HYDROLOGY L11/D6 18 PLANS 1 of 2

L11/D6

18 Plans

CITY OF ALBUQUERQUE
DRAINAGE COMPLAINT REPORT

Location 847 Foothill Rd. SW Sheet ..... of .....

Reported by: Steve Martinez for Tonia Martinez Phone 242-9353

Address: 847 Foothill Rd. SW Ext. .....

Complainant ..... Phone .....

Address ..... Ext. .....

Taken by: D. Hogan Date 9/8/83

COMPLAINT water from Bahamia Ct., Alta Vista Ct. & Gallegos Rd. is running off through private property into the back yard at above address causing silt & caving erosion. This has been reported for 3yrs and investigated in the past.

~~Referred to:~~

INVESTIGATION — CAUSE .....

Recommendation: .....

Investigated by: ..... Date .....

Action taken: .....

Taken by: ..... Date .....

Follow Up: .....

Taken by: ..... Date .....

Zone Atlas ..... Date .....

Drainage Map ..... Complaint Report No. .....

Plan No. ..... Date .....

Project No. ..... Approved .....

CITY OF ALBUQUERQUE

ALBUQUERQUE, NEW MEXICO

INTER-OFFICE CORRESPONDENCE August 16, 1983 REF. NO._____

TO: Jim Fink - Hydrology Department - MDD

FROM: Vicki L. Maddox - Claims Representative - Risk Management

SUBJECT: RITA MARQUEZ - 916 ALTA VISTA COURT S.W.

Jim:

On June 27, 1983 Rita Marquez reported a claim to this division for damage to fencing at the back of property at 916 Alta Vista Court S.W. and 908 Alta Vista Court S.W.. It is apparent rain-water, draining through these properties; washed out the back fencing and traveled down a bluff located on the east end of the properties.

Rita Marquez reports that she has been in contact with your division for a number of years attempting to alleviate their drainage problem. I inspected this area and there are two storm drain inlets that apparently open into drywells. I have denied this claim to the Marquez's under the terms of the Tort Claims Act however, I advised I would refer the matter to your office for further investigation.

VLM:ft

cc: Bill Gooden - Mayors Office
Barbara Stevenson - Legal

July 1, 1983

RECEIVED
JUL 07 1983
CITY ENGINEER

Dear Sir;

Here is a Copy of a letter sent to you since July 28, 1981.

To this day nothing has been done About this Problem. I would appreciate some action on this

Mrs Padilla
5600 Bohemia ct SW.

RECEIVED
JUL 06 1983
TRANSPORTATION DEPT.

MEMORANDUM:

August 5, 1981

TO: Richard Heller, City Engineer

FROM: D.L. Morehead, Design Engineer

SUBJECT: 5600 BOHEMIO CT.

Attached for necessary action is a complaint letter received by this office.

Attach:

DLM:ht

xc: P.D. Noland
W.H. Nickerson
M.E. Mendoza
Ed Archuleta
Ms. Padilla
f/readers (7-79)

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

CITY COUNCIL

Phone: 766-7110

PRESIDENT
Marion M. Cottrell
District 9

Patrick J. Baca
District 1

Vincent E. Griego
District 2

Mel C. Aragon
District 3

Thomas W. Hoover
District 4

VICE PRESIDENT
Sondra L. West
District 5

Robert M. White
District 6

Nadyne C. Bicknell
District 7

Fran J. Hill
District 8

August 27, 1981

Ms. Cecila Padilla
5600 Bohemio Court, SW
Albuquerque, New Mexico

Dear Ms. Padilla:

Thank you for sending me a copy of your July 28th letter to Walter Nickerson. I asked my staff to follow up on what action the administration was taking. We discovered that since Mr. Nickerson was not the proper official to deal with your problem, he referred your letter to the City Engineer. Unfortunately, the letter was mislaid somewhere in this process. I have now given a copy of your letter to Richard Heller, the City Engineer, and his staff has added it to a file of similar complaints.

City Engineering indicates that at the end of the rainy season they will undertake a study of how best to handle this drainage problem, which exists in a number of locations in the City. I believe that they will be able to arrive at some appropriate action on the very real problem that you have.

Sincerely,

Patrick J. Baca

Patrick J. Baca, Councillor
District No. 1

PJB:dg

cc: Richard Heller, City Engineer

July 28, 1981

RECEIVED
JUL 30 1981
WATER RESOURCES

RECEIVED
JUL 31 1981
ENGINEERING DIVISION

Walt Nickerson
Chief Engineer
Water resources
P.O. Box 1293

Dear Sir;

I reside in the Vista Alta addition. My address is 5600 Bohemio Ct. S.W. We have lived here for about five and a half years.

I have complained to the city of Albuquerque during this time that water gathers on my street(Bohemio) as a matter of fact on my driveway to the point of coming into my house every time it rains.

The city installed what they call a storm drain. They dug a 2x4x4 hole and filled it with gravel. In my estimation that was a waste of time and money. there is no drainage what so ever.

About two years ago I called councilman Pat Baca. He came and took a look and was amazed at this hole.

The street is slumped towards our house, therefore we get all the debris from up the block.

Every time it rains I have to call the city to come and pump the water out. sometimes they come and sometimes I have to make three or four calls. If we are out of town the water will just sit there and rot.

We have being getting some giant roaches from this hole and bug spray doesn't seem to help.

I suggest that the city send some resposible person that can and will resolve this problem, instead of wasting money pumping this hole, as I intend to keep filing letters of complaint until this matter is resolved.

I think I have being very patient about this.

Sincerely yours,
Cecilia Padilla
Cecilia Padilla

dlw 8/4/81

ccMayor Rusk
Pat Baca

1924

MARINA CONSTRUCTION, INC.

June 27, 1983

RECEIVED
JUN 29 1983
CITY ENGINEER

Richard S. Heller
City Engineer
P.O. Box 1293
Albuquerque NM 87103

Dear Mr. Heller:

Again I want to bring to your attention a city engineering problem which has existed for many years at 908 Alta Vista Ct. S.W. Lot #19 Vista Alta addition.

On my last conversation with Chuck Esterling approximately one year ago I was told that the city was aware of the problem and that it would be remedied within the next few months. To date the city has done nothing to alleviate the problem for not only myself but all the residents of the Vista Alta addition. I have discussed this problem with Mr. Pat Baca, Mr. Esterling and various engineers at City Hall to no avail.

I am requesting that the city allow the residents of Vista Alta addition an opportunity to meet with you so that we can take whatever action we deem necessary to alleviate this problem. I am sure you are aware that as the city grows in this area the natural flow of water becomes worse. On our last heavy rain June 24th approximately $ 2,000.00 damage was caused to my home and property.

Sincerely,

George Chavez

cc Pat Baca
Harry Kinney
C.M. Easterling

DES
HRO INSP
CME HYDRO
JNH SUR
SAD ADM
FILE
RESPONSE BY ASAP

No letter of yours. Know what problem is - what Chuck promised what needs doing?

Headquarters: 6209 Menaul Blvd. N.E., Suite 7, Albuquerque, N.M. 87110 883-8569

CITY OF ALBUQUERQUE
DRAINAGE COMPLAINT REPORT

Location 908 ALTA VISTA CT. NW. Sheet 1 of 1
MR. GEO. CHAVEZ
Reported by: ALBERT RIVERA Phone
Address: 8615 VICKI DR. WHITTIER CA 90606 Ext.
Complainant Phone
Address Ext.
Taken by: C. GASTERLING Date 9-18-82
COMPLAINT PIPE FROM FRENCH DRAIN THROUGH LOT 19 VISTA ALTA SUBDIV., 908 ALTA VISTA CT. NW, DRAINING WATER ONTO PROPERTY EAST OF 908 ALTA VISTA CT.
Referred to: B.B.D. Board
INVESTIGATION — CAUSE ANDRE HOALE # I INVESTIGATED — FOUND THAT MR. CHAVEZ HAD GROUTED UP THE PIPE IN QUESTION. WE TOOK PHOTOS — AREA NEEDS PERMANENT DRAINAGE.
Recommendation: ANDRE TO FOLLOW UP SITE DRAINAGE REPORT LIT-86
Investigated by: [signature] Date 9-24-82
Action taken: SCANLON DESIGNED POND — NO PLANS DRAWN FOR STORM SEWER — WATER IS DRAINING FROM PADS ACROSS 908 ALTA VISTA
Taken by: [signature] Date 8-5-83
Follow Up:
Taken by: Date

Zone Atlas L-11
Drainage Map
Complaint Report No. 4113.01
Date
Plan No.
Date
Project No.
Approved

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

September 14, 1982

CERTIFIED MAIL

Mr. George E. Chavez
908 Alta Vista Court SW
Albuquerque, NM 87105

RE: 908 ALTA VISTA COURT SW, LOT 19, VISTA ALTA ADDITION

Dear Mr. Chavez:

On August 4, 1982 a letter was sent to you from this office, a copy of which is attached. As of this date we have not received a reply. Please inform us as to what action you are going to take in this matter.

Please comply within thirty days or contact this office within the same time frame, to prevent initiation of legal action.

Sincerely,

FOR Richard S. Heller
City Engineer

RSH/BC/br

cc: Mr. Albert Rivera, 8615 Vicki Dr.,
Whittier, California 90606
City Attorney's Office, Claims Division
C. M. Easterling, Principal Asst. City Engineer/Hydrology

Attachment

file copy

MUNICIPAL DEVELOPMENT DEPARTMENT

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

AN EQUAL OPPORTUNITY EMPLOYER

P 217 145 333

RECEIPT FOR CERTIFIED MAIL

NO INSURANCE COVERAGE PROVIDED—
NOT FOR INTERNATIONAL MAIL
(See Reverse)

SENT TO
George E. Chavez
STREET AND NO.
908 Alta Vista Ct. SW
P.O., STATE AND ZIP CODE
Albuquerque, NM 87105

POSTAGE		$
CONSULT POSTMASTER FOR FEES	CERTIFIED FEE	¢
OPTIONAL SERVICES	SPECIAL DELIVERY	¢
OPTIONAL SERVICES	RESTRICTED DELIVERY	¢
RETURN RECEIPT SERVICE	SHOW TO WHOM AND DATE DELIVERED	¢
RETURN RECEIPT SERVICE	SHOW TO WHOM, DATE AND ADDRESS OF DELIVERY	¢
RETURN RECEIPT SERVICE	SHOW TO WHOM AND DATE DELIVERED WITH RESTRICTED DELIVERY	¢
RETURN RECEIPT SERVICE	SHOW TO WHOM, DATE AND ADDRESS OF DELIVERY WITH RESTRICTED DELIVERY	¢
TOTAL POSTAGE AND FEES		$

POSTMARK OR DATE
9/15/82

PS Form 3800, Apr. 1976

PS Form 3811, Dec. 1980

SENDER: Complete items 1, 2, 3, and 4.
Add your address in the "RETURN TO" space on reverse.

(CONSULT POSTMASTER FOR FEES)

1. The following service is requested (check one).
☒ Show to whom and date delivered ..... —¢
☐ Show to whom, date, and address of delivery .. —¢
2. ☐ RESTRICTED DELIVERY —¢
(The restricted delivery fee is charged in addition to the return receipt fee.)
TOTAL $ 1.2

3. ARTICLE ADDRESSED TO:
Mr. George E. Chavez
908 Alta Vista Court SW
Albuquerque, NM 87105

4. TYPE OF SERVICE:
☒ REGISTERED ☐ INSURED
☐ CERTIFIED ☐ COD
☐ EXPRESS MAIL
ARTICLE NUMBER

(Always obtain signature of addressee or agent)

I have received the article described above.
SIGNATURE ☒ Addressee ☐ Authorized agent

5. DATE OF DELIVERY
9-16-82

6. ADDRESSEE'S ADDRESS (Only if requested)

7. UNABLE TO DELIVER BECAUSE:

7a. EMPLOYEE'S INITIALS

RETURN RECEIPT, REGISTERED, INSURED AND CERTIFIED MAIL

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO

August 4, 1982

Mr. George E. Chavez
908 Alta Vista Court S.W.
Albuquerque, N.M. 87105

RE: 908 ALTA VISTA COURT S.W., LOT 19, ALTA VISTA ADDITION

Dear Sir:

A complaint received by our office has brought to our attention the existence of an illegal connection with a City storm drainage facility. A tap was made in the back of the City inlet and french drain adjacent to the address of 908 Alta Vista Court S.W. and drainage has been made to discharge onto the lot at 847 Foothill Rd. SW. This condition must be remedied at once, disconnecting the illegal drainage across your property. Please advise this office of when the required work will be performed for inspection and verification.

Very truly yours,

Richard S. Heller

Richard S. Heller
City Engineer

RSH/BC/tsl

cc: Mr. Albert Rivera, 8615 Vicki Dr.,
Whittier, California 90606
City Attorney's Office, Claims Division
Charles M. Easterling, Princ. Asst. City Eng./Hydrology

8-19-81

DRAINAGE COMPLAINT REPORT

Location: L-11 Project:

Reported by: Water Resources Phone

Address: Ext.

Complainant: Cecilia Padilla Phone

Addres: 5600 Bohemio Ct. S.W. Ext.

Taken by: B. Montoya Date August 14, 1981

COMPLAINT: Water gathering adjacant to 5600 Bohemio Ct. French drains installed but did not take care of the problem.

Referred to:

INVESTIGATION — Cause: No outfall of collectionsystem other than the two french drains. Not storm sewer facilities close by to be able to connect to.

Recommendation: Storm sewer system could be installed to outfall downstream at the Arenal Drain. This would probably would mean added expense for drainage right of way.

Investigated by: B. Montoya Date 8-14-81

Plan No. Sheet No. Drainage Map

Approved Date

#30

THIS MICROIMAGE IS THE BEST POSSIBLE
REPRODUCTION DUE TO THE POOR QUALITY
OF THE ORIGINAL DOCUMENT



5600 Bohemia Ct. 8-14-81
Drain inlet plugged



5600 Bohemia Ct 8-14-81
looking from west to East

C-18

MEMORANDUM:

RECEIVED
AUG 06 1981
CITY ENGINEER

August 5, 1981

TO: Richard Heller, City Engineer

FROM: D.L. Morehead, Design Engineer

SUBJECT: 5600 BOHEMIO CT.

Attached for necessary action is a complaint letter received by this office.

Attach:

DLM:ht

xc: P.D. Noland
W.H. Nickerson
M.E. Mendoza
Ed Archuleta
Ms. Padilla
f/readers (7-79)

BERNIE,
PLEASE INVESTIGATE AND ADVISE.
CME

Chuck - This is area of long standing problems — no outfall or collection system. Probably can't do anything now. I think Sandra Bevans & Mayo's office is awarding these identical complaints - same area.
Duane 8/6/81

RSH ADM
HRO SUR
CDS COUN
DES SEC
INSP FILE
HYDRO CME RETURN

July 28, 1981

RECEIVED
JUL 30 1981
WATER RESOURCES

Walt Nickerson
Chief Engineer
Water resources
P.O. Box 1293

ENGINEERING DIVISION

Dear Sir;

I reside in the Vista Alta addition. My address is 5600 Bohemio Ct. S.W. We have lived here for about five and a half years.

I have complained to the city of Albuquerque during this time that water gathers on my street(Bohemio) as a matter of fact on my driveway to the point of coming into my house every time it rains.

The city installed what they call a storm drain. They dug a 2x4x4 hole and filled it with gravel. In my estimation that was a waste of time and money. there is no drainage what so ever.

About two years ago I called councilman Pat Baca. He came and took a look and was amazed at this hole.

The street is slumped towards our house, therefore we get all the debris from up the block.

Every time it rains I have to call the city to come and pump the water out. sometimes they come and sometimes I have to make three or four calls. If we are out of town the water will just sit there and rot.

We have being getting some giant roaches from this hole and bug spray doesn't seem to help.

I suggest that the city send some resposible person that can and will resolve this problem, instead of wasting money pumping this hole, as I intend to keep filing letters of complaint until this matter is resolved.

I think I have being very patient about this.

Sincerely yours,
Cecilia Padilla

cc Mayor Rusk
Pat Baca

CITY OF ALBUQUERQUE, NEW MEXICO
CITY ENGINEER'S OFFICE

MEMORANDUM - August 11, 1976

TO: Mr. V. M. Kimmick, City Engineer
FROM: K. H. Laws, Assist. City Engineer-Hydrology
SUBJECT: FLOODING IN VISTA ALTA ADDITION

Alta Vista Street was constructed in SAD179 and provided two dry wells. Bohemio Court and Gallegos Rd. were in SAD170 and have a dry well on each street. Generally the dry well is fed by to Type C inlets and consists of a 6' M.H. without an outlet or bottom. The area of the 6' pipe is 28.27 square feet. If the soil will absorb water at the rate of 12 inches per hour, the dry well capacity would be 28.27 cubic feet per hour or 0.47 cfs. The peak flow of the 100 year storm would be between 7 and 13 cfs to the inlets and the volume varies from 10,000 cubic feet to 20,000 cubic feet. Thus it would require the dry wells 15 to 30 days to handle the 100 year storm and these figures are probably optimistic. The street at each drywell can probably store about 500 cubic feet and the well itself about 170 cubic feet.

Calculations were made to determine ponding if a controlled outlet were found. An 18" outlet at each dry well would require about 3150 cubic feet of storage or 112 ft. of 6' pipe.

I talked with Si Nanniga about controlled outlet into the Arenal ditch and feel we have a good chance to get permission. However, Si will require a plan to review before a commitment is made.

The 18" pipe handles about the 10 year storm. A 24" pipe will handle the 100 year storm without the cost of storage facility.

I would recommend an easement be found and acquired over the bluff and a 24" pipe installed. This will be an expensive solution to solve a nuisance, but not dangerous to life problem.

KHL/fs

(18)
1/11/81

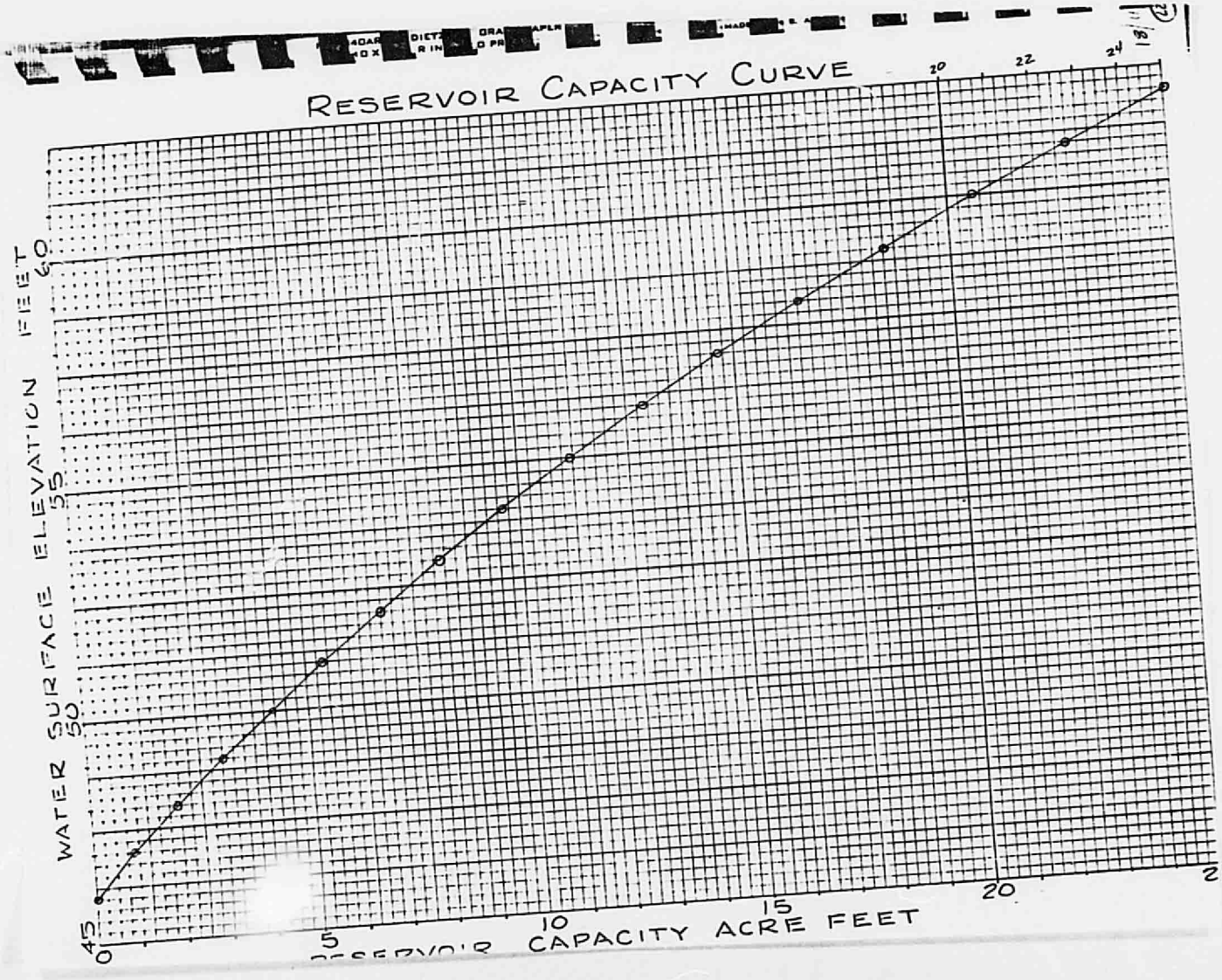
100 year Frequency Rainstorm

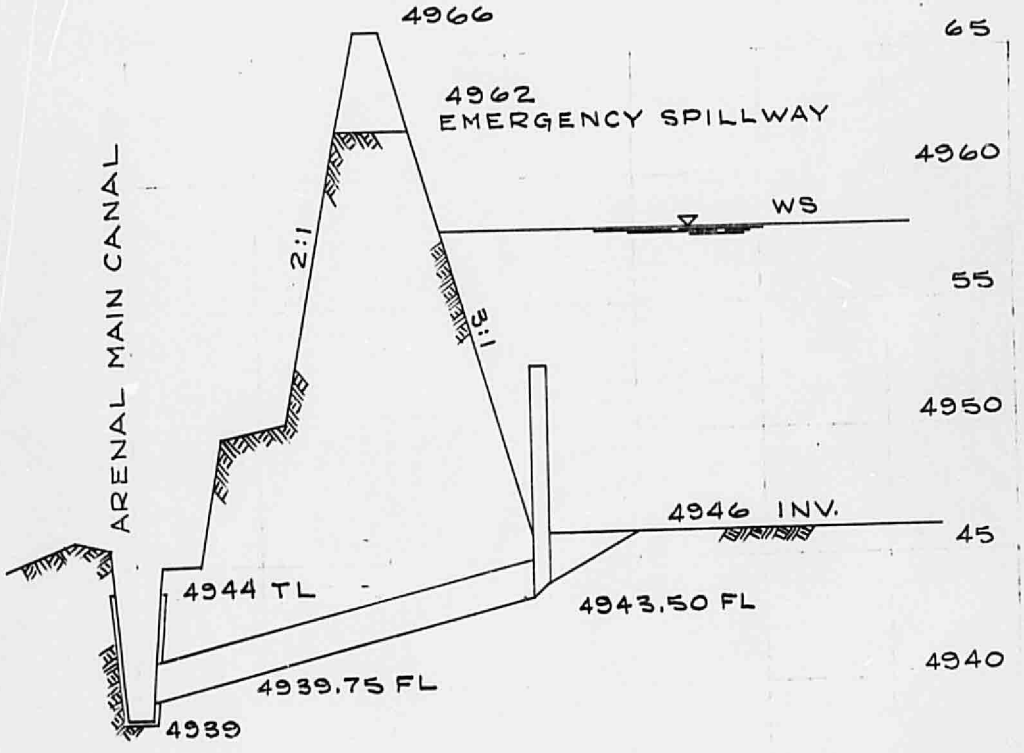
Emergency Spillway Design:
Design emergency spillway using Graphical Method of Determing 100-year Frequency Peak Discharge from SCS Method.
Reference: SCS, TR-55, Fig 5-2, pp 5-5

