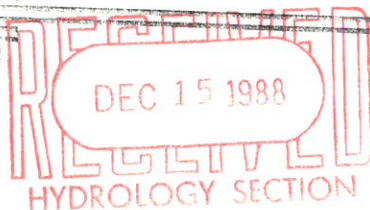




KEN SCHULTZ
MAYOR

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103



December 14, 1988

REVISED

CERTIFICATE OF COMPLETION AND ACCEPTANCE

Donald Morgan
Muchmore Morgan, Inc.
11197 Montgomery N.E.
Albuquerque, NM 87111

RE: PROJECT NO. 3325, SANDIA RESEARCH PARK, (MAP NO. M-21) *105*

Dear Mr. Morgan:

This is to certify that the City of Albuquerque accepts Project No. 3325 as being completed according to approved plans and construction specifications. If all required right-of-ways and/or easements have been dedicated, the City of Albuquerque will accept for continuous maintenance all public infrastructure improvements constructed as part of Project No. 3325. If the required right-of-ways and/or easements have not been dedicated, the City of Albuquerque cannot accept the project for continuous maintenance and said maintenance will be the responsibility of the developer. When a final plat has been filed it will be the developer's responsibility to provide the Construction Management Division with a copy, at which time the City will fully accept Project No. 3325.

The project is described as follows:

- Installed water, sanitary sewer, storm drainage and paving improvements within Sandia Research Park as well as offsite sanitary sewer and waterline improvements within Eubank Blvd., alignment.
- The contractor's warranty begins on October 31, 1988, and will be effective for a period of one (1) year.

Sincerely,

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

RBG:tjp

AN EQUAL OPPORTUNITY EMPLOYER

LETTER OF ACCEPTANCE FOR PROJECT NO. 3325
December 14, 1988
Page Two (2)

xc: AVID Engineering
C.C.M., Inc.
Fred Aguirre, Engineering Group, PWD
Phil Fischer, Engineering Group, PWD
Ray Pang, Engineering Group, PWD
Terri Martin, Engineering Group, PWD
Jeanette Barrett, Special Assessments
Jim Olsen, Operations Group, PWD
Sam Cummins, Operations Group, PWD
Jim Fink, Operations Group, PWD
Anthony Lopez, Operations Group, PWD
Jon Ertsgaard, Engineering Group, PWD
Dave Parks, Engineering Group, PWD
Tom Kennerly, Operations Group, PWD
Josie Gutierrez, New Meter Sales, Finance Group, PWD
Claudia Gallegos, Standby Clerk, Finance Group, PWD
Della Gallegos, Engineering Group, PWD
Terry Schultz, Engineering Group, PWD
Fred Gomez, Engineering Group, PWD
Judy Aguilar, Engineering Group, PWD
f/Project 3325
f/Warranty
f/Readers

FILE COPY



KEN SCHULTZ
MAYOR

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

April 7, 1989

Fred Arfman, P.E.
Isaacson & Arfman, P.A.
128 Monroe Street, NE
Albuquerque, New Mexico 87108

RE: REVISED DRAINAGE PLAN FOR OFFICE BUILDING @ SANDIA RESEARCH PARK
LOT 1, BLOCK 1 (M-21/D5D) ENGINEER'S STAMP DATED MARCH 10, 1989

Dear Mr. Arfman:

Based on the information provided on your submittal of March 13, 1989,
the above referenced plan is approved for Building Permit.

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

If I can be of further assistance, please feel free to call me at
768-2650.

Cordially,

Bernie J. Montoya
Bernie J. Montoya, C.E.
Engineering Assistant

BJM/bsj
(WP+952)

FILE COPY



KEN SCHULTZ
MAYOR

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

December 6, 1988

Fred Arfman, P.E.
Isaacson & Arfman, P.A.
128 Monroe Street, NE
Albuquerque, New Mexico 87108

RE: DRAINAGE PLAN FOR OFFICE BUILDING @ SANDIA RESEARCH PARK
LOT 1, BLOCK 1 (M-21/D5D)
ENGINEER'S STAMP DATED SEPTEMBER 23, 1988

Dear Mr. Arfman:

Based on the information provided on your submittal of November 29, 1988, the above referenced drainage plan is approved for Site Development.

Please be advised that prior to Building Permit approval, certain concerns will need to be addressed.

1. Master Drainage Plan indicates that the design criteria to be used is a $C = .40$ for undeveloped and a $C = .80$ for developed. Your calculations indicate different composites.
2. Increase in your composite for the developed condition may have little effect on the downstream conditions without having to control the excess amount. Please address.

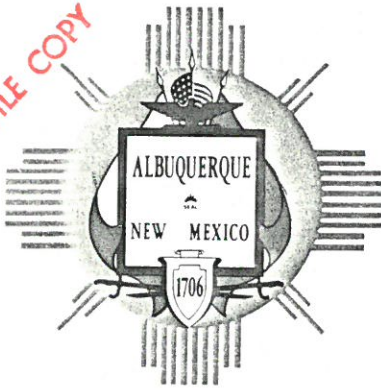
Should you have any questions or comments, please call me at 768-2650.

Cordially,

Bernie J. Montoya
Bernie J. Montoya, C.E.
Engineering Assistant

BJM/bsj
(WP+952)

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, P.E.
C.E./Hydrology Section

cc: M.B. Ford, Theatre Joint Venture

RAG/bsj

PUBLIC WORKS DEPARTMENT

Walter Nickerson, P.E., City Engineer

ENGINEERING GROUP

Telephone (505) 768-2500

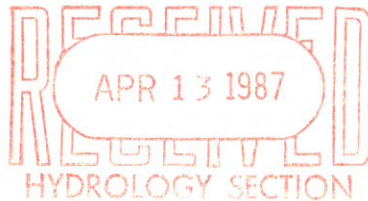
AN EQUAL OPPORTUNITY EMPLOYER



ANDREWS, ASBURY & ROBERT, INC.
Consulting Engineers

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

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.



