HYDROLOGY H16/D13 2 PLANS

H/6/D13

2 PLANS

REPRODUCTION DUE TO THE POOR QUALITY
OF THE ORIGINAL DOCUMENT

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

April 2, 1981

Scott Vernines
Scanlon & Associates
1570 Pacheco, Suite A 7
Santa Fe, New Mexico 87501

RE: WESTINGHOUSE ELECTRICAL SUPPLY COMPANY
DRAINAGE REPORT

Dear Mr. Vernines:

The referenced drainage report satisfies our present drainage requirements, therefore, this report is approved.

In the future, before submitting any drainage reports, please contact Charles M. Easterling, Principal Assistant City Engineer (Hydrology), for a pre-conference meeting. By requiring these meetings we hope to minimize the amount of time and effort needed to prepare and review a report. Also we may be able to suggest some design alternatives that you may not have entertained.

Sincerely,

Fred J. Aguirre

Fred J. Aguirre, P.E.
Civil Engineer

FJA:wdh

Enclosure

MUNICIPAL DEVELOPMENT DEPARTMENT

Richard S. Heller, P.E., City Engineer ENGINEERING DIVISION Telephone (505) 766-7467

DAVIS & ASSOCIATES, INC.
1210 Luisa Street (P. O. Box 2184)
Santa Fe, New Mexico 87501
Phone (505) 988-2894

letter of transmittal

DATE March 3, 1981	JOB NO. 143
ATTENTION Mr. Fred Aguirre	
RE Warehouse & Office Building	
Westinghouse Electric Supply Co.	
3333 Los Arboles, N. E.	
Albuquerque, NM	

TO

City of Albuquerque

City Engineer's Office

Albuquerque, New Mexico 87103

GENTLEMEN:

We are sending you –

[ ] Drawings
[ ] Copy of letter
[ ] Purchase Order
[X] Attached
[ ] Prints
[ ] Change Order
[ ] Subcontract
[ ] Under separate cover via _____ the following items:
[ ] Plans [ ] Samples [X] Submittal Data [ ] Specifications
[ ] _____

COPIES	DATE	NUMBER	DESCRIPTION
2	12-15-80		Drainage Report for Westinghouse Electric Supply Co.,
			3333 Los Arboles, N. E.
			For Plan Check-Building Permit.

RECEIVED
MAR 04 1981
CITY ENGINEER

THESE ARE TRANSMITTED AS checked below:

[ ] For approval
[X] For your use
[ ] As requested
[ ] Approved as submitted
[ ] Approved as noted
[ ] Returned for corrections
[ ] Resubmit_____ copies for approval
[ ] Submit_____ copies for distribution
[ ] Return_____ corrected prints
[ ] For review and comment
[ ] For bids due_____ 19_____
[ ] Prints returned after loan to us
[ ] _____

cc: Job

REMARKS Two (2) copies this report submitted 10 January 1981 with Foundation Permit Request.

SIGNED: _____
C. T. Murphy, Project Manager

DAVIS & ASSOCIATES, INC.
1210 Luisa Street (P. O. Box 2184)
Santa Fe, New Mexico 87501
Phone (505) 988-2894

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C. T. Murphy, Project Manager

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[ ] For bids due_____19_____
[ ] Prints returned after loan to us
[ ] _____

cc: Job

REMARKS Two (2) copies this report submitted 10 January 1981 with Foundation Permit Request.

SIGNED: Murphy
C. T. Murphy, Project Manager

PRELIMINARY DRAINAGE REPORT ?

FOR

WESTINGHOUSE ELECTRICAL SUPPLY COMPANY

PREPARED FOR

DAVIS and ASSOCIATES

DECEMBER 15,1980

RECEIVED
MAR 0 4 1981
CITY ENGINEER

SCANLON & ASSOCIATES INC.
ENGINEERS
& PLANNERS

I. Introduction

Westinghouse Electric Supply Company (WESCO) is a commercial facility which is being developed by Davis and Associates. The site is bounded on three sides by Wellesley Drive, Matthew Avenue, and Los Arboles Avenue, on Albuquerque's northeast side. The facility will include a warehouse, office building, and parking lot encompassing approximately 1.84 acres.

II. Existing Conditions:

The site of the proposed WESCO facility currently has no major structures on it. The terrain primarily consists of low grasses, with the majority of runoff being directed into a swale which runs east to west across the southern end of the property, or to the northwest corner, due to a low ridge running through the center of the site. In estimating the peak runoff rate for existing and proposed conditions, the Rational Method was used in conjunction with the Albuquerque Metropolitan Flood Control Authority (AMAFCA) criteria. Details of the runoff calculations are provided in the appendix. The total peak runoff from the site for existing conditions is estimated to be 6 cubic feet per second.

III. Effects of Development:

The proposed development including parking lot and building would render approximately 75% of the site impervious with approximately 25% being grassed and landscaped areas. A weighted runoff coefficient is estimated to be 0.78, with 0.9 used for impervious surfaces and 0.4 for landscaped areas. Consequently, the peak runoff rate for post development conditions is estimated to be 11.5 cubic feet per second.

IV. Ponding Requirements:

The capacity of on site ponding necessary to detain the increase in runoff caused by development of the site is estimated by taking the difference in runoff volume before and after development.

$$\text{Volume retained} = (0.78 - 0.40) \times \frac{2.4''}{12''} \times 200' \times 400'$$

$$= 6080 \text{ cubic feet}$$
$$= 0.14 \text{ acre feet}$$

V. Conclusions:

In the Interim Drainage Guidelines, for the City of Albuquerque, November, 1979, it is stated that the allowable positive discharge from ponds to street or storm drain is equal to the five-year peak runoff rate from the

undeveloped site. As estimated in the drainage calculations, this amounts to approximately 3.1 cubic feet per second. It is proposed that a detention pond be constructed along the north property line within the grassed area as shown, which would contain 6080 cubic feet at a maximum depth of 1.5 feet. The required length of pond, assuming a 30 foot top width, 4:1 side slopes, and a 1.5 foot depth, is approximately equal to 175 feet.

In order to collect and convey the runoff from the parking lot and loading area on the south side of the building to the detention pond, an 18-inch diameter CMP storm drain will be provided within the 5 foot wide area along the west property line. In addition, all roof drainage will be routed into the CMP through drain pipes on the building's west side. The paved parking/storage area on the north end of the building will be graded so as to direct runoff in a sheet flow manner to the detention ponding area.

A 12-inch diameter CMP discharge pipe is proposed to allow for the release of approximately 3.1 cubic feet per second of positive discharge from the detention pond into the 30-inch storm sewer under Wellesley Avenue (see site plan).

Any future development of the facilities which would encroach on the capacity of the detention pond, or increase the amount of impervious surface on the site, would necessitate additional runoff detention facilities. These would most likely be in some form of underground gravel pits due to the limited available space.

Off site drainage is contained within the streets at present, and it is assumed that it will be similarly contained in the future. Therefore, no off site runoff was considered in the calculations.

APPENDIX

DRAINAGE CALCULATIONS

I. Existing Conditions

A. Areas as separated by low ridge (A)

Area 1; south of ridge 1.04 acres
0.80 acres
1.84 total

B. Rainfall Intensity (i)

100 year, 6 hour = 8.0 in/hr
5 year, 6 hour = 4.2 in/hr

C. Runoff Coefficient (C)

Assume C = 0.4 for entire site

D. Peak Runoff Rates Q = CiA

1. Area 1:

Q_{100} = (0.4)(8.0)(1.04) = 3.33 cfs
Q_5 = (0.4)(4.2)(1.04) = 1.75 cfs

2. Area 2:

Q_{100} = (0.4)(8.0)(0.80) = 2.56 cfs
Q_5 = (0.4)(4.2)(0.80) = 1.34 cfs

3. Totals:

Q_{100} = 3.33 + 2.56 = 5.89
Q_5 = 1.75 + 1.34 = 3.10

II. After Development

A. Areas as determined by land use:

Impervious areas 1.39 acres
Landscaped areas 0.45 acres
1.84 total

B. Rainfall Intensity (i):

100 year, 6 hour = 8.0 in/hr ?
5 year, 6 hour = 4.2 in/hr ?

C. Runoff Coefficients (C)

Impervious Areas	0.90
Landscaped Areas	0.40
Weighted C-Factor	0.78

D. Peak Runoff Rates: Q = CiA

Q_{100} = (0.78)(8.0)(1.84) = 11.5 cfs
Q_5 = (0.78)(4.2)(1.84) = 6.0 cfs

III. Pond Dimensions:

Total volume required = 6080 cubic feet

Depth = 1.5 feet

Side Slopes = 4 to 1

Width = 40 feet

Length = 142 feet

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

MAYOR
Harry E. Kinney

CHIEF
ADMINISTRATIVE OFFICER
Frank A. Kleinhenz

November 22, 1977

H16-D13

Ray Macey
Bohannan & Huston & Assoc.,Inc.
4125 Carlisle Blvd.,NE
Albuquerque, New Mexico

RE: Drainage report for Puerto del Cielo

Dear Ray:

From the drainage report mentioned above as well as from others, a misconception appears to have taken hold, namely the Amafca Resolution concerns itself with a reduction of the peak flow and that the volume reduction is an inconsequential matter. The peak discharge for any small subdivision or parcel of land, may occurr with high intensity short duration storm (say 10 minutes duration, 100 yrs. frequency). If devices such as detention and orifices are used for the purpose of reducing this instantaneous peak discharge to the pre-development value, the same devices would have no restraining effect on the runoff from the longer duration storms (say 1.0 hrs. or greater).

The unfortunate thing is that, from the point of view of the major collector networks, these larger duration storms are precisely those which result in the peak floods or peak discharges. Therefore, in order to minimize the impact that urbanization would have on the hydrologic regimen of the receiving arroyos, it is mandatory that the volume be controlled as well as the peak discharge. Only then, the mandates of the Amafca Resolution and of the Drainage Policy Resolution would be satisfied and more costly remedies than those already necessary, would not be required.

Addressing more directly the questions pertaining to the drainage report for the Puerto del Cielo Subdivision, the storm sewer that crosses the property will be used to remove the runoff from Girard Ave., Gibson Boulevard and Yale Boulevard and cannot be counted on for the relief of the internal drainage of Puerto del Cielo. In the light of the prior discussion I am satisfied with the proposed provision for the interm period of development. Nevertheless upon development, each parcel of land will have to submit its own drainage plan which will have to include storm water retention and infiltration,

this requirement is made in order to avoid further over taxing the existing drainage facilities which, as you indicate, may at best represent a 10 yrs. frequency design.

A revision of the report in letter form will be necessary before approval is granted and a set of recommendations submitted that are consistent with the discussion above.

If you want to discuss the matter further please feel free to contact me.

Very truly yours,

Bruno Conegliano

Bruno Conegliano
Asst. City Engineer-Hydrology

BC/gm

cc; Jim Smith
V.M. Kimmick
Drainage file

SF-6819

July 23, 1982

Re: 3333 Los Arboles, N. E.
Albuquerque, NM
Permit #06303

COMPLETED

City of Albuquerque
P. O. Box 1293
Albuquerque, New Mexico 87103

Attention: Quentin R. Kielich

Gentlemen:

Enclosed for your records are completed City of Albuquerque forms for "Drainage Facilities Within City Right-of-Way".

