HYDROLOGY

E17/D26

INTERSTATE
INDUSTRIAL TRACT
LOT 2 BLOCK A UNIT II
EM · DSI

2 PLANS

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

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

July 24, 1984

Mr. Richard T. Williams
Denney-Gross & Associates
2400 Comanche Road NE
Albuquerque, NM 87107

REF: DRAINAGE PLAN FOR INTERSTATE INDUSTRIAL TRACT AT 3700 OSUNA ROAD, NE (E17-D51) RECEIVED JUNE 6, 1984

Dear Richard:

I have reviewed the above referenced plan and forward the following comments:

1. Require a vicinity map.
2. Quantification of on-site and off-site flows.
3. Locate off-site flows.
4. Require private drainage easements on property to the west of the site.
5. Require coordination with AMAFCA to discharge water into the North Diversion Channel.
6. Determine velocities and depths of flows on adjacent property to the west of the site.
7. Where will the retaining wall be placed? Does the dashed symbol indicate the retaining wall?

If you should have any questions, please feel free to call me at 766-7644.

Sincerely yours,

Carlos A. Montoya

Carlos Montoya
Civil Engineer/Hydrology

CM:mrk

DENNEY-GROSS & ASSOCIATES, INC.
CONSULTING ENGINEERS
2400 COMANCHE ROAD, N.E.
ALBUQUERQUE, NEW MEXICO 87107
(505) 884-0696

August 17, 1984

HAND DELIVERED

Mr. Carlos Montoya
Design Hydrology Section
City of Albuquerque
P.O. Box 1293
Albuquerque, NM 87103

E7DS'

RECEIVED
AUG 17 1984
HYDROLOGY SECTION

Re: Drainage Plan for
Interstate Industrial Tract
DGA Job No. 731.11

Dear Mr. Montoya:

Thank you for your comments dated July 24, 1984, regarding the referenced project. We have reviewed the comments and submit a revised drainage report along with the following responses.

1. A vicinity map has been added to Sheet 1 of the plan.

2. On-site and off-site flows have been calculated and are included herein.

3. Off-site flows have been located on the map at the end of the report.

4. Proposed private drainage easements are shown on Sheet 2 of the plans. A grant of easement on the lot to the west is in progress and will be forwarded to you when complete.

5. We are in the process of coordinating the discharge of water into the North Diversion Channel with AMAFCA.

6. Calculations showing the velocities and depths of flows on adjacent property to the west are included in the report.

7. The symbol for the retaining wall has been added to the plan.

Please contact me if you require additional information.

Sincerely,

RTWilliams

Richard T. Williams, P.E.

RTW/cbk
Enclosures

DENNEY-GROSS & ASSOCIATES, INC.
CONSULTING ENGINEERS
2400 COMANCHE ROAD, N.E.
ALBUQUERQUE, NEW MEXICO 87107
(505) 884-0696

August 23, 1984

Mr. Carlos Montoya
Design Hydrology Section
City of Albuquerque
P.O. Box 1293
Albuquerque, NM 87103

Re: Drainage Plan for Interstate
Industrial Tract (E17-D51)
DGA Job No. 731.12

Dear Mr. Montoya:

This is to transmit to you one copy each of the recorded grants of easements for Lots 1A1 and 1B1, Block A, Unit II, Interstate Industrial Tract as you requested in paragraph 4 of your letter dated July 24, 1984, subject as above.

The design of the modifications to the existing rundown into the AMAFCA North Diversion Channel which you mentioned in paragraph 5 of your above referenced letter is currently under review by AMAFCA and the Corps of Engineers.

Please contact me if you require additional information.

Sincerely,

RTWilliams

Richard T. Williams, P.E.

RTW/cbk

Attachments

RECEIVED
AUG 24 1984
HYDROLOGY SECTION

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

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

September 21, 1984

Mr. Richard Williams
Denney-Gross & Associates, Inc.
2400 Comanche Road, N.E.
Albuquerque, New Mexico 87107

RE: DRAINAGE PLAN FOR INTERSTATE INDUSTRIAL TRACT (E17-D51) RECEIVED AUGUST 17, 1984

Dear Mr. Williams:

The above referenced drainage plan is approved contingent on the approval of AMAFCA and the Corps of Engineers on the modification of the existing rundown.

If I can be of further assistance, please contact me at 766-7644.

Sincerely yours,

Carlos A. Montoya
Civil Engineer/Hydrology

CAM/bm

RICHARD E. LEONARD
EXECUTIVE ENGINEER

B. H. SWINBURNE, CHAIRMAN
WILLIAM V. HEREFORD, VICE-CHAIRMAN
FRANCES McCOY, SECRETARY-TREASURER
R. WARD HUNNICUTT, DIRECTOR
KLESTON LAWS, DIRECTOR

Albuquerque
Metropolitan
Arroyo
Flood
Control
Authority

P. O. BOX 25851 - ALBUQUERQUE, N. M. 87125
TELEPHONE 884-2215

October 4, 1984

R. T. Williams
Denney-Gross & Associates
2400 Comanche Rd., NE
Albuquerque, NM 87107

SUBJECT: Drainage Plan for Interstate
Industrial Tract

Dear Rick:

The Rundown into the AMAFCA North Diversion Channel included with your submittal of October 1 is approved subject to adding 10 inches of Type II bedding material (see attached sheet) under the wire enclosed riprap detail on Sheet 2. Please send me two prints of the revised Sheet 2.

Sincerely,

Dan Sabo

Dan Sabo
Drainage Engineer

ic
encl.

RECEIVED
OCT 05 1984
DENNEY-GROSS & ASSOC., INC.

Table 5-3
GRADATION FOR GRANULAR BEDDING

Sieve Size	% by Weight passing Square Mesh Sieves	
	Type I	Type II
2"	-	90-100
1-1/2"	-	-
3/4"	-	20-90
3/8"	100	-
#4	95-100	0-20
#16	45-80	-
#50	10-30	-
#100	2-10	-
#200	0-2	0-3

lower layer in a two layer filter for protecting fine grained soils and has a gradation identical to Colorado Division of Highways concrete sand specification AASHTO M-6 (Section 703.02). Type II bedding, the upper layer in a two layer filter, is equivalent to Colorado Division of Highways Class A filter material (Section 703.09). When the channel consists of course sand and gravel (50% or more by weight retained on the #40 sieve), only the Type II filter is required. Otherwise, either a two layer bedding (Type I topped by Type II) is required, or alternatively, a single layer of Type II bedding equal in thickness to 1.25 times the thickness of Type I + Type II bedding. For required bedding thickness see Table 5-4.

The specifications for the T-V reverse filter relate the gradation of the protective layer (filter) to that of the bed material (base) by the following inequalities:

DENNEY-GROSS & ASSOCIATES, INC.
CONSULTING ENGINEERS
2400 COMANCHE ROAD, N.E.
ALBUQUERQUE, NEW MEXICO 87107
(505) 884-0696

October 8, 1984

Mr. Dan Sabo
Drainage Engineer
AMAFCA
P.O. Box 25851
Albuquerque, NM 87125

Re: Drainage Plan for Interstate
Industrial Tract
DGA Job No. 731.11

Dear Mr. Sabo:

Thank you for your letter dated October 4, 1984, regarding the referenced project. We have added ten inches of Type II bedding material under the wire enclosed riprap detail on Sheet 2 as you requested. This is to transmit to you two prints of the revised Sheet 2.

Please contact me if you require additional information.

Very truly yours,

RTWilliams

Richard T. Williams, P.E.