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

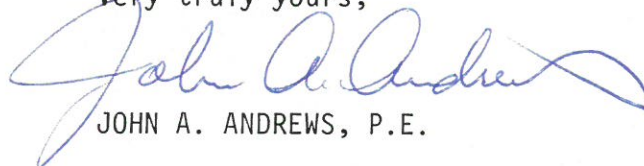
Dear Mr. Aguirre:

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,

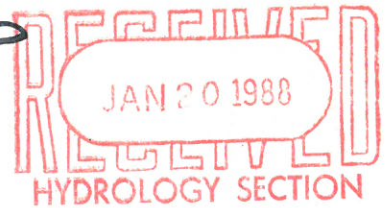
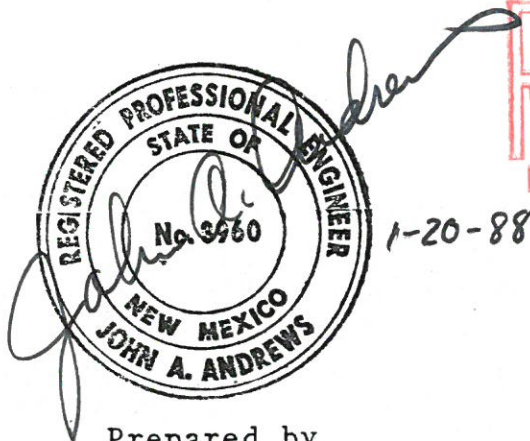


JOHN A. ANDREWS, P.E.

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

DRAINAGE REPORT
for
SANDIA RESEARCH PARK
Albuquerque, New Mexico

January, 1988



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

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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.

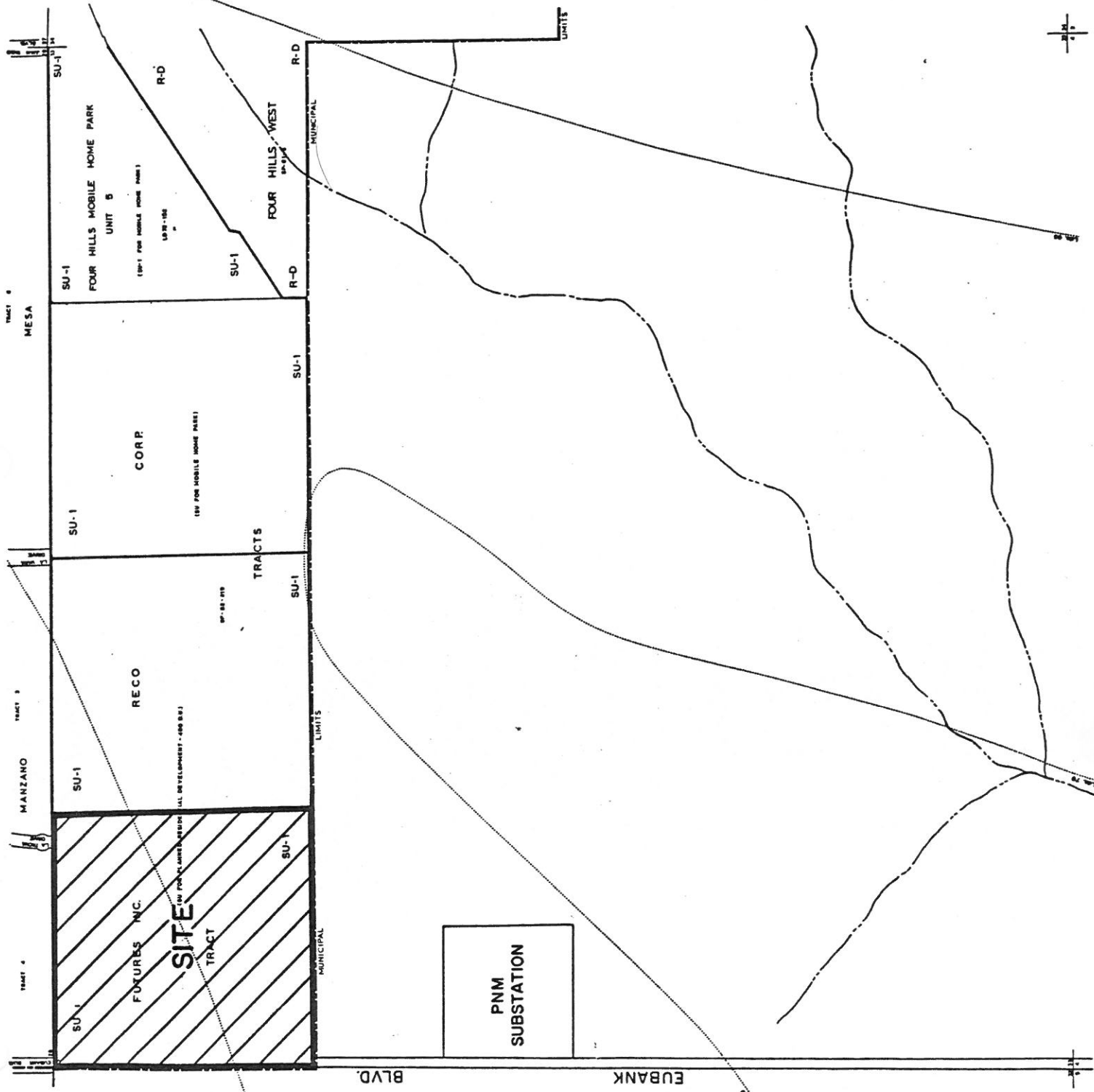
Upon completion of construction of this future storm drain by the City the retention pond can be eliminated by filling, and the lot on which the retention pond is located will be developed.

