FILE COPY

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

July 31, 1990

Harold Bennett
Bennett Engineers
729 San Mateo Boulevard, NE
Albuquerque, New Mexico

RE: REVISED DRAINAGE PLAN FOR UNIVERSITY VILLAGE
(L-15/D8A) REVISION DATED JULY 17, 1990

Dear Mr. Bennett:

Based on the information provided on your resubmittal of July 17, 1990, the referenced drainage plan is approved for building permit and site development.

Please be advised that all the roof runoff must be routed to the asphalt areas.

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

If I can be of further assistance, please feel free to call me at 768-2650.

Cordially,

for Bernie J. Montoya
Fred J. Aguirre, P.E.
Hydrologist

BJM:FJA/bsj
(WP+2012)

L15/D8A

DRAINAGE INFORMATION SHEET

PROJECT TITLE: University Village ZONE ATLAS/DRNG. FILE #: L 15 Z

LEGAL DESCRIPTION: Portions of Tract 1 (formerly Tract C-1) of University Village

CITY ADDRESS: University Blvd and Eastern Ave SE

ENGINEERING FIRM: Bennett Engineers CONTACT: Harold Bennett PE

ADDRESS: 729 San Mateo NE PHONE: 256 7364

OWNER: Dick Chess CONTACT: Dick Chess

ADDRESS: 1907 Buena Vista Dr SE PHONE: 842-6484

ARCHITECT: Lawrence Garcia CONTACT: Lawrence Garcia

ADDRESS: 915 Rio Vista SW PHONE: 842 6484

SURVEYOR: Clint Sherrill CONTACT: Clint Sherrill

ADDRESS: 729 San Mateo NE PHONE: 256 7364

CONTRACTOR: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

PRE-DESIGN MEETING:

____ YES

____ NO

____ COPY OF CONFERENCE RECAP SHEET PROVIDED

DRB NO. _____

EPC NO. _____

PROJ. NO. _____

TYPE OF SUBMITTAL:

____ DRAINAGE REPORT

__X__ DRAINAGE PLAN

____ CONCEPTUAL GRADING & DRAINAGE PLAN

__X__ 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

__X__ BUILDING PERMIT APPROVAL

____ FOUNDATION PERMIT APPROVAL

____ CERTIFICATE OF OCCUPANCY APPROVAL

____ ROUGH GRADING PERMIT APPROVAL

____ GRADING/PAVING PERMIT APPROVAL

____ OTHER _____ (SPECIFY)

RECEIVED
JUL 17 1990
HYDROLOGY DIVISION

DATE SUBMITTED: 7-17-90

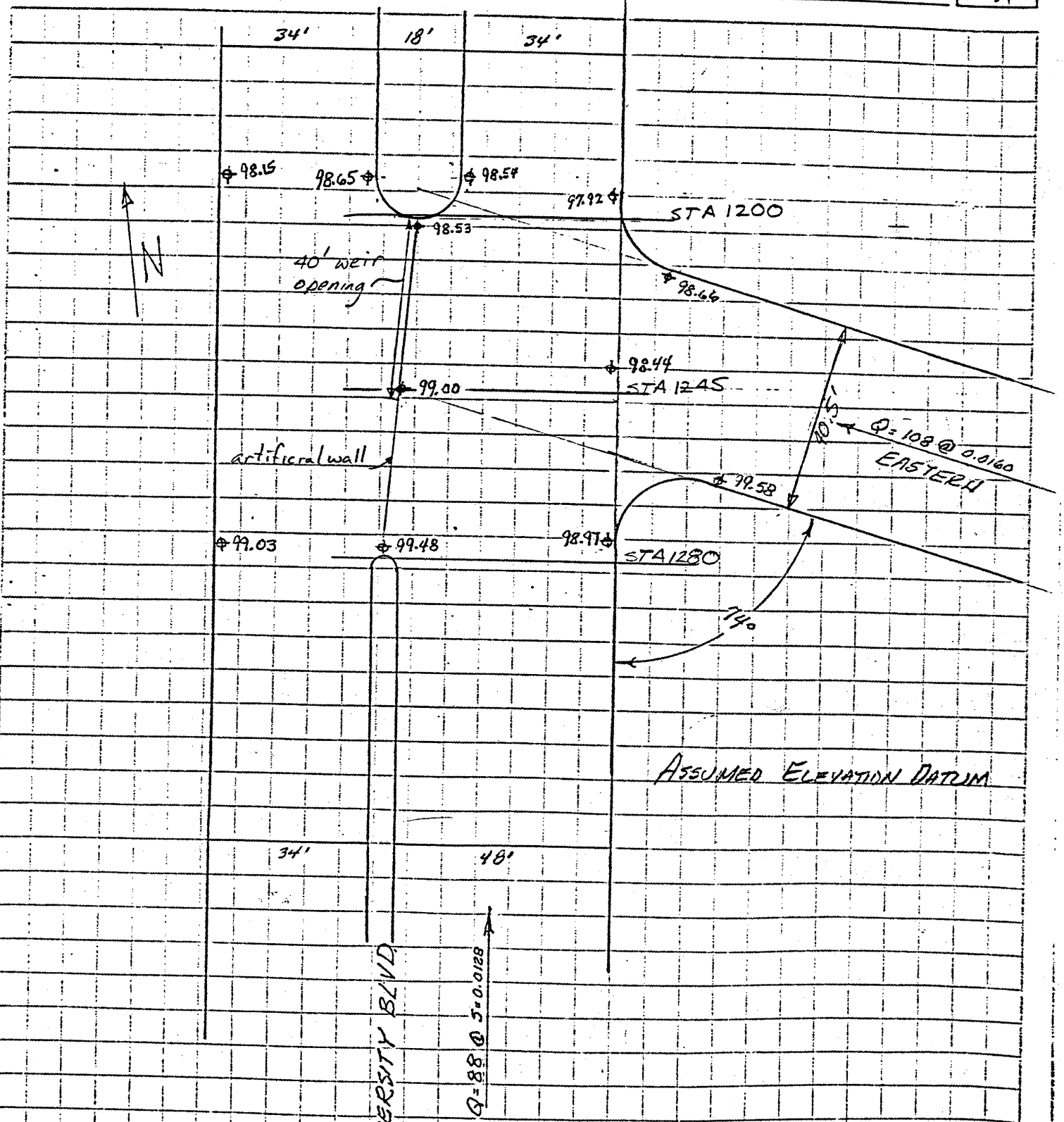
BY: Harold L Bennett PE

BOYLE ENGINEERING CORPORATION

Project GENEIVA'S ARROYO
Job No.
By Date Chkd By Date

Description INTERSECTION AT UNIVERSITY BLVD & EASTERN AVE.

SHEET 8/31



BOYLE ENGINEERING CORPORATION

Project Geneva's Arroyo
Job No. AL-A01-124-00
By PL Date 6-5 Chkd By _____ Date _____

Description Hydraulic calcs. Intersection of Eastern Ave. & University Blvd.

SHEET 9/13

Los Angeles Computer Model was used to compute the water surface elevation at various points along University Blvd. An artificial wall was put into the model at the median cut inorder to keep the flow in the east side of University Blvd.

The median cut on University was treated as a broad-crested weir. The water surface elev., at the artificial wall, was input into the weir eqn. The flow computed in the weir eqn was subtracted from the inflow from Eastern Ave. The new flow (adjusted by subtracting the exit flow) was used to rerun the Los Angeles Model. This iterative process was repeated until the flows balanced across the weir.

Eastern Ave FLOW (cfs)	height of water at weir (ft)	weir outflow (cfs)	flow needed to balance
JOB --	(.80)	(96)	
70.8 + 88	.65	55.1	37.2
25	.4	26	83.8
60	.55	42.9	48
64	.585	47.0	44
62	.58	46.5	46
			OK

Approx. 46 cfs will flow to the west side of University Blvd. based on the following assumptions.

Median cut was treated as a broadcrested weir [$Q = c\,l\,h^{1.5}$] with $c = 2.63$
Momentum and friction forces were neglected.
Force of crown on water was neglected.
weir opening was assumed to be 40' wide. (see sketch)
Flow crossing the crown south of the weir was neglected.

46 CFS FLOWS TO WEST SIDE OF UNIVERSITY BLVD.
150 CFS CONTINUES ON EAST SIDE OF UNIVERSITY BLVD.

INPUT FILE LISTING


```
T1 BOYLE ENGINEERING CORPORATION
T2 INTERSECTION OF UNIVERSITY AND EASTERN
T3 JUNE 5. 1990
SO   1000.00  95.36  1                          96.36
R    1200.00  97.92  1      .016
BX   1245.00  98.50  2  4   .016    62.0        98.50        74.0
R    1280.00  98.97  3      .016
R    1580.00 102.81  3      .016
EH                   3
```

WSPG

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

CARD CODE	SECT NO	CHN TYPE	NO OF PIERS	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	1	5	0	.00															
CD	2	5	0	.00															
CD	3	5	0	.00															
CD	4	2	0	.00	2.00	40.66			.00										
CD	5	1	0	.00	2.00	30.00	6.00	6.00	.00										
CD	6	5	0	.00															
CD	7	1	0	.00	4.70	10.00	2.00	2.00	2.40										
CD	9	2	0	.00	7.00	22.00			2.40										
CD	10	6	0	.00															
CD	11	4			4.50														
CD	12	4			5.00														
CD	14	4			2.00														
CD	15	4			3.50														
CD	16	4			4.00														

