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

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

December 6, 1985

Jay T. Olson
Espey, Huston & Associates
4801 Indian School Road, NE
Albuquerque, New Mexico 87110

RE: DRAINAGE PLAN FOR CARVER DEVELOPMENT
SUBMITTED NOVEMBER 8, 1985 FOR GRADING AND PAVING PERMIT
(H-18/D1)

Dear Jay:

The referenced submittal dated November 7, 1985, is approved for grading and paving permit.

After completion of paving project, please notify this office for a final inspection.

If you have any questions or comments regarding this project, call me at 766-7644.

Cordially,

Roger A. Green, PE

Roger A. Green, P.E.
C.E./Design Hydrology

cc: Carver Development
2155 Louisiana Blvd., NE Suite 8300
87110

RAG/bsj

2. For Final Plat approval, the following additional items must be provided:

   a. Reference adequacy of downstream drainage systems including streets and storm drains.

   b. Label Zone Atlas location map.

   c. Provide legal description and copy of preliminary plat previously approved by DRB.

   d. Locate building pads with finish building floor elevations on all individual lots.

   e. Locate any required retaining walls.

If you have any questions or comments regarding this project, please call me at 766-7644.

Cordially,

Roger A. Green, PE

Roger A. Green, P.E.
C.E./Design Hydrology

cc: Sproul Enterprises
P.O. Box 25485 87125

RAG/bsj

EH&A JOB NO. 7079

DRAINAGE INFORMATION SHEET

PROJECT TITLE: Carver Development ZONE ATLAS/DRNG. FILE #: H - 18/D1

LEGAL DESCRIPTION: Tract D-1, Jeannedale Addition

CITY ADDRESS: 2155 Louisiana Boulevard NE

ENGINEERING FIRM: Espey, Huston & Associates CONTACT: Jay T. Olson

ADDRESS: 4801 Indian School Rd. NE; 87110 PHONE: 255-1625

OWNER: Carver Development CONTACT: Les Lewis

ADDRESS: 2155 Louisiana Blvd. NE; 87110 Suite 8300 PHONE: 883-7667

ARCHITECT: NONE CONTACT: —

ADDRESS: — PHONE: —

SURVEYOR: Espey, Huston & Associates CONTACT: Tim Aldrich

ADDRESS: 4801 Indian School Rd. NE; 87110 PHONE: 255-1625

CONTRACTOR: NOT KNOWN CONTACT: —

ADDRESS: — PHONE: —

RECEIVED
NOV 08 1985
HYDROLOGY SECTION

PRE-DESIGN MEETING:

X YES

___ NO

X COPY OF CONFERENCE RECAP SHEET PROVIDED

DRB NO. —

EPC NO. —

PROJ. NO. —

TYPE OF SUBMITTAL:

___ DRAINAGE REPORT

X DRAINAGE PLAN

___ CONCEPTUAL GRADING & DRAINAGE PLAN

___ GRADING PLAN

___ EROSION CONTROL PLAN

___ ENGINEER'S CERTIFICATION

CHECK TYPE OF APPROVAL SOUGHT:

___ SKETCH PLAT APPROVAL

___ PRELIMINARY PLAT APPROVAL

___ SITE DEVELOPMENT PLAN APPROVAL

___ FINAL PLAT APPROVAL

___ BUILDING PERMIT APPROVAL

___ FOUNDATION PERMIT APPROVAL

___ CERTIFICATE OF OCCUPANCY APPROVAL

___ ROUGH GRADING PERMIT APPROVAL

X GRADING/PAVING PERMIT APPROVAL

___ OTHER _____ (SPECIFY)

DATE SUBMITTED: November 8,1985

BY: Jay T. Olson

7079

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

CONFERENCE RECAP

DRAINAGE FILE/ZONE ATLAS PAGE NO.: H-18 DATE: 10/02/85 @ 8:00 am
PLANNING DIVISION NOS: EPC: _____ DRB: _____
SUBJECT: Carver Development Bldg. N W corner
STREET ADDRESS (IF KNOWN): 2155 Louisiana Blvd.
SUBDIVISION NAME: Tract D-1 Jeannedale Addition

APPROVAL REQUESTED:

_____ PRELIMINARY PLAT
_____ SITE DEVELOPMENT PLAN
X OTHER paving permit
_____ FINAL PLAT
_____ BUILDING PERMIT
_____ ROUGH GRADING

RECEIVED NOV 08 1985 WHO HYDROLOGY SECTION

ATTENDANCE: Jay T. Olson — Espey, Huston & Assoc. Inc.
Billy Goolsby ~~Carlos Montoya~~ — City

FINDINGS:

① A plan is required to be submitted to show what improvements are to take place. Upon approval a paving permit is issued.
② The plan shall show an erosion control method for the period of construction.
③ Drainage patterns should be ~~managed~~ studied to ensure that ponding will not occur with the proposed improvements. (i.e. curbcuts and/or sidewalk culverts may be required)

The undersigned agrees that the above findings are summarized accurately and are only subject to change if further investigation reveals that they are not reasonable or that they are based on inaccurate information.

SIGNED: Billy J. Goolsby — SIGNED: Jay T. Olson
TITLE: CE/Hydrology — TITLE: C.E.
DATE: 10/2/85 — DATE: 10/2/85

ADDITIONS OR CORRECTIONS TO THIS RECAP WITH THE DRAINAGE SUBMITTAL

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

February 11, 1981

Mr. Steven F. Fritz, P.E.
Bovay Engineers Inc.
P. O. Box 30068
3125 Carlisle Blvd. N.E.
Albuquerque, New Mexico 87110

FILE

Re: The Carver Office Building Drainage Report Amended February, 1981

Dear Mr. Fritz:

Your amended drainage report dated February, 1981 for the Carver Office Building is in compliance with the approved drainage report dated November, 1980. Therefore this amended report is approved.

Very truly yours,

B. C.

Bruno Conegliano
Assistant Hydrology Engineer

BC/fs

BOVAY ENGINEERS, INC.
HOUSTON • AUSTIN • SPOKANE • ALBUQUERQUE • BATON ROUGE • WASHINGTON, D. C.

April 3, 1980

Mr. Fred Aguirre, Civil Engineer
City of Albuquerque
P. O. Box 1293
Albuquerque, New Mexico 87103

Re: Drainage Report for Carver Office Building
BEI Project No. 6076-000

Dear Mr. Aguirre:

The purpose of this letter is to acknowledge receipt of your letter dated March 28, 1980 which furnished the City's comments on the above referenced Drainage Report.

To answer your question, the equation was found in another drainage report that had been furnished to us as a sample by AMAFCA. This equation does give high intensity values for the 5-year return period. A value of 3.60 in./hr. for the 5-year, 5-minute rainfall intensity would be more appropriate.

On the evening of Thursday, March 20, 1980, the Environmental Planning Commission approved, with two provisions, the development plan for the Carver Office Building. One of these provisions required the Carver Development Co., the developer, to seek alternate drainage solutions to the proposed open detention wells. At this meeting, the developer agreed to either construct underground or cover over the detention wells.

Mr. Robert Fosnaugh, the City's Traffic Engineer, recommended that the developer provide additional right-of-way for the future widening of Louisiana Blvd. on the east and Indiana Street on the west. Since the site area would be reduced by the right-of-way taking, the required detention well volumes would be decreased.

Until such time as the developer secures construction financing for the 10-story office building, further work on our part has been held in abeyance.

Upon being notified to once again proceed with the work on this project, we will resubmit the Drainage Report.

This revised Drainage Report will reflect the Environment Planning Commission's desire for either an underground detention well or an at-grade

well with a cover on top of it. The revised drainage calculations will be based on a smaller drainage area and the reduced 5-year, 5-minute rainfall intensity value.

If you have any questions, please don't hesitate to call.

Sincerely,

BOVAY ENGINEERS, INC.

Stephen F. Fritz, P.E.

SFF:jr

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

March 28, 1980

Bovay Engineers, Inc.
3125 Carlisle Blvd. N.E.
Albuquerque, New Mexico 87110

RE: CARVER OFFICE BUILDING

Dear Mr. Bovay:

The following are my comments concerning the above referenced Drainage Report submitted to this office on March 11, 1980:

1. The 5-year intensity seems very high because the 10-year 5 minute intensity I 10 = 91/5+24 = 3.14 in/hr. Where did the equation for computing the intensity come from?

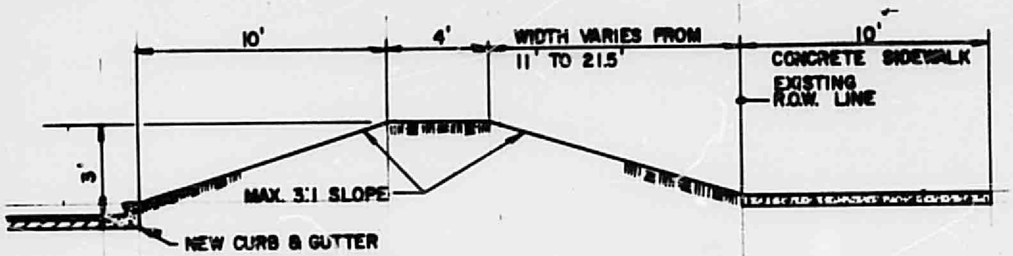
2. With the data provided the detention ponds are a little over designed. However, the outflow determined by using the intensity for Q5 is actually closer to the Q100 instead of the Q5. The Q5 should be about 6 cfs. which would mean that probably 6" outflow pipes would be required instead of 8".

If you have any questions concerning these comments, please feel free to contact me.