RTW/cbk

Enclosures

RECEIVED
NOV 21 1984
HYDROLOGY SECTION

DENNEY-GROSS & ASSOCIATES, INC.
CONSULTING ENGINEERS
2400 COMANCHE ROAD, N.E.
ALBUQUERQUE, NEW MEXICO 87107
(505) 884-0696

October 8, 1984

Mr. Carlos A. Montoya, P.E.
City of Albuquerque
Design Hydrology Section
123 Central Avenue, N.W.
Albuquerque, NM 87102

Re: Drainage Plan for Interstate
Industrial Tract (E17 - D51)
DGA Job No. 731.11

Dear Mr. Montoya:

Thank you for your letter of September 21, 1984, regarding the referenced project. This is to transmit to you one copy of the revised drainage plan for the project. The material relating to the existing rundown has been changed. The rundown design has been reviewed and approved by AMAFCA (see enclosed letter).

Please contact me if you require additional information.

Very truly yours,

RT Williams

Richard T. Williams, P.E.

RTW/cbk

Enclosures

RECEIVED
OCT 11 1984
HYDROLOGY SECTION

INFORMATION SHEET

PROJECT TITLE Drainage Plan for Lot 2, Block A, Unit II, Interstate Industrial Tract TYPE OF SUBMITTAL Drainage Plan

ZONE ATLAS PAGE NO. E-17-Z CITY ADDRESS 3700 Osuna Road N.E.

LEGAL DESCRIPTION Lot 2, Block A, Unit II, Interstate Industrial Tract

ENGINEERING FIRM DENNEY-GROSS & ASSOC. CONTACT Richard T. Williams, P.E.

ADDRESS 2400 Comanche Road N.E. PHONE 884-0696

OWNER Rademacher, Peixotto & Bradford CONTACT John Bradford

ADDRESS 5345 Wyoming N.E. PHONE 821-8512

ARCHITECT Flatow Moore Bryan & Assoc. CONTACT David Weatherman

ADDRESS 5608 Zuni S.E. PHONE 268-6783

SURVEYOR DENNEY-GROSS & ASSOCIATES CONTACT Steven L. Youtsey, L.S.

ADDRESS 2400 Comanche Road N.E. PHONE 884-0696

CONTRACTOR _____ CONTACT _____

ADDRESS _____ PHONE _____

PRE-DESIGN MEETING:

76

____ YES
X NO
____ COPY OF CONFERENCE RECAP SHEET PROVIDED

PLEASE CHECK TYPE OF APPROVAL EXPECTED WITH THIS SUBMITTAL:

____ SKETCH PLAT APPROVAL
____ PRELIMINARY PLAT APPROVAL
____ SITE DEVELOPMENT PLAN APPROVAL
____ FINAL PLAT APPROVAL
X BUILDING PERMIT APPROVAL
____ CERTIFICATE OF OCCUPANCY APPROVAL
____ ROUGH GRADING PERMIT APPROVAL
X GRADING/PAVING PERMIT APPROVAL
____ OTHER _____ (SPECIFY)

RECEIVED
OCT 11 1984
HYDROLOGY SECTION

DATE SUBMITTED: OCT 1, 1984

BY: RTWilliams
RICHARD T. WILLIAMS, P.E.

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

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

D24-86

November 14, 1984

3800
~~3620~~ Osuna Rd NE

Mr. Richard T. Williams, PE
Denney-Gross & Associates
2400 Comanche Road NE
Albuquerque, NM 87108

REF: DRAINAGE PLAN FOR INTERSTATE INDUSTRIAL TRACT (E17-D51)

Dear Mr. Williams:

Based on the information provided on your October 11, 1984 resubmittal of the above referenced drainage plan, listed you will find certain items that will need to be addressed before final approval is granted:

1. Sheet 1 of 2 will need the revised date included on the Engineer's stamp.

2. Copy of the recorded grant of easement with book and page number along with the Deputies signature.

Please advise your clients that upon completion of project, Engineer Certification will be in order because of the complexity of the drainage scheme across private property via private easements. Also, concurrence from AMAFCA on the rundown into the Diversion Channel will be required.

If you have any questions or comments, please feel free to call me at 766-7644.

Sincerely yours,

Carlos A Montoya

Carlos Montoya, PE
City/County Flood Plain Admin.

CM:EJM:mrk

DENNEY-GROSS & ASSOCIATES, INC.
CONSULTING ENGINEERS
2400 COMANCHE ROAD, N.E.
ALBUQUERQUE, NEW MEXICO 87107
(505) 884-0396

November 19, 1984

Mr. Carlos A. Montoya, P.E.
City of Albuquerque
Design Hydrology Section
123 Central Ave., N.W.
Albuquerque, NM 87102

Re: Drainage Plan for Interstate Industrial Tract (E17-D51)
DGA Job No. 731.11

Dear Mr. Montoya:

Thank you for your letter dated November 14, 1984, regarding the referenced project.

1. We have enclosed prints of both sheets. The date included on the Engineer's stamp has been revised on sheet 1 of 2.

2. We have enclosed copies of the recorded grants of easements. That for Lot 1B1, Block A, Unit II, Interstate Industrial Tract is recorded in Miscellaneous Book 148A, pages 617-619. That for Lot 1A1, is recorded in Miscellaneous Book 148A, pages 620-622.

We have advised our client that upon completion of the project, Engineer Certification will be in order because of the complexity of the drainage scheme across private property via private easements.

We have enclosed correspondence indicating AMAFCA's concurrence on the rundown into the Diversion Channel.

Please contact me if you require additional information.

Very truly yours,

RTWilliams

Richard T. Williams, P.E.

RTW/cbk

Enclosures

RECEIVED
NOV 21 1984
HYDROLOGY SECTION

INFORMATION SHEET

PROJECT TITLE Drainage Plan for Lot 2, Block A, Unit II, Interstate Industrial Tract TYPE OF SUBMITTAL Drainage Plan

ZONE ATLAS PAGE NO. E-17-Z DS CITY ADDRESS 3700 Osuna Road N.E.

LEGAL DESCRIPTION Lot 2, Block A, Unit II, Interstate Industrial Tract

ENGINEERING FIRM DENNEY-GROSS & ASSOC. CONTACT Richard T. Williams, P.E.

ADDRESS 2400 Comanche Road N.E. PHONE 884-0696

OWNER Rademacher, Peixotto & Bradford CONTACT John Bradford

ADDRESS 5345 Wyoming N.E. PHONE 821-8512

ARCHITECT Flatow Moore Bryan & Assoc. CONTACT David Weatherman

ADDRESS 5608 Zuni S.E. PHONE 268-6783

SURVEYOR DENNEY-GROSS & ASSOCIATES CONTACT Steven L. Youtsey, L.S.

ADDRESS 2400 Comanche Road N.E. PHONE 884-0696

CONTRACTOR _____ CONTACT _____

ADDRESS _____ PHONE _____

PRE-DESIGN MEETING:

____ YES
X NO
____ COPY OF CONFERENCE RECAP SHEET PROVIDED

PLEASE CHECK TYPE OF APPROVAL EXPECTED WITH THIS SUBMITTAL:

____ SKETCH PLAT APPROVAL
____ PRELIMINARY PLAT APPROVAL
____ SITE DEVELOPMENT PLAN APPROVAL
____ FINAL PLAT APPROVAL
X BUILDING PERMIT APPROVAL
____ CERTIFICATE OF OCCUPANCY APPROVAL
____ ROUGH GRADING PERMIT APPROVAL
X GRADING/PAVING PERMIT APPROVAL
____ OTHER _____ (SPECIFY)

RECEIVED
NOV 21 1984
HYDROLOGY SECTION

DATE SUBMITTED: NOV 21, 1984

BY: RTWilliams
RICHARD T. WILLIAMS, P.E.

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

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

January 3, 1985

Richard T. Williams
Denney-Gross & Associates
2400 Comanche Road, NE
Albuquerque, New Mexico 87107

RE: DRAINAGE PLAN FOR INTERSTATE INDUSTRIAL TRACT, UNIT II;
BLOCK A, LOT 2 (E-17/D51) RECEIVED NOVEMBER 21, 1984

Mr. Williams:

The referenced plan dated September 27, 1984, is approved.

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

If I can be of further assistance, please call me at 766-7644.

