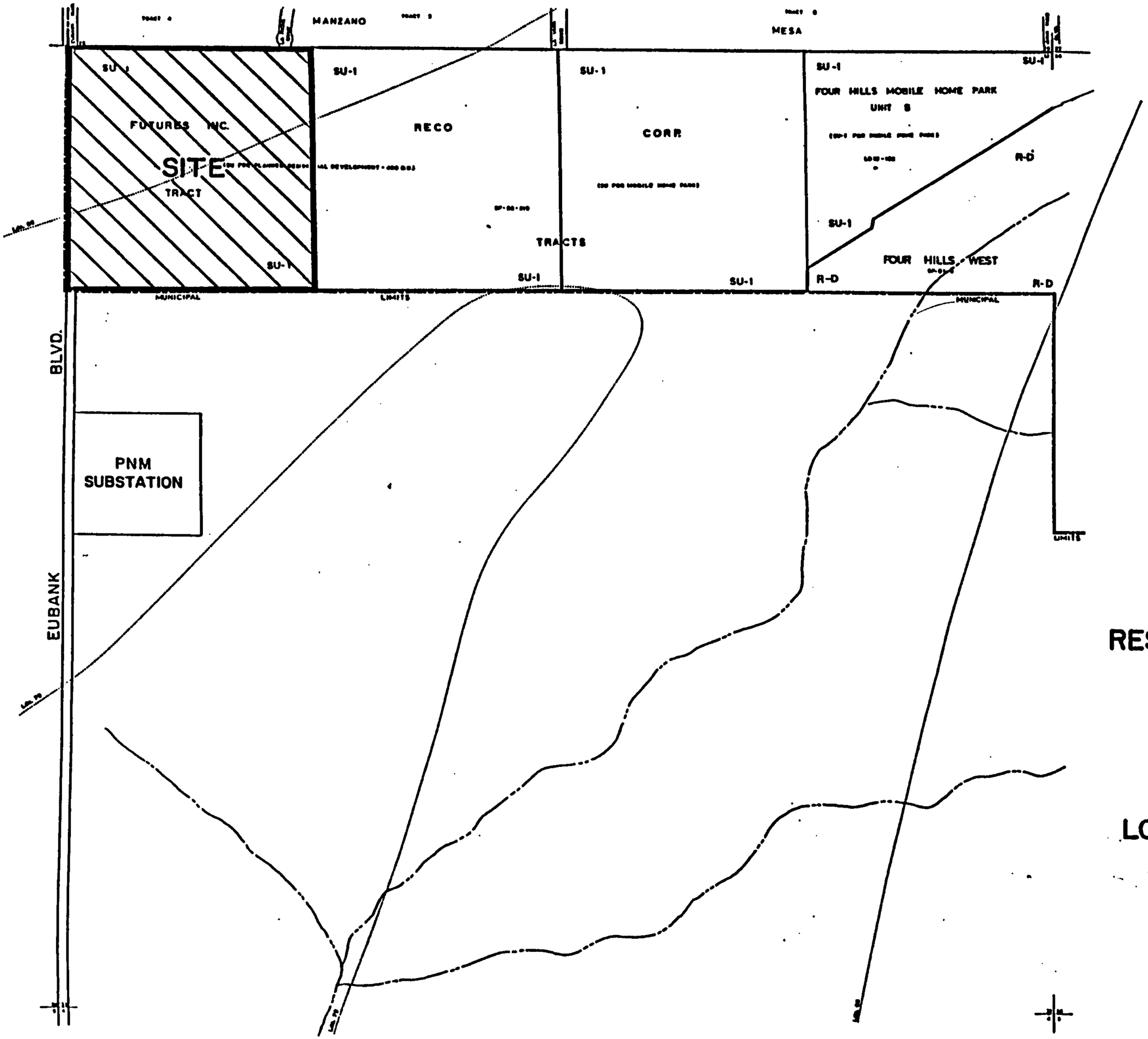
Upon completion of construction of this future storm drain by the City the retention pond can be eliminated by filling, and the lot on which the retention pond is located will be developed.

V

EROSION CONTROL

The contractor for the project will be responsible for soil migration during the construction phase. This can be accomplished by the grading of windrows in a north-south direction.

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



SANDIA
RESEARCH PARK

LOCATION MAP
MAP No. I

M-21-Z

VI

DRAINAGE ANALYSIS

Following is the Drainage Analysis (computations) for the subject property.

Table 1 - Existing Conditions	Sheets 2 & 3
Table 2 - Onsite Developed Conditions	Sheets 4 & 5
Table 3 - Onsite Developed Conditions and Offsite Undeveloped	Sheets 6 & 7
Table 4 - Onsite Developed Conditions and Offsite Developed Conditions	Sheet 10
Hydraulic Gradient	Sheet 16

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" = 0.80

For Existing Conditions -

"C" = 0.40

$I_{100} = (2.4)(6.84)(t_c)^{-0.51}$

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

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

TABLE 1

EXISTING CONDITIONS - See MAP No. 2

ANALYSIS POINT	DRAINAGE AREA DESIGNATION	AREA (Ac)	LENGTH OF TRAVEL (FT)	SLOPE (%)	VELOCITY (FPS)	TRAVEL TIME (T_c) (MINS.)	C	I_{10} (IN/HR)	I_{100} (IN/HR)	Q_{10} (CFS)	Q_{100} (CFS)
(1)	A OFFSITE	21.1	1300	1.31	0.66 overland	32.83	0.40	1.82	2.77	15.4	23.4
	E-1 ON SITE	18.4 0.9-offsite	1350	1.15	0.62 overland	36.29	0.40	1.73	2.63	12.7	19.4
	From A.P. (1) to A.P. (2)		1250' - Channel, 350'-Ditch	1.12 045	3.5 2.5	5.95 2.33 } 8.28					
(2)	A & E-1	39.5	—	—	—	32.83+8.28 = 41.11	0.40	1.62	2.47	25.6	39.0
	E-2 ON-SITE	15.8	1500	1.53	0.73 Overland	34.25	0.40	1.78	2.71	11.2	17.1
	From A.P. (2) to A.P (3)		1000' Ditch.	0.45	2.5	6.67					
(3)	A, E-1 & E-2	55.3	—	—	—	41.11+6.67 47.78	0.40	1.50	2.28	33.1	50.4

ANDREWS, ASBURY & ROBERT, INC.
CONSULTING ENGINEERS
149 Jackson, N.E., Albuquerque, N.M. 87108
Telephone (505) 265-5631

Project: Sandia Research Park
By: JA
Chk'd:
Date: 12-7-86
Sheet 2 of 11
Job No. 458

TABLE 1- Cont'd.

EXISTING CONDITIONS - Cont'd.

ANALYSIS POINT	DRAINAGE AREA DESIGNATION	AREA (Ac)	LENGTH OF TRAVEL (Ft)	SLOPE (%)	VELOCITY (FPS)	TRAVEL TIME (T_c) (Mins.)	C	I_{10} (IN/Hr)	I_{100} (IN/Hr)	Q_{10} (CFS)	Q_{100} (CFS)
4	B OFFSITE	14.5	1230	1.38	0.68 Overland	30.14	0.40	1.90	2.89	11.0	16.8
	E-3 ON SITE	7.2	750	1.27	0.65 Overland	19.23	0.40	2.38	3.63	6.9	10.5
5	B & E-3	21.7	—	—	—	30.14+19.23 49.37	0.40	1.48	2.25	12.8	19.5

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

Project Sandia Park Search Sheet 3 of 16
By JA Chk'd Date 12-7-86 Job No. 458

TABLE 2

ONSITE - DEVELOPED CONDITIONS - See Map No. 3

ANALYSIS POINT	DRAINAGE AREA DESIGNATION	AREA (Ac)	LENGTH OF TRAVEL (Ft)	SLOPE (%)	VELOCITY (FPS)	TRAVEL TIME (T_c) (Mins.)	C	I_{10} (IN/Hr)	I_{100} (IN/Hr)	Q_{10} (CFS)	Q_{100} (CFS)
(A)	C-1	8.21	310' Overland 450' st. 140' st.	1.61 0.50 0.82	1.75 1.90 2.45	2.95 3.95 6.39 } 13.29	0.80	2.88	4.39	18.9	28.8
	C-2	1.27	250' Overland 120' st.	1.68 0.30	1.77 1.50	2.35 1.33 } use 10	0.80	3.33	5.07	3.4	5.2
	System to AP (B)	AP (A)	330' st.	0.30	1.50	3.67					
(B)	C-1 & C-2	9.48	--	--	--	13.29 3.67 } 16.96	0.80	2.54	3.87	19.3	29.4
	C-3	8.54	380 Overland 80 st. 600 st.	0.85 1.60 1.10	0.55 3.30 2.80	11.51 0.40 3.57 } 15.48	0.80	2.67	4.06	18.2	27.7
	system to AP (C)	AP (B)	150' st.	0.54	2.0	1.25					
(C)	C-1 thru C-3	18.02	--	--	--	16.96 1.25 } 18.46	0.80	2.44	3.71	35.1	53.5

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Project Sandia Research Park Sheet 4 of 16
By JA Chk'd Date 12-8-86 Job No. 458

TABLE 2 Cont'd.

ONSITE - DEVELOPED CONDITIONS - Cont'd.

ANALYSIS POINT	DRAINAGE AREA DESIGNATION	AREA (Ac)	LENGTH OF TRAVEL (Ft)	SLOPE (%)	VELOCITY (FPS)	TRAVEL TIME (T_c) (MINS.)	C	I_{10} (IN/HR)	I_{100} (IN/HR)	Q_{10} (CFS)	Q_{100} (CFS)
	C-4	2.54	240' Overland 440' St.	2.30 0.54	2.0 2.0	2.00 3.67 } Use 10	0.80	3.33	5.07	6.8	10.3
	System-to AP-	AP (C) (D)	630' St.	0.54	2.0	5.25					
(D)	C-1 thru C-4	20.56	— —	— —	— —	18.46 5.25 } 23.71	0.80	2.15	3.27	35.3	53.8
(E)	D-1	17.56	430' Overland 400' Overland 670' St.	- 1.38 - 0.67 - 1.25	1.60 1.15 3.00	4.48 5.80 3.72 } 14.0	0.80	2.80	4.27	39.4	60.0
		38.12									

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Project: Sandia Research Park
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Chk'd:
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TABLE 3

ON-SITE - DEVELOPED & OFFSITE UNDEVELOPED - See Map No. 2 & 3

ANALYSIS POINT	DRAINAGE AREA DESIGNATION	AREA (Ac)	LENGTH OF TRAVEL (Ft)	SLOPE (%)	VELOCITY (FPS)	TRAVEL TIME (T_c) (Mins.)	C	I_{10} (IN/HR)	I_{100} (IN/HR)	Q_{10} (CFS)	Q_{100} (CFS)
1	A OFFSITE	21.1	See Existing Conditions			32.83	0.40	1.82	2.77	15.4	23.4
	System from A.P. 1 to	A.P. A	320' St. 940' St.	-1.8 0.82	-3.1 2.45	1.72 6.39 } 8.11					
A	A & C-1	29.31	—	—	—	32.83 8.11 } 40.94	0.51	1.62	2.47	24.2	36.9
	System AP A to	AP B	See On-Site Developed Conditions			3.67					
B	A, C-1 & C-2	30.58				40.94 3.67 } 44.61	0.53	1.56	2.37	25.2	38.4
	System AP B to	AP C				1.25					
C	A & C-1 thru C-3	39.12				44.61 1.25 } 45.86	0.58	1.53	2.33	34.8	52.9
	System AP C to	AP D				5.25					
D	A & C-1 thru C-4	41.66				45.86 5.25 } 51.11	0.60	1.45	2.21	36.3	55.2

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Project Sandia Research Park
Sheet 6 of 16
By JA
Chk'd
Job No. 458
Date 12-10-86

TABLE 3 Cont'd.

ON SITE DEVELOPED & OFF SITE UNDEVELOPED Cont'd.

ANALYSIS POINT	DRAINAGE AREA DESIGNATION	AREA (Ac)	LENGTH OF TRAVEL (Ft)	SLOPE (%)	VELOCITY (FPS)	TRAVEL TIME (T_c) (Mins.)	C	I_{10} (IN/Hr)	I_{100} (IN/Hr)	Q_{10} (CFS)	Q_{100} (CFS)
(4)	B OFFSITE	14.5	See existing Conditions			30.14	0.40	1.90	2.89	11.0	16.8
	System AP(4) to	From AP (E)	320' St. 800' St.	1.50 1.25	3.3 3.0	1.62 4.44 } 6.06					
(E)	B & D-1	32.06	--	--	--	30.14 6.06 } 36.20	0.62	1.73	2.63	34.4	52.3

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Project: Sandia Research Park
Sheet 7 of 16
By: JA
Chk'd: —
Job No. 458
Date: 12-10-86

CONDITIONS - ONSITE DEVELOPED & OFFSITE UNDEVELOPED

Determine if proposed streets will have capacity to carry runoff flows for on site developed conditions & offsite undeveloped conditions

Opportunity Ave. @ A.P. (A)

From Table 3, Q = 36.9 cfs.

Temporary street Section is Std. curb & gutter and 22 ft. of paving. (½ street)

Street Area @ 0.20' above Top of Curb = 13.40 ft²

Street Slope = 0.82%, $R = \frac{13.4}{25.8} = 0.53$

$V = (99)(0.53)^{2/3}(.0082)^{1/2} = 5.87$ fps

Street Capacity = Q = AV = (13.40)(5.87) = 78.7 cfs
OK

Eubank Blvd @ A.P. (B)

From Table 3; Q = 38.4 CFS

Temporary street section is Std. Curb & Gutter and 22' of paving adjacent & Connected to existing 48' Wide paved Roadway,

Street Area @ 0.20' above Top of Curb = 15.80

Street Slope = 0.30%, $R = \frac{15.80}{40.80} = 0.39$

$V = (99)(0.39)^{2/3}(.003)^{1/2} = 2.90$ fps

Street Capacity = Q = AV = (15.80)(2.90) = 45.8 cfs
OK

Eubank Blvd @ A.P. (D)

From Table 3, Q = 55.2 cfs

Temporary street Section - Same as at A.P. (B).

Street Area @ 0.20' above Top of Curb = 15.80

Street Slope = 0.54%, $R = \frac{15.80}{40.80} = 0.39$

$V = (.99)(.39)^{2/3}(.0054)^{1/2} = 3.88$ fps

Street Capacity = $Q = AV = (15.80)(3.88) =$ 61.3 cfs

ok

Research Road @ A.P. (E)

From Table 3, Q = 52.3 cfs.

Street Section is Std. 40 ft wide Street

Street Area @ 0.20' above Top of Curb = 24.00 ft²

Street Slope = 1.25%, $R = \frac{24.00}{42.58} = 0.56$

$V = (.99)(.56)^{2/3}(.0125)^{1/2} = 7.52$ fps

Street Capacity = $Q = AV = (24.00)(7.52) =$ 180.5 cfs

ok

TABLE 4

ON SITE DEVELOPED CONDITIONS - OFF SITE DEVELOPED CONDITIONS
(See Map No. 2 & 3)

ANALYSIS POINT	DRAINAGE AREA DESIGNATION	AREA (Ac)	LENGTH OF TRAVEL (Ft)	SLOPE (%)	VELOCITY (FPS)	TRAVEL TIME (T_c) (Mins.)	C	I_{10} (IN/Hr)	I_{100} (IN/Hr)	Q_{10} (CFS)	Q_{100} (CFS)
1	A	21.1	450' Overland 600' Street 750' Street	1.44 0.50 1.23	1.65 1.9 3.0	4.55 5.26 4.17 } 13.98	0.80	2.81	4.28	47.4	72.2
	AP 1 to	AP A				8.11					
A	A & C-1	29.31	--	--	--	13.98 8.11 } 22.09	0.80	2.23	3.39	52.2	79.5
4	B	14.5	450' Overland 300' Street 750' Street	1.44 0.50 1.40	1.65 1.9 3.2	4.55 2.63 3.91 } 11.19	0.80	3.16	4.81	36.7	55.8
	AP 4 to	AP E				6.06					
E	B & D-1	32.06	---	---	---	11.09 6.06 } 17.15	0.80	2.53	3.85	64.8	98.7

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Project: Sandia Research Park
Sheet: 10 of 16
By: JA
Chk'd: —
Job No.: 458
Date: 12-10-81

CONDITIONS - ONSITE DEVELOPED & FUTURE OFFSITE DEVELOPED

Determine if proposed streets will have capacity to carry runoff flows for on-site developed conditions & "future" off site developed conditions

Opportunity Ave. @ A.P. (A)

From Table 4; Q = 79.5 cfs.

Assume full street section is constructed. with Std. 40' Street.

Street Area @ 0.20' above Top of Curb = 24.00 ft²

Street Slope = 0.82%, $R = \frac{24}{42.58} = 0.56$

$V = (99)(0.56)^{2/3}(0.0082)^{1/2} = 6.09$ fps

Street Capacity = Q = AV = (24.00)(6.09) = 146.2 cfs

OK

Research Road @ A.P. (E)

From Table 4, Q = 98.7 cfs

Street section is std. 40' wide street

Street Area @ 0.20' above Top of Curb = 24.00

Street Slope = 1.25%, $R = \frac{24.00}{42.58} = 0.56$

$V = (99)(0.56)^{2/3}(0.0125)^{1/2} = 7.52$ fps

Street Capacity = Q = AV = (24.00)(7.52) = 180.5 cfs

OK

CONDITIONS - ONSITE DEVELOPED & FUTURE OFFSITE DEVELOPED - Cont'd.

Only the Street Capacities at Analysis Point (A) on Opportunity Ave and at Analysis Point (E) on Research Road were checked for capacity because:

1. Prior to the time that offsite developed flows will be allowed to flow through the Sandia Reseach Park subdivision the proposed major Storm Drain Line will be installed in the Drainage Easement located east of Eubank Blvd.

2. The installation of this Major storm Drain will collect the flows on Opportunity Ave and on Research Road East of Eubank Blvd. Therefore, the flows on these streets will not flow onto Eubank Blvd.

VOLUME OF TEMPORARY RETENTION POND REQUIRED

CONDITIONS - ONSITE DEVELOPED & OFFSITE UNDEVELOPED

CRITERIA

1. Develop Inflow hydrograph to Retention Pond for above Conditions
2. Allow offsite flow rates, under existing conditions, to flow through the Retention Pond. - Area "A" = 23.4 + Area "B" = 16.8 = 40.2 Ac
3. Determine total Area contributing to volume & runoff rate, & "C" value

Offsite Area "A"	= 21.1 Acres		C = 0.40
" Area B	= 14.5 Acres		C = 0.40
Sub-Total	35.6 Acres	@	C = 0.40

Onsite Area C-1	8.21 Acres		C = 0.80
C-2	1.27 "		C = 0.80
C-3	8.54 "		C = 0.80
C-4	2.54 "		C = 0.80
D-1	17.56 "		C = 0.80
E-1	1.92 "		C = 0.40
F-1	0.40 "		C = 0.80
Subtotal	40.44 "	@	C = 0.78

Total Area = 76.04

Combined "C"

$= (35.6)(0.40)/76.04 + (40.44)(.78)/76.04$

$= 0.60$

4. Use T_c for Analysis Point "D" (51.11 min.), see Table 3, as this is the time required for runoff flows to reach the ponding area from the most remote point of the overall combined drainage areas.

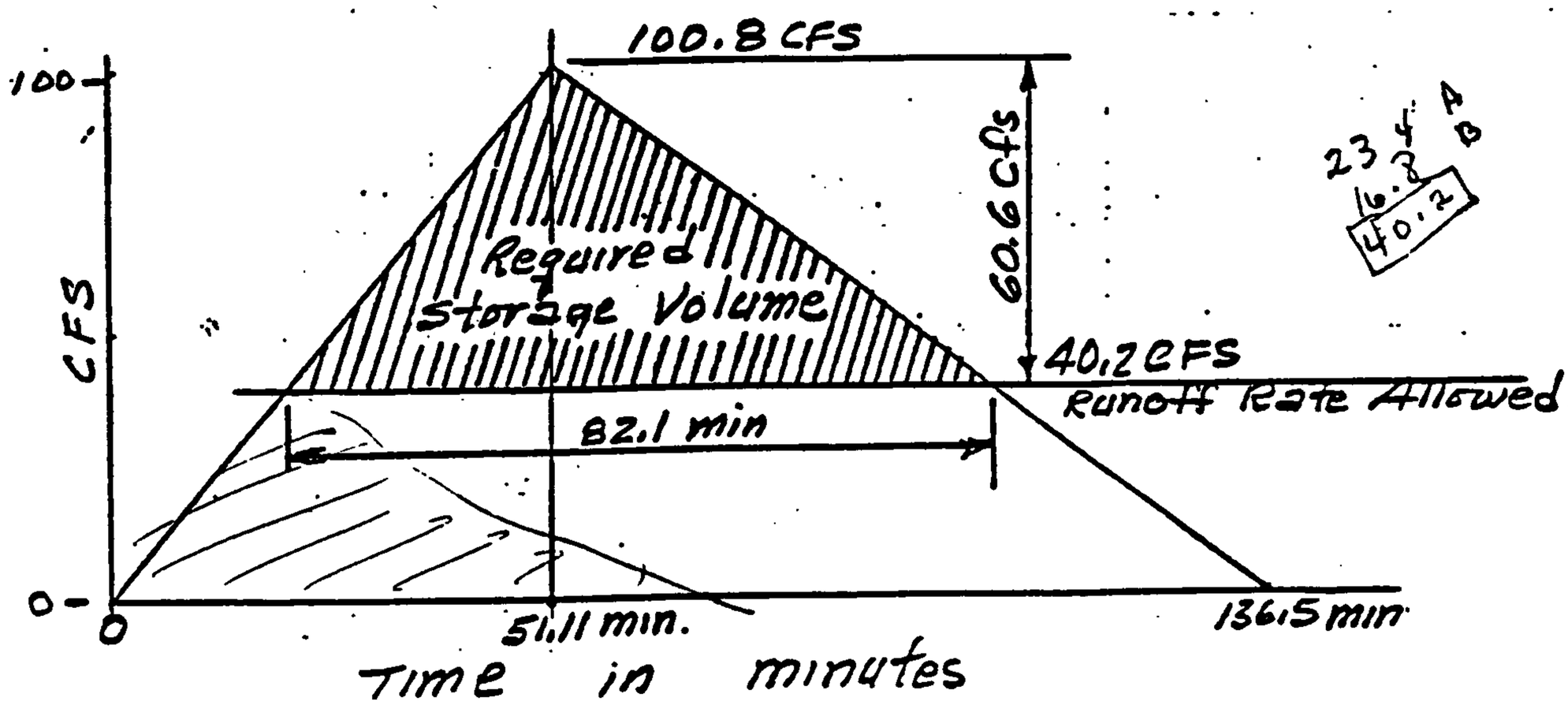
Must use 24 hr storm

Therefore $I = 2.21$ - See Table 3

$$Q = CIA = (0.60)(2.21)(76.04) = 100.8 \text{ CFS}$$

From USDA - Soil Conservation Service
National Engineering Handbook,
Section 4, Hydrology
Supplemental A, "The Hydrology Guide"

Triangular Hydrograph Base = 2.67 (Tp)
= 2.67 (51.11) = 136.5 min.