Sincerely,

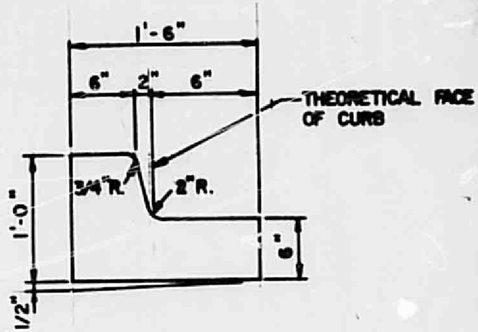
Fred Aguirre
Civil Engineer

FA/tsl



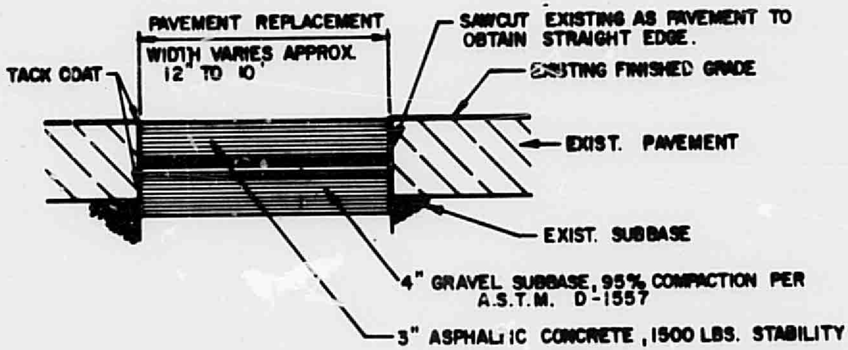
SECTION A-A

N.T.S.



CURB & GUTTER DETAIL

N.T.S



PAVEMENT SECTION

N.T.S.

NOTES:

1) 6" SUBGRADE, 90% COMPACTION PER A.S.T.M. D-1557
2) 3000 P.S.I. P.C.C. CONCRETE
3) EXPANSION JOINTS @ 24'-0" O.C.
4) CONSTRUCTION JOINTS @ 6'-0" O.C.
5) REMOVE & REPLACE 12" WIDE STRIP OF PAVEMENT BEYOND LIP OF GUTTER WHEN CONSTRUCTING CURB & GUTTER ADJACENT TO EXISTING PAVEMENT
6) DEPRESS CURB 1/2" AS SHOWN.

RECEIVED
NOV 08 1985
HYDROLOGY SECTION

JAMES L. LEYBOURN, JR.
NEW MEXICO
8105
REGISTERED PROFESSIONAL ENGINEER
11/08/85

CARVER DEVELOPMENT
DETAIL PLAN

ESPEY, HUSTON & ASSOC., INC.
Engineering & Environmental Consultants

DRAINAGE REPORT

BOVAY ENGINEERS, INC.

BOVAY ENGINEERS, INC.
HOUSTON • SPOKANE • BATON ROUGE
AUSTIN • ALBUQUERQUE • WASHINGTON, D. C.

March 8, 1982

Mr. Fred Aguirre, P.E.
Hydrology Engineering Division
Municipal Development Department
P. O. Box 1293
Albuquerque, New Mexico 87103

RE: Carver Office Building
2155 Louisiana Boulevard, N. E.
Zone Atlas Page H-18
Bovay Number 6076-003

Dear Mr. Aguirre:

As I stated in my January 15, 1982 letter to you, I am enclosing three copies of the amended drainage report.

Also, please find enclosed three copies of the Record Drawings for the project referenced above. I have certified that the improvements constructed were in substantial compliance with the approved City drainage concept.

If you should have any questions, please don't hesitate to call.

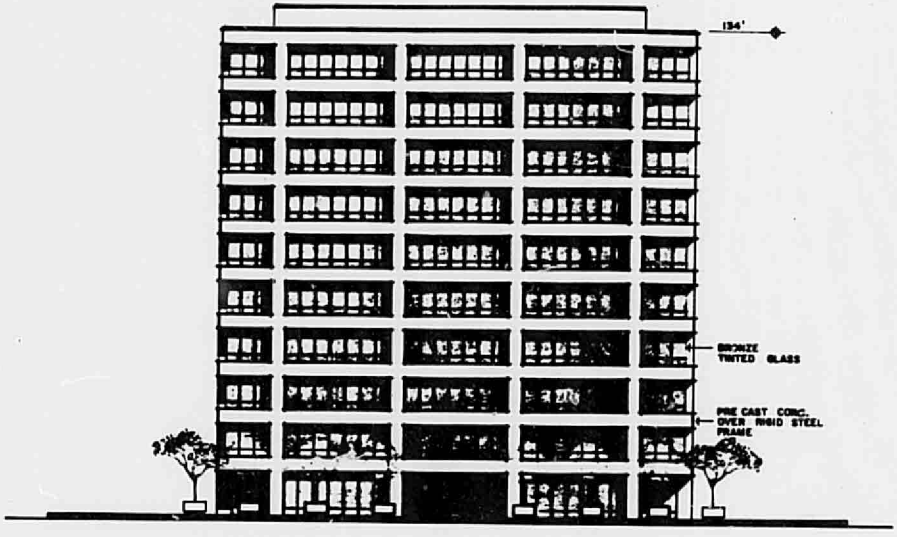
Sincerely,

BOVAY ENGINEERS, INC.

Stephen F. Fritz, P.E.

SFF/slh

Enclosures



EXTERIOR ELEVATION
10 STORY OFFICE BUILDING

DEVELOPED DRAINAGE CONDITIONS

The 10-story office building covers approximately 5 percent of the entire site, sidewalks and paved parking 74 percent, and landscaped areas 21 percent.

As shown on Drawing C-1 (located in the map pocket) the site has been graded so that most of the storm runoff drains to either of two east-west swales, one in the north parking area and one in the south parking area. These swales will carry the storm runoff through the parking areas to the detention basins located beneath the parking area on the west side of the site. A water block 2 inches high has been constructed in the south parking area to direct the surface runoff to the swale and not out the entrance to Indian School Road.

The building roof drains have been tied into the detention basin system in the north parking area.

The perimeter landscaped areas to the west, north, and east will be graded so that about half the area will drain directly offsite while the remainder drains onsite into the detention basin system.

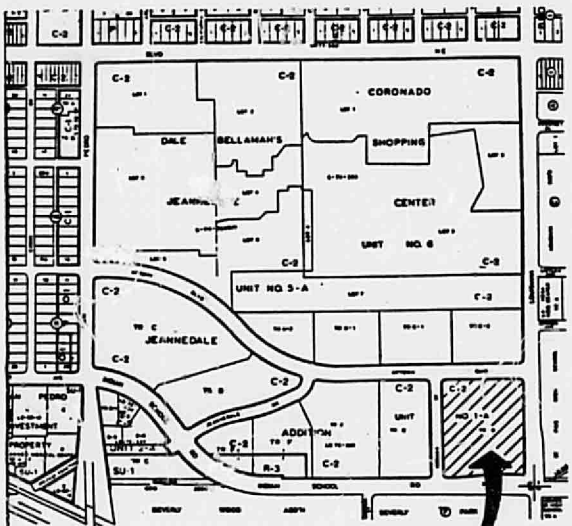
Storm runoff from portions of the driveway entrances and the perimeter landscaped areas to the southeast, south, and southwest will drain directly off the site without being detained.

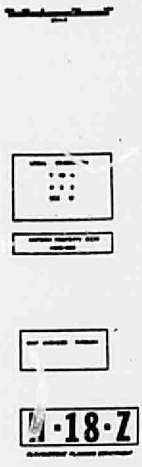
The storm runoff detention basin system which includes ponding in the parking area is designed to hold the difference between the developed 100-year volume and the undeveloped 100-year volume. Based on storm routing computations, the volume to

be detained equals 21,405 cubic feet. The actual storage volume is 24,598 cubic feet. The volume of storm runoff that can be ponded in the parking area is approximately equal to the difference in volume between the 100-year and 50-year storm events. The depth of ponding is limited to 9 inches. Detention Basin System No. 1 will detain 10,729 cubic feet. Detention Basin System No. 2 will detain 10,676 cubic feet.

The undeveloped 5-year discharge rate from the site was 7.2 cfs. The 100-year discharge rate from the landscaped areas and driveway entrances that drain directly off the site without being detained equals 3.2 cfs. The maximum discharge rates for the Detention Basin System is 4.7 cfs. The combined developed 100-year discharge rate is 7.9 cfs. This discharge rate even though it exceeds the 7.2 cfs, is in substantial compliance with the City's guidelines. At the edge of both the northwest and southwest parking lot ponding areas, an overflow spillway structure has been designed to discharge the 100-year developed runoff. This structure is a standard catch basin with a single grate (see City of Albuquerque Drawings K-6 and K-8). The peak rate of runoff from the southern parking area is 13.5 cfs and from the northern parking area is 13.1 cfs.

As presently constructed, the underground detention basins consist of corrugated steel pipe. The inlet structures to these basins are modified standard catch basins and grates (see City of Albuquerque Drawings K-6 & K-8 and Drawing C-4 in the map pocket).





LEGAL DESCRIPTION

JEANNEDALE ADDITION
UNIT NO. I-A
TRACT D-I
CITY OF ALBUQUERQUE
STATE OF NEW MEXICO

LOCATION MAP

DRAWING 1

DEVELOP INTENSITY-DURATION-FREQUENCY CURVE FOR CARVER DEVELOPMENT SITE

FROM THE USGS ALBUQUERQUE EAST QUAD MAP. THE SITE IS LOCATED
106°- 34'-10" 35°- 6'-10"

FROM NOAA ATLAS 2 VOLUME IV - NEW MEXICO

X_1 = 2YR. 6HR. VALUE = 1.07 IN.
X_2 = 2YR. 24HR. VALUE = 1.30 IN.
X_3 = 100YR. 6HR. VALUE = 2.41 IN.
X_4 = 100YR. 24HR. VALUE = 2.85 IN.

EQUATION FOR ESTIMATING 1 HR VALUES IN N.MEX. WEST OF GENERALIZED CREST OF SANGRE DE CRISTO RANGE AND SACRAMENTO MOUNTAINS FROM PG. 15 NOAA ATLAS

$Y_2 = -0.011 + 0.942\,[(X_1)(X_1/X_2)]$
$Y_{100} = 0.494 + 0.755\,[(X_3)(X_3/X_4)]$

$Y_2 = -0.011 + 0.942\,[(1.07)(1.07/1.30)] = 0.82$
$Y_{100} = 0.494 + 0.755\,[(2.41)(2.41/2.85)] = 2.03$

Y_2 = 2YR 1HR ESTIMATED VALUE = 0.82 IN.
Y_{100} = 100YR 1HR ESTIMATED VALUE = 2.03 IN.

USE FIGURE 6 NOMOGRAPH ON PAGE 6 OF NOAA ATLAS TO DETERMINE PRECIP.-FREQ. VALUES FOR RETURN PERIODS BETWEEN 2-100 YRS.