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. 1

LEGAL	DESCRIPTION
1.00	1.00
2.00	2.00
3.00	3.00
4.00	4.00

UNIFORM PROPERTY CODE	1-101-100
-----------------------	-----------

MAP ADDRESS THROUGH	1000
---------------------	------

M-21-Z
M-21-Z
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

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

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

TABLE 1

EXISTING CONDITIONS - See MAP No. 2

ANALYSIS POINT	DRAINAGE AREA DESIGNATION	AREA (Ac)	LENGTH TRAVEL (Ft)	SLOPE (%)	VELOCITY (FPS)	TRAVEL TIME (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 0.45	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

TABLE 1- Cont'd.

ANDREWS, ASBURY & ROBERT, INC. CONSULTING ENGINEERS 149 Jackson, N.E., Albuquerque, N.M. 87108 Telephone (505) 265-6631										Project <u>Sandia Research</u> <u>Park</u> By <u>JA</u> Chk'd _____	Sheet <u>3</u> of <u>16</u> Job No. <u>458</u> Date <u>12-7-86</u>
ANALYSIS POINT	DRAINAGE AREA DESIGNATION	AREA (AC)	LENGTH TRAVEL (FT)	SLOPE (%)	VELOCITY (FPS)	TRAVEL TIME (Yr) (MINS.)	C	I ₁₀ (IN/HR)	I ₁₀₀ (IN/HR)	Q ₁₀ (CFS)	Q ₁₀₀ (CFS)
4	B OFF SITE	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

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

TABLE 2

ONSITE - DEVELOPED CONDITIONS - See Map No. 3

ONSITE - DEVELOPED CONDITIONS - See Map No. 3

ANALYSIS POINT	DRAINAGE AREA DESIGNATION	AREA (AC)	LENGTH OF TRAVEL (Ft)	SLOPE (%)	VELOCITY (FPS)	TRAVEL TIME (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	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	0.80	3.33	5.07	3.4	5.2
	System to AP (B)		330' st.	0.30	1.50	3.67					
(B)	C-1 & C-2	9.48	--	--	--	13.29 3.67	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	0.80	2.67	4.06	18.2	27.7
	System to 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	0.80	2.44	3.71	35.1	53.5

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

TABLE 2 Cont'd.

[illegible]

TABLE 3

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

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

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

ANALYSIS POINT	DRAINAGE AREA DESIGNATION	AREA (AC)	LENGTH TRAVEL (FT)	SLOPE (%)	VELOCITY (FPS)	TRAVEL TIME (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.	-1.3 0.82	-3.1 2.45	1.72 6.39					
(A)	A & C-1	29.31	—	—	—	32.83 8.11	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	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	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	0.60	1.45	2.21	36.3	55.2

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

TABLE 3 Cont'd.

[illegible]

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, (1/2 street)

Street Area @ 0.20' above Top of Curb = 13.40 ft^2

Street Slope = 0.82%, $R = \frac{13.4}{25.3} = 0.53$

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

$$\text{Street Capacity} = Q = AV = (13.40)(5.87) = 78.7 \text{ cfs}$$

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

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

$$\text{Street Capacity} = Q = AV = (15.80)(2.90) = 45.8 \text{ cfs}$$

OK

Eubank Blvd @ A.P. (D)

From Table 3, $Q = 55.2 \text{ cfs}$

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

street Area @ 0.20' above Top of Curb = 15.80

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

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

$$\text{Street Capacity} = Q = AV = (15.80)(3.88) = 61.3 \text{ cfs}$$

OK

Research Road @ A.P. (E)

From Table 3, $Q = 52.3 \text{ cfs}$

street Section is std. 40 ft wide street

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

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

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

$$\text{Street Capacity} = Q = AV = (24.00)(7.52) = 180.5 \text{ cfs}$$

OK

TABLE 4

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

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

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

ANALYSIS POINT	DRAINAGE AREA DESIGNATION	AREA (AC)	LENGTH OF TRAVEL (FT)	SLOPE (%)	VELOCITY (FPS)	TRAVEL TIME (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	0.80	2.81	4.28	47.4	72.2
	AP ① to AP ④					8.11					
④	A & C-1	29.31	--	--	--	13.98 8.11 22.09	0.80	2.23	3.39	52.2	79.5
	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	0.80	3.16	4.81	36.7	55.8
	AP ④ to AP ⑤					6.06					
⑤	B & D-1	32.06	--	--	--	11.09 6.06 17.15	0.80	2.53	3.85	64.8	98.7

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, $Q = 79.5 \text{ cfs}$.

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

Street Area @ 0.20' above Top of Curb = 24.00 ft^2

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

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

$$\text{Street Capacity} = Q = AV = (24.00)(6.09) = 146.2 \text{ cfs}$$

OK

Research Road. @ A.P. (E)

From Table 4, $Q = 98.7 \text{ cfs}$

street section is std. 40' wide street

Street Area @ 0.20' above Top of Curb = 24.00

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

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

$$\text{Street Capacity} = Q = AV = (24.00)(7.52) = 180.5 \text{ cfs}$$

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 Research 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 Cfs
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 e-1 8.21 Acres C = 0.80
" e-2 1.27 " C = 0.80
" e-3 8.54 " C = 0.80
" e-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
Sub total 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.