Cordially,

Carlos A. Montoya
City/County Floodplain Administrator

CAM/bsj

FILE COPY

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

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

April 2, 1986

John Bradford
Rademacker, Peixotto & Bradford
5345 Wyoming Blvd., NE
Albuquerque, New Mexico 87109

RE: CONCRETE RUNDOWN FOR INTERSTATE INDUSTRIAL TRACT, LOT 2.
BLOCK A, UNIT II (E-17/D51)

Dear Mr. Bradford:

It has been brought to my attention that the concrete rundown into the North Diversion Channel has not been completed. We approved the engineering plan, however, it was not constructed according to this plan. The rundown improvements are essential to the discharge from your property.

We would appreciate your prompt review of this matter.

Cordially,

Carlos A. Montoya

Carlos A. Montoya, P.E.
City/County Floodplain Administrator

CAM/bsj

cc: Dan Sabo, A.M.A.F.C.A.

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

RTWilliams

New Mexico Professional Engineer No. 7309

RICHARD T. WILLIAMS
NEW MEXICO
7309
REGISTERED PROFESSIONAL ENGINEER

I N D E X

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SOILS MAP	
SHEET 1 - LOT 2 BLOCK A, UNIT II INTERSTATE INDUSTRIAL TRACT GRADING PLAN	
SHEET 2 - LOT 2 BLOCK A, UNIT II INTERSTATE INDUSTRIAL TRACT DISCHARGE OF FLOWS	

LOT 2, BLOCK A, UNIT II
INTERSTATE INDUSTRIAL TRACT
DRAINAGE PLAN

I. PURPOSE:

The purpose of this report is to analyze and manage the storm flows within the above lot resulting from the 6-hour 100-year event according to methodology presented in the City of Albuquerque Development Process Manual.

II. EXISTING CONDITIONS:

The site is located between Osuna Road N.E. and the AMAFCA Bear Arroyo Channel and from about 400 feet to about 1000 feet east of the AMAFCA North Diversion Channel. It has an area of 10.02 acres. The adjacent property to the west is developed for commercial and industrial uses. The adjacent property to the east is partially developed for commercial and industrial uses.

The property slopes to the west and north at about two percent. The soils are Embudo gravelly fine sandy loam. Runoff on this soil is medium, and the hazard of water erosion is moderate.

The site is not located within a 100-year flood hazard area according to the National Flood Insurance Program Flood Boundary and Floodway Map, City of Albuquerque, panel 16.

There is an existing concrete rundown on the adjacent site to the west. The rundown drains into the AMAFCA Channel.

III. PROPOSED CONDITIONS:

Proposed development includes construction of three office buildings totaling 151,500 SF, paved parking and access totaling 252,870 SF, and landscaping of 32,000 SF.

The 6-hour 100-year storm will generate a peak flow from the property of about 42 cfs. Total volume of flow will be on the order of 71,200 cf. It is proposed to discharge this flow across the adjacent property to the west through existing swales in the parking and access areas which were designed for this purpose. The flows will be collected at, and discharged through, and existing rundown into the AMAFCA North Diversion Channel.

The offsite area contributing flows to the site totals about 4.6 acres. The peak flow generated from this area is 18.4 cfs, which will be accepted at the east boundary of the site, conveyed across the site, and discharged across the adjacent property to the west into the AMAFCA North Diversion Channel.

The adjacent property to the west will have an onsite peak flow of 20 cfs. This flow will combine with the offsite flows of 42 cfs and 18.4 cfs from the two adjacent sites to the east for a total of 80.4 cfs which will be discharged through a concrete rundown into the AMAFCA Channel.

The existing rundown was found to have inadequate capacity to accept this flow. We thus propose that the existing rundown be removed and a new one constructed.

The proposed rundown was designed according to methodology presented in Urban Storm Drainage Criteria Manual Vol. 1 (Wright-McLaughlin Engineers, 1969), particularly the material regarding design of curb opening inlets.

The existing paving will be depressed two inches at the mouth of the rundown. A six-inch concrete rundown 30 feet wide and 0.9 feet high will be required. The width of the rundown tapers to ten feet over a distance 33.5 feet. The ten-foot rundown section will continue for 16 feet. At this point the flows will discharge onto a one-foot thick wire-tied rip-rap apron. The wire-tied apron will extend approximately 27 feet to an existing concrete apron on the overbank area of the AMAFCA North Diversion Channel.

Private drainage easements have been granted on the property to the west to accept and convey the flows generated from the site.

All calculations are included within this report.

IV. CONCLUSION:

The material contained herein demonstrates a storm water management scheme which will provide the site with a practical and effective plan for handling storm water runoff during times of precipitation.

Approval of this plan is requested.

CALCULATIONS

DENNEY - GROSS & ASSOCIATES, INC.
ENGINEERS SURVEYORS PLANNERS
2400 COMANCHE ROAD N.E.
ALBUQUERQUE, NEW MEXICO 87107
(505) 884-0695

LOCATION LOT 2, BLOCK A, UNIT II INTERSTATE INDUSTRIAL TRACT

PROJ. NO. 731.11

DATE APR 10, 1984

DESIGNER RTW

PAGE 1

A = 436,370 SF = 10.02 AC

PERVIOUS AREA = 32,000 SF

IMPERVIOUS AREA = 436,370 - 32,000 = 404,370 SF

% IMPERVIOUS = $\frac{404,370}{436,370}$ = 0.93

SOIL SERIES - EMB (EMBUDO GRAVELLY FINE SANDY LOAM. RUNOFF IS MEDIUM, AND THE HAZARD of WATER EROSION IS MODERATE. THIS SOIL IS USED for WATERSHED, WILDLIFE HABITAT, COMMUNITY DEVELOPMENT, AND RANGE. CONTROL of MOISTURE IS NEEDED for PROPER COMPACTION). (SCS - SOIL SURVEY of BERNALILLO COUNTY, NM, MAP 21 + p. 18).

HYDROLOGIC SOIL GROUP - B (op. cit., pp. 76-77).

C = 0.83 (DPM VOL 2, # 22.2 C-1)

P = 2.2" (DPM VOL 2, # 22.2 D-1)

ΔH = 5113 - 5096 = 17'

L = 840'

S = $\frac{17}{840}$ = 0.0202

$t_c = 0.0077 \frac{(840)^{0.77}}{(0.0202)^{0.385}}$ = 6.17 USE t_c = 10 MIN

$I = 2.2 (6.84)(10)^{-0.51}$ = 4.65

Q_{100} = 0.83 (4.65)(10.02) = 41.47 CFS

V_{100} = 0.83 $\left(\frac{2.2}{12}\right)$(436,370) = 71,201 CF

DENNEY - GROSS & ASSOCIATES, INC.
ENGINEERS SURVEYORS PLANNERS
2400 COMANCHE ROAD N.E.
ALBUQUERQUE, NEW MEXICO 87107
(505) 884-0695

LOCATION INTERSTATE INDUSTRIAL PARK
PROJ. NO. 731.11
DATE JUN 1, 1984
DESIGNER RW
PAGE 2

ANALYSIS of OFFSITE FLOWS

MAP SCALE : 1" = 500'

$1 in^2$ = 250,000 SF = 5.74 AC

$\frac{78+73+74}{3}$ = 75 PLANIMETER UNITS = 5.74 AC

1 P.U. = 0.077 AC

OFFSITE DRAINAGE AREA

$\frac{60+61+59}{3}$ = 60 P.U. = 4.6 AC

SOIL SERIES - EmB - EMBUDO GRAVELLY FINE SANDY LOAM, 0 to 5 PERCENT SLOPES. RUNOFF IS MEDIUM, AND THE HAZARD of WATER EROSION IS MODERATE. THIS SOIL IS USED for WATERSHED, WILDLIFE HABITAT, COMMUNITY DEVELOPMENT, AND RANGE (SCS - SOIL SURVEY of BERNALILLO COUNTY, NM, MAP 21 & P. 18).