23.4 AD
16.3
40.2

Volume of Storage Req'd.

$= 82.1 \text{ min} \times 60 \times 60.6''/2 = 149{,}258 \text{ ft}^3 = 3.43 \text{ AF}$

Need for Volume calculations

RESEARCH AVENUE - STORM DRAIN

A storm drain with inlets will need to be installed in Research Avenue, East of Eubank Blvd. to Collect the Flows from Drainage Area D-1 and OFFSITE AREA B.

This stormdrain is required to divert the flows on Research Ave to the Temporary Retention Pond.

From Table 3 - Q = 52.3 cfs.

Use 6 - Curb inlets - Ea. to collect 10cfs±

4 - Inlets upstrem to Collect 40cfs.

Pipe size Req'd = 36" @ 1.2%±; Q = 42cfs OK

From 6 - Inlets to Pond -

Pipe Size Req'd = 36" @ 1.0%±; Q = 65 CFS OK

SUMMARY OF HYDRAULIC CALCULATIONS

STAT.	STRUC	D	Q	A	V	K	S_f	L	Δ	JUNCTION D	JUNCTION θ	LOSSES h_f	h_b	h_j	h_{MH}	h_T	h_{MH}	Σ	EG	h_v	HG
2+46	Outlet	36"	53.2	6.75	7.88	1.00											0.96	0.96	66.00	0	66.00
2+46	Outlet	36"	53.2	6.25	7.88							0.28						0.28	66.96	0.96	66.00
2+96	45° MH	36"	53.2	5.58	9.53	0.14			45°				0.20					0.20	67.24	1.4	67.31
																			67.44		
			Free Discharge Into MH ½ upstream																		
2+96	MH	30"	40	4.62	8.67			40'				0.34						0.34	67.57	1.17	66.40
3+36	MH	30"	40	4.91	8.15														67.91	1.03	67.02

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Project Sandia Resort Park
By JM
Chk'd
Date 01.20.88
Sheet 16 of 16
Job No. 45-

```
    FALL            TYPE=1 RAIN QUARTER=0.0 IN
                    RAIN ONE=1.42 IN RAIN SIX=1.73 IN
                    RAIN DAY=2.07 IN DT=0.03333 HR
COMPUTE NM HYD      ID=1 HYD NO=110.1 AREA=0.00814219 SQ MI
                    PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                    TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD           ID=1 CODE=1
*
*
FINISH
```

AHYMO SUMMARY TABLE (AHYMO194) - AMAFCA Hydrologic Model - January, 1994 RUN DATE (MON/DAY/YR) =02/09/1998
INPUT FILE = A:9805.DAT USER NO.= R_BOHANN.I01

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	PAGE = 1 NOTATION
START										TIME= .00
RAINFALL TYPE= 1										RAIN6= 2.600
COMPUTE NM HYD	100.10	-	1	.00814	9.76	.284	.65514	1.533	1.873	PER IMP= .00
START										TIME= .00
RAINFALL TYPE= 1										RAIN6= 1.730
COMPUTE NM HYD	110.10	-	1	.00814	2.90	.081	.18715	1.533	.557	PER IMP= .00
START										TIME= .00
RAINFALL TYPE= 1										RAIN6= 2.600
COMPUTE NM HYD	100.10	-	1	.00814	24.90	.960	2.21184	1.500	4.779	PER IMP= 90.00
START										TIME= .00
RAINFALL TYPE= 1										RAIN6= 1.730
COMPUTE NM HYD	110.10	-	1	.00814	16.13	.600	1.38065	1.500	3.096	PER IMP= 90.00
FINISH										

```
*****************************************************************
*         SANDIA RESEARCH FACILITY - EMCORE BUILDING            *
*****************************************************************
*       100-YEAR, 6-HR STORM  (UNDER EXISTING CONDITIONS)       *
*****************************************************************
*
START                TIME=0.0
*
* BASIN 1
*
RAINFALL             TYPE=1 RAIN QUARTER=0.0 IN
                     RAIN ONE=2.14 IN RAIN SIX=2.60 IN
                     RAIN DAY=3.10 IN DT=0.03333 HR
COMPUTE NM HYD       ID=1 HYD NO=100.1 AREA=0.00814219 SQ MI
                     PER A=100.00 PER B=0.00 PER C=0.00 PER D=0.00
                     TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD            ID=1 CODE=1
*
*
*****************************************************************
*        10-YEAR, 6-HR STORM  (UNDER EXISTING CONDITIONS)       *
*****************************************************************
*
START                TIME=0.0
*
* BASIN 1
*
RAINFALL             TYPE=1 RAIN QUARTER=0.0 IN
                     RAIN ONE=1.42 IN RAIN SIX=1.73 IN
                     RAIN DAY=2.07 IN DT=0.03333 HR
COMPUTE NM HYD       ID=1 HYD NO=110.1 AREA=0.00814219 SQ MI
                     PER A=100.00 PER B=0.00 PER C=0.00 PER D=0.00
                     TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD            ID=1 CODE=1
*
*
*****************************************************************
*       100-YEAR, 6-HR STORM  (UNDER DEVELOPED CONDITIONS)      *
*****************************************************************
*
START                TIME=0.0
*
* BASIN 1
*
RAINFALL             TYPE=1 RAIN QUARTER=0.0 IN
                     RAIN ONE=2.14 IN RAIN SIX=2.60 IN
                     RAIN DAY=3.10 IN DT=0.03333 HR
COMPUTE NM HYD       ID=1 HYD NO=100.1 AREA=0.00814219 SQ MI
                     PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                     TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD            ID=1 CODE=1
*
*****************************************************************
*        10-YEAR, 6-HR STORM  (UNDER DEVELOPED CONDITIONS)      *
*****************************************************************
*
START                TIME=0.0
*
* BASIN 1
*
```

DRAINAGE REPORT
FOR

LOT 2 BLOCK 4
SANDIA RESEARCH FACILITY

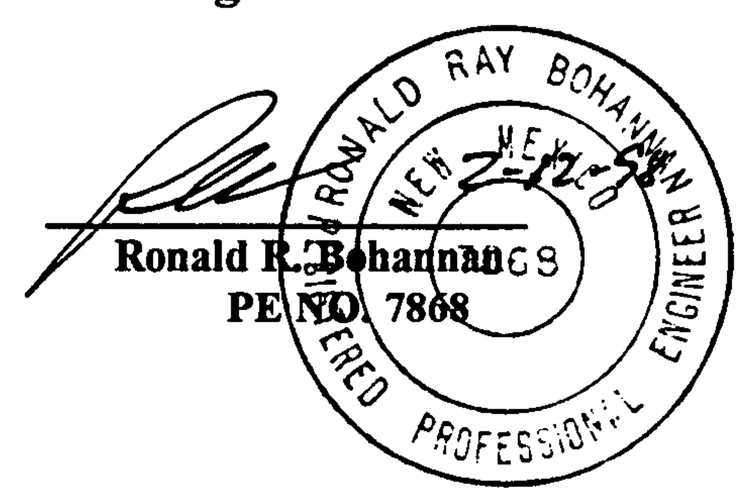
EMCORE BUILDING

Prepared by:

Tierra West, LLC
4421 McLeod Rd., NE, Suite D
Albuquerque, New Mexico 87109

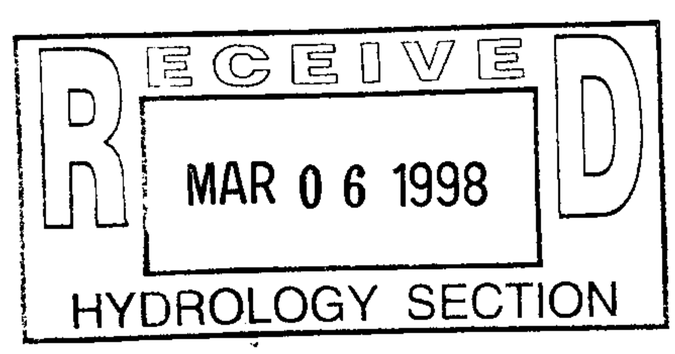
February, 1998

I certify that this report was prepared under my supervision, and I am a registered professional engineer in the State of New Mexico in good standing.



Ronald R. Bohannan
PE NO. 7868

Job No 980005



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Sandia Research Park Master Drainage Plan

Section I

Report

Location

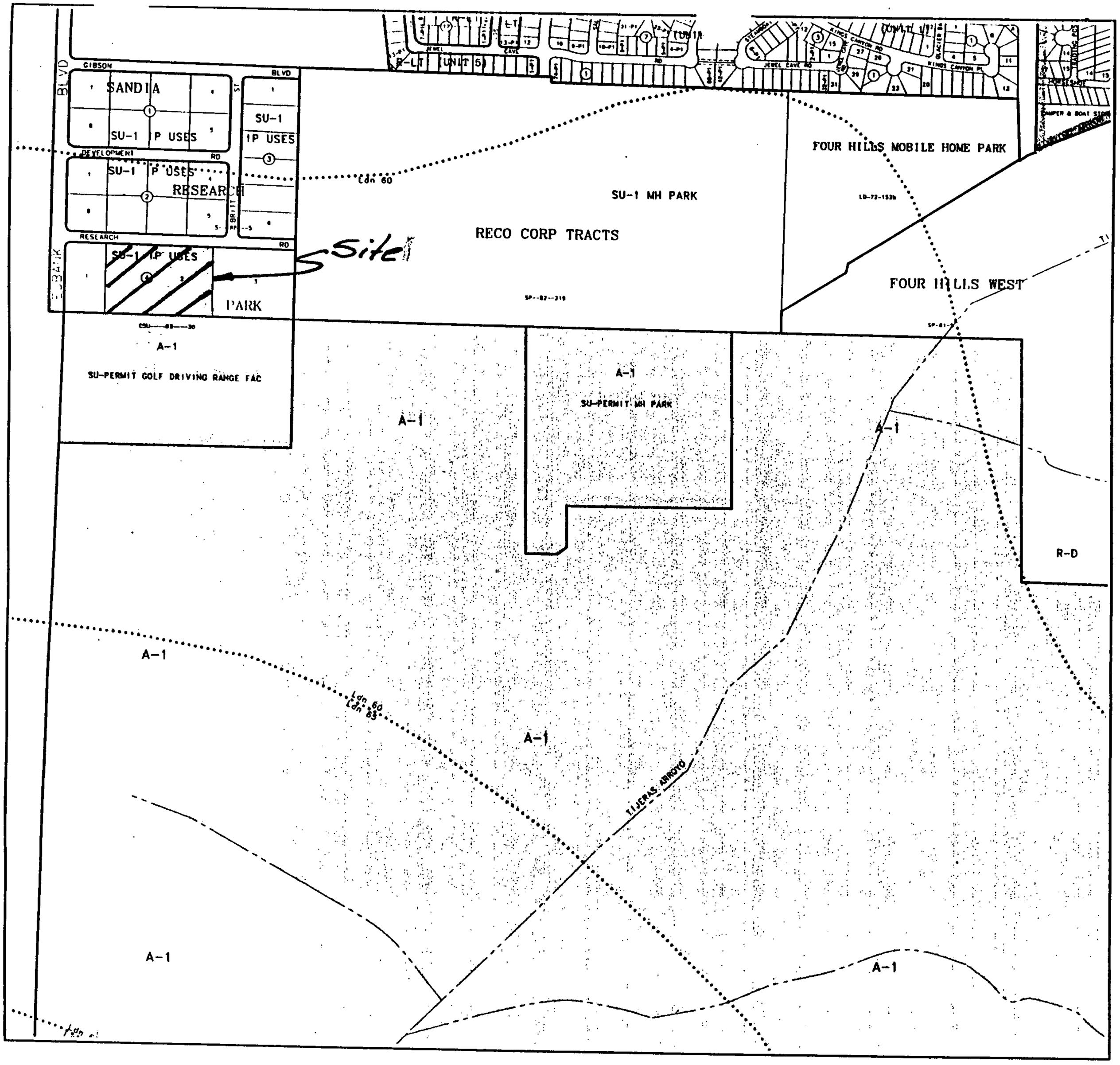
Tract 2, Block 4 of the Sandia Research Center is located at the southeast corner of Research Road and Eubank Boulevard in the southeast quadrant of Albuquerque. The site has been highlighted on Zone Atlas page number M-2 for an exact location. The owners of the project are proposing to construct a new research warehouse building on the site to be built in two phases.

Purpose

The purpose of this drainage report is to present a grading and drainage solution for the proposed building to be built in two phases. We are requesting grading approval, Site Development Plan for Building Purposes, Site Development Plan for Building Permit, and Building Permit.

Existing Drainage Conditions

The site falls within the approved Sandia Research Park Drainage Report, and it is currently undeveloped. Research Road, and all of the roads, were constructed but the individual parcels (with the exception of Lot 3, Block 4, Lot 8, Block 2) are undeveloped at this time. The existing conditions for the entire site were originally analyzed under the Drainage Report for Sandia Research Park prepared by Andrews, Asbury, & Robert under M-15/D5, a copy of which is attached in the appendix.



GRAPHIC SCALE IN FEET

250 0 500 1000

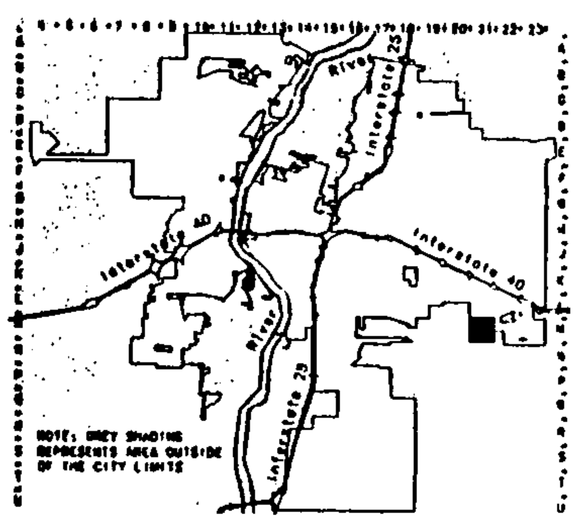
CITY OF Albuquerque

Albuquerque Geographic Information System

PLANNING DEPARTMENT

©Copyright 1997

Map Amended through February 17, 1997



LEGAL DESCRIPTION

T10N

R4E

SEC 33

UNIFORM PROPERTY CODE

1-021-088

M-21-Z

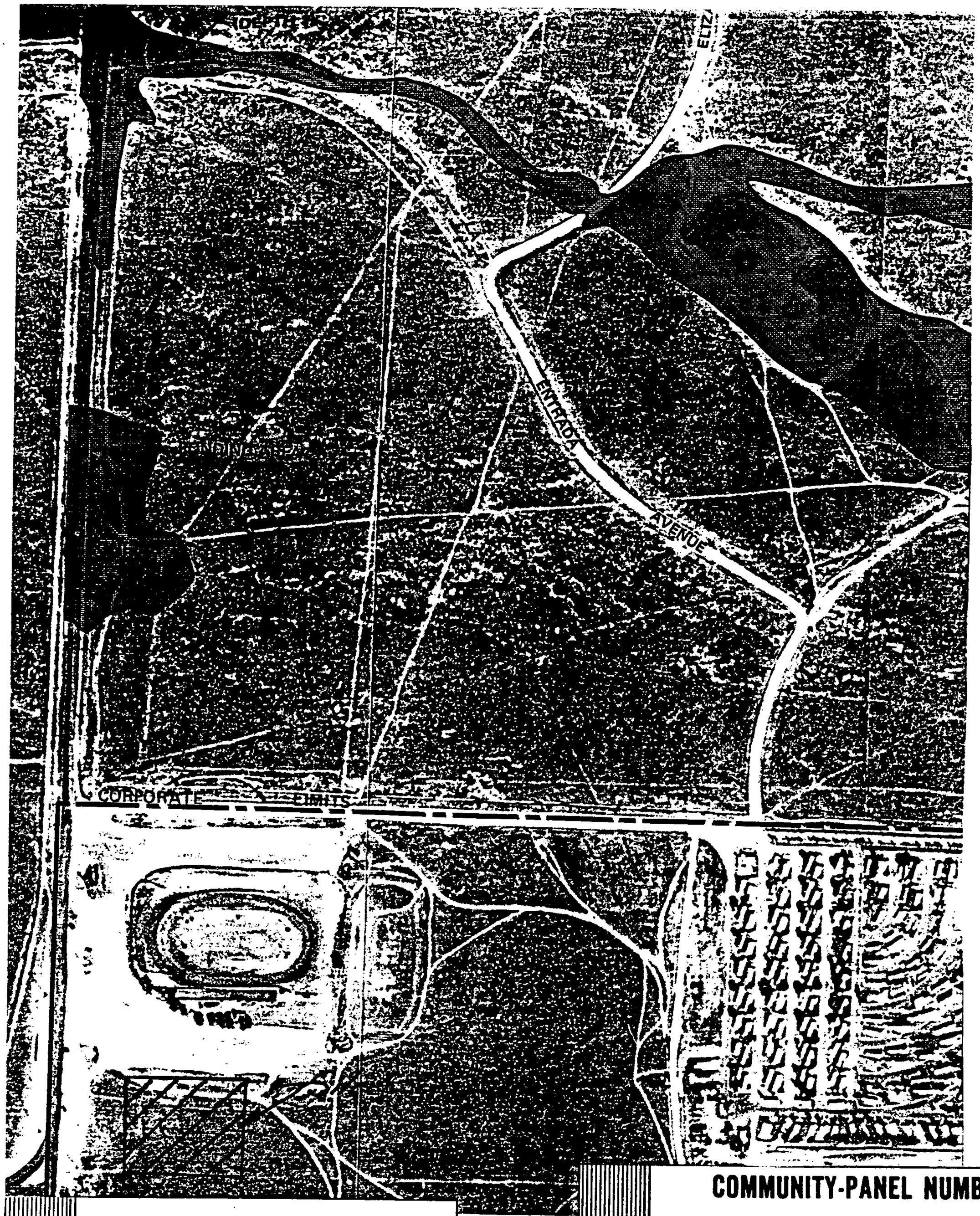
The site does not have any developed flows that impact the project. The proposed project lies within the park and is bounded on the west by the temporary retention pond, on the east by a developed site, and on the north by Research Boulevard. The south is owned by APS and is currently undeveloped. The site falls east to west at around 2%. The property to the east has directed all of the developed runoff to Research Road and the runoff to the property to the south flows west and south away from the project.

The approved drainage plan directs all the developed flow to the streets with Research Road and Eubank Boulevard. These flows are then collected by an existing storm sewer collection system. This storm sewer system collects the entire flow directing it to a temporary retention pond located on Lot 1, Block 4, due west of the site. The future Eubank storm system will intercept the flows and remove the need for the retention basin on Lot 1, Block 4. The site was analyzed under one basin (Basin 1) for existing flows. The AHYMO run was used to calculate the flows and the 100 year and 10 year flows were 9.76 cfs and 2.90 cfs, respectively.

Flood Plain and Soil Condition

The site is located on FEMA Map No. 350002 panel 37 as shown on the attached excerpt. The map shows that the site does not lie within any 100 year flood plains.

The site contains two soil types: Madurez Wink (MWA) and Tijeras



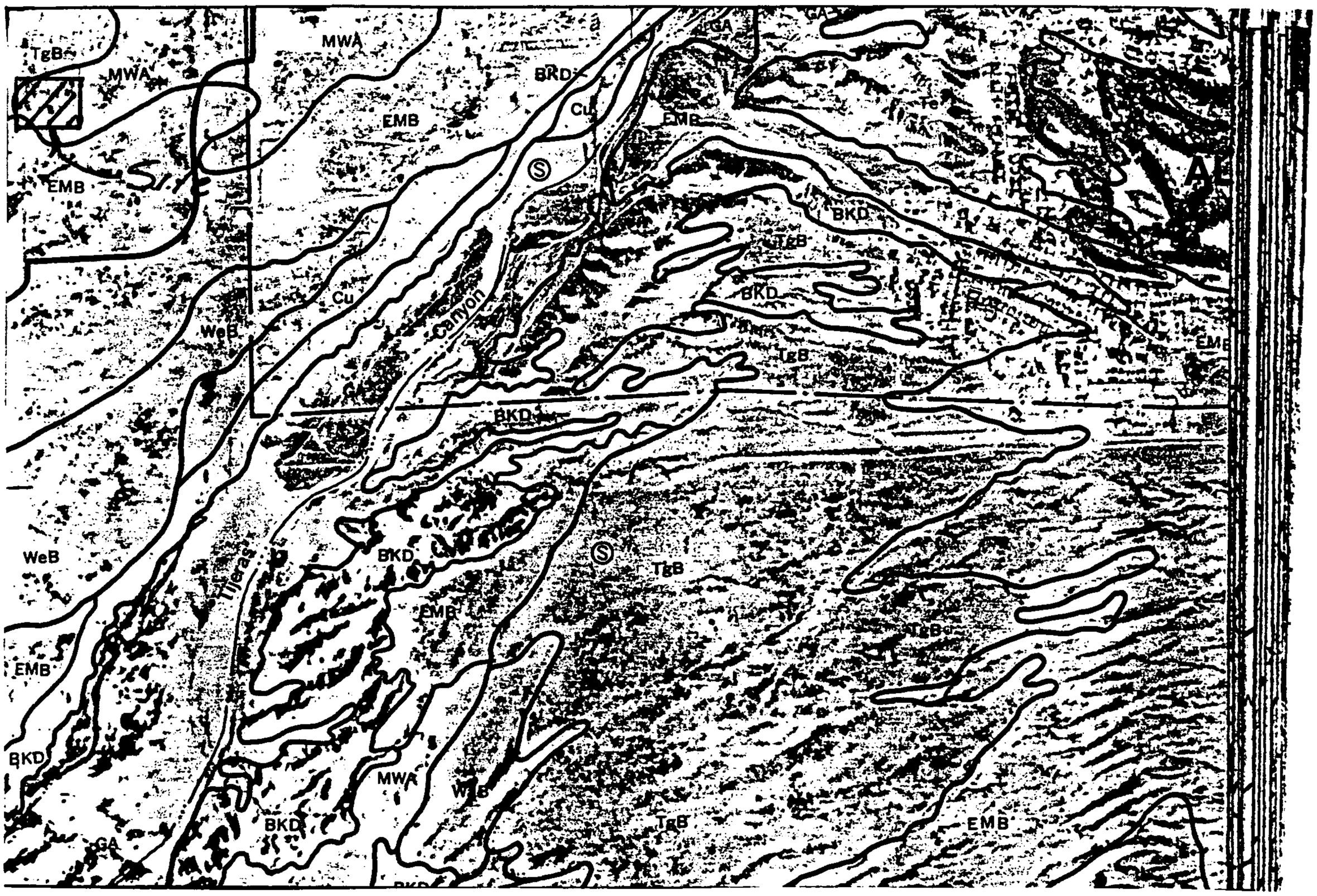
FIRM
FLOOD INSURANCE RATE MAP

COMMUNITY-PANEL NUMBER

350002 0037 C

EFFECTIVE DATE:

OCTOBER 14, 1983



SOIL SURVEY OF

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

(TgB) as indicated on the Soil Map (sheet #42) from the Soil Conservation Service Survey of Bernalillo County. The Tijeras is gentle sloping old allivate fan material with moderate runoff and soil erosion. The Madurez Wink series is a sandy loam with slow runoff and moderate to severe soil erosion. (See attached soil map for site location).