WSPG

WATER SURFACE PROFILE - CROSS SECTION POINT LISTING

CARD CODE	SECT NO	NO OF POINTS	X(1) . Y(1) X(8) . Y(8)	X(2) . Y(2) X(9) . Y(9)	X(3) . Y(3) X(10) .Y(10)	X(4) . Y(4) X(11) .Y(11)	X(5) . Y(5) X(N) . Y(N)	X(6) . Y(6) X(N+1).Y(N+1)	X(7) . Y(7) X(99) .Y(99)
PTS	1	4	1.00 100.21	1.01 98.54	35.00 97.92	35.01 99.92			
PTS	2	4	1.00 101.00	1.01 99.00	42.00 98.44	42.01 100.44			
PTS	3	4	1.00 101.15	1.01 99.48	49.00 98.97	49.01 100.97			
PTS	10	12	2.47 2.00	2.86 1.00	3.79 .50	7.25 .09	10.71 .50	11.64 1.00	12.03 2.00
PTS			11.92 3.00	11.59 4.00	7.25 6.78	2.91 4.00	2.59 3.00		

WATER SURFACE PROFILE - TITLE CARD LISTING

LEADING LINE NO 1 IS -

BOYLE ENGINEERING CORPORATION

LEADING LINE NO 2 IS -

INTERSECTION OF UNIVERSITY AND EASTERN

LEADING LINE NO 3 IS -

JUNE 5, 1990

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET

U/S DATA	STATION	INVERT	SECT	W S ELEV
	1000.00	95.36	1	96.36

ELEMENT NO 2 IS A REACH

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1200.00	97.92	1	.016	.00	.00	.00	0

ELEMENT NO 3 IS A JUNCTION

U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
	1245.00	98.50	2	4	0	.016	62.0	.0	98.50	.00	74.00	.00

WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS

ELEMENT NO 4 IS A REACH

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1280.00	98.97	3	.016	.00	.00	.00	0

ELEMENT NO 5 IS A REACH

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1580.00	102.81	3	.016	.00	.00	.00	0

ELEMENT NO 6 IS A SYSTEM HEADWORKS

U/S DATA	STATION	INVERT	SECT	W S ELEV
	1580.00	102.81	3	.00

0 EDIT ERRORS ENCOUNTERED-COMPUTATION IS NOW BEGINNING

** WARNING NO. 2 ** - WATER SURFACE ELEVATION GIVEN IS LESS THAN OR EQUALS INVERT ELEVATION IN HDWKDS. W.S.ELEV = INV + DC

WATER SURFACE PROFILE LISTING

BOYLE ENGINEERING CORPORATION

INTERSECTION OF UNIVERSITY AND EASTERN

JUNE 5, 1990

STATION /ELEM	INVERT ELEV SO	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD SF AVE	ENERGY GRD.EL. HF	SUPER ELEV	CRITICAL DEPTH NORM DEPTH	HGT/ DIA ZR	BASE/ ID NO.	ZL	NO PIER	AVBPR
1000.00	95.36	.91	96.27	150.0	7.33	.84	97.11		1.16		1		0	.00
53.67	.01280					.01284	.69		.91					
1053.67	96.05	.91	96.96	150.0	7.33	.84	97.79		1.16		1		0	.00
76.65	.01280					.01272	.98		.91					
1130.32	97.03	.92	97.94	150.0	7.29	.83	98.77		1.16		1		0	.00
41.55	.01280					.01169	.49		.91					
1171.87	97.56	.94	98.50	150.0	6.95	.75	99.25		1.16		1		0	.00
13.29	.01280					.01000	.13		.91					
1185.16	97.73	.98	98.71	150.0	6.63	.68	99.39		1.16		1		0	.00
6.83	.01280					.00855	.06		.91					
1191.99	97.82	1.01	98.83	150.0	6.32	.62	99.45		1.16		1		0	.00
4.08	.01280					.00731	.03		.91					
1196.07	97.87	1.04	98.91	150.0	6.02	.56	99.48		1.16		1		0	.00
2.34	.01280					.00625	.01		.91					
1198.41	97.90	1.08	98.98	150.0	5.74	.51	99.49		1.16		1		0	.00
1.29	.01280					.00535	.00		.91					
1199.70	97.92	1.12	99.03	150.0	5.48	.47	99.50		1.16		1		0	.00
.30	.01280					.00457	.00		.91					
1200.00	97.92	1.16	99.08	150.0	5.22	.42	99.50		1.16		1		0	.00
NCT STR	.01289					.00248	.11							
1245.00	98.50	1.20	99.70	88.0	1.94	.06	99.76		.73		3		0	.00

WATER SURFACE PROFILE LISTING

BOYLE ENGINEERING CORPORATION
INTERSECTION OF UNIVERSITY AND EASTERN
JUNE 5, 1990

STATION	INVERT ELEV	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD	ENERGY GRD.EL.	SUPER ELEV	CRITICAL DEPTH	HGT/ DIA	BASE/ ID NO.	ZL	NO PIER	AVBPR
L/ELEM	SO					SF AVE	HF		NORM DEPTH			ZR		
HYDRAULIC JUMP														
1245.00	98.50	.60	99.10	88.0	5.28	.43	99.54		.73		3		0	.00
.55	.01343					.01353	.00		.60					
1245.55	98.51	.60	99.11	88.0	5.29	.43	99.54		.73		3		0	.00
34.45	.01343					.01322	.46		.60					
1280.00	98.97	.61	99.58	88.0	5.21	.42	100.00		.73		3		0	.00
224.72	.01280					.01291	2.90		.61					
1504.72	101.85	.61	102.45	88.0	5.21	.42	102.87		.73		3		0	.00
41.59	.01280					.01284	.53		.61					
1546.31	102.38	.61	102.99	88.0	5.19	.42	103.41		.73		3		0	.00
21.92	.01280					.01184	.26		.61					
1568.23	102.66	.63	103.28	88.0	4.95	.38	103.66		.73		3		0	.00
6.18	.01280					.01011	.06		.61					
1574.41	102.74	.64	103.38	88.0	4.72	.35	103.73		.73		3		0	.00
2.99	.01280					.00863	.03		.61					

WATER SURFACE PROFILE LISTING

BOYLE ENGINEERING CORPORATION
INTERSECTION OF UNIVERSITY AND EASTERN
JUNE 5, 1990

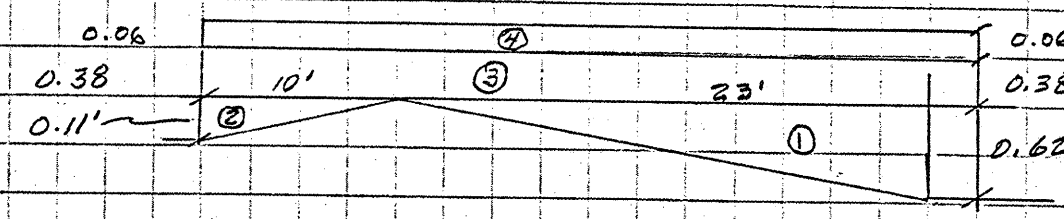
STATION	INVERT ELEV	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD	ENERGY GRD.EL.	SUPER ELEV	CRITICAL DEPTH	HGT/ DIA	BASE/ ID NO.	ZL	NO PIER	AVEPR
L/ELEM	SO					SF AVE	HF		NORM DEPTH			ZR		
1577.40	102.78	.66	103.44	88.0	4.50	.31	103.75		.73		3		0	.00
1.59	.01280					.00737	.01			.61				
1578.99	102.80	.68	103.48	88.0	4.29	.29	103.77		.73		3		0	.00
.77	.01280					.00630	.00			.61				
1579.76	102.91	.70	103.51	88.0	4.09	.26	103.77		.73		3		0	.00
.24	.01280					.00536	.00			.61				
1580.00	102.91	.73	103.54	88.0	3.89	.24	103.77		.73		3		0	.00

FROM SHEET 9:

$Q = 46$ CFS WEST SIDE UNIVERSITY

$Q = 150$ CFS EAST SIDE UNIVERSITY

EAST SIDE OF UNIVERSITY



① CAPACITY

$A = 7.13$ $P = 23.62$ $R = 0.30$ $R^{2/3} = 0.45$

$S = 0.0109$ $S^{1/2} = 0.104$

$Q = 7.13 \times 1.486/0.017 \times 0.45 \times 0.104 = 29$ CFS

② CAPACITY

$A = 0.55$ $P = 10.11$ $R = 0.054$ $R^{2/3} = 0.144$

$Q = 0.55 \times 1.486/0.017 \times 0.144 \times 0.104 = 0.72$ CFS

TOTAL CAPACITY ①+②+③

$A = 7.13 + 0.55 + 12.54 = 20.22$ $P = 34.49$ $R = 0.586$ $R^{2/3} = 0.700$

$Q = 20.22 \times 1.486/0.017 \times 0.700 \times 0.104 = 128.7$ CFS

HEIGTH OF FLOW FOR 150 CFS ①+②+③+④

$A = 7.13 + 0.55 + 12.54 + 1.98 = 22.2$ $P = 34.61$

$R = 0.64$ $R^{2/3} = 0.74$

$Q = 22.2 \times 1.486/0.017 \times 0.74 \times 0.104 = 149.3$ CFS

HEIGTH OF FLOW @ EAST CURB = 1.06

@ MEDIAN = 0.55

PLACE TYPE "A" @ MEDIAN & CURB

FROM FIGURE 1 q = 16.5 CFS @ CURB

FROM FIGURE 2 q = 8.0 CFS @ MEDIAN

Q RESIDUAL = 150.0 - 16.5 - 8.0 = 125.5 CFS (USE H FOR 128.7 CFS)

HEIGTH OF FLOW @ EAST CURB = 1.0'

@ MEDIAN = 0.49'

PLACE DBL "C" @ MEDIAN & CURB

FROM FIGURE 3 q = 24 CFS @ CURB

FROM FIGURE 4 q = 8.6 CFF @ MEDIAN

Q RESIDULE = 125.5 - 24 - 8.6 = 92.9 CFS

TRY H@ CURB = 0.88

$A = 16.26$ $P = 34.25$ $R = 0.475$ $R^{2/3} = 0.61$

$Q = 16.26 \times 1.486/0.017 \times 0.61 \times 0.104 = 90.2$ CFS - OK

HEIGTH OF FLOW @ EAST CURB = 0.88

@ MEDIAN = 0.37

PLACE DBL "C" @ MEDIAN & E. CURB

FROM FIGURE 5 $\frac{q}{}$ = 21.0 @ CURB

FROM FIGURE 6 $\frac{q}{}$ = 4.5 @ MEDIAN

Q RESIDULE = 92.9 - 21.0 - 4.5 = 67.4 CFS

TRY H @ E. CURB = 0.80

A = 13.62 P = 34.09 R = 0.40 $R^{2/3}$ = 0.542

Q = 13.62 x 1.486/0.017 x 0.542 x 0.104 = 67.1 - OK

HEIGHT OF FLOW @ EAST CURB = 0.80

MEDIAN = 0.29

PLACE DBL "C" @ MEDIAN & E CURB

FROM FIGURE 7 $\frac{q}{}$ = 17.5 @ CURB

FROM FIGURE 8 $\frac{q}{}$ = 2.8 @ MEDIAN — NO!

