HYDROLOGY C18/D 4 PLANS

C18/D2

4 Plans

DRAINAGE REPORT
WESTERN POWER SERVICE &
CONSTRUCTION CO., INC
ALBUQUERQUE SITE
Zone Atlas Sheet C–18–Z

BOHANNAN–HUSTON INC.

4125 CARLISLE BOULEVARD, NORTHEAST, ALBUQUERQUE, NEW MEXICO 87107 (505) 881-2000

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CITY ENGINEER

# DRAINAGE REPORT
# WESTERN POWER SERVICE & CONSTRUCTION CO., INC.
# ALBUQUERQUE SITE
Zone Atlas Sheet C–18–Z

PREPARED BY

Bohannan–Huston, Inc.
4125 Carlisle Blvd., N.E.
Albuquerque, New Mexico 87107

February, 1981

STATE OF NEW MEXICO
MICHIAL M. EMERY
No. 5194
2-28-81
REGISTERED PROFESSIONAL ENGINEER

Michial M. Emery

Michial M. Emery, P.E.
N.M.P.E. No. 5194

Job No. 1 021 1

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## APPENDIX


Computations
AMAFCA Memo — March 25, 1980


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## APPENDIX


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# DRAINAGE REPORT
# FOR
# WESTERN POWER FACILITY
February, 1981

## PURPOSE AND SCOPE

The purpose of this drainage report is to determine the drainage management requirements for the site. This includes the method for handling storm water run-off from the construction of Western Power's Facility and methods of protecting the site from upland flows.

## SITE LOCATION AND TOPOGRAPHY

The site is located in northeast Albuquerque, south of Alameda Avenue, east of San Mateo Boulevard and west of I–25, more specifically Lots 5, 6, 7, 8, 9, and 10, Block 9 of Tract "A" Unit "B" North Albuquerque Acres (see Plate 1). Soils consist largely of alluvial sands and silts with decomposed granite as the major soil constituent.

The land slopes from east to west at a slope between 2% and 3%. There presently exists a small natural arroyo that generally runs down the center of the tract. This arroyo is referred to as the "Small Southern Arroyo" in the "Drainage Report Signetics – Albuquerque Facility, August, 1980." by Bohannan–Huston, Inc.

## FLOOD CONTROL GUIDELINES

This report follows various documents as far as flood control guidelines are concerned. One being, the AMAFCA memo of March 25, 1980 which established the design flows for the Camino and La Cueva Arroyo branches west of I–25. These flows were further refined by the "Drainage Report Signetics – Albuquerque Facility, August 1980" by Bohannan–Huston, Inc. and were agreed upon by AMAFCA and the City of Albuquerque. The flow rate discharged from the site was calculated using the Rational Method and the Intensity/Duration Frequency curves from AMAFCA Resolution 1980–15 (see Plate 5).

## COMPUTATIONAL METHODS

The procedure used in determining the flow from the site is outlined in the "Introduction to Hydrology" by Viessman, Knapp and Lewis, second edition. Specifically, the rational method was employed with a composite "C" factor being derived for the total site. Other references used were "Concrete Pipe Design Manual" by American Concrete Pipe Association and Bureau of Public Roads "Hydraulic Engineer Circular No. 5 and 10."

## OFF-SITE DRAINAGE

Upland drainage conditions were defined in the "Drainage Report Signetics — Albuquerque Facility August, 1980 by Bohannan—Huston, Inc. To briefly summarize, the site is subject to shallow overland flooding caused by weir flow over I—25. These shallow flows and on-site runoff are collected by a small arroyo that generally flows west. This arroyo intercepts the La Cueva Arroyo approximately 950 feet west of I—25 west Frontage Road. This arroyo is referred to as the "Small Southern Arroyo" in the Signetics Drainage report and its flow rate was calculated as being 283 CFS. See Signetics Drainage Report for complete calculations and methods.

## FLOOD PROTECTION

To protect the site from weir flow over I—25, a diversion berm and channel will be placed parallel to I—25 on the east end of the site (see Plate 2). This structure will collect and divert the weir flow over I—25, and direct the flow to a 54"x88" reinforced concrete arch pipe under Alameda Avenue. This pipe empties into an earthen channel that will intercept the existing Southern Earthen Channel on the Signetics property (see Plate 3). At the intersection of the two earthen channels, rip-rap will be placed on the north side of the Signetics Channel to prevent any possible erosion of the bank. See Signetics Drainage Report for the continuation of this flow in the Southern Park Section.