HYDROLOGIC SOIL GROUP = B (op. cit., pp 76-77)

ASSUME ULTIMATE DEVELOPMENT (90% IMPERVIOUS)

C = 0.86 (DPM VOL 2, ⊥ 22.2 C-1)

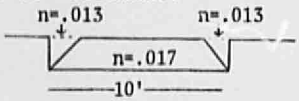
ASSUME t_c = 10 MIN

P = 2.2" (DPM VOL 2, ⊥ 22.2 D-1)

$I = 2.2 \times 6.84 \times 10^{-0.51} = 4.65$

$Q_{100} = 0.86(4.65)(4.6) = 18.4$ CFS

Theoretical calculations to check the maximum carrying capacity of a 10' easement.



lowest adjoining finished floor elevation
existing invert of swale elevation

Sides are concrete and bottom is asphalt

Using Mannings Equation $Q = \frac{1.486}{n} S^{1/2} R^{2/3} A$

A $d = 98.95 - 96.52 = 2.43$

$A = d^2 = 5.9049$ $\quad 10d - d^2 = 18.395$

$P = 2d = 4.8600'$ $\quad 10.000'$

$R = \frac{d}{2} = 1.215'$ $\quad 1.8395'$

$R^{2/3} = 1.1386.$ $\quad 1.5013$

$S = \frac{97.25 - 96.52}{13.5} = 0.0054$

$Q = 1.486\ (0.0054)^{\frac{1}{2}} \left(\frac{5.9049 \times 1.1386}{.013} + \frac{18.395 \times 1.5013}{.017}\right) = 234$ cfs

Flow 57.85 cfs <u>Safe</u>

B $Q = 234$ cfs

Flow 36.43 cfs <u>Safe</u>

C $d = 98.76 - 98.25 = 0.51'$

$A = d^2 = 0.2601$ $\quad 10d - d^2 = 4.8399$

$P = 2d = 1.02'$ $\quad 10.000'$

$R = \frac{d}{2} = 0.2550'$ $\quad 0.48399'$

$R^{2/3} = 0.4021$ $\quad 0.6164$

$S = \frac{99.58 - 97.56}{230} = 0.0088$

$Q = 1.486\ (0.0088)^{\frac{1}{2}} \left(\frac{0.2601 \times 0.4021}{.013} + \frac{4.8399 \times 0.6164}{.017}\right) = 25.6$ cfs

Flow = 24.32 cfs <u>Safe</u>

D $d = 00.77 - 00.14 = 0.63$

$A = d^2 = 0.3969$ $(10-d)d = 5.9031$

$P = 2d = 1.26'$ 10.000

$R = 0.315'$ $0.59031'$

$R^{2/3} = 0.4630$ 0.7037

$$S = \frac{100.14 - 99.21}{135} = 0.0069$$

$$Q = 1.486\ (0.0069)^{\frac{1}{2}}\ \left(\frac{0.3969 \times 0.4630}{.013} + \frac{5.9031 \times 0.7037}{.017}\right) = 31.91 \text{ cfs}$$

Flow = 28.34 <u>Safe</u>

E $d = 98.95 - 96.75 = 2.2'$

$A = d^2 = 4.84$ $(10-d)d = 17.16$

$P = 2d = 4.4'$ $10.000'$

$R = 1.1'$ $1.716'$

$R^{2/3} = 1.0656$ 1.4333

$$S = \frac{96.1 - 95.76}{72} = 0.0047$$

$$Q = 1.486\ (0.0047)^{\frac{1}{2}}\ \left(\frac{4.84 \times 1.0656}{.013} + \frac{17.16 \times 1.4333}{.017}\right) = 187.8 \text{ cfs}$$

Flow = 19.1 cfs <u>Safe</u>

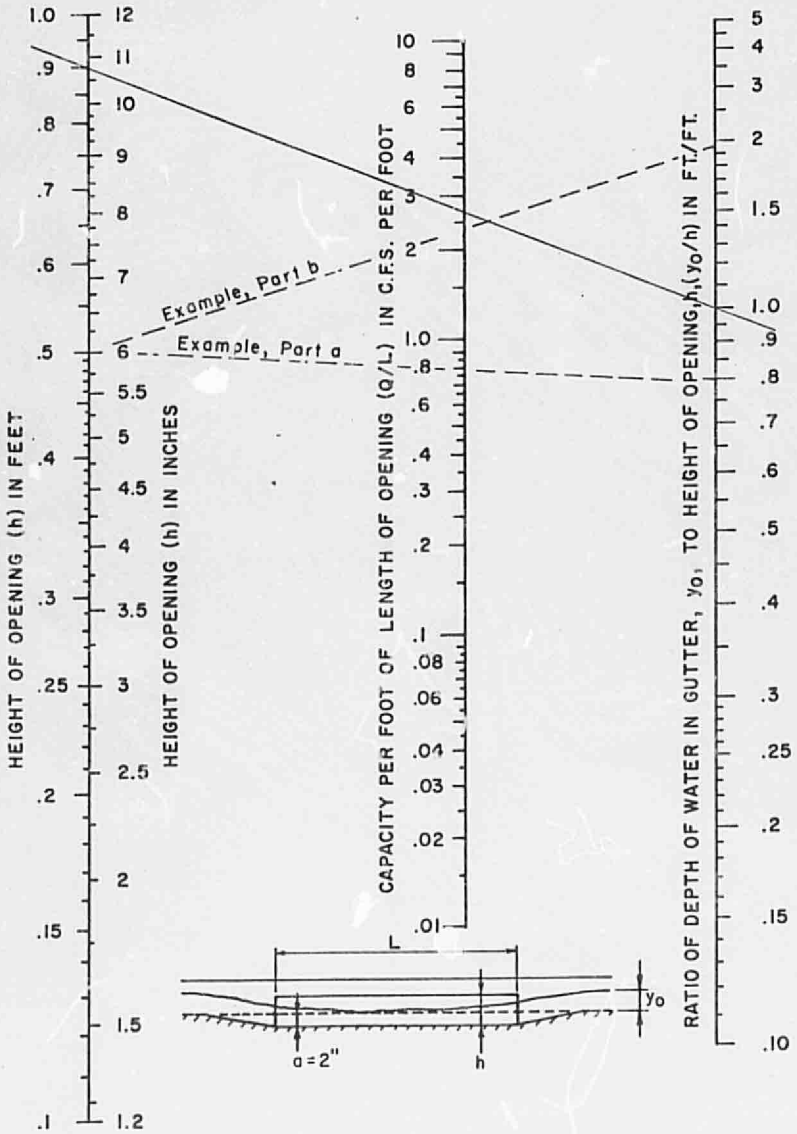


FIGURE 3-1. NOMOGRAPH FOR CAPACITY OF CURB OPENING INLETS IN SUMPS, DEPRESSION DEPTH 2"

Adapted from Bureau of Public Roads Nomograph.