USE DBL @ E. CURB ONLY

Q RESIDULE = 67.4 - 17.5 = 49.9

TRY H @ CURB = 0.73

A = 11.31 P = 33.95 R = 0.333 $R^{2/3}$ = 0.48

Q = 11.31 x 1.486/0.017 x 0.48 x 0.104 = 49.4 OK

HEIGHT OF FLOW @ EAST CURB = 0.73

MEDIAN = 0.22

PLACE DBL "C" @ EAST CURB

FROM FIGURE 9 q = 15.5 CFS

Q RESIDULE = 49.9 - 15.5 = 34.4 CFS

TRY H @ CURB = 0.67

A = 9.33 P = 33.83 R = 0.276 $R^{2/3}$ = 0.424

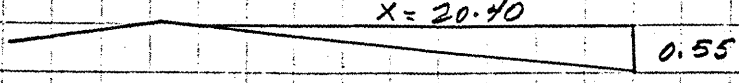
Q = 9.33 x 1.486/0.017 X 0.424 X 0.104 = 35.9 - OK

PLACE DBL "C" @ EAST CURB

FROM FIGURE 10 q = 13 CFS

Q RESIDULE = 34.4 - 13.0 = 21.4 CFS

SEE SHEET 24 FOR MEDIAN OPENING & CURB OPENING CAPACITIES @ UNIVERSITY & CHANNEL - NEED 1 MORE DBL "C" ON EAST SIDE.



TRY H @ CURB = 0.65 S = 0.02696

X = 0.35/0.02696 = 20.40

A = 5.61 P = 20.95 R = 0.268 $R^{2/3}$ = 0.416

Q = 5.61 x 1.486/0.017 X 0.416 X 0.104 = 21.2 OK

PLACE DBL "C" @ E. CURB

FROM FIGURE 1.1 $q = 10.0$ CFS

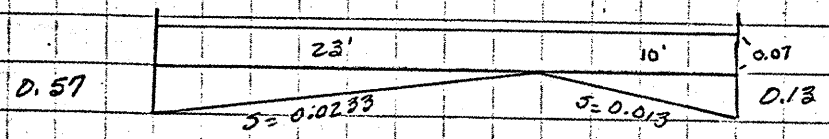
$Q_{RESIDUE} = 21.4 - 10.0 = 11.4$ CFS - OK - LET GO TO CHANNEL OVERLAND ACROSS UNIV. BLVD.

WEST SIDE OF UNIVERSITY

$Q = 46$ CFS FROM SOUTH

ALLOWABLE DISCHARGE TO CHANNEL = 71 CFS

$Q = 71.0 - 21.4 = 49.6$ CFS ALLOWABLE FROM W. SIDE



$S = 0.0172$ $S^{1/2} = 0.131$

FIND H & W FOR 46 CFS

TRY H @ W. CURB = 0.64

$A = 6.56 + 0.65 + 2.31 = 9.52$ $P = 33.84$ $R = 0.281$ $R^{2/3} = 0.429$

$Q = 9.52 \times 1.486 / 0.017 \times 0.429 \times 0.131 = 46.8$ CFS - OK

WATER COVERS ENTIRE WEST SIDE - NEEDS TO BE RELIEVED

PLACE SGL "A" @ WEST CURB

FROM FIGURE 12 $q = 10.5$ CFS

$Q_{RESIDUE} = 46.0 - 10.5 = 35.5$ CFS

TRY H @ W. CURB = 0.58

$A = 7.87$ $P = 33.74$ $R = 0.233$ $R^{2/3} = 0.379$

$Q = 7.87 \times 1.486/0.017 \times 0.379 = 34.2$ CFS - OK

PLACE DBL "C" @ WEST CURB

FROM FIGURE 13 $q = 13$ CFS

$Q_{RESIDUE} = 35.5 - 13.0 = 22.5$ CFS

TRY H @ W. CURB = 0.48 $W = 20.60$

$A = 4.94$ $P = 21.08$ $R = 0.234$ $R^{2/3} = 0.33$

$Q = 4.94 \times 1.486/0.017 \times 0.330 \times 0.131 = 21.4$ - OK

PLACE DBL "C" @ WEST CURB

FROM FIGURE 14 $q = 9.0$ CFS

$Q_{RESIDUE} = 22.5 - 9.0 = 13.5$ CFS - OK - LET GO OVERLAND TO CHANNEL

TOTAL TO CHANNEL = 13.5 + 11.4 = 24.9 CFS - OK

OVERFLOW FROM UNIVERSITY BLVD. TO CHANNEL

WIDTH OF OPENING = 48'

$Q = C L H^{1.5}$ * C = 2.7

$Q = 2.7 \times 48 \times 0.67^{1.5} = 71$ CFS

MEDIAN OPENING = 20.0

$Q = 2.7 \times 20 \times 0.67^{1.5} = 29.6$ CFS ±

SINCE ONLY 34.9 CFS INTERS WIER TO CHANNEL THE WIER CAN BE SHORTENED.

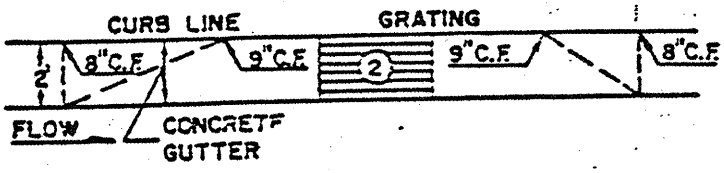
USE L = 30' SOLVE FOR H

$H^{1.5} = Q/CL = 29.6/2.7 \times 30 = 0.365$

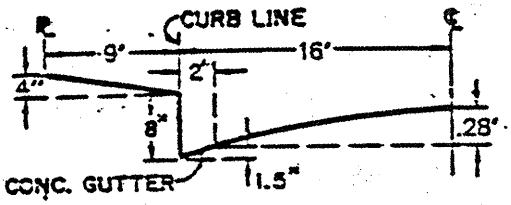
H = 0.51' - OK

* TABLE 5-3, PG 5-40 "HANDBOOK OF HYDRAULICS" BRATER & KING

GRATING CAPACITIES FOR TYPE "A", "C" and "D"



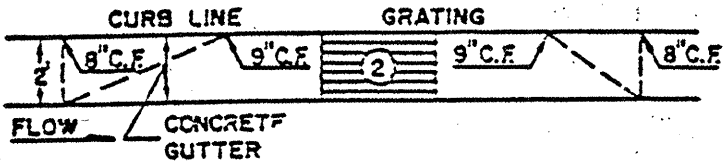
GRATING & GUTTER PLAN



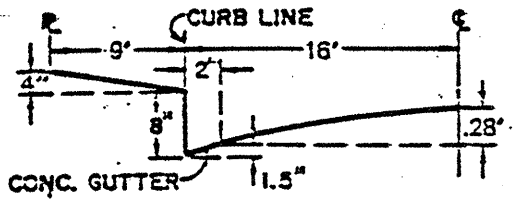
TYPICAL HALF STREET SECTION
(ABOVE BASIN)

FIGURE 1

GRATING CAPACITIES FOR TYPE "A", "C" and "D"



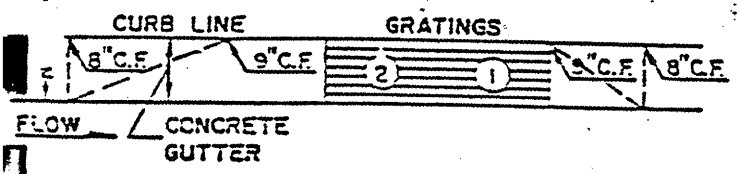
GRATING & GUTTER PLAN



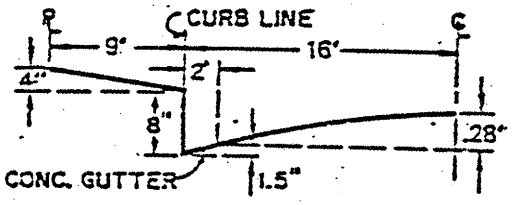
TYPICAL HALF STREET SECTION
(ABOVE BASIN)

FIGURE 2

GRATING CAPACITIES FOR TYPE DOUBLE "C," AND "D"



GRATING & GUTTER PLAN



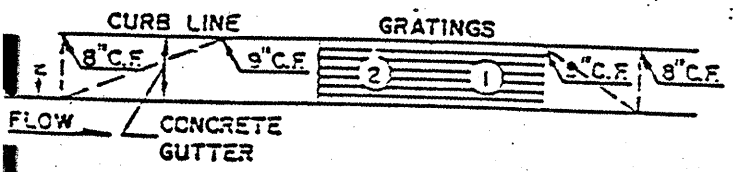
TYPICAL HALF STREET SECTION
(ABOVE BASIN)