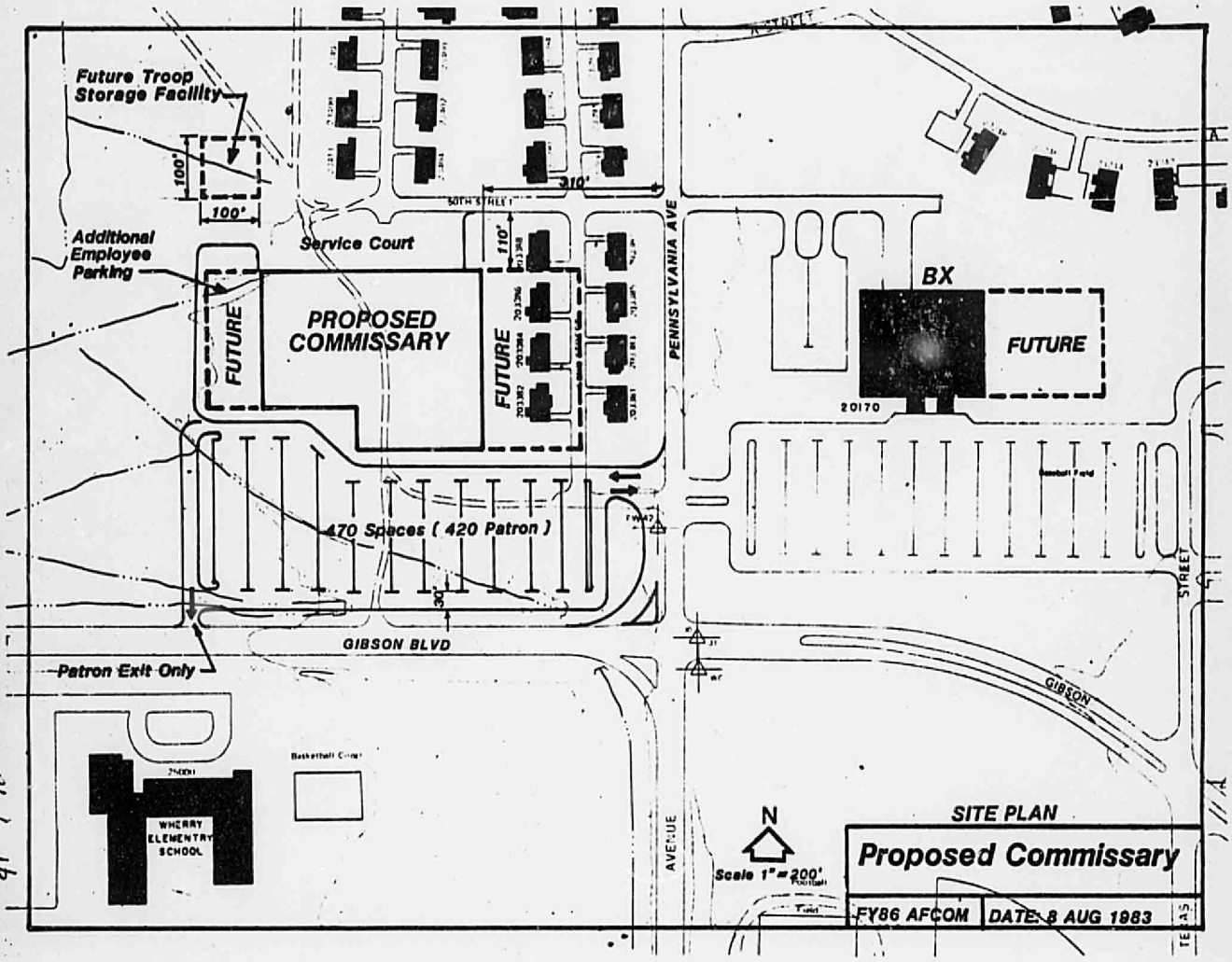
Drainage Area (275 acres)	0.43	Sq. mi.
Runoff Curve Number "CN"	87	
Hydrologic Soil Group	B	
Time of Concentration (39 minutes)	0.648	hr.
$T_T = 0$ → Peak Discharge "qp" Ref. Fig 5-2, TR-55	430	CMS/in
24 hr. accumulatioe Direct Runoff	1.48	in
Peak Discharge "q" in cfs		
$q = qp(A)Q = 430 \times 0.43 \times 1.48$	274	cfs

From table 5-3, pp 5-9 using Tc = 0.50 hr. and 0.75 hr. to incumpus Tc of 0.648 hours of drainage area under study.

Subtract 10 from each hydrograph time interval (11.0 - 10.0 = 1.0)
Pick number between Table Tc = 0.50 hr. and Tc = 0.75 hr. as close to qp = 430 as possible and interpolate between the two tables (496 and 329 under the 12.1 hour.)
Ref. SCS - TR-55 pp 5-9


RESERVOIR CAPACITY CURVE
WATER SURFACE ELEVATION FEET
45
50
55
60
0
5
10
15
20
22
24
RESERVOIR CAPACITY ACRE FEET


4966
4962
EMERGENCY SPILLWAY
WS
2:1
1:1
ARENAL MAIN CANAL
4946 INV.
4944 TL
4943.50 FL
4939.75 FL
4939
65
4960
55
4950
45
4940
35


Future Troop Storage Facility
100'
100'
Additional Employee Parking
Service Court
110'
310'
50TH STREET
PENNSYLVANIA AVE
FUTURE
PROPOSED COMMISSARY
FUTURE
BX
FUTURE
20170
470 Spaces (420 Patron)
30'
GIBSON BLVD
Patron Exit Only
GIBSON
STREET
WHERRY ELEMENTRY SCHOOL
Basketball Court
AVENUE
N
Scale 1" = 200'
SITE PLAN
Proposed Commissary
FY86 AFCOM
DATE: 8 AUG 1983

(11)
1/9/81

Preliminary Dam Clasification

Size Clasification

Storage in acre ft	< 50	30	ac. ft
Height of embankment	< 25	25	ft
Category		Small	

Hazard Potential Clasification

Loss of Life	None	
Economic Loss	Minimal	
Category	Low	

Hydrologic Evaluation Guidelines

Hazard	Low	
Size	Small	
Spillway Design Flood	100	year
Storage Capacity Design Flood	100	year
Storm Drain Design Capacity	10	year
Outlet Capacity	15	cfs

Size Detention Basin

Area of pond bottom (3.94 x 0.2296)	0.9	Acres
Area of high water surface (10.47 x 0.2296)	2.40	Acres
Average end area (0.90 + 2.40 / 2)	1.65	Acres
Volume of pond (1.65 x 16')	26.4	ac. ft.
Area at top of berm (12.25 x 0.2296)	2.81	Acres

10-12-82

To: CME - PACE
FROM: ANDRE HOUME - FPA

REF: ALTA VISTA DRAINAGE PROBLEM

STATEMENT: THE SITE IS LOCATED NORTH OF EDRIDGE & FOOTHILLS (L-11) UP ON A CLIFF. THE SUBDIVISION WAS PAVED UNDER A SPECIAL ASSESSMENT DISTRICT AND DRAINAGE WAS ADDRESSED USING "FRENCH" DRAINS. WATER NOW STANDS AT THE SOUTHEAST CORNER OF ALTA VISTA. A PROPERTY OWNER TAPPED AN ILLEGAL 8" PIPE TO THE CATCH BASIN AND DIRECTED THE FLOWS DOWN THE CLIFF. THIS RESULTED IN EROSION PROBLEMS ON THE DOWNSTREAM OWNER. THIS PIPE WAS RECENTLY PLUGGED, THEREFORE WATER WILL NOW POND IN THE STREET AND YARDS. THERE IS A POSSIBILITY OF FLOODING SOME HOMES IF THE STORM IS LARGE ENOUGH.

SOLUTION: PROVIDE A POSITIVE DISCHARGE FROM THIS SITE TO HANDLE THE 100 YEAR RUNOFF RATE & VOLUME. THE POINT OF DISCHARGE IS A VARIABLE WITH THREE POSSIBLE ALTERNATIVES:

THIS MICROIMAGE IS THE BEST POSSIBLE REPRODUCTION DUE TO THE POOR QUALITY OF THE ORIGINAL DOCUMENT

ALTERNATIVE Nº 1:

DISCHARGE THIS SITE TO THE ISLETA DRAIN. THIS WILL REQUIRE EASEMENTS. THE MRGCD HAS VERBALLY APPROVED A 25 c.f.s discharge TO THIS OUTFALL. THE FOLLOWING IS A COST ESTIMATE FOR ALTERNATE Nº 1:

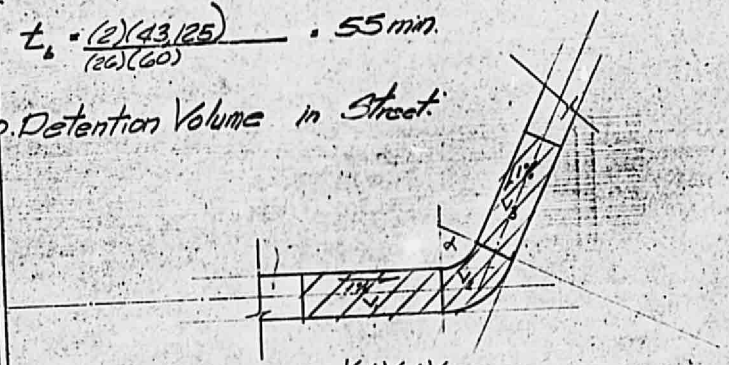
1	LAND ACQUISITION L.S.	$2000
2	36" R.C.P. ~ 2500 l.f @ 44.00	110,000
3	MANHOLES ~ 8ea @ $1300.00	10,400
4	TRENCH & BACKFILL ~ 2500 l.f. @ $9.50	23,750
5	OUTFALL STRUCTURE L.S.	2,000
	SUBTOTAL	148,150
	10% CONT.	14,815
	TOTAL	162,965
	ENGINEERING	16,297
	SURVEYING & TESTING	11,408
	PROJECT TOTAL	$191,000

THIS MICROIMAGE IS THE BEST POSSIBLE REPRODUCTION DUE TO THE POOR QUALITY OF THE ORIGINAL DOCUMENT

ALTERNATE N°2: PROVIDE ON STREET DETENTION & DISCHARGE AT AN ACCEPTABLE RATE TO BRIDGE STREET.

Detention Facility Investigation

1. Tributary Area estimated at 9 acres
2. 100% residential development
3. No significant runoff from Coors Blvd. as determined by 1"=500' topography & Flood Maps.
4. $t_c = 10$ min
5. $t_p = t_c = 10$ min.
6. Volume = $(0.6)(2.2)(\frac{1}{2})(9)(43{,}560) = 43{,}125$ ft.^{3}
7. $q_i = C \cdot I \cdot A = (0.6)(2.2)(2.2)(9) = 26$ c.f.s.
8. $t_2 = \frac{(2)(43{,}125)}{(26)(60)} = 55$ min.
9. Detention Volume in Street



DETENTION VOL. IN STREET = $V_1 + V_2 + V_3$

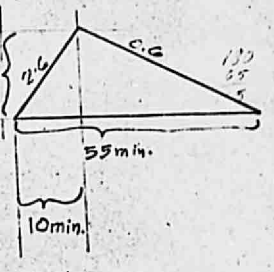
ALLOWABLE Depth = 0.67

$V_1 = (30)(\frac{1}{2})(.67)(67) = V_3 = 674$ ft.^{3}

$V_2 = \frac{1}{2}\pi(\frac{\alpha}{360})(r_1^2 - r_2^2) = \pi(\frac{65}{360})(25^2 - 55^2)(.67) = 912$ ft.^{3}

Total volume = $V_1 + V_3 + V_2 = 674 + 674 + 912 =$ **2260 ft.^{3}**

Pipe	Discharge @ h=2.0'	t_1	t_2	V_1	V_2	Req'd. V_t
4	0.6 c.f.s.	2.8	41.8	7468	34,138	11,606
6	1.3 c.f.s	9.5	41.5	7410	32,975	40,015
8	2.4 c.f.s.	9.1	41.1	6413	31,223	37,666
12	5.3 c.f.s.	8.0	43.0	4968	26,703	31,671
18	12.0 c.f.s	5.4	40.4	2268	16,968	19,296
24	21.4 c.f.s.	1.8	36.8	218	5078	5326



INADEQUATE STORAGE IN STREET FOR DETENTION FACILITIES ~ REQ'D ADD'N LAND ADJACENT TO OUTFALL.

THIS MICROIMAGE IS THE BEST POSSIBLE REPRODUCTION DUE TO THE POOR QUALITY OF THE ORIGINAL DOCUMENT

4.21 x

ALTERNATE No 3

THE COUNTY IS CURRENTLY THE LEAD AGENCY IN THE BRIDGE BOULEVARD IMPROVEMENT CURBAN SYSTEM PROJECT M-4014(2)). PART OF THIS PROJECT INCLUDES A DETENTION POND (10 year Frq. Design storm) for this area & Lores Blvd. The detention pond could then be incorporated to solve this problem. The pipe lines and outfall could be sized for the 100 year storm as long as the detention facility is provided with a 100 year storm overflow. Since the detention facility contains more than 10-acre-feet it will meet state requirement for a P.M.P. overflow.

Conclusion: The City Engineer should amend the service agreement with Scanlon to incorporate a storm drainage system to serve the Vista Alta Addn'n and the Altos Add.

COST ESTIMATE:

1) 700 l.f. 36" RCP	@ 44.00	=	30,800
2) 700 l.f. 6-8'T+B	@ 9.50	=	6,650
3) 3 - 6'-8' Mh. holes	@ 1300.00	=	3,900
4) 60' of Jacking	@ 175.00	=	10,500
5) Modification of Wet Well	L.S	=	2,000
6) Land Excav. 1. 300 l.f. @ 10"		=	3,000
7) Outfall	L.S	=	1,500
			58,350
Eng. Fee			5835
7% Surv & Test.			4085
TOTAL PROJECT COST.			68,270 ≈ $70,000

THIS MICROIMAGE IS THE BEST POSSIBLE REPRODUCTION DUE TO THE POOR QUALITY OF THE ORIGINAL DOCUMENT



L-11-Z

COUNTY NOW STATE

Phase I

Storm

Detention pond

w/ new bridge to Cooper

Sta ISCETA

(1) w/ new ~~Bridge~~ bridge to Cooper

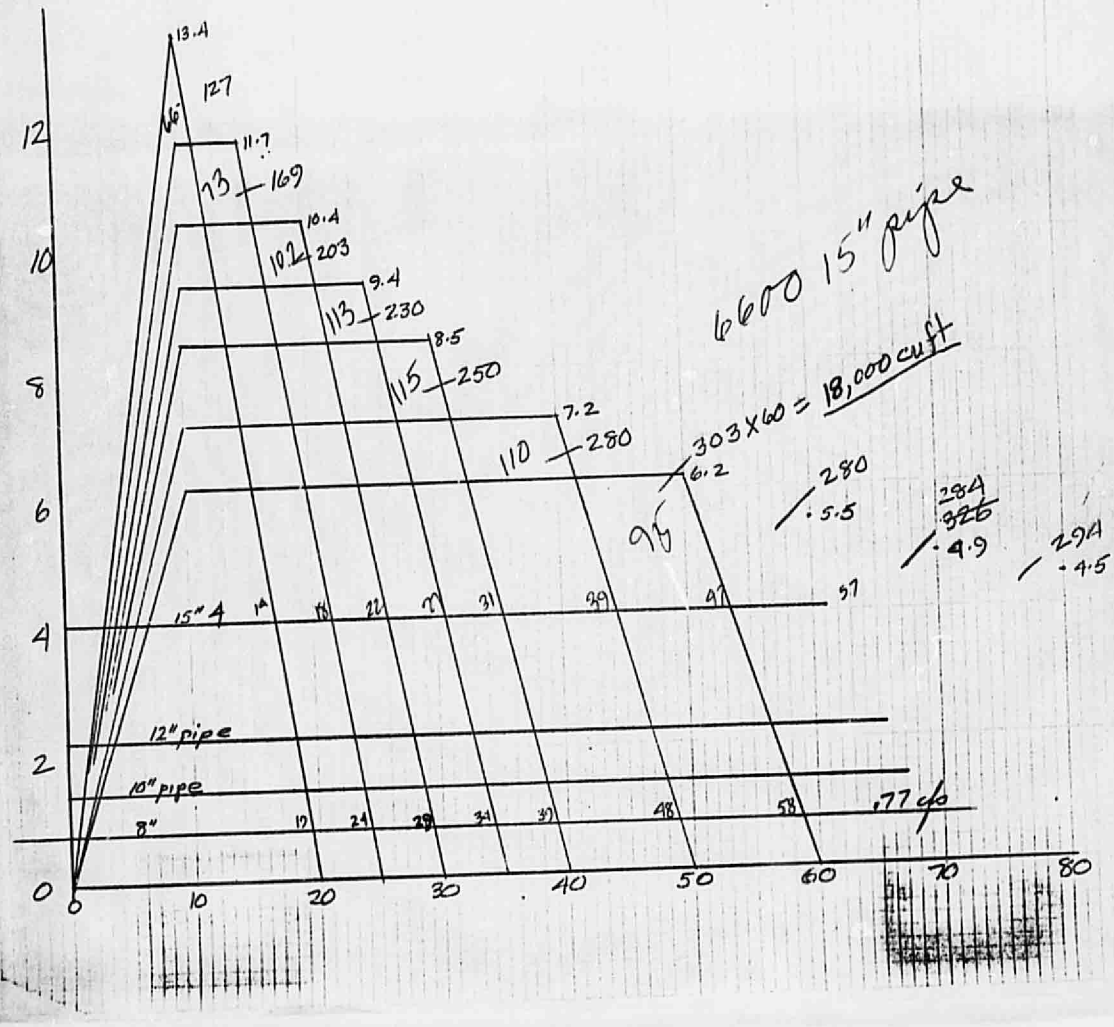
(2) System 5 st. Stand. ISCETA West — ISCETA PARK

(3) Detention Pond — FUTURE

THIS MICROIMAGE IS THE BEST POSSIBLE REPRODUCTION DUE TO THE POOR QUALITY OF THE ORIGINAL DOCUMENT

BY ... DATE 6 Aug 76 SUBJECT ALTA VISTA Area 1 SHEET NO. 1 OF ...
CHKD. BY ... DATE ... JOB NO. ...