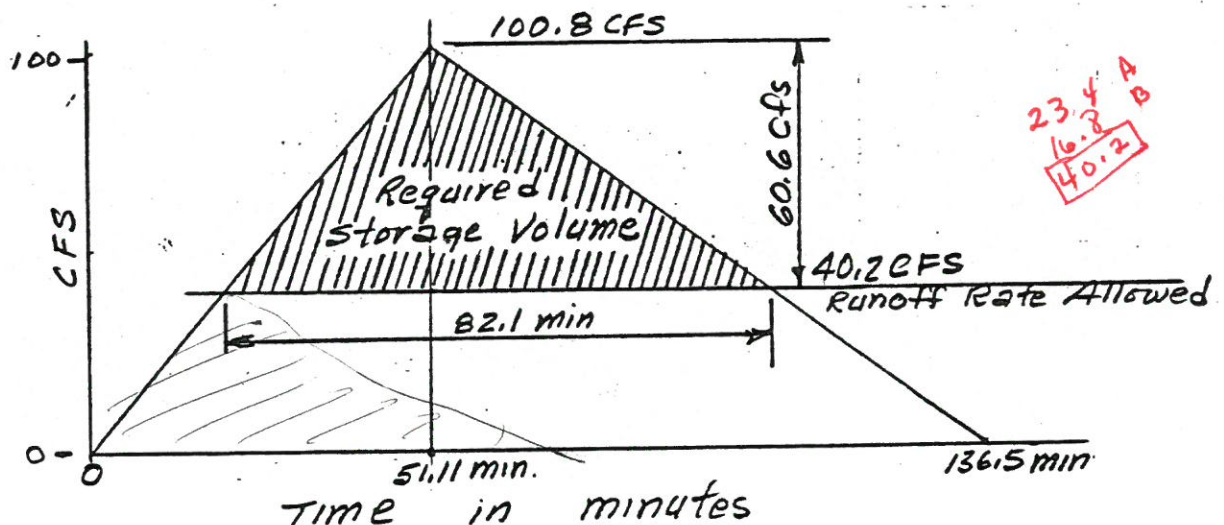
must use
24 hr storm

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"

$$\text{Triangular Hydrograph Base} = 2.67(T_p) \\ = 2.67(51.11) = 136.5 \text{ min.}$$



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 pond 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 storm drain is required to divert the flows on Research Ave. to the Temporary Retention Pond.

From Table 3- $Q = 52.3 \text{ Cfs}$.

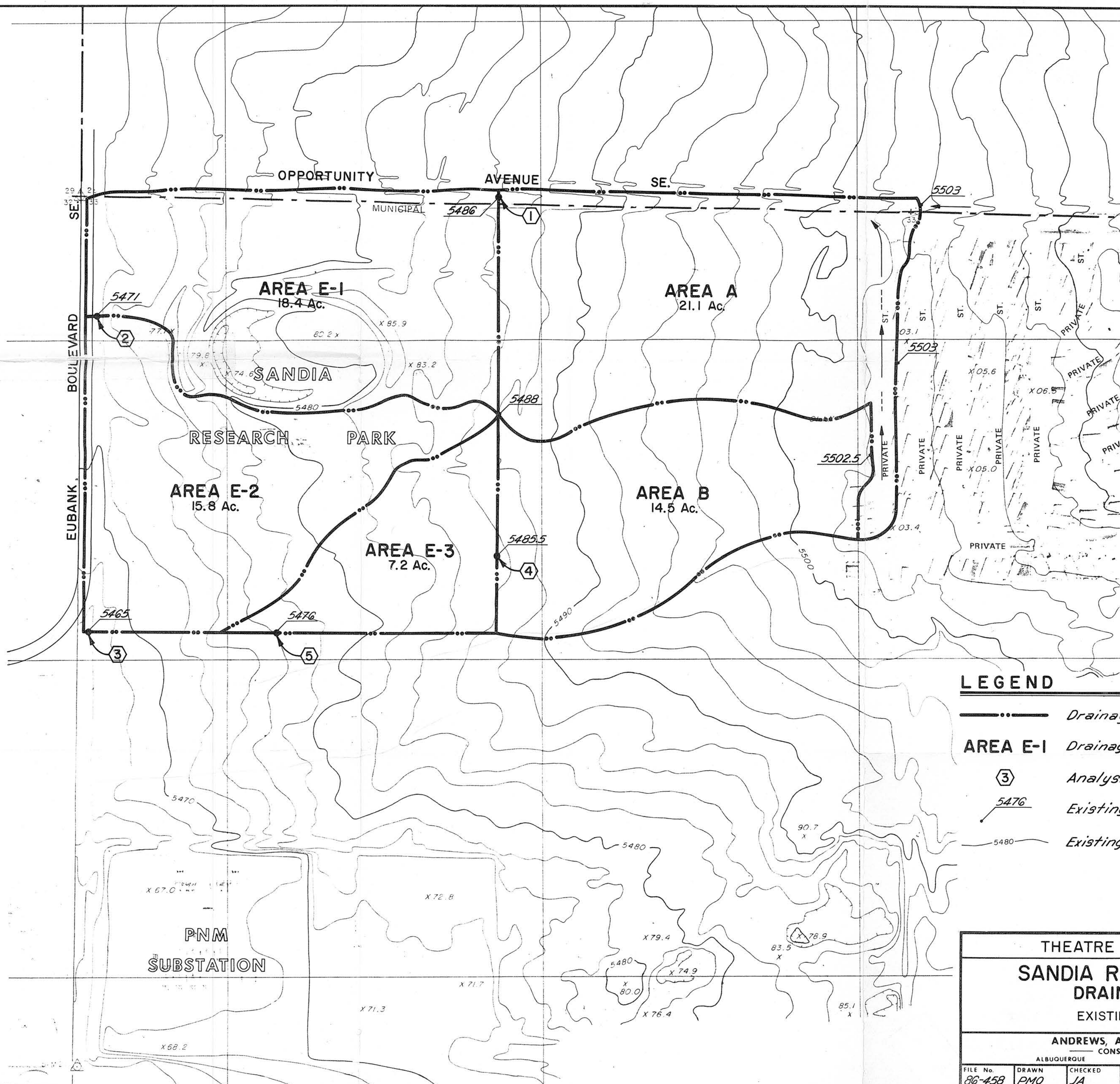
Use 6- Curb inlets - Ea. to collect 10 cfs ±