Hydraulic properties of arch pipe crossing structure are as follows:

Q = 283 CFS

For inlet control, head required for flow to enter pipe is 6.75 Ft. (see Calcs).

Head provided 8.75 Ft.

A = 29.5 Ft.$^2$

Vel. = 9.6 Ft/Sec

Hydraulic properties of earthen channel are as follows:

Q = 283 CFS

Width = 10 Ft.

Side Slopes = 3:1

Slope = .0049

N = .035

Depth of Flow = 3.09 Ft.

Vel. = 4.74 Ft/Sec

On-site drainage will be directed to the northwest corner of the site. This is approximately the location where the small Southern Arroyo intercepts the La Cueva Arroyo. At this point, a small earth catch basin will direct the flow to a 24" CMP crossing structure. This CMP will empty into the Signetics Southern Park Channel. The site grading will insure that the flows reach the 24" CMP and do not impact downstream properties (see Plate 4 for CMP crossing structure).

The 24" CMP crossing structure was designed for any possible future paving of the equipment storage area and will need no upgrading if this area is made more impervious (see Plate 2 for site drainage).

The hydraulic properties for the 24" CMP are as follows:

Q = 22.8 CFS

For inlet control, head required for flow to enter pipe is 3.4 Ft.

Head provided 5 Ft (see calculations)

A = 3.14 $Ft.^2$

Vel = 7.3 Ft/Sec

**CONCLUSION**

The drainage improvements proposed are listed below:

1) Diversion berm and channel improvement placed at the east boundary of the site to protect the site from weir flow across I–25.
2) Construction of a 54"x88" reinforced concrete arch pipe crossing structure from the diversion berm and channel under Alameda Avenue.
3) Earthen channel improvements from arch pipe crossing structure to the existing Signetics earthen channel.

4) 24" CMP crossing structure under Alameda Avenue to direct the on-site flows to the Signetics Southern Park Section Channel.

5) On-site grading to direct the on-site flow to the 24" CMP crossing structure.

If the procedures are followed as outlined in this report, the Western Power Site will be protected from the 100-year upland flows. The flood protection berm and channel will direct the flows that cross I–25 to the Signetics South Earthen Channel. The developed flow from the site will be directed to the Signetics Southern Park Channel and will create no problems downstream.

# APPENDIX

TOTAL AREA 4.97 AC

BLDG = 14,000 SQ FT
= 0.32 AC

PAVED PARKING LOT = .63 AC

GRAVEL STORAGE AREA = 2.91 AC

FLOOD CONTROL CANL = 0.38 AC

LANDSCAPED AREA = 0.73 AC

TOTAL = 4.97 AC

"C" VALUE FOR RUNOFF TO 24" CMP

AREA = 4.97 - 0.38 AC (FLOOD CONTROL CANL)
= 4.59

BLDG C = .98
PARKING LOT C = .98
GRAVEL STORAGE AREA C = .90
LANDSCAPED AREA C = .40

COMPOSITE C = $\frac{.63(.98) + .32(.98) + .90(2.91) + .40(.73)}{4.59}$

C = 0.78

PROJECT NAME WESTERN POWER SHEET 1 OF
PROJECT NO. BY RGB DATE 2/16/81
SUBJECT "C" VALUES CH'D DATE

RUN OFF

Q = CIA

I FROM AREREM RESOLUTION NO 1980-5

I = 5.85 , 25YR-24HR

Q = 0.71 (5.85) 4.57

= 19.27 CFS

IF IN THE FUTURE THE EQUIPMENT STORAGE AREA IS PAVED , C = .85

Q = 0.85 (5.85) 4.57

= 22.8 CFS

HEAD REQUIRED FOR 22.8 CFS TO ENTER 24" CMP W/ INLET CONTROL FROM BUR OF PUBLIC ROADS

HYDRAULIC ENG. CIR NO 5 + NO 10

CHART NO 5, PG 5-25

$\frac{H_w}{D} = 1.7$

$H_w = 3.4$ ft

$H_w$ PROVIDED = 5'