THIS MICROIMAGE IS THE BEST POSSIBLE REPRODUCTION DUE TO THE POOR QUALITY OF THE ORIGINAL DOCUMENT

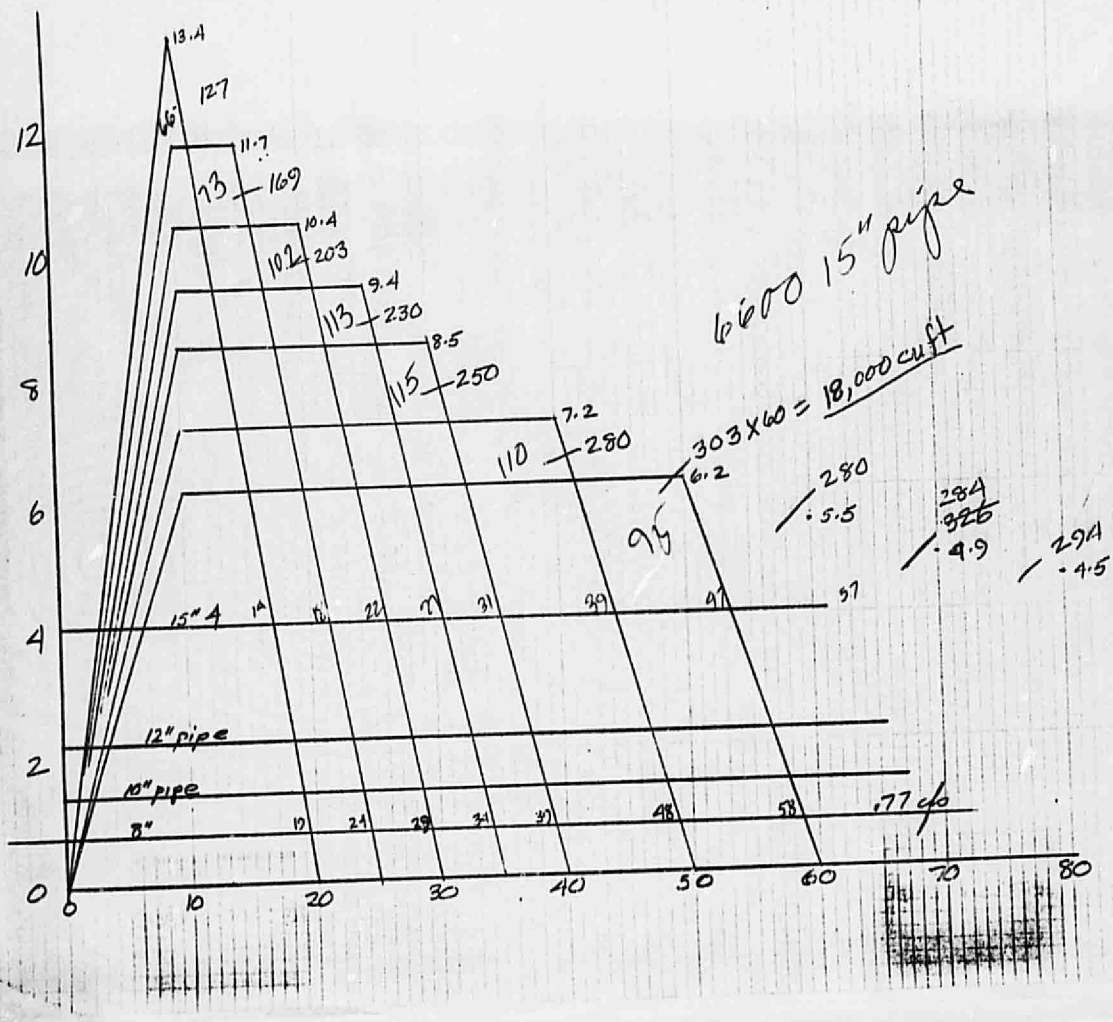


BY AHT DATE 6 Aug 76 SCT ALTA VISTA Area 1 SHEET NO. 1 OF

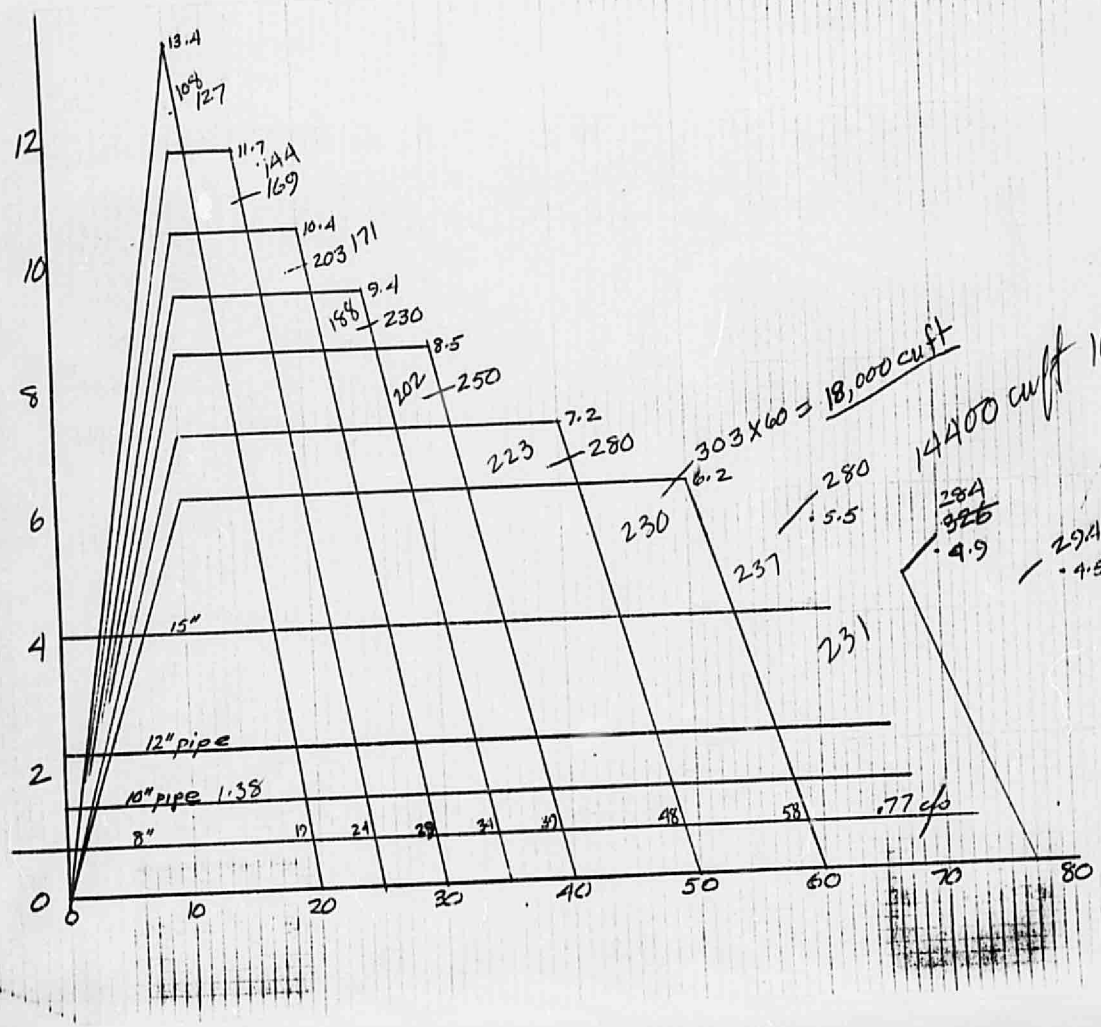
CHKD. BY DATE JOB NO.

THIS MICROIMAGE IS THE BEST POSSIBLE REPRODUCTION DUE TO THE POOR QUALITY OF THE ORIGINAL DOCUMENT

BY. JHT DATE 6 Aug 76 SUBJECT ALTA VISTA
CHKD. BY. DATE Area 1
JOB NO. SHEET NO. 1 OF

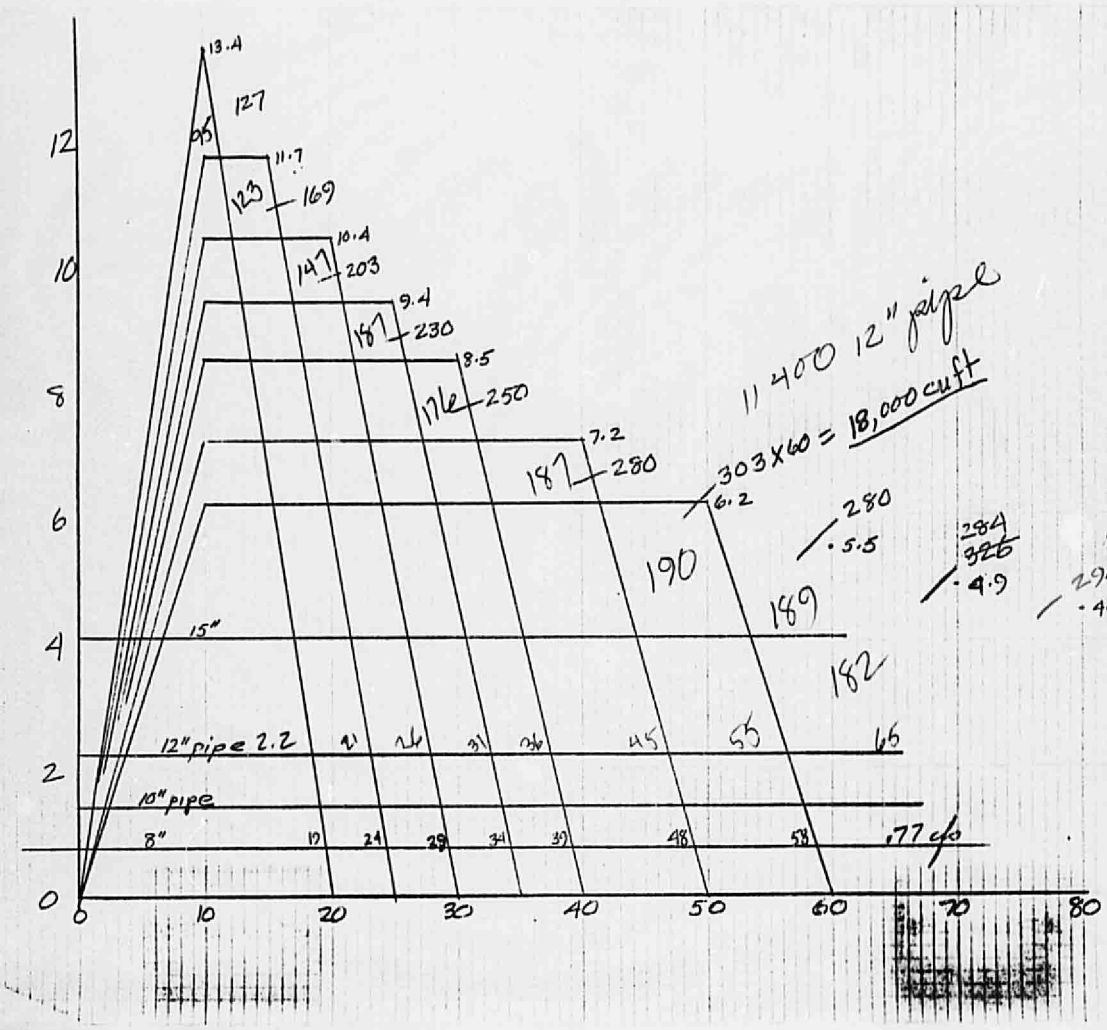


THIS MICROIMAGE IS THE BEST POSSIBLE REPRODUCTION DUE TO THE POOR QUALITY OF THE ORIGINAL DOCUMENT



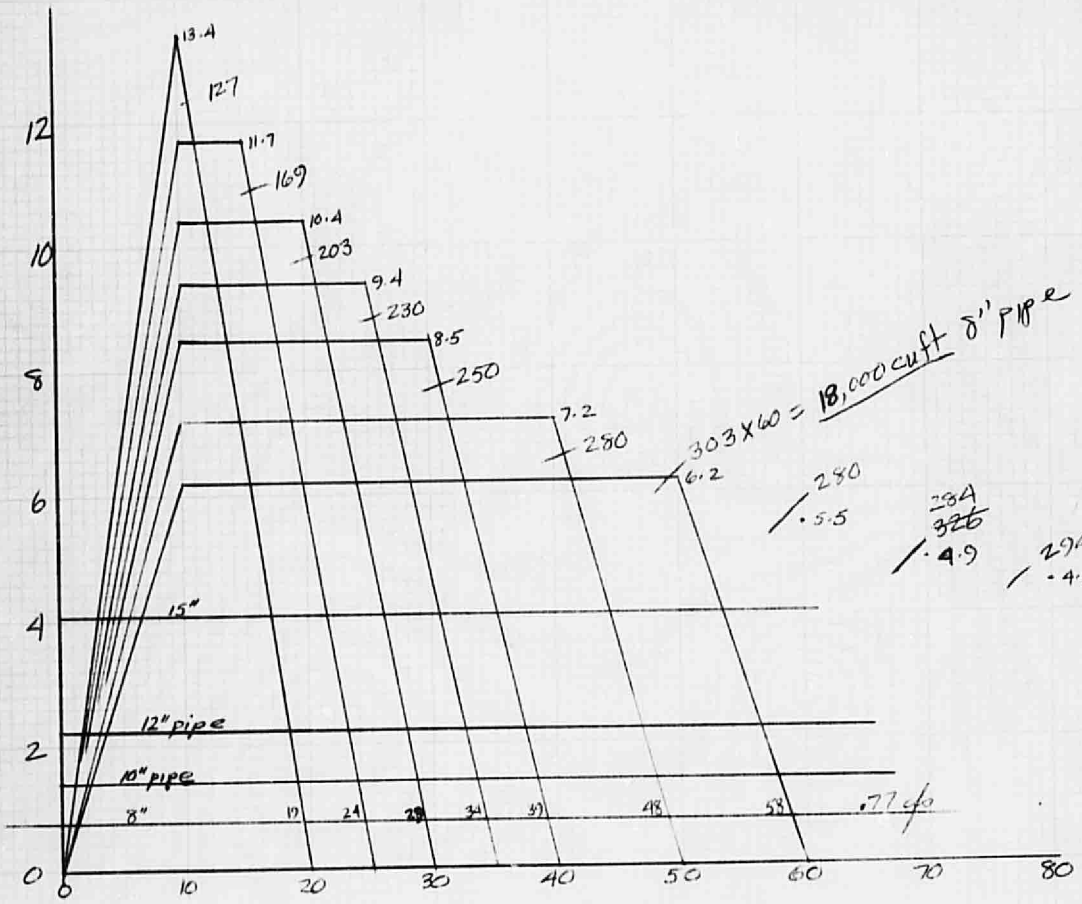
BY AM DATE 6 Aug 76 SUBJECT ALTA VISTA
CHKD. BY DATE Area 1
SHEET NO. 1 OF
JOB NO.

THIS MICROIMAGE IS THE BEST POSSIBLE REPRODUCTION DUE TO THE POOR QUALITY OF THE ORIGINAL DOCUMENT



BY JMM DATE 6 Aug 76 SUBJECT ALTA VISTA Area 1 SHEET NO. 1 OF
CHKD. BY DATE JOB NO.

THIS MICROIMAGE IS THE BEST POSSIBLE REPRODUCTION DUE TO THE POOR QUALITY OF THE ORIGINAL DOCUMENT



BY fdl DATE 6 Aug. 76 SUBJECT ALTA VISTA Area 1

CHKD. BY DATE

SHEET NO. 1 OF

JOB NO.

THIS MICROIMAGE IS THE BEST POSSIBLE REPRODUCTION DUE TO THE POOR QUALITY OF THE ORIGINAL DOCUMENT

$I_{10} = \frac{90}{T+22} = 3.00$

Ponding to release in 8" pipe .17 cfs.
18000 ft³ = 135,000 gals.

Area 1	4.13 ac	35	12800
Area 2	2.94	25	9600
Area 3	2.20	18	11600
Area 4	2.66	22	
Total	11.93	100	

$Y_2 = -0.011 + 0.942\left[.9\left(\frac{.9}{1.0}\right)\right] = .75$ 83%

$Y_{100} = .494 + .755\left[2.2\left(\frac{2.2}{2.6}\right)\right] = 1.90$ 86%

1hr storm as 85% of 6hr.

2	.9	= .77
5	1.2	= 1.02
10	1.4	= 1.19
100	2.2	= 1.87

Area 1

4.13	$\frac{.77}{12}$ = .27	= 11,543 ft³		
4.13	$\frac{1.02}{12}$ = .35	= 15291	× .8 =	12233
4.13	$\frac{1.19}{12}$ = .41	= 17840	× .8	14272
4.13	$\frac{1.87}{12}$ .64	= 28035		22427

Area 2 .71 of area 1
Area 3 .53 of area 1
.64 of area 1

		$\sqrt{.004}$	
8" pipe	12.1	$\sqrt{5}$	.77
10"	21.8		1.38
12"	35.7		2.26

15" 4.05
18" 105.1 6.65
24" 226.2 14.31

THIS MICROIMAGE IS THE BEST POSSIBLE REPRODUCTION DUE TO THE POOR QUALITY OF THE ORIGINAL DOCUMENT

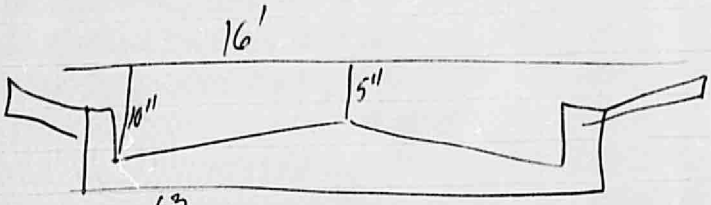
$I = \frac{189}{t + 25}$

t	I
10	5.4
15	4.73
20	4.20
25	3.78
30	3.44
40	2.91
50	2.52
60	2.22
70	1.99
80	1.80
90	1.64

Area 1	Area 2	Area 3	Area 4	Total
13.4	9.5	7.1	8.6	
11.7	8.3	6.2	7.6	
10.4	7.4	5.5	6.7	
9.4	6.7	5.0	6.0	
8.5	6.1	4.5	5.5	
7.2	5.1	3.8	4.6	
6.2	6.2	3.3	4.0	
5.5				
4.9				
4.5				
4.1				

THIS MICROIMAGE IS THE BEST POSSIBLE REPRODUCTION DUE TO THE POOR QUALITY OF THE ORIGINAL DOCUMENT

4
2 8
168



$7\frac{63}{1/2}$" x 16 = 10

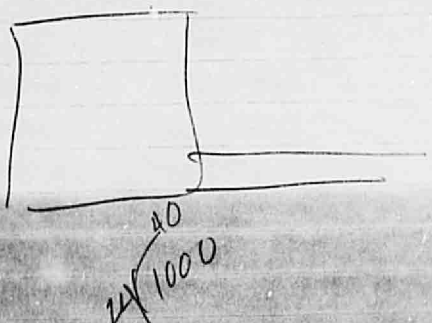
$\frac{.83}{.0186}$ = 45' x 10 = 450 cuft/in street

10' of 72" pipe = 282.7 cuft / 732 cuft.

Q = CIA

6.65 = (6) I $\left(\frac{4.13}{\text{[illegible]}}\right)$ = [illegible] 2.68 10 yr.

[illegible]



24 | 1000 | 40

7814
689
.55

THIS MICROIMAGE IS THE BEST POSSIBLE REPRODUCTION DUE TO THE POOR QUALITY OF THE ORIGINAL DOCUMENT

Bernalillo County
Albuquerque, New Mexico

BRIDGE BOULEVARD IMPROVEMENTS

Federal-Aid Urban Systems Project

M-4014 (2)

DRAINAGE REPORT

VOLUME I

Including Addendum No. 1

Job No. 79007

Scanlon & associates, inc.
Engineers-Planners
albuquerque artesia santa fe

Bernalillo County
Albuquerque, New Mexico

BRIDGE BOULEVARD IMPROVEMENTS

Federal-Aid Urban Systems Project

M-4014 (2)

DRAINAGE REPORT

VOLUME I

Including Addendum No. 1

Job No. 79007

Scanlon & associates, inc.
Engineers—Planners
albuquerque artesia santa fe

ADDENDUM NO. 1 TO

DRAINAGE REPORT FOR BRIDGE BOULEVARD

BERNALILLO COUNTY, ALBUQUERQUE, NEW MEXICO

FEDERAL * AID URBAN SYSTEMS PROJECT

M*4014 (2)

VOLUME I DATED APRIL 4, 1979

PREPARED BY

SCANLON & ASSOCIATES

OCTOBER, 1980

ADDENDUM NO. 1 TO

DRAINAGE REPORT FOR BRIDGE BOULEVARD

Since the original drainage report dated April 4, 1979, was published, more detailed information regarding the proposed future storm drainage improvements for drainage Area "A" (area west of Arenal Canal) has become available. The improvements proposed in the Amole del Norte Storm Drainage Facility project will collect drainage from the area west of Airport Drive and divert it south to the Giannini Gravel Pit. This reduces the area contributing runoff to the Bridge Boulevard project from 515 acres to 215 acres. This reduction in area changes the Q_{100} discharge from 146.8 to 100 cfs at the Arenal Canal. The original report recommended that the runoff from this area be discharged into the Arenal Canal if this were allowed by the Middle Rio Grande Conservancy District.

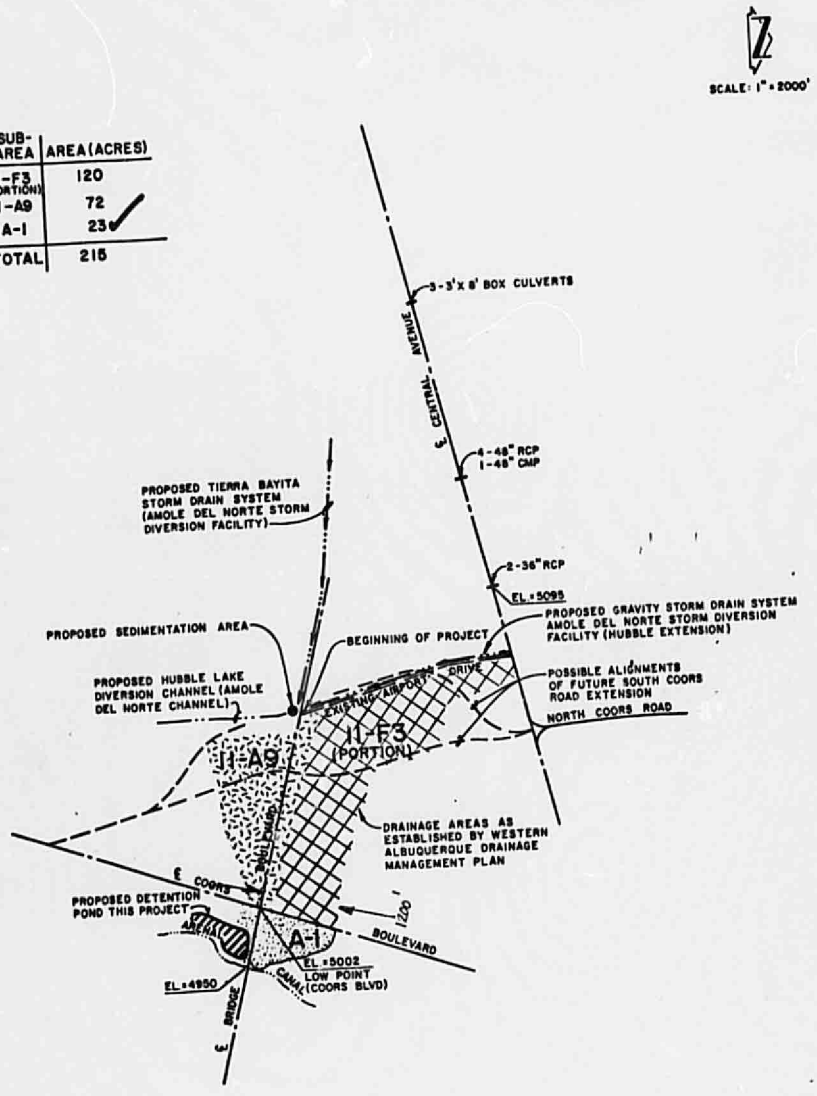
Negotiations have been conducted with the MRGCD for discharge of runoff into the Arenal Canal and the Isleta Drain. The MRGCD did not approve discharging the 100 cfs directly into the Arenal Canal, but agreed to allow a maximum discharge of 15 cfs. This would require the construction of a detention area to store the expected runoff and discharge it into the canal at a slower rate. This alternative was considered and a proposal which included the detention area and other considerations was presented to and approved by the Board of Directors of the MRGCD at their May 13, 1980 meeting.