This installation was approved on the Architect's drawings 26 March 1981, by the Drainage Section of The City of Albuquerque. The installation was completed in April 1981 and inspected and approved by the Plumbing Inspection Division of The City of Albuquerque prior to being backfilled.

If you require any more information, please inform us.

Very truly yours,

DAVIS & ASSOCIATES, INC.

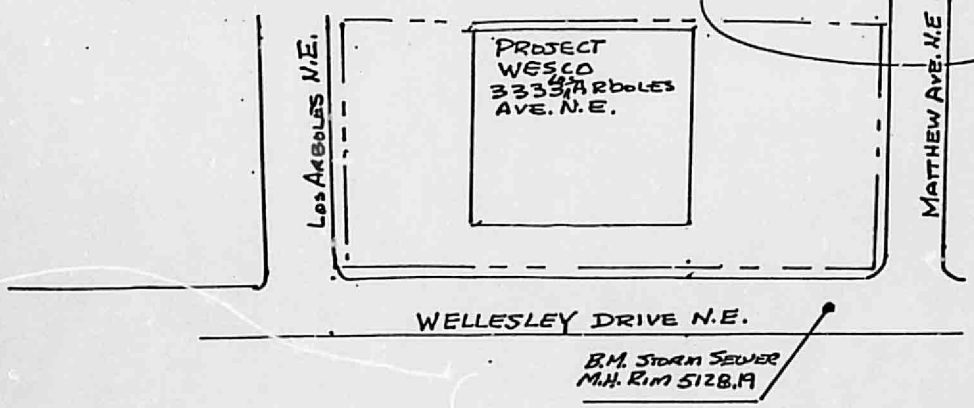
C. T. Murphy
Project Manager

CTM:nh
encls.
cc: Mr. Mike Wizer - WESCO
3333 Los Arboles, N.E.
Albuquerque, NM 87107

H16 D13
C-4

AINAGE FACILITIES WITHIN CITY RIGHT OF WAY

WESCO FILE 19



VICINITY MAP

SUBDIVISION: DUKE CITY

LOT A BLOCK 10

ALBUQUERQUE, N.MEX.

OWNER: WESTINGHOUSE ELECTRIC CORPORATION
1695 WESTINGHOUSE BLDG.
GATEWAY CENTER, PITS., PA. 15222

GENE W. MYERS
NEW MEXICO
6539
REGISTERED PROFESSIONAL ENGINEER

NOTICE TO CONTRACTOR

1. An excavation/construction permit will be required before beginning any work within City right-of-way. An approved copy of these plans must be submitted at the time of application for this permit.

2. All work detailed on these plans to be performed, except as otherwise stated or provided hereon, shall be constructed in accordance with "Contract Documents for City-Wide Utilities and Cash Paving No. 30 "

3. Two working days prior to any excavation, contractor must contact Line Locating Service, 765-1234, for location of existing utilities.

4. Prior to construction, the contractor shall excavate and verify the horizontal and vertical locations of all obstructions. Should a conflict exist, the contractor shall notify the engineer so that the conflict can be resolved with a minimum amount of delay.

5. Backfill compaction shall be according to COMMERCIAL street use.

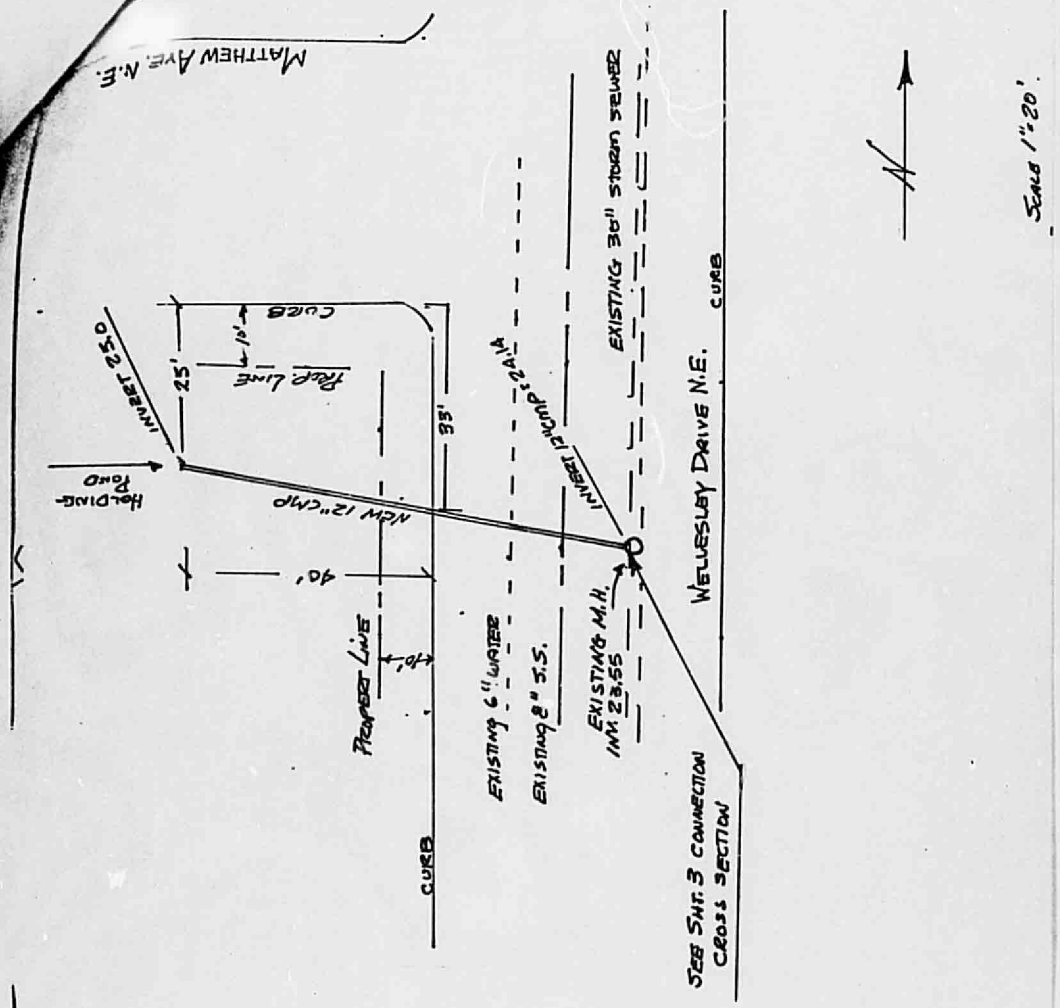
* See letter

C-4

APPROVALS	NAME	DATE	TITLE: WESCO WAREHOUSE AND OFFICE BUILDING 3333 Los Arboles N.E. Albq. N.M.
A.C.E./DESIGN	J.K. Kilick	1/4/83	CATCH BASIN & JUNCTION STRUCTURE
CR	D.S. 2-1-83		PERMIT NO. 06303
FIELD	*	2.4.83	SHEET 1 OF 1 — MAP NO. H-1

CITY OF ALBUQUERQUE

AGE FACILITIES WITHIN CITY RIGHT-OF-WAY



APPROVALS	NAME	DATE
A.C.E./DESIGN	[illegible]	12 Jan 83
INSPECTOR		
A.C.E./FIELD		

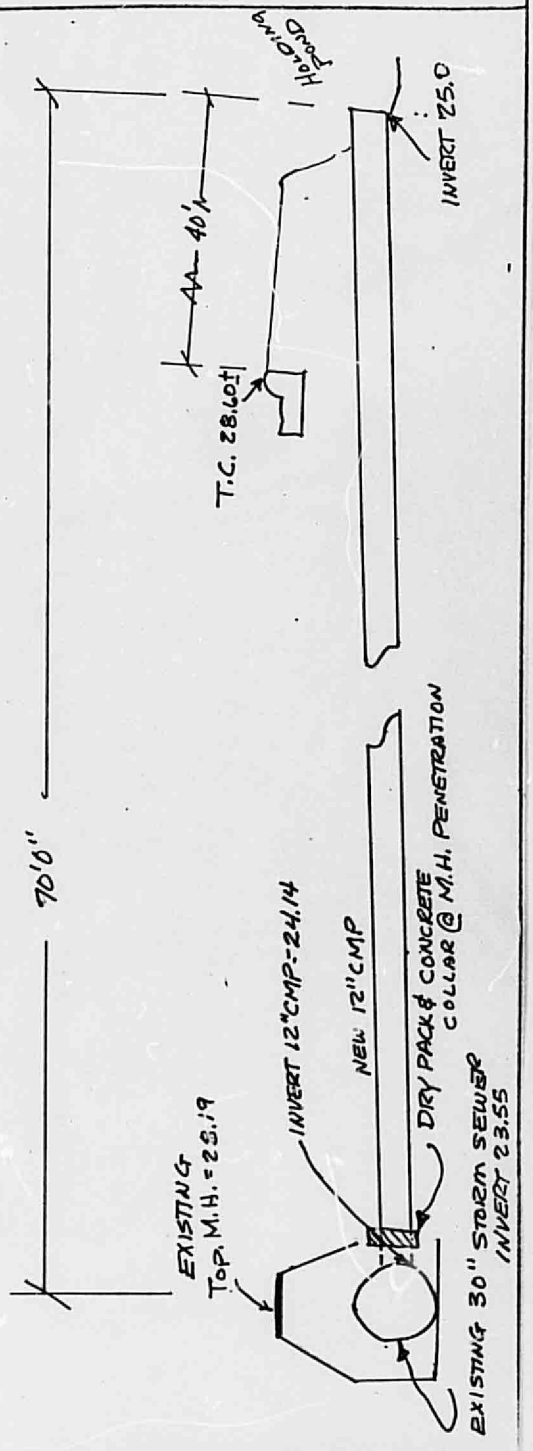
TITLE: WESCO WAREHOUSE & OFFICE BUILDING
3333 Los Arboles N.E
Albq

PERMIT NO. 06303
SHEET 2 OF 4

MAP NO. H-16

CITY OF ALBUQUERQUE

E FACILITIES WITHIN CITY RIGHT-OF-WAY



APPROVALS	NAME	DATE
A.C.E./DESIGN	[illegible]	12 Jan 83
INSPECTOR		
A.C.E./FIELD		

TITLE: WESCO WAREHOUSE & OFFICE BLDG. 3333 Los Arboles, N.E., ALBQ. N. MEX

PERMIT NO. 06303
SHEET 3 OF 4

MAP NO. H-16

CITY OF ALBUQUERQUE

GE FACILITIES WITHIN CITY RIGHT-OF-WAY

TES.
1. CMP shall be minimum 16 ga. galvanized.
2. Backfill compaction 95%
3. Conc. collar dry pack 3000 psi minimum
4. Asphalt patch will comply with City of Albq. paving requirements.