Q = 22.8 CFS

A = 3.14 ft²

DH = 7.3 ft/sec

PROJECT NAME WESTERN POWER SHEET 2 OF

PROJECT NO. BY RCB DATE 2/16/81

SUBJECT ON SITE RUNOFF CH'D DATE

FROM SIGNETICS - ALBUQUERQUE DRAINAGE REPORT, FLOW IN SMACK SOUTHERN AREA 40

= 283 CFS

ALAMEDA CROSSING STRUCTURE

1 - 54" x 88" RC ARCH PIPE

FROM DESIGN MANUAL FOR CONCRETE PIPE

Pg 210, FIG 32,

HEAD REQUIRED FOR 283 CFS TO ENTER PIPE

$\frac{H_w}{D} = 1.5$

$H_w = 6.75$ ft

PIPE INV = 84.69

TOP OF BERM = 93.44

$H_w$ PROVIDED = 8.75 ft

Q = 283 CFS

A = 29.5 ft²

V = 9.6 ft/sec

PROJECT NAME WESTERN POWER SHEET 3 OF

PROJECT NO. BY RGB DATE 2/14/81

SUBJECT ALAMEDA CROSSING STRUCTURE CHKD DATE

EARTHEN DIVERSION CHNL

Q = 283 CFS
S = .0049
n = .035

WIDTH = 16'
SIDE SLOPES = 3:1

DEPTH OF FLOW = 3.09 ft

VEL = 4.74 ft/sec

PROJECT NAME WESTERN POWER SHEET 4 OF
PROJECT NO. 10211 BY DATE
SUBJECT DIVERSION CHNL CH'D DATE

RICHARD E. LEONARD
EXECUTIVE ENGINEER

G. H. SWINBURNE, CHAIRMAN
WILLIAM V. HEREFORD, VICE-CHAIRMAN
FRANCES MIDDY, SECRETARY-TREASURER
VERNON BOAK, DIRECTOR
GLESTON LAWS, DIRECTOR