Proposed Conditions and On-Site Drainage Management Plan

This project will be developed in two phases that encompass the entire tract. The entire site will be built out in its entirety in the first phase but the pad for Phase 2 will be left at grade. The enclosed grading plan in the map pocket shows the grades for the entire project.

The entire site continues to drain west and then north to the northwest entrance and to Research Road. The entire site runoff will continue to drain, per the Sandia Research Park Master Drainage Plan, which calls for free discharge from the site. Therefore, the developed discharge rate for this site (containing 5.211 acres) is 24.90 cfs for the 100 year and 16.13 cfs for the 10 year flow. The basin drains to the paved parking areas which drain west and north to Research Road. The entire flow drains through the western entrance to Research Road and is collected by a storm sewer and conveyed to the temporary detention pond.

The Sandia Research Park was originally analyzed using the rational method for all of the basins. We have included a copy of the report from the file

in the appendix. The new flows were analyzed under City of Albuquerque, Development Process Manual, Section 22.2, Hydrology Section, revised January, 1993, was used for runoff calculations. See Sections IV, V, and VI of this report for AHYMO input and output files for runoff and ponding calculations.

Summary

Lot 2, Block 4 proposes to discharge 24.90 cfs and 16.13 cfs from a 5.211 acre site to Research Road per the approved drainage master plan prepared by Andrews, Asbury, and Robert under M-15/D5. The flows enter Research Road where they are picked up by an existing storm sewer and coveyed to a retention pond on Lot 1 Block 4. This pond will be removed when the City and AMAFCA constructs the Eubank Storm Drain.

Infrastructure List

All work will be performed under building permit outside of any public right-of-way and no infrastructure list is required for drainage management.

Runoff Calculations

Driveway Opening Capacity

Manning's Equation:

Equation 7-366 Handbook of Hydraulics
Braten and King

$$Q = \frac{1.49}{n} A R^{2/3} S^{1/2}$$

Where
Q = Flow (cfs)
n = 0.017 Roughness located page 7-22
A = Area
R = Hydraulic Radius
S = Slope

$$A = 0.24 + 24 * 0.5 = 12.00$$

$$WP = 2 * 0.5 + 24 = 25$$

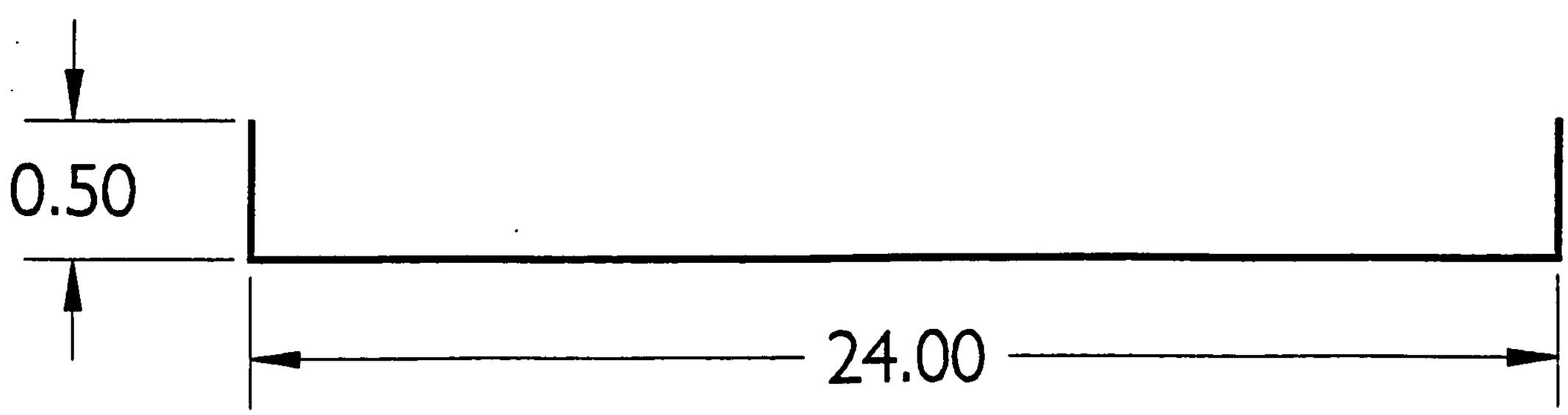
$$R = \frac{A}{WP} = \frac{12}{25} = 0.480$$

Manning's Equation:

$$Q = \frac{1.49}{0.017} * 12 * 0.48^{2/3} * 0.028^{1/2}$$

$$Q = 107.89 \ cfs$$

Capacity of street = 107.87 cfs
Required capacity of street = 24.90 cfs
107.87 cfs > 24.90 cfs



Curb Cut

Weir Equation:

$Q=CLH^{3/2}$

Equation 5-10 Handbook of Hydraulics
King and Brater

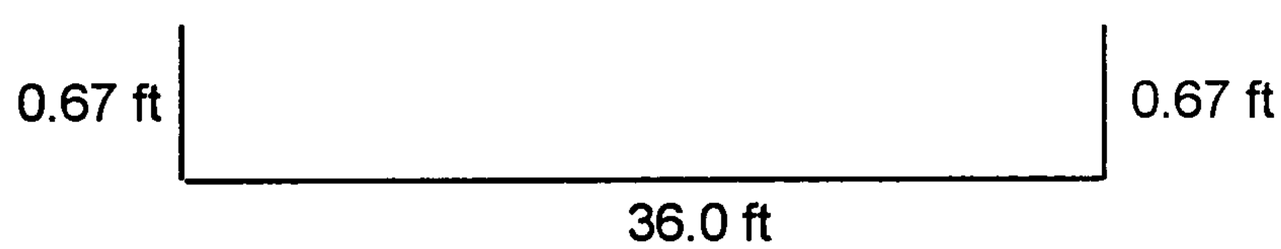
Basin 2:
Q= Flow (cfs)
C = 2.95

H = 0.67 ft
L = 2.0 ft

Where
Q = Flow in cubic feet per second
C = Coefficient for Broad Crested Weirs
Table 5-3 King and Brater
H = Height of the water
L = Width of the weir

$Q=2.95*36.0*0.67^{3/2}$

Q = 58.24 cfs
58.24 cfs > 24.90 cfs



RUNOFF CALCULATIONS

The site is @ Zone 3

LAND TREATMENT

Proposed	*Existing*
B = 10%	A = 100%
D = 90%	

DEPTH (INCHES) @ 100-YEAR STORM

P_{60} = 2.14 inches

P_{360} = 2.60 inches

P_{1440} = 3.10 inches

DEPTH (INCHES) @ 10-YEAR STORM

P_{60} = 2.14 x 0.667
= 1.427 inches

P_{360} = 2.60 x 0.667
= 1.734

P_{1440} = 2.068

See the summary output from AHYMO calculations.

Drainage Basins

BASIN	AREA (SF)	AREA (AC)	AREA (MI^2)
1	226991.16	5.2110	0.008142
Total	226991.16	5.2110	0.008142

Runoff Calculation Results

BASIN	Q-100 CFS	Q-10 CFS	V-100 AC-FT	V-10 AC-FT
1	24.90	16.13	0.960	0.600
Total	24.90	16.13	0.960	0.600

Drainage Facilities Analysis

Pipe Capacity

<u>Manning's Equation:</u>

Q = 1.49/n * A * R^(2/3) * S^(1/2)

A = Area
R = D/4
S = Slope
n = 0.013

Pipe	D	Slope	Area	R	Q Provided	Q Required	Velocity
	(in)	(%)	(ft^2)		(cfs)	(cfs)	(ft/s)
Metal Pipe	12	1.64	0.79	0.25	4.57	7.65	9.74

AHYMO
Runoff Input
and
Summary Output
for
Existing Drainage Basins

CITY OF
Albuquerque

October 19,1998

Ronald R. Bohannan
Tierra West, LLC
4421 McLeod Rd. NE Suite D
Albuquerque, New Mexico 87109

RE: ENGINEER CERTIFICATION FOR EMCORE (M21-D05E) ENGINEER'S CERTIFICATION STATEMENT DATED 10/1/98

Dear Mr. Bohannan:

Based on the information provided on your October 2,1998 submittal, Engineer Certification for the above referenced site is acceptable.

If I can be of further assistance, please feel free to contact me at 924-3986.

C: Andrew Garcia
File

Sincerely

Bernie J. Montoya CE
Associate Engineer

980002

DRAINAGE INFORMATION SHEET

PROJECT TITLE: *Emcore Building* ZONE ATLAS/DRNG. FILE #: *M-21 / D5E*

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

LEGAL DESCRIPTION: *Lot 2, Block 4, Sandia Research Park*

CITY ADDRESS: *SE Corner of Research Rd & Eubank Blvd.*

ENGINEERING FIRM: *TIERRA WEST LLC* CONTACT: *RONALD R. BOHANNAN OR SHAHAB BIAZAR*

ADDRESS: *4421 McLEOD RD., NE SUITE D, ABQ, 87109* PHONE: *(505) 883-7592*

OWNER: *Don Morgan* CONTACT: *Don Morgan*

ADDRESS: _____ PHONE: _____

ARCHITECT: *Dekker-Perich & Associates* CONTACT: *Tim Grattan*

ADDRESS: *6801 Jefferson NE Suite 100* PHONE: *505 761-9700*

SURVEYOR: *Precision Surveys* CONTACT: *Larry Medrano*

ADDRESS: *2929 Coors Blvd NW Suite 309* PHONE: *505 883-0569*

CONTRACTOR: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

TYPE OF SUBMITTAL:

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

PRE-DESIGN MEETING:

_____ YES
X NO
_____ COPY PROVIDED

CHECK TYPE OF APPROVAL SOUGHT:

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

RECEIVED
MAR 0 6 1998
HYDROLOGY SECTION

DATE SUBMITTED: *1/30/98*

BY: *Ronald R. Bohannan*

Tierra West, LLC

March 5, 1998

Mr. Bernie J. Montoya, CE
City of Albuquerque
Hydrology Department
P O Box 1293
Albuquerque, NM 87103

Re: Drainage Plan for Emcore Building (M21-D005E) Dated 1/29/98

Dear Mr. Montoya:

Enclosed is a copy of the revised plan for the above referenced project addressing your comments of March 4, 1998. With this submittal we are requesting Building Permit approval. We have included a copy of your letter for your reference and our numbers correspond with the numbers in your letter.

1. We have checked the capacity of the driveway, which is 58.28 cfs, and is substantially greater than the 24.90 cfs that is being discharged from the site at that location.

2. We have included a one foot water block on the eastern entrance.

3. We have included the SO 19 format on the plan but we are draining the entire project to the street and not to any drop inlet.

4. We have added the meets and bounds information to the boundary showing the bearings and distances for each side.

5. The pipe capacity calculation was left over from a previous report that was used as a base to write the report. We apologize for the confusion.

If there are any additional questions on the plan or any other aspect of the project, please do not hesitate to contact me. Thank you for your time and cooperation in this matter.

Sincerely,

Ronald R. Bohannan, P.E.

RECEIVED
MAR 0 6 1998
HYDROLOGY SECTION

Enclosure

cc: Tim Grattan

JN: 980005
RRB/to

9805bm3598

4421 McLeod Rd. NE, Suite D • Albuquerque, NM 87109 • (505) 883-7592
fax (505) 883-7034 • e-mail: twdms@aol

DRAINAGE INFORMATION SHEET

PROJECT TITLE: *Emcore Building* ZONE ATLAS/DRNG. FILE #: *M-21*

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

LEGAL DESCRIPTION: *Lot 2, Block 4, Sandia Research Park*

CITY ADDRESS: *SE Corner of Research Rd & Eubank Blvd*

ENGINEERING FIRM: *TIERRA WEST, LLC* CONTACT: *RONALD R. BOHANNAN*

ADDRESS: *4421 McCleod Rd. NE Suite D, 87109* PHONE: *(505) 883-7592*

OWNER: *Reed & Associates* CONTACT: *Mike Reed*

ADDRESS: _____ PHONE: _____

ARCHITECT: *Dekker-Perich & Associates* CONTACT: *Tim Grattan*

ADDRESS: *6801 Jefferson NE Suite 100* PHONE: *(505) 761-9700*

SURVEYOR: *Precision Surveys* CONTACT: *Larry Medrano*

ADDRESS: *2929 Coors Blvd NW Suite 309* PHONE: *(505)839-0569*

CONTRACTOR: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

TYPE OF SUBMITTAL:

X DRAINAGE REPORT

_____ DRAINAGE PLAN

_____ CONCEPTUAL GRADING & DRAINAGE PLAN

X GRADING PLAN

_____ EROSION CONTROL PLAN

_____ ENGINEER'S CERTIFICATION

_____ OTHER

PRE-DESIGN MEETING:

_____ YES

X NO

_____ COPY PROVIDED

CHECK TYPE OF APPROVAL SOUGHT:

_____ SKETCH PLAN APPROVAL

_____ PRELIMINARY PLAT APPROVAL

_____ S. DEV. PLAN FOR SUB'D. APPROVAL

X S. DEV. PLAN FOR BLDG. PERMIT APPROVAL

_____ SECTOR PLAN APPROVAL

_____ FINAL PLAT APPROVAL

_____ FOUNDATION PERMIT APPROVAL

X BUILDING PERMIT APPROVAL

_____ CERTIFICATE OF OCCUPANCY APPROVAL

X GRADING PERMIT APPROVAL

_____ PAVING PERMIT APPROVAL

_____ S. A. D. DRAINAGE REPORT

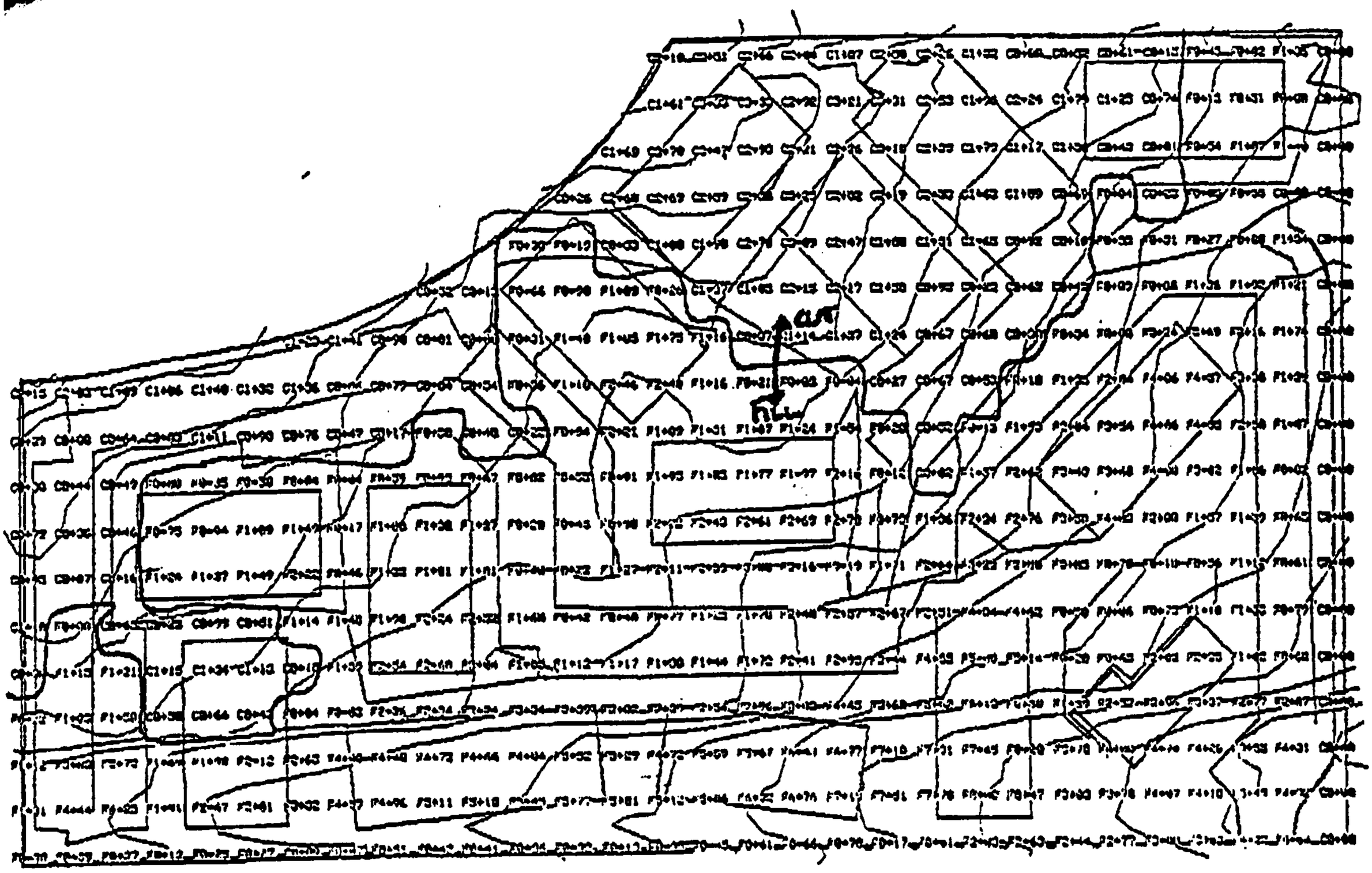
_____ DRAINAGE REQUIREMENTS

_____ *OTHER*

RECEIVED
MAY 1 8 1998
HYDROLOGY SECTION

DATE SUBMITTED: 5/14/98

BY: *Ronald R. Bohannan*



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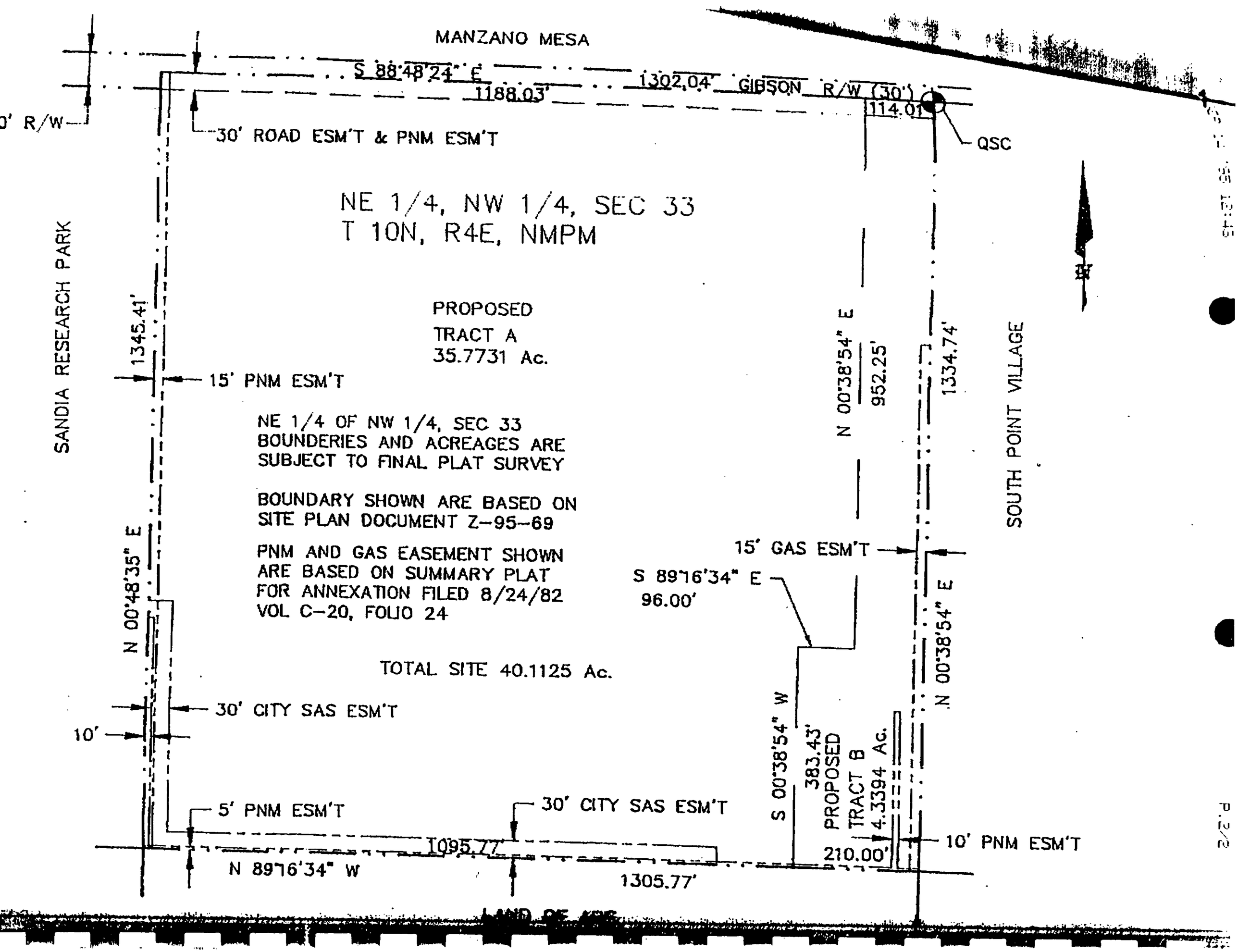
336.4,-85.9) C=(418.6,-85.9)