APPROVALS	NAME	DATE	TITLE: WESCO WAREHOUSE & OFFICE BUILDING 3333 Los Arboles N.E. Albq. N.Mex
A.C.E./DESIGN	[illegible]	12 Jan 83	
INSPECTOR			
A.C.E./FIELD			PERMIT NO. SHEET 4 OF 4

NO. H-16

DRAINAGE REPORT

FOR

WESTINGHOUSE ELECTRICAL SUPPLY COMPANY

PREPARED FOR

DAVIS and ASSOCIATES

MARCH 16,1981

RECEIVED
MAR 16 1981
RECEIVED

SCANLON & ASSOCIATES INC.
ENGINEERS
& PLANNERS

I. Introduction

Westinghouse Electric Supply Company (WESCO) is a commercial facility which is being developed by Davis and Associates. The site is bounded on three sides by Wellesley Drive, Matthew Avenue, and Los Arboles Avenue on Albuquerque's northeast side (see vicinity map Appendix A-1). The facility will include a warehouse, office building, and parking lot encompassing approximately 1.84 acres.

II. Existing Conditions

The site of the proposed WESCO facility currently has no major structures on it. The terrain primarily consists of low grasses, with the majority of runoff being directed either into a swale which runs east to west across the southern end of the property, or towards the northwest corner, due to a low ridge running through the center of the site. Sidewalks and curb and gutter, corresponding to the three streets previously mentioned which define the site, were existing at the time the site was purchased. Consequently, little or no runoff from off site is conveyed across the property. A topographic map showing how the WESCO site relates to the surrounding topography is included in Appendix A, page A-1. In estimating the peak runoff rates for existing and proposed conditions, the Rational Method was used in conjunction with the Albuquerque Metropolitan Flood Control Authority (AMAFCA) criteria and the Interim Drainage Guidelines, November 1979, for the City of Albuquerque. Details of the runoff calculations are provided in Appendix B. The total peak runoff from the site for existing conditions is estimated to be 5.30 cubic feet per second.

III. Effects of Development:

The proposed development will consist of parking lot, building, and landscaped areas. Landscaped areas as shown will consist of 1 1/2 inch gravel underlaid with a plastic film and, for runoff calculation purposes, will be considered impervious. A weighted runoff coefficient is estimated to be 0.89, with 0.9 used for impervious surfaces and 0.4 for existing or permeable areas such as planters. From Appendix B the peak runoff rate for post development conditions is estimated to be 11.8 cubic feet per second.

IV. Ponding Requirements

The volume of on site ponding necessary to detain the increased runoff caused by development is estimated by taking the difference in runoff volume before and after development:

0.40 = runoff coefficient prior to development
0.89 = runoff coefficient after development
2.44" = 100 year, 6 hour rainfall depth
80,000 sq. ft. = total area of site

Volume retained = $(0.89 - 0.40) \times \frac{2.44''}{12'/ft.} \times 80{,}000$ sq. ft.

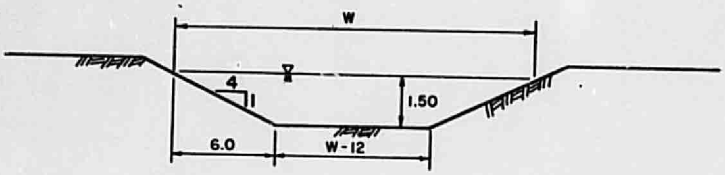
= 7970 cubic feet
= 0.183 acre feet

Pond Size:

L - Length = 175'
Z - Side slopes = 4 hor. to 1 vert.
D - Average depth 1.50 ft.
T - Top area = 175' x W (width)
B - bottom area = (175 - 12)(W - 12) = 163 W - 1956

Vol. = 1/2 (T + B) x D
7970 = 1/2 (175W + 163W - 1956)(1.50)
7970 = 1/2 (338W - 1956)(1.50)
W = 37.25'

FIGURE 1: CROSS SECTION OF POND



V. Conclusions

In the Interim Drainage Guidelines for the City of Albuquerque, November 1979, it is stated that the allowable positive discharge from pond to street or storm drain is equal to the five year-10 minute peak runoff rate from the undeveloped site. From Figure B-3, for a 10 minute storm duration and a 5 year return period, the total rainfall depth is approximately equal to 0.60 inches, or a rainfall intensity of 3.60 inches per hour. Therefore, the peak runoff Q = CIA = (0.40)(3.60)(1.84)≈ 3.00 cfs. It is proposed that the detention pond be constructed along the north property line within the landscaped area assshown on the site plan.

In order to collect and convey the runoff from the parking lot and loading area on the south side of the building to the detention pond, it is proposed that an 18 inch diameter CMP storm drain be provided within the 5 foot wide area along the west property line. In addition, all roof drainage will be routed into the CMP via drain pipes on the building's west side (see detail on site plan). The paved parking/storage area on the north end of the warehouse will be graded so as to direct runoff in a sheet flow manner to the pond area.

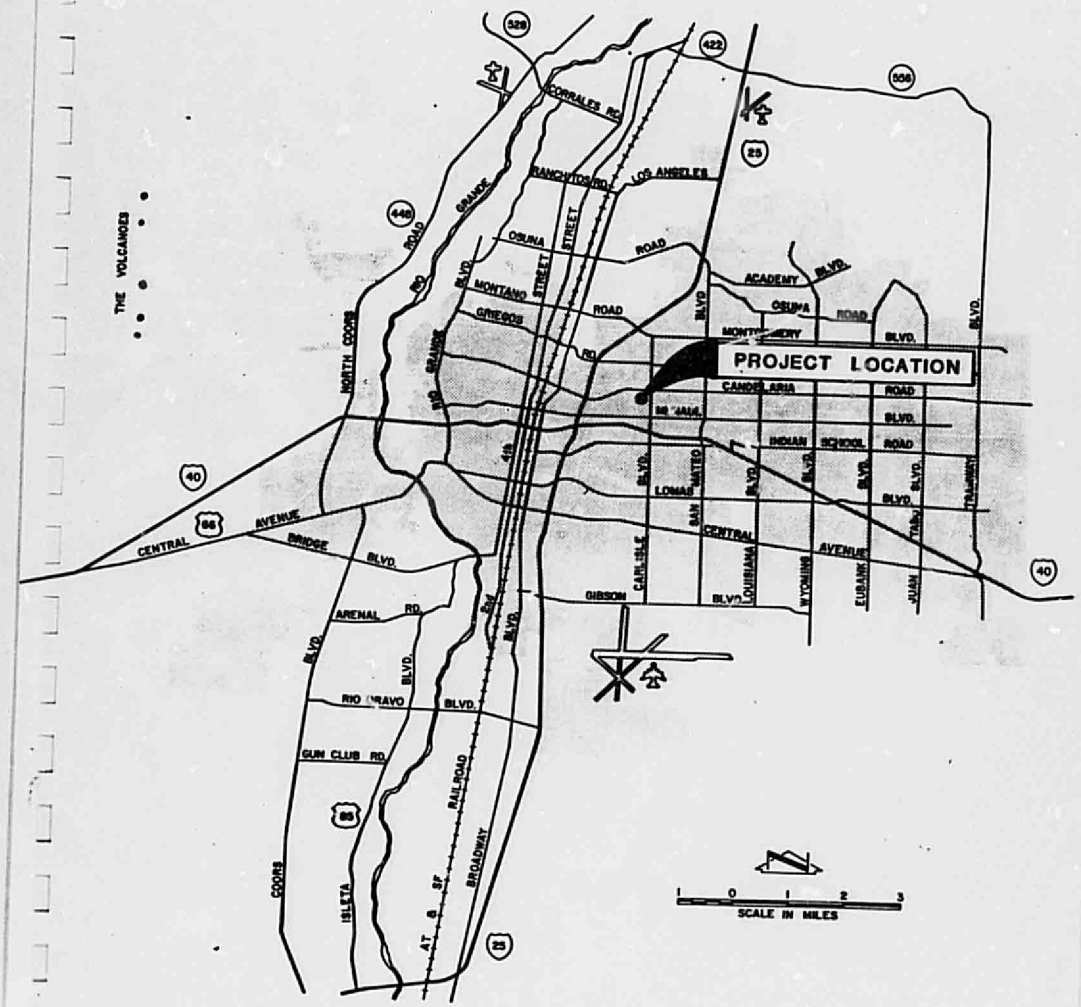
A 12 inch diameter discharge pipe is proposed to allow for the release of approximately 3 cfs of positive discharge from the detention pond into the 30 inch storm sewer via the manhole as shown under Wellesley Drive. Twelve inch RCP discharge piping is called for from the manhole under the street to 5 feet inside the property line to provide adequate surface loading protection, with the remainder being 12 inch CMP with a flared end section conforming to the pond side slope.

Assuming that entrance control will occur in the case where the 30 inch storm sewer is flowing at a minimum depth, the 12 inch CMP will discharge approximately 3 cfs. In the case where the 30 inch storm sewer is flowing full which is more likely in a major rainfall event, the pipe will discharge approximately 2 cfs which is less than the allowable maximum (see calculations Appendix D).

Any future development of the facilities which would encroach on the capacity of the detention pond or increase the amount of impervious surface on the site would necessitate additional runoff detention facilities. These would most likely be some form of underground gravel pits due to the limited amount of available space.

Off site drainage is currently contained within the streets bordering the property, and it is assumed that it will be similarly contained in the future. Therefore, no off site runoff was considered in the calculations.