**A**lbuquerque
**M**etropolitan
**A**rroyo
**F**lood
**C**ontrol
**A**uthority

3600 PROSPECT AVE. N.E.
P. O. BOX 25651 - ALBUQUERQUE, N. M. 87125
TELEPHONE 344-3616

March 25, 1980

Memo for: Mr. Beck
Mr. Heller
Mr. Salazar
Mr. Robert
Mr. Emery

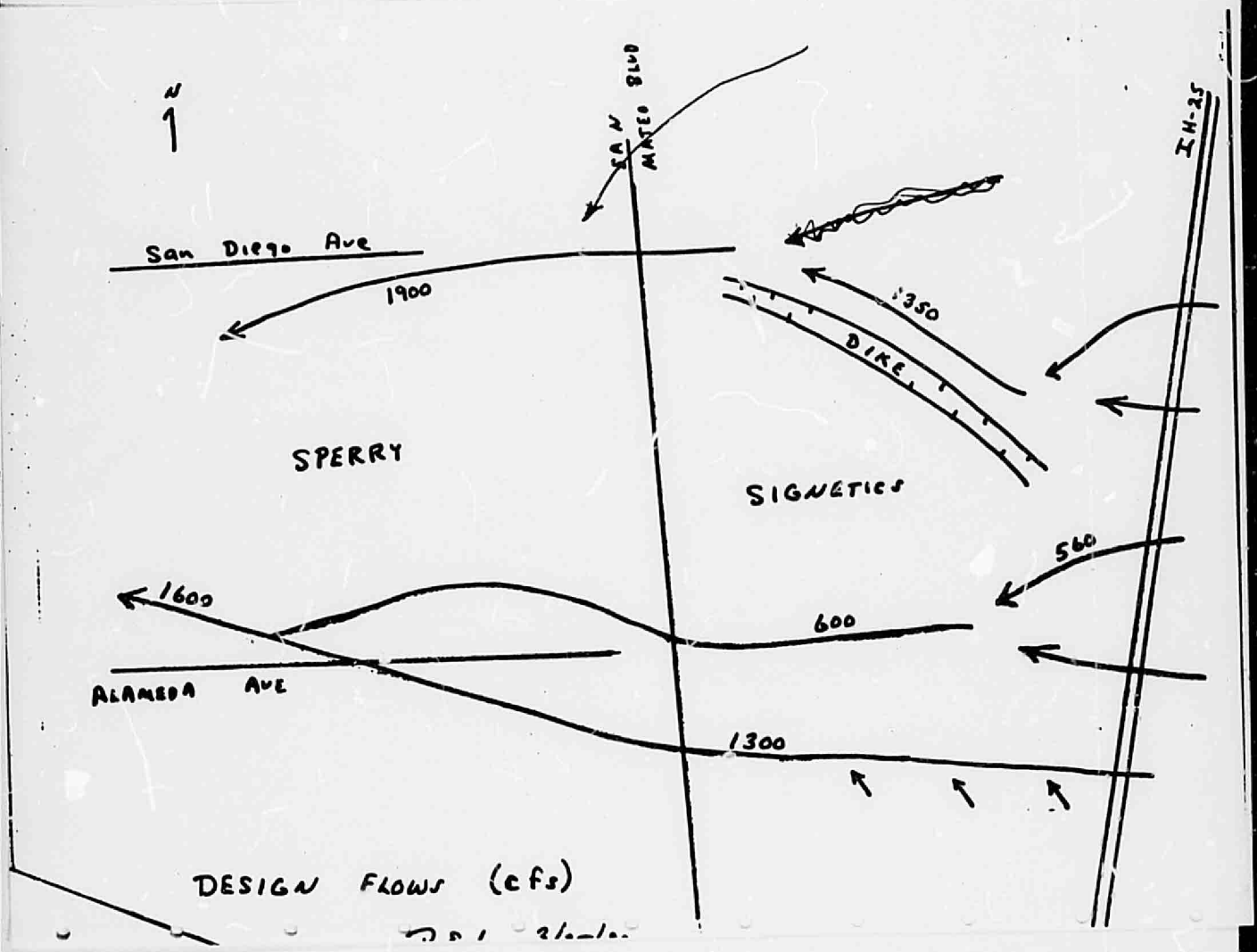
REL

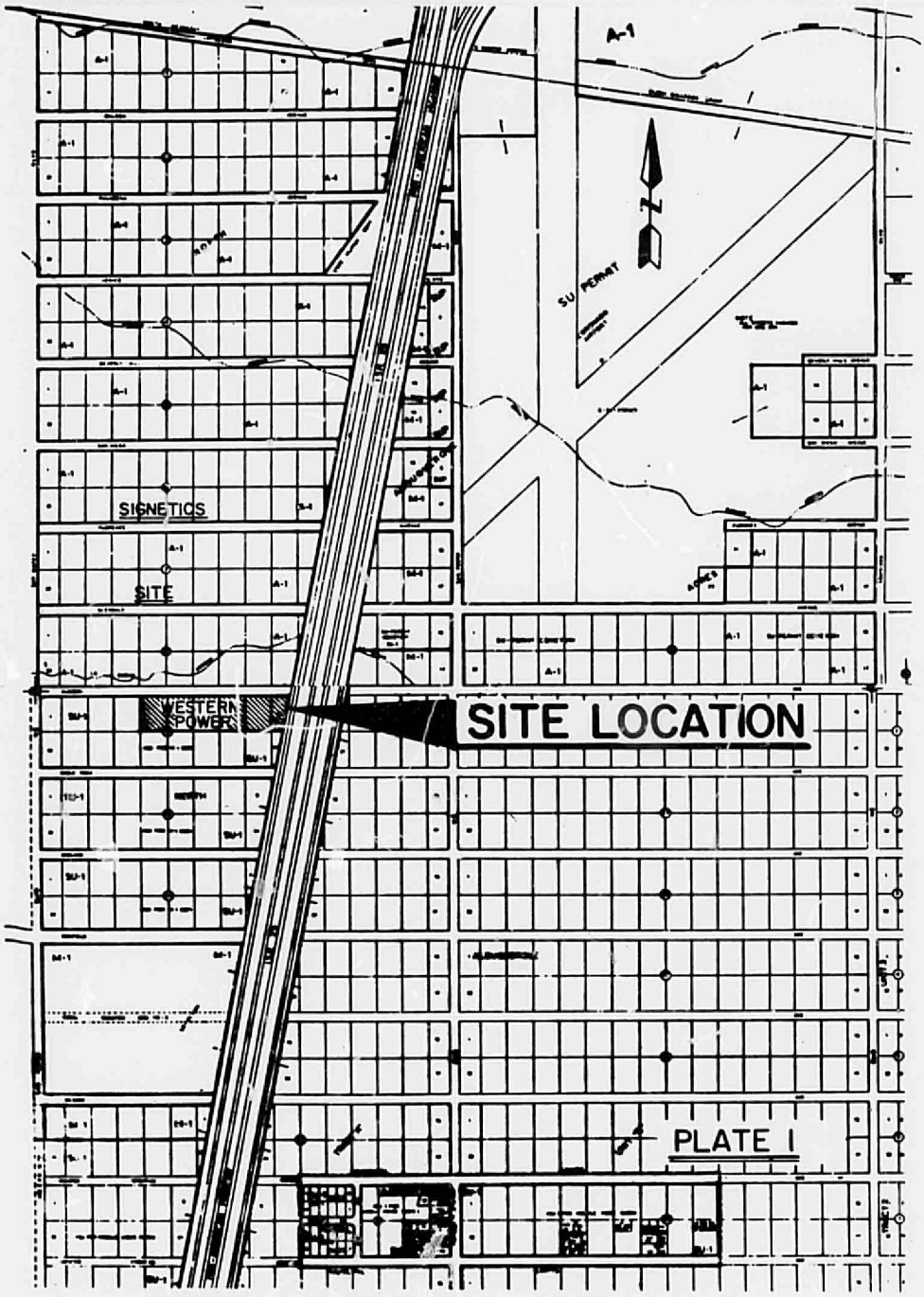
From: Rich Leonard, AMAFCA

Subject: Design Flows for La Cueva Arroyo
Branches West of IH-25

The attached sketch map establishes design flows in the vicinity of the Signetics and Sperry