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LOCATION INTERSTATE INDUSTRIAL TRACT
PROJ. NO. 731.11
DATE SEP 19, 1984
DESIGNER RTW
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CONCRETE RUNDOWN CALCULATIONS

$Q = 80.4$ CFS

$TC = 96.27$, $FL = 95.37$

$H = TC - FL = 96.27 - 95.37 = 0.90$

RATIO of DEPTH of WATER TO HEIGHT of OPENING = 1

from NOMOGRAPH FIG. 3-1: $\frac{Q}{L} = 2.7$

$L_{REQ} = \frac{80.4}{2.7} = 29.77'$ USE $30'$

$S_1 = \frac{95.37 - 89.81}{33.5} = 0.1660$

$Q = \frac{1.486}{n} A r^{\frac{2}{3}} S^{\frac{1}{2}}$, $n = 0.013$

$A r^{\frac{2}{3}} = \frac{Qn}{1.486 S^{\frac{1}{2}}} = \frac{80.4(0.013)}{1.486(0.1660)^{\frac{1}{2}}} = 1.73$

try $w = 10'$, $h = 0.9'$

$A = 10(0.9) = 9$ SF

$WP = 2(0.9) + 10 = 11.8$

$r^{\frac{2}{3}} = \left(\frac{9}{11.8}\right)^{\frac{2}{3}} = 0.8348$

$A r^{\frac{2}{3}} = 9(0.8348) = 7.51 > 1.73$ OK

$S_2 = \frac{89.81 - 85.37}{16} = 0.2400$

$A r^{\frac{2}{3}} = \frac{80.4(0.013)}{1.486(0.2400)^{\frac{1}{2}}} = 1.44$

USE $W = 10'$, $h = 0.9'$ $(A r^{\frac{2}{3}} = 7.51 > 1.44)$

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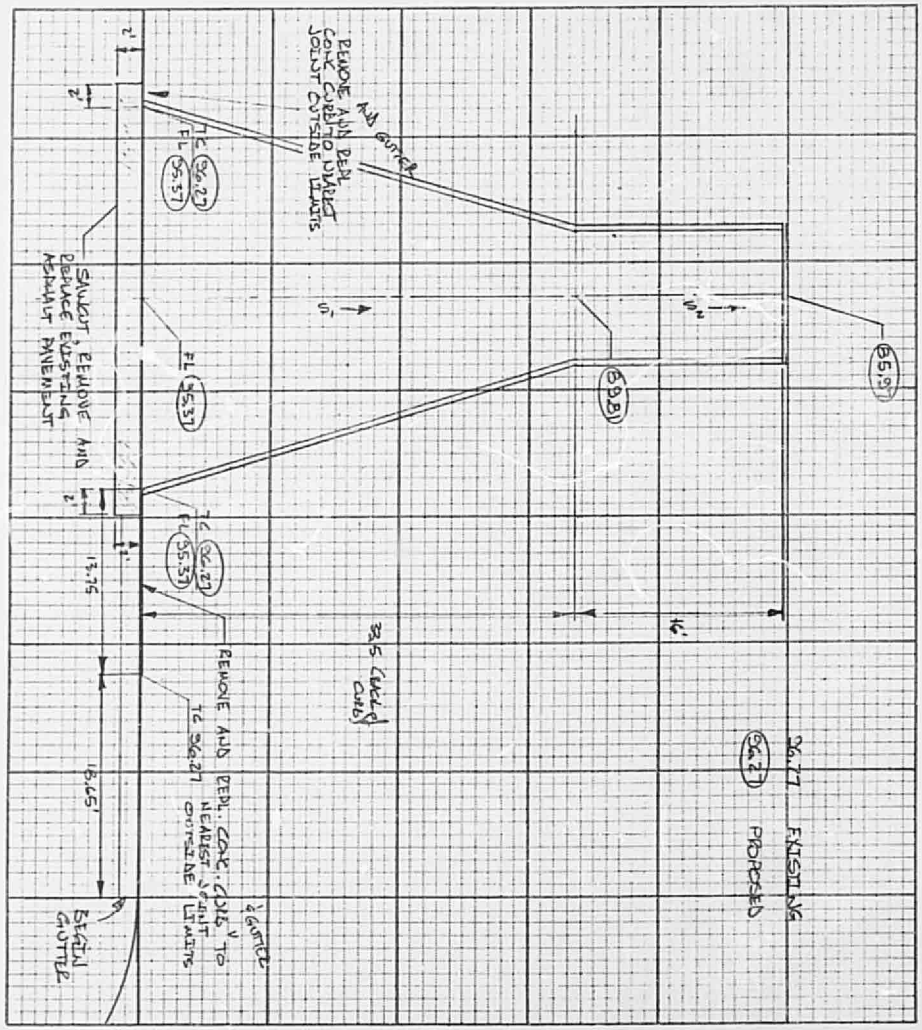

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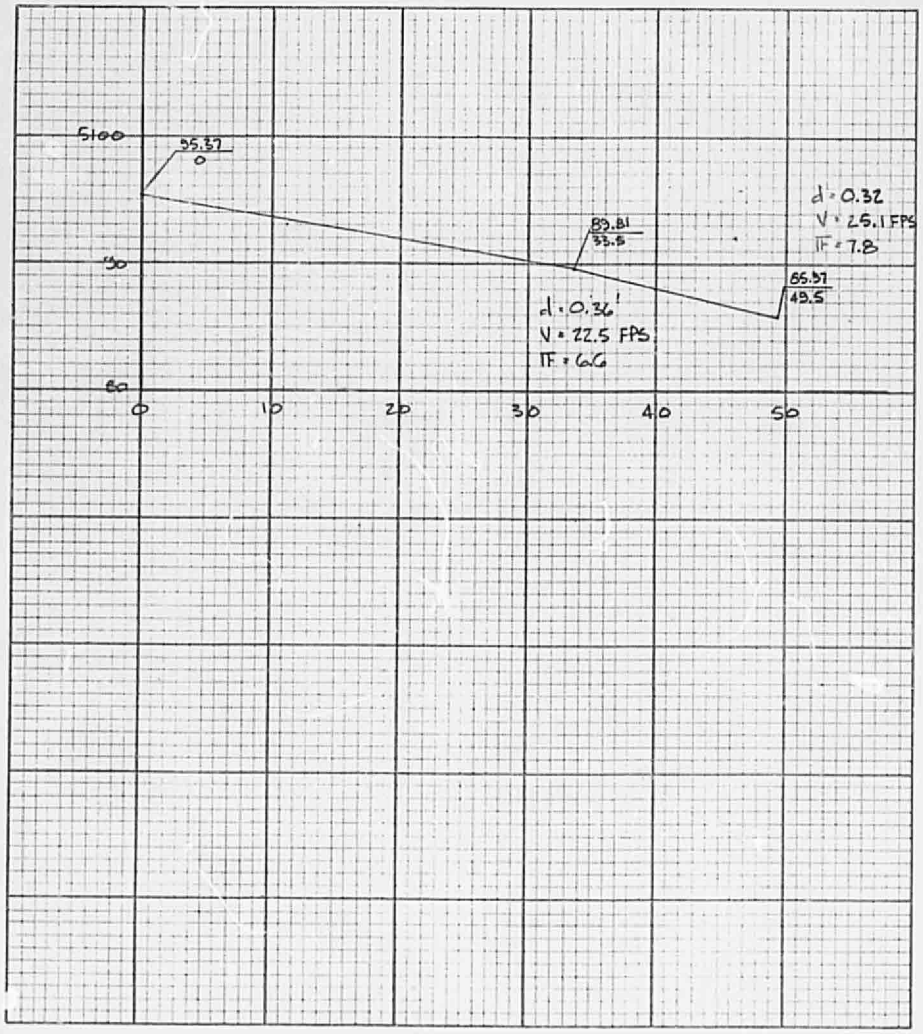

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DEPTH, FROUDE NUMBER COMPUTATIONS

POINT 1 (33.5' DOWNSTREAM of CURB OPENING), S = 0.1660 (from p. 1)

$Q = \frac{1.486}{n} A r^{\frac{2}{3}} s^{\frac{1}{2}}$

$A r^{\frac{2}{3}} = \frac{Qn}{1.486 s^{\frac{1}{2}}} = \frac{80.4(0.013)}{1.486(0.1660)^{\frac{1}{2}}} = 1.73$

$W = 10'$

$A = Wd = 10d$

$WP = 2d + 10$

$r^{\frac{2}{3}} = \left(\frac{10d}{2d+10}\right)^{\frac{2}{3}}$

$A r^{\frac{2}{3}} = 10d\left(\frac{10d}{2d+10}\right)^{\frac{2}{3}} = 1.73$

$d\left(\frac{10d}{2d+10}\right)^{\frac{2}{3}} = 0.173$

$d^{\frac{3}{2}}\left(\frac{10d}{2d+10}\right) = (0.173)^{\frac{3}{2}} = 0.072$

$10d^{\frac{5}{2}} = 0.072(2d+10)$

$d^{\frac{5}{2}} = 0.00[illegible](2d+10)$

$\frac{d^{\frac{5}{2}}}{0.0072} = 2d + 10$

$138.89 d^{\frac{5}{2}} - 2d = 10$

try $d = 0.36$

$138.89(0.36)^{\frac{5}{2}} - 2(0.36) = 10.08$ OK

$r^{\frac{2}{3}} = \left[\frac{10(.36)}{2(.36)+10}\right]^{\frac{2}{3}} = 0.4831$