4- Inlets up stream to collect 40 cfs.

Pipe size Req'd = 36" @ 1.2% ±; $Q = 42 \text{ cfs}$
OK

From 6- Inlets to Pond -

Pipe Size Req'd = 36" @ 1.0% ±; $Q = 65 \text{ CFS}$
OK



SCALE: 1" = 200'

LEGEND

- Drainage Basin Boundary
- AREA E-1 Drainage Basin Designation
- ③ Analysis Point
- 5476 Existing Spot Elevation
- 5480 Existing Surface Contour

RECEIVED
JAN 20 1988
HYDROLOGY SECTION

THEATRE JOINT VENTURE
**SANDIA RESEARCH PARK
DRAINAGE PLAN**
EXISTING CONDITIONS

ANDREWS, ASBURY & ROBERT, INC.
CONSULTING ENGINEERS
ALBUQUERQUE NEW MEXICO

FILE No. 86-458	DRAWN PMO	CHECKED JA	DATE Dec., 1986	MAP No. 2
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SCALE: 1"=100'

Future Major Storm Drain By City

Concrete Run-down & Pond Overflow
Grade Pond Side Slope around exist. Power Pole. Top of Slope to be 6' from Pole all around.

F-1
0.40 Ac.

Future Storm Drain By City.

Exist. Public R.O.W.

LEGEND

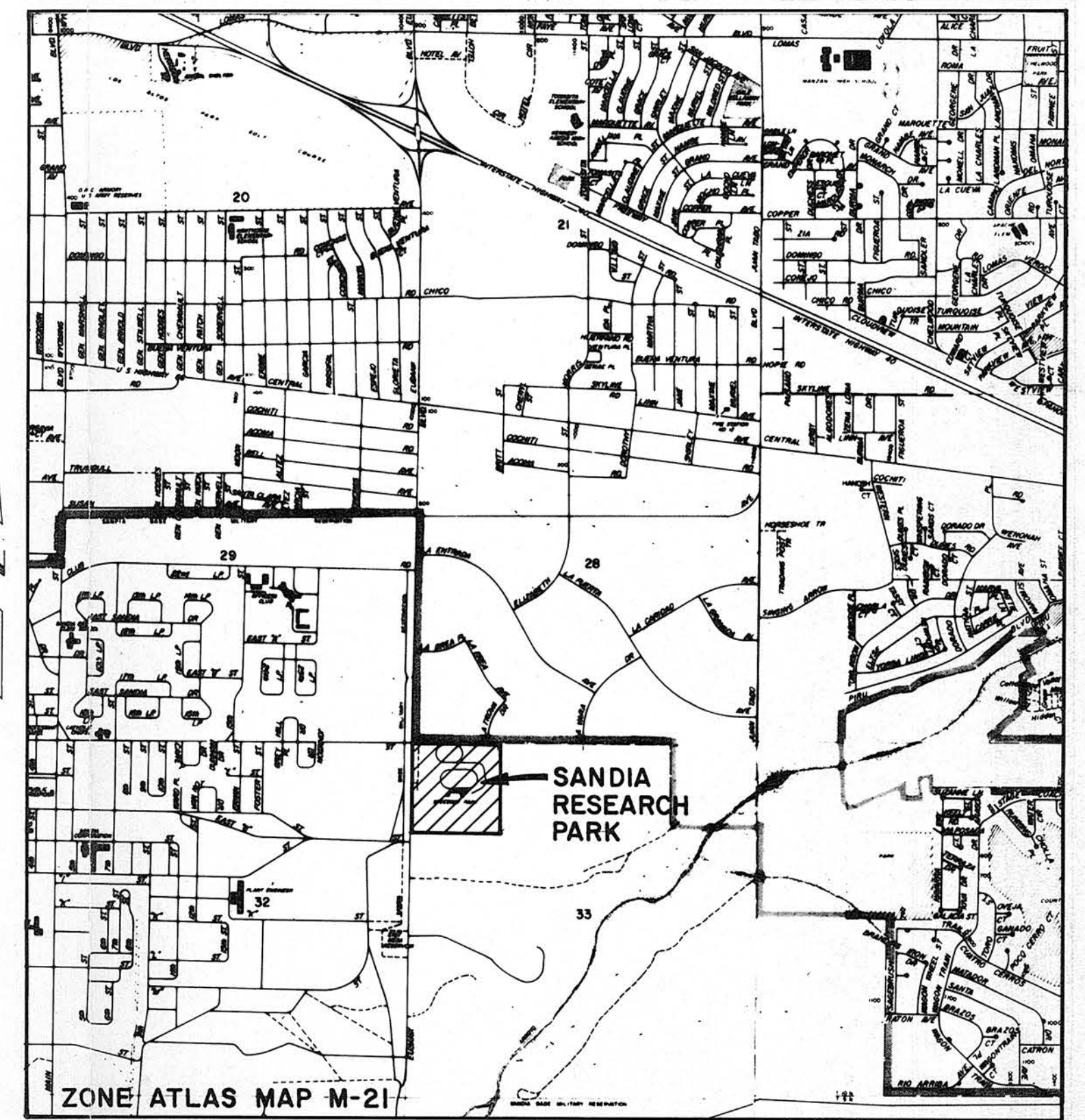
- DRAINAGE AREA BOUNDARY
- C-2 DRAINAGE AREA DESIGNATION
- ⬡ ANALYSIS POINT
- DIRECTION OF SURFACE FLOW
- 74.5 FINISH SPOT ELEVATION
- 480— EXISTING SURFACE CONTOUR
- SD— PROPOSED STORM DRAIN
- SD--- FUTURE STORM DRAIN
- DITCH & DIKE w/DIRECTION OF FLOW