Name:Ladera Apts


MANZANO MESA
S 88°48'24" E
1188.03'
1302.04'
GIBSON R/W (30')
114.01'
QSC
0' R/W
30' ROAD ESM'T & PNM ESM'T
NE 1/4, NW 1/4, SEC 33
T 10N, R4E, NMPM
SANDIA RESEARCH PARK
1345.41'
15' PNM ESM'T
PROPOSED
TRACT A
35.7731 Ac.
NE 1/4 OF NW 1/4, SEC 33
BOUNDERIES AND ACREAGES ARE
SUBJECT TO FINAL PLAT SURVEY
BOUNDARY SHOWN ARE BASED ON
SITE PLAN DOCUMENT Z-95-69
PNM AND GAS EASEMENT SHOWN
ARE BASED ON SUMMARY PLAT
FOR ANNEXATION FILED 8/24/82
VOL C-20, FOLIO 24
TOTAL SITE 40.1125 Ac.
N 00°38'54" E
952.25'
1334.74'
SOUTH POINT VILLAGE
15' GAS ESM'T
S 89°16'34" E
96.00'
N 00°48'35" E
N 00°38'54" E
30' CITY SAS ESM'T
10'
S 00°38'54" W
383.43'
PROPOSED
TRACT B
4.3394 Ac.
5' PNM ESM'T
30' CITY SAS ESM'T
1095.77'
N 89°16'34" W
1305.77'
210.00'
10' PNM ESM'T

DRAINAGE INFORMATION SHEET

PROJECT TITLE: SHAW MHP ZONE ATLAS/DRNG. FILE #: M21-D6

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

LEGAL DESCRIPTION: RECO CORP

CITY ADDRESS: 11100 GIBSON SE

ENGINEERING FIRM: BRASHER ENGR CONTACT: D. LORENZ

ADDRESS: 11930 MENAUL NE PHONE: 296 0422

OWNER: G. MITCHELL CONTACT: SAME

ADDRESS: 11100 GIBSON SE PHONE: _____

ARCHITECT: NA CONTACT: _____

ADDRESS: _____ PHONE: _____

SURVEYOR: NA CONTACT: _____

ADDRESS: _____ PHONE: _____

CONTRACTOR: NA CONTACT: _____

ADDRESS: _____ PHONE: _____

TYPE OF SUBMITTAL:

____ DRAINAGE REPORT

____ DRAINAGE PLAN

____ CONCEPTUAL GRADING & DRAINAGE PLAN

____ GRADING PLAN

____ EROSION CONTROL PLAN

____ ENGINEER'S CERTIFICATION

X OTHER TOPIC FOR DISCUSSION

PRE-DESIGN MEETING:

X 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

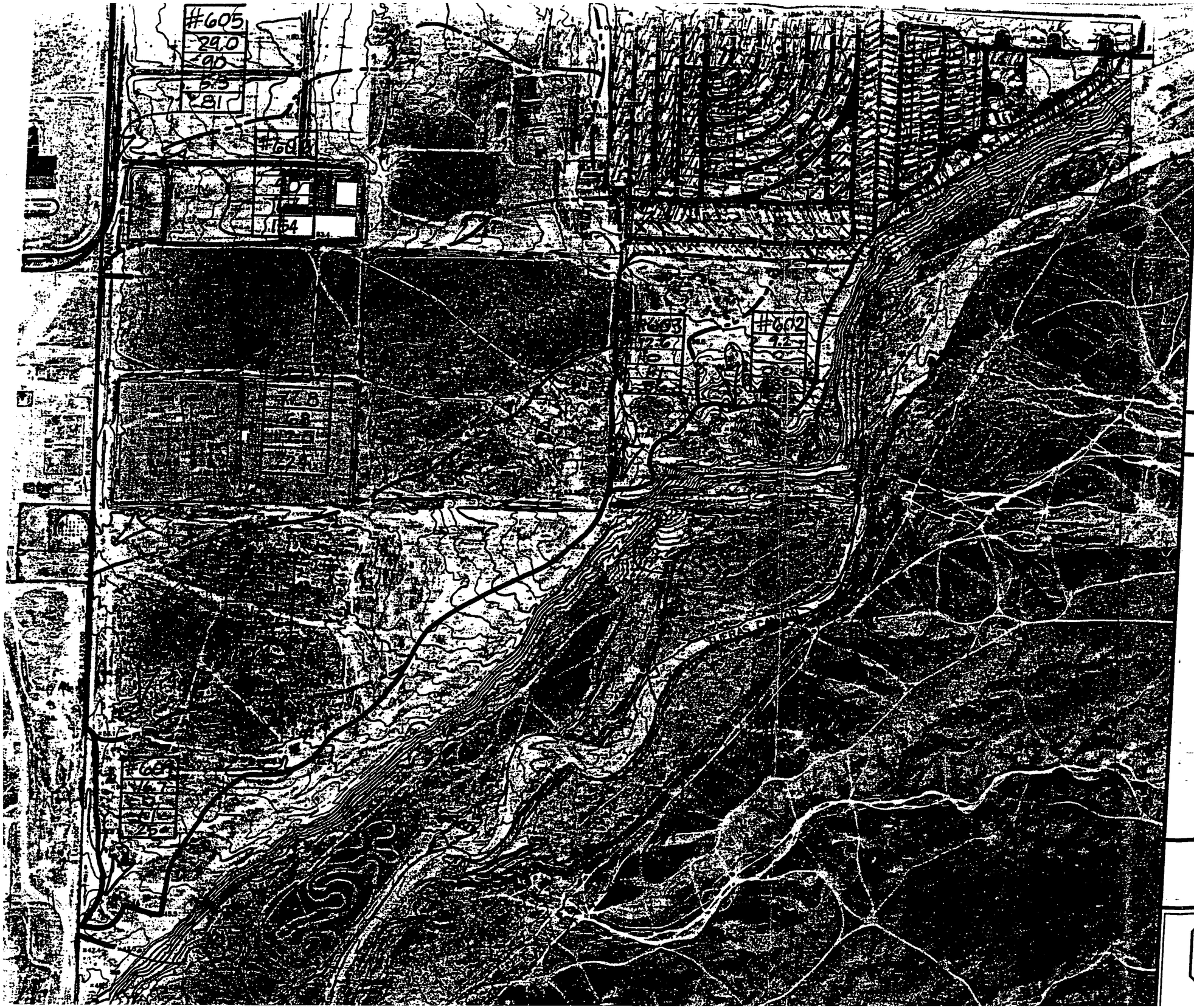
____ S.A.D. DRAINAGE REPORT

____ DRAINAGE REQUIREMENTS

X OTHER SET UP (SPECIFY)
MEETING WITH HYDROLOGY STAFF. NO APPROVAL OR ACTION REQUESTED.

DATE SUBMITTED: 1-24-92

BY: D. LORENZ



NOTES

LEGEND

34 — ANALYSIS POINT NUMBER WITH LOCATION BAR

STUDY BOUNDARY

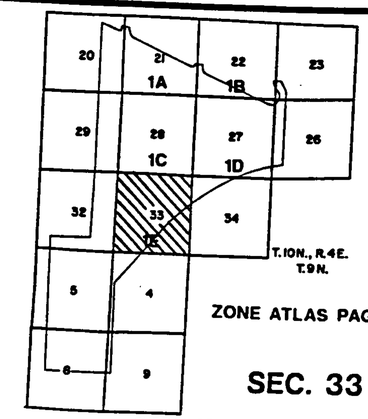
BASIN BOUNDARY

SUB-BASIN BOUNDARY

SUB-BASIN NUMBER
AREA (ACRES)
% IMPERVIOUS
100-YEAR RUNOFF VOLUME (AC-FT)
100-YEAR PEAK RUNOFF FLOW (CFS)

SUB-BASIN DATA

DRAINAGE BASIN MAP



SHEET INDEX

ZONE ATLAS PAGE M-21

SEC. 33

N

1"=50

2' CONT
INTERVAL

THE AERIAL PHOTOGRAPH ON THIS SHEET HAS BEEN RECTIFIED TO SELECTED PLANIMETRIC DETAIL OBTAINED DURING MAP COMPILATION. CONSEQUENTLY, THE PHOTO IMAGES FALLING OUTSIDE OF THE MAPPING AREA ARE UNCONTROLLED.

500 250 0 500 1000

DATE OF PHOTOGRAPHY: MARCH 2, 1994

SOUTH EUBANK AREA STORM DRAINAGE ANALYSIS

PROJ. # 4790

89-01-08

Smith Engineering Company

A Full Service Engineering Company

6400 Uptown Boulevard

VOLUMES REPORT
JOB NAME : 263.EAS Ladera Apts
PRINTED : 05/31/1995 02:19:35 PM

(NO STRIPPING REGIONS SPECIFIED)

REGION	LAYER	MATERIAL	SECT	AREA, SF TOTAL	AREA, SF CUT	AREA, SF FILL	VOLUMES, CY (AFTER STRIPPING) CUT	VOLUMES, CY (AFTER STRIPPING) FILL
Total Site	NAT'L GROUND	SUITABLE	var	267878	80527	187351	4002	16546
JOB TOTAL	NAT'L GROUND	SUITABLE		267878	80527	187351	4002	16546

SITE AREA: 274954
UNSPECIFIED: 7076

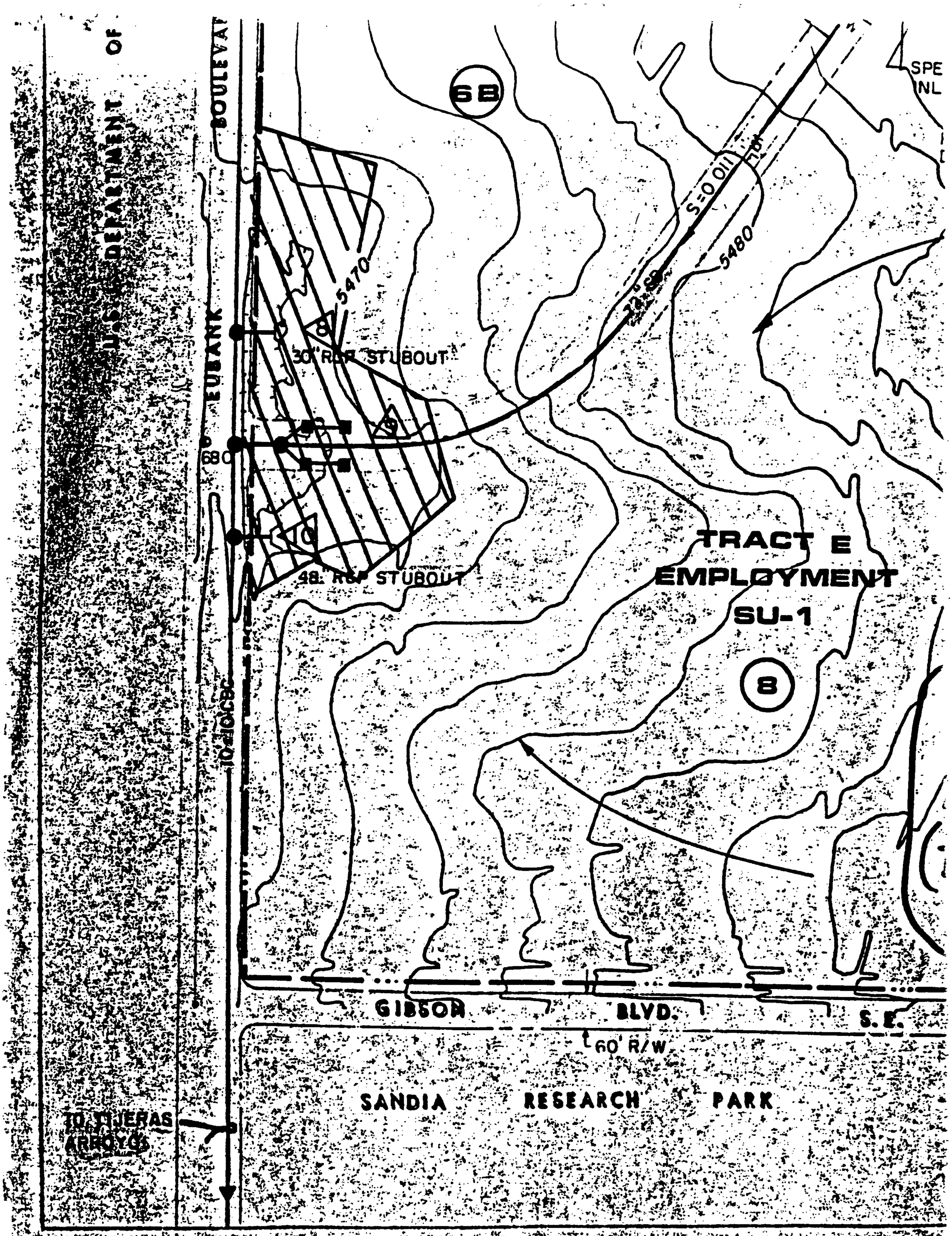
These volumes were calculated using the AVERAGE END AREA method.
839 cross sections were computed at an average separation of 0.52 feet.

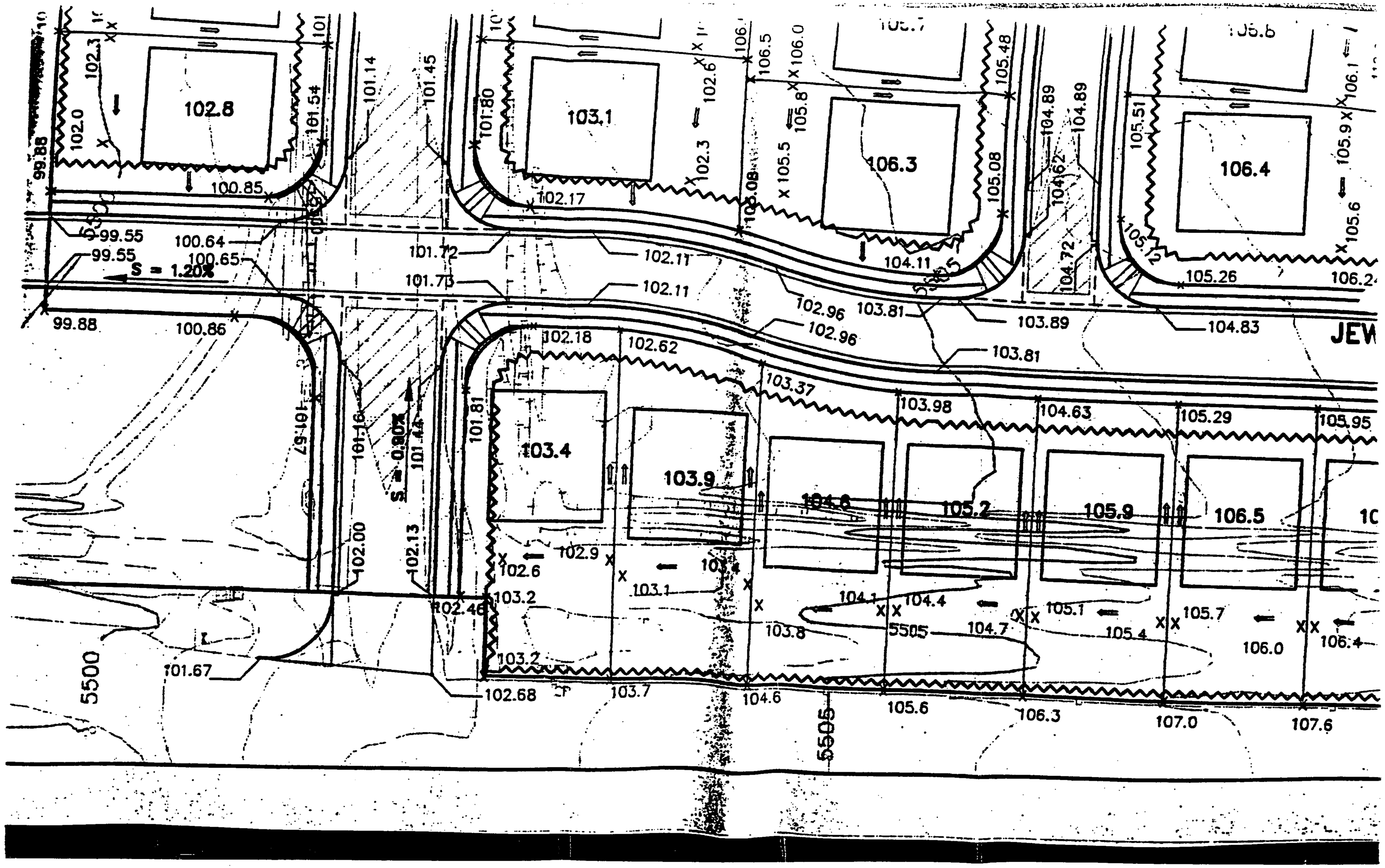
PADS

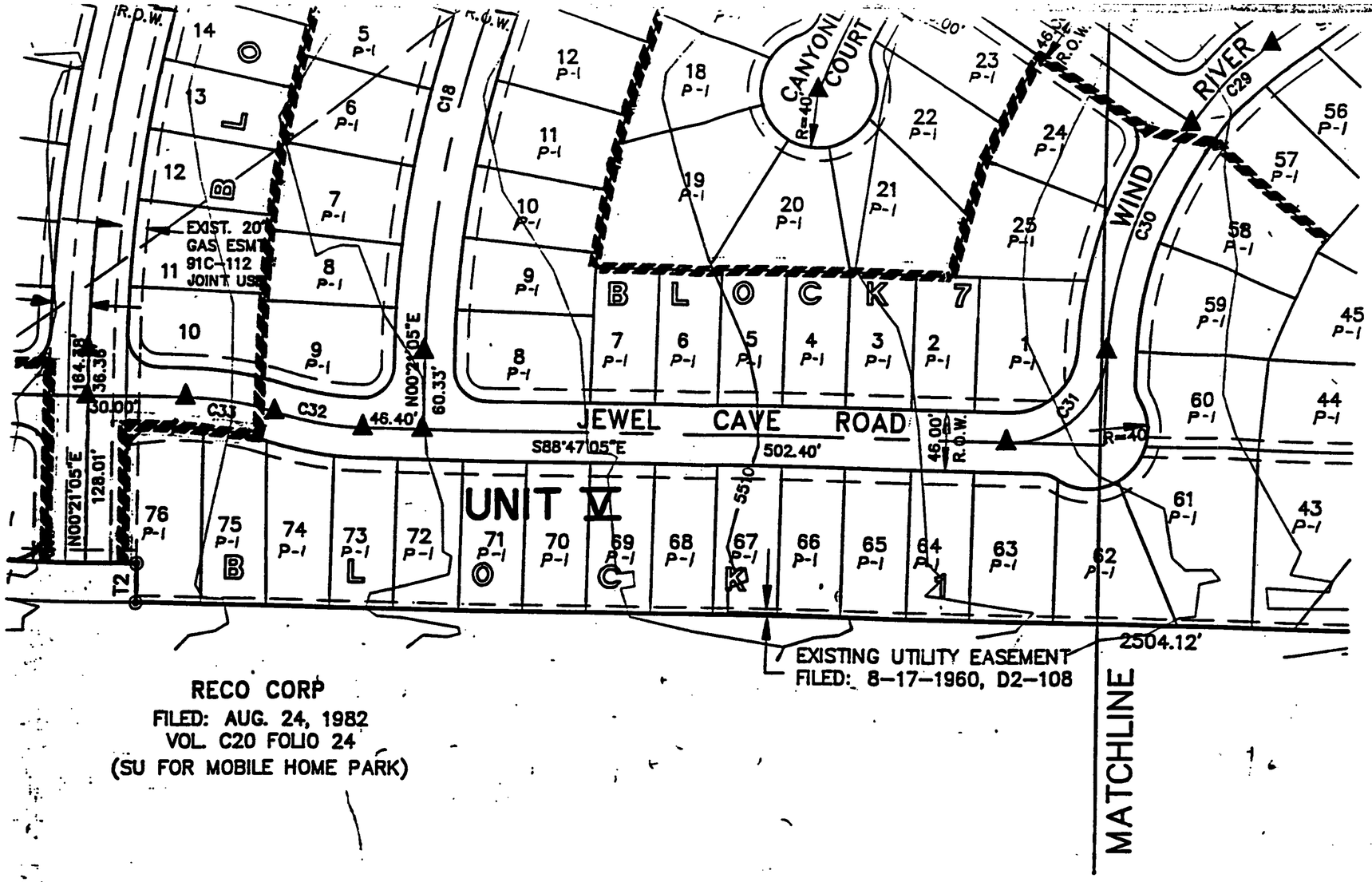
EXISTING	PROPOSED	DIFFERENCE
5304	5314.97	−10.97
5305	5324.16	−19.16
5307	5328.88	−21.88
5319	5330.78	−11.78
5330	5330.51	−0.51
5330	5329	1
5325	5329.35	−4.35
5324	5330.56	−6.56
5320	5329.44	−9.44
5315	5319.1	−4.1
5323	5329.45	−6.45
5326	5329.45	−3.45
5327	5327	0
5330	5325.8	4.2
5323	5322.88	0.12
5330	5327.58	2.42
5328	5327.58	0.42
5322	5325	−3
5323.25	5324.75	−1.5
5324	5322.06	1.94
5325	5320.08	4.92
5322.5	5318.84	3.66
5325	5321.81	3.19
5324	5320.9	3.1
5320	5317.94	2.06
5320	5317.95	2.05
5317	5318.18	−1.18
5316.5	5317.41	−0.91
5315	5318.07	−3.07
5315	5317.16	−2.16
5314	5319.74	−5.74
5315	5320.62	−5.62
5315	5315.59	−0.59
5313	5317.62	−4.62
5312	5319.19	−7.19
5311	5320.04	−9.04
5312	5321.4	−9.4
5312	5321.56	−9.56
5315	5321.18	−6.18
		−3.57

STREETS

EXISTING	PROPOSED	DIFFERENCE
5311.5	5318.9	−7.4
5313	5317.62	−4.62
5315	5319.62	−4.62
5315	5320.21	−5.21
5315	5321.03	−6.03
5316	5320.34	−4.34
5316	5317.56	−1.56
5315	5315.4	−0.4
5310	5311	−1
5310.5	5312	−1.5
5312	5313	−1
5314	5314	0
5314.25	5314.38	−0.13
5317	5313.2	3.8
5321	5315.14	5.86
5322	5319.24	2.76
5328	5327.36	0.64
5329	5327.2	1.8
5330	5330	0
5329	5325.46	3.54
5329	5328.63	0.37
5329	5328.7	0.3
5323	5324.2	−1.2
5310	5310	0
5325	5328.14	−3.14
5320	5329.71	−9.71
5312	5319.96	−7.96
		−1.51


U.S. DEPARTMENT OF
EUBANK BOULEVAR
68
5470
5480
30" RGP STUBOUT
48" RGP STUBOUT
S=0.011
TRACT E
EMPLOYMENT
SU-1
8
GIBSON BLVD. S.E.
60' R/W
SANDIA RESEARCH PARK
TO TIJERAS ARROYO