D = DEPTH OF FLOW (FT.) ABOVE NORMAL GUTTER GRADE

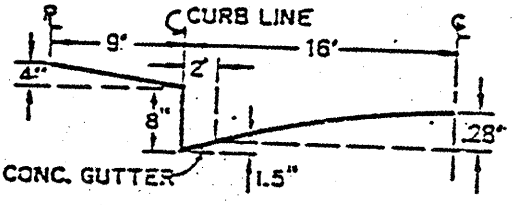
D = 1.0' @ CURB

FIGURE 3

GRATING CAPACITIES FOR TYPE DOUBLE "C," AND "D"



GRATING & GUTTER PLAN

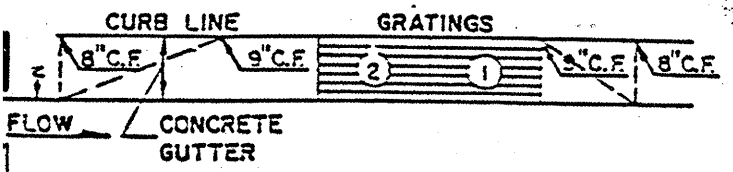


TYPICAL HALF STREET SECTION
(ABOVE BASIN)

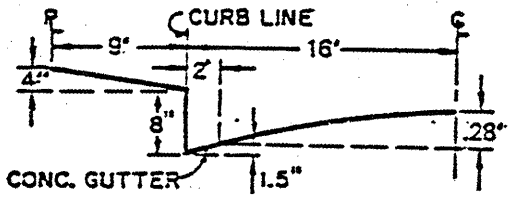
D = DEPTH OF FLOW (FT.) ABOVE NORMAL GUTTER GRADE

d = 0.49' @ MEDIAN

GRATING CAPACITIES FOR TYPE DOUBLE "C," AND "D"



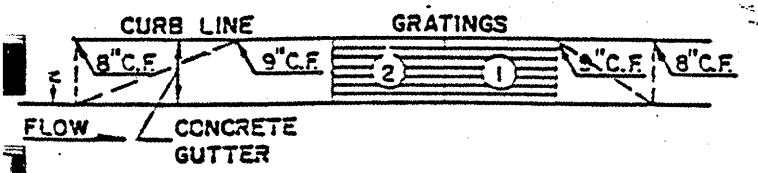
GRATING & GUTTER PLAN



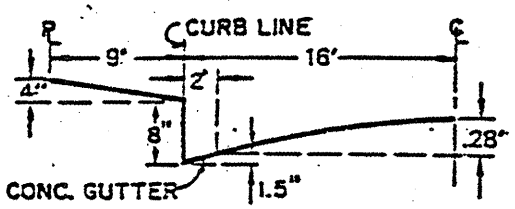
TYPICAL HALF STREET SECTION
(ABOVE BASIN)

FIGURE 5

GRATING CAPACITIES FOR TYPE DOUBLE "C," AND "D"



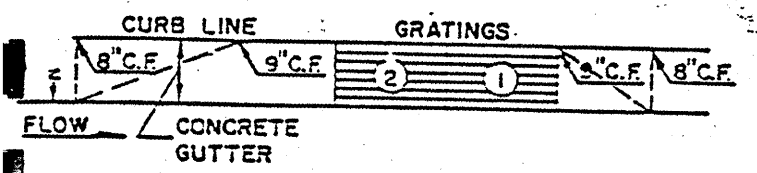
GRATING & GUTTER PLAN



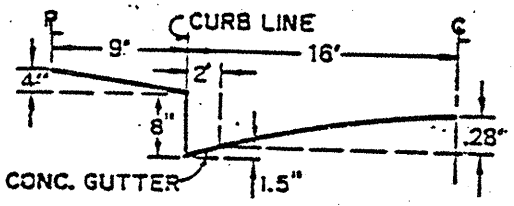
TYPICAL HALF STREET SECTION
(ABOVE BASIN)

FIGURE 6

GRATING CAPACITIES FOR TYPE DOUBLE "C," AND "D"



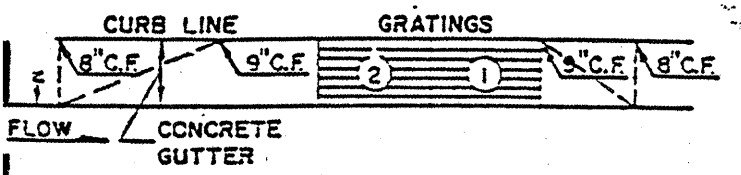
GRATING & GUTTER PLAN



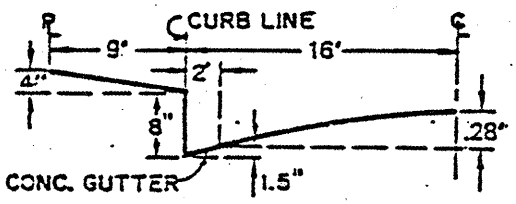
TYPICAL HALF STREET SECTION
(ABOVE BASIN)

FIGURE 7

GRATING CAPACITIES FOR TYPE DOUBLE "C," AND "D"



GRATING & GUTTER PLAN



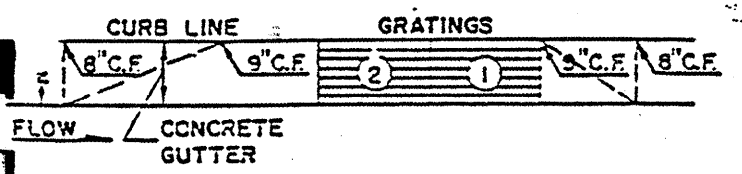
TYPICAL HALF STREET SECTION
(ABOVE BASIN)

D = DEPTH OF FLOW (FT.) ABOVE NORMAL GUTTER GRADE

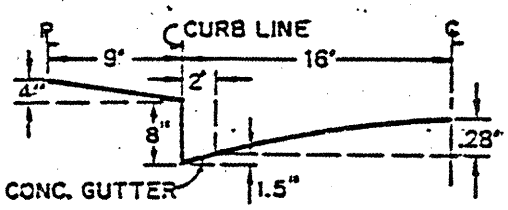
0.29' @ MEDIAN

FIGURE 8

GRATING CAPACITIES FOR TYPE DOUBLE "C," AND "D"



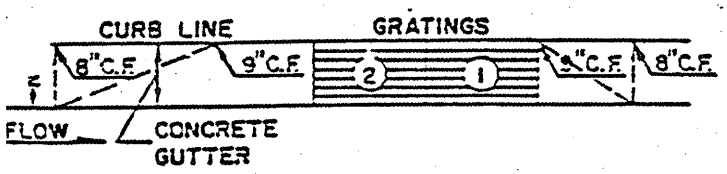
GRATING & GUTTER PLAN



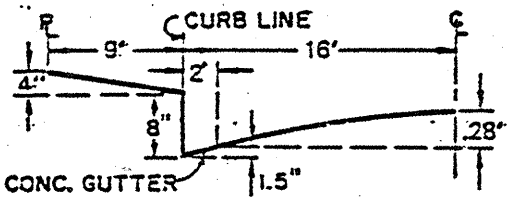
TYPICAL HALF STREET SECTION
(ABOVE BASIN)

FIGURE 9

GRATING CAPACITIES FOR TYPE DOUBLE "C," AND "D"



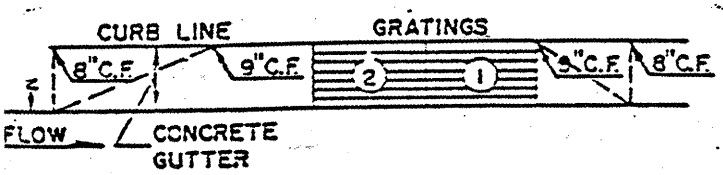
GRATING & GUTTER PLAN



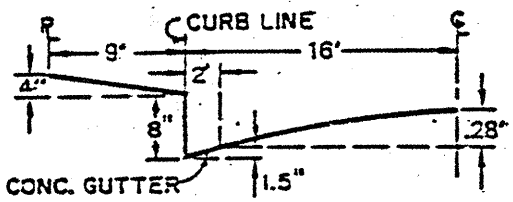
TYPICAL HALF STREET SECTION
(ABOVE BASIN)

FIGURE 10

GRATING CAPACITIES FOR TYPE DOUBLE "C," AND "D"



GRATING & GUTTER PLAN



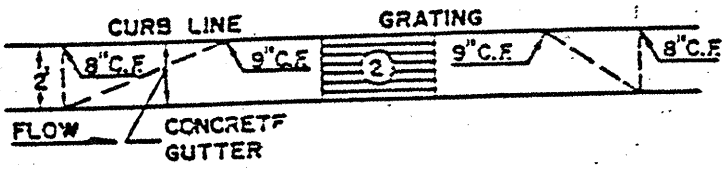
TYPICAL HALF STREET SECTION
(ABOVE BASIN)

D = DEPTH OF FLOW (FT.) ABOVE NORMAL GUTTER GRADE

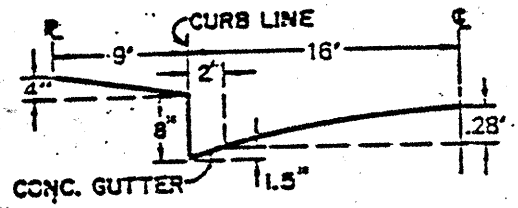
H = 0.55

FIGURE 11

GRATING CAPACITIES FOR TYPE "A", "C" and "D"