properties. The numbers specified represent the best information available from a variety of sources.

If the two southern channels are consolidated further to the east, 1600 cfs may be used for the combined flow.


N
SAN MATEO BLVD
I-25
San Diego Ave
1900
1350
DIKE
SPERRY
SIGNETICS
560
1600
600
ALAMEDA AVE
1300
DESIGN FLOWS (cfs)


SIGNETICS
SITE
WESTERN POWERS
SITE LOCATION
SU PERMIT
A-1
PLATE I

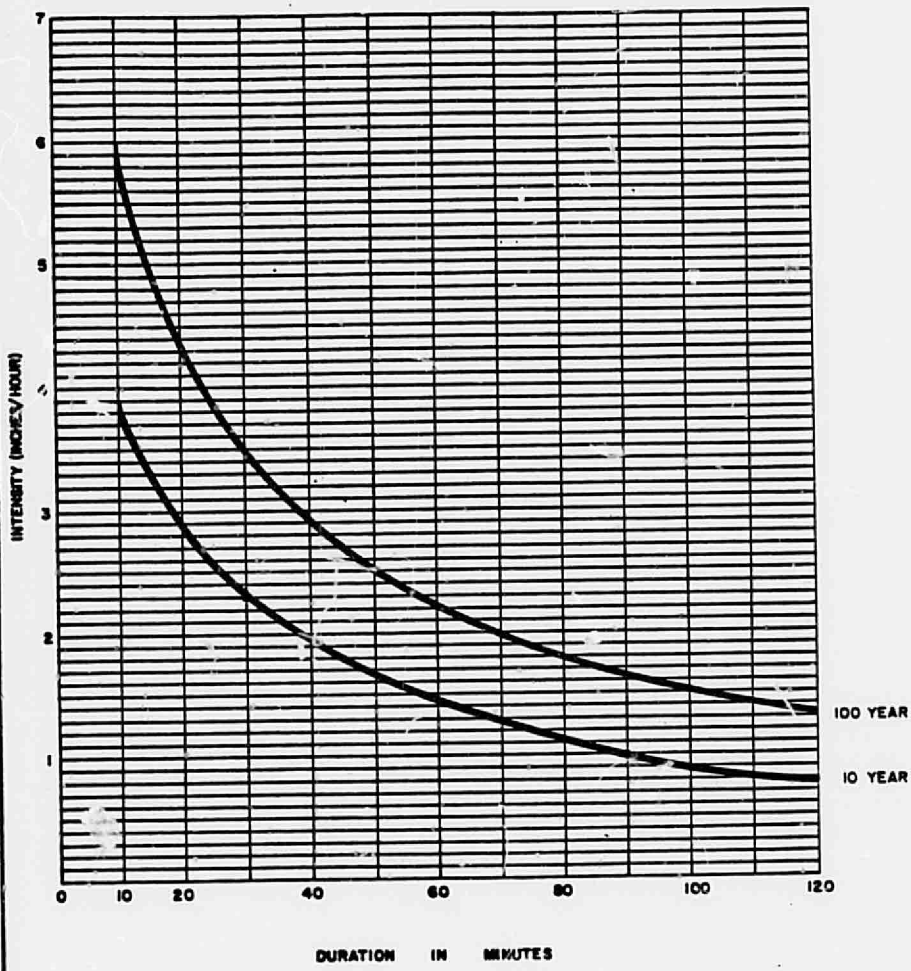



PLATE 5

NOTE:
CURVE IS BASED ON DATA CONTAINED IN NOAA ATLAS 2, DATED 1973.