The attached letter dated May 13, 1980 outlines the accepted conditions for discharging storm water runoff into the Arenal Canal and the Isleta Drain.

Included as part of this Addendum are the revised runoff computations for drainage Area "A", related correspondence and cost estimates for the improvements described above.

It may become necessary to further update this report as detailed data regarding the north-south Coors extension and the Amole del Norte Drainage Facilities project becomes available.

SUB-AREA	AREA (ACRES)
II-F3 (PORTION)	120
II-A9	72 ✓
X A-1	23 ✓
TOTAL	215



DRAINAGE AREA "A" - BRIDGE BOULEVARD

Addendum No. 1
Sheet 3 of 11

STORM DRAIN SYSTEM DESIGN DATA

DESIGN POINT	Drainage Area Designation	Drainage Area acres	Length feet	Vertical Elevation Change feet	Inlet Time minutes	Pipe Flow Time minutes	Time of Concentration minutes	Coefficient "C"	Intensity "I" - inches/hour	Summation Area "A" - acres	Runoff "Q" cubic feet/second	Slope of Pipe feet/foot	Pipe Size inches	Velocity of Flow in Pipe feet/second	KEYED NOTES
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Assume Storm Drain System extended along existing Airport Drive															① 72 cfs to be collected in an underground system at or upstream of intersection of Coors Blvd. and Bridge Blvd., delivered and stored in detention area, then discharged into Arenal Canal.
	F-3ptn. 11-A9	192	3200	30	-	-	24	0.2	1.9	192 ①	72.0				
Intersection Coors/Bridge															
	A-1	23	1000	52	-	-									
Arenal Canal							10	0.45	2.7	23 ②	28.0				② 28 cfs to be collected in an underground system upstream of the Arenal Canal, delivered and stored in detention area, then discharged into Arenal Canal
											100.0				
															NOTE: Detension area outlet to be designed to discharge into Arenal Canal at a maximum rate of 15 cfs.

MIDDLE RIO GRANDE CONSERVANCY DISTRICT
POST OFFICE BOX 581
1930 SECOND ST., S.W. PHONE 243-6796
ALBUQUERQUE, NEW MEXICO 87103

April 18, 1980

Mr. Cliff Anderson
Scanlon & Associates
800 Pennsylvania Ct. NE
Albuquerque, NM 87110

Re: Bridge Street - drainage improvements

Dear Cliff:

We had several meetings regarding surface runoff discharging into MRGCD facilities. The District entails the following comments and recommendations:

1. In phase I - Bridge Street improvements provide a temporary detention basin west of Arenal Canal to handle 100 year storm runoff. A controlled discharge outlet must be installed to allow 15 c.f.s. into the Arenal Canal. This controlled rate should improve the existing runoff system.

2. Allow 25 c.f.s. into the Isleta Drain. This should not exceed the existing condition.

3. Improve the necessary County road crossings on Isleta Drain to handle any excess runoff generated due to improvements. A list of crossings is attached to this letter with recommended sizes, locations and lengths.

4. Re-emphasize the importance of pumps in Los Padillas areas to discharge excess water into the Rio Grande prior to reaching Isleta Pueblo.

5. The existing storm sewer discharging into the Riverside Drain does not cause any serious problem to the District facilities.

Overall, the Bridge Street drainage improvement project should improve the existing drainage system and alleviate the existing problems of MRGCD facilities.

If you need additional information, please do not hesitate to call.

Sincerely yours,

Subhas K. Shah
District Engineer

SKS:cj
Enclosure

cc: R. S. Nanninga, General Manager
Dan Carr, BIA
Tom Gius, County Road Department

Addendum No. 1
Sheet 5 of 11

ROAD CROSSINGS AT ISLETA DRAIN

	Location	Existing Size	Recommended size
		- - - -	- - - -
***1.	Bridge Street	46"x66" - 85' long	60" Ø - 96' long
*2.	Atrisco Feeder	48" Ø - 96' long	May remove
***3.	Private crossing	36" Ø - 48' long	60" Ø - 60' long
*4.	San Ygnacio Road	48" Ø - 60' long	60" Ø - 60' long
**5.	Rosendo Garcia Road	48" Ø - 40' long	60" Ø - 60' long
*6.	Kelly Road	42" Ø - 60' long	72" Ø - 60' long
*7.	Mares Road	42" Ø - 50' long	72" Ø - 60' long
*8.	Arenal Road	48" Ø - 40' long	72" Ø - 40' long
**9.	Rio Grande High School(walkway)	48" Ø - 40' long	72" Ø - 40' long
**10.	Private crossing	48" Ø - 30' long	72" Ø - 100' long
*11.	Pajarito Lateral	48" Ø - 90' long	72" Ø - 60' long
*12.	Foothill Road	42" Ø - 50' long	72" Ø - 60' long
**13.	Private crossing	42" Ø - 50' long	Remove
**14.	Private crossing	42" Ø - 36' long	72" Ø - 80' long
*15.	Blake Road	48" Ø - 75' long	72" Ø - 80' long
**16.	Barcelona Road	60" Ø - 50' long	72" Ø - 100' long
*17.	Arenal Main Canal	42" Ø - 100' long	Okay
**18.	Rio Bravo	72" Ø -	72" Ø - 80' long
*19.	Wenk's Farm	36" Ø - 80' long	72" Ø - 90' long
*20.	Gun Club Road	Unknown	Okay
***21.	Don Felipe Road	72" Ø - 90' long	84" Ø - 90' long
*22.	Pajarito Road	2-36" Ø - 90' long	84" Ø - 90' long
*23.	Raymac Road	Unknown	Okay
**24.	Chanata Road	Okay	Okay
***25.	Norment Road	Okay	84" Ø - 90' long
*26.	Los Padillas Road	Unknown	84" Ø - 90' long
*27.	Malpaiz Road	Unknown	

This is a partial list of the crossings on Isleta Drain. Eventually the crossings will be replaced by the County of Bernalillo at a later date. This list does not include the crossings in Isleta Pueblo.

*(Priority 1) Indicates a crossing should be replaced in Phase I of the project. It should have concrete transitions and headwalls.

**(Priority 2) Indicates a crossing should be installed in next phase of the project. It should have concrete transitions and headwalls.

***(Priority 3) Indicates the pipe is in good condition, however, concrete transitions and headwalls are required.

ROAD CROSSING AT ISLETA DRAIN ESTIMATED COST

	Location	Recommended Size	Estimated Cost
***1.	Bridge Boulevard	-----	Included in Bridge Boulevard Estimate
*2.	Atrisco Feeder	60" Ø - 96' long	$19,800.00
***3.	Private Crossing	May remove	---
*4.	San Ygnacio Road	60" Ø - 60' long	14,500.00
**5.	Rosendo Garcia Road	60" Ø - 60' long	13,300.00
*6.	Kelly Road	60" Ø - 60' long	14,500.00
*7.	Mares Road	72" Ø - 60' long	15,160.00
*8.	Arenal Road	72" Ø - 60' long	14,560.00
**9.	Rio Grande High School (walkway)	72" Ø - 40' long	11,840.00
**10.	Private Crossing	72" Ø - 40' long	11,240.00
*11.	Pajarito Lateral	72" Ø - 100' long	23,000.00
*12.	Foothill Road	72" Ø - 60' long	15,160.00
**13.	Private Crossing	72" Ø - 60' long	15,160.00
**14.	Private Crossing	Remove	---
**15.	Blake Road	72" Ø - 80' long	19,380.00
**16.	Barcelona Road	72" Ø - 80' long	19,380.00
*17.	Arenal Main Canal	72" Ø - 100' long	23,600.00
***18.	Rio Bravo	Okay	---
*19.	Wenk's Farm	72" Ø - 80' long	19,680.00
*20.	Gun Club Road	72" Ø - 90' long	20,240.00
***21.	Don Felipe Road	Okay	---
*22.	Pajarito Road	84" Ø - 90' long	35,590.00
*23.	Raymac Road	84" Ø - 90' long	34,190.00
***24.	Chanate Road	Okay	---
***25.	Norment Road	Okay	---
*26.	Los Padillas Road	84" Ø - 90' long	34,190.00
*27.	Malpaiz Road	84" Ø - 90' long	34,190.00
		TOTAL	408,660.00

*(Priority 1) Indicates a crossing should be replaced in Phase I of the project. It should have concrete transitions and headwalls. ($318,360.00)

**(Priority 2) Indicates a crossing should be installed in next phase of the project. It should have concrete transitions and headwalls.($90,300 Remainder)

***(Priority 3) Indicates the pipe is in good condition, however, concrete transitions and headwalls are required.

OVERALL STORM DRAINAGE IMPROVEMENTS ESTIMATED COST

1.	Road Crossings at Isleta Drain	$ 408,660.00
2.	Estimated Cost of Detention Area and Appurtenances	150,000.00*
3.	Storm Drain System I	108,500.00
4.	Storm Drain System II	93,720.00
5.	Storm Drain System V	411,060.00
	TOTAL COST	$ 1,171,940.00

*Figure does not include cost of right-of-way which is approximately five acres.

SCANLON & ASSOCIATES INC
CONSULTING ENGINEERS

May 13, 1980

Middle Rio Grande Conservancy District
1930 Second Street, S. W.
Albuquerque, New Mexico 87103

Re: Storm Drainage on Bridge Boulevard

Gentlemen:

For the past several months we have been negotiatng with the Middle Rio Grande Conservancy District, and other concerned parties for an acceptable method of disposing of expected local storm drainage runoff on Bridge Boulevard from Airport Drive to Isleta Boulevard.

The plan as developed includes the following items:

1. Construction of a detention area with a maximum discharge of 15 cfs into the Arenal Canal. This work is to be included in Phase I.

2. Road crossing improvements on the Isleta Drain as outlined in letter dated April 18, 1980, from Mr. Shah, District Engineer MRGCD. This work to be accomplished in phases according to the priorities outlined in the letter. Phase I Construction will be Priority I Road Crossings.

3. Storm drainage system in Bridge Boulevard which will discharge 25 cfs into the Isleta Drain.

4. Supporting the installation of pumps near the Isleta Pueblo to pump water from the drains directly to the Rio Grande.

We are in the process of doing the final design on Phase I which will include street improvements between Goff Boulevard and Isleta Boulevard. We would like your concurrence in this plan for storm drainage so we may include the improvements in our design.

Sincerely,

Richard Lovato

Richard Lovato, P.E.
Project Engineer

Addendum No. 1
Sheet 9 of 11

PLEASE REPLY TO:
☐ ALBUQUERQUE, NEW MEXICO 87110
☐ ARTESIA, NEW MEXICO 88210
☐ FARMINGTON, NEW MEXICO 87401
☐ SANTA FE, NEW MEXICO 87501

8008 PENNSYLVANIA CIRCLE NE
510 WEST TEXAS AVENUE
1403 SCHOFIELD LANE
1570 PACHECO STREET, SUITE A-7

TELEPHONE: (505) 265-6941
TELEPHONE: (505) 748-1010
TELEPHONE: (505) 327-1023
TELEPHONE: (505) 983-3323

SCANLON & ASSOCIATES INC
CONSULTING ENGINEERS

80015

May 14, 1980

Mr. Alex Abeyta
County Manager
Bernalillo County
620 Lomas, N.W.
Albuquerque, New Mexico 87102

Re: Storm Drainage on Bridge Boulevard

Dear Mr. Abeyta:

For the past several months we have been negotiating with the Middle Rio Grande Conservancy District, and other concerned parties for an acceptable method of disposing of expected local storm drainage runoff on Bridge Boulevard from Airport Drive to Isleta Boulevard.

On April 4, 1979, we submitted to Bernalillo County a drainage report for review which recommended that Alternate "B" be implemented. This alternate proposed discharging approximately 147 cfs into the Arenal Canal and 25 cfs into the Isleta Drain at a cost of approximately $614,000. Since April, 1979, more definite plans have been developed by others for drainage of the area upstream of Airport Drive which reduced the expected drainage flow at Arenal Canal to 100 cfs.

On February 26, 1979, we presented the drainage report to the Board of Directors of the Middle Rio Grande Conservancy District for consideration. MRGCD indicated that it was unacceptable to discharge 100 cfs into the Arenal Canal since this canal is designed and used for irrigation purposes and this much runoff could exceed the capacity of the canal. They recommended that we consider the feasibility of a detention pond to store the runoff and discharge it at some lower controlled rate into the canal. Another concern of MRGCD was the increased discharge into the Isleta Drain and the poor condition and inadequate capacities of the road crossing on the drain. MRGCD recommended that improvements on the road crossings be made along the Isleta Drain to compensate for increased drainage from Bridge Boulevard.

Mr. Dan Carr of the Bureau of Indian Affairs was present at the meeting and indicated that the Iselta Pueblo objected to any increase in the flow in the Arenal Canal and the Isleta Drain, because of water table problems in the Pueblo.

Addendum No. 1
Sheet 10 of 11

PLEASE REPLY TO:
☒ ALBUQUERQUE, NEW MEXICO 87110
☐ ARTESIA, NEW MEXICO 88210
☐ FARMINGTON, NEW MEXICO 87401
☐ SANTA FE, NEW MEXICO 87501

8008 PENNSYLVANIA CIRCLE NE
510 WEST TEXAS AVENUE
1405 SCHOFIELD LANE
1570 PACHECO STREET SUITE A-7

TELEPHONE: (505) 265-6941
TELEPHONE: (505) 748-1010
TELEPHONE: (505) 327-1023
TELEPHONE: (505) 983-3323

We have considered the detention area concept and find it to be a feasible solution to the drainage problem, since it will allow for drainage of Bridge Boulevard, reduce the flow to the Isleta Pueblo and alleviate the problems of the MRGCD facilities.

Attached is a letter from Mr. Subhas K. Shah, District Engineer MRGCD which outlines the improvements they recommend. Also attached are Estimated Costs for Road Crossings at Isleta Drain, Phase I Construction and Overall Storm Drainage, based on the new plans for storm drainage.

We concur with the recommendations made by the MRGCD and recommend that the improvements as discussed be incorporated into the Phase I Construction plans. At the latest MRGCD board meeting on May 13, 1980, we made a presentation which outlined the design concept. At that time the MRGCD board adopted a resolution endorsing this design concept. Attached is a letter to MRGCD requesting approval of the plan that we presented.

Sincerely,

SCANLON & ASSOCIATES, INC.

Richard Lovato

Richard Lovato, P.E.
Project Engineer

RL:lcm
enclosures (5)

79007

April 4, 1979

Bernalillo County
2400 Broadway, S. E.
Albuquerque, New Mexico 87102

RE: Bridge Boulevard Paving Project

ATTN: Tom Gius

Gentlemen:

Transmitted herewith are three (3) copies of the Drainage Report for the above referenced project. The report is presented in two volumes, Volume I is the text and Volume II are plan and profile sheets.

This report investigated three alternate solutions for drainage of Bridge Boulevard using an underground gravity storm drain system. Alternate "B" is recommended because it is the most cost effective and will not require installation of a storm drain line through the already widened stretch of Bridge Boulevard between Isleta Boulevard and the Atrisco Riverside Drain.

Alternate "B" can be accomplished at a cost of $613,280.00 and will discharge runoff of 146.8 cubic feet per second into the Arenal Canal, 25.2 cubic feet per second into the Isleta Drain and no runoff into the Atrisco Riverside Drain.

This report should be forwarded to the Middle Rio Grande Conservancy District for review and so that a permit can be obtained for discharging runoff into the Arenal Canal and the Isleta Drain.

We will be happy to meet with you and the MRGCD Engineer to discuss the report and recommendations. If you need additional copies of the report or any further information, please contact us.

Sincerely,

SCANLON AND ASSOCIATES, INC.

Richard Lovato

Richard Lovato, P.E.

DRAINAGE REPORT

FEDERAL-AID URBAN SYSTEMS PROJECT M-4014(2)

BRIDGE BOULEVARD

BERNALILLO COUNTY - ALBUQUERQUE, NEW MEXICO

COMMUNITY DEVELOPMENT PROGRAM

VOLUME I

APRIL, 1979

PREPARED BY:

SCANLON & ASSOCIATES, INC.
ALBUQUERQUE, NEW MEXICO
JOB NUMBER 79007

INDEX

DESCRIPTION	PAGE NUMBER
SCOPE	1
EXISTING CONDITIONS	1
PROJECT LOCATION MAP	3
PROJECT SITE MAP	4
DRAINAGE AREA DESCRIPTIONS	5
STORM DRAINAGE SYSTEM DESIGN DATA	12
SYSTEM COSTS	21
ALTERNATE "A"	25
ALTERNATE "B"	27
ALTERNATE "C"	29
CONCLUSIONS AND RECOMMENDATIONS	31

APPENDIX

FIGURE 1 - INTENSITY DURATION FREQUENCY CURVES
FIGURE 2 - NOMOGRAPH FOR COMPUTING REQUIRED SIZE OF CIRCULAR DRAINS FLOWING FULL
FIGURE 3 - NOMOGRAPH FOR TIME OF CONCENTRATION OVERLAND FLOW
FIGURE 4 - NOMOGRAPH FOR FLOW IN TRIANGULAR GUTTERS
FIGURE 5 - REDUCTION FACTOR FOR ALLOWABLE GUTTER CAPACITY
FIGURE 6 - TYPICAL ROADWAY CROSS-SECTION

PLAN AND PROFILE SHEETS (VOLUME II)

SHEET 1 of 7 SYSTEM I AND II
SHEET 2 of 7 SYSTEM II AND III
SHEET 3 of 7 SYSTEM IV
SHEET 4 of 7 SYSTEM V
SHEET 5 of 7 SYSTEM V
SHEET 6 of 7 SYSTEM VI
SHEET 7 of 7 SYSTEM VI AND VII

DRAINAGE REPORT

BRIDGE BOULEVARD

SCOPE

This report includes drainage data for the construction of a four lane arterial street and related appurtenances from approximately Airport Drive to Isleta Boulevard as shown on the enclosed Project Location Map (page 3) and Project Site Map (page 4). A Typical Roadway Cross Section is presented in Figure 6 of Appendix.

The purpose of this report is to delineate drainage areas which contribute storm runoff to the project, to determine flow quantities to be expected and to develop a storm drainage plan to dispose of these expected flows.

A ten year design storm was used in calculating runoff. The storm drain systems were designed to carry flows from this storm.

In establishing drainage areas and computing flows it was assumed that the storm drainage improvements proposed in the Drainage Management Plan Western Albuquerque Metropolitan Area (DMPWAMA) as submitted to the Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA) by W. Matotan & Associates (Volumes I & II: June, 1975; Supplement: August, 1975) will be constructed and that the requirements set forth by AMAFCA regarding discharging runoff onto streets will be complied with.

The Rational method was used in calculating runoff from the various drainage areas and Manning's equation was used in sizing conduits.

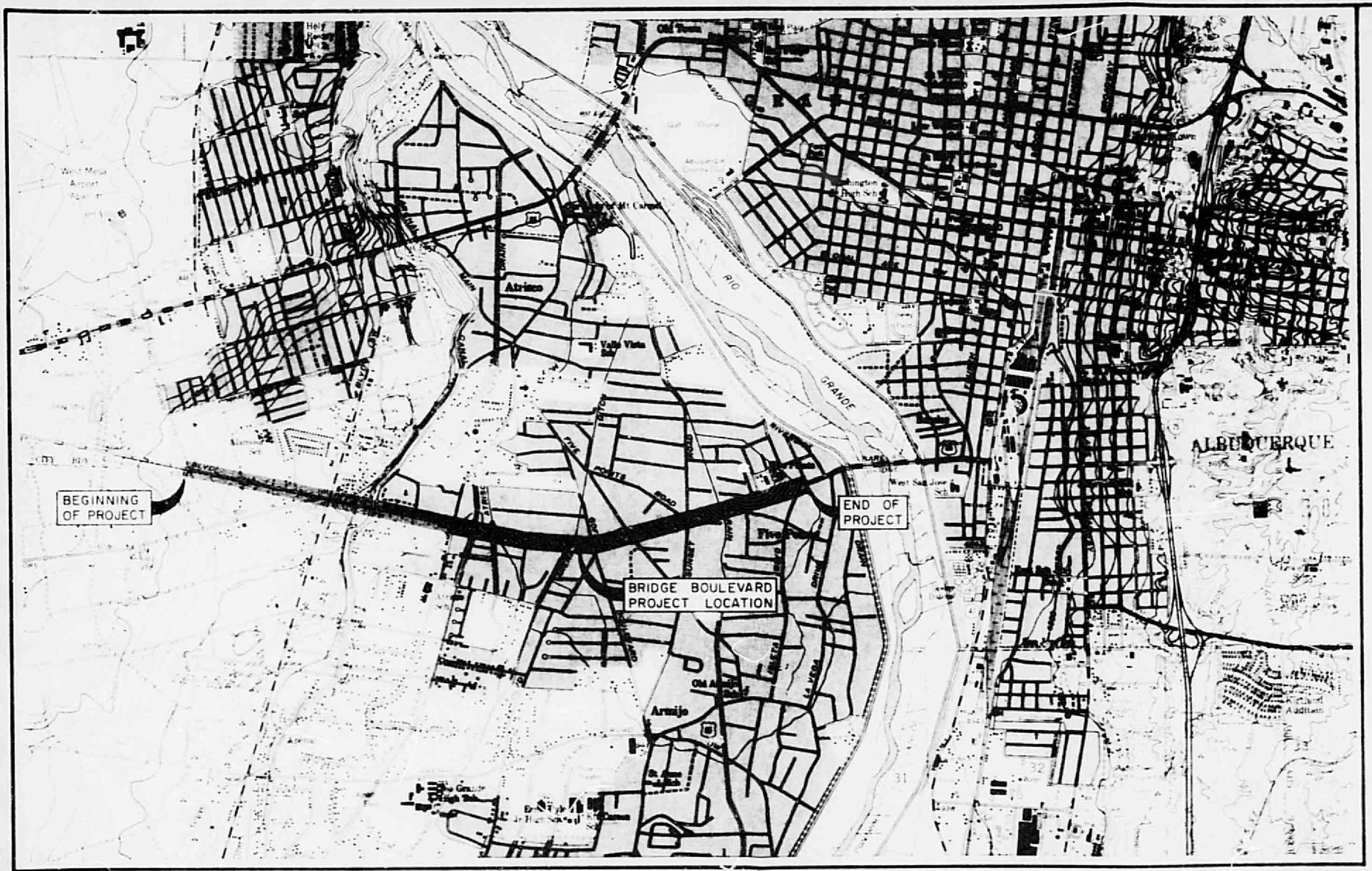
The main purpose of this report is to establish expected flows and possible points of discharge. The storm drainage systems considered are based on preliminary grades which may change in the final design. This report will be updated to fit actual field conditions during the final design process.