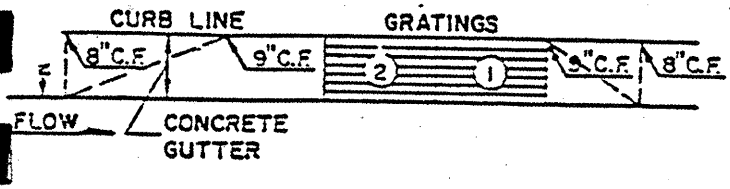
GRATING & GUTTER PLAN



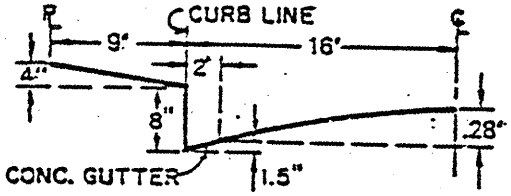
TYPICAL HALF STREET SECTION
(ABOVE BASIN)

FIGURE 12

GRATING CAPACITIES FOR TYPE DOUBLE "C," AND "D"



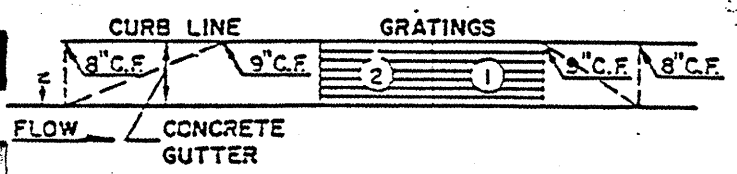
GRATING & GUTTER PLAN



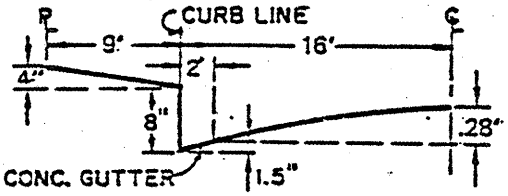
TYPICAL HALF STREET SECTION
(ABOVE BASIN)

FIGURE 13

GRATING CAPACITIES FOR TYPE DOUBLE "C," AND "D"



GRATING & GUTTER PLAN



TYPICAL HALF STREET SECTION
(ABOVE BASIN)

FIGURE 14

CATCH BASINS ON WEST CURB Q = 32.5 CFS IN
1 - TYPE "A" & 2 - TYPE DBL "C"

CATCH BASINS ON EAST MEDIAN CURB Q = 21.1 CFS IN
1 - TYPE "A" & 3 - TYPE DBL "C"'S

CATCH BASINS ON EAST CURB Q = 117.5 CFS IN
1 - TYP "A" & 6 - TYPE DBL "C"

TOTAL FLOW IN 54" EXTENSION = 171.10 CFS

SOLVE FOR SLOPE

N = 0.014, DIA = 4.5' DEPTH = 4.5

THEN Q = 0.0090 FOR 148 FEET TO 10' DIAM. MH.

EAST CURB - CLUSTER 1 - TYPE "A" & 3 TYPE "C" DRAINED
BY A 36" RCP TO M.H. (48" RCP FOR ALL INLETS
WILL NOT FIT UNDER EXISTING 20" WATER MAIN)

Q = 16.5 + 24.0 + 21.0 + 17.5 = 79 CFS

TRY 36" RCP @ 0.0160 Q = 78.6 CFS - OK

EAST CURB REMAINING 3 - TYPE DBL "C"

Q = 38.5 CFS

TRY 30" RCP @ 0.0100 Q = 38.2 CFS - OK

EAST MEDIAN CURB 1- TYPE "A" & 3 TYPE DBL "C"

$Q = 8.0 + 8.6 + 4.5 = 21.1$

TRY 24" @ 0.0200 $Q = 28.8$ CFS - OK

WEST CURB 1- TYPE A & 2 - TYPE DBL "C"

$Q = 10.5 + 13.0 + 9.0 = 32.50$

TRY 24" @ $S = 0.0551$ $Q = 49.44$ CFS - OK

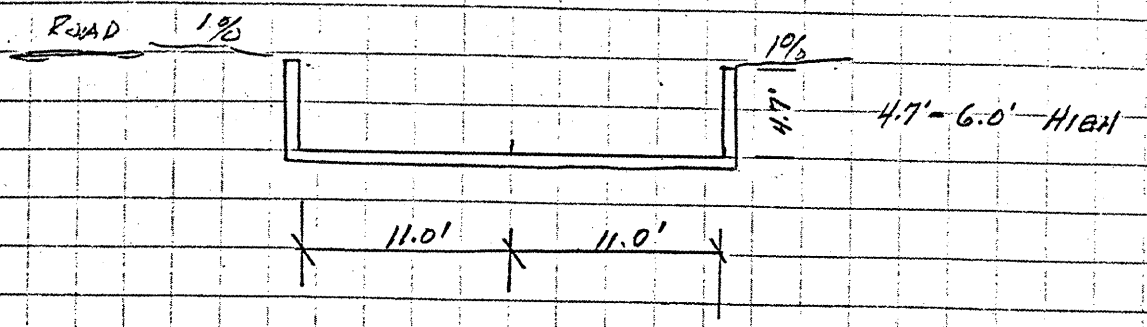
BOYLE ENGINEERING CORPORATION

Project _____ Description GENEVA'S AREA 40

Job No. _____ RECTANGULAR CHANNEL DESIGN

By HH Date 4/11/10 Chkd By _____ Date _____

SHEET 27/31



SOIL: SAND NON-COHISIVE 120 #/CF

REQUIRED STEEL:

LONG - $A_s/A_c = 0.005$

TRANS - $A_s/A_c = 0.0025$

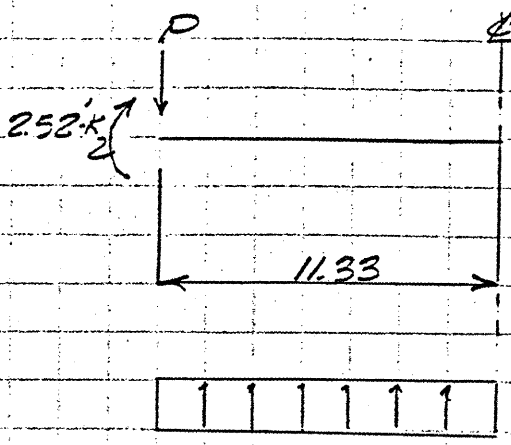
E.F.P = 35 p.c.f.

Surcharge: 2'

f'_c = 4000 psi Reinf. Grade 60

BASE SLAB :

a.) ASSUME MAX MOMENT @ ℄ SLAB

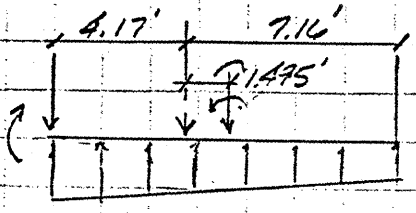


$P = 6 \times .67 \times .15 = .603$ K/'

$w_n = .603 \times \frac{1}{11.33} = 0.0532$ K/'

$M_{℄} = 2.52 + (.0532 \times \frac{11.33^2}{2}) - (.603 \times 11.33) = -.9$ 'K

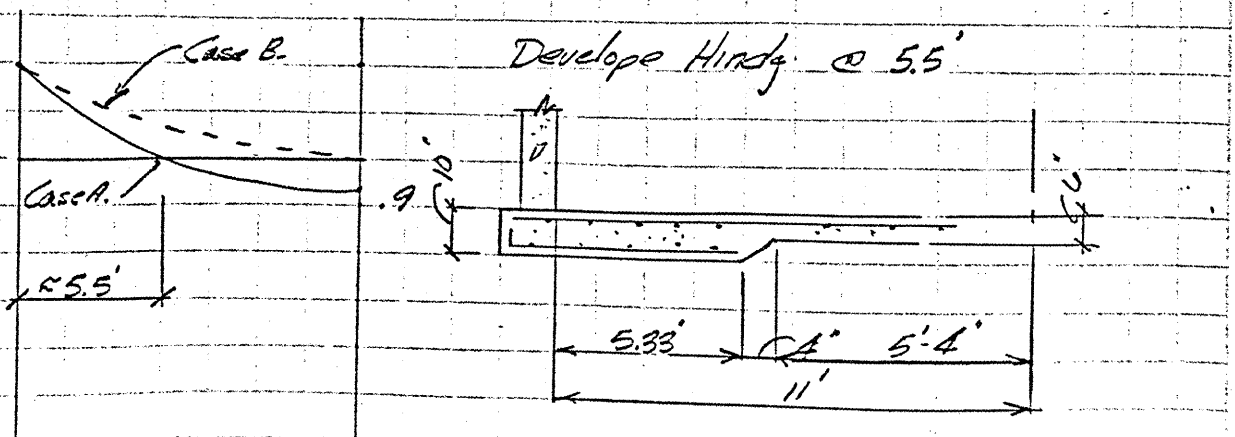
b.) ASSUME MAX SOIL PRESSURES @ ℄ SLAB. I.E. 0 MOMENT.