INTENSITY/ DURATION
FREQUENCY CURVE
ALBUQUERQUE, N.M.

APPENDIX "A"

FILE COPY

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

July 15, 1986

Lou Gross
Logan/Gross & Associates, Inc.
935 Sixth Street, NW
Albuquerque, New Mexico 87102

RE: DRAINAGE PLAN FOR WAREHOUSE/OFFICE (C-19/D2)
RECEIVED JUNE 30, 1986

Dear Mr. Gross:

The above referenced plan, dated June 30, 1986, is approved for Building Permit.

Please attach copies of this approved plan to both sets of construction drawings prior to forwarding to the Hydrology Section for sign-off.

If you have any questions, call me at 766-7944.

Cordially,

Carlos A. Montoya

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

CAM/bs

DRAINAGE INFORMATION SHEET

CITY OF ALBUQUERQUE, N.M.

PROJECT TITLE: Warehouse/Office Bldg. ZONE ATLAS/DRNG. FILE #: C18/D 2

LEGAL DESCRIPTION: Tract 1, Block 9, Tract A, Unit B, North Albuquerque Acres

CITY ADDRESS: 5500 Modesta (Alameda) Ave., NE

ENGINEERING FIRM: Logan/Gross and Assoc, Inc. CONTACT: Lou Gross

ADDRESS: 925 6th St., NW PHONE: 243-6353

OWNER: Western Power Service and Const. Co. CONTACT: Earl Sury

ADDRESS: 211 Sierra Drive, SE PHONE: 265-1687

ARCHITECT: Joe Burwinkle CONTACT: Same

ADDRESS: 3209 Silver Ave., SE PHONE: 268-9987

SURVEYOR: Logan/Gross CONTACT: Duane Logan

ADDRESS: AS Above PHONE:

CONTRACTOR: Jim Templeton CONTACT: Jim Templeton

ADDRESS: 7208-A Jefferson NE PHONE: 345-5271

RECEIVED JUN 30 1986 HYDROLOGY SECTION

PRE-DESIGN MEETING:

XX YES

___ NO

XX COPY OF CONFERENCE RECAP SHEET PROVIDED

DRB NO. 86-386 6/17/86

EPC NO. ___

PROJ. NO. ___

TYPE OF SUBMITTAL:

___ DRAINAGE REPORT

XXX DRAINAGE PLAN

___ CONCEPTUAL GRADING & DRAINAGE PLAN

___ GRADING PLAN

___ EROSION CONTROL PLAN

___ ENGINEER'S CERTIFICATION

CHECK TYPE OF APPROVAL SOUGHT:

___ SKETCH PLAT APPROVAL

___ PRELIMINARY PLAT APPROVAL

___ SITE DEVELOPMENT PLAN APPROVAL

___ FINAL PLAT APPROVAL

XXX BUILDING PERMIT APPROVAL

___ FOUNDATION PERMIT APPROVAL

___ CERTIFICATE OF OCCUPANCY APPROVAL

___ ROUGH GRADING PERMIT APPROVAL

___ GRADING/PAVING PERMIT APPROVAL

___ OTHER ___ (SPECIFY)

DATE SUBMITTED: June 30, 1986

BY: Louis Gross

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

CONFERENCE RECAP

DRAINAGE FILE/ZONE ATLAS PAGE NO.: C18/D2 DATE: 4/28/86

PLANNING DIVISION NOS: EPC: Z-77-133 DRB:

SUBJECT: Western Power Service & Construction Co.

STREET ADDRESS (IF KNOWN):

SUBDIVISION NAME: Lots 5-10, Blk 9, TRACT A, UNIT B, NAA.