$V = \frac{1.486}{0.013}(0.4831)(0.1660)^{\frac{1}{2}} = 22.5$ FPS

$IF = \frac{V}{\sqrt{gd}} = \frac{22.5}{\sqrt{32.2(0.36)}} = 6.6$

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POINT 2 (49.5' DOWNSTREAM of CURB OPENING), S = 0.2100 (from p.1)

$$Ar^{\frac{2}{3}} = \frac{30A\,(0.013)}{1.486\,(0.2100)^{\frac{1}{2}}} = 1.44$$

$$Ar^{\frac{2}{3}} = 10d\left(\frac{10d}{2d+10}\right)^{\frac{2}{3}} = 1.44$$

$$d\left(\frac{10d}{2d+10}\right)^{\frac{2}{3}} = 0.144$$

$$d^{\frac{2}{3}}\left(\frac{10d}{2d+10}\right) = (0.144)^{\frac{3}{2}} = 0.055$$

$$10d^{\frac{5}{3}} = 0.055\,(2d+10)$$

$$d^{\frac{5}{3}} = 0.0055\,(2d+10)$$

$$\frac{d^{\frac{5}{3}}}{0.0055} = 2d+10$$

$$181.82\,d^{\frac{5}{3}} - 2d = 10$$

try $d = 0.32$

$$181.82(0.32)^{\frac{5}{3}} - 2(0.32) = 9.89 \quad \text{OK}$$

$$r^{\frac{2}{3}} = \left[\frac{10(0.32)}{2(0.32)+10}\right]^{\frac{2}{3}} = 0.4485$$

$$V = \frac{1.486}{0.015}(0.4485)(0.2100)^{\frac{1}{2}} = 25.1 \text{ FPS}$$

$$F = \frac{V}{\sqrt{gd}} = \frac{25.1}{\sqrt{32.2(0.32)}} = 7.8$$

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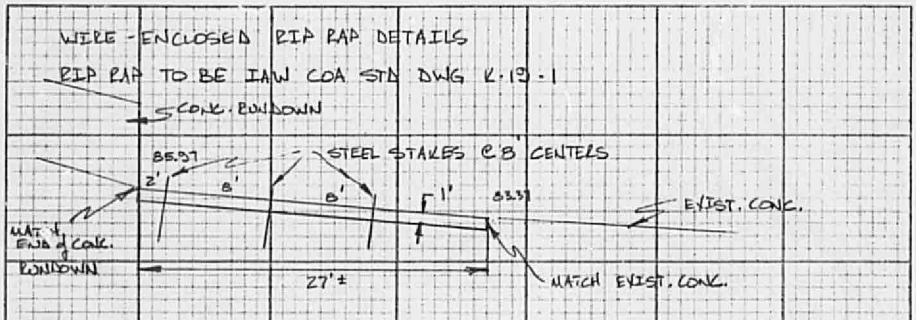
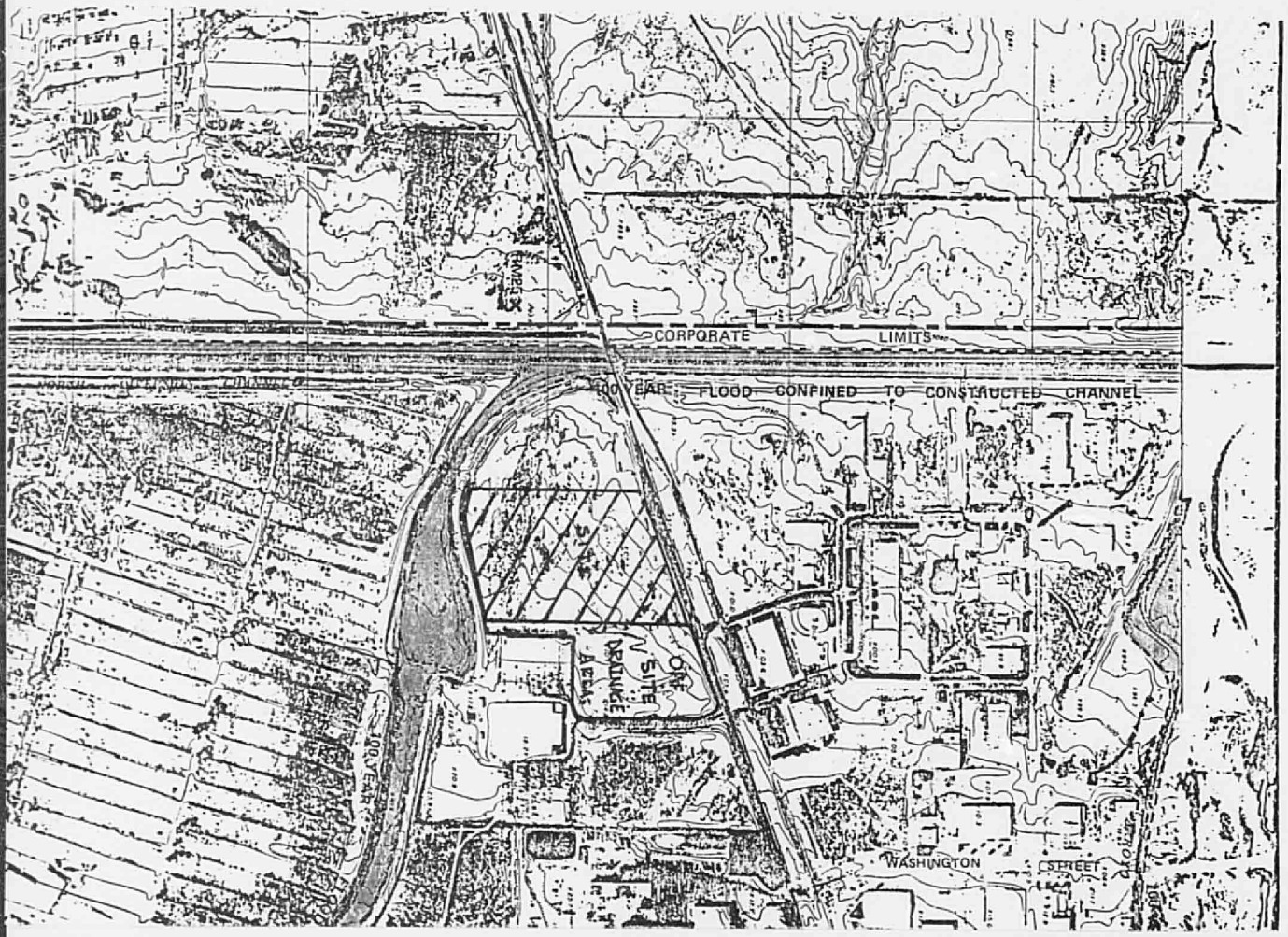
WIRE - ENCLOSED RIP RAP DETAILS