5YR RETURN PERIOD - PRECIPITATION - 1.13
10YR RETURN PERIOD - " - 1.32
25YR RETURN PERIOD - " - 1.59
50YR RETURN PERIOD - " - 1.81

ADJUSTMENT FACTORS TO OBTAIN ESTIMATES FOR DURATIONS LESS THAN 1 HR FROM TABLE 12 NOAA ATLAS

DURATION (MIN)	5	10	15	30
	0.29	0.45	0.57	0.79

DRAINAGE AREA LESS THAN 10 SQ. MI. - AREAL REDUCTION FACTOR NOT APPLIED

2HR = 0.341 (6HR) + 0.659 (1 HR)
3HR = 0.569 (6HR) + 0.431 (1HR)

FOR CARVER OFFICE BLDG DESCRIPTION DRAINAGE REPORT COMPUTATIONS
DESIGNED SEE DATE 11-22-82 CHECKED [illegible] DATE 11-24-80 FILE NO 60076-002 SHEET 1 OF 28
REVISED SFF 3-1-82

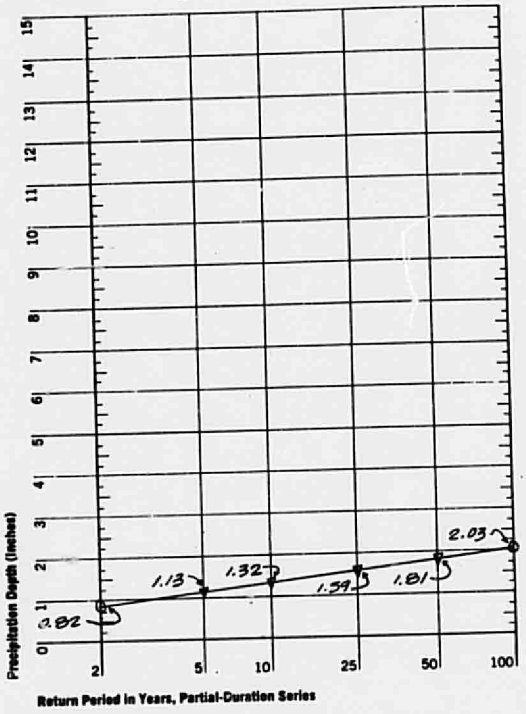


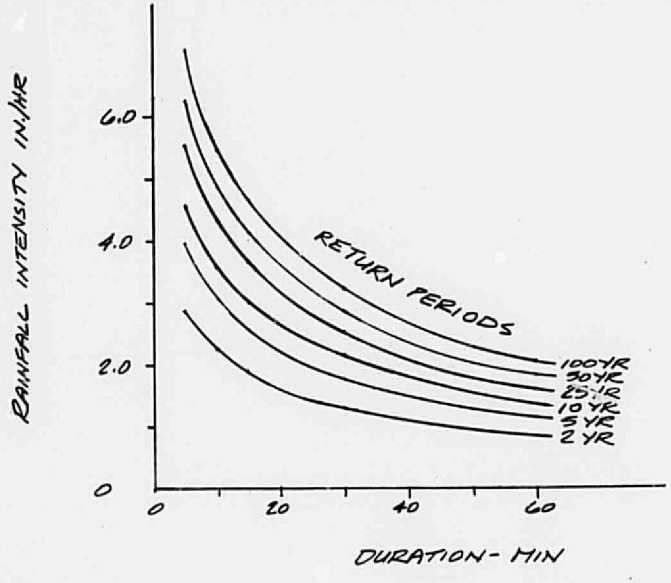
Figure 6. *Precipitation depth versus return period for partial-duration series.*

FOR CARVER OFFICE BLDG DESCRIPTION DRAINAGE REPORT COMPUTATIONS
DESIGNED SEF DATE 11-22-80 CHECKED [illegible] DATE 11-24-80 FILE NO 80716002 SHEET 2 OF 28

2HR = 0.341 (2.41) + 0.659 (2.03) = 2.16 IN

3HR = 0.569 (2.41) + 0.431 (2.03) = 2.25 IN

FREQ / DURAT	2 YEARS IN.	2 YEARS IN/HR	5 YEARS IN.	5 YEARS IN/HR	10 YEARS IN.	10 YEARS IN/HR	25 YEARS IN.	25 YEARS IN/HR	50 YEARS IN.	50 YEARS IN/HR	100 YEARS IN.	100 YEARS IN/HR
5 MIN	0.24	2.88	0.33	3.96	0.38	4.56	0.46	5.52	0.52	6.24	0.59	7.08
10 MIN	0.37	2.22	0.51	3.06	0.59	3.54	0.72	4.32	0.81	4.86	0.91	5.46
15 MIN	0.47	1.88	0.64	2.56	0.75	3.00	0.91	3.64	1.03	4.12	1.16	4.64
30 MIN	0.65	1.30	0.89	1.78	1.04	2.08	1.26	2.52	1.43	2.86	1.60	3.20
1 HR	0.82		1.13		1.32		1.59		1.81		2.03	
6 HR	1.07	0.18	1.38	0.23	1.61	0.27	1.90	0.32	2.22	0.37	2.41	0.40
24 HR	1.30	0.05	1.69	0.07	1.92	0.08	2.40	0.10	2.64	0.11	2.85	0.12



FOR CARVER OFFICE BLDG DESCRIPTION DRAINAGE REPORT COMPUTATIONS

DESIGNED SEE DATE 11-22-80 CHECKED DGR DATE 11-24-80 FILE NO 6A016-002 SHEET 3 OF 28

REVISED SAF 3-1-82

POSITIVE DISCHARGE = Q_5 UNDEVELOPED TO STREETS

TIME OF CONCENTRATION FOR SMALL UPLAND WATERSHEDS WHERE OVERLAND FLOW EXISTS

$$t_c = \frac{L}{60\ \text{SEC/MIN}\ V}$$

WHERE,
t_c = TIME OF CONCENTRATION IN MINUTES
L = LENGTH OF WATERCOURSE IN FEET
V = VELOCITY IN FEET PER SECOND

DRAINAGE AREA #1 DISCHARGES TO LOUISIANA BLVD.

AVE SLOPE = $S_{AVE} = H/L$
ELEV DIFF = 5279.1 - 5277.3 = 1.8'
LENGTH = 27'
S_{AVE} = 1.8'/27' = 0.0667 1/1

V = 2.6 FT/SEC

FROM FIG 2-3, PEAK RATES OF DISCHARGES FOR SMALL WATERSHEDS, USDA-SCS, NEARLY BARE AND UNTILLED (OVERLAND FLOW)

$$t_c = \frac{27\ \text{FT}}{60\ \text{SEC/MIN}\ (2.6\ \text{FT/SEC})} = 0.2\ \text{MIN}$$

USE 10 MIN. AS MINIMUM TIME OF CONCENTRATION

DRAINAGE AREA #2 DISCHARGES TO INDIAN SCHOOL ROAD

AVE SLOPE = $S_{AVE} = H/L$
ELEV DIFF = 5279.1 - 5269.9 = 9.2'
LENGTH = 268'
S_{AVE} = 9.2'/268' = 0.0343 1/1
V = 1.9 FT/SEC

$$t_c = \frac{268\ \text{FT}}{60\ \text{SEC/MIN}\ (1.9\ \text{FT/SEC})} = 2.4\ \text{MIN}$$

USE 10 MIN. AS MINIMUM TIME OF CONCENTRATION

FOR CARVER OFFICE BLDG DESCRIPTION DRAINAGE REPORT COMPUTATIONS
DESIGNED SEE DATE 11-22-80 CHECKED DJL DATE 11-24-80 FILE NO. 607/6002 SHEET 4 OF 28

DRAINAGE AREA #3 DISCHARGES TO INDIANA ST.

AVE SLOPE = $S_{AVE} = H/L$

ELEV DIFF = 5278.9 - 5269.7 = 9.2'

LENGTH = 470'

$S_{AVE} = 9.2'/470' = 0.0196$ ft/ft

V = 1.4 FT/SEC

$t_c = \frac{470 \text{ FT}}{60 \text{ SEC/MIN} \times (1.4 \text{ FT/SEC})} = 5.6 \text{ MIN.}$

USE 10 MIN AS MINIMUM TIME OF CONCENTRATION

DRAINAGE AREA #4 DISCHARGES TO UPTOWN BLVD

AVE SLOPE = $S_{AVE} = H/L$

ELEV DIFF = 5276.6 - 5273.0 = 3.6'

LENGTH = 175'

$S_{AVE} = 3.6'/175' = 0.0206$ ft/ft

V = 1.45 FT/SEC

$t_c = \frac{175 \text{ FT}}{60 \text{ SEC/MIN} \times (1.45 \text{ FT/SEC})} = 2.0 \text{ MIN.}$