APPENDIX A


PROJECT LOCATION
THE VOLCANOES
CORRALES RD.
RANCHITOS RD.
LOS ANGELES
OSUNA
ROAD
ACADEMY
BLVD.
MONTANO
STREET
GRIEGOS
RD.
NORTH COORS
RIO GRANDE
CANDELARIA
ROAD
BLVD.
INDIAN SCHOOL
ROAD
LOMAS
SAN MATEO
CENTRAL
AVENUE
CARLISLE
LOUISIANA
WYOMING
EUBANK
JUAN TABO
TRAMWAY
GIBSON
BRIDGE
ARENAL RD.
RIO BRAVO
GUN CLUB RD.
COORS
ISLETA
AT & SF
RAILROAD
BROADWAY
SCALE IN MILES
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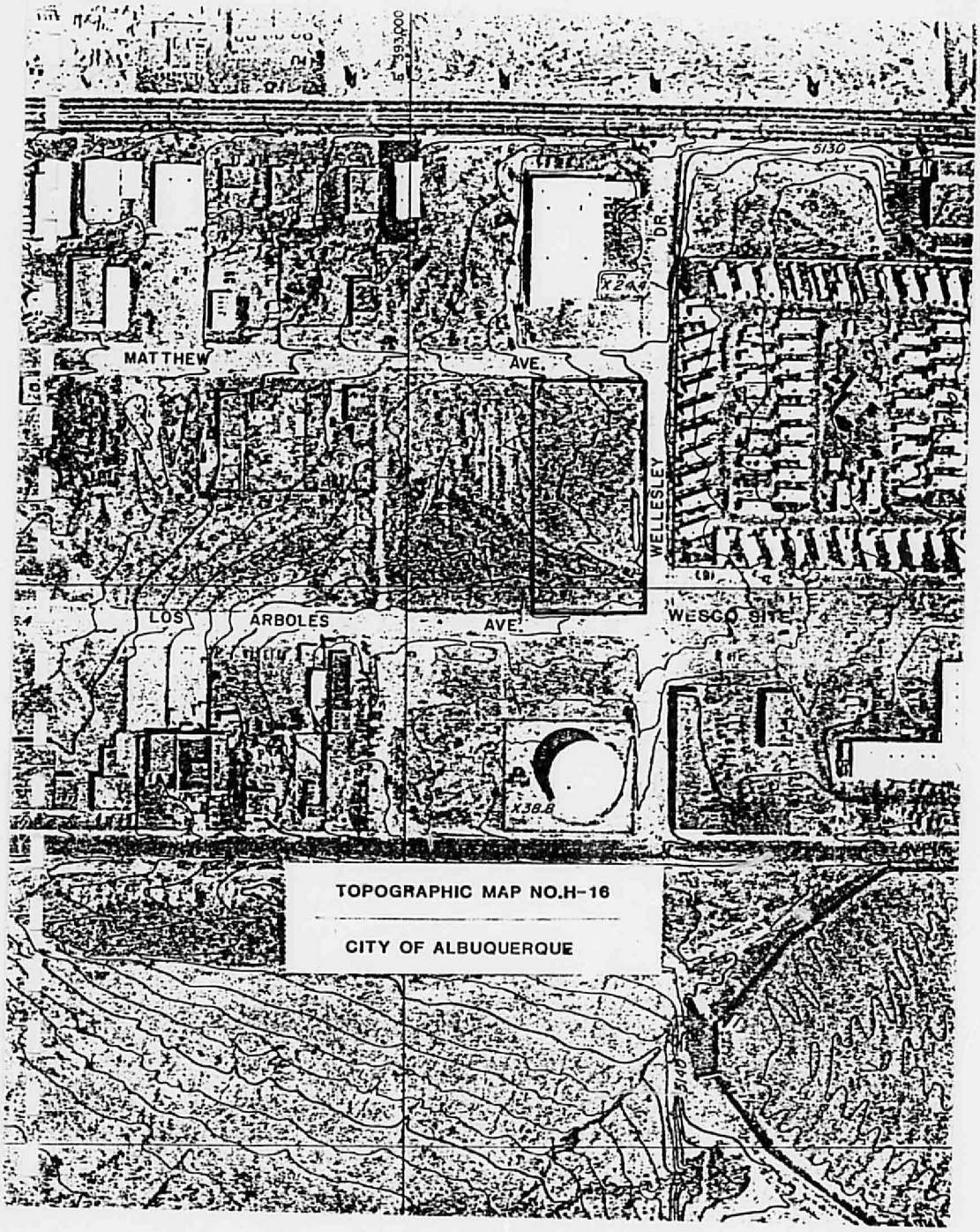
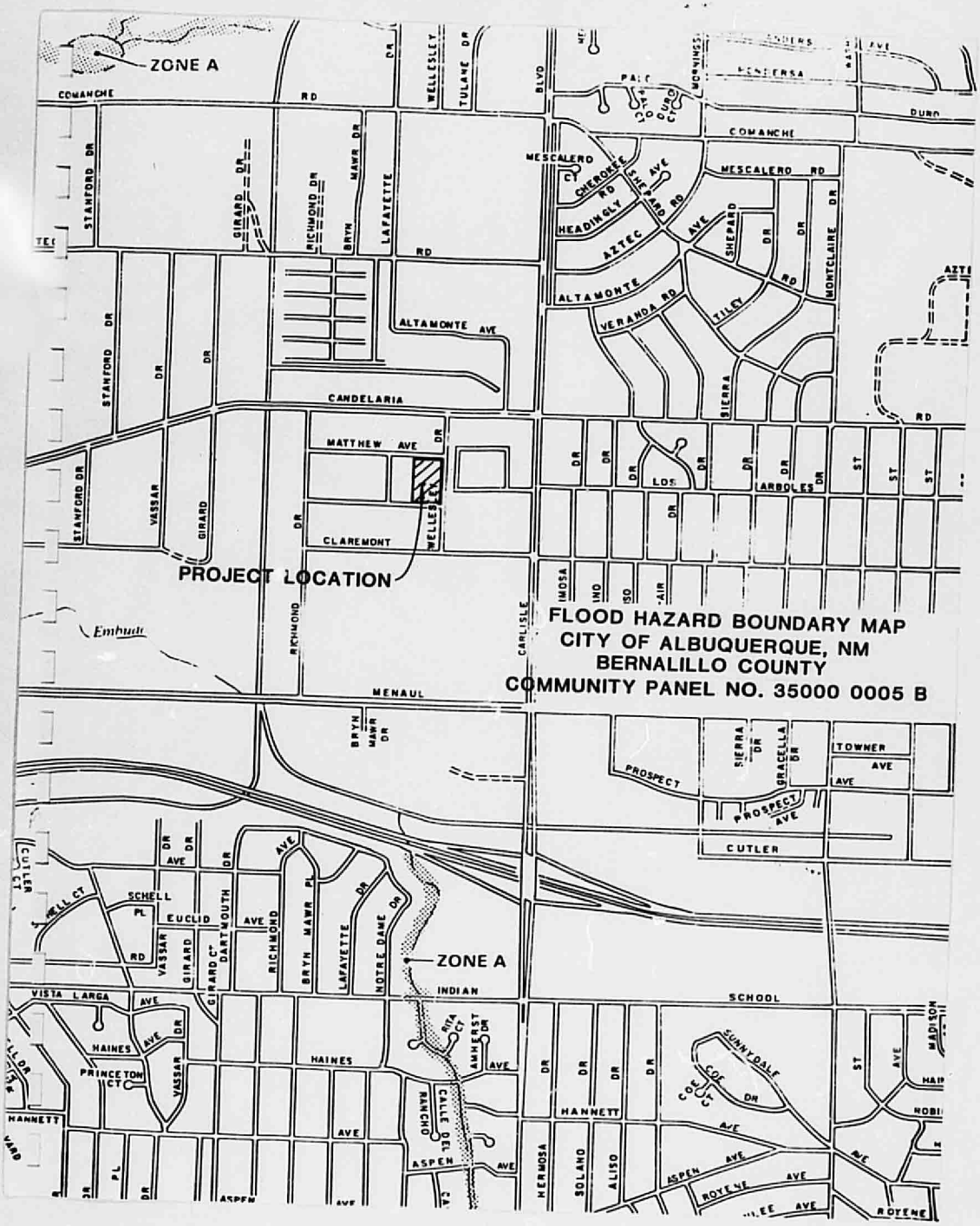

MATTHEW
AVE.
WELLESLEY
DR.
LOS
ARBOLES
AVE.
WESCO SITE
5130
X 2.4.4
X 38.8
TOPOGRAPHIC MAP NO.H-16
CITY OF ALBUQUERQUE


ZONE A
COMANCHE
RD
STANFORD DR
GIRARD DR
RICHMOND DR
BRYN MAWR DR
LAFAYETTE
WELLESLEY
TULANE DR
BLVD
MESCALERO
CHEROKEE RD
SHEPARD RD
HEADINGLY
AZTEC AVE
ALTAMONTE
VERANDA RD
TILEY RD
SHEPARD DR
MONTCLAIRE DR
ALTAMONTE AVE
CANDELARIA
MATTHEW AVE
CLAREMONT
VASSAR
GIRARD
PROJECT LOCATION
Embudo
RICHMOND
CARLISLE
IMOSA
LOS ARBOLES
SIERRA
MENAUL
BRYN MAWR DR
PROSPECT
SIERRA DR
GRACELLA DR
TOWNER AVE
PROSPECT AVE
CUTLER
SCHELL PL
EUCLID AVE
GIRARD
DARTMOUTH
RICHMOND
BRYN MAWR PL
LAFAYETTE
NOTRE DAME DR
ZONE A
VISTA LARGA AVE
INDIAN
SCHOOL
HAINES AVE
PRINCETON CT
HAINES
AMHERST DR
RITA CT
RANCHO
CALLE EL
HANNETT
ASPEN AVE
HERMOSA
SOLANO
ALISO
SUNNYDALE
COE DR
ROYENE AVE
MADISON
FLOOD HAZARD BOUNDARY MAP
CITY OF ALBUQUERQUE, NM
BERNALILLO COUNTY
COMMUNITY PANEL NO. 35000 0005 B

APPENDIX B: DRAINAGE CALCULATIONS

I. Estimation of Rainfall Depths:

Rainfall depth values for 2, 5, and 100 year recurrence intervals for both 6 and 24 hour storm durations were estimated from isopluvial maps found in the NOAA Atlas 2, Volume IV, for New Mexico, 1973, and are given in Table B-1.

Copies of the applicable NOAA Atlas maps showing the estimated values are found in Appendix C.

One hour values for 2 and 100 year storms were calculated from the equations given in the NOAA Atlas 2, Volume IV, for Western New Mexico. The values were plotted on Figure B-2 to determine the 5 year, 1 hour rainfall value.

Total Rainfall Depth versus Storm Duration is plotted as Figure B-3 in order that rainfall depth values as well as rainfall intensity can be determined for any time of concentration.

II. Existing Conditions

A. Areas as separated by low ridge (A)

Area 1; south of ridge line	1.04 acres
Area 2; north of ridge line	0.80
total	1.84 acres

B. Time of concentration (t), Rainfall Intensity (i)

Area 1; $t = \left[\frac{(11.9)(.\ldots)^3}{3.30}\right]^{0.385*} = 3.30$ min.

Area 2; $t = \left[\frac{(11.9)(0.056)^3}{4.80}\right]^{0.385} = 3.05$ min.

Use t = 5.0 min.

From Figure B-3; for t = 5.00 min.

Rainfall Depth = 0.60 inches

Rainfall Intensity = $\frac{0.60 \text{ inches}}{5 \text{ min}} \times \left(60 \frac{\text{min}}{\text{hr}}\right) = 7.20$ in/hr

* Equation is from California Culverts Practice, California Highways and Public Works, September 1942, and is of the form:

$$T = \left(\frac{11.9\ L^3}{H}\right)^{0.385}$$

where:

T = time of concentration in hours
L = length of longest watercourse in miles
H = elevation difference in feet

C. Runoff Coefficient (C)

Assume C = 0.4 for entire site

D. Peak Runoff Rate: Q = CiA

1. Area 1:

Q = (0.4)(7.20 in/hr.)(1.04 acres) = 3.00 cubic feet

2. Area 2:

Q = (0.4)(7.20)(0.80 acres) = 2.30 cfs

3. Total Peak Runoff

Q_T = 3.00 + 2.30 = 5.30 cfs

III. After Development

A. Areas as determined by land use (A)

Impervious Area
(Parking, Building, Landscaping, etc.) = 1.791 acres

Permeable Area
(Planters, etc.) = 0.046 acres

total = 1.84 acres

B. Time of Concentration (t), Rainfall Intensity (i)

L - southeast corner to pond discharge = 680 L.F.
= 0.129 miles
H - 31.5 - 25.0 = 6.5 ft.