RIP RAP TO BE IAW COA STD DWG K-13-1

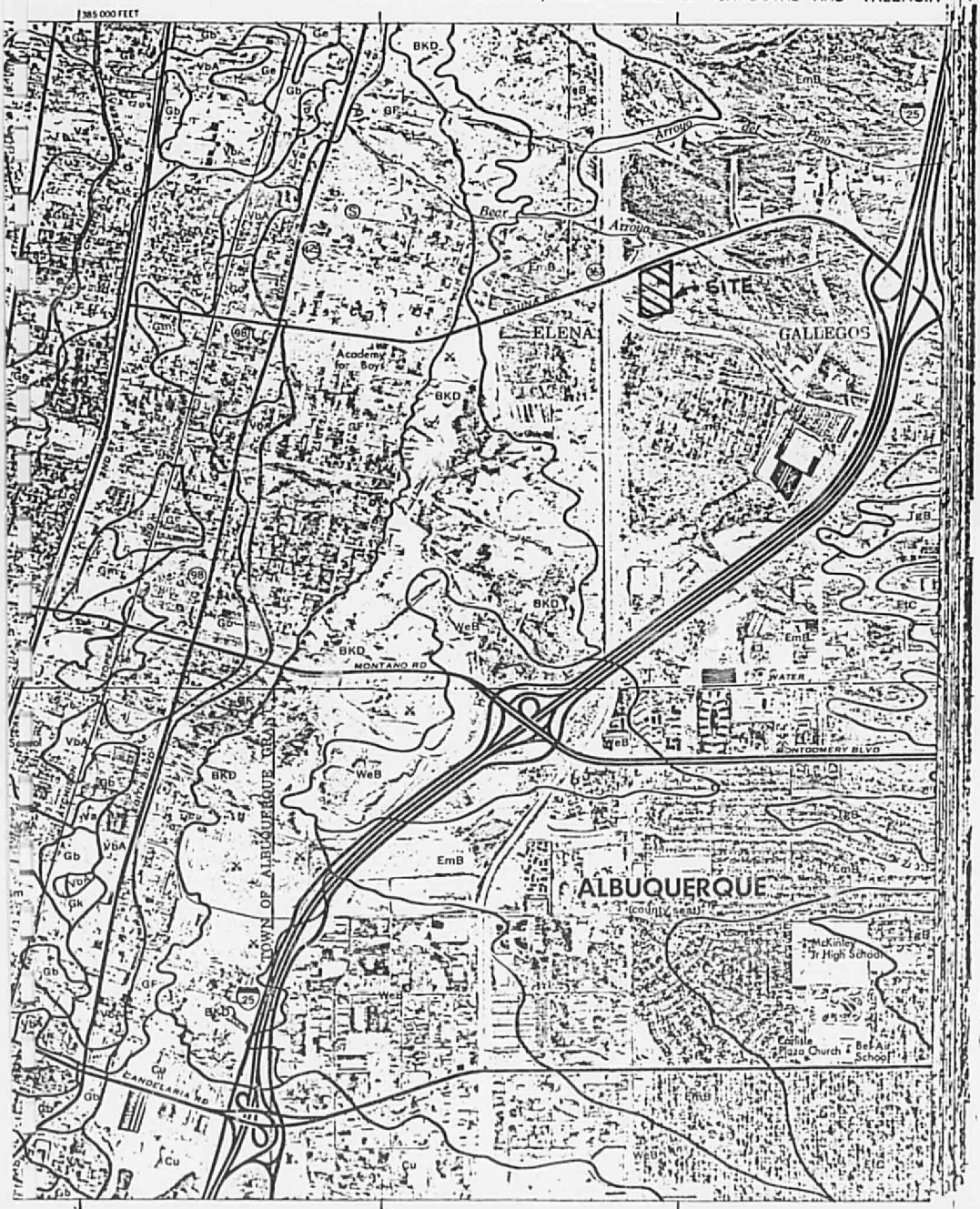


FLOOD HAZARD MAP


CORPORATE
LIMITS
100 YEAR FLOOD CONFINED TO CONSTRUCTED CHANNEL
SITE
DRAINAGE
AREA
WASHINGTON
STREET

SOILS MAP

BERNALILLO COUNTY, AND PARTS OF SANDOVAL AND VALENCIA



84 64741

GRANT OF EASEMENT

THE GRANTORS, owners of Lot 1B1, Block A, Unit II of the Interstate Industrial Tract, Rademacher, Peixotto and Bradford, a New Mexico Partnership, for and in consideration of the sum of ONE DOLLAR ($1.00), the receipt whereof is hereby acknowledged, hereby grants to the owners of Lot 2, Block A, Unit II of the Interstate Industrial Tract, Rademacher, Peixotto and Bradford, a New Mexico Partnership, their successors and assignees the right to drain surface runoff across real property hereinafter described situated in the County of Bernalillo, State of New Mexico.

Said Real Property is described as follows:

SEE EXHIBIT "A"

THE GRANTEES, their successors and assignees and their agents and employees, shall at all times have free use of the above described real property for the sole purpose of draining surface runoff.

THE GRANTORS, their successors and assignees and their agents and employees shall construct no structures which will obstruct drainage of surface runoff within the above described real property.

IN WITNESS WHEREOF, the GRANTORS, Rademacher, Peixotto and Bradford, a New Mexico Partnership, EXECUTED THIS AGREEMENT THE 22nd day of August, 1984.

Rademacher, Peixotto and Bradford,
A New Mexico Partnership

John R. Bradford
General Partner

WITNESS

R T Williams

State of NEW MEXICO)
) ss.
County of Bernalillo)

On this 22nd day of August A.D., 1984, before me, Carol Kent A Notary Public in and for said County and State, residing therein duly commissioned and sworn, personally appeared Richard T. Williams, known to me to be the person whose name is subscribed to the within Instrument, as a Witness thereto, who being by me duly sworn, deposes and says: That he resides in Albuquerque, New Mexico, and that he was present and says that John B. Bradford executed the foregoing instrument before him and is personally known to him to be the same person as whose name is subscribed to the within and annexed Instrument, did execute and deliver the same, and his name thereto as a Witness. In Witness Whereof, I have hereunto set my hand and affixed my official seal the day and year in this certificate first above written.

My Commission Expires:
February 2, 1988

Carol Kent
Notary Public

EXHIBIT A

DRAINAGE EASEMENTS IN
LOT 1B1, BLOCK A, UNIT II
INTERSTATE INDUSTRIAL TRACT

That certain twenty foot strip of land situate within Lot 1B1 as shown and designated on the plat entitled "Redivision of the Replat of Lot 1, Block A, Unit II, Interstate Industrial Tract" as filed for Public Record in the Office of the Bernalillo County Clerk on March 23, 1982 in Volume C19, Folio 108, lying within projected Sections 26 and 27, Township 11 North, Range 3 East of the New Mexico Principal Meridian, within the Elena Gallegos Land Grant, Bernalillo County, New Mexico, and being more particularly described as follows:

BEGINNING at the southern most corner of said Lot 1B1, being marked by a rebar; thence,

Following the southwest boundary of said Lot 1B1 for the next four (4) courses:

N 85° 03' 11" W, 0.91 feet; thence,

N 63° 46' 05" W, 159.68 feet to a found rebar; thence,

Northwesternly, 340.02 feet along the arc of a curve to the right (said arc having a radius of 452.96 feet, a central angle of 43° 00' 28" and a long chord which bears N 41° 31' 44" W, a distance of 332.08 feet) to a found rebar; thence,

N 20° 00' 29" W, 87.85 feet to the northwest corner of said Lot 1B1; thence,

N 89° 58' 17" E, 21.28 feet along the north boundary of said Lot 1B1; thence,

S 20° 00' 29" E, 80.57 feet; thence,

Southeasternly, 324.99 feet along the arc of a curve to the left (said arc having a radius of 432.96 feet, a central angle of 43° 00' 28" and a long chord which bears S 41° 31' 44" E, a distance of 317.42 feet); thence,

S 63° 46' 05" E, 150.57 feet to the east boundary of said Lot 1B1; thence,

S 00° 01' 43" E, 21.93 feet along said east boundary of Lot 1B1 to the POINT OF BEGINNING of the strip of land herein described.

The above delineated strip of land lies adjacent to and contiguous with said southwest boundary of Lot 1B1 is twenty (20.00') feet wide and contains 11,446 square feet (0.2628 acres), more or less.