USE 10 MIN. AS MINIMUM TIME OF CONCENTRATION

PRE-DEVELOPMENT RUNOFF COEFFICIENT

C = 0.35 THE SITE IS VEGETATED WITH NATIVE GRASSES, POOR COVER

i_5 FOR t_c = 10 MIN IS 3.06 IN/HR

$Q_5 = C i_5 A$ RATIONAL FORMULA

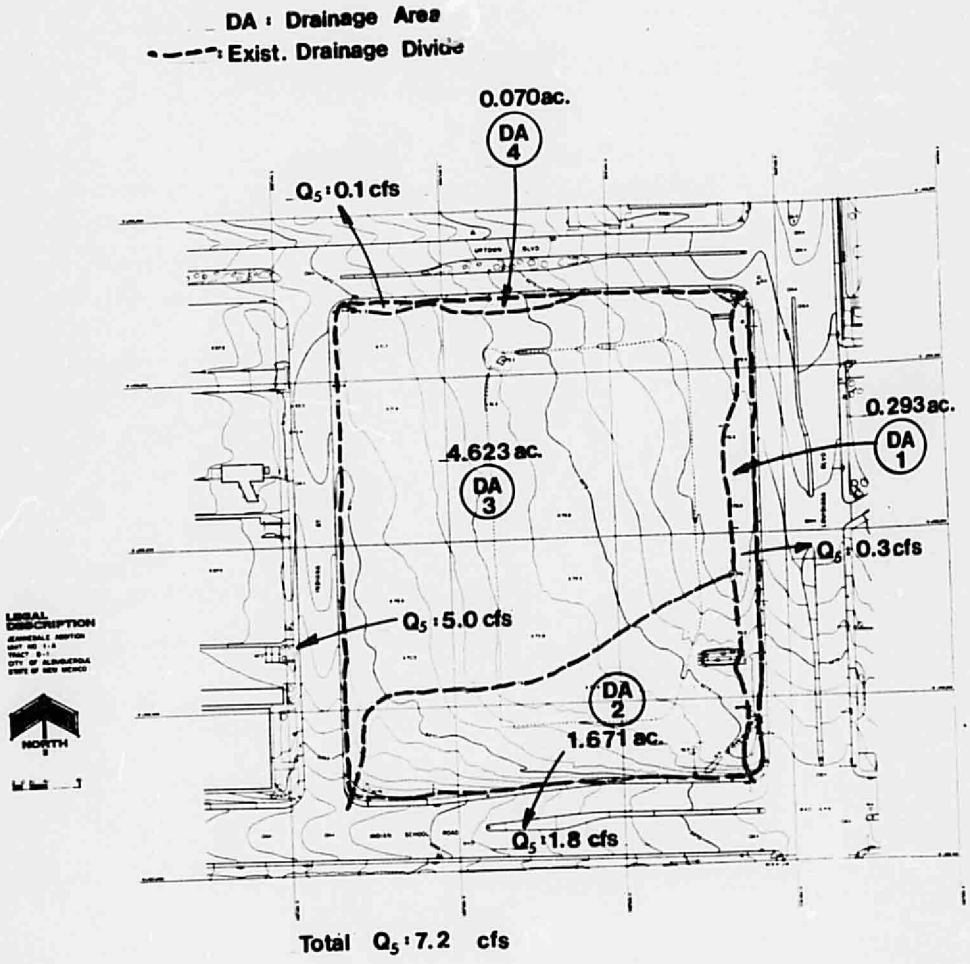
DRAINAGE AREA NO.	AREA (ACRES)	RUNOFF COEF.	t_c (MIN)	i_5 (IN/HR)	Q_5 (CFS)
1	0.293	0.35	10	3.06	0.3
2	1.671	0.35	10	3.06	1.8
3	4.623	0.35	10	3.06	5.0
4	0.070	0.35	10	3.06	0.1
TOTAL	6.657				7.2

$Q_5 = 7.2$ CFS UNDEVELOPED

FOR CARVER OFFICE BLDG DESCRIPTION DRAINAGE REPORT COMPUTATIONS

DESIGNED SEF DATE 11-22-80 CHECKED [illegible] DATE 11-24-80 FILE NO. 60076002 SHEET 5 OF 28

BOVAY ENGINEERS, INC.



TOPOGRAPHIC MAP

DRAWING 2

DRAINAGE AREAS

No.	Description	ONSITE Area Acres	ONSITE C	ONSITE AC	OFFSITE Area Acres	OFFSITE C	OFFSITE AC	EAC	REMARKS
A	PAVEMENT	0.031	.95	.030					
B									DELETED
C	SOD	0.165	.35	.058					
D	PAVEMENT	0.121	.95	.115					
E	SOD	0.222	.35	.078					
F									DELETED
G	PAVEMENT	0.209	.95	.199					
	LANDSCAPED	0.017	.25	.004					
	ΣA	0.226						.203	$\bar{C} = \frac{.203}{.226} = .90$
H	SOD	0.165	.35	.058					
I	PAVEMENT	0.009	.95	.009					
J	SOD	0.127	.35	.045					
K	PAVEMENT	2.464	.95	2.341					
	SOD	0.217	.35	.076					
	LANDSCAPED	0.153	.25	.038					
	ΣA	2.834						2.455	$\bar{C} = \frac{2.455}{2.834} = .87$
L	PAVEMENT	1.079	.95	1.025					
	SOD	0.091	.35	.032					
	LANDSCAPED	0.064	.25	.016					
	ΣA	1.234						1.073	$\bar{C} = \frac{1.073}{1.234} = .87$

FOR DEVELOPED DRAINAGE AREAS SEE DRAWING DA-1 IN MAP POCKET

BY SFF DATE 1-11-82
CK MG DATE 3/4/82

DRAINAGE AREAS

No.	Description	ONSITE Area Acres	ONSITE C	ONSITE AC	OFFSITE Area Acres	OFFSITE C	OFFSITE AC	EAC	REMARKS
M	PAVEMENT	0.993	.95	.943					
	SOD	0.098	.35	.034					
	LANDSCAPED	0.078	.25	.020					
	EA	1.169						.997	"C" $\frac{.997}{1.169}$ = .95
N	ROOF	0.354	.95	.336					
	TOTAL	4.657		5.457					"C" $\frac{5.457}{4.657}$ = .92
M+N		1.523						1.333	"C" = $\frac{1.333}{1.523}$ = .88
M+M+N		2.757						2.406	"C" $\frac{2406}{2.757}$ = .87

BY SFF DATE 1-11-82
CK MG DATE 3/2/82

DETERMINE DISCHARGE THAT FLOWS FROM THE DEVELOPED SITE WITHOUT BEING DETAINED. THESE AREAS INCLUDE PORTIONS OF THE FOUR DRIVEWAY ENTRANCES AND PORTIONS OF THE PERIPHERY SODDED AREAS.

TIME OF CONCENTRATION - ALL LESS THAN 10 MIN, THEREFORE USE MIN t_c = 10 MIN

RUNOFF COEFFICENT

C = 0.95 PAVED/ROOF AREAS
C = 0.35 SODDED AREAS
C = 0.25 LANDSCAPED AREAS - PINE BARK MULCH DEPRESSED AN AVE. OF 2" SOME RETENTION

i_{100} FOR t_c = 10 MIN IS 5.46 IN/HR

$Q_{100} = C\, i_{100}\, A$

DRAINAGE AREA NO.	AREA (ACRES)	RUNOFF COEF	i_{100} (IN/HR)	Q_{100} (CFS)
A	0.031	0.95	5.46	0.2
C	0.165	0.35	5.46	0.3
D	0.121	0.95	5.46	0.6
E	0.222	0.35	5.46	0.4
G	0.226	0.90	5.46	1.1
H	0.165	0.35	5.46	0.3
I	0.009	0.95	5.46	0.1
J	0.127	0.35	5.46	0.2
TOTAL	1.0666			3.2

Q_{100} = 3.2 CFS DEVELOPED/NO DETENTION

TO DETERMINE ALLOWABLE DISCHARGE FROM DETENTION BASINS REDUCE Q_S UNDEVELOPED DISCHARGE BY Q_{100} DEVELOPED/NO DETENTION-DIRECT OFFSITE DISCHARGE

$Q_{\text{DETENTION BASINS}} = Q_{S\,\text{UNDEVELOPED}} - Q_{100\,\text{DEVELOPED OFFSITE DISCHARGE}}$

$= 7.2\ \text{CFS} - 3.2\ \text{CFS}$

$= 4.0\ \text{CFS}$

REVISED

FOR OFFICE BLDG DESCRIPTION DRAINAGE REPORT COMPUTATIONS

DESI 1-11-82 CHECKED MG DATE 3/4/82 FILE NO. 4076-003 SHEET 8 OF 28

BOVAY ENGINEERS, INC.

PARKING LOT SUMP - SW SIDE

ELEVATION (FT)	ELEV. DIFF. (FT)	SURFACE AREA (SF)	AVE. AREA (SF)	VOLUME (CF)	CUM. VOL. (CF)
5267.15		0			0
	0.05		64	3	
5267.20		128			3
	0.10		292	29	
5267.30		456			32
	0.10		672	67	
5267.40		888			99
	0.10		1156	116	
5267.50		1424			215
	0.10		1684	168	
5267.60		1944			383
	0.10		2240	224	
5267.70		2536			607
	0.10		2860	286	
5267.80		3184			893
	0.10		3548	355	
5267.90		3912			1248

PARKING LOT SUMP - NW SIDE

ELEVATION (FT)	ELEV DIFF (FT)	SURFACE AREA (SF)	AVE AREA (SF)	VOLUME (CF)	CUM. VOL. (CF)
5271.35		0			0
	0.05		160	8	
5271.40		320			8
	0.10		576	58	
5271.50		832			66
	0.10		1184	118	
5271.60		1536			184
	0.10		1984	198	
5271.70		2432			382
	0.10		2996	300	
5271.80		3560			682
	0.10		4188	419	
5271.90		4816			1101
	0.10		5552	555	
5272.00		6288			1656
	0.10		7128	713	
5272.10		7968			2369

TOTAL VOLUME THAT CAN BE PONDED IS

VOL_{100} DEVEL. = 1248 CF + 2369 CF = 3617 CF < 3765 CF O.K.

FOR CARVER OFFICE BLDG DESCRIPTION DRAINAGE REPORT COMPUTATIONS

DESIGNED SFF DATE 11-23-80 CHECKED EGL DATE 11-24-80 FILE NO. 607602 SHEET 10 OF 28

REVISED SFF 1-23-81 EGL 1-23-81

REVISED SFF 1-11-82

BOVAY ENGINEERS, INC.

VOLUME TO BE PONDED = DEVELOPED 100 YR VOLUME - UNDEVELOPED 100 YR VOLUME

$$\text{Vol}_{100\ \text{UNDEV}}^{6\text{-HR}} = \frac{2.41\text{IN}}{12\text{IN/FT}}(0.35)(6.657\ \text{ACRES})\left(43{,}560\ \frac{\text{SF}}{\text{ACRE}}\right)$$

$$= 20{,}383\ \text{CF}.$$

$$\text{Vol}_{100\ \text{DEVEL}}^{6\text{-HR}} = \frac{2.41\text{IN}}{12\text{IN/FT}}(0.82)(6.657\ \text{ACRES})\left(43{,}560\ \frac{\text{SF}}{\text{ACRE}}\right)$$

$$= 47{,}755\ \text{CF}.$$

DIFFERENCE = 47,755 - 20,383 = 27,372 CF TO BE PONDED.