CONSTRUCTION NOTE

WHEN PERFORMING GRADING WORK AND/OR THE CONSTRUCTION STAKING FOR SITE GRADING, CONTRACTOR AND SURVEYOR AS APPLICABLE, SHALL ESTABLISH GRADING FOR STREET AREAS FROM STREET PROFILES AND TYPICAL STREET SECTIONS AS SHOWN ON CONSTRUCTION PLANS FOR "SANDIA RESEARCH PARK INFRASTRUCTURE IMPROVEMENTS" CITY OF ALBUQUERQUE PROJECT NO. 3325. ALSO, GRADING DETAILS FOR RETENTION POND SHALL CONFORM TO DETAILS SHOWN ON SAID PLANS.

APPROVED FOR GRADING

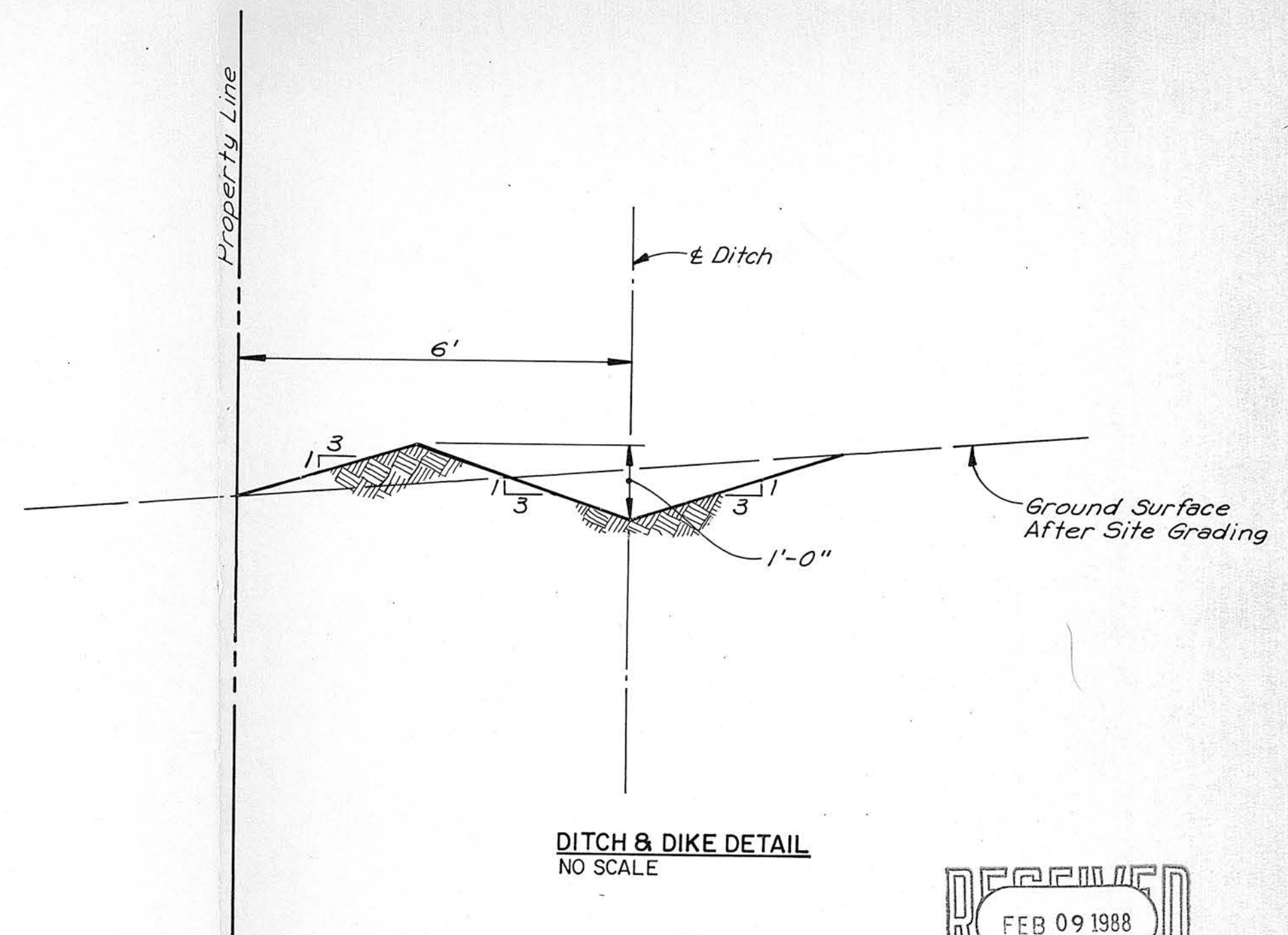
DATE



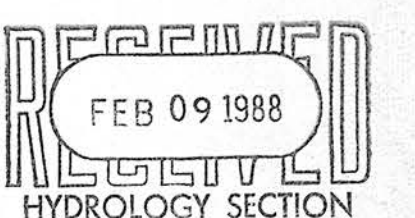
LOCATION MAP

PROPERTY DESCRIPTION

SANDIA RESEARCH PARK WITHIN S33, T10N, R4E, N.M.P.M. COMPRISING ALL THE NW 1/4, NW 1/4 OF SAID SECTION 33.