EXISTING CONDITIONS

Runoff from the area west of the Arenal Canal is currently being discharged into the Arenal Canal as surface flow. There is an existing paved "V" ditch on the south side of Bridge Boulevard between South Coors Boulevard and the Arenal Canal. There is also an existing pipe and inlet which collect runoff from the developed area north of Bridge Boulevard and west of the Arenal Canal. This pipe discharges onto Bridge Boulevard and runoff is carried to a small detention area on the west side the Arenal Canal.

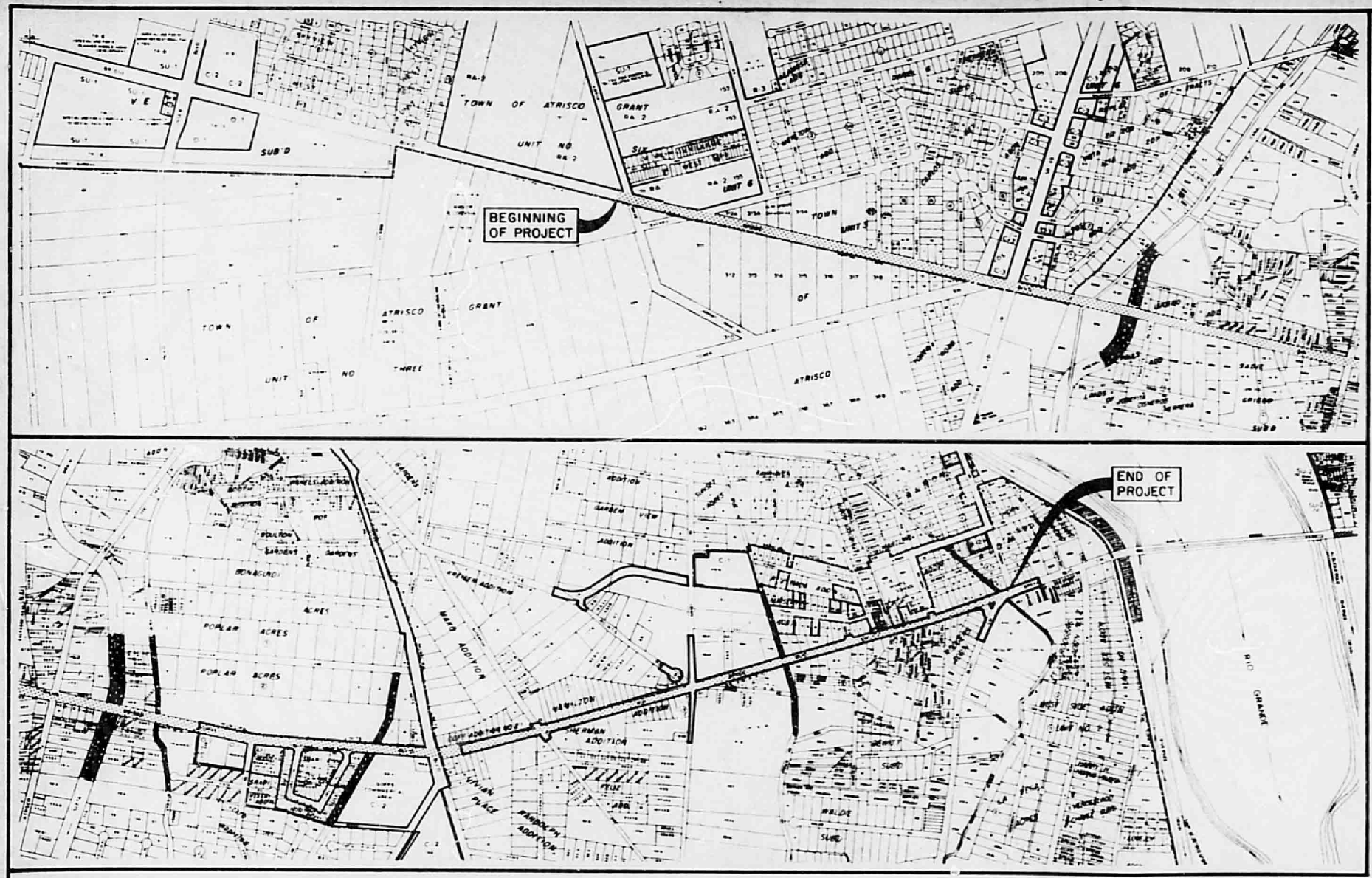
There is no existing storm drain system in the area described in the DMPWAMA as the Valley Flood Plain, located between the Arenal Canal and the Rio Grande, with the exception of a few local drop inlets

which discharge directly into two small ditches. Existing Bridge Boulevard is a paved two lane "estate" section and is elevated above adjacent property and intersecting streets. There are seven ditches and drains which run north-south across Bridge Boulevard. Three of these have raised berms and produce a daming effect. Most of the project lies within the Rio Grande Valley Flood Plain. There is no defined surface flow pattern within the area of the Rio Grande Flood Plain. Local runoff ponds in the lower areas which are located in the parking lots, yards and side streets.



Scanlon & associates, inc.
Engineers - Planners
albuquerque arizona santa fe

Bridge Boulevard Project Location Map



Scanlon & associates, inc.
Engineers—Planners
albuquerque artesia santa fe

FIRST PHASE

Bridge Boulevard Project Site Map

DRAINAGE AREA DESCRIPTIONS

1. DRAINAGE AREA "A"

The area west of Arenal Canal extending beyond Central Avenue is defined as Drainage Area "A". This area is broken up into four sub-areas. Three of these sub-areas are located west of South Coors Boulevard and the fourth sub-area is between Arenal Canal and South Coors Boulevard.

There are several proposed drainage improvements and street improvements which will have a direct effect on the amount of runoff to be expected from Drainage Area "A".

a. The Drainage Management Plan Western Albuquerque Metropolitan Area prepared for AMAFCA proposes the construction of the Hubble Diversion Channel, Tierra Bayita Drainage Channels and a stilling basin near the intersection of Bridge Boulevard and Airport Drive. These drainage improvements will collect runoff from the area generally north and west of the above mentioned intersection. However, according to DMPWAMA there will remain three sub-areas downstream of the proposed channels. These sub-areas were delineated in the study and were described as 11-A9, 11-F3, and 11-F2. These sub-areas will contribute runoff to the intersection of Bridge Boulevard and Coors Road and should be carried by a local storm drainage system in Bridge Boulevard.

b. There is a study currently being done to provide for the extension of North Coors Road to South Coors Boulevard. The proposed alignments are indicated on the map of Drainage Area "A". If this street is constructed it will probably intercept the flows from the west and an underground storm drain system will most likely be required in order to meet the requirements of the State Highway Department of keeping one driving lane in each direction clear of storm water runoff.

Runoff from the sub-areas 11-A9, 11-F3 and 11-F2 should be collected at the intersection of South Coors Boulevard and Bridge Boulevard in drop inlets and delivered in a storm drain system to Arenal Canal. This storm drain system should be designed to carry the ten year flow from the three sub-areas. This will allow for the extension of the system upstream as required to intercept flows in the North-South Coors Boulevard extension if it is built. Further consideration will be given to the design of the storm drain system for Drainage Area "A" as more definite plans regarding proposed improvements become available.

Runoff from sub-area A-1 should be carried into the street and discharged into the Arenal Canal through two rundowns. It should be noted that the flows computed for this area were based on the assumption that the Canals proposed in the Drainage Management Plan Western Albuquerque Metropolitan Area will be constructed.

It is proposed to discharge runoff from the entire Drainage Area "A" into the Arenal Canal provided approval from MRGCD can be obtained.

Runoff from Area "A" west of the Arenal Canal is currently entering the Canal as surface flow. There has been some attempt to direct this flow into the Canal since an asphalted "V" ditch has been constructed on the south side of Bridge Boulevard between South Coors Boulevard and the Canal. Unless adequate provisions are made for discharging future runoff into the Arenal Canal, there is potential for serious damage to the new channel lining.

2. DRAINAGE AREA "B"

The area between the Arenal Canal and Isleta Drain is defined as Drainage Area "B". This area is broken up into five sub-areas, B-1 through B-5. Runoff from sub-areas B-1 through B-4 should be collected in an underground storm drain system and discharged into the Isleta Drain. Runoff from sub-area B-5 should be carried in the street and discharged into the Isleta Drain through rundowns.

3. DRAINAGE AREA "C"

The area between Isleta Drain and Atrisco Ditch is defined as Drainage Area "C". Runoff should be carried west in the street to the Isleta Drain and discharged through rundowns.

4. DRAINAGE ARA "D"

The area between Atrisco Ditch and the Arenal Ditch is defined as Drainage Area "D". This area should be divided and inlets provided to meet State Highway Department criteria for keeping two driving lanes clear. Design should use two inlet points for computations. Runoff from this area should be collected in an underground storm drain system and discharged into the Isleta Drain.

5. DRAINAGE AREA "E"

The area between Arenal Ditch and Five Points intersection is defined as Drainage Area "E". This area is broken up into four sub-areas, E-1 through E-4. Runoff should be collected in an underground storm drain system and discharged into the Isleta Drain.

6. DRAINAGE AREA "F"

The area between Five Points intersection and Atrisco Drain is defined as Drainage Area "F". Runoff from this area should be collected in an underground storm drain system and discharged into the Isleta Drain or the Atrisco Riverside Drain.

7. DRAINAGE AREA "G"

The area between the Atrisco Drain and Isleta Boulevard intersection is defined as Drainage Area "G". This area is broken up into two sub-areas, G-1 and G-2. Runoff should be collected in an underground storm drain system and discharged into the Isleta Drain or the Atrisco Riverside Drain.

8. DRAINAGE AREA "H"

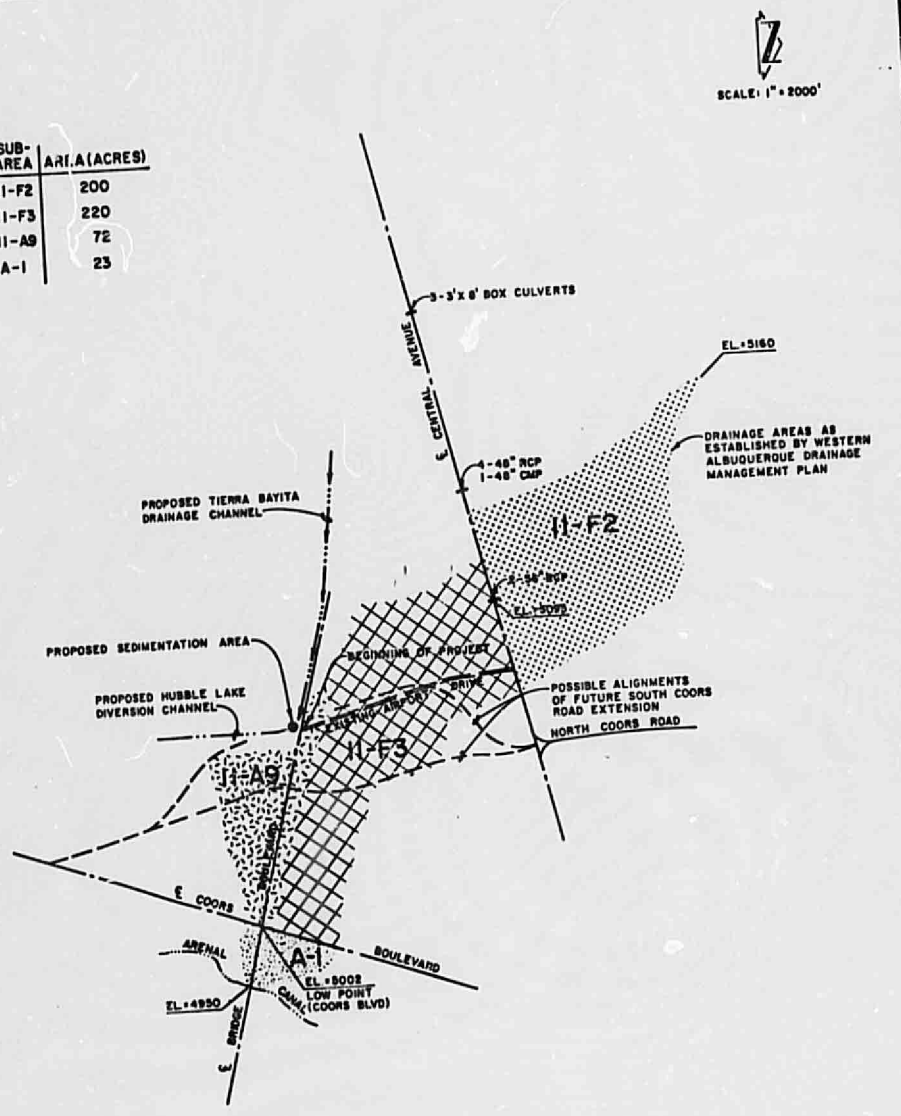
The area between Isleta Boulevard and the Atrisco Riverside Drain is defined as Drainage Area "H". Bridge Boulevard, in this area, is a four lane Arterial street with parking, sidewalks but no existing storm drain system. If the street is to be drained, drop inlets should be installed at existing low points. Runoff should be discharged into the Atrisco Riverside Drain. Alternate "B" does not include draining this area since runoff is all taken west to the Isleta Drain. A local system could be constructed to drain the area at any time in the future. There has been some discussion regarding modifications or replacement of the existing bridges over the Rio Grande. If this ever comes about the street grade will change at the approach to the new bridge and a storm drain system could be included in the project.

9. DRAINAGE AREA TABULATION

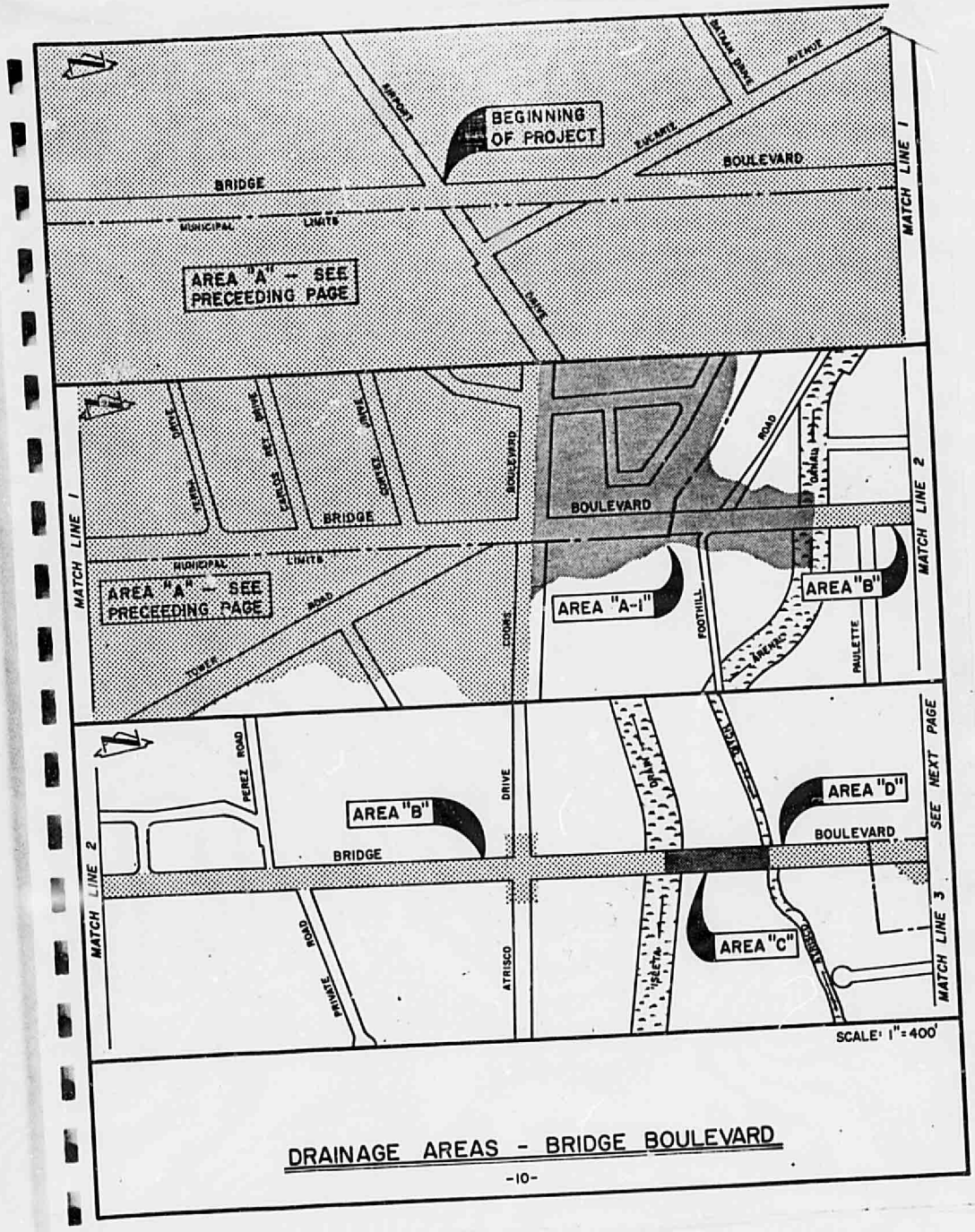
DRAINAGE AREA	DRAINAGE SUB-AREA	AREA (ACRES)
A	*11-F2	200
	*11-F3	220
	*11-A9	72
	A-1	23
B	B-1	1.14
	B-2	0.83
	B-3	0.92
	B-4	1.21
	B-5	0.44
C	C-1	0.70
D	D-1	1.75
	D-2	1.67
E	E-1	1.27
	E-2	1.27
	E-3	1.34
	E-4	3.16
F	F-1	2.55
G	G-1	3.29
	G-2	2.28
H	H-1	1.56

*These sub-areas were established in the Drainage Management Plan Western Albuquerque Metropolitan Area (DMPWAMA).

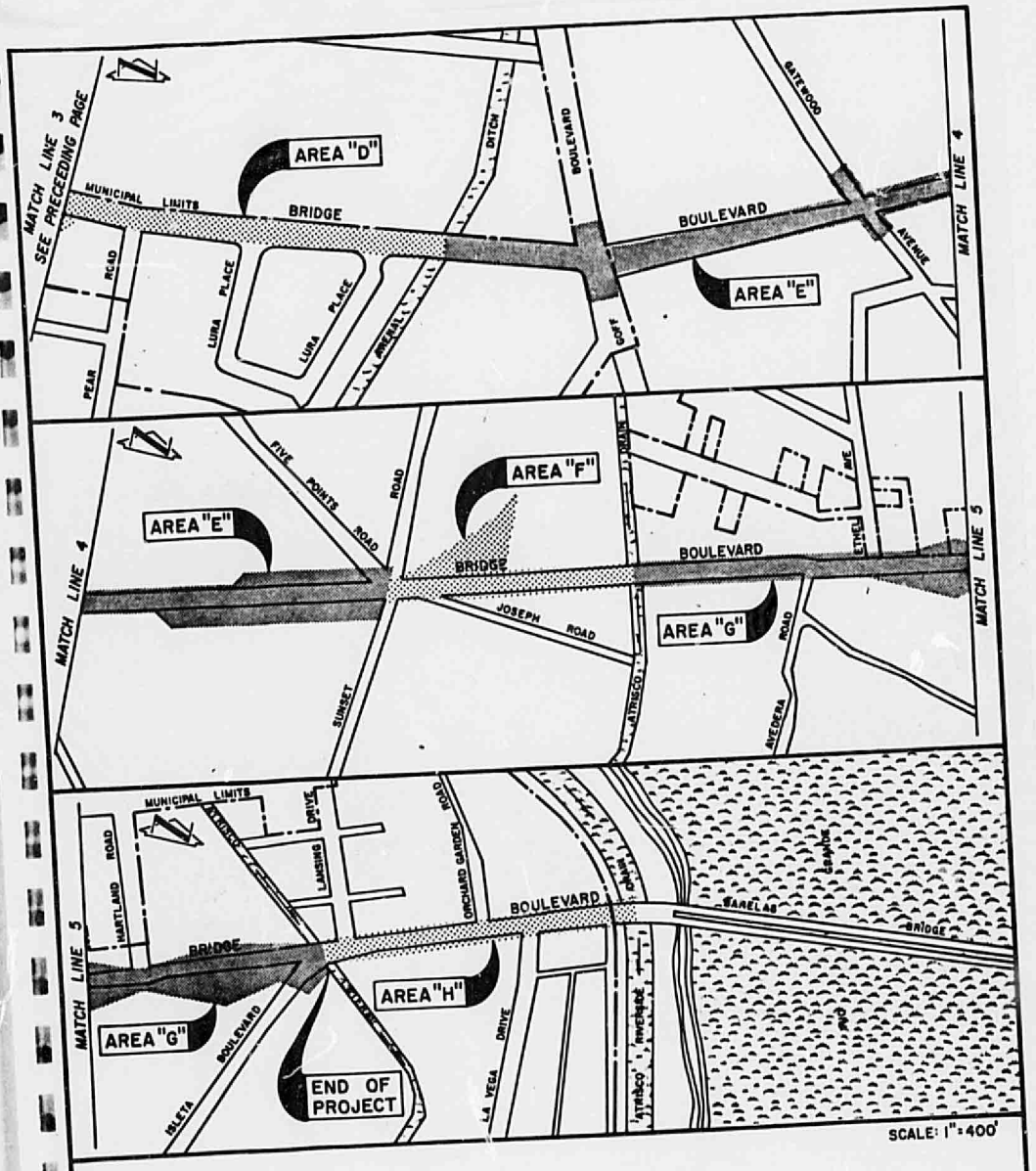
HYDROLOGY L11/D6 18 PLANS 2 of 2



DRAINAGE AREA "A" - BRIDGE BOULEVARD



DRAINAGE AREAS - BRIDGE BOULEVARD



DRAINAGE AREAS - BRIDGE BOULEVARD

STORM DRAINAGE SYSTEM DESIGN DATA

1. DESIGN STORM

A ten year design storm was used with the provision that one driving lane in each direction be clear of runoff during the storm.