RUNOFF WILL BE PONDED IN PARKING LOT AND DETENTION BASINS

THE VOLUME WHICH CAN BE PONDED IN THE PARKING LOT WILL BE LIMITED TO APPROXIMATELY THE VOLUME DIFFERENCE BETWEEN THE 100 YEAR AND 50 YEAR STORM EVENTS. THE MAXIMUM PONDED DEPTH WILL BE LIMITED TO 9"

$$\text{Vol}_{50\ \text{DEVEL}}^{6\text{-HR}} = \frac{2.22\text{IN}}{12\text{IN/FT}}(0.82)(6.657\ \text{ACRES})\left(43{,}560\ \frac{\text{SF}}{\text{ACRE}}\right)$$

$$= 43{,}990\ \text{CF}.$$

$$\text{VOL TO BE PONDED IN PARKING LOT APPROX} = V_{100\ \text{DEVEL}}^{6\text{HR}} - V_{50\ \text{DEVEL}}^{6\text{HR}}$$

$$= 47{,}755 - 43{,}990$$

$$= 3765\ \text{CF}.$$

0.1' CONTOURS WERE DRAWN OF THE PARKING LOT SUMPS AND PLANIMETERED

REVISED

FOR CARVER OFFICE BLDG DESCRIPTION DRAINAGE REPORT COMPUTATIONS

DESIGNED SFF DATE 1-11-82 CHECKED MG DATE 5/6/82 FILE NO. 6076.003 SHEET 9 OF 28

BOVAY ENGINEERS, INC.

DETERMINE APPROXIMATE STORAGE VOLUME TO BE APPORTIONED TO EACH DETENTION BASIN

TOTAL VOLUME TO BE PONDED = 27,372 CF

APPORTION STORAGE VOLUME BASED ON PERCENT OF OVERALL DRAINAGE AREA

D.A. K	=	2.834 ACRES	50.7%
D.A. L, M & N	=	2.757 ACRES	49.3%
		5.591 ACRES	100.0%

DETENTION BASIN #1 DA-"K"

27,372 CF x 50.7% = 13,878 CF
MINUS SW PARK LOT SUMP - 1,248 CF
MINIMUM STORAGE VOL. = 12,630 CF.

DETENTION BASIN #2 DA L, M & N

27,372 CF x 49.3% = 13,494 CF
MINUS NW PARK LOT SUMP - 2,369 CF
MINIMUM STORAGE VOL = 11,125 CF.

BASED ON THE ABOVE MINIMUM STORAGE VOLUME REQUIRED, DETERMINE VOLUME AVAILABLE IN THE DETENTION SYSTEM.

DETENTION BASIN #1 DA-K (SEE SHT 14 & 15)

80 LF - 40" Ø CSP
WATERWAY AREA = 19.635 SF
19.635 x 80 = 1571 CF.

190 LF - 96" Ø CSP
WATERWAY AREA = 50.266 SF
50.266 x 190 = 9551 CF.

INLET STRUCTURE VOLUME
5266.75
5260.15
6.60
6.60 x 6.5 x 2.125 = 91 CF

11,213 CF < 12,630 CF

FOR CARVER OFFICE BLDG DESCRIPTION REVISED DRAINAGE REPORT COMPUTATIONS
DESIGNED SFF DATE 1-11-82 CHECKED MG DATE 3/2/82 FILE NO. 60076-003 SHEET 11 OF 28

BOVAY ENGINEERS, INC.

DETENTION BASIN #2 + 24"Ø RCP
DA - L, M & N (SEE SHT 14 & 16)

184 LF - 96"Ø CSP
50.266 × 184 = 9,249 CF.

254 LF - 24"Ø RCP
WATERWAY AREA = 3.142 SF
3.142 × 254 = 798 CF.

INLET STRUCTURE VOLUME
5270.95
5261.73
9.22
9.22 × 9.75 × 2.125 = 191 CF

10,238 CF < 11,125 CF

SINCE REQUIRED STORAGE VOLUME IS NOT AVAILABLE THE 100YR-6HR STORM WILL BE ROUTED THROUGH THE DETENTION SYSTEM

THE CALCULATIONS FOR ROUTING THE STORM ARE SHOWN ON THREE SHEETS, 1, 2 & 3 LOCATED IN THE MAP POCKETS

ON SHEET 1

a. DEPTH-AREA CURVES FOR THE 24", 60" & 96" Ø PIPES
b. MASS-RAINFALL CURVE
c. X-SECTION THROUGH THE DETENTION SYSTEM

ON SHEET 2

a. TABULATION OF ELEVATION VS STORAGE FOR EACH DETENTION BASIN-SYSTEM
b. ELEVATION-STORAGE CURVES FOR EACH DETENTION BASIN-SYSTEM

ON SHEET 3

a. HEAD-DISCHARGE CURVES FOR THE 8" AND 10" Ø PIPES
b. TABULATION OF INFLOW TO THE DETENTION BASINS AT TIME t
c. STORM ROUTING COMPUTATIONS

FOR CARVER OFFICE BLDG DESCRIPTION REVISED DRAINAGE REPORT COMPUTATIONS
DESIGNED SFF DATE 3-2-82 CHECKED MG DATE 5/4/82 FILE NO. 6076008 SHEET 12 OF 28
BOVAY ENGINEERS, INC.

THE RESULTS OF THE STORM ROUTING COMPUTATIONS WERE AS FOLLOWS:

MAXIMUM STORAGE REQUIRED

DETENTION BASIN #1 - SYSTEM
10,729 CF OK

DETENTION BASIN #2 - SYSTEM
10,676 CF OK

PEAK DISCHARGE TO CITY STORM SEWER SYSTEM IN INDIAN SCHOOL ROAD
4.7 CFS

TOTAL OFFSITE DISCHARGE RATE EQUALS
4.7 + 3.2 (DIRECT OFFSITE DISCHARGE) = 7.9 CFS

ALLOWABLE DISCHARGE RATE = 7.2 CFS

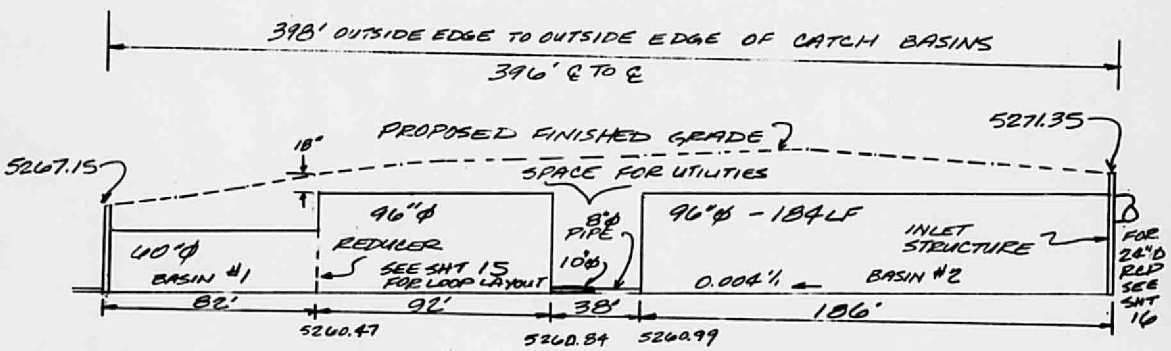
EXCESS DISCHARGE = 0.7 CFS

EVEN WITH THE EXCESS DISCHARGE THE SYSTEM IS IN SUBSTANTIAL COMPLIANCE WITH THE CITY ENGINEERS INTERIM GUIDELINES

FOR CARVER OFFICE BLDG DESCRIPTION DRAINAGE REPORT COMPUTATIONS

DESIGNED SEE DATE 1-23-81 CHECKED SPL DATE 1-27-81 FILE NO. 1976-002 SHEET 14 OF 28

BOVAY ENGINEERS, INC.



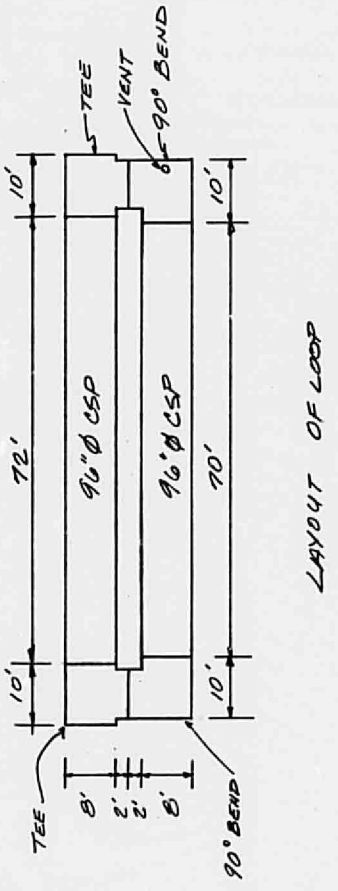
5267.15 TOP OF GRATE
−1.5 COVER (TABLE 6-8)
5265.65 TOP OF PIPE
−5.50 60"ϕ PIPE + 0.5'
5260.15 INV

396 @ .004'/' 5260.15 + 1.58 = 5261.73 INV

5271.35 TOP OF GRATE
−1.5 COVER (TABLE 6-8)
5269.85 TOP OF PIPE (MAX)
−5261.73 INV
8.12 AVAILABLE FOR PIPE

USE 96"ϕ RCP

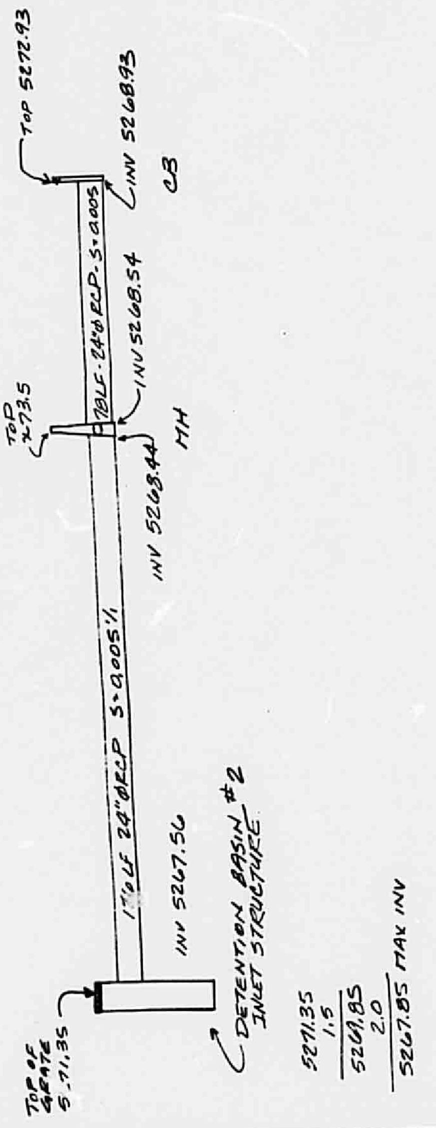
REVISED NEW SHEET 7



LAYOUT OF LOOP

FOR CARVER OFFICE BLDG DESCRIPTION DRAINAGE REPORT COMPUTATIONS

DESIGNED SFF DATE 1-24-81 CHECKED BGF DATE 1-27-81 FILE NO. 6076-002 SHEET 15 OF 28



FOR CARVER OFFICE BLL DESCRIPTION DRAINAGE REPORT COMPUTATIONS

DESIGNED SEE DATE 1/12/81 CHECKED DJF DATE 1-27-81 FILE NO. 6076-007 SHEET 16 OF 29

BOVAY ENGINEERS, INC.