$S = \frac{11.33^2}{6} = 21.395$

$T = \frac{.603}{11.33} \pm \frac{.603 \times 1.495}{21.395}$; $T_L = 0.011$ KSF

$T_R = 0.095$ KSF



BASE SLAB REINFORCING:

a.) @ WALL $t = 10"$ $d = 10 - 3 - .5 = 6.5"$

$A_{S REQD} = \frac{4.28}{4 \times 6.5} = .16\ in^2$

$Min\ A_{S REQD} = .0025 \times 10 \times 12 = .3\ in^2$ (#4 @ 12" O.C. TOP)

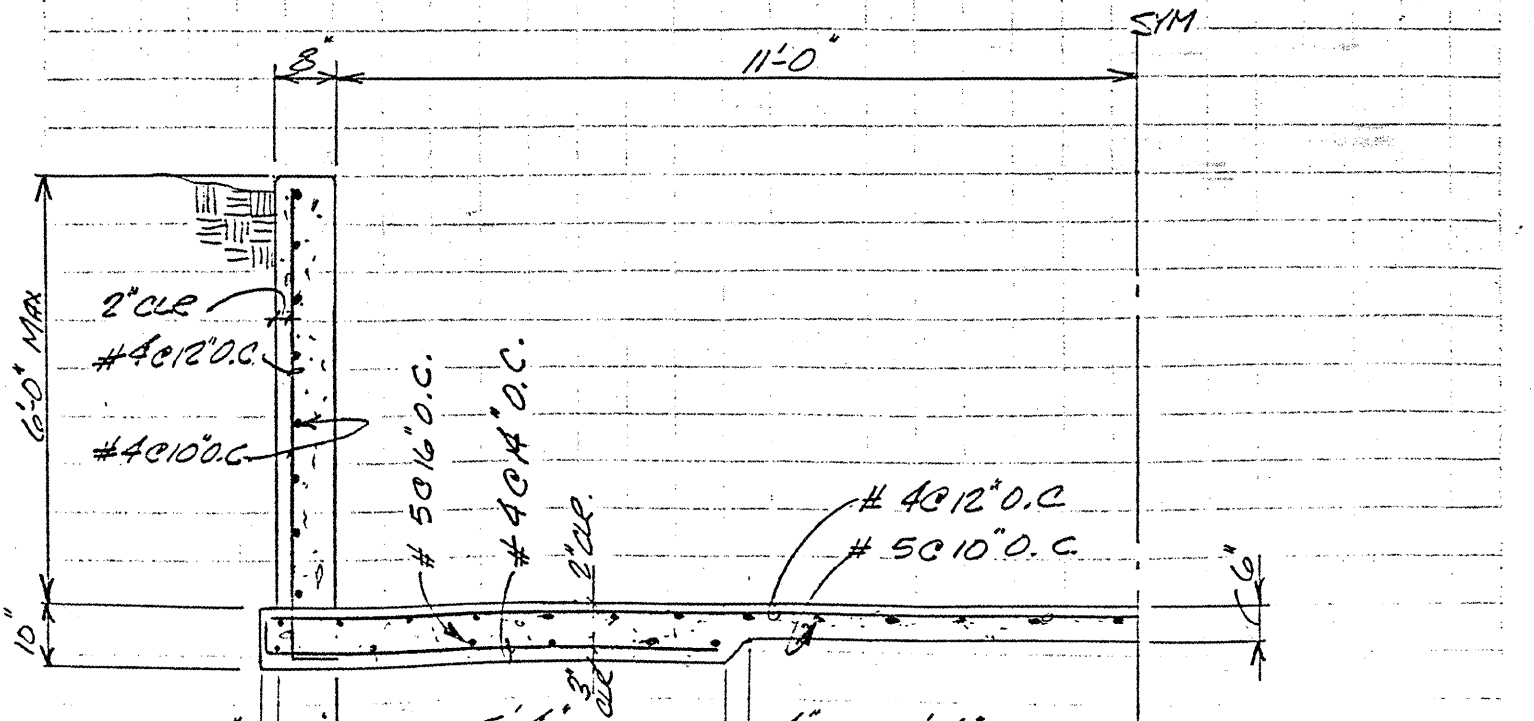
$.3 - .2 = .1$ TRANSVERSE Use #4 @ 14" O.C.

Long. Reinf: $A_{S REQD} = .005 \times 10 \times 12 = .6\ in^2$ LONG.
Use #5 @ 10" O.C. TOP
& #5 @ 16" O.C. BOT.

b.) MIN. STEEL REQD IN 6" SLAB

1. TRANS. $A_S = .0025 \times 6 \times 12 = .18\ in^2$ TRANS. Use #4 @ 12" O.C.

2 Long $A_S = .005 \times 6 \times 12 = .36\ in^2$ LONG. Use #5 @ 10" O.C.



8' DIAMETER MANHOLE @ STA 27+19.62

K_b (45°) = 0.32 K_b (23°27') = 0.16

V =

$h_b = K_b (V^2)/2g = 0.16 \times 19.6^2/2 \times 32.2 = 0.95$

S = 0.02564

$\Delta E_L = 8 \times 0.02564 = 0.21$

DROP ACROSS MH = 0.95 + 0.21 = 1.16

.333	94.7	1.667	1.3	3.333	.6	4.667	.2	6.000	.0
.667	99.4	2.000	1.8	3.333	.7	4.667	.2	6.000	.0
1.000	36.3	2.333	1.4	3.667	.5	5.000	.0	6.333	.0

RUNOFF VOLUME = 1.68395 INCHES = 6.0092 ACRE-FEET
PEAK DISCHARGE RATE = 196.25 CFS AT .533 HOURS

$ROUTE HG 300' DOWN UNIVERSITY BLVD
COMPUTE RATING CURVE ID=6 VS NO=1 NO SEGS=1
MIN ELEV=100 MAX ELEV=102.2
CH SLP=0.01 FP SLP=0.01
N=0.016 DIST=67.01

DIST	ELEV	DIST	ELEV	DIST	ELEV
0.0	102.2	0.01	100.	2.0	100.2
26.	100.7	26.01	101.2	41.	101.3
41.01	100.8	67.	101.3	67.01	102.2

RATING CURVE VALLEY SECTION 1.0

WATER SURFACE ELEV	FLOW AREA SQ FT	FLOW RATE CFS
100.00	.0	.0
100.12	.1	.1
100.23	.3	.5
100.35	1.0	2.1
100.46	2.4	6.5
100.58	4.4	14.5
100.69	7.1	27.2
100.81	10.1	47.9
100.93	13.5	67.9
101.04	17.6	94.3
101.16	22.4	128.0
101.27	28.4	153.1
101.39	36.0	216.1
101.51	43.8	298.4
101.62	51.6	390.8
101.74	59.3	492.5
101.85	67.1	603.2
101.97	74.8	722.3
102.08	82.6	849.5
102.20	90.3	984.5

COMPUTE TRAVEL TIME ID=2 REACH=16 NO VS=1 L=300 SLP=0.0053

TRAVEL TIME TABLE
REACH 16.0

WATER DEPTH FEET	FLOW RATE CFS	TRAVEL TIME HRS
.23	2.	.02
.47	8.	.01
.70	18.	.01
.94	32.	.01
1.17	49.	.01
1.41	71.	.01
1.64	95.	.00
1.88	121.	.00
2.11	149.	.00
2.35	178.	.00
2.58	208.	.00
2.81	238.	.00

3.26	317.	.00
3.52	327.	.00
3.75	338.	.00
3.99	352.	.00
4.22	358.	.00
4.50	336.	.00

```
ROUTE              ID=2 HYD NO=2.14 INFLOW ID=2 DT=0.033333 HRS
PRINT HYD          ID=2 CODE=10
```

OUTFLOW HYDROGRAPH REACH 2.14

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
.000	.0	1.333	2.9	2.667	.6	4.000	.2	5.333	.0
.333	11.4	1.667	1.3	3.000	.4	4.333	.1	5.667	.0
.667	43.6	2.000	.9	3.333	.3	4.667	.1	6.000	.0
1.000	19.4	2.333	.7	3.667	.3	5.000	.0	6.333	.0

RUNOFF VOLUME = 1.79117 INCHES = 2.8075 ACRE-FEET
PEAK DISCHARGE RATE = 88.19 CFS AT .533 HOURS

```
*BASIN 2.5 PERVIOUS
COMPUTE HYD        ID=3 HYD NO=2.51 DT=0.033333 HRS DA=0.0144 SQ MI
                   CN=182.8 K=-.0693 TP=-0.167 HRS RAIN=-1
```

K = .068300HR TP = .167000HR SHAPE CONSTANT, N = 10.41622
UNIT PEAK = 57.369 CFS UNIT VOLUME = .9997 B = 665.32
RUNOFF COMPUTED BY ALBUQ. MODIFIED SCS CURVE NUMBER METHOD

```
*BASIN 2.5 IMPERVIOUS
COMPUTE HYD        ID=4 HYD NO=2.52 DT=0.033333 HRS DA=0.0231 SQ MI
                   CN=197 K=-0.0475 TP=-0.167 HRS RAIN=-1
```

K = .047500HR TP = .167000HR SHAPE CONSTANT, N = 17.48106
UNIT PEAK = 124.17 CFS UNIT VOLUME = 1.000 B = 897.66
RUNOFF COMPUTED BY ALBUQ. MODIFIED SCS CURVE NUMBER METHOD

```
*COMBINE PERVIOUS AND IMPERV. HG'S FOR BASIN 2.5
ADD HYD            ID=3 HYD NO=2.53 ID=3 ID=4
PRINT HYD          ID=3 CODE=10
```

OUTFLOW HYDROGRAPH REACH 2.53

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
.000	.0	1.333	2.8	2.667	.5	4.000	.2	5.333	.0
.333	13.0	1.667	1.2	3.000	.4	4.333	.1	5.667	.0
.667	55.9	2.000	.8	3.333	.3	4.667	.1	6.000	.0
1.000	18.9	2.333	.7	3.667	.2	5.000	.0		

RUNOFF VOLUME = 1.59988 INCHES = 3.1997 ACRE-FEET
PEAK DISCHARGE RATE = 108.07 CFS AT .533 HOURS

```
*COMBINE HG 2.14 WITH BASIN 2.5 HG AT UNIVERSITY BLVD          APS
ADD HYD            ID=2 HYD NO=2.54 ID=2 ID=3
PRINT HYD          ID=2 CODE=10
```