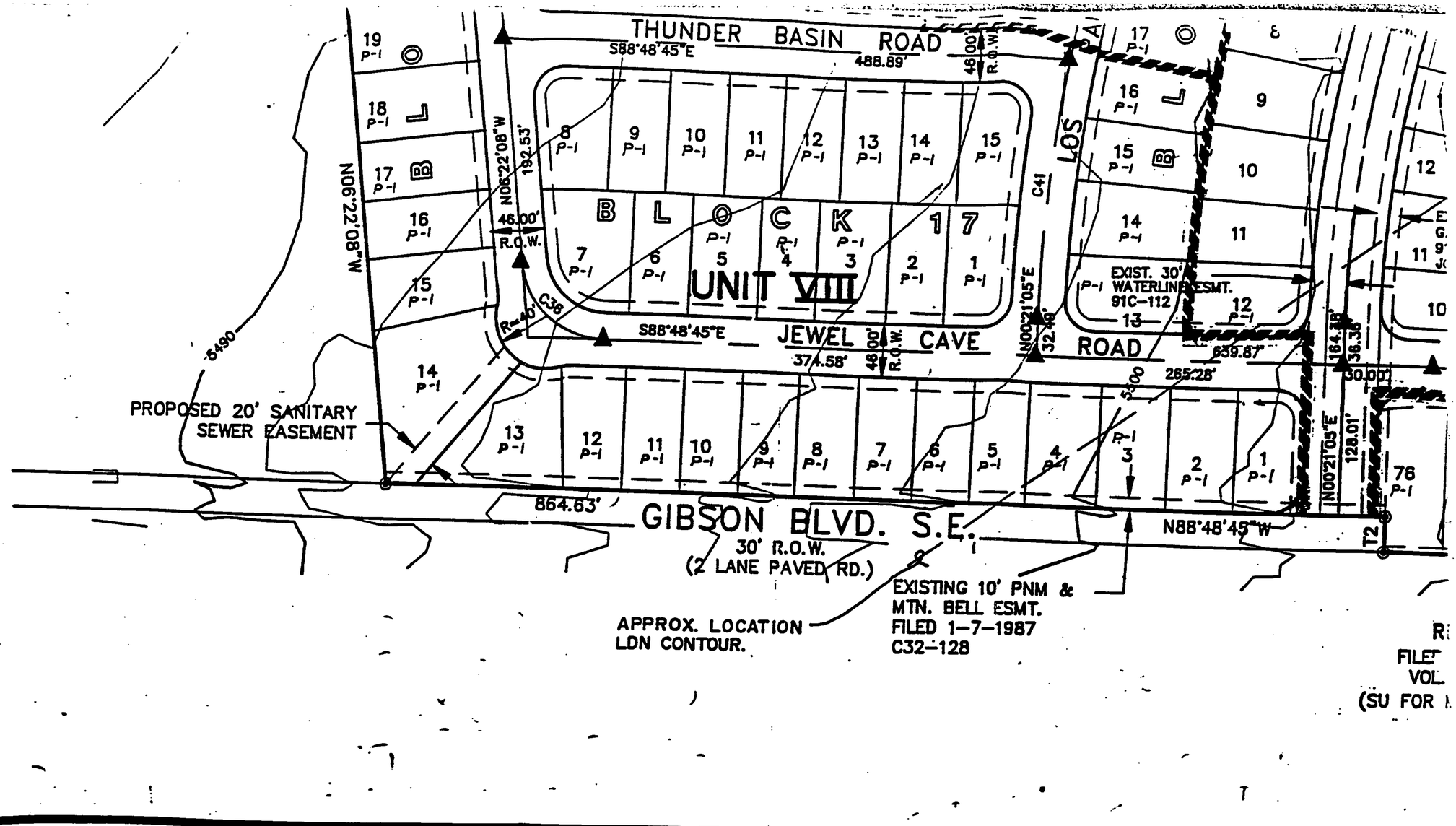

102.8
103.1
106.3
106.4
S = 1.20%
S = 0.80%
103.4
103.9
104.6
105.2
105.9
106.5
5500
5505
JEW

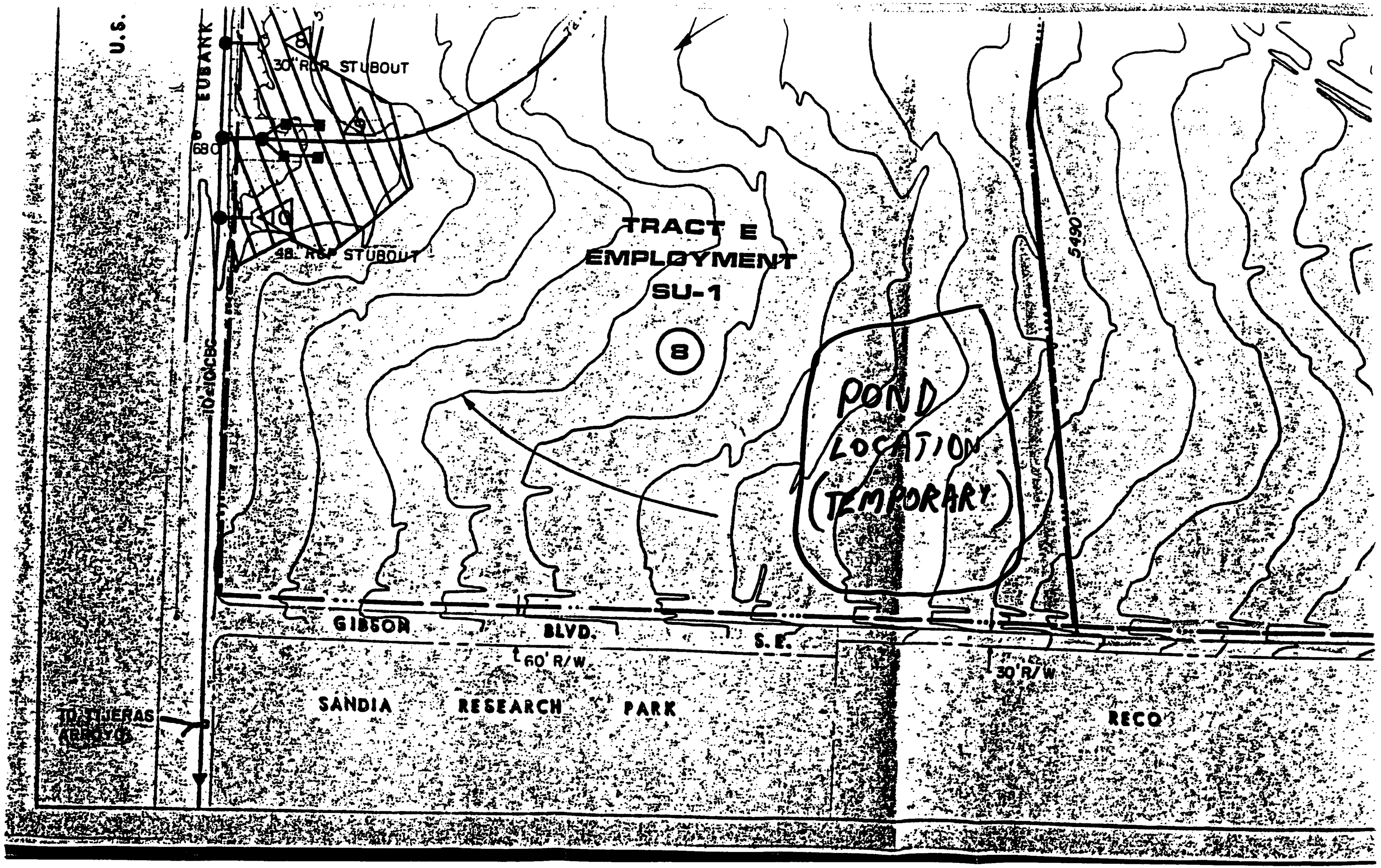


RECO CORP
FILED: AUG. 24, 1982
VOL. C20 FOLIO 24
(SU FOR MOBILE HOME PARK)

APPROVED FOR

CITY SURVEYOR


THUNDER BASIN ROAD
S88°48'45"E
488.89'
46.00' R.O.W.
BLOCK 17
UNIT VIII
JEWEL CAVE ROAD
S88°48'45"E
374.58'
46.00' R.O.W.
N00°22'08"W
192.53'
46.00' R.O.W.
R=40'
C38
C41
N00°21'05"E
32.49'
639.87'
265.28'
R=80
184.38'
36.36'
30.00'
N00°21'05"E
128.01'
EXIST. 30' WATERLINE ESMT. 91C-112
PROPOSED 20' SANITARY SEWER EASEMENT
5490
LOS ALBOROS
GIBSON BLVD. S.E.
30' R.O.W.
(2 LANE PAVED RD.)
864.63'
N88°48'45"W
EXISTING 10' PNM & MTN. BELL ESMT. FILED 1-7-1987 C32-128
APPROX. LOCATION LDN CONTOUR.


U.S.
EUBANK
30" RGP STUBOUT
680
48" RGP STUBOUT
10'-10' CBC
TRACT E
EMPLOYMENT
SU-1
8
POND
LOCATION
(TEMPORARY)
5490
GIBSON
BLVD.
S.E.
60' R/W
30' R/W
SANDIA
RESEARCH
PARK
RECO
TO TIJERAS
ARROYO

Tierra West, LLC

March 11, 1998

Mr. Bernie J. Montoya, CE
City of Albuquerque
Hydrology Department
P O Box 1293
Albuquerque, NM 87103

Re: Drainage Plan for Emcore Building (M21-D005E) Dated 3/6/98

Dear Mr. Montoya:

Enclosed is a copy of the revised plan for the above referenced project addressing your comments of March 11, 1998. We have changed the date on the plans to March 6, 1998, to match the submittal date.

If there are any additional questions on the plan or any other aspect of the project, please do not hesitate to contact me. Thank you for your time and cooperation in this matter.

Sincerely,

Ronald R. Bohannan, P.E.

Enclosure

cc: Tim Grattan

JN: 980005
RRB/to

9805bm3598

RECEIVED
MAR - 6 1998
HYDROLOGY SECTION

4421 McLeod Rd. NE, Suite D • Albuquerque, NM 87109 • (505) 883-7592
fax (505) 883-7034 • e-mail: twdms@aol

DRAINAGE INFORMATION SHEET

005E

PROJECT TITLE: *Emcore Building* ZONE ATLAS/DRNG. FILE #: *M-21*

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

LEGAL DESCRIPTION: *Lot 2, Block 4, Sandia Research Park*

CITY ADDRESS: *SE Corner of Research Rd & Eubank Blvd.*

ENGINEERING FIRM: *TIERRA WEST LLC* CONTACT: *RONALD R. BOHANNAN OR SHAHAB BIAZAR*

ADDRESS: *4421 McLEOD RD., NE SUITE D, ABQ, 87109* PHONE: *(505) 883-7592*

OWNER: *Don Morgan* CONTACT: *Don Morgan*

ADDRESS: _____ PHONE: _____

ARCHITECT: *Dekker-Perich & Associates* CONTACT: *Tim Grattan*

ADDRESS: *6801 Jefferson NE Suite 100* PHONE: *505 761-9700*

SURVEYOR: *Precision Surveys* CONTACT: *Larry Medrano*

ADDRESS: *2929 Coors Blvd NW Suite 309* PHONE: *505 883-0569*

CONTRACTOR: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

TYPE OF SUBMITTAL:

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

PRE-DESIGN MEETING:

_____ YES
X NO
_____ COPY PROVIDED

CHECK TYPE OF APPROVAL SOUGHT:

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

RECEIVED
FEB 12 1998
HYDROLOGY SECTION

DATE SUBMITTED: *1/30/98*

BY: *Ronald R. Bohannan*

980002

DRAINAGE INFORMATION SHEET

PROJECT TITLE: *Emcore Building* ZONE ATLAS/DRNG. FILE #: *M-21* D5E

DRB #: - EPC #: WORK ORDER #:

LEGAL DESCRIPTION: *Lot 2, Block 4, Sandia Research Park*

CITY ADDRESS: *SE Corner of Research Rd & Eubank Blvd.*

ENGINEERING FIRM: *TIERRA WEST LLC* CONTACT: *RONALD R. BOHANNAN OR SHAHAB BIAZAR*

ADDRESS: *4421 McLEOD RD., NE SUITE D, ABQ, 87109* PHONE: *(505) 883-7592*

OWNER: *Don Morgan* CONTACT: *Don Morgan*

ADDRESS: PHONE:

ARCHITECT: *Dekker-Perich & Associates* CONTACT: *Tim Grattan*

ADDRESS: *6801 Jefferson NE Suite 100* PHONE: *505 761-9700*

SURVEYOR: *Precision Surveys* CONTACT: *Larry Medrano*

ADDRESS: *2929 Coors Blvd NW Suite 309* PHONE: *505 883-0569*

CONTRACTOR: CONTACT:

ADDRESS: PHONE:

TYPE OF SUBMITTAL:

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

PRE-DESIGN MEETING:

YES
X NO
COPY PROVIDED

RECEIVED
MAR - 6 1998
HYDROLOGY SECTION

CHECK TYPE OF APPROVAL SOUGHT:

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

DATE SUBMITTED: *1/30/98*

BY: *Ronald R. Bohannan*

DRAINAGE INFORMATION SHEET

PROJECT TITLE: *COMMUNICATIONS CENTER* ZONE ATLAS/DRNG. FILE #: *L-8 / D11A1*

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

LEGAL DESCRIPTION: *LOTS 2 THRU 5, BLOCK 6 LANDS OF THE ATRISCO GRANT*

CITY ADDRESS: *NORTH OF EUCARIZ BETWEEN 114TH AND 118TH STREETS*

ENGINEERING FIRM: *TIERRA WEST DEV. MAGT. SER.* CONTACT: *RONALD R. BOHANNAN*

ADDRESS: *4421 McCleod Rd. NE Suite D, 87109* PHONE: *(505) 883-7592*

OWNER: *CITY OF ALBUQUERQUE* CONTACT: _____

ADDRESS: _____ PHONE: _____

ARCHITECT: *VAN GILBERT ARCHITECTS* CONTACT: *JIM GRAFF*

ADDRESS: *319 CENTRAL AVE, NW* PHONE: *(505) 247 - 9955*

SURVEYOR: *Precision Surveys* CONTACT: *Larry Medrano*

ADDRESS: *2929 Coors Blvd, NW Suite 105* PHONE: *(505) 839 - 0569*

CONTRACTOR: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

TYPE OF SUBMITTAL:

- X DRAINAGE REPORT
- ___ DRAINAGE PLAN
- ___ CONCEPTUAL GRADING & DRAINAGE PLAN
- X GRADING PLAN
- ___ EROSION CONTROL PLAN
- ___ ENGINEER'S CERTIFICATION
- ___ OTHER

PRE-DESIGN MEETING:

- ___ YES
- X NO
- ___ COPY PROVIDED

CHECK TYPE OF APPROVAL SOUGHT:

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

DATE SUBMITTED: *07/08/97*

BY: *SARA McCOLLAM*

RECEIVED
JUL 08 1997
HYDROLOGY SECTION

DRAINAGE REPORT

for

Communication Center

Prepared by

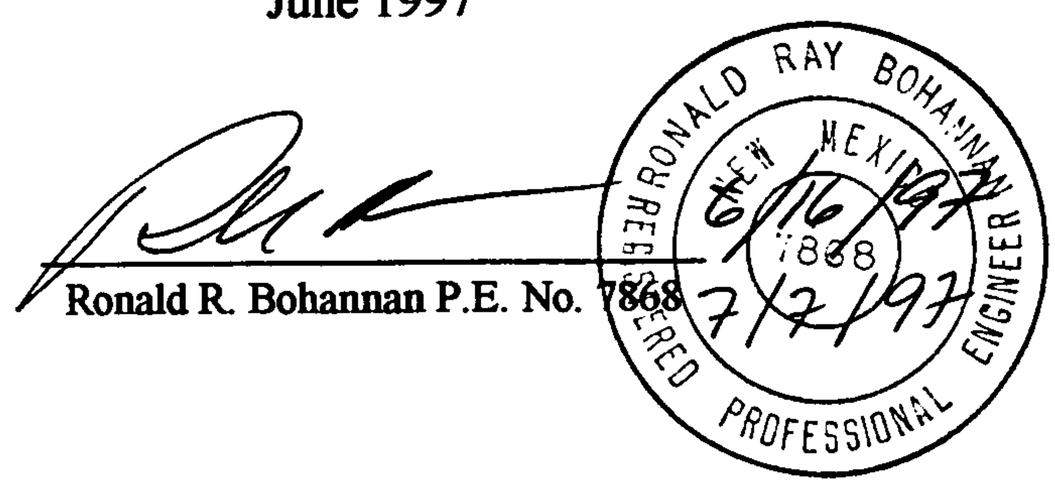
Tierra West Development Management Services
4421 McLeod Road NE, Suite D
Albuquerque, New Mexico 87109

Prepared for

Van Gilbert Architects
319 Central Ave, NW
Albuquerque, New Mexico 87102

R D
JUL 08 1997
HYDROLOGY SECTION

June 1997



Ronald R. Bohannan P.E. No. 7868

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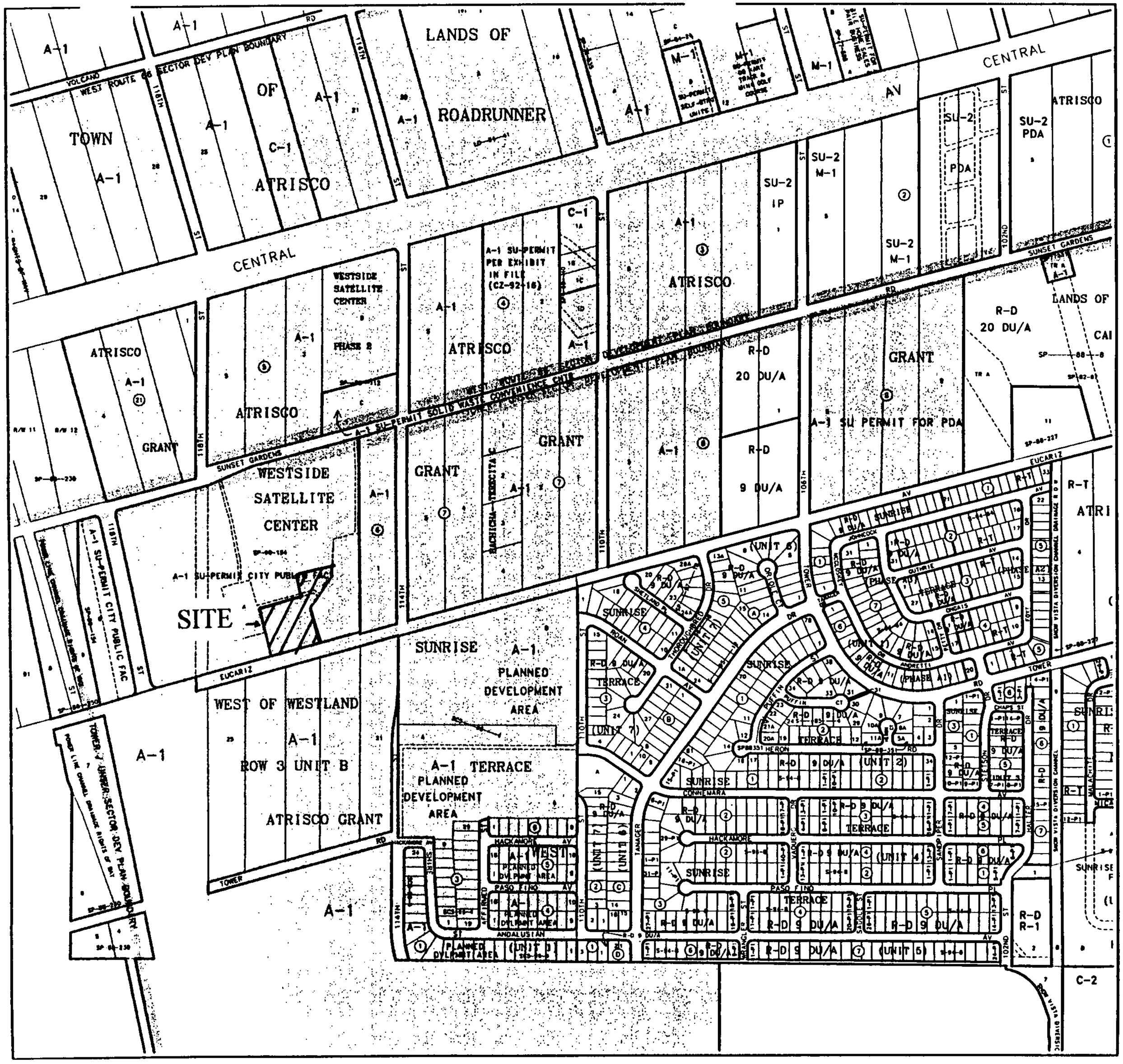

GRAPHIC SCALE IN FEET

250 0 500 1000

CITY OF
Albuquerque

Albuquerque Geographic Information System

PLANNING DEPARTMENT

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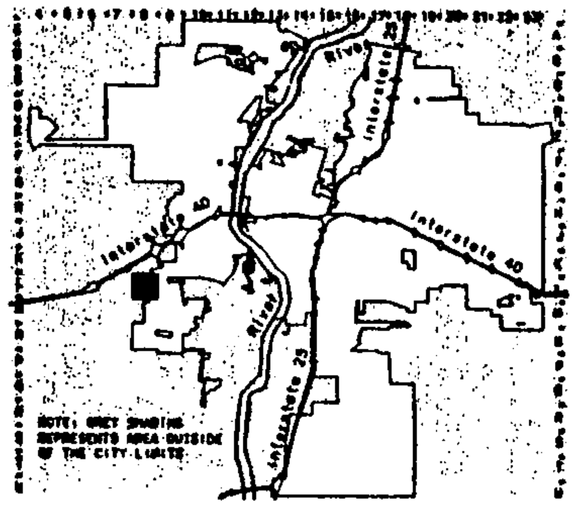
Map Amended through February 21, 1997