TOGETHER WITH:

That certain ten foot (10') strip of land situate within Lot 1B1 as shown and designated on the plat entitled "Redivision of the Replat of Lot 1, Block A, Unit II, Interstate Industrial Tract" as filed for Public Record in the Office of the Bernalillo County Clerk on March 23, 1982 in Volume C19, Folio 108, lying within projected Sections 26 and 27, Township 11 North, Range 3 East of the New Mexico Principal Meridian, within the Elena Gallegos Land Grant, Bernalillo County, New Mexico, and being more particularly described as follows:

Beginning at the northeast corner of said Lot 1B1; whence, the most southerly corner of said Lot 1B1 bears S 00° 01' 43" E, a distance of 462.00 feet; thence, S 89° 58' 17" W, 16.53 feet along the north boundary of said Lot 1B1 to the TRUE POINT OF BEGINNING and northeast corner of the ten foot (10') strip of land herein described; thence,

S 00° 01' 43" E, 26.29 feet; thence,

S 07° 44' 50" W, 18.27 feet; thence,

S 00° 01' 43" E, 386.30 feet to the southeast corner of the ten foot (10') strip of land herein described; thence,

N 63° 46' 05" W, 11.15 feet to the southwest corner of the ten foot (10') strip of land herein described; t ence,

N 00° 01' 43" W, 382.08 feet; thence,

N 07° 44' 50" E, 18.24 feet; thence,

N 00° 01' 43" W, 25.61 feet to the northwest corner of the ten foot (10') strip of land herein described, being on said north boundary of Lot 1B1; thence,

N 89° 58' 17" E, 10.00 feet to the TRUE POINT OF BEGINNING of the ten foot (10') strip of land herein described.

The above delineated ten (10.00') foot strip of land contains 4282 square feet (0.0983 acres), more or less.

The combined drainage easements within said Lot 1B1, Block A, Unit II of the Interstate Industrial Tract herein described contain 15,729 square feet (0.3611 acres), more or less.

STATE OF NEW MEXICO
COUNTY OF BERNALILLO
FILED FOR RECORD

1984 AUG 23 AM 8:56

BK. _____ PG. _____
DOLORES C. WALLER
CO. CLERK & RECORDER
_____ DEPUTY

84 64742

GRANT OF EASEMENT

THE GRANTORS, owners of Lot 1A1, Block A, Unit II of the Interstate Industrial Tract, Rademacher, Peixotto and Bradford, a New Mexico Partnership, for and in consideration of the sum of ONE DOLLAR ($1.00), the receipt whereof is hereby acknowledged, hereby grants to the owners of Lot 2, Block A, Unit II of the Interstate Industrial Tract, Rademacher, Peixotto and Bradford, a New Mexico Partnership, their successors and assignees the right to drain surface runoff across real property hereinafter described situated in the County of Bernalillo, State of New Mexico.

Said Real Property is described as follows:

SEE EXHIBIT "A"

THE GRANTEES, their successors and assignees and their agents and employees, shall at all times have free use of the above described real property for the sole purpose of draining surface runoff.

THE GRANTORS, their successors and assignees and their agents and employees shall construct no structures which will obstruct drainage of surface runoff within the above described real property.

IN WITNESS WHEREOF, the GRANTORS, Rademacher, Peixotto and Bradford, a New Mexico Partnership, EXECUTED THIS AGREEMENT THE 22nd day of August, 1984.

Rademacher, Peixotto and Bradford,
A New Mexico Partnership

John R. Bradford
General Partner

WITNESS

RTW Williams

State of NEW MEXICO)
) ss.
County of Bernalillo)

On this 22nd day of August A.D., 1984, before me, Carol Kent A Notary Public in and for said County and State, residing therein duly commissioned and sworn, personally appeared Richard T. Williams, known to me to be the person whose name is subscribed to the within Instrument, as a Witness thereto, who being by me duly sworn, deposes and says: That he resides in Albuquerque, New Mexico, and that he was present and says that John B. Bradford executed the foregoing instrument before him and is personally known to him to be the same person as whose name is subscribed to the within and annexed Instrument, did execute and deliver the same, and his name thereto as a Witness. In Witness Whereof, I have hereunto set my hand and affixed my official seal the day and year in this certificate first above written.

My Commission Expires:
February 2, 1988

Carol Kent
Notary Public

EXHIBIT A

DRAINAGE EASEMENTS IN
LOT 1A1, BLOCK A, UNIT II
INTERSTATE INDUSTRIAL TRACT

That certain strip of land situate within Lot 1A1 as shown and designated on the plat entitled "Redivision of the Replat of Lot 1, Block A, Unit II, Interstate Industrial Tract" as filed for Public Record in the Office of the Bernalillo County Clerk on March 23, 1982 in Volume C19, Folio 108, lying within projected Sections 26 and 27, Township 11 North, Range 3 East of the New Mexico Principal Meridian, within the Elena Gallegos Land Grant, Bernalillo County, New Mexico, and being more particularly described as follows:

BEGINNING at an angle point on the west boundary of said Lot 1A1, being marked by a rebar; whence, the northwest corner of said Lot 1A1 bears N 00° 00' 32" W, a distance of 138.72 feet; thence,

N 00° 00' 32" W, 122.18 feet along said west boundary of Lot 1A1; thence,

N 70° 01' 06" E, 420.53 feet to the east boundary of said Lot 1A1; thence,

S 00° 01' 43" E, 15.96 feet along said east boundary of Lot 1A1; thence,

S 70° 01' 06" W, 404.58 feet; thence,

S 00° 00' 32" E, 94.41 feet; thence,

S 20° 00' 29" E, 21.77 feet to the south boundary of said Lot 1A1; thence,

S 89° 58' 17" W, 21.28 feet along said south boundary of Lot 1A1 to the southwest corner of said Lot 1A1; thence,

N 20° 00' 29" W, 3.41 feet along said west boundary of Lot 1A1 to the POINT OF BEGINNING of the strip of land herein described.

The above delineated strip of land contains 8065 square feet (0.1851 acres), more or less.

TOGETHER WITH:

That certain parcel of land situate within Lot 1A1 as shown and designated on the plat entitled "Redivision of the Replat of Lot 1, Block A, Unit II, Interstate Industrial Tract" as filed for Public Record in the Office of the Bernalillo County Clerk on March 23, 1982 in Volume C19, Folio 108, lying within projected Sections 26 and 27, Township 11 North, Range 3 East of the New Mexico Principal Meridian, within the Elena Gallegos Land Grant, Bernalillo County, New Mexico, and being more particularly described as follows:

BEGINNING at the southeast corner of said Lot 1A1; whence, the northeast corner of said Lot 1A1 bears N 00° 01' 43" W, 251.97 feet; thence,

S 89° 58' 17" W, 188.78 feet along the south boundary of said Lot 1A1; thence,

S 00° 01' 43" E, 60.00 feet continuing along said south boundary; thence,

S 89° 58' 17" W, 184.11 feet continuing along said south boundary; thence,

N 20° 00' 29" W, 15.96 feet; thence,

N 89° 58' 17" E, 164.56 feet; thence,

N 00° 01' 43" W, 60.00 feet; thence,

N 89° 58' 17" E, 187.85 feet; thence,

N 00° 01' 43" W, 54.52 feet; thence,

N 19° 12' 05" W, 107.16 feet; thence,

N 70° 01' 06" E, 15.00 feet; thence,

S 19° 12' 05" E, 109.90 feet; thence,

S 00° 01' 43" E, 57.06 feet; thence,

N 89° 58' 17" E, 10.93 feet to the east boundary of said Lot 1A1; thence,

S 00° 01' 43" E, 15.00 feet along said east boundary of Lot 1A1 to the POINT OF BEGINNING of the parcel of land herein described.

The above parcel of land contains 9599 square feet (0.2204 acres), more or less.

The combined drainage easements within said Lot 1A1, Block A, Unit II of the Interstate Industrial Tract herein described contain 17,663 square feet (0.4055 acres), more or less.

STATE OF NEW MEXICO
COUNTY OF BERNALILLO
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1984 AUG 23 AM 8:56

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CO. CLERK & RECORDER

 _____ DEPUTY