2. RUNOFF

Runoff was computed using the Rational method

$Q = CIA$

where:

Q = Runoff in cubic feet per second (cfs)

C = Runoff coefficient (see computations page 18)

* I = Intensity in inches per hour

A = Drainage area in acres.

*Figure 1, Intensity Duration Frequency Curves (Albuquerque area 1961) presented in Master Plan of Drainage, City of Albuquerque, New Mexico and Environs were used to determine rainfall intensity.

3. STORM DRAIN

Required pipe size was determined using Manning's equation.

$$V = \frac{1.486}{n} (R)^{\frac{2}{3}} (S)^{\frac{1}{2}} \text{ and } Q = VA$$

where:

V = Velocity of flow in pipe in feet per second

R = Hydraulic Radius; $R = \frac{A}{P}$

S = Slope of pipe in feet per foot

n = Pipe roughness coefficient = 0.013

A = Cross sectional area of pipe in square feet

P = Wetted perimeter in feet

See Figure 2 for nomograph solution.

4. COMPUTATIONS

The following sheets are runoff computations and storm drain system designs for seven separate systems. These seven systems are combined in various ways to make up three alternate solutions for draining the street.

STORM DRAIN SYSTEM DESIGN DATA

DESIGN POINT	Drainage Area Designation	Drainage Area acres	Length feet	Vertical Elevation Change feet	Inlet Time minutes	Pipe Flow Time minutes	Time of Concentration minutes	Coefficient "C"	Intensity "I" - inches/hour	Summation Area "A" - acres	Runoff "Q" cubic feet/second	Slope of Pipe feet/foot	Pipe Size inches	Velocity of Flow in Pipe feet/second	KEYED NOTES
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
SYSTEM I (See Plan & Profile Sheet 1 of Volume II)															①72.0 cfs must pass through 2 - 36" RCP existing under Central Avenue.
Upper Limit of Area II-F2															②118.8 cfs to be collected in an underground system at or upstream of intersection of Coors Blvd. and Bridge Blvd. and discharged into Arenal Canal.
	II-F2	200.0	5000	65.0	-	-									
Central Avenue							27.0	0.20	1.80	200.0	① 72.0	-	-	-	
	II-F3 II-A9	292.0	11200	158.0	-	-									
Intersection of Coors Blvd. & Bridge Blvd.							51.0	0.20	1.20	492.0	②118.8	0.055	36"	⑤ 20+	③28.0 cfs to be carried in street and discharged into Arenal Canal through rundowns.
	A-1	23.0	1000	52.0											
Arenal Canal							10.0	0.45	2.70	23.0	③ 28.0				④146.8 cfs total runoff from Drainage Area "A" to be discharged into Arenal Canal.
											④146.8 cfs				
															⑤Velocity of flow in pipe will be in excess of 20 ft/sec. Energy dissipator will be required.
SYSTEM II (See Plan & Profile Sheets 1 & 2 of Volume II)															①6.40 cfs to be collected in an underground storm drain system and discharged into Isleta Drain.
Arenal Canal															②0.95 cfs to be carried in street and discharged into Isleta Drain through rundowns.
			500	8											
B-1 (Low Point)	B-1	1.14			10.0	-	10.0	0.80	2.70	1.14	2.46				③7.35 cfs total runoff from Drainage Area "B" to be discharged into Isleta Drain.
			300			3.13						0.0006	24"min	1.6	
B-2 (Low Point)	B-2	0.83					13.13	0.80	2.30	1.97	3.62				
			500			4.90						0.0006	24"	1.7	
B-3 (Low Point)	B-3	0.92					18.03	0.80	2.20	2.89	5.09				
			510			5.00						0.0006	24"	1.7	
B-4 (Low Point)-Atrisco Drive	B-4	1.21					23.05	0.80	1.95	4.10	①6.40				
			470			4.61						0.0006	27"	1.7	
Isleta Drain							27.66								
Isleta Drain (Surface)	B-5	0.44	250	1	10.0	-	10.0	0.80	2.70	0.44	②0.95				
											③7.35 cfs				

STORM DRAIN SYSTEM DESIGN DATA

DESIGN POINT	Drainage Area Designation	Drainage Area acres	Length feet	Vertical Elevation Change feet	Inlet Time minutes	Pipe Flow Time minutes	Time of Concentration minutes	Coefficient "C"	Intensity "I" - inches/hour	Summation Area "A" - acres	Runoff "Q" cubic feet/second	Slope of Pipe feet/foot	Pipe Size inches	Velocity of Flow in Pipe feet/second	KEYED NOTES
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
SYSTEM III (See Plan & Profile Sheet 3 of Volume II)															①11.7 cfs to be collected in an underground storm drain system and discharged into Isleta Drain.
Five Points Intersection															
			750	5.0											
E-4 (Low Point)	E-4	3.16			10.0	-	10.0	0.80	2.70	3.16	6.83				②1.51 cfs to be carried in street and discharged into Isleta Drain through rundowns.
			500			4.39						0.0006	27"	1.9	
E-3 (Low Point)	E-3	1.34					14.39	0.80	2.35	4.50	8.46				③13.21 cfs total runoff from Drainage Areas "C", "D" and "E" to be discharged into Isleta Drain.
			500			4.17						0.0006	30"	2.0	
E-2 (Low Point)	E-2	1.27					18.56	0.80	2.20	5.77	10.16				
			450			4.17						0.0006	33"	1.8	
E-1 (Inlet Point)-Coff Blvd.	E-1	1.27					22.73	0.80	1.90	7.04	10.70				
			1300			10.32						0.0006	33"	2.1	
D-2 (Inlet Point)	D-2	1.67					33.05	0.80	1.55	8.71	10.80				
			800			6.35						0.0006	33"	2.1	
D-1 (Low Point)	D-1	1.75					39.40	0.80	1.40	10.45	③11.70				
			520			4.13						0.0006	33"	2.1	
Isleta Drain							43.53								
C-1 (Surface)	C-1	0.70	380	2.0	10.0	-	10.0	0.80	2.70	0.70	② 1.51				
											③13.21 cfs				
SYSTEM IV (See Plan & Profile Sheet 3 of Volume II)															①12.0 cfs to be collected in an underground storm drain system and discharged into the Atrisco Riverside Drain.
Five Points Intersection															
			310	1.0											
F-1 (Low Point)	F-1	2.55			10.0	-	10.0	0.80	2.70	2.55	5.51				
			1550			11.23						0.0006	24"	2.3	
G-1 (Low Point)	G-1	3.29					21.23	0.80	2.00	5.84	9.34				
			500			5.56						0.0006	30"	1.5	
G-2 (Low Point)	G-2	2.28					26.79	0.80	1.80	8.12	11.69				
			880			6.98						0.0006	33"	2.1	
H-1 (Low Point)	H-1	1.56					33.77	0.80	1.55	9.68	①12.00				
			380			3.02						0.0006	33"	2.1	
Atrisco Riverside Drain							36.79								

STORM DRAIN SYSTEM DESIGN DATA

DESIGN POINT	Drainage Area Designation	Drainage Area acres	Length feet	Vertical Elevation Change feet	Inlet Time minutes	Pipe Flow Time minutes	Time of Concentration minutes	Coefficient "C"	Intensity "I" - inches/hour	Summation Area "A" - acres	Runoff "Q" cubic feet/second	Slope of Pipe feet/foot	Pipe Size inches	Velocity of Flow in Pipe feet/second	KEYED NOTES
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
SYSTEM V (See Plan & Profile Sheets 4 & 5 of Volume II)															①16.35 cfs to be collected in an underground storm drain system and discharged into the Isleta Drain.
Isleta Boulevard															
			300	1.2											
G-2 (Low Point)	G-2	2.28			10.0	-	10.0	0.80	2.70	2.28	4.92				②1.51 cfs to be carried in street and discharged into Isleta Drain through rundowns.
			500			3.09						0.0006	24"	2.7	
G-1 (Low Point)	G-1	3.29					13.09	0.80	2.45	5.57	10.92				③17.86 cfs total runoff from Drainage Areas "C", "D", "E", "F" and "G" to be discharged into Isleta Drain.
			1550			12.30						0.0006	33"	2.1	
F-1 (Low Point)	F-1	2.55					25.39	0.80	1.85	8.12	12.02				
			1050			7.95						0.0006	33"	2.2	
E-4 (Low Point)	E-4	3.16					33.34	0.80	1.55	11.28	13.99				NOTE: This system does not include drainage of Area "H".
			500			3.62						0.0006	36"	2.3	
E-3 (Low Point)	E-3	1.34					36.96	0.80	1.50	12.62	15.14				
			500			3.62						0.0006	36"	2.3	
E-2 (Low Point)	E-2	1.27					40.58	0.80	1.40	13.89	15.56				
			450			3.26						0.0006	36"	2.3	
E-1 (Inlet Point)-Coff Blvd.	E-1	1.27					43.84	0.80	1.30	15.16	15.77				
			1300			9.42						0.0006	36"	2.3	
D-2 (Inlet Point)	D-2	1.67					53.26	0.80	1.15	16.83	15.48				
			800			5.80						0.0006	36"	2.3	
D-1 (Low Point)	D-1	1.75					59.06	0.80	1.10	18.58	①16.35				
			520			3.77						0.0006	36"	2.3	
Isleta Drain							62.83								
C-1 (Surface)	C-1	0.70	380	2.0	10.0	-	10.0	0.80	2.70	0.70	② 1.51				
											③17.86 cfs				

STORM DRAIN SYSTEM DESIGN DATA

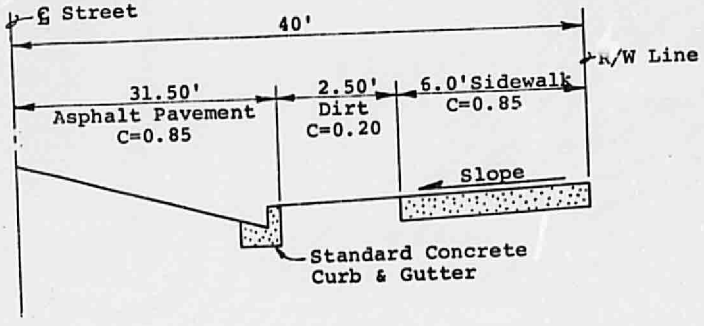
DESIGN POINT	Drainage Area Designation	Drainage Area acres	Length feet	Vertical Elevation Change feet	Inlet Time minutes	Pipe Flow Time minutes	Time of Concentration minutes	Coefficient "C"	Intensity "I" - inches/hour	Summation Area "A" - acres	Runoff "Q" cubic feet/second	Slope of Pipe feet/foot	Pipe Size inches	Velocity of Flow in Pipe feet/second	KEYED NOTES
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
SYSTEM VI (See Plan & Profile Sheets 6 & 7 of Volume II)															① 13.01 cfs to be collected in an underground storm drain system and discharged into the Isleta Drain.
Atrisco Drain															
			470	3.4											② 1.51 cfs to be carried in street and discharged into Isleta Drain through rundowns.
F-1 (Low Point)	F-1	2.55			10.0	-	10.0	0.80	2.70	2.55	5.51				
			1050			9.72						0.0006	24"	1.8	③ 14.52 cfs total runoff from Drainage Areas "C", "D", "E" and "F" to be discharged into Isleta Drain.
E-4 (Low Point)	E-4	3.16					19.72	0.80	2.05	5.71	9.36				
			500			4.17						0.0006	30"	2.0	
E-3 (Low Point)	E-3	1.34					23.89	0.80	1.90	7.05	10.72				
			500			3.97						0.0006	33"	2.1	
E-2 (Low Point)	E-2	1.27					27.86	0.80	1.75	8.32	11.65				
			450			3.57						0.0006	33"	2.1	
E-1 (Inlet Point)-Goff Blvd.	E-1	1.27					31.43	0.80	1.60	9.59	12.28				
			1300			10.32						0.0006	33"	2.1	
D-2 (Inlet Point)	D-2	1.67					41.75	0.80	1.35	11.26	12.16				
			800			6.35						0.0006	33"	2.1	
D-1 (Low Point)	D-1	1.75					48.10	0.80	1.25	13.01	①13.01				
			520			3.94						0.0006	33"	2.2	
Isleta Drain							52.04								
C-1 (Surface)	C-1	0.70	380	2.0	10.0	-	10.0	0.80	2.70	0.70	② 1.51				
											③14.52 cfs				
SYSTEM VII (See Plan & Profile Sheet 7 of Volume II)															① 10.84 cfs to be collected in an underground storm drain system and discharged into the Atrisco Riverside Drain.
Atrisco Drain															
			1070	6.0											
G-1 (Low Point)	G-1	3.29			12.0	-	12.0	0.80	2.60	3.29	6.84				
			500			4.39						0.0006	27"	1.9	
G-2 (Low Point)	G-2	2.28					16.39	0.80	2.35	5.57	10.47				
			880			6.98						0.0006	33"	2.1	
H-1 (Low Point)	H-1	1.56					23.37	0.80	1.90	7.13	①10.84				
			380			3.02						0.0006	33"	2.1	
Atrisco Riverside Drain							26.39								

5. "C" RUNOFF COEFFICIENT DETERMINATION

a. Area "A", Sub-areas 11-F2, 11-F3, and 11-A9
These areas are relatively unimproved open land. It is assumed that this area will be developed in the near future and that the requirements of AMAFCA regarding discharge of runoff will be enforced. A "C" factor of between 0.10 and 0.30 is recommended for this type of area in ASCE Manual of Practice, Number 37. A "C" factor of 0.20 was used in computing flows for these sub-areas.

b. Area "A", Sub-area A-1
This area is made up of a combination of undeveloped open land and a developed residental area with paved streets. A "C" factor of between 0.30 to 0.50 is recommended for this type of area in ASCE Manual of Practice, Number 37. A "C" factor of 0.45 was used in computing flows from this sub-area.

c. All Other Areas
These areas are made up of paved parking areas and the paved street within the proposed right-of-way. A dirt strip from back of curb to the sidewalk is also included in the area. ASCE Manual recommends a "C" factor of between 0.70 and 0.95 for paved surfaces and between 0.10 and 0.30 for unimproved areas. In computing the weighted "C" factor for these areas, a "C" factor of 0.85 was used for paved areas and 0.20 for unpaved areas. The following is a computation of weighted "C" factor for these areas.



$$\text{Weighted "C" Factor} = \frac{(31.50)(0.85)+(6.0)(0.85)+(2.5)(0.20)}{40}$$

$$= 0.81$$

A "C" Factor of 0.80 was used in computing flows from these areas.

6. FLOW IN STREET

Allowable flow in street was computed using a modified Manning's equation:

$$Q = 0.56 \left(\frac{z}{n}\right)(S)^{\frac{1}{2}} (Y)^{\frac{8}{3}}$$

where:

Q = Runoff in cubic feet per second (cfs)

n = Roughness coefficient = .016

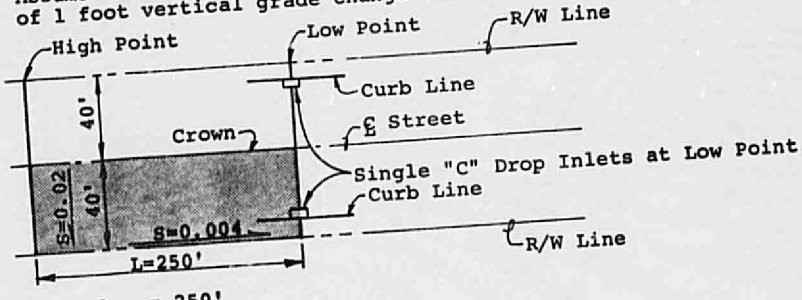
S = Longitudinal slope of street

Y = Depth of flow at flowline

Z = Reciprocal at cross slope

See Figure 4 for nomograph solution
and Figure 5 for reduction factor.

a. Expected Runoff at Typical Low Point
Assume a minimum street grade of 0.004 and that a maximum of 1 foot vertical grade change can be obtained.



$$L = \frac{1}{.004} = 250'$$

Drainage Area = (40)(250)/43,560 = 0.23 acres

I_{10} = 2.70 in/hr (See Figure 1, Assume a minimum inlet time of 10 minutes)

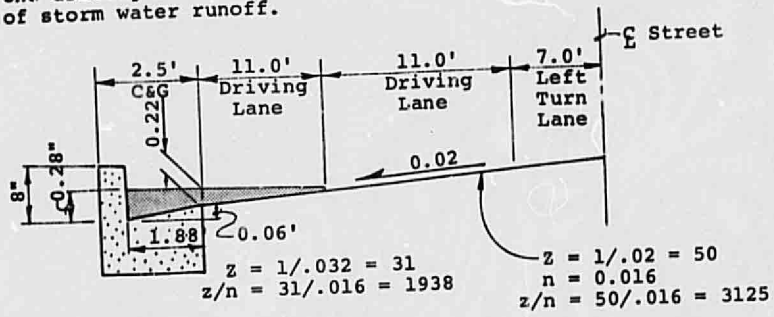
C = 0.80 (See computations page 18)

Q = CIA = (0.80)(2.70)(0.23) = 0.50 cfs

A single "C" inlet should be placed at each low point.

b. Street Carrying Capacity

One driving lane in each direction must be kept clear of storm water runoff.



$Q_{cap} = 0.56 \left(\frac{1}{n}\right) (S)^{\frac{1}{2}} (Y)^{\frac{8}{3}}$

See Figure 4 for nomograph solution of equation

Q = 7.0 + 2.2+2.5 = 7.3 cfs

Allowable Street Capacity

Q_{All} = (7.3) (Reduction Factor)

= (7.3) (0.5) = 3.65 cfs

See Figure 5 for reduction factor determination

Only 0.50 cfs is expected, so street will carry flow.

The final design of storm drain system will provide for keeping one driving lane in each direction clear of storm water. This will be addressed in detail when final street grades are established.

SYSTEM COSTS

1. SYSTEM I

DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	COST
42" RCP including trenching & back-filling	LF	100	$ 56.00	$ 5,600.00
36" RCP including trenching & back-filling	LF	900	48.00	43,200.00
18" RCP including trenching & back-filling	LF	700	23.00	16,100.00
Double "C" Drop Inlet	EA	15	1,800.00	27,100.00
Single "C" Drop Inlet	EA	2	1,200.00	2,400.00
4' Diameter Manhole	EA	4	800.00	3,200.00
6' Diameter Manhole	EA	1	1,000.00	1,000.00
Concrete Rundowns	EA	2	5,000.00	10,000.00
			TOTAL	$108,500.00

NOTE: This estimate does not include extension of the system upstream of intersection of South Coors Boulevard and Bridge Boulevard or the cost of relocating existing utilities which may be in conflict with proposed storm drain system.