LEGAL DESCRIPTION

T10N

R2E

SEC 20

UNIFORM PROPERTY CODE

1-006-056

L-8-Z

Location

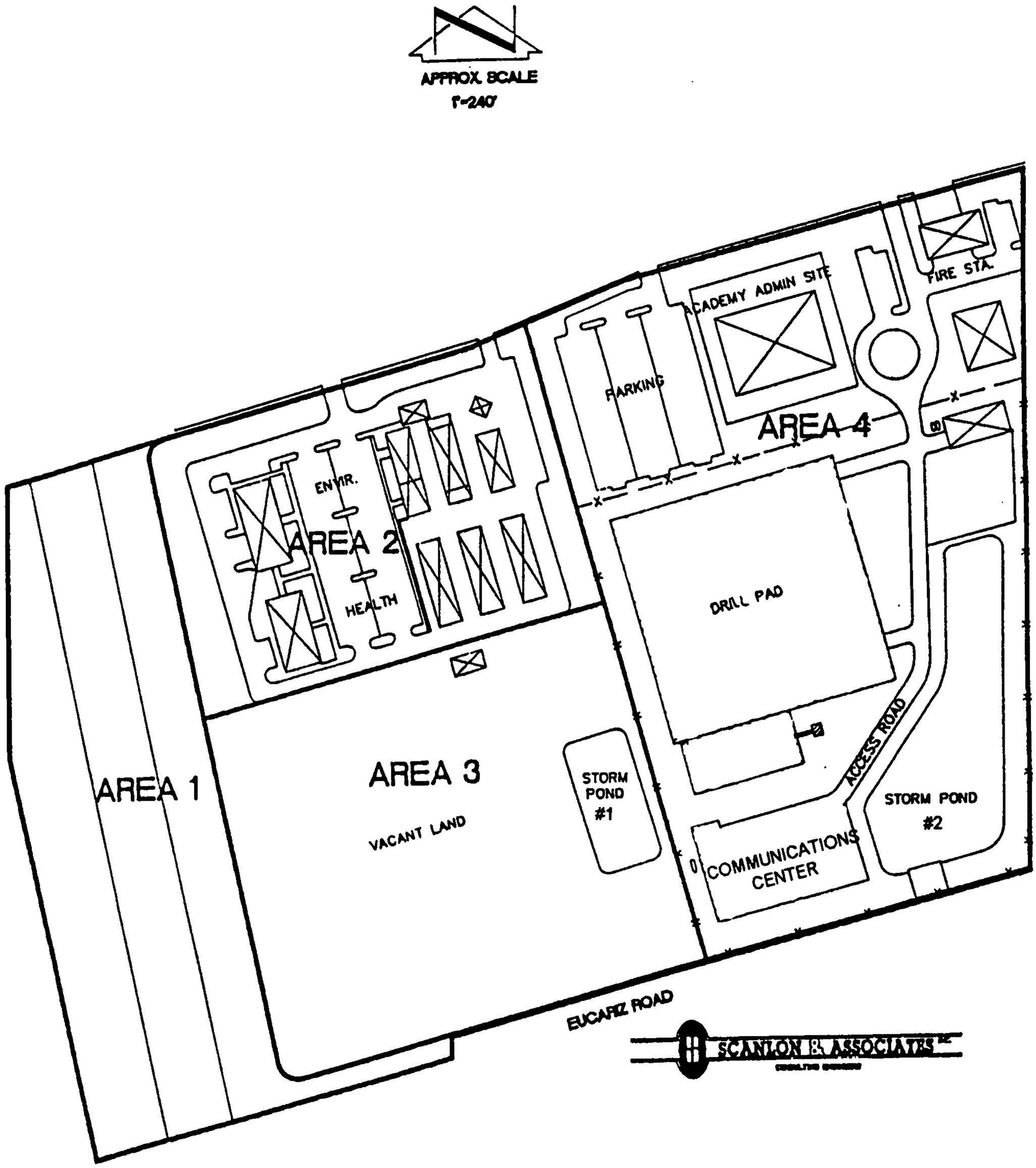
The site is located south of Sunset Gardens Road between 118th Street and 114th Street. The site is shown on the attached Zone Atlas Map L-8 and contains approximately 1.79 acres. The site is a portion of a larger City facility located on this tract. The City is proposing to build a 16,000 SF Communications Center located on the south side of the firefighter's drill pad. The purpose of this report is to provide the drainage analysis and management plan for the continued development of the City Yard.

Existing Drainage Conditions

The site is part of an approved master plan prepared by Scanlon & Associates (L8-D11). The master plan divides the site into four areas as shown on the attached exhibit. Area 1 is undeveloped and drains south with no restrictions. Areas 2 and 3 will drain to Storm Pond 1. Area 4, which includes the Communications Center, will drain to Storm Pond 2. Storm Pond 1 overflows into Storm Pond 2 through an existing 18" RCP pipe. Storm Pond 2 is a retention pond and does not discharge any runoff.

The master plan calls for the area where the Communications Center is located, to drain to a retention pond (Storm Pond 2) located directly east of our site. We will continue to follow the master plan with this site. Currently, the site drains east towards the retention pond with an undeveloped runoff flow of 3.69 cfs.

There are no offsite flows entering the site. The existing drainage ponds on the east and west of the site contain the flows from those directions. Flows from the south are captured by an existing swale and routed east to the retention pond. Flows to the north are intercepted by a firefighter training pond. Flows north of the site, in the entrance road, are conveyed via an



ONSITE DRAINAGE AREAS

existing valley gutter to the retention pond.

FEMA Map and Soil Conditions

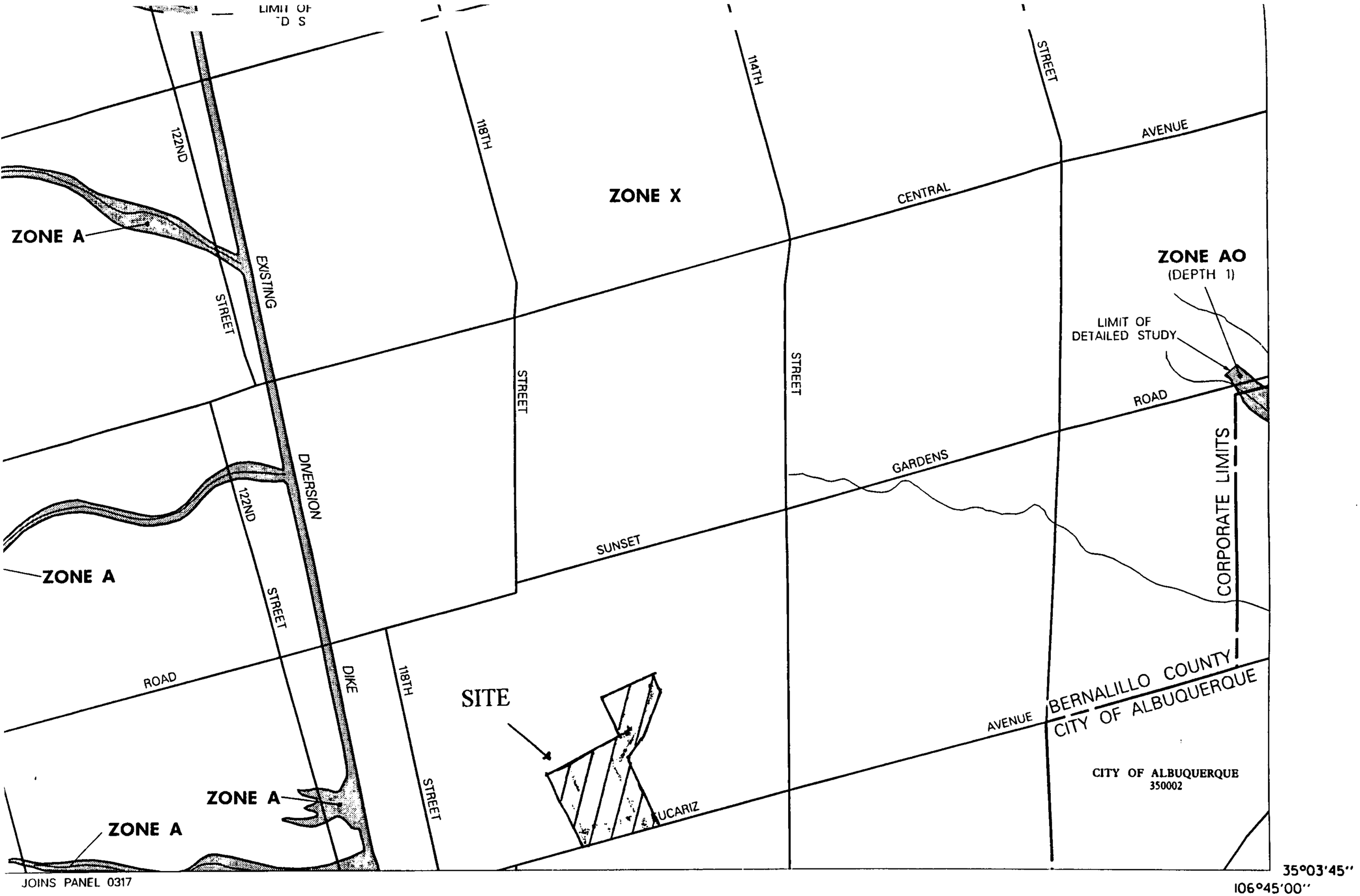
The site is located on FEMA Map section 35001C0306 D as shown on the attached excerpt. The map shows that the site does not lie within any 100-year flood plains.

The site contains two different soil types from the Soil Conservation Service Soil Survey of Bernalillo County. One of the soils is a Madurez loamy fine sand. It has slow runoff and the hazard of soil blowing is severe. This soil also has moderate permeability. The second soil is a Bluepoint-Kokan association. These soils have slow runoff and the hazard of water erosion is moderate or severe. The Bluepoint-Kokan association has rapid permeability.

On-Site Drainage Management Plan

There are three proposed basins in Area 4, where the Communications Center is located. Basins 1 and 2 are on the Communications Center site. Basin 3 is north of the Communications Center and includes the balance of Area 4. The runoff from Basin 3 drains to a existing concrete channel and is routed into the retention pond. Runoff from Basin 3 does not impact the Communications Center.

Basin 1 has a runoff flow of 5.34 cfs and will drain to a single 'D' drop inlet. The flow will be carried from the proposed drop inlet to an existing catch basin in a 12" RCP pipe. The flow from Basin 1 will be limited to 5.08 cfs by a 10-3/4" orifice plate. Basin 2 has a developed runoff flow of 2.15 cfs and will also drain to a single 'D' drop inlet. This drop inlet will also drain to the existing catch basin via a 12" RCP pipe. The total developed flow entering the retention pond will be limited to 7.23 cfs which is less than the 7.35 cfs allowable. The existing catch basin

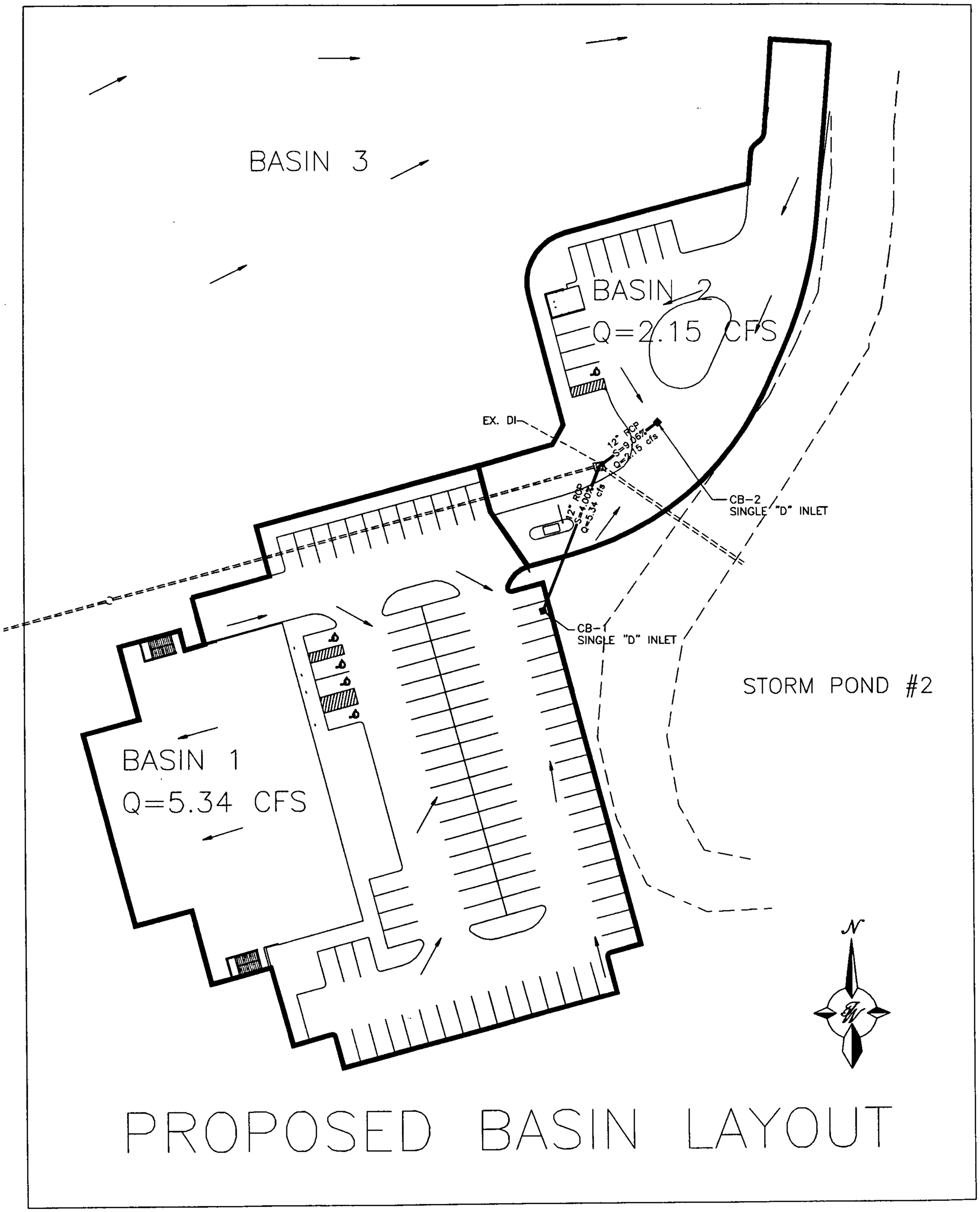


FEMA MAP 35001C0309 D

drains to the existing retention pond by an existing 24" RCP pipe. The existing 24" RCP pipe has capacity for 46.49 cfs. Currently only 29.91 cfs is being conveyed through the pipe. The developed conditions will increase the flow in the pipe to 37.14 cfs, which the pipe has capacity for.

Summary

The site follows the approved master plan for the area. There are two developed basins on the Communications Center site. These basins will drain to two proposed drop inlets located within each basin. The drop inlets will drain via two 12" RCP pipes to an existing catch basin. The total developed flow entering the retention pond will be limited to 7.23 cfs, which is less than the 7.35 cfs allowable. The developed runoff will then be conveyed by a 24" RCP pipe to the existing retention pond located to the east of the site. The existing 24" pipe has capacity for 46.49 cfs, but it will only be carrying 37.14 cfs with the developed flows.


BASIN 3
BASIN 2
Q=2.15 CFS
EX. DI
12" RCP
S=9.06%
Q=2.15 cfs
12" RCP
S=4.00%
Q=5.34 cfs
CB-2
SINGLE "D" INLET
CB-1
SINGLE "D" INLET
STORM POND #2
BASIN 1
Q=5.34 CFS
N
PROPOSED BASIN LAYOUT

Runoff Calculations

RUNOFF CALCULATIONS

The site is @ Zone 1

LAND TREATMENT

Proposed
B = 10%
D = 90 %

Existing
B = 100%

DEPTH (INCHES) @ 100-YEAR STORM

P_{60} = 1.87 inches

P_{360} = 2.20 inches

P_{1440} = 2.66 inches

DEPTH (INCHES) @ 10-YEAR STORM

P_{60} = 1.87 x 0.667
= 1.25 inches

P_{360} = 1.47

P_{1440} = 1.77

See the summary output from AHYMO calculations.

Also see the following summary tables.

Runoff
Summary Tables
for
Proposed and Existing
Drainage Basins

DRAINAGE BASINS

BASIN	AREA (SF)	AREA (AC)	AREA (MI^2)
1	55744.78	1.2797	0.002000
2	22348.07	0.5130	0.000802

RUNOFF CALCULATION RESULTS

Existing

BASIN	Q-100 CFS	Q-10 CFS	V-100 AC-FT	V-10 AC-FT
1	2.63	0.99	0.071	0.024
2	1.06	0.4	0.029	0.01

Proposed

SUB-BASIN	Q-100 CFS	Q-10 CFS	V-100 AC-FT	V-10 AC-FT
1	5.34	3.46	0.196	0.121
2	2.15	1.39	0.079	0.049

Storm Sewer

Pipe Capacity

Manning's Equation:
Q = 1.49/n * A * R^(2/3) * S^(1/2)

A = Area
R = D/4
S = Slope
n = 0.013

PROPOSED PIPE CAPACITIES

Pipe	D	Slope	Area	R	Q Provided	Q Required	Velocity
	(in)	(%)	(ft^2)		(cfs)	(cfs)	(ft/s)
Basin 1	12	4	0.79	0.25	7.14	5.34	6.80
Basin 2	12	6.23	0.79	0.25	8.92	2.15	2.74

EXISTING PIPE CAPACITIES

Pipe	D	Slope	Area	R	Q Provided	Q Required	Velocity
	(in)	(%)	(ft^2)		(cfs)	(cfs)	(ft/s)
1	18	4.6	1.77	0.375	22.59	--	0.00
2	12	4.2	0.79	0.25	7.32	--	0.00
3	24	4.2	3.14	0.5	46.49	--	0.00

The existing Pipe 3 drains from the existing drop inlet to the existing retention pond. This pipe has capacity for 46.49 cfs. The pipe is currently only carrying 29.91 cfs. The proposed conditions will add 7.49 cfs to the existing pipe. This is a total of 37.4 cfs. The existing 24" has capacity for the additional flow.

STORM DRAIN INLET

EFFECTIVE AREA ASSUMING A 50% CLOGGING FACTOR

SINGLE 'D':

Area at the grate:

L = 38.375" - 7 (1/2" $_{\text{middle bars}}$)
= 34.875"
= 2.906'

W = 25.5" - 13 (1/2 $_{\text{middle bars}}$)
= 19"
= 1.583'

Area = 1.583' x 2.906'
= 4.601 ft^2

Effective Area = 4.601 - 0.5 (4.601)
= 2.30 ft^2

Effective Area = 2.30 ft^2

DROP INLET #1
HEAD CAPACITY

Orifice Equation:

$$Q = CA\sqrt{2gH}$$

Q = Flow (cfs)
C = 0.60
A = Area of drop inlet (ft^2)
g = 32.2
H = Height of water above drop inlet (ft)

$$H = \frac{\left(\frac{Q}{C*A}\right)^2}{2g}$$

$$H = \frac{\left(\frac{5.34}{0.6*2.30}\right)^2}{2*32.2}$$

H = 0.23 feet

Allowable depth = 0.50 feet
Required depth = 0.23 feet

0.23 feet < 0.50 feet

DROP INLET #2
HEAD CAPACITY

Orifice Equation:

$$Q = CA\sqrt{2gH}$$

Q = Flow (cfs)
C = 0.60
A = Area of drop inlet (ft^2)
g = 32.2
H = Height of water above drop inlet (ft)

$$H = \frac{\left(\frac{Q}{C*A}\right)^2}{2g}$$

$$H = \frac{\left(\frac{2.15}{0.6*2.30}\right)^2}{2*32.2}$$

H = 0.038 feet

Allowable depth = 0.50 feet
Required depth = 0.038 feet

0.038 feet < 0.50 feet

Pond
Calculations

VOLUME CALCULATIONS

PARKING LOT POND

Ab - Bottom Of The Pond Surface Area
At - Top Of The Pond Surface Area
D - Water Depth
Dt - Total Pond Depth
C - Change In Surface Area / Water Depth

Volume = Ab * D + 0.5 * C * D^2

C = (At - Ab) / Dt

Ab =	6.80	(@ Elevation 5326.55)
At =	792.74	(@ Elevation 5327.05)
Dt =	0.50	
C =	1571.88	

ACTUAL ELEV.	DEPTH (FT)	VOLUME (AC-FT)	Q (CFS)
23.55	0	0	0.0000
26.55	3	0.000468	4.8483
26.65	3.1	0.0007	4.9423
26.75	3.2	0.0012	5.0347
26.85	3.3	0.0021	5.1253
26.95	3.4	0.0034	5.2144
27.05	3.5	0.0051	5.3020

<u>Orifice Equation</u>
Q = CA SQRT(2gH)