HEAD-DISCHARGE RELATIONSHIP FOR OUTLET PIPE FROM DETENTION BASIN NO 1

OUTLET PIPE SIZE = 10" ϕ

THE DISCHARGE THROUGH AN ORIFICE IS EXPRESSED BY THE EQUATION

$$Q = Ca\sqrt{2gh}$$

WHERE $C = \left(1 + 0.16d^{0.6} + \frac{0.106L}{d^{1.2}}\right)^{-\frac{1}{2}}$ EQ 4-35 HANDBOOK OF HYDRAULICS KING & BRATER

FOR CSP FULL PIPE FLOW.

$L = 36'$

$$C = \left(1 + 0.16(0.83)^{0.6} + \frac{0.106(36)}{(0.83)^{1.2}}\right)^{-\frac{1}{2}} = 0.41$$

$$a = \pi r^2 = \pi\left(\frac{0.83}{2}\right)^2 = 0.545$$

FOR CARVER OFFICE BLDG DESCRIPTION REVISED DRAINAGE REPORT COMPUTATIONS

DESIGNED SFF DATE 3-2-82 CHECKED MG DATE 3/4/82 FILE NO 6076-003 SHEET 17 OF 28

BOVAY ENGINEERS, INC.

HEAD-DISCHARGE RELATIONSHIP FOR OUTLET PIPE FROM DETENTION BASIN NO. 2

19' 10" CSP	+	19' 8" CSP

1. Convert 10" pipe to equivalent length of 8" pipe

   For pipes w/same "C" $L_2 = L_1 \left(\frac{D_2}{D_1}\right)^{4.871}$

   $L_e = 19\left(\frac{8}{10}\right)^{4.871} = 6.41'$

   $L_T = 25.41'$ of 8"

2. THE DISCHARGE THROUGH AN ORIFICE IS EXPRESSED BY THE EQUATION
   $Q = Ca\sqrt{2gh}$

   WHERE

   $$C = \left(1 + 0.16D^{0.6} + \frac{0.106L}{D^{1.2}}\right)^{-1/2}$$

   $$C = \left(1 + 0.16(.67)^{0.6} + \frac{0.106(25.41)}{.67^{1.2}}\right)^{-1/2} = 0.43$$

   a = cross sectional Area of pipe in feet

   $a = \pi r^2 = \pi\left(\frac{.67}{2}\right)^2 = 0.353$

REVISED

FOR CARVER OFFICE BLDG DESCRIPTION DRAINAGE REPORT COMPUTATIONS

DESIGNED MG DATE 1-11-82 CHECKED SFF DATE 1-11-82 FILE NO. 6076003 SHEET 18 OF 28

OVERFLOW SPILLWAY = Q_{100} DEVELOPED

DETERMINE TIME OF CONCENTRATION

DRAINAGE AREA "K"

SHEET FLOW — PAVED AREA

ELEV. DIFF = 5277.6 - 5271.7 = 5.9'

LENGTH = 165'

S_{AVE} = 5.9'/165' = 0.036'/'

V = 3.8 FT/SEC

$t_{c_1} = \frac{165'}{60 SEC/MIN (3.8 FT/SEC)} = 0.7$ MIN

FLOW IN CONCRETE/ASPHALT SWALES

ELEV. DIFF. 5271.7 - 5267.15 = 4.55

LENGTH = 320'

T_c = 3.3 MIN

CORRECTION FACTOR = 0.2

$t_{c_2} = 0.2 T_c = 0.2 (3.3) = 0.7$ MIN

$t_c = t_{c_1} + t_{c_2} = 0.7 + 0.7 = 1.4$ MIN

T_c FROM FIG. 5 HDS NO. 4, DESIGN OF ROADSIDE DRAINAGE CHANNELS USDOT - FHWA

USE 10 MIN. AS MINIMUM TIME OF CONCENTRATION

DRAINAGE AREA "L"

SHEET FLOW - PAVED AREA

ELEV. DIFF. = 5275.6 - 5271.6 = 4.0'

LENGTH = 155'

$S_{AVE} = H/L$ = 4.0'/155' = 0.026'/'

V = 3.3 FT/SEC

$t_{c_1} = \frac{155'}{60 SEC/MIN (3.3 FT/SEC)} = 0.8$ MIN

FLOW IN CONCRETE/ASPHALT SWALES

ELEV. DIFF. 5271.6 - 5271.35 = 0.25

LENGTH = 35'

T_c = 0.8 MIN

CORRECTION FACTOR = 0.2

$t_{c_2} = 0.2 T_c = 0.2 (0.8) = 0.2$ MIN

$t_c = t_{c_1} + t_{c_2} = 0.8 + 0.2 = 1.0$ MIN USE 10 MIN.

FOR CARVER OFFICE BLDG DESCRIPTION DRAINAGE REPORT COMPUTATIONS

DESIGNED SFF DATE 11-24-80 CHECKED [signature] DATE 11-25-80 FILE NO. 6076.032 SHEET 19 OF 23

REVISED SFF 1-23-81 [signature] 1-27-81

BOVAY ENGINEERS, INC.

DETERMINE PEAK DISCHARGE

i_{100} FOR t_c = 10 MIN IS 5.46 IN/HR

DA K

$Q_{100} = Ci_{100}A = 0.87\,(5.46)\,2.834 = 13.5$ CFS.

DA L, M, N

$Q_{100} = Ci_{100}A = 0.87\,(5.46)\,2.757 = 13.1$ CFS.

FOR CARVER OFFICE BLDG DESCRIPTION REVISED DRAINAGE REPORT COMPUTATIONS

DESIGNED SFF DATE 1-11-82 CHECKED MG DATE 3/4/82 FILE NO. 6076.003 SHEET 20 OF 28

BOVAY ENGINEERS, INC.

FOR OVERFLOW SPILLWAY USE CITY OF ALBUQUERQUE CATCH BASIN, STD DWG K-6

DETERMINE CAPACITY OF GRATE INLET IN SUMP WATER PONDED ON GRATE USING BUREAU OF PUBLIC ROADS PROCEDURES (FHWA).

GRATE – CITY OF ALBUQUERQUE, STD DWG K-8

DETERMINE CAPACITY OF GRATE ACTING AS A WEIR

FIND PERIMETER OF THE GRATE OPENING IGNORING THE BARS AND ANY SIDE OVER WHICH THE WATER DOES NOT ENTER

$a = 40\frac{1}{2}" = 3.375'$ LENGTH

$b = 25\frac{1}{2}" = 2.125'$ WIDTH

$P = 2(a+b) = 2(3.375+2.125) = 11.000$ FT SINGLE

$P = 4(a)+2(b) = 4(3.375)+2(2.125) = 17.750$ FT DOUBLE

FIND DISCHARGE THROUGH GRATE

$Q_w = 3.0\,P(H)^{3/2}$ FOR $H = 8" = 0.67'$

$Q_w = 3.0(11.000)(0.67)^{3/2} = 18.1$ CFS SINGLE

$Q_w = 3.0(17.750)(0.67)^{3/2} = 29.2$ CFS DOUBLE

DETERMINE CAPACITY OF GRATE ACTING AS AN ORIFICE

FIND THE TOTAL AREA OF CLEAR OPENING

CENTER SECTION

$a = 12\frac{1}{2}" - 2(\frac{1}{4}") = 12" = 1'$ LENGTH

$W = 3/4" = 0.0625'$ & $5/8" = 0.0521'$ WIDTH OF OPENING

$N = 19$ @ $3/4"$ & 2 @ $5/8"$ No. OF OPENINGS

$A = Naw = 19(1)(0.0625) + 2(1)(0.0521) = 1.292$ SF

2 ENDS

$a = 42" - 2(3") - 2(\frac{1}{4}") - 12\frac{1}{2}" = 23" = 1.917'$

$w = 3/4" = 0.0625$ & $5/8" = 0.0521'$

$N = 19$ @ $3/4"$ & 2 @ $5/8"$

$A = Naw = 19(1.917)(0.0625) + 2(1.917)(0.0521)$
$= 2.476$ SF

FOR CARVER OFFICE BLDG DESCRIPTION DRAINAGE REPORT COMPUTATIONS

DESIGNED SFF DATE 11-24-80 CHECKED DGL DATE 11-25-80 FILE NO 6076-002 SHEET 21 OF 28

BOVAY ENGINEERS, INC.

FIND DISCHARGE THROUGH GRATE

$Q_o = 5.37\,A(H)^{1/2}$ FOR $H = 8" = 0.67'$

$Q_o = 5.37(3.768)(0.67)^{1/2} = 16.6$ CFS SINGLE

$Q_o = 5.37(7.536)(0.67)^{1/2} = 33.1$ CFS DOUBLE

FOR H BETWEEN 0.4' AND 1.4' USE MOST CONSERVATIVE VALUE

$Q_o = 16.6$ CFS SINGLE
$Q_o = 33.1$ CFS DOUBLE

SINCE PEAK DISCHARGE FROM DA "K" = 13.5 CFS AND D.A. "L"M" & "N" = 13.1 CFS BOTH LESS THAN 16.6 CFS, A SINGLE GRATE IS ALL THAT IS REQUIRED.