APPROVAL REQUESTED:

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

| | WHO | REPRESENTING |
|---|---|---|
| ATTENDANCE: | Lou Gross | Logan Gross & Assoc. |
| | Billy Godsby | City / Hydrology |

FINDINGS:

- Need to provide an update drainage report to reflect current proposed construction & comply with current ordinances & criteria.
- No discharge constraints are to be placed on this development. However the rate is to be identified and quantified per the DPM.
- Appropriate legal documentation will be required for drainage across lotlines.
- An erosion control plan for the period of construction will be required.
- Water is available per facility map.
- Sanitary may have to be extended - Contact Water Utility Department.

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: | Billy A. Godsby | SIGNED: | |
| TITLE: | CE/Hydrologist | TITLE: | |
| DATE: | 4/28/86 | DATE: | |

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

March 23, 1981

Mr. Earl Sury
President
Western Power Service and
Construction Company
P.O. Box 25225
Albuquerque, NM 87125

Re: Construction of Drainage Improvements on Western Power's Property, South of the Signetics Albuquerque Facility Site

Dear Earl:

As we discussed today, the city has approved the improvement plans for the off-site work on your site, as well as the Signetics site. Mr. Heller called me on March 20, 1981 and requested the following documents from you.

1) A letter granting the city right of entry on your property to construct the easterly diversion berm and to construct the westerly inlet for the 24" pipe that will drain your property.

2) In the same letter, your commitment to maintain the facility that is constructed at the east end of your property, specifically, the diversion dike.

If you could prepare a letter to him covering these two items, then he will be ready to issue the work orders for the project. Mr. Heller's address is as follows: Mr. Richard Heller, City Engineer, City of Albuquerque, P.O. Box 1293, Albuquerque, NM 87103.

If you should have any questions concerning this matter, please feel free to contact this office.

Sincerely yours,

Michial M. Emery, P.E.
Vice President

MME/js
Job No. 1 021 0

Project: Western Power - East Diversion Berm and Crossing Structure

Designer: Bohahnan - Huston

Check Date: 3/19/81

By: Brian Burnett

Points of Review:

A. Check required HW needed to drive 283 cfs through pipe

B. Check pipe velocities to insure that no downstream protection is needed.

A. HW Calculation:

Reference: "Design Manual - Concrete Pipe" (DM-CP)
Pipe Size: 54 x 88
Flowrate: 283 cfs

From figure 32 p. 210

$\frac{HW}{D} = 1.5$ ; $D = 54" (4.5')$

$H_w = 1.5(4.5) = 6.75'$

Pipe Invert: 84.69'
Top of Berm: 93.44'
$H_w$ provided: 8.75'

⇒ Two-foot freeboard appears adequate

B. <u>Determination of Outlet Velocity:</u>

<u>Critical Depth</u>: Figure 28b p.206 (DM-CP)

$d_c$ = critical depth

$d_c = 3.85'$

<u>The Design Manual States: (p18)</u>

"If outlet control governs, the outlet velocity equals the flow quantity divided by the flow cross-sectional area at the outlet. * If outlet is not submerged, it is usually accurate to calculate the flow area based on a depth of flow equal to the average of the critical depth and the vertical height of the pipe"

$\Rightarrow$ Depth of Flow $= \frac{d_c + D}{2}$

$d_c = 3.85$
$D = 4.50$

Flow depth $= \frac{3.85' + 4.50}{2} = 4.18' = d$

Equivalent Circular Pipe $= 72''$
Using Table A-10 (Appendix)

$\frac{d}{D} = \frac{4.18}{72/12} = .70$

$\frac{\text{Area}}{D^2} = .5872$

Area $= .5872(6)^2 = 21.14\ ft^2$

Outlet Velocity:

$V = \frac{Q}{A} = \frac{283}{21.14} = 13.5$ fps.

Summary of review:

The berm does provide adequate freeboard in containing the flow of 283 cfs. It is suggested that a pad of rip-rap be placed at the pipe outlet to prevent erosion caused by a flow velocity of 13.4 cfs.

ENGINEERS PLANNERS PHOTOGRAMMETRISTS

BOHANNAN-HUSTON INC.

4125 CARLISLE BLVD., N.E. ALBUQUERQUE, NEW MEXICO 87107 505 881-2000

February 23, 1981

Mr. Richard Heller
City Engineer
City of Albuquerque
P.O. Box 1293
Albuquerque, NM 87103

Re: Drainage Report for the Western Power Service and Construction Company, Adjacent to the Signetics Site

Dear Mr. Heller:

Enclosed for your review, comment and approval are two copies of the above-referenced drainage report. A third report has been sent to AMAFCA for their files by copy of this letter.