$T = 11.9(0.129)^3 \quad 0.385 = 0.119$ hours = 7.1 min.

From Figure B-3; for T = 7.1 min.

Rainfall Depth = 0.85 in.
Rainfall Intensity = $\frac{0.85}{7.1}$ (60) = 7.2 in/hr

C. Runoff Coefficient (C)

Impervious Areas = 0.90
Permeable Areas = 0.40

Weighted C Factor - 0.89

D. Peak Runoff Rate: Q = CiA

Q = (0.80)(7.2 in/hr)(1.84 ac) = 11.8 cfs

APPENDIX C : RAINFALL DATA

FIGURE 19, NOAA ATLAS 2, VOL IV
2 YR. - 6 HOUR = 1.05"

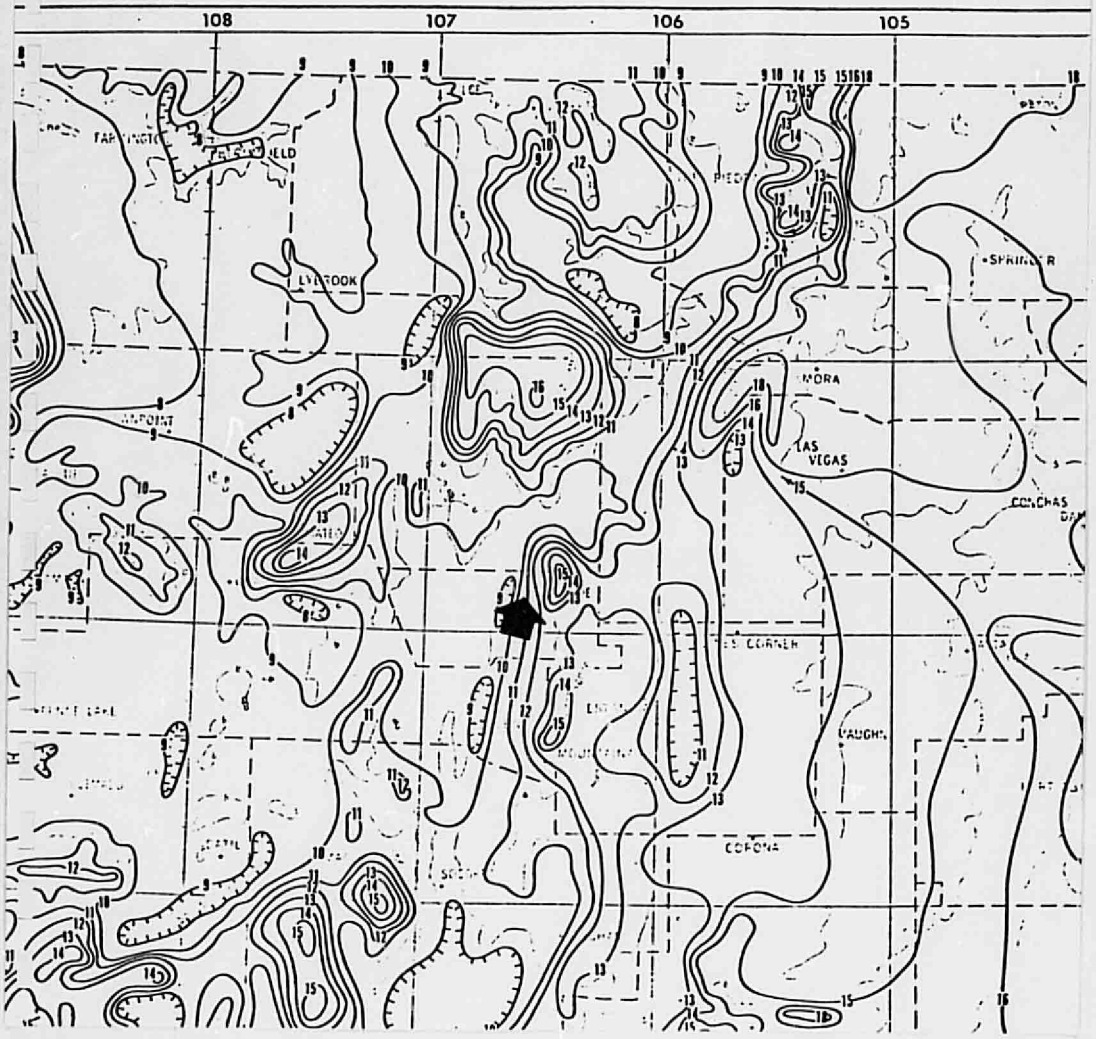
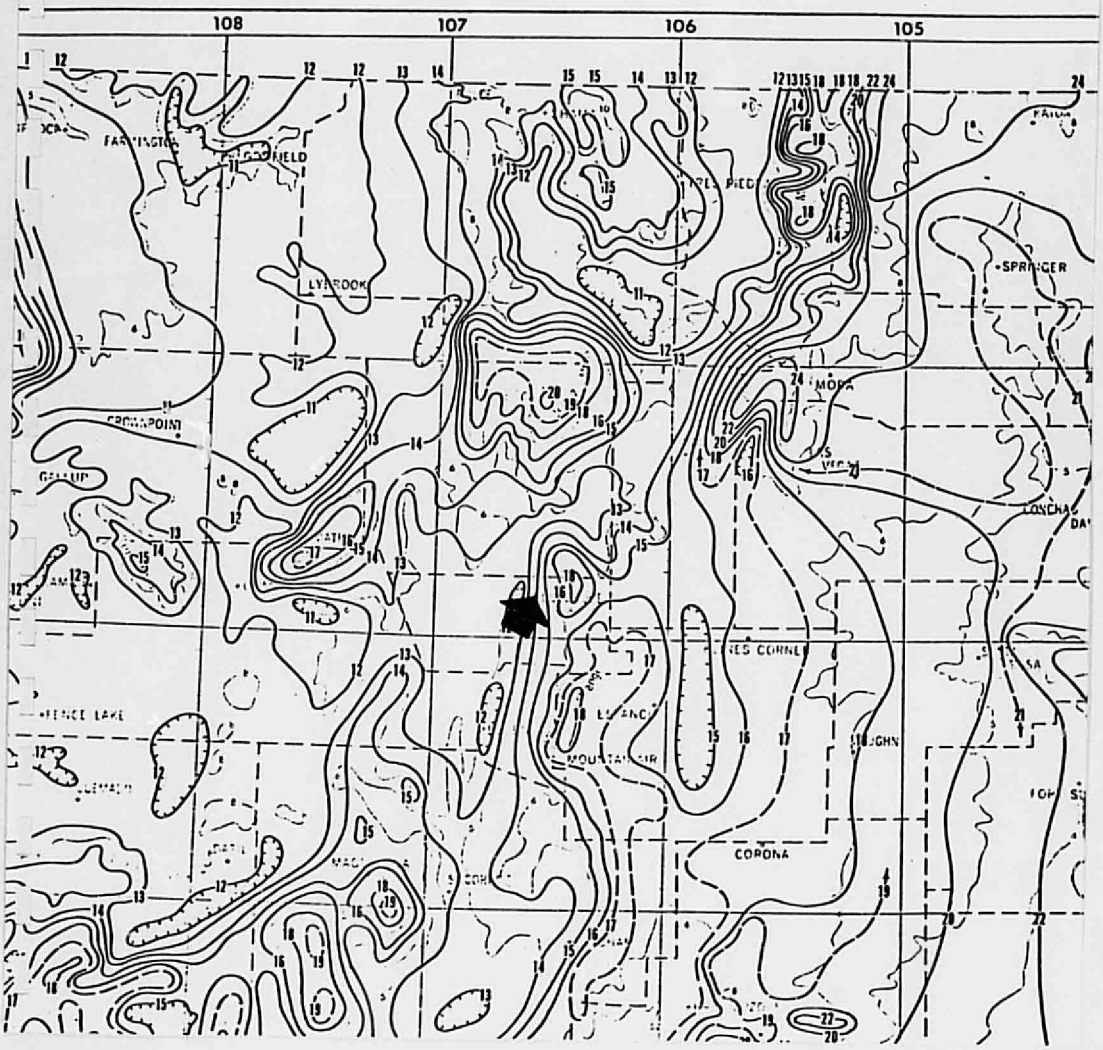


FIGURE 20, NOAA ATLAS 2, VOL IV.
5 YR. - 6 HOUR = 1.38"