DITCH & DIKE DETAIL
NO SCALE

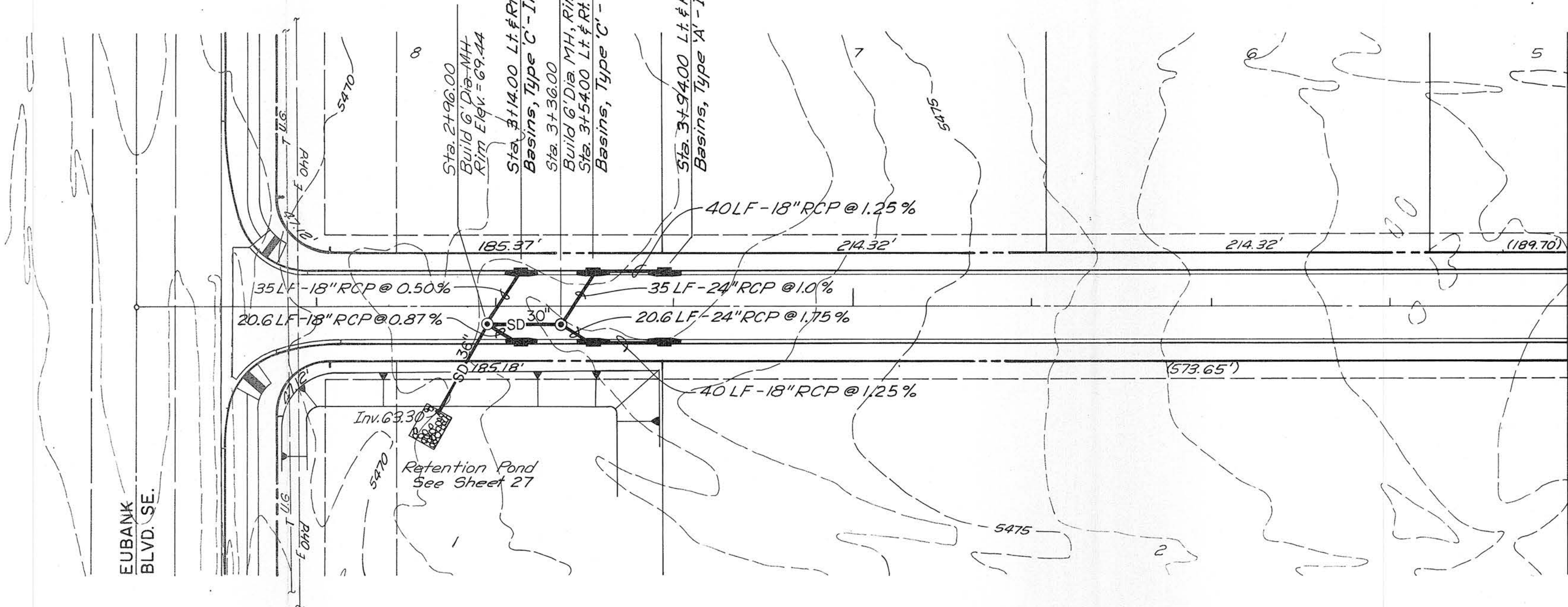


THEATRE JOINT VENTURE SANDIA RESEARCH PARK GRADING & DRAINAGE PLAN ON SITE DEVELOPED CONDITIONS

ANDREWS, ASBURY & ROBERT, INC.
CONSULTING ENGINEERS

FILE NO. 86-458 DRAWN PMO CHECKED JA DATE Dec, 1986 MAP No. 3

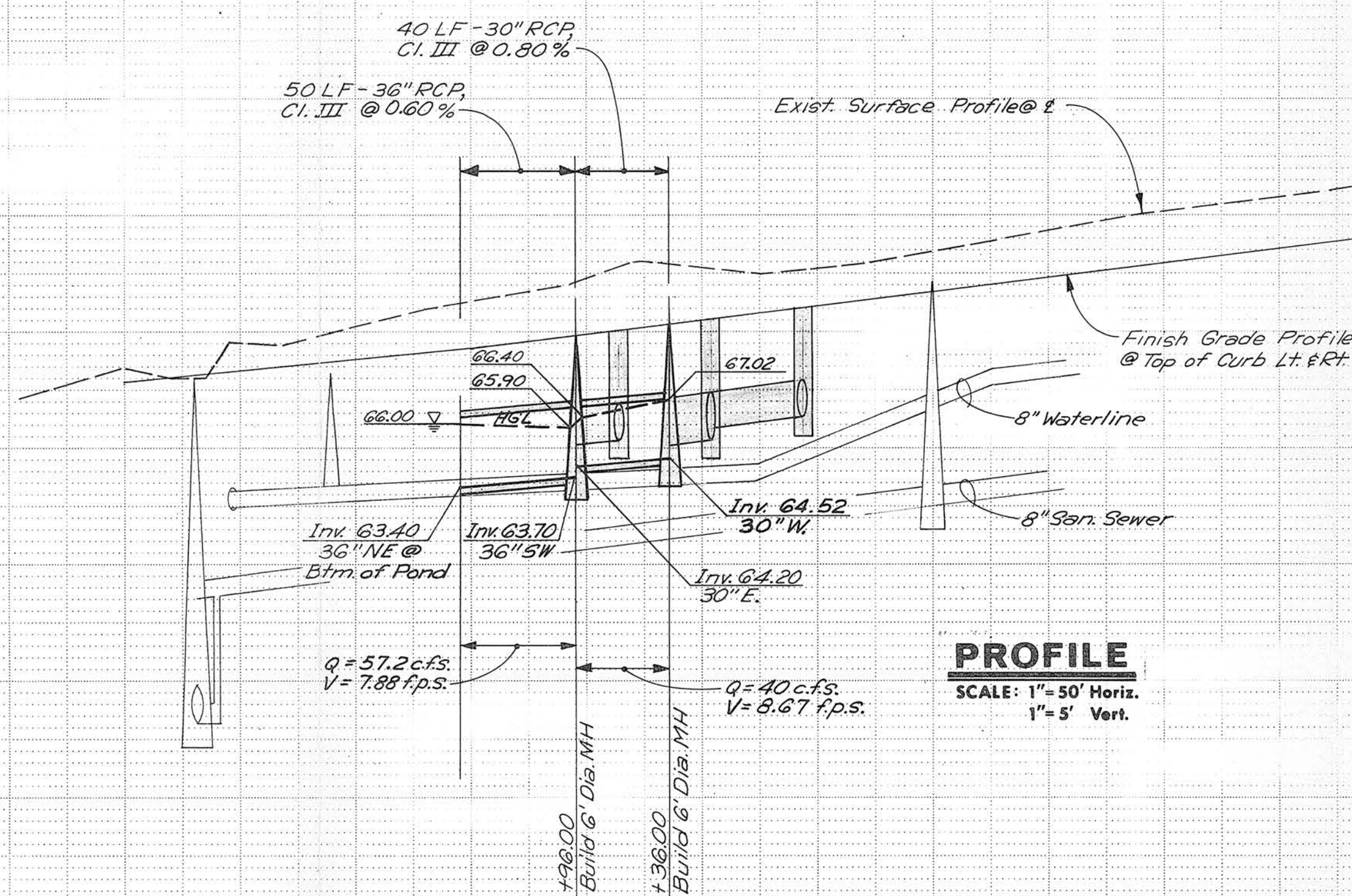
EUBANK
BLVD. SE.



PLAN
SCALE: 1" = 50'

RESEARCH ROAD SE.

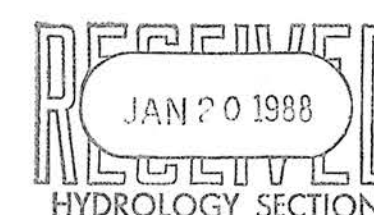
5490
5485
5480
5475
5470
5465
5460
5455
5450



PROFILE
SCALE: 1" = 50' Horiz.
1" = 5' Vert.

0+00 1 2 3 4 5+00 6 7 8 9 10+00 11

5490
5485
5480
5475
5470
5465
5460
5455
5450

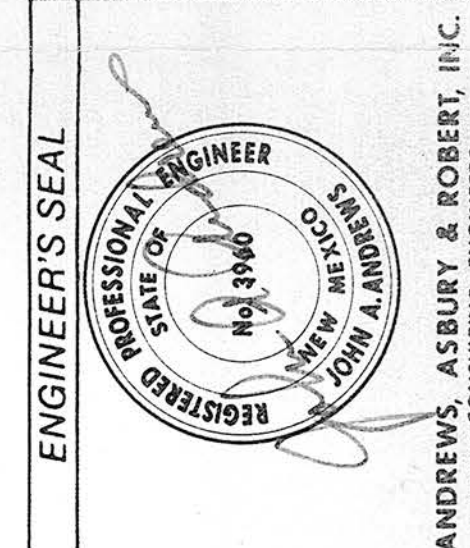


CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT
**SANDIA RESEARCH PARK
INFRASTRUCTURE IMPROVEMENTS**
STORM DRAIN PLAN & PROFILE