OUTFLOW HYDROGRAPH REACH 2.54

TIME	FLOW	TIME	FLOW	TIME	FLOW	TIME	FLOW	TIME	FLOW

WATERSHED MAP

FIGURE 2

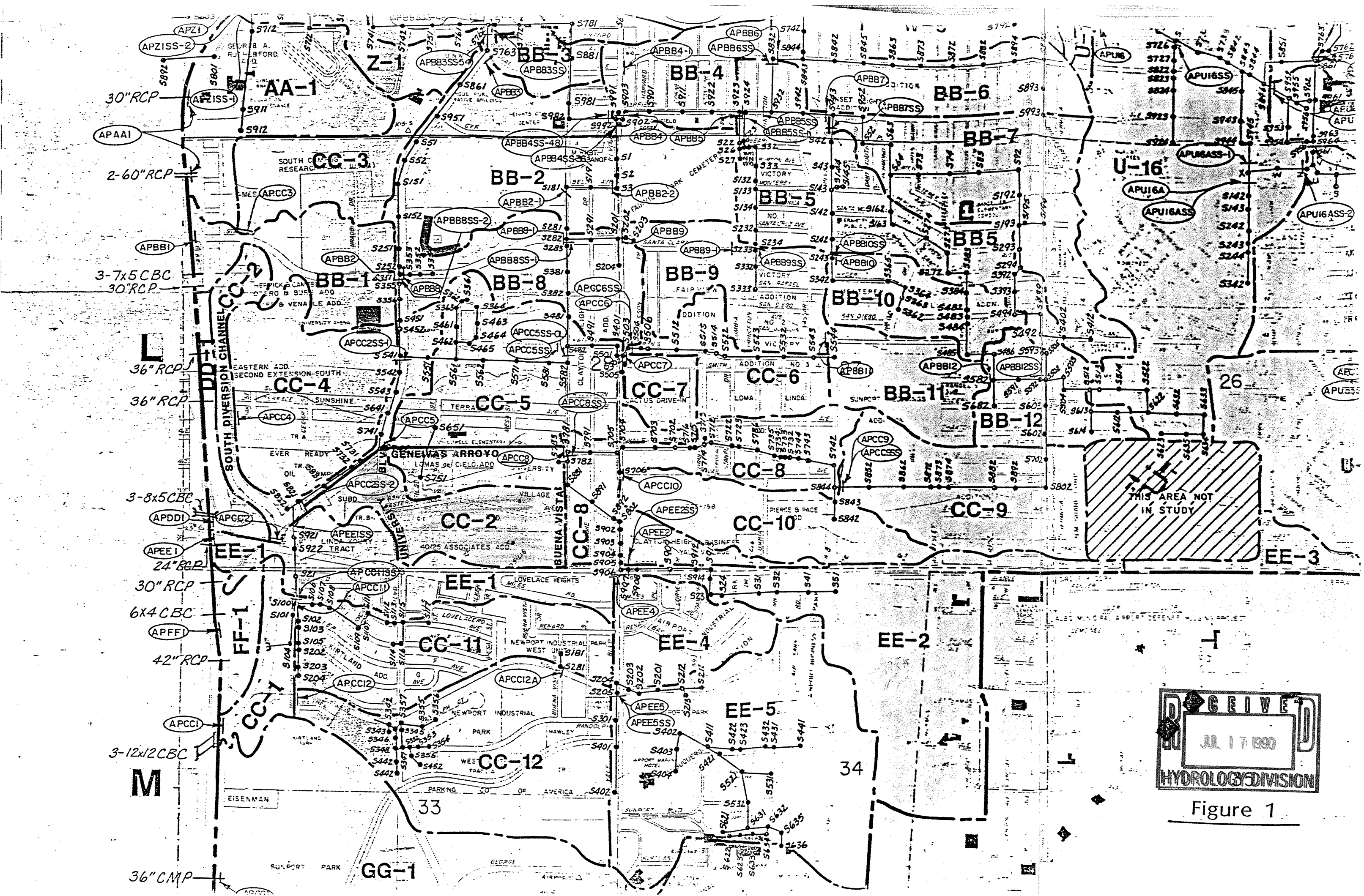

AA-1
Z-1
BB-3
BB-4
BB-6
BB-7
BB-5
BB-2
BB-1
BB-8
BB-9
BB-10
BB-11
BB-12
CC-3
CC-2
CC-4
CC-5
CC-7
CC-6
CC-8
CC-9
CC-10
CC-11
CC-12
EE-1
EE-2
EE-3
EE-4
EE-5
FF-1
GG-1
U-16
BB5
30"RCP
2-60"RCP
3-7x5 CBC
30"RCP
36"RCP
36"RCP
3-8x5CBC
30"RCP
24"RCP
30"RCP
6X4 CBC
42"RCP
3-12x12CBC
36"CMP
SOUTH DIVERSION CHANNEL
GENESIAS ARROYO
UNIVERSITY AVE
BUENA VISTA
APZ1
APZISS-2
APZISS-1
APAA1
APCC3
APBB1
APBB2
APBB8SS-2
APBB8SS-1
APBB8
APBB8-1
APBB2-1
APBB2-2
APBB4SS-48
APBB4SS-36
APBB4
APBB5
APBB3SS-54
APBB3SS
APBB3
APBB4-1
APBB6
APBB6SS
APBB7
APBB7SS
APBB5SS
APBB5SS-1
APBB9
APBB9-1
APBB9SS
APBB10SS
APBB10
APBB11
APBB12
APBB12SS
APCC6SS
APCC6
APCC5SS-1
APCC5SS
APCC2SS-1
APCC7
APCC8SS
APCC4
APCC5
APCC8
APCC2SS-2
APCC9
APCC9SS
APCC10
APEE2SS
APEE2
APEE4
APEE5
APEE5SS
APDD1
APCC2
APEE1SS
APEE1
APCC11SS
APCC11
APCC12
APCC12A
APCC1
APFF1
APU16
APU16SS
APU16A
APU16ASS
APU16ASS-1
APU16ASS-2
APU
THIS AREA NOT IN STUDY
RECEIVED
JUL 17 1990
HYDROLOGY DIVISION

Figure 1

DRAINAGE REPORT
UNIVERSITY PARK

The following items concerning the University Village Revised Conceptual Drainage Plan are contained herein:

1. Vicinity Map
2. Site Grading and Drainage Plan
3. Revised Calculations

A review of the Conceptional Grading and Drainage Plan dated 3-88 was completed including a field review of the flows and runoff pattern during the severe storm of 5-2-90. It was found that the flows into the North side of Eastern Avenue had been miss assigned and that the contours shown on the drawing were proper. All of the Eastern Avenue flows East of Ash Street were conveyed into the arroyo via the existing street drainage with inlets. The only flow from the North side of Eastern Avenue into University Blvd., was from one-half street accumulation from Ash Street to University Blvd.

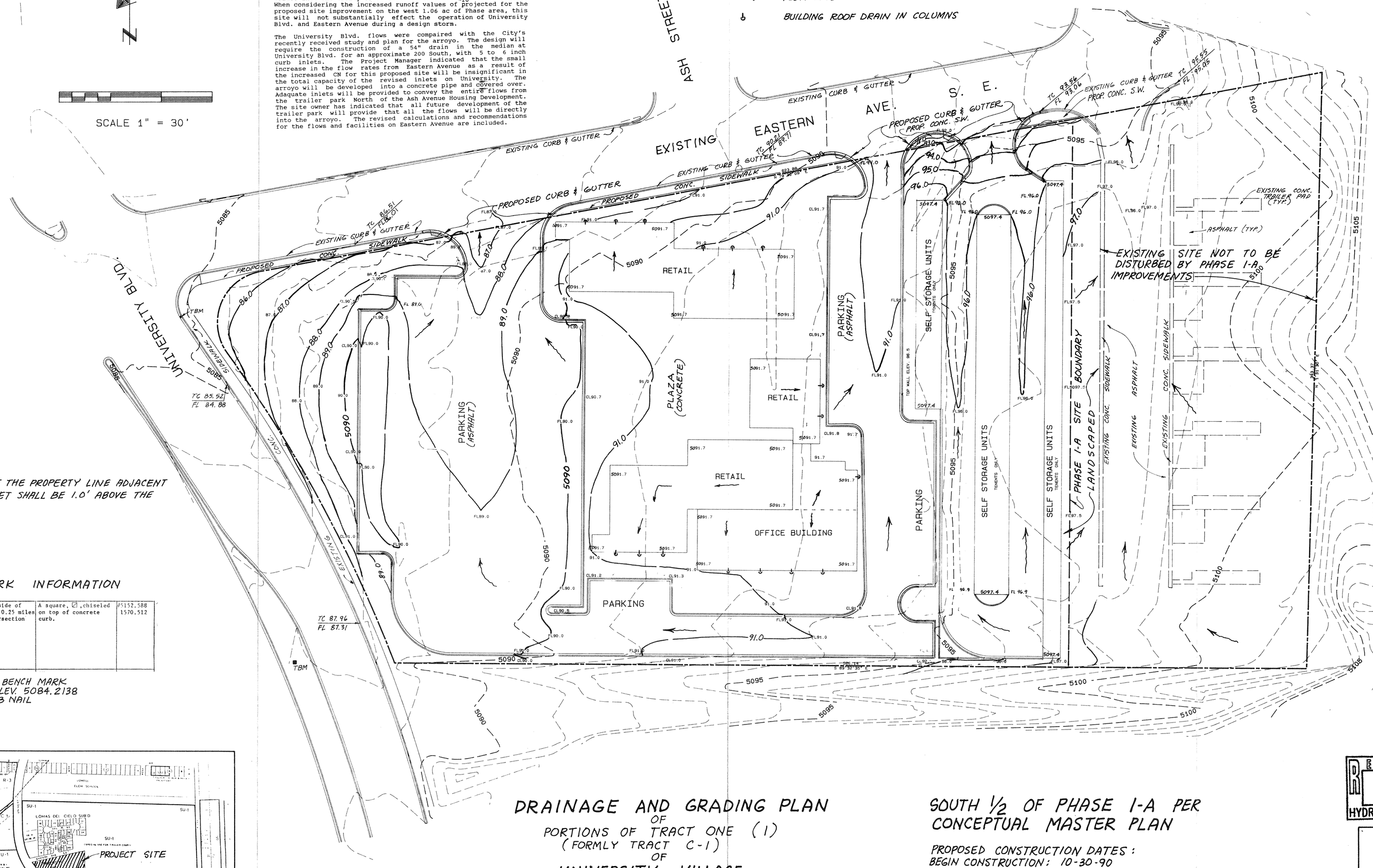
A review of the Conceptual Grading and Drainage Plan Calculations was made and the areas were adjusted to reflect the reduced flow from Basin 1 into University Blvd. No flow from Basin 2 was assigned to University Blvd. This reassignment of Q_{10} flow values into University Blvd. resulted in a net Q_{10} flow decrease. When considering the increased runoff values of projected for the proposed site improvement on the west 1.06 ac of Phase area, this site will not substantially effect the operation of University Blvd. and Eastern Avenue during a design storm.