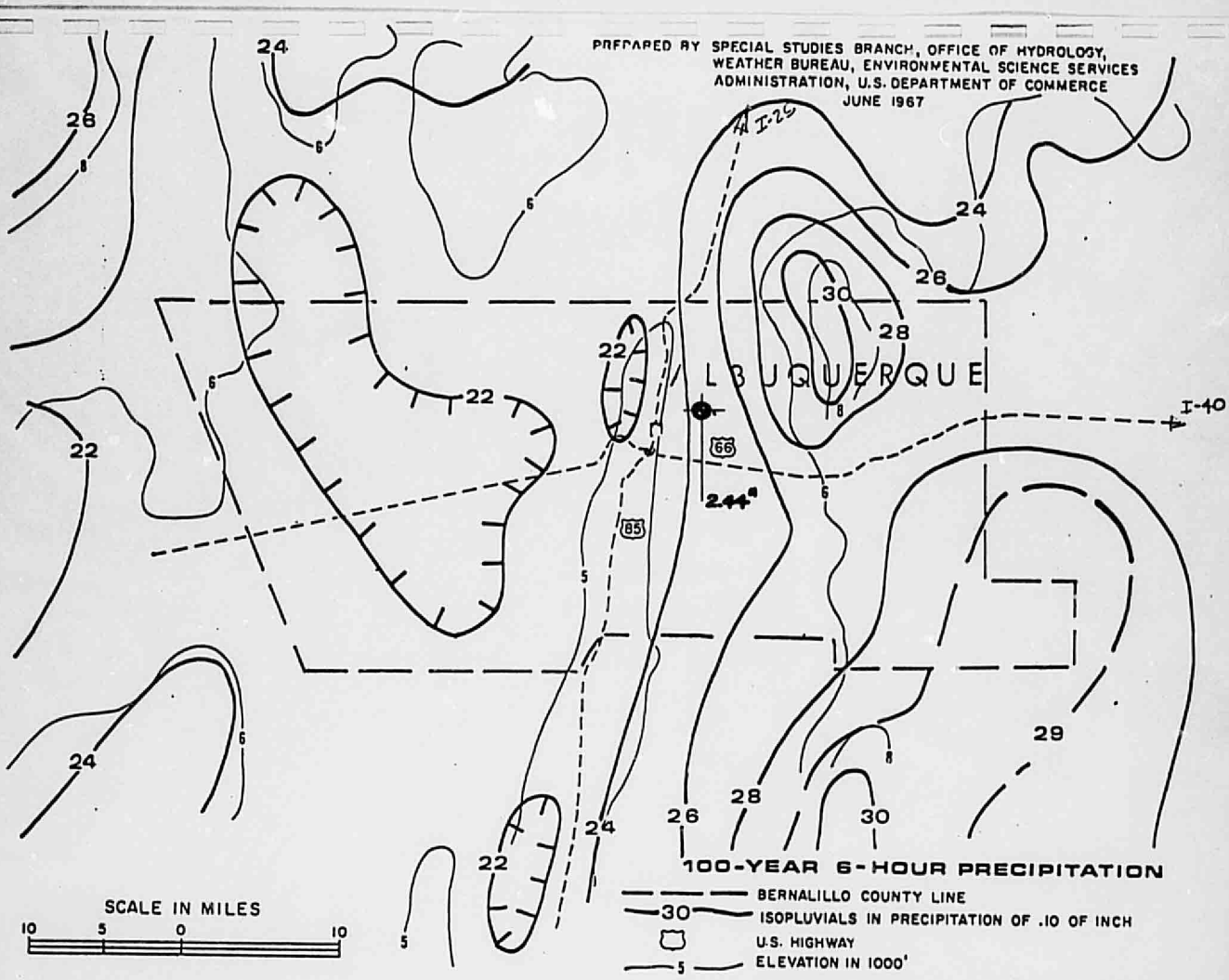

PREPARED BY SPECIAL STUDIES BRANCH, OFFICE OF HYDROLOGY,
WEATHER BUREAU, ENVIRONMENTAL SCIENCE SERVICES
ADMINISTRATION, U.S. DEPARTMENT OF COMMERCE
JUNE 1967
ALBUQUERQUE
I-25
I-40
66
85
2.44"
100-YEAR 6-HOUR PRECIPITATION
SCALE IN MILES
10 5 0 10
BERNALILLO COUNTY LINE
30 ISOPLUVIALS IN PRECIPITATION OF .10 OF INCH
U.S. HIGHWAY
5 ELEVATION IN 1000'

FIGURE 25, NOAA ATLAS 2, VOL IV.
2 YR. - 24 HOUR = 1.30"

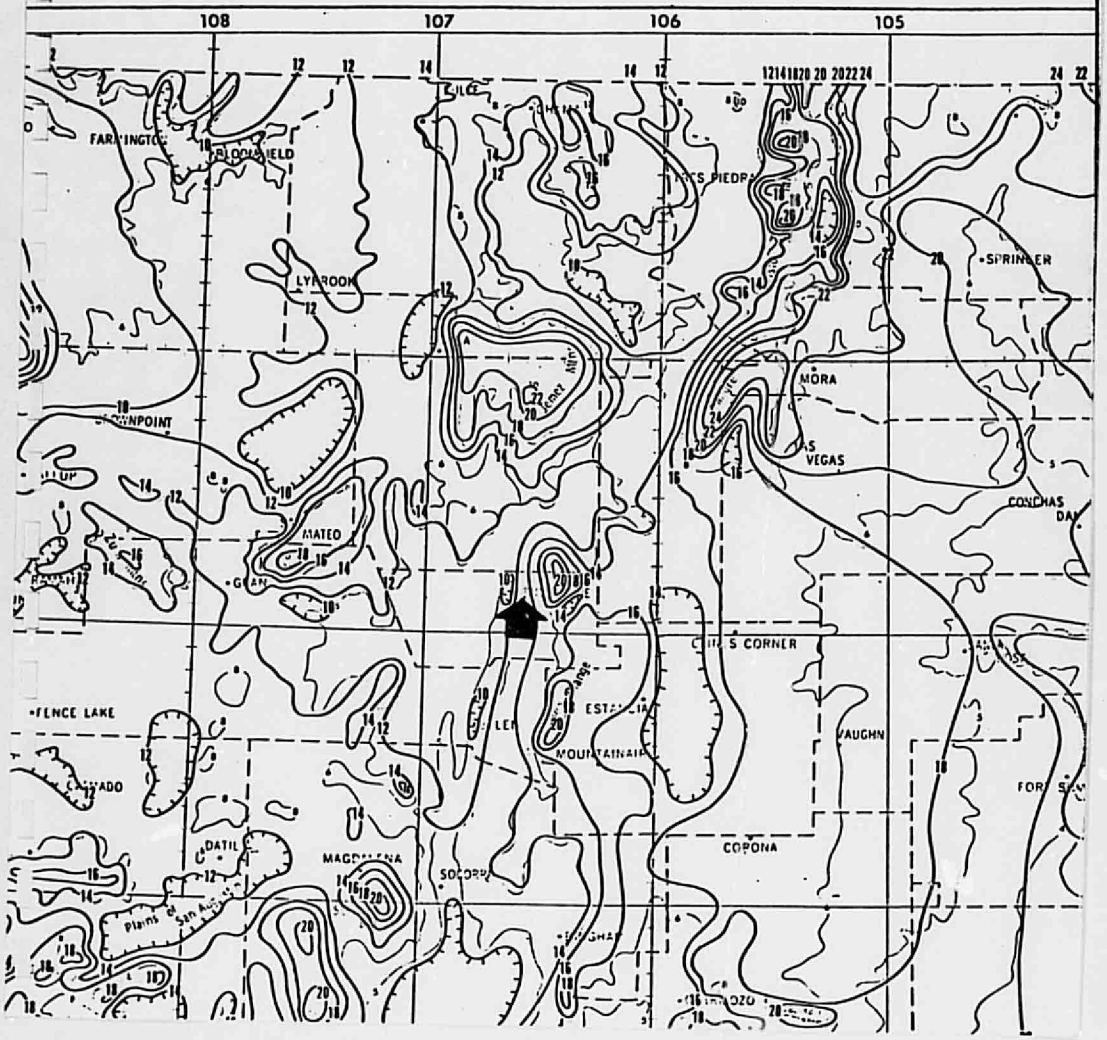


FIGURE 26, NOAA ATLAS 2, VOL. IV
5 YR. - 24 HOUR = 1.70"

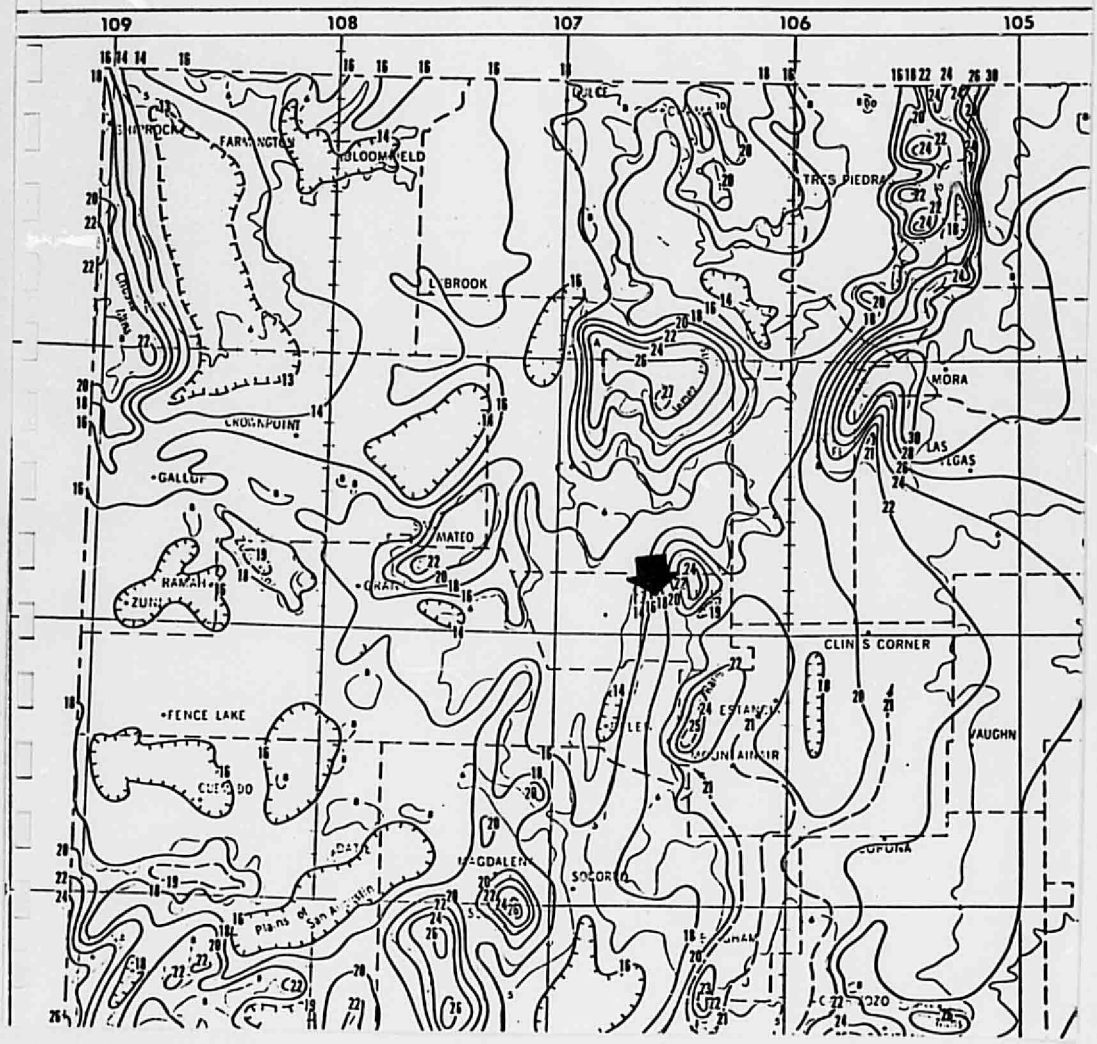
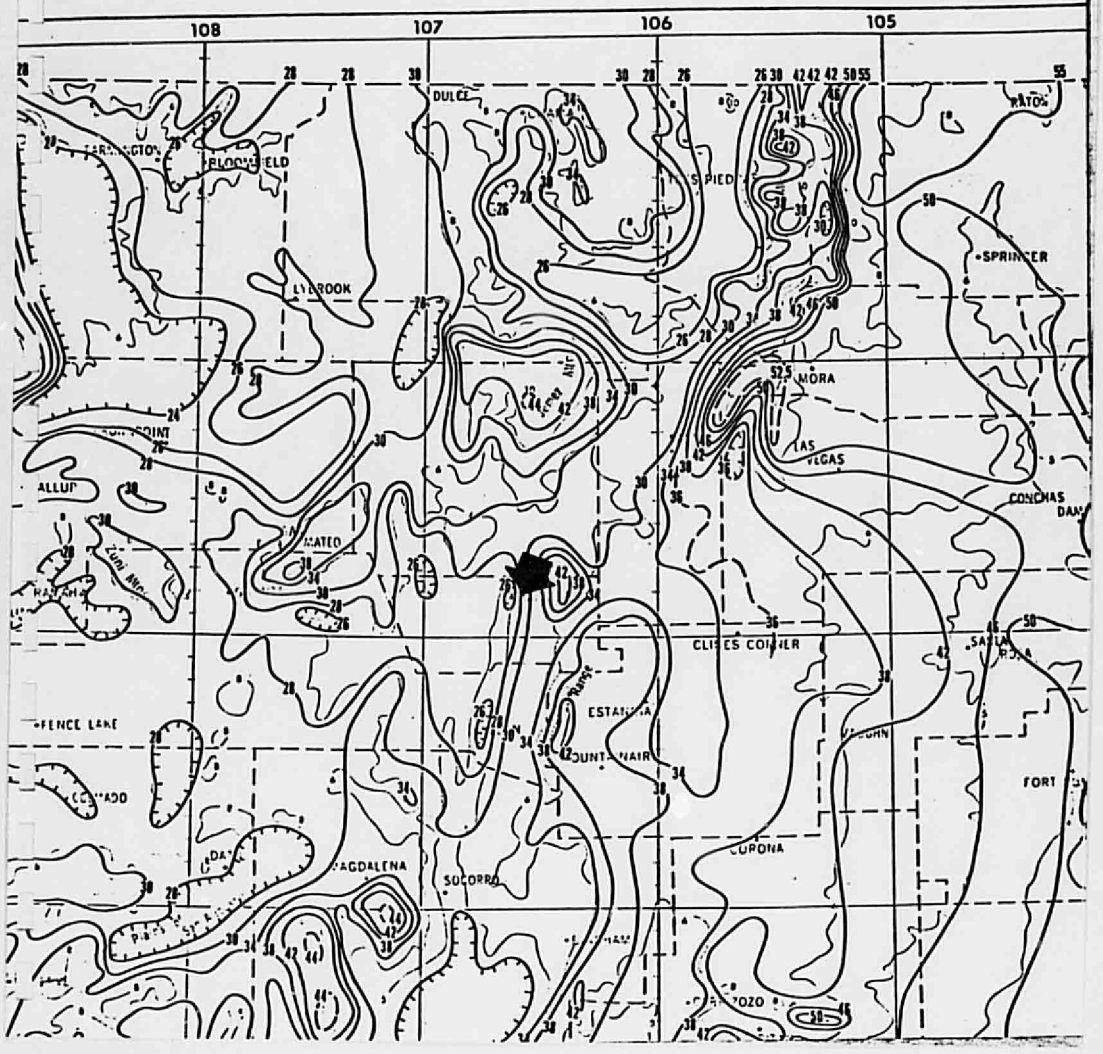