2. SYSTEM II

DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	COST
27" RCP including trenching & back-filling	LF	1310	$ 35.00	$45,850.00
24" RCP including trenching & back-filling	LF	470	31.00	14,570.00
18" RCP including trenching & back-filling	LF	500	23.00	11,500.00
Single "C" Drop Inlet	EA	10	1,200.00	12,000.00
4' Diameter Manhole	EA	6	800.00	4,800.00
Concrete Rundown	EA	1	5,000.00	5,000.00
			TOTAL	$93,720.00

3. SYSTEM III

DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	COST
33" RCP including trenching & back-filling	LF	3070	43.00	$132,010.00
30" RCP including trenching & back-filling	LF	500	38.00	19,000.00
27" RCP including trenching & back-filling	LF	500	35.00	17,500.00
18" RCP including trenching & back-filling	LF	800	23.00	18,400.00
Single "C" Drop Inlet	EA	16	1,200.00	19,200.00
4' Diameter Manhole	EA	14	800.00	11,200.00
Concrete Rundown	EA	1	5,000.00	5,000.00
			TOTAL	$222,310.00

4. SYSTEM IV

DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	COST
33" RCP including trenching & back-filling	LF	1260	$ 43.00	$ 54,180.00
30" RCP including trenching & back-filling	LF	500	38.00	19,000.00
24" RCP including trenching & back-filling	LF	1550	31.00	48,050.00
18" RCP including trenching & back-filling	LF	700	23.00	16,100.00
Single "C" Drop Inlet	EA	14	1,200.00	16,800.00
4' Diameter Manhole	EA	10	800.00	8,000.00
Remove and replace existing pavement	SY	14000	12.00	168,000.00
			TOTAL	$330,130.00

5. SYSTEM V

DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	COST
36" RCP including trenching & back-filling	LF	4070	$ 48.00	$195,360.00
33" RCP including trenching & back-filling	LF	2600	43.00	111,800.00
24" RCP including trenching & back-filling	LF	500	31.00	15,500.00
18" RCP including trenching & back-filling	LF	1400	23.00	32,200.00
Single "C" Drop Inlet	EA	28	1,200.00	33,600.00
4' Diameter Manhole	EA	22	800.00	17,600.00
Concrete Rundown	EA	1	5,000.00	5,000.00
			TOTAL	$411,060.00

6. SYSTEM VI

DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	COST
33" RCP including trenching & back-filling	LF	3570	$ 43.00	$153,510.00
30" RCP including trenching & back-filling	LF	500	38.00	19,000.00
24" RCP including trenching & back-filling	LF	1050	31.00	32,550.00
18" RCP including trenching & back-filling	LF	900	23.00	20,700.00
Single "C" Drop Inlet	EA	18	1,200.00	21,600.00
4' Diameter Manhole	EA	16	800.00	12,800.00
Concrete Rundown	EA	1	5,000.00	5,000.00
			TOTAL	$265,160.00

7. SYSTEM VII

DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	COST
33" RCP including trenching & back-filling	LF	1260	$ 43.00	$ 54,180.00
22" RCP including trenching & back-filling	LF	500	35.00	17,500.00
18" RCP including trenching & back-filling	LF	500	23.00	11,500.00
Single "C" Drop Inlet	EA	10	1,200.00	12,000.00
4' Diameter Manhole	EA	7	800.00	5,600.00
Remove & replace existing pavement	SY	14000	12.00	168,000.00
			TOTAL	$268,780.00

Note: These estimates do not include the cost of relocating existing underground utilities which may be in conflict with the proposed storm drain system.

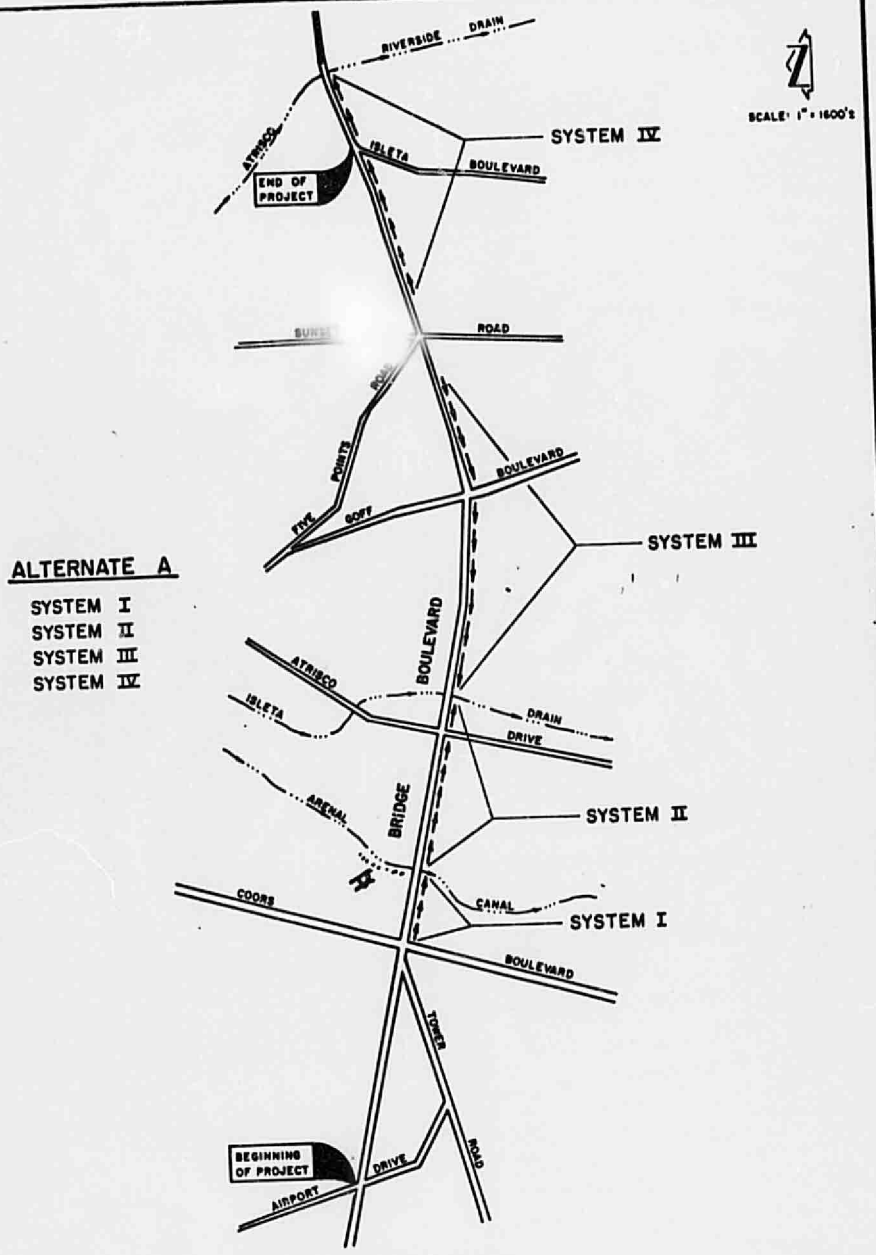
ALTERNATE "A"

1. DESCRIPTION

Alternate "A" is made up of System I, II, III, IV and is shown on Plan and Profile Sheets 1,2 and 3 of Volume II and on next page. This alternate will discharge 146.8 cfs in the Arenal Canal. 20.6 cfs into the Isleta Drain and 12.0 cfs into the Atrisco Riverside Drain.

2. COST

System I	$108,500.00	
System II	93,720.00	
System III	222,310.00	
System IV	330,130.00	
TOTAL	$754,660.00	ALTERNATE "A"


RIVERSIDE DRAIN
SCALE: 1" = 1600'S
SYSTEM IV
ATRISCO
IBLETA
BOULEVARD
END OF PROJECT
ROAD
SUNSET
POINTE
BOULEVARD
FWK
GOFF
SYSTEM III
ALTERNATE A
SYSTEM I
SYSTEM II
SYSTEM III
SYSTEM IV
ATRISCO
BOULEVARD
IBLETA
DRAIN
DRIVE
ARENAL
BRIDGE
SYSTEM II
COORS
CANAL
SYSTEM I
BOULEVARD
TOWER
BEGINNING OF PROJECT
DRIVE
ROAD
AIRPORT

ALTERNATE A

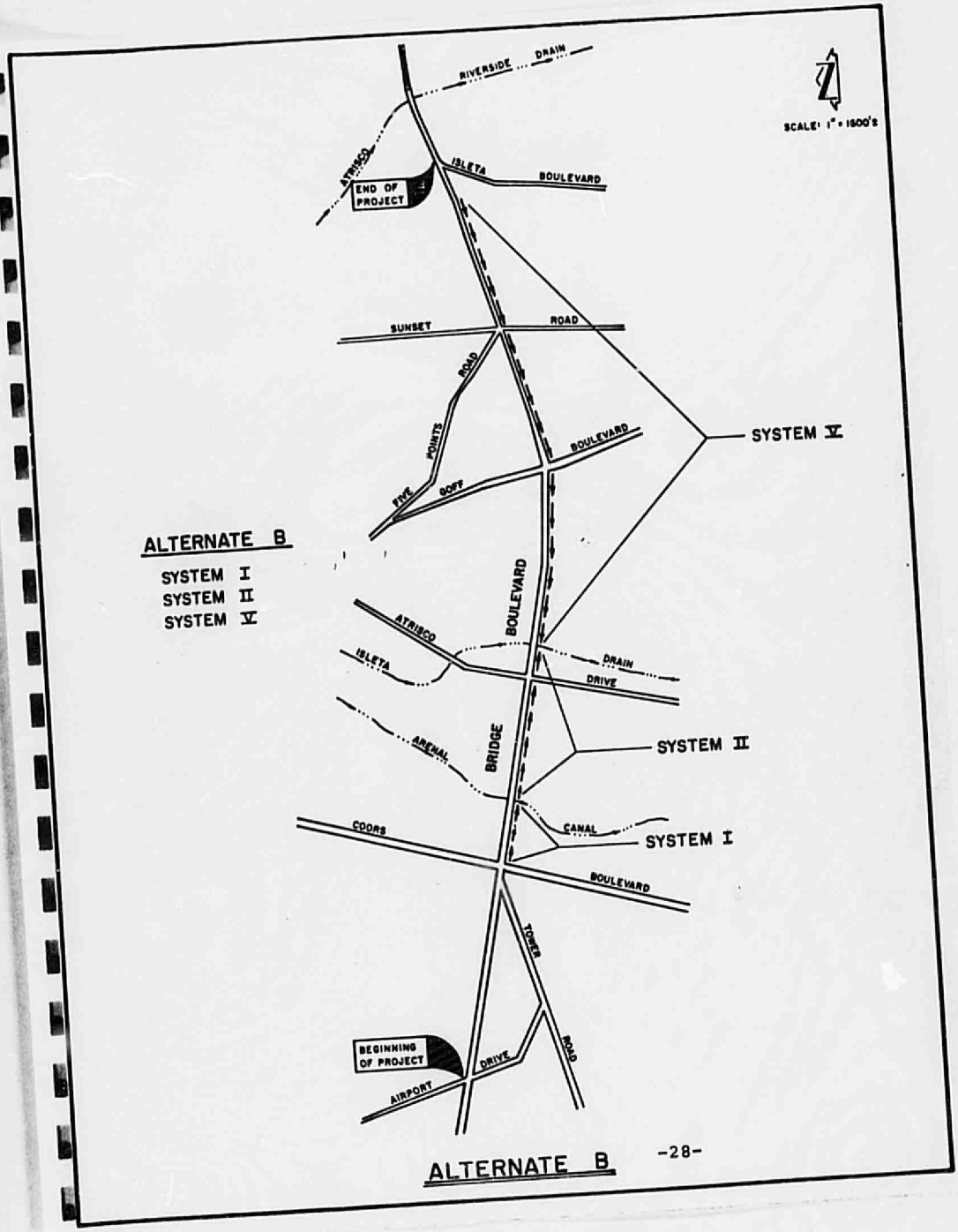
ALTERNATE "B"

1. DESCRIPTION

Alternate "B" is made up of System I, II and V and is shown on Plan and Profile Sheets 4 and 5 of Volume II and on next page. This alternate will discharge 146.8 cfs into the Arenal Canal, 25.2 cfs into the Isleta Drain and no discharge into the Atrisco Riverside Drain.

2. COST

System I	$108,500.00	
System II	93,720.00	
System V	411,060.00	
TOTAL	$613,280.00	ALTERNATE "B"


RIVERSIDE DRAIN
ATRISCO
END OF PROJECT
ISLETA BOULEVARD
SUNSET ROAD
ROAD
POINTS
FIVE
GOFF
BOULEVARD
SYSTEM V
ALTERNATE B
SYSTEM I
SYSTEM II
SYSTEM V
ATRISCO
ISLETA
BOULEVARD
DRAIN
DRIVE
ARENAL
BRIDGE
SYSTEM II
CANAL
SYSTEM I
COORS
BOULEVARD
TOWER
ROAD
BEGINNING OF PROJECT
DRIVE
AIRPORT
SCALE: 1" = 1500'S

ALTERNATE B

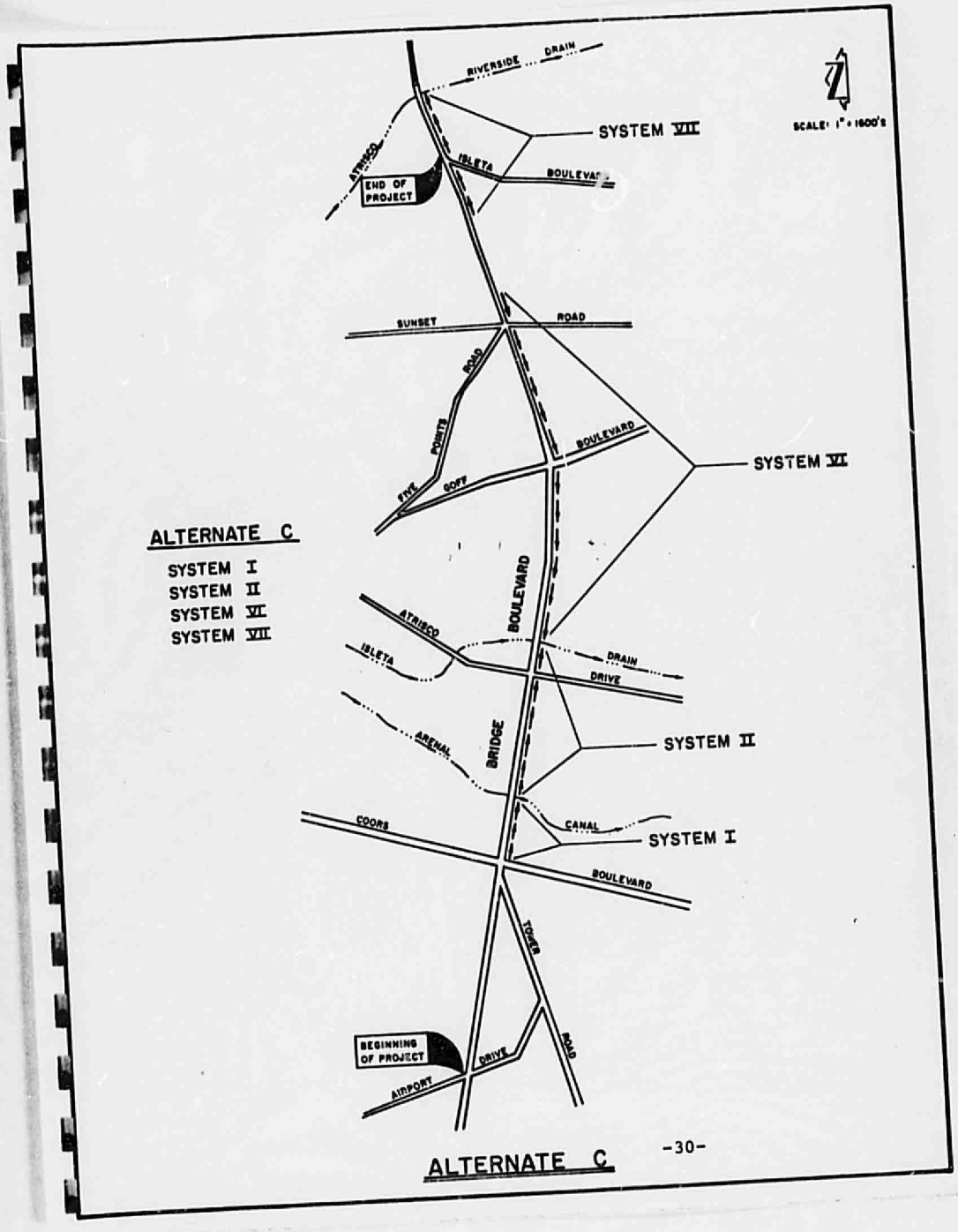
ALTERNATE "C"

1. DESCRIPTION

Alternate "C" is made up of System I, II, VI and VII and is shown on Plan and Profile Sheets 6 and 7 of Volume II and on next page. This alternate will discharge 146.8 cfs into the Arenal Canal, 21.9 cfs into the Isleta Drain and 10.8 cfs into the Atrisco Riverside Drain.

2. COSTS

System I	$108,500.00	
System II	93,720.00	
System VI	265,160.00	
System VII	268,780.00	
TOTAL	$736,160.00	ALTERNATE "C"


RIVERSIDE DRAIN
SCALE: 1" = 1600'S
SYSTEM VII
ATRISCO
ISLETA
BOULEVARD
END OF PROJECT
SUNSET
ROAD
POINTE
ROAD
BOULEVARD
SYSTEM VI
FIVE
GOFF
ALTERNATE C
SYSTEM I
SYSTEM II
SYSTEM VI
SYSTEM VII
ATRISCO
BOULEVARD
ISLETA
DRAIN
DRIVE
ARENAL
BRIDGE
SYSTEM II
COORS
CANAL
SYSTEM I
BOULEVARD
TOWER
ROAD
BEGINNING OF PROJECT
DRIVE
AIRPORT

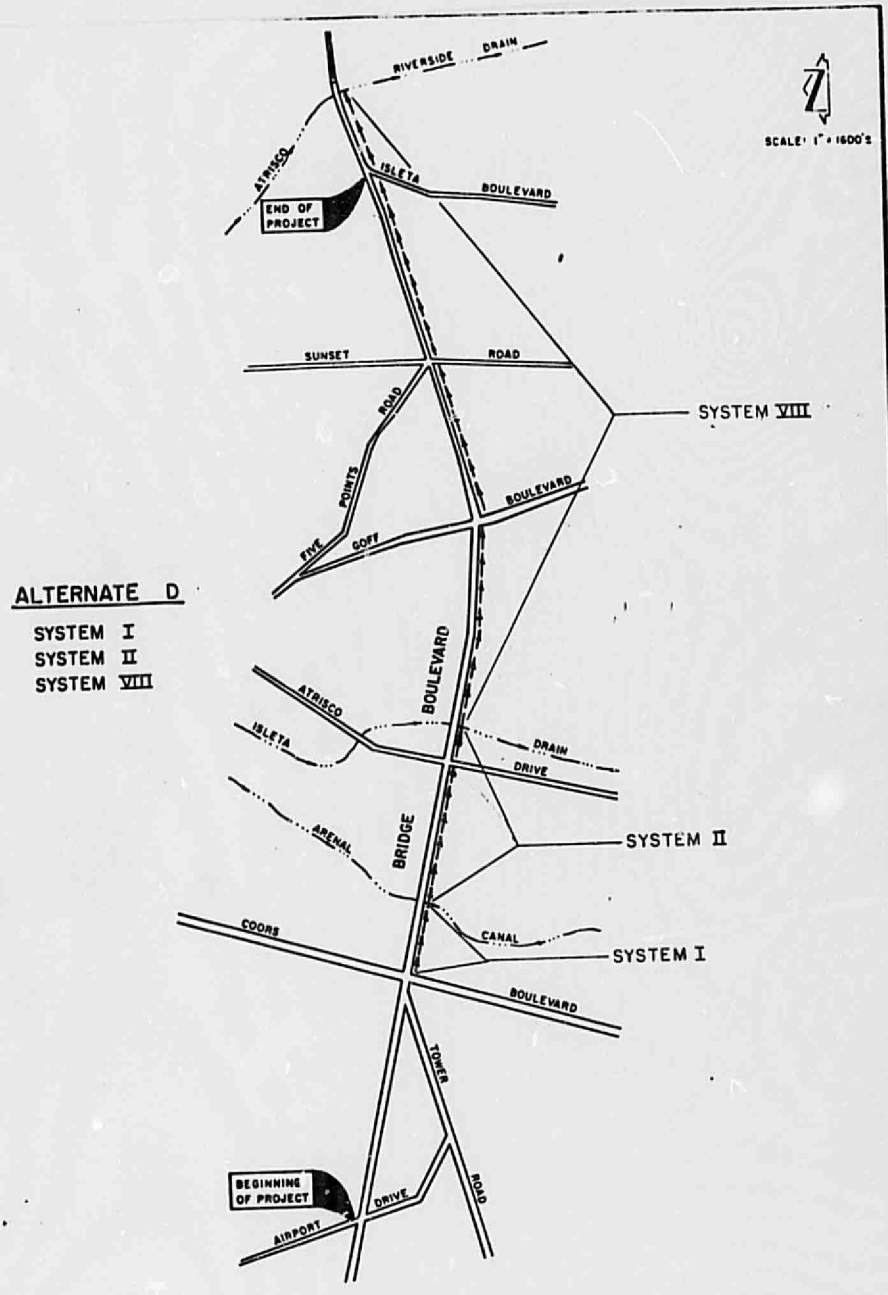
ALTERNATE C

CONCLUSIONS AND RECOMMENDATIONS

It is recommended that Alternate "B" be selected. This alternate is the most cost effective and can be accomplished at a cost of $613,280.00. This alternate will discharge 146.8 cfs into the Arenal Canal, 25.2 cfs into the Isleta Drain and no discharge into the Atrisco Riverside Drain.

Alternate "B" will not require the installation of an underground storm drain system in the already improved four lane street from Isleta Boulevard to Atrisco Riverside Drain.

This report should be submitted to the Middle Rio Grande Conservancy District for review and an agreement entered into for discharging runoff into the Arenal Canal and the Isleta Drain.