The University Blvd. flows were compaired with the City's recently received study and plan for the arroyo. The design will require the construction of a 54" drain in the median at University Blvd. for an approximate 200 South, with 5 to 6 inch curb inlets. The Project Manager indicated that the small increase in the flow rates from Eastern Avenue as a result of the increased CN for this proposed site will be insignificant in the total capacity of the revised inlets on University. The arroyo will be developed into a concrete pipe and covered over. Adaquate inlets will be provided to convey the entire flows from the trailer park North of the Ash Avenue Housing Development. The site owner has indicated that all future development of the trailer park will provide that all the flows will be directly into the arroyo. The revised calculations and recommendations for the flows and facilities on Eastern Avenue are included.

LEGEND

- 5095 — EXISTING CONTOUR
- 5090 — PROPOSED CONTOUR
- 5091.0 — PROPOSED SPOT ELEVATION (BUILDINGS)
- FL 91.0 — PROPOSED FLOWLINE ELEVATION
- CL 91.0 — PROPOSED CURBLINE ELEVATION
- BOUNDARY LINE
- PROPOSED BUILDING
- TBM — TEMPORARY BENCHMARK AT MEAN SEA-LEVEL ELEVATION
- FLOW LINE
- BUILDING ROOF DRAIN IN COLUMNS

SCALE 1" = 30'

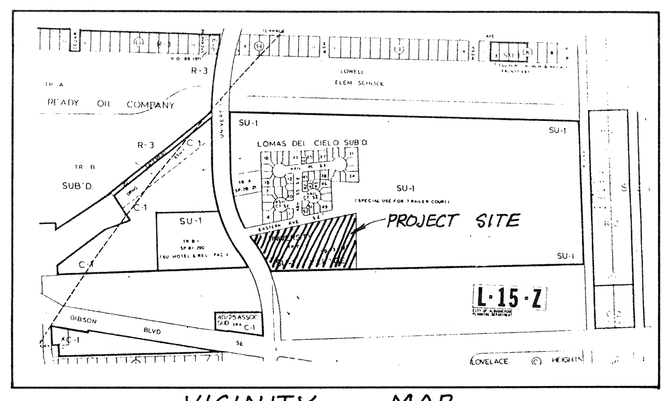


NOTE:
ELEVATION AT THE PROPERTY LINE ADJACENT TO THE STREET SHALL BE 1.0' ABOVE THE FLOWLINE.

BENCH MARK INFORMATION

S-L15	Located on northside of Gibson Blvd. SE, 0.25 miles west of the intersection with Yale Blvd.	A square, ☐, chiseled on top of concrete curb.	Y5132.588 1570.512

TEMPORARY BENCH MARK
PT# 488 ELEV. 5084.2138
TOP OF CURB NAIL



VICINITY MAP
(NOT TO SCALE)

DRAINAGE AND GRADING PLAN
OF
PORTIONS OF TRACT ONE (1)
(FORMLY TRACT C-1)
OF
UNIVERSITY VILLAGE
ALBUQUERQUE, NEW MEXICO
JULY 1990

SOUTH ½ OF PHASE I-A PER CONCEPTUAL MASTER PLAN

PROPOSED CONSTRUCTION DATES:
BEGIN CONSTRUCTION: 10-30-90
COMPLETE CONSTRUCTION: 6-30-91

ESTIMATED CONSTRUCTION DATES OF 54" PIPE AND INLET CONSTRUCTION ON UNIVERSITY BLVD. - 1-1-91 THROUGH 4-1-91

CALCULATIONS

Previous calculated flows in Eastern Avenue (3-88 Report) were as follows:

C = 0.70
% impervious = 67%
Composite CN = 78
DRO = 0.7

Phase I Q_{100} = 8.7 cfs V_{100} = 7.115 cf
Phase II Q_{100} = 11.8 cfs V_{100} = 9655 cf
Phase III Q_{100} = 15.8 cfs V_{100} = 12960 cf
Phase IV Q_{100} = 31.1 cfs V_{100} = 25560 cf

Stree Capacity Analysis was:

Q_{100} = 8.7 + 11.8 + 15.8 + 31.8 = 67.4 cfs
Q_{10} = (0.675)(67.4) = 44.3 cfs
Width of street 34'
S = 0.019
X-Slope = 0.025
Lane Width 7.11
$Q = \frac{1.49}{n} AR^{2/3} S^{\frac{1}{2}}$ = 45.2 cfs > Q_{10}

However, upon examination of the area, we found that only the area encompassing Phase I and the southern parts of Phases 3 and 4 were draining into University Blvd via Eastern Avenue. All of Phases 2 and 5 and the northern parts of Phases 3 and 4 were draining north into the arroyo via the existing street system and inlets.

The Eastern Street capacity was recalculated as follows:

Developed Conditions
Phase I

A_{total} = 121,968 sf = 2.8 ac
C = 0.70 (Weighted average per Conceptual Plan, 8/29/86)
Q_{100} = CIA = (0.70) (4.42) (2.8) = 8.7 cfs
% Impervious = 67%
Composite CN = 78 (DPM Plate 22.2 C-3)
DRO = 0.7 in (DPM Plate 22.2 C-4)
V_{100} = 3630 (DRO)A = 7,115 cf

Phase III
South of Centerline of Eastern Ave SE

Total Area 5.1 ac - 1.9 ac = 3.2 ac
C = 0.70 per Drainage Plan approx. 4-88
Q_{100} = CIA = (.7) (4.42) (3.2) 9.9 cfs
% Impervious 67%
Composite CN = 78
DRO = .7
V = 3630 (.7) 3.2 = 8130 cf

Phase IV
East of Proposed Shopping Center (off plat area)

A_{total} = 6.14
C = .70
Q_{100} = CIA = (.7) (4.42) (6.14) = 19.00 cfs
% Impervious = 67%
Composite CN = 78
DRO = .7 in
V_{100} = 3630 (DRO) (6.14) = 15600 cf

Phase IV
East of Proposed Shopping Center Site (offsite contrubution) (platted area)

A_{total} = 1.06 ac
C = .7
Q_{100} = CIA = .7 (4.42) (1.06) = 3.28 cfs
Composite CN = .78
V_{100} = 3630 (.7) (1.06) = 2700 cf

Proposed Shopping Center Site Contribution

	%	CN	imp
A_{total} = 124,582 sf = 2.86 ac			
C = Buildings = 25,875 sq. ft.	21	.90	.19
Parking & Streets = 57,480 sq. ft.	46	.95	.44
Sidewalks = 15,970 sq. ft.	13	.90	.12
Lawn & Landscape = 24,880	20	.25	.05
			.80

Previous CN = .78
Composite CN = .92 with 80% impervious plate C-2
T_C = 10 min. per minimum requirement

I_{actual} = 1/6 x rainfall = 2.27 x 2.35 = 5.33

Q_{100} = CIA = (.92) (5.33) (2.86) = 14 cfs
DRO = 1.4 Plate C-4
V_{100} = 3630 (1.4) (2.86) = 14534 cf

Present Eastern Avenue Street Capacity Use

Q_{100} = 8.7 + 9.9 + 19.0 + 3.28 + 14.02 = 54.90 cfs
Q_{10} = (0.657)(54.9) = 36.01 < 45.2 street capacity

HYDROLOGY APPROVAL & INSPECTION
APPROVED FOR BUILDING PERMIT
ENGINEER Barney Motley DATE 7/30/90
INSPECTION REQUESTED DATE
APPROVAL DATE DISAPPROVED
FINAL APPROVAL DATE
INSP. DATE
ACCEPTED BOOK NO./PAGE NO.
ACCEPTED BY
REMARKS

HAROLD L. BENNETT
NEW MEXICO
10776
7-17-90
REGISTERED PROFESSIONAL ENGINEER

RECEIVED
JUL 17 1990
HYDROLOGY DIVISION

CLINT SHERRILL & ASSOCIATES
729 SAN MATEO NE, ALBUQ., NM
87108
(505) 256-7364 (505) 256-7600

UNIVERSITY VILLAGE
DRAINAGE PLAN SITE 1 UNIVERSITY & EASTERAN SE

ENGINEER: H.L. BENNETT	PROJECT NUMBER 89 P 56
SURVEYOR: CLINT SHERRILL	
REVISION DATES: 7-17-90	
	SHEET 1 OF 1