FIGURE 30, NOAA ATLAS 2, VOL IV
100 YR- 24 HOUR = 2.85"



APPENDIX D: DISCHARGE CALCULATION

Assuming outlet control:

(case where 30" storm sewer flowing full)

Total Head Loss HL = He + Hcmp + Hconc

where: He = entrance loss = 1.5 $V^2/2g$

Hcmp = CMP friction loss $= \left[\frac{Vn}{1.49\ R\ 2/3}\right]^2 . L.$

Hconc = Conc friction loss $= \left[\frac{Vn}{1.49\ R\ 2/3}\right]^2 . L$

V - pipe velocity (ft/sec)
g - acceleration due to gravity = 32.2 ft/sec^2
n - Mannings n-value
R - hydraulic radius = $\frac{\text{DIAMETER}}{4}$

L - pipe length = 43 conc pipe
= 32 corregated metal pipe

Available Head = 0.45 ft.

solving for discharge, Q $\approx$ 2.0 cfs

COMPUTE 1 HOUR TOTAL RAINFALL DEPTH

1. EASTERN NEW MEXICO 2 YEARS, 100 YEARS

$Y_2 = 0.218 + 0.709\,[x_1(x_1/x_2)]$

$Y_{100} = 1.837 + 0.439\,[x_3(x_3/x_4)] - 0.0018\,Z$

2. WESTERN NEW MEXICO 2 YEARS, 100 YEARS

$Y_2 = -0.011 + 0.942\,[x_1(x_1/x_2)]$

$-0.011 + 0.942(1.05(1.05/130)) = 0.78''$

$Y_{100} = 0.494 + 0.755\,[x_3(x_3/x_4)]$

$0.494 + 0.755(2.44/(2.44/2.85)) = 2.07''$

WHERE Y_2 = 2 YR 1 HOUR VALUE

Y_{100} = 100 YR 1 HOUR VALUE

x_1 = 2 YR 6 HOUR VALUE

x_2 = 2 YR 24 HOUR VALUE

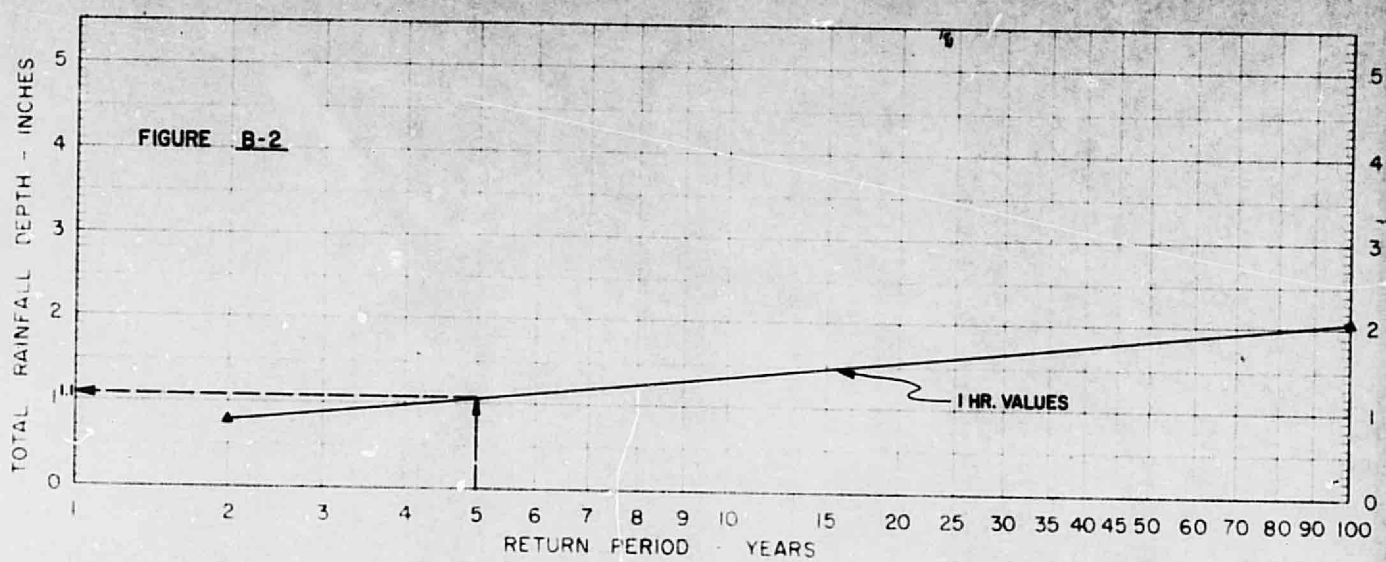
x_3 = 100 YR 6 HOUR VALUE

x_4 = 100 YR 24 HOUR VALUE

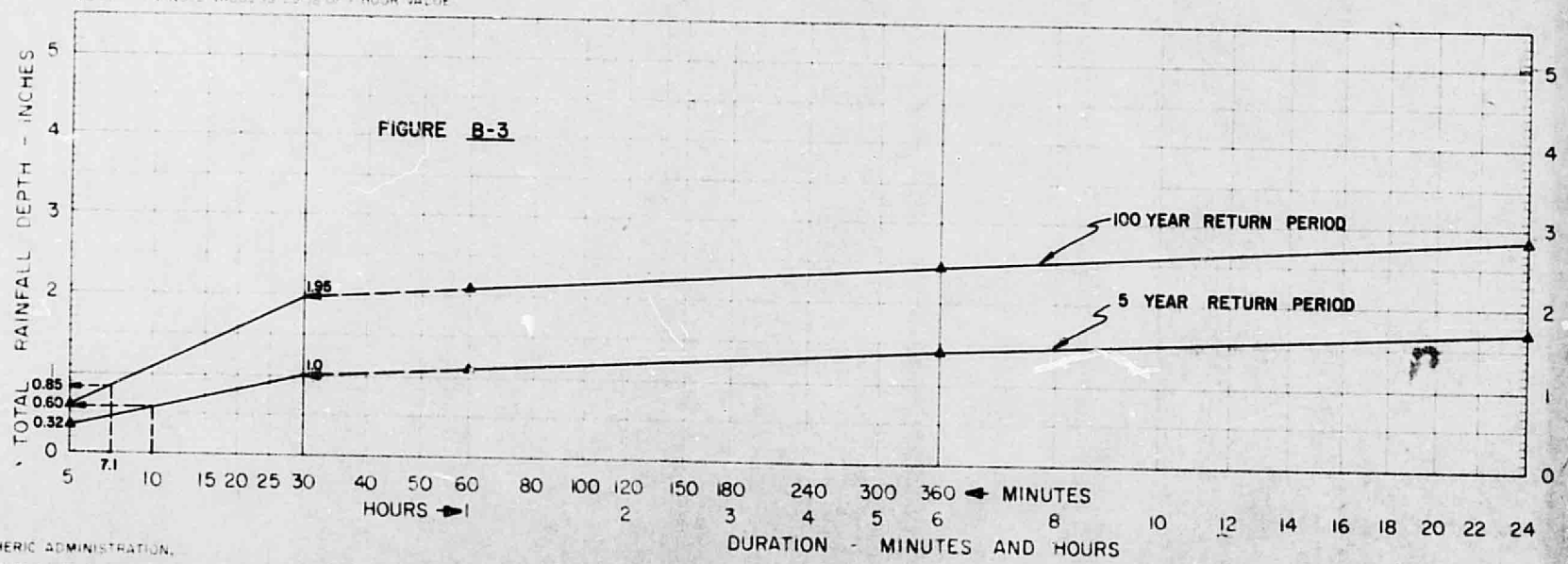
Z = ELEVATION IN HUNDREDS OF FEET

DATA TABLE B-1

YEARS	6 HOURS	24 HOURS
2	x_1 1.05	x_2 1.30
5	1.38	1.70
10		
25		
50		
100	x_3 2.44	x_4 2.85

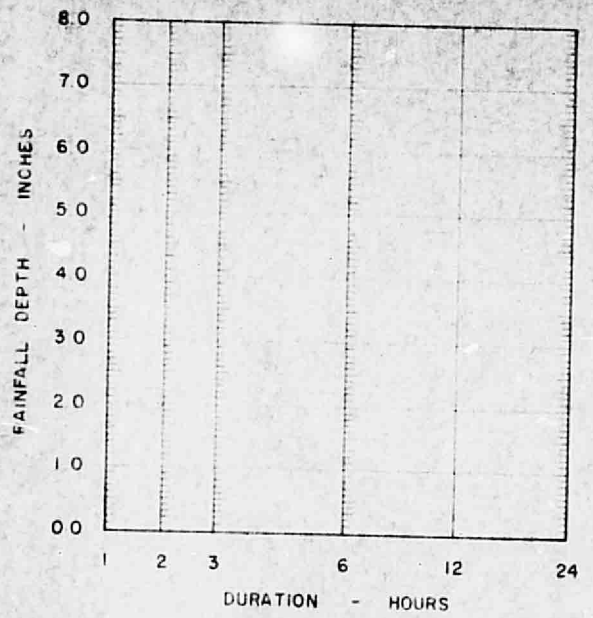


NOTE: * MINUTE VALUE IS 29% OF 1 HOUR VALUE



* INFORMATION AND DATA FROM US DEPT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, ATLAS 2 PRECIPITATATION FREQUENCY ATLAS OF THE WESTERN UNITED STATES, VOLUME IV - NEW MEXICO, 1973