The features presented in this report have been included in the final design plans for the Signetics Site. Therefore, if you have any questions or comments concerning these facilities, please advise. We hope to obtain final signatures on the plans this week and begin construction no later than the first week in March.

Sincerely yours,

Michial M. Emery

Michial M. Emery, P.E.
Vice President

Enclosure

cc: AMAFCA (w/enclosure)
Mr. Earl Sury (w/enclosure)
Mr. Jim Keeling
Mr. Dick Buvens

MME/js
Job No. 1 021 1

RECEIVED
FEB 23 1981
CITY ENGINEER

BOHANNAN-HUSTON INC.
4125 CARLISLE BLVD., N.E. ALBUQUERQUE, NEW MEXICO 87107 505 881-2000

File C18-D2A

November 25, 1980

RECEIVED
NOV 26 1980
CITY ENGINEER

Mr. Varne Kimmick
Bellamah Corporation
6121 Indian School Road, N.E.
Albuquerque, NM 87110

Re: Participation in the Construction and Right-of-Way Acquisition for the Wildflower Diversion Channel

Dear Mr. Kimmick:

In accordance with the meeting of November 19, 1980, you are being asked to participate in the construction and land acquisition costs for the development of the Wildflower Diversion Channel. The *maximum* construction costs were detailed in our letter dated October 24, 1980, a copy of which is enclosed. In addition, the land costs, which have been agreed upon as $39,000.00, will be contributed by and credited to Western Power and AIDS, equally. The total cost will be distributed to each participating party on an acreage basis, less the approximate area of the diversion easement. These costs and allocations are detailed on the enclosed sheet. If you are prepared to commit to the project to this extent, please sign in the space provided below.

One lead organization needs to be selected as the contracting entity for the actual construction project. After bids are received, the funds from each organization should be escrowed for payments to the contractor. Engineering design fees will be paid by each organization in a ratio of their participation in the project. Engineering fees may continue beyond those specified in our October 24, 1980 letter, depending upon our involvement with the bidding and field work. Invoices will be sent on a monthly basis as the design work proceeds.

The City of Albuquerque has consented to waive their review and testing fees on the project. Also the initial estimates reflect block-to-block prices and the actual construction cost should be less than reflected on the initial estimates. Therefore, we anticipate that the actual costs should fall in a range that lies between the maximum costs and this cost less 25%. This range is detailed on the enclosed sheet.

If you should have any questions concerning this matter, please feel free to call.

Sincerely yours,

Michial M. Emery, P.E.
Vice President

Enclosure

I Agree to Participate in the Cost of the Wildflower Diversion Channel to the extent stated in this letter.

Signature: _____

Organization: _____

Date: _____

cc: Mr. Gerald Davenport
Mr. James Keeling
Mr. Dick Buvens
Mr. Joe Burwinkle
Mr. Richard Heller
Mr. Bruno Conegliano

MME/js
Job No. 79-104.3

**ATTACHMENT**
**WILDFLOWER DIVERSION CHANNEL CONSTRUCTION**
**AND**
**LAND ACQUISITION PROJECT**
**COSTS AND ALLOCATIONS**

**Allocation Percentages**

| Organization | Land Benefitted | Percent of Total |
|---|---|---|
| Bellamah | 12.5 Acres | 39.7 |
| McKay | 4.0 Acres | 12.7 |
| Western Power | 5.5 Acres | 17.5 |
| AIDS | 9.5 Acres | 30.1 |
| TOTALS | 31.5 Acres | 100.0 |

**Project Costs**

| Component | Maximum | Minimum |
|---|---|---|
| Land | 39,000.00 | 39,000.00 |
| Construction | 229,789.00 | 172,340.00 |
| TOTAL | $268,789.00 | $211,340.00 |

**Allocated Costs**

| Organization | Total Maximum | Total Minimum | Land | Maximum Cash | Minimum Cash |
|---|---|---|---|---|---|
| Bellamah | $106,709.00 | $83,902.00 | –0– | $106,709.00 | $83,902.00 |
| McKay | 34,136.00 | 26,840.00 | –0– | 34,136.00 | 26,840.00 |
| Western Power | 47,038.00 | 36,985.00 | 19,500.00 | 27,538.00 | 17,485.00 |
| AIDS | 80,905.00 | 63,613.00 | 19,500.00 | 61,405.00 | 44,113.00 |