C =	0.6
Diameter (in	10.75
Area (ft^2)=	0.630296
g =	32.2
H (ft) =	Depth of water above center of orifice
Q (cfs)=	Flow

```
*****************************************************************
*                    COMMUNICATIONS CENTER                      *
*****************************************************************
*          100-YEAR, 6-HR STORM  (PONDING CALCULATIONS)         *
*****************************************************************
START                TIME=0.0
*
* ROUTE 1
*
* BASIN 1
*
RAINFALL             TYPE=1 RAIN QUARTER=0.0 IN
                     RAIN ONE=1.87 IN RAIN SIX=2.20 IN
                     RAIN DAY=2.66 IN DT=0.02253 HR
COMPUTE NM HYD       ID=1 HYD NO=101.1 AREA=0.002 SQ MI
                     PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                     TP=-0.1333 HR MASS RAINFALL=-1
* BASIN 1 PONDING
*
ROUTE RESERVOIR      ID=2 HYD NO=501.1 INFLOW ID=1 CODE=24
                     OUTFLOW(CFS)      STORAGE(AC-FT)  ELEVATION(FT)
                         0.0000            0.0000          23.55
                         4.8483            0.0005          26.55
                         4.9423            0.0007          26.65
                         5.0347            0.0012          26.75
                         5.1253            0.0021          26.85
                         5.2144            0.0034          26.95
                         5.3020            0.0051          27.05
*
*
FINISH
```

```
    AHYMO PROGRAM (AHYMO194) - AMAFCA Hydrologic Model - January, 1994
         RUN DATE (MON/DAY/YR) = 06/25/1997
         START TIME (HR:MIN:SEC) = 13:10:37     USER NO.= R_BOHANN.I01
         INPUT FILE = A:POND.DAT

*****************************************************************
*                    COMMUNICATIONS CENTER                      *
*****************************************************************
*          100-YEAR, 6-HR STORM  (PONDING CALCULATIONS)         *
*****************************************************************
START                TIME=0.0
*
* ROUTE 1
*
* BASIN 1
*
RAINFALL             TYPE=1 RAIN QUARTER=0.0 IN
                     RAIN ONE=1.87 IN RAIN SIX=2.20 IN
     RAIN DAY=2.66 IN DT=0.02253 HR

COMPUTED 6-HOUR RAINFALL DISTRIBUTION BASED ON NOAA ATLAS 2 - PEAK AT 1.40 HR.
DT =    .022530 HOURS       END TIME =     5.992981 HOURS
   .0000   .0011   .0022   .0033   .0045   .0056   .0068
   .0080   .0092   .0105   .0117   .0130   .0143   .0156
   .0169   .0183   .0197   .0211   .0225   .0240   .0255
   .0270   .0286   .0301   .0318   .0334   .0351   .0368
   .0386   .0404   .0423   .0442   .0461   .0481   .0502
   .0523   .0545   .0567   .0590   .0614   .0639   .0664
   .0691   .0718   .0747   .0779   .0814   .0852   .0890
   .0931   .1009   .1168   .1389   .1682   .2060   .2533
   .3113   .3814   .4648   .5627   .6765   .8073   .9567
  1.1258  1.2045  1.2601  1.3098  1.3554  1.3977  1.4374
  1.4748  1.5103  1.5441  1.5763  1.6070  1.6365  1.6648
  1.6919  1.7180  1.7432  1.7673  1.7906  1.8131  1.8348
  1.8557  1.8758  1.8953  1.9141  1.9322  1.9468  1.9509
  1.9548  1.9586  1.9623  1.9659  1.9693  1.9727  1.9759
  1.9791  1.9822  1.9852  1.9881  1.9910  1.9938  1.9965
  1.9992  2.0018  2.0043  2.0068  2.0093  2.0117  2.0141
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  2.0577  2.0594  2.0611  2.0627  2.0644  2.0660  2.0676
  2.0692  2.0708  2.0723  2.0738  2.0754  2.0769  2.0784
  2.0798  2.0813  2.0828  2.0842  2.0856  2.0870  2.0884
  2.0898  2.0912  2.0925  2.0939  2.0952  2.0965  2.0979
  2.0992  2.1005  2.1017  2.1030  2.1043  2.1055  2.1068
  2.1080  2.1092  2.1104  2.1117  2.1129  2.1140  2.1152
  2.1164  2.1176  2.1187  2.1199  2.1210  2.1221  2.1233
  2.1244  2.1255  2.1266  2.1277  2.1288  2.1299  2.1310
  2.1320  2.1331  2.1341  2.1352  2.1362  2.1373  2.1383
  2.1393  2.1404  2.1414  2.1424  2.1434  2.1444  2.1454
  2.1464  2.1473  2.1483  2.1493  2.1502  2.1512  2.1522
  2.1531  2.1541  2.1550  2.1559  2.1569  2.1578  2.1587
  2.1596  2.1605  2.1614  2.1623  2.1632  2.1641  2.1650
  2.1659  2.1668  2.1677  2.1685  2.1694  2.1703  2.1711
  2.1720  2.1728  2.1737  2.1745  2.1754  2.1762  2.1770
  2.1779  2.1787  2.1795  2.1803  2.1812  2.1820  2.1828
  2.1836  2.1844  2.1852  2.1860  2.1868  2.1876  2.1883
  2.1891  2.1899  2.1907  2.1915  2.1922  2.1930  2.1938
```

```
                2.1945  2.1953  2.1960  2.1968  2.1975  2.1983  2.1990
                2.1998

COMPUTE NM HYD       ID=1 HYD NO=101.1 AREA=0.002 SQ MI
                     PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                     TP=-0.1333 HR MASS RAINFALL=-1

   K =   .072649HR    TP =   .133300HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
   UNIT PEAK =   7.1065    CFS   UNIT VOLUME =    .9985       B =   526.28      P60 = 1.8700
   AREA =       .001800 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
   RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .022530


   K =   .130992HR    TP =   .133300HR    K/TP RATIO =   .982685     SHAPE CONSTANT, N =  3.593448
   UNIT PEAK =   .49075    CFS   UNIT VOLUME =    .9721       B =   327.09      P60 = 1.8700
   AREA =       .000200 SQ MI    IA =    .50000 INCHES    INF =   1.25000 INCHES PER HOUR
   RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .022530

* BASIN 1 PONDING
*
ROUTE RESERVOIR      ID=2 HYD NO=501.1 INFLOW ID=1 CODE=24
                     OUTFLOW(CFS)      STORAGE(AC-FT)  ELEVATION(FT)
                         0.0000            0.0000          23.55
                         4.8483            0.0005          26.55
                         4.9423            0.0007          26.65
                         5.0347            0.0012          26.75
                         5.1253            0.0021          26.85
                         5.2144            0.0034          26.95
                         5.3020            0.0051          27.05

  * * * * * * * * * * * * * * * * *

    TIME      INFLOW    ELEV      VOLUME    OUTFLOW
    (HRS)     (CFS)     (FEET)    (AC-FT)   (CFS)

     .00        .00     23.55      .000       .00
     .54        .00     23.55      .000       .00
    1.08        .00     23.55      .000       .00
    1.62       3.34     25.85      .000      3.72
    2.16        .62     23.94      .000       .63
    2.70        .10     23.61      .000       .10
    3.24        .04     23.58      .000       .04
    3.79        .03     23.57      .000       .03
    4.33        .03     23.57      .000       .03
    4.87        .03     23.57      .000       .03
    5.41        .03     23.57      .000       .03
    5.95        .04     23.57      .000       .04
    6.49        .00     23.55      .000       .00
 PEAK DISCHARGE =        5.075 CFS - PEAK OCCURS AT HOUR    1.53
 MAXIMUM WATER SURFACE ELEVATION =       26.795
 MAXIMUM STORAGE =         .0016 AC-FT      INCREMENTAL TIME=     .022530HRS

*
*
FINISH

    NORMAL PROGRAM FINISH          END TIME (HR:MIN:SEC) = 13:10:37
```

AHYMO
Runoff Input
and
Summary Output
for
Proposed and Existing
Drainage Basins

```
*****************************************************************
*                    COMMUNICATION CENTER                       *
*****************************************************************
*       100-YEAR, 6-HR STORM  (UNDER PROPOSED CONDITIONS)       *
*****************************************************************
*
START                TIME=0.0
*
* BASIN 1
*
RAINFALL             TYPE=1 RAIN QUARTER=0.0 IN
                     RAIN ONE=1.87 IN RAIN SIX=2.20 IN
                     RAIN DAY=2.66 IN DT=0.02253 HR
COMPUTE NM HYD       ID=1 HYD NO=100.1 AREA=0.002 SQ MI
                     PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                     TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD            ID=1 CODE=1
*
* BASIN 2
*
COMPUTE NM HYD       ID=1 HYD NO=100.2 AREA=0.000802 SQ MI
                     PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                     TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD            ID=1 CODE=1
*
*****************************************************************
*        10-YEAR, 6-HR STORM  (UNDER PROPOSED CONDITIONS)       *
*****************************************************************
*
START                TIME=0.0
*
* BASIN 1
*
RAINFALL             TYPE=1 RAIN QUARTER=0.0 IN
                     RAIN ONE=1.25 IN RAIN SIX=1.47 IN
                     RAIN DAY=1.77 IN DT=0.02253 HR
COMPUTE NM HYD       ID=1 HYD NO=110.1 AREA=0.002 SQ MI
                     PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                     TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD            ID=1 CODE=1
*
* BASIN 2
*
COMPUTE NM HYD       ID=1 HYD NO=110.2 AREA=0.000802 SQ MI
                     PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                     TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD            ID=1 CODE=1
*
*
FINISH
```

AHYMO SUMMARY TABLE (AHYMO194) - AMAFCA Hydrologic Model - January, 1994 RUN DATE (MON/DAY/YR) =06/04/1997

INPUT FILE = A:P.DAT USER NO.= R_BOHANN.I01

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	PAGE = 1 NOTATION
START										TIME= .00
RAINFALL TYPE= 1										RAIN6= 2.200
COMPUTE NM HYD	100.10	-	1	.00200	5.34	.196	1.83567	1.510	4.174	PER IMP= 90.00
COMPUTE NM HYD	100.20	-	1	.00080	2.15	.079	1.83567	1.510	4.193	PER IMP= 90.00
START										TIME= .00
RAINFALL TYPE= 1										RAIN6= 1.470
COMPUTE NM HYD	110.10	-	1	.00200	3.46	.121	1.13632	1.510	2.702	PER IMP= 90.00
COMPUTE NM HYD	110.20	-	1	.00080	1.39	.049	1.13631	1.510	2.712	PER IMP= 90.00
FINISH										

```
*****************************************************************
*                    COMMUNICATION CENTER                       *
*****************************************************************
*      100-YEAR, 6-HR STORM  (UNDER EXISTING CONDITIONS)        *
*****************************************************************
*
START                TIME=0.0
*
* BASIN 1
*
RAINFALL             TYPE=1 RAIN QUARTER=0.0 IN
                     RAIN ONE=1.87 IN RAIN SIX=2.20 IN
                     RAIN DAY=2.66 IN DT=0.02253 HR
COMPUTE NM HYD       ID=1 HYD NO=100.1 AREA=0.002 SQ MI
                     PER A=0.00 PER B=100.00 PER C=0.00 PER D=0.00
                     TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD            ID=1 CODE=1
*
* BASIN 2
*
COMPUTE NM HYD       ID=1 HYD NO=100.2 AREA=0.000802 SQ MI
                     PER A=0.00 PER B=100.00 PER C=0.00 PER D=0.00
                     TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD            ID=1 CODE=1
*
*****************************************************************
*       10-YEAR, 6-HR STORM  (UNDER EXISTING CONDITIONS)        *
*****************************************************************
*
START                TIME=0.0
*
* BASIN 1
*
RAINFALL             TYPE=1 RAIN QUARTER=0.0 IN
                     RAIN ONE=1.25 IN RAIN SIX=1.47 IN
                     RAIN DAY=1.77 IN DT=0.02253 HR
COMPUTE NM HYD       ID=1 HYD NO=110.1 AREA=0.002 SQ MI
                     PER A=0.00 PER B=100.00 PER C=0.00 PER D=0.00
                     TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD            ID=1 CODE=1
*
* BASIN 2
*
COMPUTE NM HYD       ID=1 HYD NO=110.2 AREA=0.000802 SQ MI
                     PER A=0.00 PER B=100.00 PER C=0.00 PER D=0.00
                     TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD            ID=1 CODE=1
*
*
FINISH
```

AHYMO SUMMARY TABLE (AHYMO194) - AMAFCA Hydrologic Model - January, 1994 RUN DATE (MON/DAY/YR) =06/04/1997

INPUT FILE = A:E.DAT USER NO.= R_BOHANN.I01

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	PAGE = 1 NOTATION
START										TIME= .00
RAINFALL TYPE= 1										RAIN6= 2.200
COMPUTE NM HYD	100.10	-	1	.00200	2.63	.071	.66800	1.532	2.055	PER IMP= .00
COMPUTE NM HYD	100.20	-	1	.00080	1.06	.029	.66800	1.532	2.064	PER IMP= .00
START										TIME= .00
RAINFALL TYPE= 1										RAIN6= 1.470
COMPUTE NM HYD	110.10	-	1	.00200	.99	.024	.22418	1.532	.770	PER IMP= .00
COMPUTE NM HYD	110.20	-	1	.00080	.40	.010	.22418	1.532	.773	PER IMP= .00
FINISH										

DRAINAGE INFORMATION SHEET

PROJECT TITLE: *COMMUNICATIONS CENTER* **ZONE ATLAS/DRNG. FILE #:** L-8/ D11A1

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

LEGAL DESCRIPTION: *LOTS 2 THRU 5, BLOCK 6 LANDS OF THE ATRISCO GRANT*

CITY ADDRESS: *NORTH OF EUCARIZ BETWEEN 114TH AND 118TH STREETS*

ENGINEERING FIRM: *TIERRA WEST DEV. MAGT. SER.* **CONTACT:** *RONALD R. BOHANNAN OR SHAHAB BIAZAR*

ADDRESS: *4421 McCleod Rd. NE Suite D, 87109* **PHONE:** *(505) 883-7592*

OWNER: *CITY OF ALBUQUERQUE* **CONTACT:** _____

ADDRESS: _____ **PHONE:** _____

ARCHITECT: *VAN GILBERT ARCHITECTS* **CONTACT:** *JIM GRAFF*

ADDRESS: *319 CENTRAL AVE, NW* **PHONE:** *(505) 247 - 9955*

SURVEYOR: *Precision Surveys* **CONTACT:** *Larry Medrano*

ADDRESS: *2929 Coors Blvd, NW Suite 105* **PHONE:** *(505) 839 - 0569*

CONTRACTOR: _____ **CONTACT:** _____

ADDRESS: _____ **PHONE:** _____

TYPE OF SUBMITTAL:

- X DRAINAGE REPORT
- ___ DRAINAGE PLAN
- ___ CONCEPTUAL GRADING & DRAINAGE PLAN
- X GRADING PLAN
- ___ EROSION CONTROL PLAN
- ___ ENGINEER'S CERTIFICATION
- ___ OTHER

PRE-DESIGN MEETING:

- ___ YES
- X NO
- ___ COPY PROVIDED

CHECK TYPE OF APPROVAL SOUGHT:

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

DATE SUBMITTED: *06/16/97*

BY: *SARA McCOLLAM*

DRAINAGE REPORT

for

Communication Center

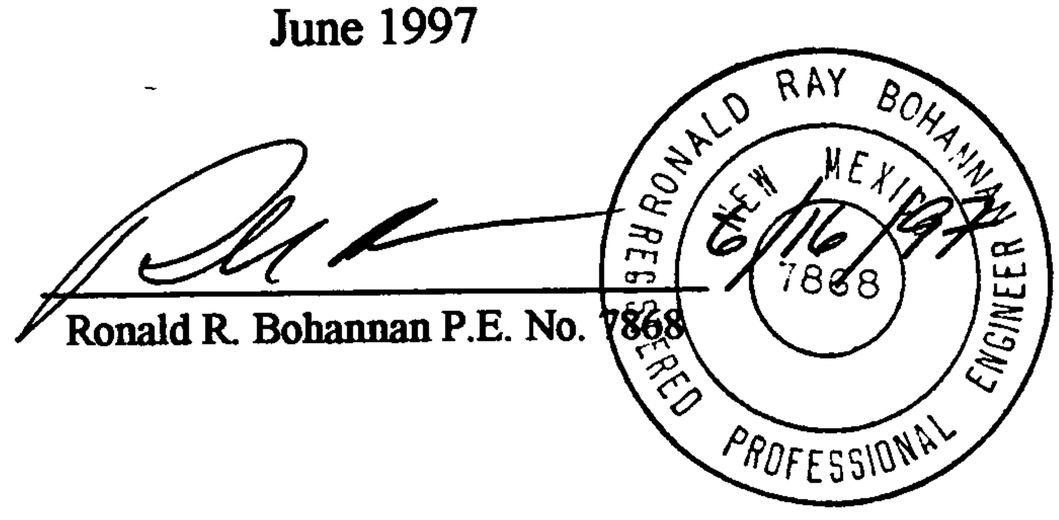
Prepared by

Tierra West Development Management Services
4421 McLeod Road NE, Suite D
Albuquerque, New Mexico 87109

Prepared for

Van Gilbert Architects
319 Central Ave, NW
Albuquerque, New Mexico 87102

June 1997



Ronald R. Bohannan P.E. No. 7868

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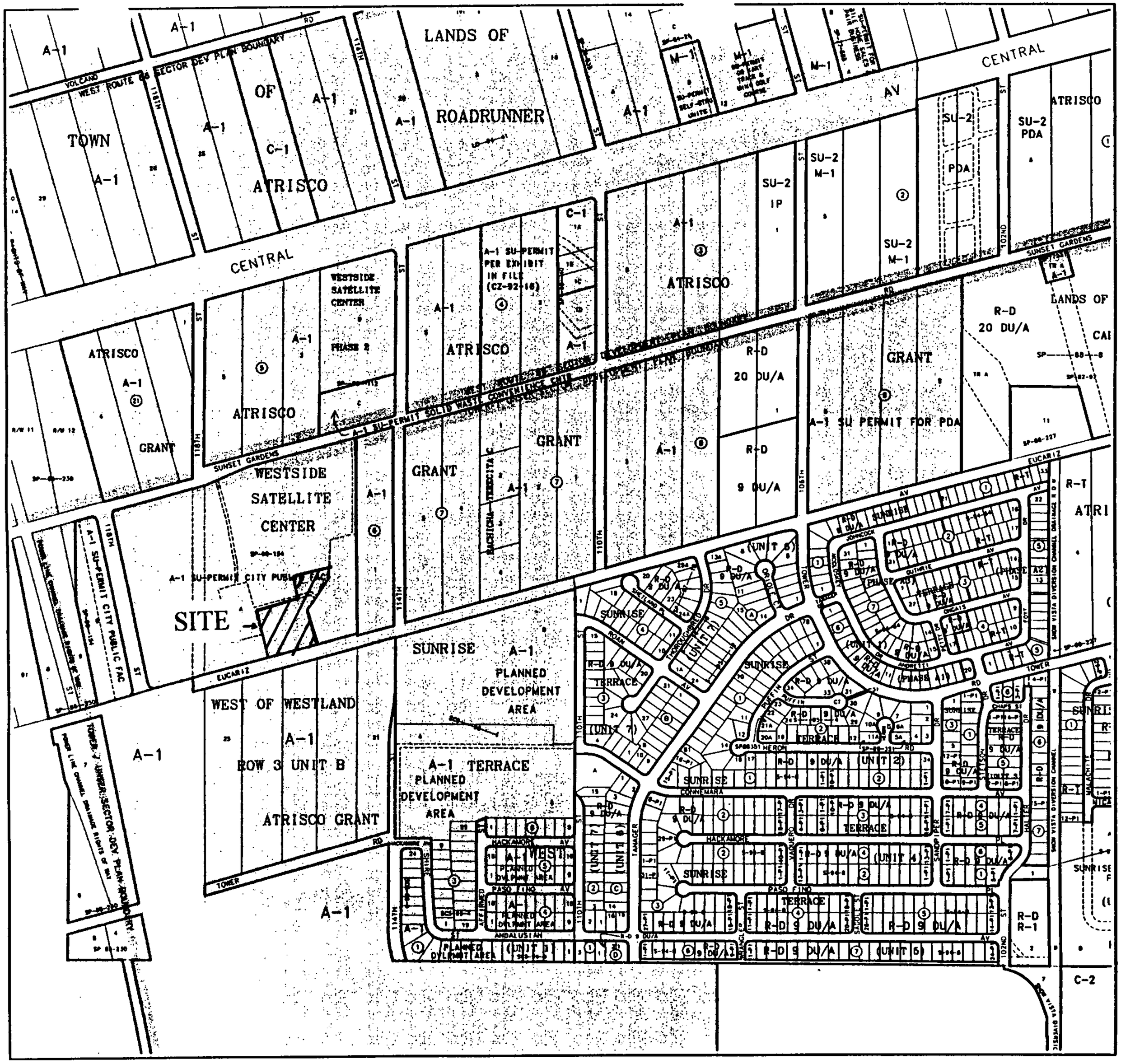


GRAPHIC SCALE IN FEET

250 0 500 1000

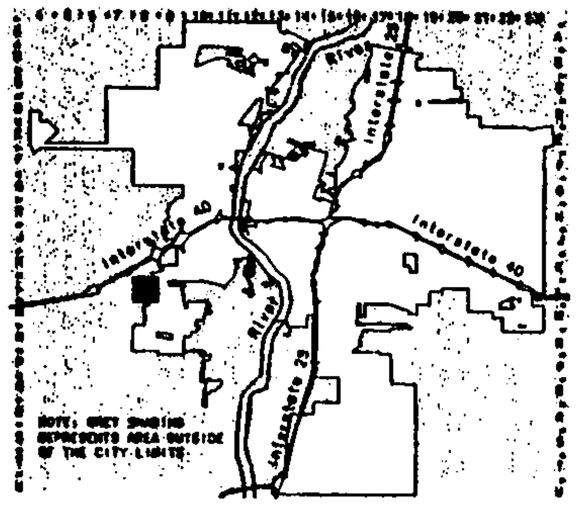
CITY OF Albuquerque

Albuquerque Geographic Information System

PLANNING DEPARTMENT

©Copyright 1997

Map Amended through February 21, 1997



LEGAL DESCRIPTION

TION

R2E

SEC 29

UNIFORM PROPERTY CODE

1-008-058

L-8-Z

Location

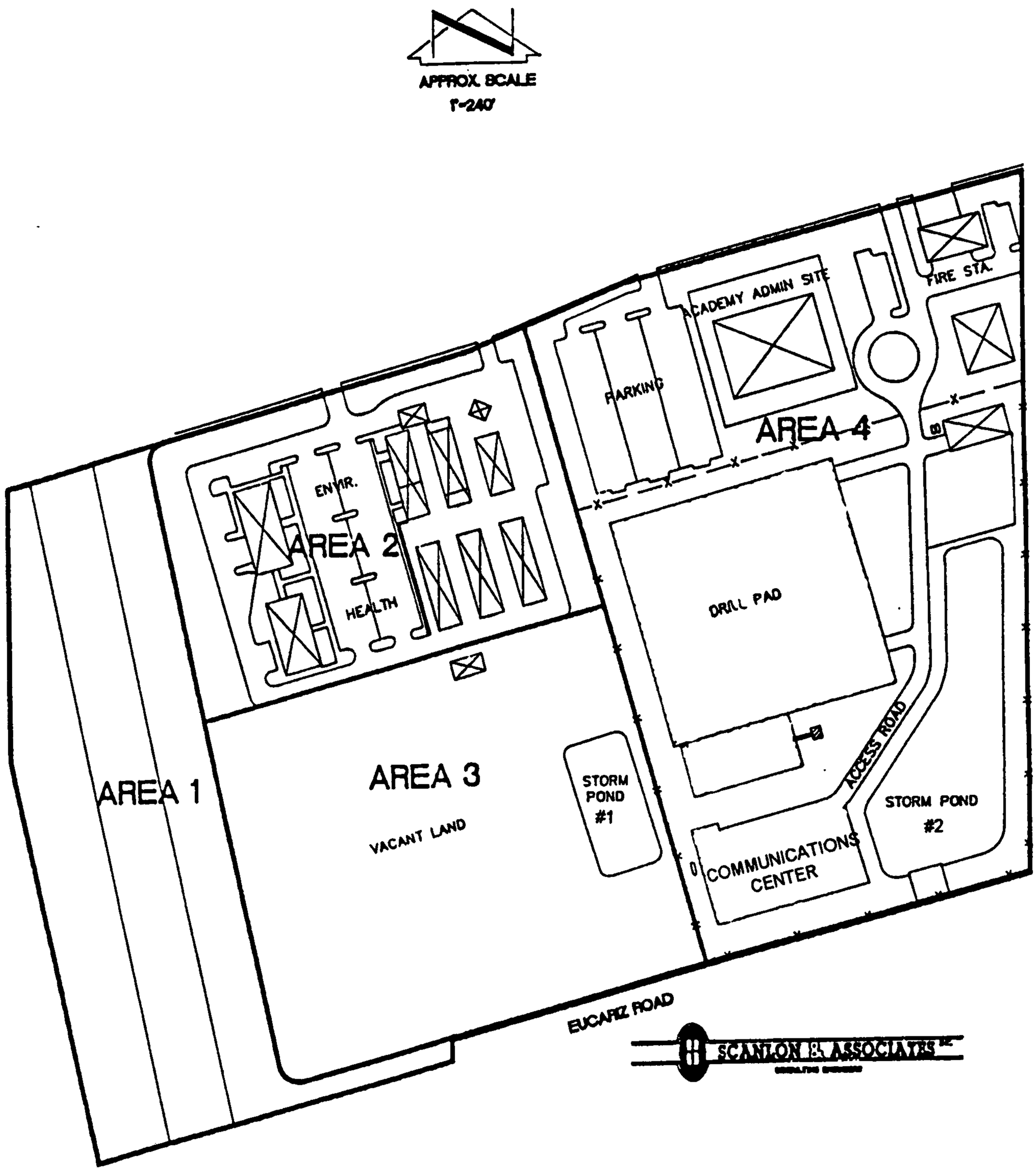
The site is located south of Sunset Gardens Road between 118th Street and 114th Street. The site is shown on the attached Zone Atlas Map L-8 and contains approximately 1.79 acres. The site is a portion of a larger City facility located on this tract. The City is proposing to build a 16,000 SF Communications Center located on the south side of the firefighter's drill pad. The purpose of this report is to provide the drainage analysis and management plan for the continued development of the City Yard.