RIVERSIDE DRAIN
ATRISCO
ISLETA
BOULEVARD
END OF PROJECT
SUNSET
ROAD
SYSTEM VIII
ROAD
POINTS
FIVE
GOFF
BOULEVARD
ALTERNATE D
SYSTEM I
SYSTEM II
SYSTEM VIII
ATRISCO
BOULEVARD
ISLETA
DRAIN
DRIVE
ARENAL
BRIDGE
SYSTEM II
CANAL
COORS
SYSTEM I
BOULEVARD
TOWER
ROAD
BEGINNING OF PROJECT
DRIVE
AIRPORT
SCALE: 1" = 1600'±

ALTERNATE D

BRDIGE BLVD. SYSTEM COSTS

8. SYSTEM VIII

DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	COST
42" RCP including trenching & back-filling	LF	1420	$ 56.00	$79,520.00
36" RCP including trenching & back-filling	LF	2600	48.00	124,800.00
33" RCP including trenching & back-filling	LF	925	43.00	39,775.00
30" RCP including trenching & back-filling	LF	1275	38.00	48,450.00
24" RCP including trenching & Back-filling	LF	1500	31.00	46,500.00
18" RCP including trenching & Back-filling	LF	2300	23.00	52,900.00
Single "C" Drop Inlet	EA	46	1,200.00	55,200.00
4' Diameter Manhole	EA	26	800.00	20,800.00
Remove & replace existing pavement	SY	14000	12.00	168,000.00
			TOTAL	$635,945.00

ALTERNATE "D"

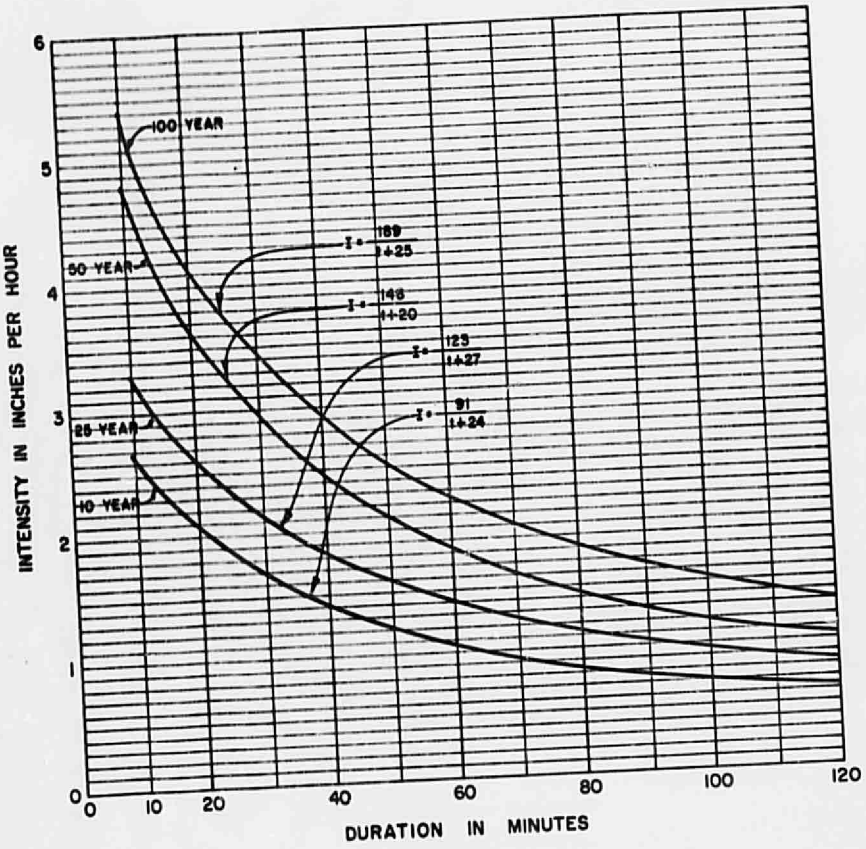
1. DESCRIPTION

Alternte "D" is made up of System I, II, VIII, and is shown on Plan & Profile Sheets 1 & 2 of 7 of Volume II and on attached sheets. This alternate will discharge 146.8 cfs in the Arenal Canal (reduced to 15 cfs by construction of detention pond), 7.3 cfs into the Isleta Drain and 11.8 cfs into the Atrisco Riverside Drain.

2. COST

System	I	$108,500.00
System	II	93,720.00
System	VIII	635,945.00
TOTAL		$838,165.00 ALTERNATE "D"

APPENDIX

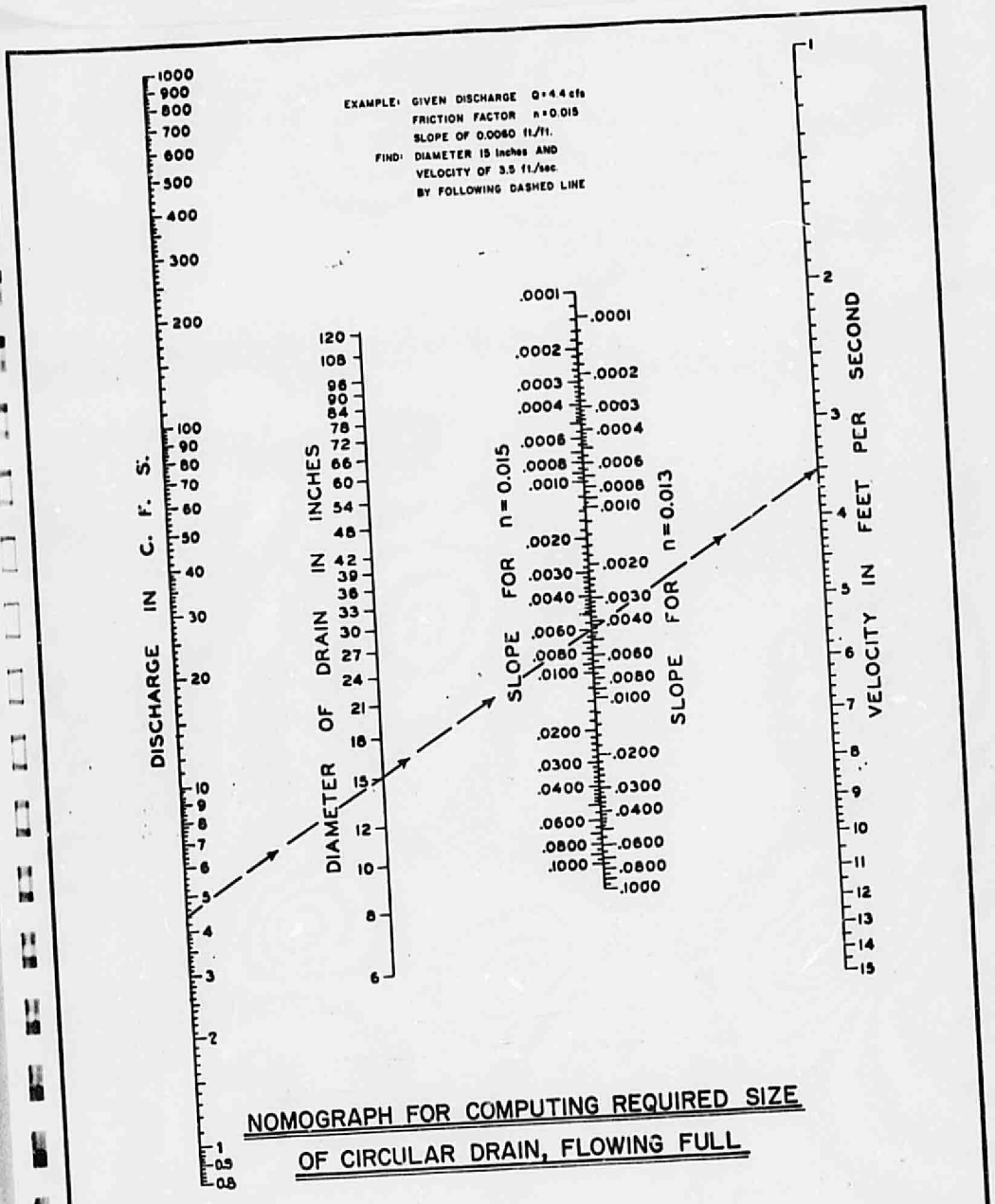


INTENSITY - DURATION - FREQUENCY CURVES

CITY OF ALBUQUERQUE, NEW MEXICO AND ENVIRONS

FIGURE 1

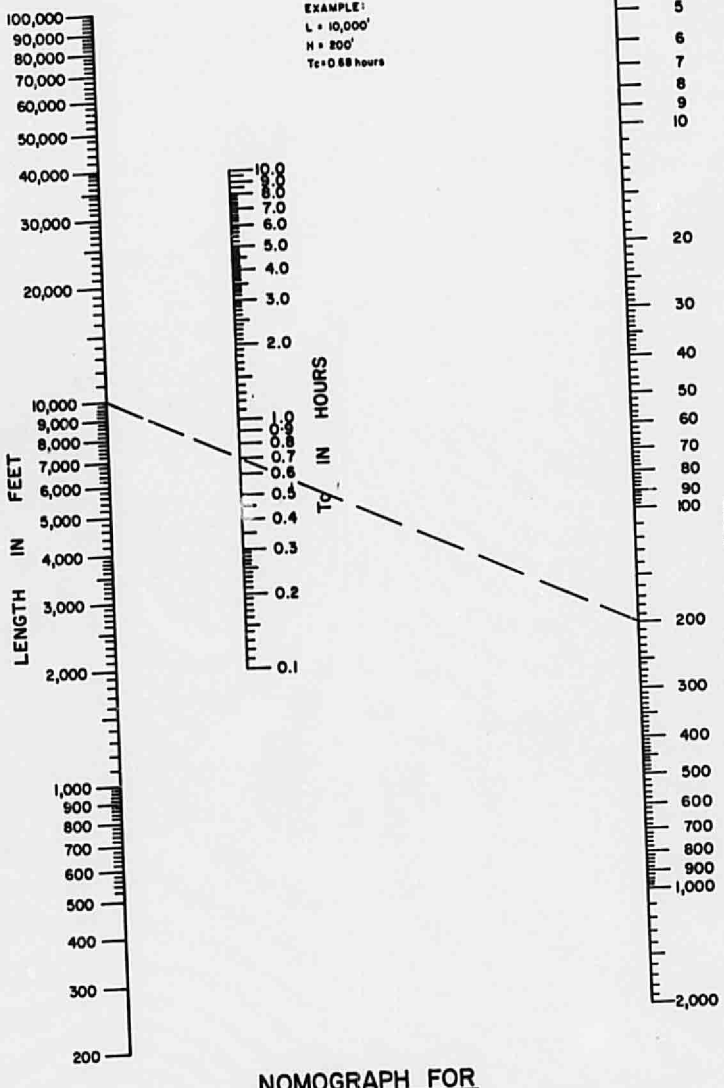
MASTER PLAN OF DRAINAGE - GORDON HERKENHOFF & ASSOCIATES



NOMOGRAPH FOR COMPUTING REQUIRED SIZE OF CIRCULAR DRAIN, FLOWING FULL

FIGURE 2

CORPS OF ENGINEERS SEPTEMBER 1942

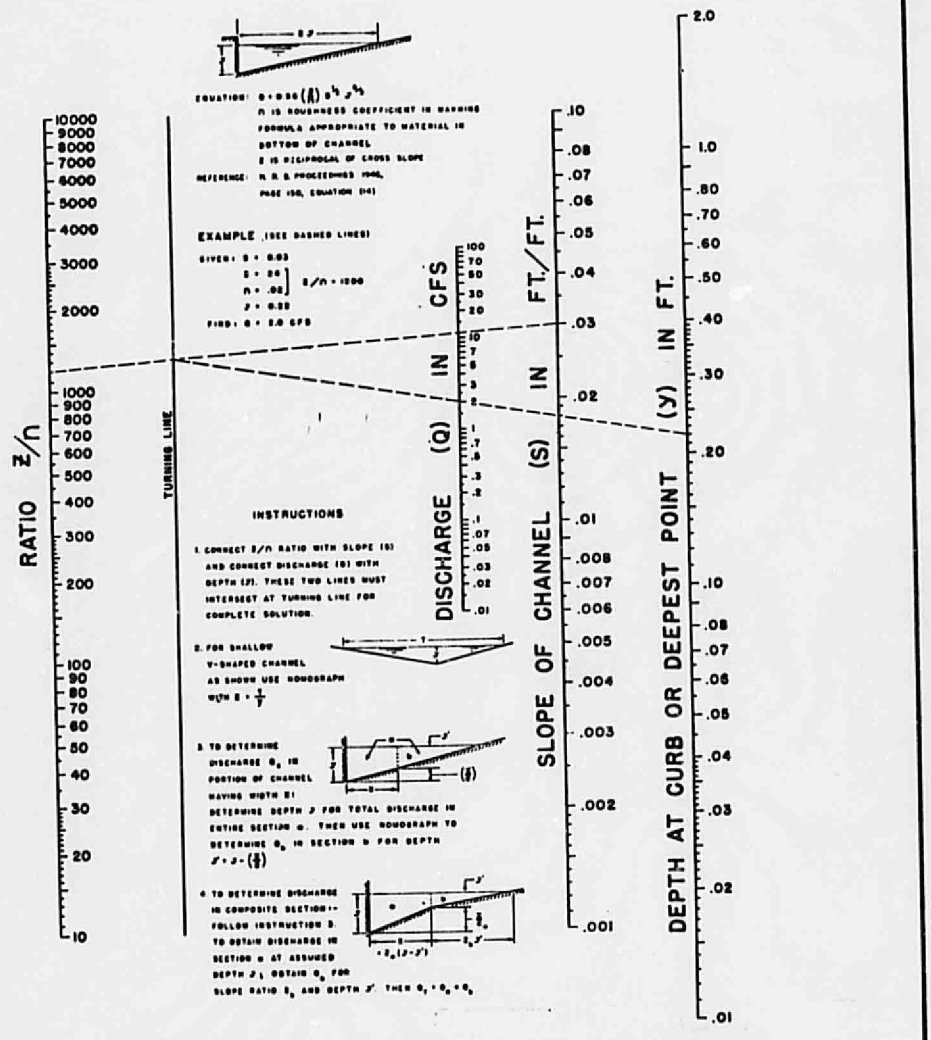


NOMOGRAPH FOR

TIME OF CONCENTRATION FOR OVERLAND FLOW

FIGURE 3

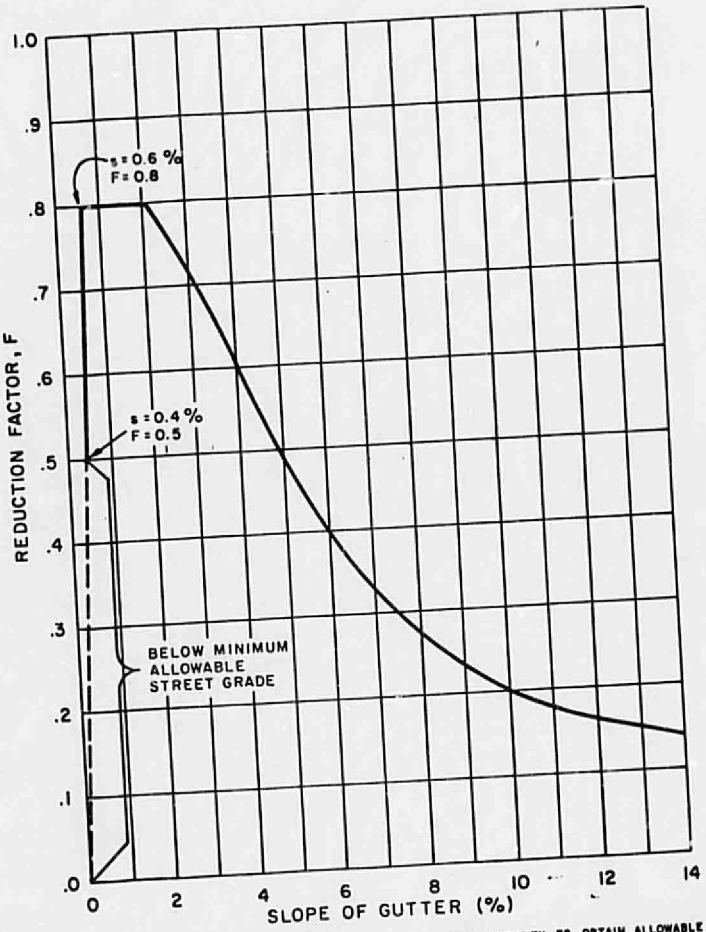
CITY OF ALBUQUERQUE, NEW MEXICO



NOMOGRAPH FOR FLOW IN TRIANGULAR GUTTERS

FIGURE 4

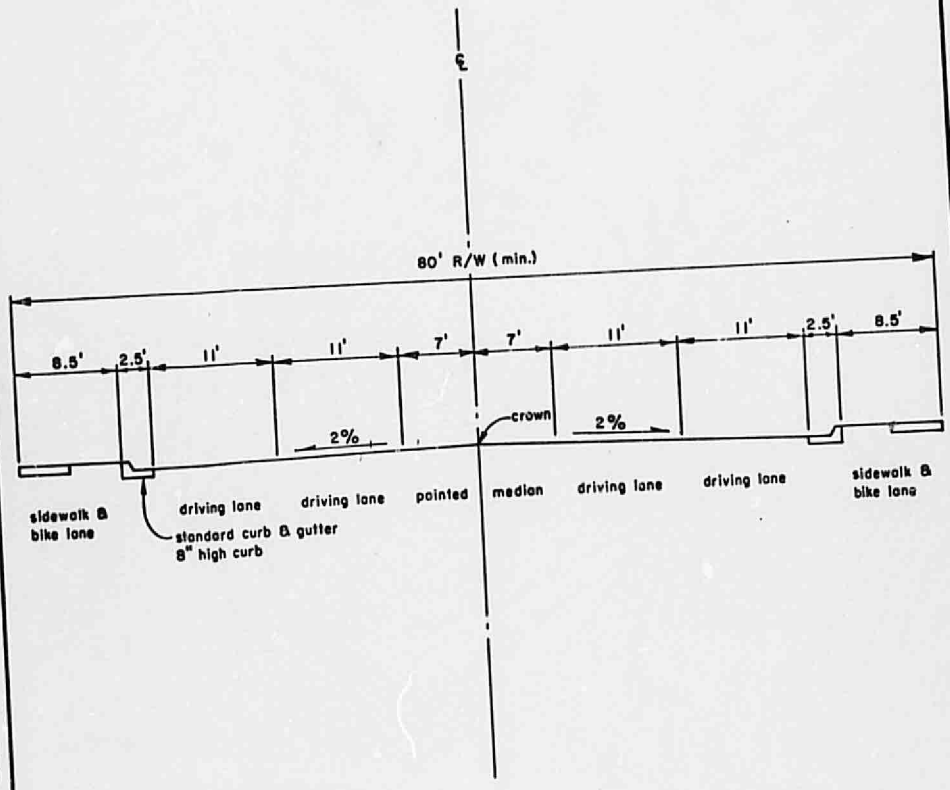
DENVER REGIONAL COUNCIL OF GOVERNMENTS 11-15-68



APPLY REDUCTION FACTOR FOR APPLICABLE SLOPE TO THE THEORETICAL GUTTER CAPACITY TO OBTAIN ALLOWABLE GUTTER CAPACITY

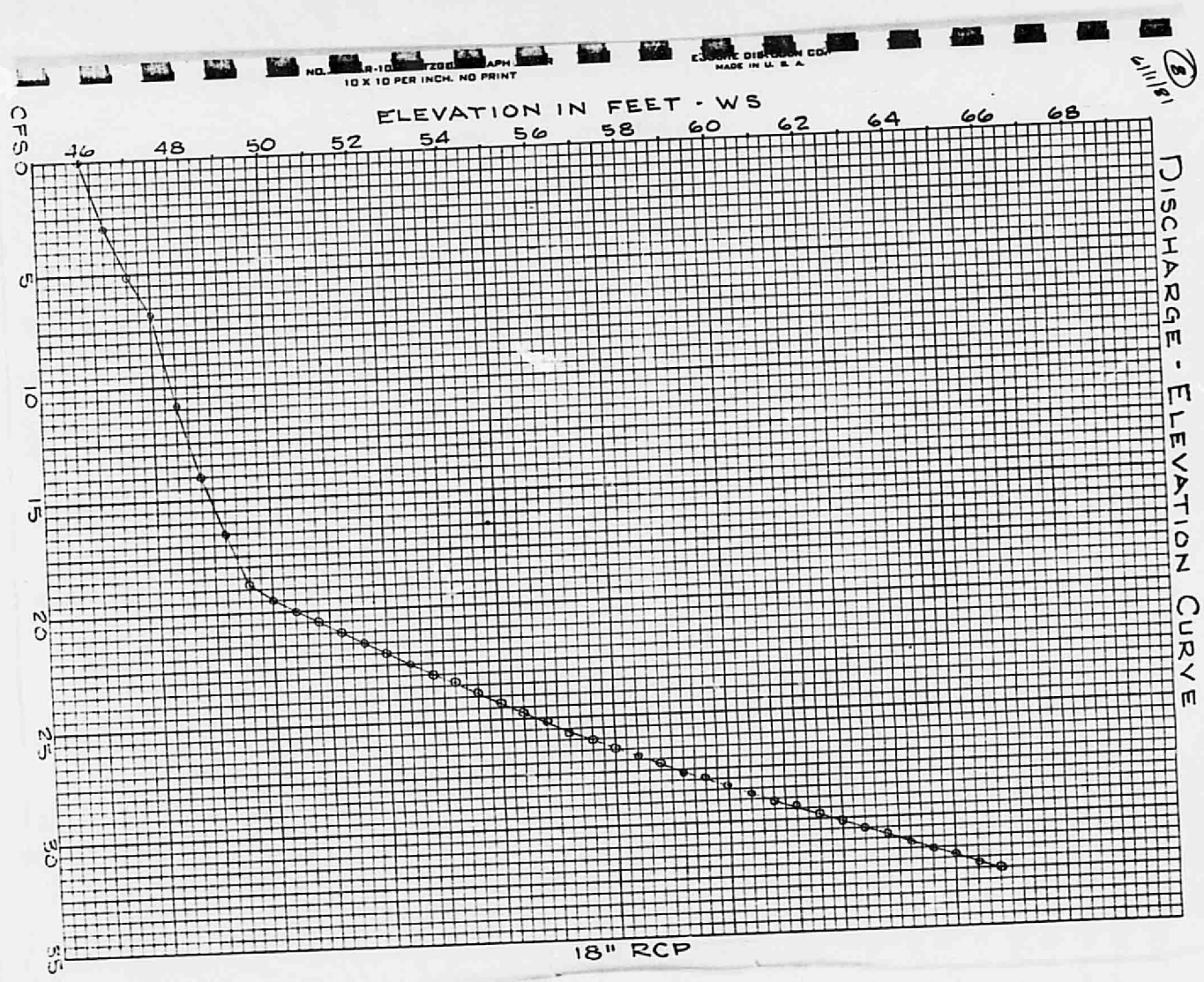
REDUCTION FACTOR FOR ALLOWABLE GUTTER CAPACITY

FIGURE 5



TYPICAL ROADWAY CROSS SECTION

FIGURE 6


10 X 10 PER INCH. NO PRINT
MADE IN U. S. A.
6/11/81
ELEVATION IN FEET - WS
46
48
50
52
54
56
58
60
62
64
66
68
CFS
0
5
10
15
20
25
30
35
18" RCP
DISCHARGE - ELEVATION CURVE