FIND PERIMETER VALUE FOR TRIPLE GRATE

$P = 6(a) + 2(b)$

$= 6(3.375) + 2(2.125) = 24.500$

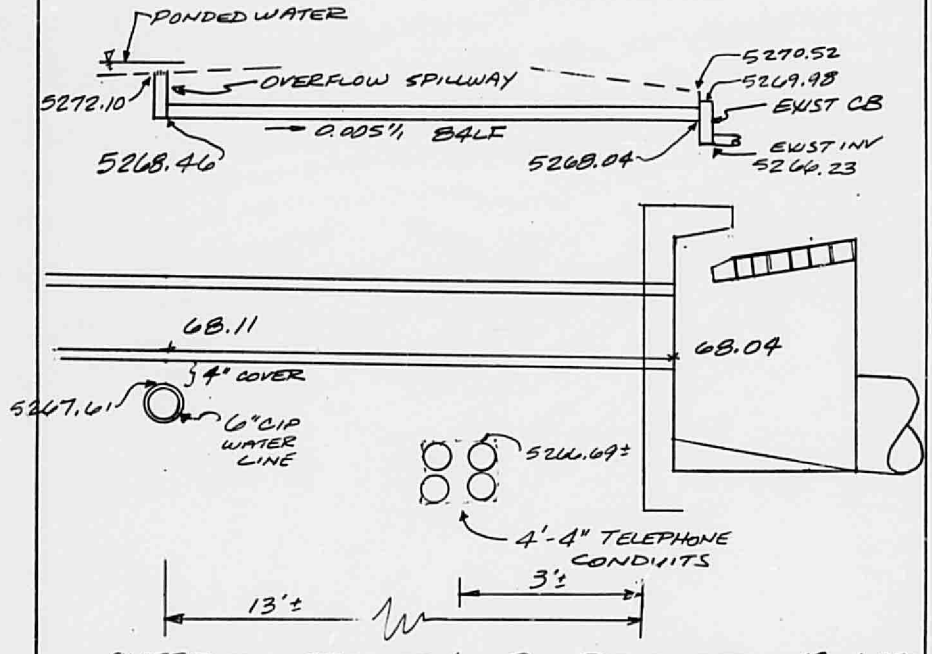
FIND AREA VALUE FOR TRIPLE GRATE

$A = 3(3.768) = 11.304$

FOR CARVER OFFICE BLDG DESCRIPTION DRAINAGE REPORT COMPUTATIONS
DESIGNED SFF DATE 11-24-80 CHECKED [illegible] DATE 11-25-80 FILE NO 6076.002 SHEET 22 OF 28
REVISED SFF 1-23-81 [illegible] 1-23-81
REVISED SFF 1-11-82
BOVAY ENGINEERS, INC.

DETERMINE SIZE OF DISCHARGE PIPE FOR EACH OVERFLOW SPILLWAY CATCH BASIN

THE OVERFLOW SPILLWAY CATCH BASIN IN THE NORTHWEST PARKING LOT WILL DISCHARGE TO AN EXISTING CATCH BASIN IN UPTOWN BLVD.



OVERFLOW SPILLWAY = Q_{100} DEVELOPED = 13.1 CFS

FIND HEAD REQUIRED TO PASS Q_{100}

$Q_o = 5.37 A H^{1/2}$ OR $A = 3.768$

$Q_w = 3.0 P(H)^{3/2}$ $P = 11.000$

$$H = \left(\frac{Q_o}{5.37A}\right)^2 = \left(\frac{13.1}{5.37 \times 3.768}\right)^2 = 0.42'$$

$$H = \left(\frac{Q_w}{3.0P}\right)^{2/3} = \left(\frac{13.1}{3.0 \times 11.000}\right)^{2/3} = 0.54'$$ ← MOST CONSERV. VALUE

FOR CARVER OFFICE BLDG DESCRIPTION DRAINAGE REPORT COMPUTATIONS

DESIGNED SFF DATE 6-18-81 CHECKED DJF DATE 6-23-81 FILE NO. 6076-002 SHEET 23 OF 28

REVISED SFF 3-1-82 REVISED NEW SHEET

BOVAY ENGINEERS, INC.

TRY 15" ØRC PIPE

9" = 0.75
− 0.54
.21

TOP OF GRATE = 5272.10
℄ 15" RCP @ OUTFALL − 5268.67
3.43
+.21
3.64

$C = \left(1 + 0.31 d^{.5} + \frac{0.026L}{d^{1.2}}\right)^{-1/2}$ FOR RCP, SQ HEADWALL

C = 0.58 FOR L = 84'

$Q = Ca\sqrt{2gh}$

$= 0.58(1.227)\sqrt{64.4 \times 3.64} =$ 10.9 CFS < 13.1 CFS

TRY 2 - 12" RC PIPES

TOP OF GRATE = 5272.10
℄ 12" RCP @ OUTFALL − 5268.54
3.56
+.21
3.77

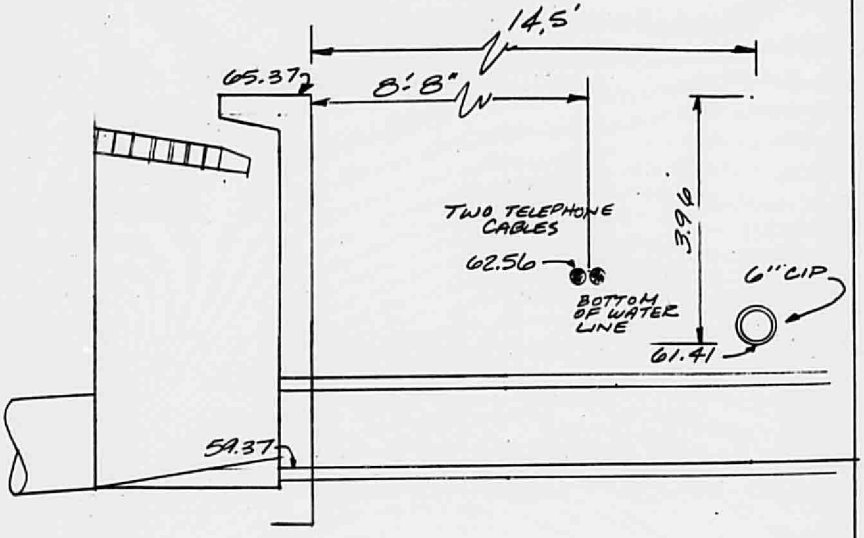
C = 0.54

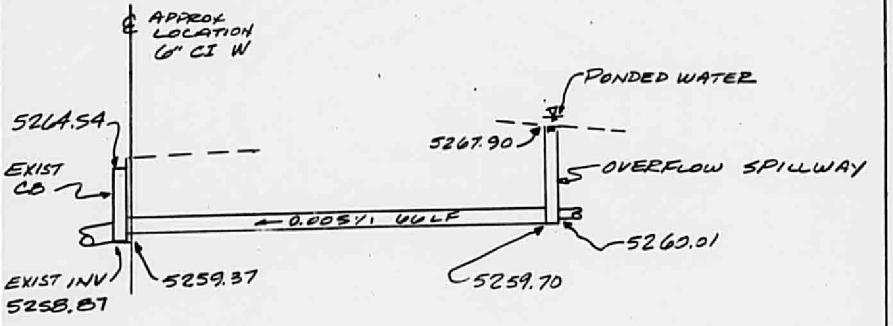
$Q = 0.54(0.785)(\sqrt{64.4 \times 3.77}) =$ 6.6 CFS.

2 × 6.6 = 13.2 CFS > 13.1 CFS OK

USE 2 - 12" RC PIPES.

THE OVERFLOW SPILLWAY CATCH BASIN IN THE SOUTHWEST PARKING LOT WILL DISCHARGE TO AN EXISTING CATCH BASIN IN INDIAN SCHOOL ROAD. (BM 64.12)





OVERFLOW SPILLWAY = Q100 DEVELOPED = 13.1 CFS

FOR CARVER OFFICE BLDG DESCRIPTION DRAINAGE REPORT COMPUTATIONS
DESIGNED SFF DATE 1-22-81 CHECKED JDR DATE 1-27-81 FILE NO. 6076-002 SHEET 25 OF 28
REVISED SFF 6-18-81 CKD [illegible] 6-22-81

BOVAY ENGINEERS, INC.

FIND HEAD REQUIRED TO PASS Q100

$H_o = \left(\frac{13.5}{5.37 \times 3.768}\right)^2 = 0.45'$

$H_w = \left(\frac{13.5}{3.0 \times 11.000}\right)^{2/3} = 0.55'$ ← MOST CONSERVATIVE VALUE

TRY 15"Ø RCP PIPE

TOP OF GRATE 5267.90
@ 15" RCP @ OUTFALL 5260.00
7.90
+0.20
8.10

9" = 0.75
0.55
0.20

C = 0.61 FOR L = 66'

$Q = 0.61\,(1.227)\sqrt{64.4 \times 8.10} = 17.1$ CFS.

USE 1 - 15"Ø RCP

CHECK THAT THE 15"Ø RCP WILL DISCHARGE Q = 4.7 CFS AS OPEN CHANNEL FLOW

FOR n = 0.012 & S = 0.005',

$d_n = 0.98'$ $V_n = 4.6$ fps

REVISED

FOR CARVER OFFICE BLDG DESCRIPTION DRAINAGE REPORT COMPUTATIONS
DESIGNED SEE DATE 3-2-82 CHECKED MG DATE 3/4/82 FILE NO 0076-003 SHEET 26 OF 28

BOVAY ENGINEERS, INC.

DETERMINE PEAK DISCHARGE FROM DA "M"

DA "M"

TIME OF CONCENTRATION
SHEET FLOW - PAVED AREA
ELEV DIFF 5279.3 - 5273.1 = 6.2
LENGTH 140'
S_{AVE} = 6.2/140' = 0.044'/'
V = 4.3 FT/SEC

$$t_{c_1} = \frac{140}{60 \frac{SEC}{MIN}\left(4.3 \frac{FT}{SEC}\right)} = 0.5 \text{ MIN}$$

FLOW IN ASPHALT SWALE
ELEV DIFF 5273.1 - 5272.9 = 0.2'
LENGTH 20'
T_c = 0.5 MIN
CORRECTION FACTOR = 0.2
t_c = 0.2 T_c = 0.2 (0.5) = 0.1 MIN
$t_c = t_c + t_{c_2}$ = 0.5 + 0.1 = 0.6 MIN
USE 10 MIN AS MINIMUM TIME OF CONCENTRATION

RAINFALL INTENSITY
i_{100} FOR t_c = 10 MIN IS 5.46 IN/HR

AREA = 1.169
C = 0.85
PEAK DISCHARGE
$Q_{100} = C i_{100} A$ = 0.85 (5.46)(1.169) = 5.4 CFS

FIND HEAD REQUIRED TO PASS Q100 - 1 GRATE

$$H_o = \left(\frac{5.4}{5.37 \times 3.768}\right)^{2} = 0.07'$$

$$H_w = \left(\frac{5.4}{3.0 \times 11.000}\right)^{2/3} = 0.30'$$ ← MOST CONSERVATIVE VALUE ACCEPTABLE

REVISED

FOR CARVER OFFICE BLDG DESCRIPTION DRAINAGE REPORT COMPUTATIONS
DESIGNED SFF DATE 3-2-82 CHECKED MG DATE 3/4/82 FILE NO. 607.0003 SHEET 27 OF 28

BOVAY ENGINEERS, INC.