RESEARCH ROAD SE.

APPROVALS	ENGINEER	DATE	APPROVALS	ENGINEER	DATE
City Engineer			Liquid Waste		
A.C.E. - Design			Traffic		
A.C.E. - Hydrology			Water		

DRAWING NO. **3325** MAP NO. **M-21** SHEET **25** OF **34**

SURVEY INFORMATION		BENCH MARKS		AS BUILT INFORMATION	
NO.	BY	DATE	CONTRACTOR	CONTRACTOR	DATE
			BRASS TABLET SET IN TOP OF CONCRETE POST 0.3 FT. BELOW GROUND. LOCATED 1 MILE SOUTH OF CENTRAL AVENUE AND 30 FEET WEST OF EUBANK BOULEVARD, S.E.	CONTRACTOR	DATE
				INSPECTOR'S FIELD VERIFICATION BY	DATE
				CORRECTED BY	DATE
				RECORDED BY	DATE
				NO.	DATE



ANDREWS, ASBURY & ROBERT, INC.
ALBUQUERQUE, NEW MEXICO

REVISIONS		BY	
NO.	DATE	REMARKS	DATE
		DESIGN	
DESIGNED BY	JA	DATE	Nov. 1986
DRAWN BY	CB, JCS	DATE	Nov. 1986
CHECKED BY	JA	DATE	Nov. 1986