Existing Drainage Conditions

The site is part of an approved master plan prepared by Scanlon & Associates (L8-D11). The master plan divides the site into four areas as shown on the attached exhibit. Area 1 is undeveloped and drains south with no restrictions. Areas 2 and 3 will drain to Storm Pond 1. Area 4, which includes the Communications Center, will drain to Storm Pond 2. Storm Pond 1 overflows into Storm Pond 2 through an existing 18" RCP pipe. Storm Pond 2 is a retention pond and does not discharge any runoff. ? Designed as a partial Ret. pond w/ a very small release rate ⇒ .75cfs until outlet is approved per an approved master plan

The master plan calls for the area where the Communications Center is located, to drain to a retention pond (Storm Pond 2) located directly east of our site. We will continue to follow the master plan with this site. Currently, the site drains east towards the retention pond with an undeveloped runoff flow of 3.69 cfs. OK ? looks like almost 1/2 drains to pond 1 ~~[illegible]~~ shows pipe capacity, but what about pond capacity? show pond cap

There are no offsite flows entering the site. The existing drainage ponds on the east and west of the site contain the flows from those directions. Flows from the south are captured by an existing swale and routed east to the partial retention pond. Flows to the north are intercepted by a firefighter training pond. Flows north of the site, in the entrance road, are conveyed via an



ONSITE DRAINAGE AREAS

existing valley gutter to the retention pond.

FEMA Map and Soil Conditions

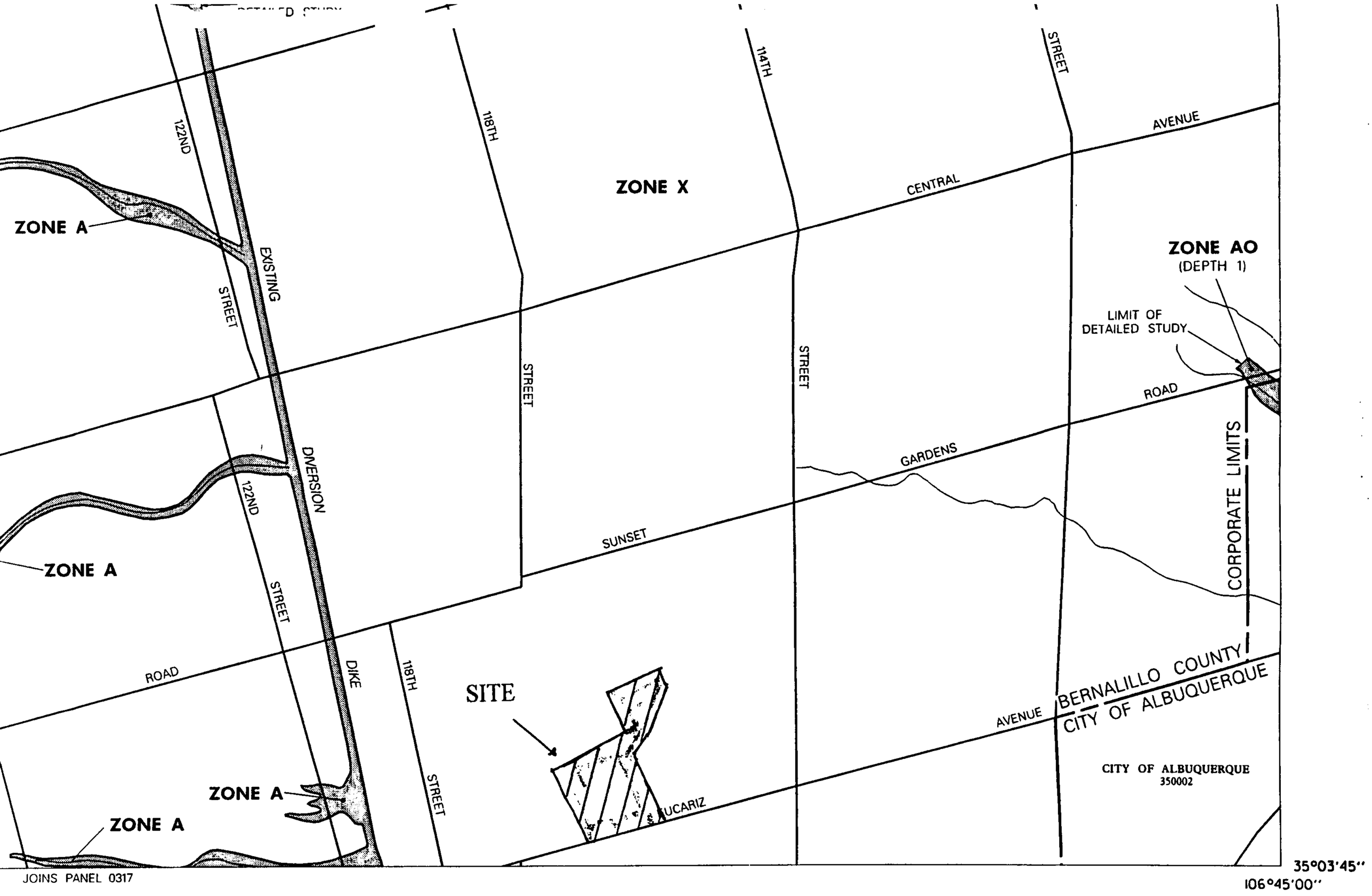
The site is located on FEMA Map section 35001C0306 D as shown on the attached excerpt. The map shows that the site does not lie within any 100-year flood plains.

The site contains two different soil types from the Soil Conservation Service Soil Survey of Bernalillo County. One of the soils is a Madurez loamy fine sand. It has slow runoff and the hazard of soil blowing is severe. This soil also has moderate permeability. The second soil is a Bluepoint-Kokan association. These soils have slow runoff and the hazard of water erosion is moderate or severe. The Bluepoint-Kokan association has rapid permeability.

On-Site Drainage Management Plan

There are three proposed basins in Area 4, where the Communications Center is located. Basins 1 and 2 are on the Communications Center site. Basin 3 is north of the Communications Center and includes the balance of Area 4. The runoff from Basin 3 drains to a existing concrete channel and is routed into the retention pond. Runoff from Basin 3 does not impact the Communications Center.

Basin 1 has a runoff flow of 5.34 cfs and will drain to a single 'D' drop inlet. The flow will be carried from the proposed drop inlet to an existing catch basin in a 12" RCP pipe. Basin 2 has a developed runoff flow of 2.15 cfs and will also drain to a single 'D' drop inlet. This drop inlet will also drain to the existing catch basin via a 12" RCP pipe. The existing catch basin drains to the existing retention pond by an existing 24" RCP pipe. The existing 24" RCP pipe has capacity for 46.49 cfs. Currently only 29.91 cfs is being conveyed through the pipe. The

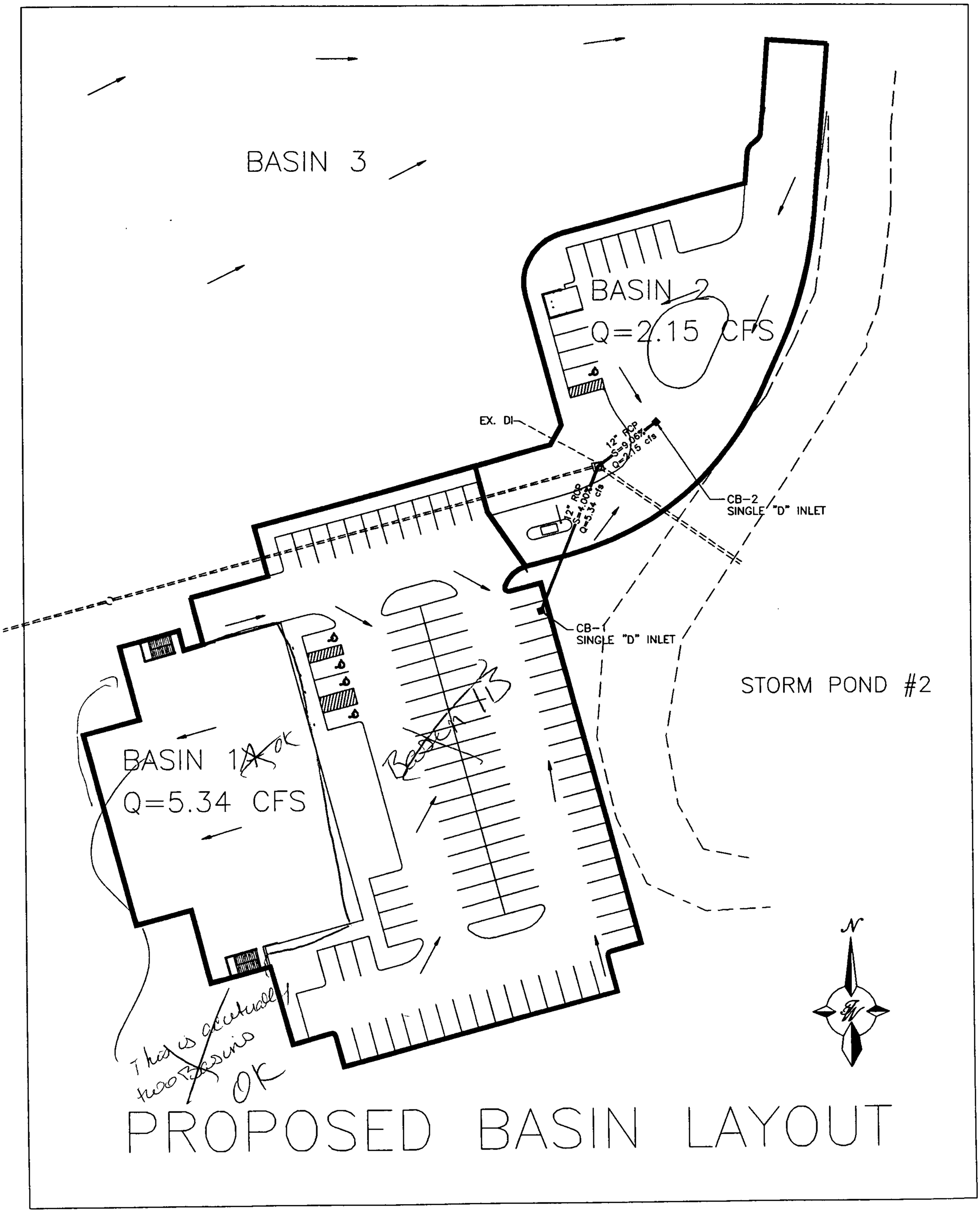


FEMA MAP 35001C0309 D

developed conditions will increase the flow in the pipe to 37.40 cfs, which the pipe has capacity for.

Summary

The site follows the approved master plan for the area. There are two developed basins on the Communications Center site. These basins will drain to two proposed drop inlets located within each basin. The drop inlets will drain via two 12" RCP pipes to an existing catch basin. The developed runoff will then be conveyed by a 24" RCP pipe to the existing retention pond located to the east of the site. The existing 24" pipe has capacity for 46.49 cfs, but it will only be carrying 37.40 cfs with the developed flows.


BASIN 3
BASIN 2
Q=2.15 CFS
EX. DI
12" RCP
S=9.06%
Q=2.15 cfs
12" RCP
S=4.00%
Q=5.34 cfs
CB-2
SINGLE "D" INLET
CB-1
SINGLE "D" INLET
STORM POND #2
BASIN 1A OK
Q=5.34 CFS
Better B
This is actually two basins
OK
N
PROPOSED BASIN LAYOUT

Runoff Calculations

RUNOFF CALCULATIONS

The site is @ Zone 1

LAND TREATMENT

Proposed
B = 10%
D = 90 %

Existing
B = 100%

DEPTH (INCHES) @ 100-YEAR STORM

P_{60} = 1.87 inches

P_{360} = 2.20 inches

P_{1440} = 2.66 inches

DEPTH (INCHES) @ 10-YEAR STORM

P_{60} = 1.87 x 0.667
= 1.25 inches

P_{360} = 1.47

P_{1440} = 1.77

See the summary output from AHYMO calculations.

Also see the following summary tables.

Runoff
Summary Tables
for
Proposed and Existing
Drainage Basins

DRAINAGE BASINS

BASIN	AREA (SF)	AREA (AC)	AREA (MI^2)
1	55744.78	1.2797	0.002000
2	22348.07	0.5130	0.000802

RUNOFF CALCULATION RESULTS

Existing

BASIN	Q-100 CFS	Q-10 CFS	V-100 AC-FT	V-10 AC-FT
1	2.63	0.99	0.071	0.024
2	1.06	0.4	0.029	0.01

Proposed

SUB-BASIN	Q-100 CFS	Q-10 CFS	V-100 AC-FT	V-10 AC-FT
1	5.34	3.46	0.196	0.121
2	2.15	1.39	0.079	0.049

Storm Sewer

Pipe Capacity

Manning's Equation:
Q = 1.49/n * A * R^(2/3) * S^(1/2)

A = Area
R = D/4
S = Slope
n = 0.013

PROPOSED PIPE CAPACITIES

Pipe	D	Slope	Area	R	Q Provided	Q Required	Velocity
	(in)	(%)	(ft^2)		(cfs)	(cfs)	(ft/s)
Basin 1	12	4	0.79	0.25	7.14	5.34	6.80
Basin 2	12	6.23	0.79	0.25	8.92	2.15	2.74

EXISTING PIPE CAPACITIES

Pipe	D	Slope	Area	R	Q Provided	Q Required	Velocity
	(in)	(%)	(ft^2)		(cfs)	(cfs)	(ft/s)
1	18	4.6	1.77	0.375	22.59	--	0.00
2	12	4.2	0.79	0.25	7.32	--	0.00
3	24	4.2	3.14	0.5	46.49	--	0.00

The existing Pipe 3 drains from the existing drop inlet to the existing retention pond. This pipe has capacity for 46.49 cfs. The pipe is currently only carrying 29.91 cfs. The proposed conditions will add 7.49 cfs to the existing pipe. This is a total of 37.4 cfs. The existing 24" has capacity for the additional flow.

STORM DRAIN INLET

EFFECTIVE AREA ASSUMING A 50% CLOGGING FACTOR

SINGLE 'D':

Area at the grate:

L = 38.375" - 7 (1/2" $_{\text{middle bars}}$)
= 34.875"
= 2.906'

W = 25.5" - 13 (1/2 $_{\text{middle bars}}$)
= 19"
= 1.583'

Area = 1.583' x 2.906'
= 4.601 ft^2

Effective Area = 4.601 - 0.5 (4.601)
= 2.30 ft^2

Effective Area = 2.30 ft^2

DROP INLET #1
HEAD CAPACITY

Orifice Equation:

$$Q = CA\sqrt{2gH}$$

Q = Flow (cfs)
C = 0.60
A = Area of drop inlet (ft^2)
g = 32.2
H = Height of water above drop inlet (ft)

$$H = \frac{\left(\frac{Q}{C*A}\right)^2}{2g}$$

$$H = \frac{\left(\frac{5.34}{0.6*2.30}\right)^2}{2*32.2}$$

H = 0.23 feet

Allowable depth = 0.50 feet
Required depth = 0.23 feet

0.23 feet < 0.50 feet

DROP INLET #2
HEAD CAPACITY

Orifice Equation:

$$Q = CA\sqrt{2gH}$$

Q = Flow (cfs)
C = 0.60
A = Area of drop inlet (ft^2)
g = 32.2
H = Height of water above drop inlet (ft)

$$H = \frac{\left(\frac{Q}{C*A}\right)^2}{2g}$$

$$H = \frac{\left(\frac{2.15}{0.6*2.30}\right)^2}{2*32.2}$$

H = 0.038 feet

Allowable depth = 0.50 feet
Required depth = 0.038 feet

0.038 feet < 0.50 feet

AHYMO
Runoff Input
and
Summary Output
for
Proposed and Existing
Drainage Basins

```
*****************************************************************
*                    COMMUNICATION CENTER                       *
*****************************************************************
*       100-YEAR, 6-HR STORM  (UNDER PROPOSED CONDITIONS)       *
*****************************************************************
*
START                TIME=0.0
*
* BASIN 1
*
RAINFALL             TYPE=1 RAIN QUARTER=0.0 IN
                     RAIN ONE=1.87 IN RAIN SIX=2.20 IN
                     RAIN DAY=2.66 IN DT=0.02253 HR
COMPUTE NM HYD       ID=1 HYD NO=100.1 AREA=0.002 SQ MI
                     PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                     TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD            ID=1 CODE=1
*
* BASIN 2
*
COMPUTE NM HYD       ID=1 HYD NO=100.2 AREA=0.000802 SQ MI
                     PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                     TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD            ID=1 CODE=1
*
*****************************************************************
*        10-YEAR, 6-HR STORM  (UNDER PROPOSED CONDITIONS)       *
*****************************************************************
*
START                TIME=0.0
*
* BASIN 1
*
RAINFALL             TYPE=1 RAIN QUARTER=0.0 IN
                     RAIN ONE=1.25 IN RAIN SIX=1.47 IN
                     RAIN DAY=1.77 IN DT=0.02253 HR
COMPUTE NM HYD       ID=1 HYD NO=110.1 AREA=0.002 SQ MI
                     PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                     TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD            ID=1 CODE=1
*
* BASIN 2
*
COMPUTE NM HYD       ID=1 HYD NO=110.2 AREA=0.000802 SQ MI
                     PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                     TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD            ID=1 CODE=1
*
*
FINISH
```

AHYMO SUMMARY TABLE (AHYMO194) - AMAFCA Hydrologic Model - January, 1994 RUN DATE (MON/DAY/YR) =06/04/1997
INPUT FILE = A:P.DAT USER NO.= R_BOHANN.I01

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	PAGE = 1 NOTATION
START										TIME= .00
RAINFALL TYPE= 1										RAIN6= 2.200
COMPUTE NM HYD	100.10	-	1	.00200	5.34	.196	1.83567	1.510	4.174	PER IMP= 90.00
COMPUTE NM HYD	100.20	-	1	.00080	2.15	.079	1.83567	1.510	4.193	PER IMP= 90.00
START										TIME= .00
RAINFALL TYPE= 1										RAIN6= 1.470
COMPUTE NM HYD	110.10	-	1	.00200	3.46	.121	1.13632	1.510	2.702	PER IMP= 90.00
COMPUTE NM HYD	110.20	-	1	.00080	1.39	.049	1.13631	1.510	2.712	PER IMP= 90.00
FINISH										

```
*****************************************************************
*                    COMMUNICATION CENTER                       *
*****************************************************************
*       100-YEAR, 6-HR STORM  (UNDER EXISTING CONDITIONS)       *
*****************************************************************
*
START                TIME=0.0
*
* BASIN 1
*
RAINFALL             TYPE=1 RAIN QUARTER=0.0 IN
                     RAIN ONE=1.87 IN RAIN SIX=2.20 IN
                     RAIN DAY=2.66 IN DT=0.02253 HR
COMPUTE NM HYD       ID=1 HYD NO=100.1 AREA=0.002 SQ MI
                     PER A=0.00 PER B=100.00 PER C=0.00 PER D=0.00
                     TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD            ID=1 CODE=1
*
* BASIN 2
*
COMPUTE NM HYD       ID=1 HYD NO=100.2 AREA=0.000802 SQ MI
                     PER A=0.00 PER B=100.00 PER C=0.00 PER D=0.00
                     TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD            ID=1 CODE=1
*
*****************************************************************
*        10-YEAR, 6-HR STORM  (UNDER EXISTING CONDITIONS)       *
*****************************************************************
*
START                TIME=0.0
*
* BASIN 1
*
RAINFALL             TYPE=1 RAIN QUARTER=0.0 IN
                     RAIN ONE=1.25 IN RAIN SIX=1.47 IN
                     RAIN DAY=1.77 IN DT=0.02253 HR
COMPUTE NM HYD       ID=1 HYD NO=110.1 AREA=0.002 SQ MI
                     PER A=0.00 PER B=100.00 PER C=0.00 PER D=0.00
                     TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD            ID=1 CODE=1
*
* BASIN 2
*
COMPUTE NM HYD       ID=1 HYD NO=110.2 AREA=0.000802 SQ MI
                     PER A=0.00 PER B=100.00 PER C=0.00 PER D=0.00
                     TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD            ID=1 CODE=1
*
*
FINISH
```

AHYMO SUMMARY TABLE (AHYMO194) - AMAFCA Hydrologic Model - January, 1994 RUN DATE (MON/DAY/YR) =06/04/1997

INPUT FILE = A:E.DAT USER NO.= R_BOHANN.I01

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	PAGE = 1 NOTATION
START										TIME= .00
RAINFALL TYPE= 1										RAIN6= 2.200
COMPUTE NM HYD	100.10	-	1	.00200	2.63	.071	.66800	1.532	2.055	PER IMP= .00
COMPUTE NM HYD	100.20	-	1	.00080	1.06	.029	.66800	1.532	2.064	PER IMP= .00
START										TIME= .00
RAINFALL TYPE= 1										RAIN6= 1.470
COMPUTE NM HYD	110.10	-	1	.00200	.99	.024	.22418	1.532	.770	PER IMP= .00
COMPUTE NM HYD	110.20	-	1	.00080	.40	.010	.22418	1.532	.773	PER IMP= .00
FINISH										