DETERMINE PEAK DISCHARGE FROM DA "M" & "N" @ MANHOLE

TIME OF CONCENTRATION — 10 MIN
RAINFALL INTENSITY - 5.46 IN/HR
AREA = 1.523 Ac.
C = 0.88

PEAK DISCHARGE
$Q_{100} = C_{i_{100}} A = 0.88 (5.46)(1.523) = 7.3$ CFS

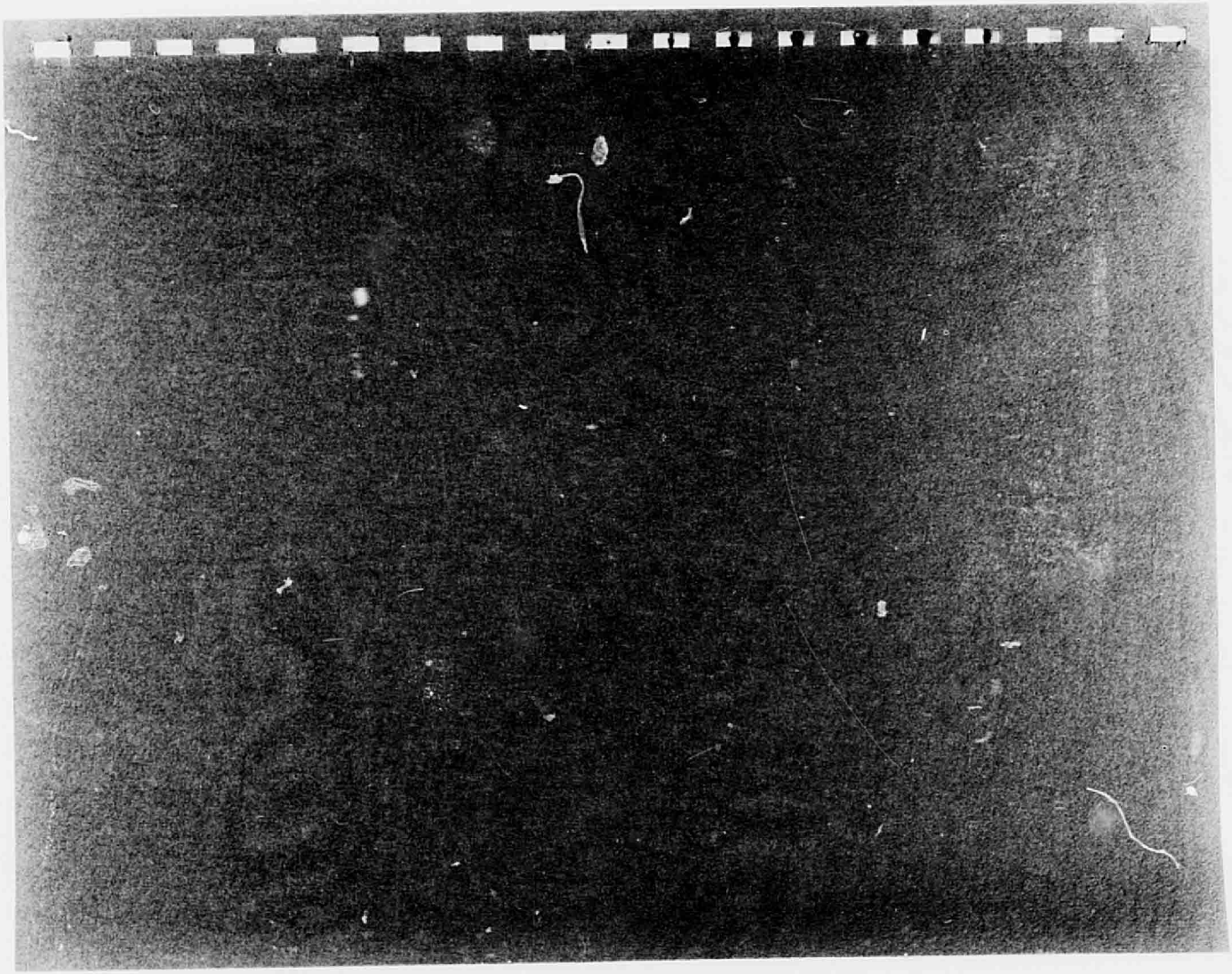
DETERMINE PEAK DISCHARGE FROM DA "N"

TIME OF CONCENTRATION — 10 MIN
RAINFALL INTENSITY — 5.46 IN/HR
AREA = 0.354 Ac.
C = 0.95

PEAK DISCHARGE
$Q_{100} = C i_{100} A = 0.95 (5.46)(0.354) = 1.8$ CFS

FOR CARVER OFFICE BLDG DESCRIPTION REVISED DRAINAGE REPORT COMPUTATIONS
DESIGNED SEE DATE 2-2-82 CHECKED MG DATE 3/4/82 FILE NO. 6076003 SHEET 28 OF 28

BOVAY ENGINEERS, INC.



BOVAY ENGINEERS, INC.
HOUSTON • SPOKANE • BATON ROUGE
AUSTIN • ALBUQUERQUE • WASHINGTON, D. C.

H18.01

April 3, 1980

Mr. Fred Aguirre, Civil Engineer
City of Albuquerque
P. O. Box 1293
Albuquerque, New Mexico 87103

Re: Drainage Report for Carver Office Building
BEI Project No. 6076-000

Dear Mr. Aguirre:

The purpose of this letter is to acknowledge receipt of your letter dated March 28, 1980 which furnished the City's comments on the above referenced Drainage Report.

To answer your question, the equation was found in another drainage report that had been furnished to us as a sample by AMAFCA. This equation does give high intensity values for the 5-year return period. A value of 3.60 in./hr. for the 5-year, 5-minute rainfall intensity would be more appropriate.

On the evening of Thursday, March 20, 1980, the Environmental Planning Commission approved, with two provisions, the development plan for the Carver Office Building. One of these provisions required the Carver Development Co., the developer, to seek alternate drainage solutions to the proposed open detention wells. At this meeting, the developer agreed to either construct underground or cover over the detention wells.

Mr. Robert Fosnaugh, the City's Traffic Engineer, recommended that the developer provide additional right-of-way for the future widening of Louisiana Blvd. on the east and Indiana Street on the west. Since the site area would be reduced by the right-of-way taking, the required detention well volumes would be decreased.

Until such time as the developer secures construction financing for the 10-story office building, further work on our part has been held in abeyance.

Upon being notified to once again proceed with the work on this project, we will resubmit the Drainage Report.

This revised Drainage Report will reflect the Environment Planning Commission's desire for either an underground detention well or an at-grade

well with a cover on top of it. The revised drainage calculations will be based on a smaller drainage area and the reduced 5-year, 5-minute rainfall intensity value.

If you have any questions, please don't hesitate to call.

Sincerely,

BOVAY ENGINEERS, INC.

Stephen F. Fritz, P.E.

SFF:jr

Fred

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

February 11, 1981

Mr. Steven F. Fritz, P.E.
Bovay Engineers Inc.
P. O. Box 30068
3125 Carlisle Blvd. N.E.
Albuquerque, New Mexico 87110

Re: The Carver Office Building Drainage Report Amended February, 1981

Dear Mr. Fritz:

Your amended drainage report dated February, 1981 for the Carver Office Building is in compliance with the approved drainage report dated November, 1980. Therefore this amended report is approved.

Very truly yours,

Bruno Conegliano
Assistant Hydrology Engineer

BC/fs

BOVAY ENGINEERS, INC.
HOUSTON • AUSTIN • SPOKANE • ALBUQUERQUE • BATON ROUGE • WASHINGTON, D. C.

January 15, 1982

Mr. Fred Aguirre, P.E.
Hydrology Engineering Division
Municipal Development Department
P.O. Box 1293
Albuquerque, New Mexico 87103

Re: Carver Office Building
2155 Louisiana Blvd., N.E.
Zone Atlas Page H-18
BEI No. 6076-003

Dear Mr. Aguirre:

The purpose of this letter is to confirm our telephone conversation of January 13, 1982.

The approved drainage concept for the above referenced project called for portions of the perimeter landscaped areas to be graded to hold all direct rainfall falling on them. Five depressed areas were constructed and the landscaping installed. Just recently Mr. Carver, the Developer, asked if these depressed areas could be eliminated.

I have redone the drainage computations. Eliminating these five depressed areas, increases the offsite runoff rate and therefore should decrease the rate of controlled dishcarge and increase the required storage volume. I routed the 100 year-6 hour storm through the now existing underground corrugated steel pipe detention basins. These calculations have shown that there is the required storage volume available in the detention basins and the parking lot sumps. In addition, the emergency spillways can discharge the increased onsite runoff rates. However, the peak discharge from the detention basins added to the direct offsite discharge rate exceeded the allowable 5 year undeveloped discharge rate of 7.2 cfs by 0.7 cfs. I asked if the City would allow this small increase in the runoff rate. You stated this would be acceptable because we were still in substantial compliance with the City's requirements.

At the time that I submit the Record Drawings for the project, I will also submit the revised computations to substantiate the above.

If you have any questions, please don't hesitate to call.

Sincerely,

Stephen F. Fritz, P.E.

PROFESSIONAL ENGINEERS AND PLANNERS
P. O. BOX 30068 • 3125 CARLISLE BOULEVARD, N.E. • ALBUQUERQUE, NEW MEXICO 87190 • TEL. 505/884-0700 • CABLE BOVENG