PROJECT WESTINGHOUSE SITE DRAINAGE

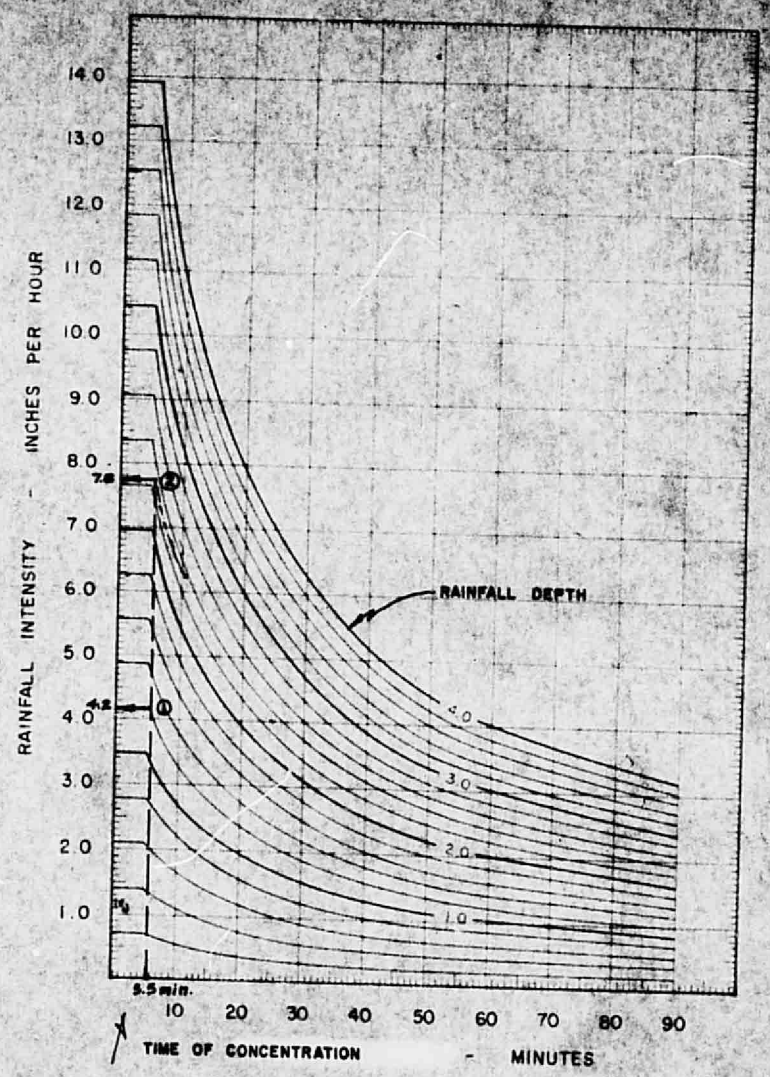


RAINFALL DEPTH - DURATION DIAGRAM

DATA

YEARS	6 HOURS	24 HOURS
2		
5	1.2" ①	
10		
25		
50		
100	2.3" ②	

INFORMATION AND DATA FROM
WEATHER BUREAU - TECHNICAL PAPER NO 40
US DEPT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION,
ATLAS 2 - PRECIPITATION FREQUENCY ATLAS OF THE
WESTERN UNITED STATES, VOLUME IV - NEW MEXICO, 1973



T.P 40

STANDARD DURATION RAINFALL INTENSITY CURVES

PROJECT Westinghouse Site Plan

COMPUTE 1 HOUR TOTAL RAINFALL DEPTH

1 EASTERN NEW MEXICO 2 YEARS, 100 YEARS

$Y_2 = 0.218 + 0.709\,[x_1(x_2/x_2)]$

$Y_{100} = 1.897 + 0.439\,[x_3(x_3/x_4)] - 0.008\,Z$

2 WESTERN NEW MEXICO 2 YEARS, 100 YEARS

$Y_2 = -0.011 + 0.942\,[x_1(x_1/x_2)]$

$-0.011 + 0.942(0.9(0.9/1.1))$ 0.68"

$Y_{100} = 0.494 + 0.755\,[x_3(x_3/x_4)]$

$0.494 + 0.755\,(2.3(2.3/2.8))$ 1.92"

WHERE Y_2 2 YR 1 HOUR VALUE

Y_{100} 100 YR 1 HOUR VALUE

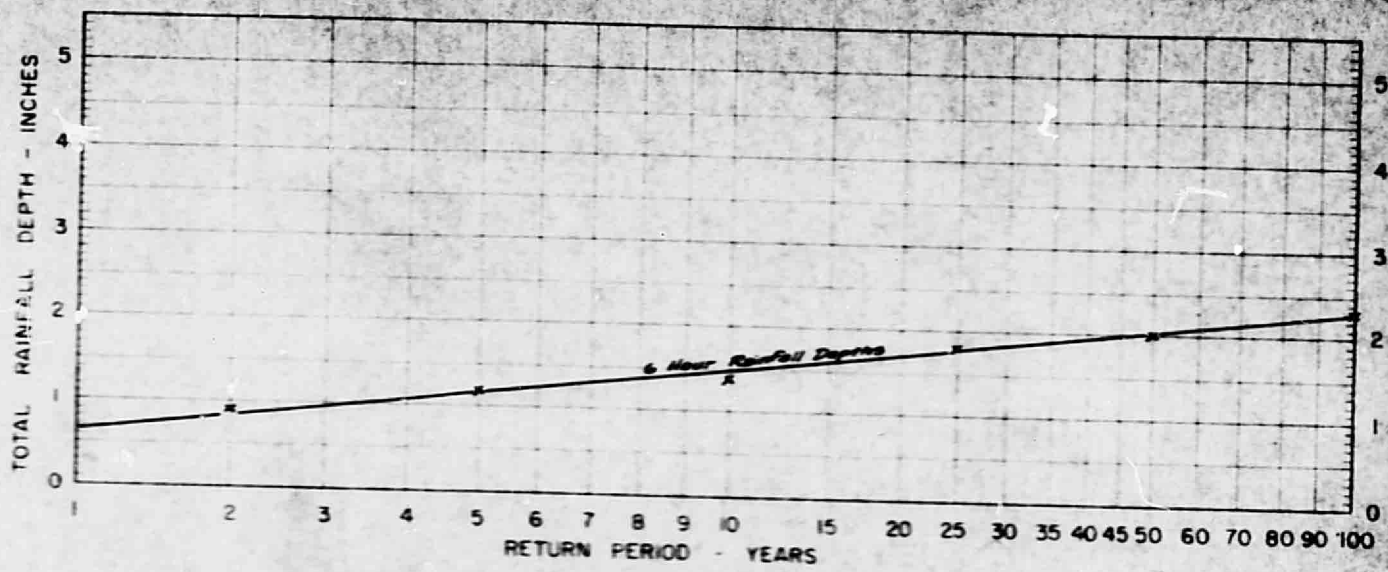
x_1 2 YR 6 HOUR VALUE

x_2 2 YR 24 HOUR VALUE

x_3 100 YR 6 HOUR VALUE

x_4 100 YR 24 HOUR VALUE

Z ELEVATION IN HUNDREDS OF FEET

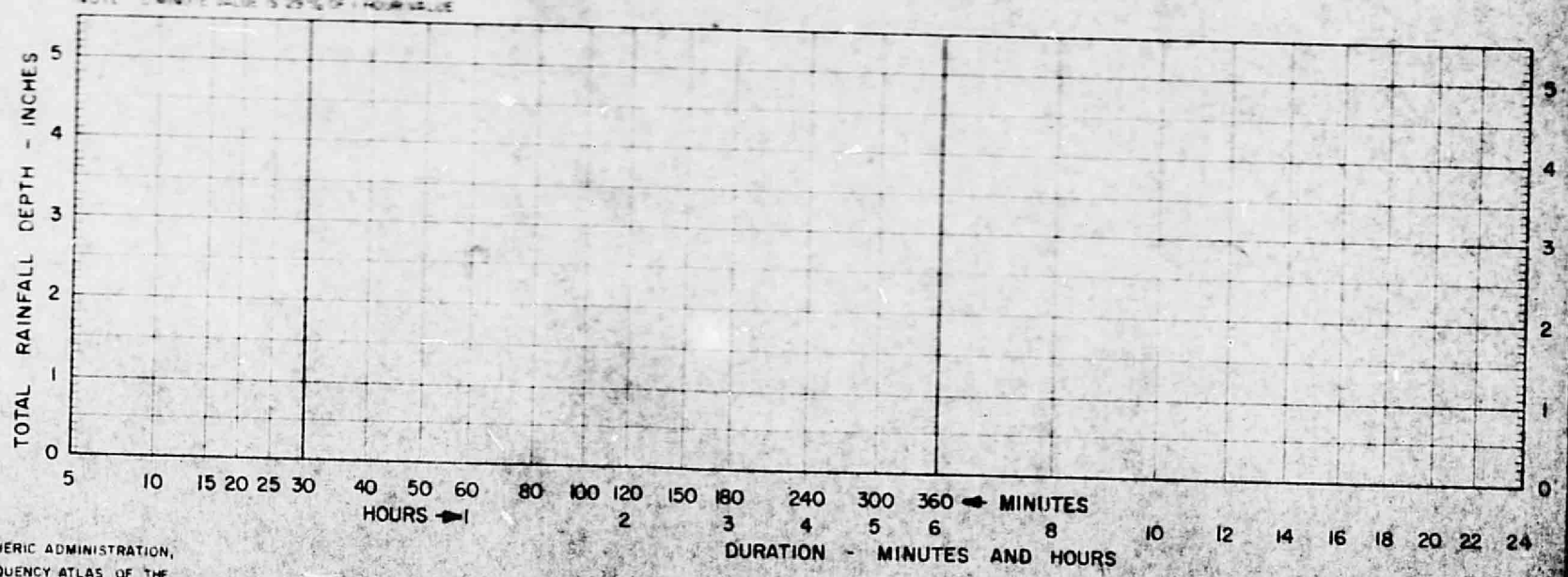


DATA *

YEARS	6 HOURS	24 HOURS
2	x_1 0.9	x_2 1.10
5	1.2	1.5
10	1.4	1.8
25	1.8	2.3
50	2.0	2.6
100	x_3 2.3	x_4 2.8

2.1

NOTE 5 MINUTE VALUE IS 29% OF 1 HOUR VALUE



* INFORMATION AND DATA FROM
US DEPT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION,
ATLAS 2 - PRECIPITATATION FREQUENCY ATLAS OF THE
WESTERN UNITED STATES, VOLUME IV - NEW MEXICO, 1973

PROJECT : WESTINGHOUSE SITE PLAN